WOODHEAD PUBLISHING INDIA IN TEXTILES

Encyclopaedic Dictionary of Textile Terms

Volume II

Mathews Kolanjikombil

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Preface

It has been told the first thing that a business man should know, is—the little things of his business. This book is meant for textile personae, be it a textile student, textile chemist, a spinner, a weaver, garment maker or a merchandiser who may be an expert in his/her field but he/she may come across many terms in his/her day to day business which he/she is not familiar with but is related to his/her field which he/she should know, but nine times out of ten does not know. He/She may not have an expert in that field of that term near him/her to clear his doubt about that term. This book comes handy in such circumstances.

There is nothing scholarly in this book, but is a compilation of short easy understandable meanings of the textile terms enough to help the referrer to understand the term. I have come across dictionaries which gives the meaning of the textile terms in one sentence. But it may not be sufficient to give a full idea about it. But this book is a little different. The meaning of the terms is explained in a concise manner even with the help of diagrams or photos, wherever necessary, which is enough to clear his/her doubts. These terms and meanings have been collected right from my college days and throughout my career. I believe it is not complete, but, such as it is, the compilation is reliable. There are further terms which are being collected by the author which will be added in the next edition, probably. The author believes that he has produced a book which may be profitably consulted by all who are either interested or practically engaged in textile trade.

It has to be specially mentioned that students can use the present book as a reference guide for his/her immediate needs without going to many textbooks. For detailed study of any terms he/she can further refer to books specialized in that field. I may not suggest this book for a research student. The author has also tried to explain the construction of many fabrics new or old for general knowledge.

Hope this book will be greatly accepted by textile personnel. Any suggestions or corrections are welcome, which will be included in the next editions.

Mathews Kolanjikombil

Senior Textile Processing Technologist

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Dedication

This book is dedicated to my Father (Thomas Abraham) and my Mother (Thankamma Abraham) who solely made me what I am today.

D

D and K: Short form for Damaged and Kept. Denotes lengths of fabrics spoilt in processing.

D/Y ratio: The ratio of speed of movement (D) of a friction surface or surfaces in a friction spindle used in false twist texturising to the axial speed (Y) of untwisted yarn

D65: The CIE standard illuminate that represents a colour temperature of 6504K. This is the colour temperature most widely used in graphic arts industry viewing booths. See **Kelvin (K)**.

D: (1) Symbol for: (a) Debye; (b) Dielectric constant; (c) Diffusion coefficient; (d) Deuterium.

(2) (a) Unit prefix for Deci- (one tenth), factor 1/10; (b) Abbreviation for dextrorotatory (optical activity).

DA: Dye accessible. The term is used, for e.g., in connection with the bilateral structure of the cortex cell layer in wool (paracortex/orthocortex).

Da: Symbol for deca- (prefix indicating 10, as in decametre), factor 10.

Daba: A coarse, plain woven, unbleached cotton fabric, made in Asia.

Dabbing: Faults in silk fabrics with a brushed face (white or mealy marks) are rendered invisible by dabbing with a felt pad lightly impregnated with paraffin oil. Also on Dabbing machines.

Dabbing machine: Machines used for Dabbing. Dabbing is done continuously or intermittently by oiled felt rollers of these machines which are traversed by a cam mechanism across the cloth. Once an area has been treated the cloth moves on. See also **Dabbing**.

Dabbing print: Surface printing in the form of a stamp for printing industrial textiles using pigment printing, e.g. trademarks on drive belts and carpet backing. If necessary, the substrate to be printed should be pre-treated with primers (adhesion agents) or by corona treatment in order to overcome the polymer incompatibility between the substrate and the pigment printing binder.

Dabouis: The Indian name for a narrow, bleached cotton cloth made in eastern India; used for calico.

Dacca: Silk; Embroidered silk.

Dacca twist: Fine English plain or twilled calico; used for sheets, underwear, etc.

Dacey: Coarse wild silk, produced by an East Indian silk worm from six to eight times a year.

Dacron: The trade name for an American polyester fibre. Trade name of a polyester fibre. As with any other polyester it can be blended with various fibres. As blends or pure fibre it dyes well and also bleaches well. Used in the manufacture of various dress material or as furnishing filling pillows, etc. Since it is a hydrophobic fibre, it washes well and drip dries.

Dado: A usually two-coloured, printed cotton; used for wall hangings in Italy; usually has a cream ground.

Dagges: Used in gothic period, a cut out or a sewn – on flaps of fabric at the edges of a garment.

Daghestan rugs: Made in Caucasia; the web and the short and close pile being of wool and tied in Ghiorde's knot; warp and weft in wool. The warp thread, which is often quite thick and brown in colour, can easily be seen on the back of the rug. The medium deep pile is of good quality, but the wool is lustreless. The field is completely divided into fairly narrow diagonal bands (5–10 cm wide) of different alternating colours. The most frequently used colours are blue in various shades, yellow, white and a faded green. These bands are closely decorated with small squares of different colours. At opposite corners of each square is a hooked motif. The decoration of these bands is completed by stylized roses or eight-pointed stars scattered in haphazard fashion. The ground colours are red and blue. The Turkish knot is used with a density of approximately 1,50,000 knots per m2. The design is almost always geometrical, mosaic patterns with many angular hooks being used in blue, red, yellow and ivory colours without any shading. Both ends are finished with a narrow selvage and knotted fringe; the sides are finished with a very narrow coloured selvage.

Dags: Parts of the fleece, consisting of matted fibres and dirt.

Daisy stitch or detached chain stitch: Works in the same way as chain stitch, but fashions each loop at the foot with a small stitch. This stitch may be worked singly or in groups to form flower petals.

Daka: Unbleached cotton muslin, made in Turkestan; the finer grades are used for turbans, the coarser for lining.

Dalecarlian lace: Very strong Swedish bobbin lace, made and worn by the peasant as starched ruffles. It is of buff colour.

Dalmatian lace: Coarse, narrow bobbin lace, made in Dalmatia, Austria, by the peasant women.

Dalmatic: Unbelted outer robe, for the ruling classes of the ancient Roman in Byzantine period with wide arms and coloured lengthways straps.

Dalzell: A Highland tartan, composed of green stripes over red ground, split with white narrow lines.

Damage factor (S): It is used to assess the effects of chemical treatments on cellulosic textile goods. It is calculated from the average Degree of polymerization (DP) before and after the treatment. The damaging effect of any treatment on celluloses with different degrees of polymerization can be compared through the damage factor (S) which is calculated with the following formula:

$$S = \log \{(2000/DP2) - (2000/DP1) + 1\}3.3219$$

Where, DP1 = average degree of polymerization of the material being tested before the damaging treatment; and DP2 = average degree of polymerization after the damaging treatment

Damajagua or Majagua: A fine, strong cloth-like bast that is yielded by a species of the mellow in South America; used for baskets, clothing and ropes.

Damaged feathers: The feathers that have been broken, damaged by insects, by mildew or rot, or otherwise materially injured.

Damaged selvage: See **Cut selvedge**.

Damas: French for damask.

Damascaffard: Tapestry damask, made of wool, silk waste, cotton, etc., and given a high finish on the face.

Damas chine: French silk damask dress goods, made with printed warp.

Damasen Dorure: French silk damask with gold flower designs.

Damaslisere: Silk damask, the Jacquard design being outlined in gold.

Damascene lace: Made of sprigs and lace braid joined with corded bars without any fillings. It is a modern adaptation of the Honiton pillow lace.

Damask: A very old type of fabric first made of silk in damascus. Elaborately woven on a Jacquard loom, the fabric has satin floats on a warp satin background. The surface designs run in the opposite direction from those in the background. It is now woven in different fibres and different weights and is mostly used in furnishings. Made with large weaving patterns on jacquard looms, it comes bleached. A guideline construction is 72 × 72 using 26s warp and weft. The 5 harness satin weave is usually used. In very fine damask

construction, a face and back warp and 7 harness satin weave may be used. Such fabrics are called double damask. It comes in dyed shades also. Used as table linen, towels. It is rarely found now as a dress fabric. Most damask is self-toned, that is the warp and weft are in the same colour; the design creates the interest. Similar to brocade, but flatter and reversible, damask is used for napkins, tablecloths, draperies, and upholstery.

Damask satin: Double satin, the ground and the figures formed by warp and weft satin.

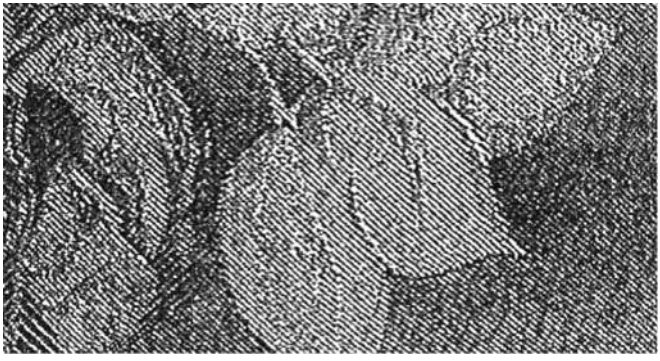
Damask stitch: In embroidery, a variety of ***Satin stitch,*** it takes in four horizontal threads of foundation or two stitches in a slanting direction and over two upright threads. The remaining second lines of the damask stitch are taken over the two lower threads of the upper line and two new threads instead of all the threads being new.

Damask (false): If a four-shaft broken twill structure is used in two blocks formed by areas of 1/3 twill next to areas of 3/1 twill, all woven in a broken treadling, then the cloth is called false damask or twill damask. The twill for false damask may be broken by way in which the blocks are threaded or by changing the treadling order.

Damask (twill): See **Damask (false)**.

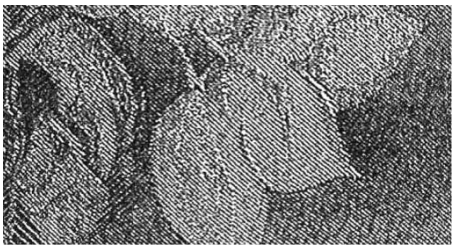
Damasquette: An 18th Century silk brocade of Venice, showing floral designs in gold thread which was rolled out flat under heavy pressure, after taken from the loom, forming a continuous gold surface.

Damasse': (a) French shawl, made with combed wool warp and filling with large flower designs; (b) French for fabrics having both the ground and the large patterns woven in satin weave but of various coloured or lustred yarn; (c) In French, general term for fabrics woven on a Jacquard loom. See also **Ouvre**.



Damassin: Brocade or damask fabric with gold or silver patterns woven in to it. Originally from Venice of 17th century, later made in France. The gold or silver threads are flattened-out (after the weaving) under heavy pressure, forming the design in a continuous surface.

Damask (woven pattern): Damask is a fine filament woven cloth, which is made by Jaquard-weaving machines (loom). There are floral and graphic patterns with glossy and dull areas possible. Damask is a high-quality decoration cloth with a wide range of use. All fibres can be used.



Damier: French for large square checks in solid colours.

Damp wool: Wool that has become damp or wet before or after bagging and may mildew. This weakens the fibres and seriously affects the spinning properties.

Dampening (tyre cord): The relative ability to absorb energy and deaden oscillation after citation.

Damping cloth: A piece of absorbent fabric which is wetted and laid over a garment during pressing so as to improve the press ability of the fabric/ garment.

Damping of textiles: Damping of textiles are done at various stages of processing either to help in the particular process in various ways such as lubricants, or as a participants in a reaction or sometimes as a catalyst. Example: The dampening of the fabric before sanforizing, whereby the moisture on the fabric help in slippage of the yarn which in turn help in the shrinkage of the fabric.

Dancer roll: See **Compensator roll**.

Danish cloth: Plain woven, stout cotton dress goods that are made in solid colours and slightly sized.

Danish embroidery: The lace-like white embroidery on the edges of handkerchiefs.

Doublet: Term for the men's close-fitting buttoned jacket worn over the shirt and under the coat or as an outer garment; used in gothic and renaissance period.

Darale: East Indian unbleached cotton fabric having a red stripe parallel with the selvage; used for garments by the native women.

Dardanelles canvas: Coarse Turkish canvas; used for sails and farmers' suits.

Dari: Thick, coarse and very durable and washable woven cotton carpet of small dimension; made in India.

Darida: Indian cloth, made in various colours of vegetable fibre, not common now a days.

Darin: A canvas fabric once made in France using coarse hemp yarn.

Darned lace or darned netting: Plain square or other net used for ground Roseau and is decorated with stitches, also called open lace Siena point and point Conte; in the latter, the stitches being counted.

Darnet: A French wool and silk fabric of the l0th century, brocaded with gold.

Darning: The filling up of holes, rents, etc., in textiles by means of forming a new texture with the thread and needle. Darning can be done on machine or by hand.

Darning needles: These hand-sewing needles are large needles with very large eyes. Wool darners are used when working with heavy fibres, wide ribbons and wool darning yarns. Sizes 14–19 for wool and 1–9 for cotton are available.

Dart: A wedge or diamond shape removed from the surface of a garment part by stitching or by cutting and stitching to contribute to the shape of the garment.

Dart (cut-in): An open dart cut in approximately 12" under the armhole.

Dart (front or double): An additional closed dart located toward the front edge of the garment, used to get maximum waist suppression.

Dart (panel): A panel sewn full length to the front that is used for waist suppression.

Darya: A rough faced, stout, natural coloured fabric, made of wild silk in East India.

Daryai: See **Amritsar silk**.

Dazwischen: German name for a type of curtain fabric. See **In between**.

Date palm: These leaf fibres are used for ropes, bags, hats, etc., in Asia Minor.

Datil: Leaf fibres yielded by a species of the cocoanut palm in Brazil; used for baskets, hats, etc.

Dauglin: Coarse Philippine fibre; used for cordage.

Davidson: A Highland tartan composed as follows over a dark green ground – the stripes running both warp and weftwise; a group of black stripes with two narrow stripes at the edges and a wide bar between, the latter split by a narrow strip of red in the centre; a bar of dark green, about the width of the 'black group, split in the middle with a black stripe (of the same width as the edge stripes in the black group) ; a group of navy stripes, of the same dimensions as the black, the centre bar likewise split by a red stripe; followed by a green bar as above and repeat.

Daylight colour: The colour or shades as seen in the daylight. Since the shade has to be seen at any time or anywhere, daylight tubes are used which give almost the daylight effect artificially. For example: D65 lights.

Daylight illuminants (CIE): Series of illuminant spectral power distribution curves based on measurements of natural daylight and recommended by the CIE in 1965. Values are defined for the wavelength region 300–830nm. They are described in terms of the correlated colour temperature. The most important is D65 because of the closeness of its correlated colour temperature to that of illuminant C, 6774K. D75 bluer than D65 and D55 yellower than D65 are also used.

Daylight lamp: See **D65 lamp/light.**

dB: Decibel. See **Sound level**.

DD: Differential dyeing.

D.D.: American abbreviation on textile care labels for drip drying (hang only). Applies to the garments made from self-smoothing fabrics.

DDT [dichlorodiphenyltrichloroethane; $(ClC_6H_4)_2CH(CCl_3)$]: Acolourless crystalline organic compound that was once widely used as an insecticide. It is very stable and tends to accumulate in the soil, and passes up the food chain to accumulate in the fatty tissues of carnivorous animals. Its systematic name is 1,1-bis(4-chlorophenyl)- 2,2,2-trichloroethane.

De Fundato: Medieval silk, dyed purple and having a gold net pattern.

De-aereation: Removal of all undissolved gasses and part of the dissolved gases from spinning liquor before extrusion.

Dead cotton: (1) A small nep of cotton fibres which is gathered on the surface of the fabric and which is different in colour from the surrounding fabric.

(2) An extreme form of immature cotton with a very thin fibre wall. These fibres are usually weak, brittle, and lacking in twist or convolutions which easily forms 'neps' and it lacks in lustre which gives the 'dead' appearance especially after dyeing.

Dead frame yarn, in the Wilton type pile floor covering: Yarn of the same fibre composition as the pile yarn that is included in the backing and which never appears in the face of the floor covering.

Dead time: Dynamic parameter of transfer elements in automation systems; the time between turning on an input signal in a system at rest before the output signal begins to alter distinctly (for humans: reaction time).

Dead wool: Wool taken from sheep that have died of natural causes.

Dead yarn: The pile yarn in a multi-frame Wilton carpet which lies completely flat in the substrate and is not being raised by the jacquard mechanism.

Deanionised water: Water treated by ion exchange so that the anions (e.g. NO^{3-}) have been removed.

Deareation (in spinning): The removal of all undissolved gases (bubbles) and part of the dissolved gases from spinning liquor before extrusion to avoid any problem while extrusion and fibre formation.

Dearing: A late maturing commercial variety of cotton, yielding very large percentage of lint; the staple measures 20–25 millimetres.

Debage: French dress fabric, made with lustre wool warp of natural colour and dyed woollen filling.

Debuani: Native East African trade name for cotton fabrics, woven with red, yellow, black, or blue stripes, borders or checks; used for turbans.

Deburring: A process in wool yarn manufacturing for extracting burrs, seeds and vegetable matters from raw wool. Deburring is done mechanically on a burring machine.

Deca-: (Gk.: *deka*= ten). Unit prefix denoting ten times = 10; e.g. 1 daN = 10 N.

Decarbonation: The process of removing CO_2 from water typically using compact towers or air scrubbers.

Decating: The American word for Decatizing. See **Decatizing**.

Decating mark: A crease mark or impression extending weftwise across the cloth near the beginning or end of the piece. See **Apron mark, leader mark**.

Decationised (decationized) water: Water treated by ion exchange so that the cations (e.g. Ca^{2+}) have been removed.

Decatising: Same as Decatizing. See **Decatizing.**

Decatizing: Decatizing is normally the last finishing process for some fabrics. It is a method of steaming fabric between two layers of cotton press cloths. The process is used to: (a) Improve the hand and drape; (b) Brighten the colours and enhance natural lustre, assist in setting the finish or refinish fabrics after sponging or cold water shrinkage. Decating is a normal step for many wool and wool blend fabrics. It is an effective mechanical softening treatment resulting in a luxurious, soft and smooth handle. The process involves the fabric to be wound over a perforated cylinder and pass the steam through it from inside to outside or outside to inside. The process is also effective on acetate, acrylic, rayon, spun polyester and other synthetic blends.

Decatizing, fastness to: Resistance of the dye/dyeing to decatizing operation. Wind a sample sandwiched between cotton-cloth brushed on both sides around a perforated decatizing cylinder through which dry saturated steam is blown for 15 min; a) light decatizing factor: steam pressure 147 kPa, temperature 110ºC; b) intense decatizing factor: steam pressure 245 kPa, temperature 127ºC. Dry specimen in warm air (< 60ºC). Simultaneously test dyed reference fabric. When assessing the dyed reference fabric using the grey scale, light decatizing should result in yellowing to grade 4, and intense decatizing yellowing to grade 3, which is more yellow.

Dechets: French for silk waste.

Dechlorination: (a) Removal of excess chlorine after chlorination, usually by adding sulphur dioxide

$$HOCl + SO_2 + H_2O = H_2SO_4 + HCl$$

Where, sulphur dioxide is not available sodium thiosulphate can be used; (b) The addition of a chemical to soil from contaminated land in order to remove or destroy organochlorine compounds. It has been used to treat soils contaminated with ***PCBs***.

Decibel (dB): A customary logarithmic measure most commonly used (in various ways) for measuring sound. The human ear is capable of detecting an enormous range of sound intensities. Furthermore, our perception is not linear. Experiment shows that when humans perceive one sound to be twice as loud as another, in fact the louder sound is about ten times as intense as the fainter one. For this reason, sound is measured on logarithmic scales. Informally, if one sound is 1 bel (10 decibels) “louder” than another, this means the louder sound is 10 times louder than the fainter one. A difference of 20 decibels corresponds to an increase of 10 × 10 or 100 times in intensity. The beginning of the scale (0 decibels) can be set in different ways, depending

on exactly which aspect of sound is being measured. For sound intensity (the power of the sound waves per unit of area) 0 decibels is equal to 1 picowattper square meter; this corresponds approximately to the faintest sound that can be detected by a person who has good hearing. A quiet room has a normal sound intensity of around 40 decibels, ten thousand times louder than the faintest perceptible sound, and a thunderclap may have an intensity of 120 decibels, a trillion times louder than the faintest sound. For sound pressure (the pressure exerted by the sound waves) 0 decibels equals 20 micropascals (μPa) RMS, and for sound power 0 decibels sometimes equals 1 picowatt. In all cases, one decibel equals about 0.115 129 neperand *d* decibels equal *d*(ln 10)/20 nepers. See also **dB-**.

Decigram (dg): A metric unit of mass equal to 100 milligrams or about 1.5432 grains.

Deciliter (dl or dL): A common metric unit of volume equal to 0.1 litre or 100 cubic centimetres. A decilitre contains 6.10237 cubic inches, 3.38140 US fluid ounces, or 3.519 British fluid ounces. The decilitre is similar in size to the gill, an old English unit of volume.

Decimetre (dm): A fairly common metric unit of distance equal to 10 centimetres or 3.9370 inches. The decimetre is very close to the hand, a traditional English unit.

Decitex (dtex): A common metric unit of yarn density equal to 0.1 tex, 0.9 denier, or 0.1 milligram per metre. This unit was previously called the **drex**.

Deco: Designs popular on 20s and 30s with bold outlines and streamlined shapes.

Deconvolution index: According to Calvert and Clibbens, this is the criterion for assessing mercerization. It is determined by counting out approximately 800 fibres (0.1–0.2 mm long) under a microscope. The percentage number of fibres with no twist corresponds to the deconvolution index. Assessment: 9–15 = unmercerized cotton, 60–70 = mercerised cotton (for piece goods, 25–40, usually fewer in the weft direction than in the warp direction).

Decorative fabric: A broad class of fabrics used for drapery, upholstery, etc, in the field of interior decoration. Any fibres may be employed in decorative fabrics, such as cotton, silk, wool, man-made fibre, linen, plastics, and all weaves are used as well as printing, embossing etc.. Popular decorative fabrics include tapes tries, damasks, cretonnes, chintzes, brocades, tweeds etc.

Decorative seams: This is the first of the two classes of seam, which, in the old British Standard, were not regarded as seams at all and were given the name ‘stitching’. The main use of the seam is for decorative sewing on garments

where multiple rows of stitches are sewn through one or more layers of fabric. These several layers can be folds of the same fabric. The simplest seam in the class has decorative stitching across a garment panel. One row would have little effect but multi-needle stitching is common. The main decorative seams are:

(a) *Channel seam*: Channel seams are used as decorative seams in skirts, blouses, dresses, suits, coats and children's clothes made of heavy- or medium-weight fabrics. Pin and machine-tack on the seamline, leaving one long thread at each end. Press as stitched and then press the seam open. Clip the machine tacking on one side at four or five stitch intervals. Cut an underlay of the same or contrasting fabric 2.5 cm (1 inch) wider than the two seam edges. Working from the wrong side, centre the underlay over the seam and pin in position. Tack from the right side, stitch along each side an equal distance from the seam depression. The distance may be from 6.0 to 1.2 cm (1/4 to 1/2 inch), gauge the distance with the presser foot – if more than 6 cm (1/4 inch), mark both stitching lines with tacking Remove the machine tacking by pulling the long thread, and remove any short threads that are visible with tweezers.

(b) *Slot seam*: The slot seam is desirable when one would like to add a strip of fabric in a matching or contrasting colour to the garment. This also adds a little bit of "spice" to an otherwise plain seam. Sew a plain seam with a basting stitch. Press the seam open. Cut a strip of matching or contrasting fabric, the same width as the two edges. Lay the strip in place as illustrated. Pin if necessary. Turn the garment over with correct side of fabric up (with strip still in position). Using the presser foot as a guide, stitch 1/4 inch away from seamline with a regular machine-stitch. Repeat on opposite side seamline. Press the seam in place. Remove the basting stitch.

(c) *Corded seam*: The corded seam is a decorative seam or edge and can be used as a design feature on your garment. Place one piece of fabric on the sewing table with correct side up. Place raw edge of cording even with even edge of fabric. Place second piece of fabric with correct side down over cording with allowance edges even. Using a cording foot (or zipper foot) stitch along the edge of cording (stitch on the seamline).

(d) *Piped seam*: Piped seam is a decorative seam in which an additional component or piping is inserted between the two layers of fabric preferably of different fabric or material just to add an additional feature in the garment.

(e) *Fagotting*: Fagotting is a decorative seam which is done by hand. Here two folded edges of different pieces are joined together by Herringbone stitch or other decorative stitch with same coloured embroidery thread as the colour of the fabric.

Decorative stitching: The sewing of thread to accent a pocket, collar or some other part of the garment. Usually, this thread is a different colour than the body fabric.

Decorticating: A mechanical process for separating the woody matter from the bast fibre of such plants as ramie and hemp.

Decoupe: Extra yarn patterns from which the long floats have been cut out.

Decortication of polyester: This treatment is aimed at providing a silky-smooth hand to polyester fabrics (a few years ago this process was also used to obtain microfilaments by increasing the fibre fineness), a lustrous effect and an enhanced drapability. The best results can be obtained with fabrics produced with coarser yarns. The open-width decortication process can be carried out on jiggers or beam dyeing machines; rope decortication is performed on jet or overflow systems (batch systems). Decortication is carried out after scouring and heat setting; it is better to carry out a heat setting treatment also after the decortication process. Operating conditions applied: the process is carried out at a temperature varying from 90–95°C to 120–130°C for 20–35 minutes, with 30–50 g/l of NaOH 36°Bé. Once the process has been completed, the fabric is washed and neutralised.

Decrease: In bobbin lace, knitting, crocheting decrease means diminishing the patterns by using less stitches or loops.

Decrystallised cotton: Cotton treated with zinc chloride, caustic soda, etc., to reduce the degree of crystallization.

Dehbid: Persian all-wool knotted rugs, similar to Kermanshah, but of inferior quality.

Deep dyeing: The fibres which have higher dye uptake than the normal fibres when dyed together.

Deep dyeing variants: Polymers that have been chemically modified to increase their dye ability. Fibres and fabrics made therefrom can be dyed to very heavy depth.

Deep emboss printing: Coloured embossed finishes in which the embossing roller on the embossing calendar operates simultaneously as a printing roller. Immediately before embossing, the upper areas of the heated relief roller are supplied with dye paste by means of a colour embosser situated at the cloth

entry end and this paste then spreads straightaway into the embossed, deep parts of the fabric.

Deep dyeing fibres: See **Deep dyeing**.

Deep embossed finishes: See **Embossed deep finishes**.

Deep pinning: Conspicuous pin-stenter marks in the body of the fabric (i.e. clear of the selvedge), and that therefore reduce the usable width of the fabric.

Defect: Specific for inflatable restraints, an imperfection in a cut piece of the fabric that judgement and experience indicate is likely to result in either hazardous or improper deployment of the inflatable restraint module in which the imperfection is incorporated.

(a) *Article* – A fault that reduces the ability of the article to perform its intended function or if it were to appear in a prominent position in the article, would readily be seen and objected to by an ordinary person who might contemplate purchasing the article in a retail shop.

(b) *Fabric* – A fault that if it were to appear in a prominent position in a garment or manufactured article made from the fabric, would readily be seen and objected to by an ordinary person who might contemplate purchasing such a garment or manufactured article in a retail shop.

Defect (in sewing): It refers to a quality imperfection found in the thread. Thread defects include – slubs, knots, neps, slack twists, corkscrew twists and single kinks.

Defective: A description of a unit or group of a unit that does not meet the unit or group tolerance. A test sample or a test specimen or a set of test specimens which fail in one or more respects to comply with the relevant requirements of the specification or standard reference sample.

Defects (in inspection and grading): The departure of non-conformance of some characteristics from its intended level or state.

Defibrillation: Individual fibres can become partially separated from the yarns that make up a fabric, poking up and degrading the appearance of the fabric. Fibrillation can result from long wet processing, especially if agitation is vigorous. With cellulose fibres, *cellulase* enzymes are now commonly used to remove fibrils from dyed garments by a process called bio-polishing.

Defoamers: Chemicals or auxiliaries used for reducing the foam developed in a process due to any reason. Silicones are good defoamers, but with disadvantages. Now a days, many defoamers are developed - both organic and inorganic.

Deformation: A change of shape of a material caused by forces of compression, shear, tension or torsion. Deformation may be immediate or delayed and the latter may be recoverable or non-recoverable.

Deformation (delayed): Deformation which is time dependent and in exhibited by material subject to a continuing force.

Deformation (immediate elastic): Recoverable deformation which is essentially independent of time.

Deformation (in testing): A change in the shape of a testing specimen.

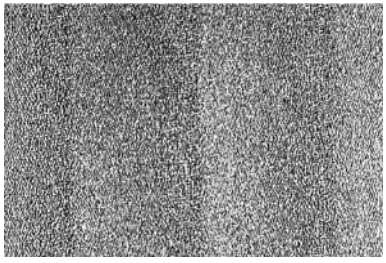
Deformation (permanent): The net long term change in dimension of a specimen after deformation and relaxation under specified conditions.

Degasifiers: Gases, such as carbon dioxide, can readily be stripped from water by passing the water down a tower with air being forced up through the tower.

Degradation: The loss of desirable physical properties by a textile material as a result of some processes or physical/chemical phenomenon.

Dégradé: (1) An ombré effect with alternating light/dark zones, where the shade gradually changes in contrast to the uninterrupted dark/light/dark sequence (ombré). Such effects can be achieved by interlacing suitably dyed yarns or alternatively by liquor feed pipes which have holes of varying diameter. These enable dye liquor and water to flow into the trough of the padding machine and create a variable dyestuff concentration in the trough.

(2) Reductions in tonal strength of colour.



Degreasing: (a) The removal of grease and other extraneous matters by an aqueous or solvent process. E.g., Degreasing of rotary screens; (b) The removal of natural fats waxes, grease, oil and dirt from any textile material by extracting with an organic solvent.

Degree (° or deg): (1) The standard unit of angle measure, equal to 1/360 circle, 60 minutes, 3600 seconds, or about 0.017 453 293 radian. So far as we know, this unit was introduced by the Greek geometer Hipparchus of Nicaea (ca. 180-ca. 125 BC), who developed the first trigonometric tables.

(2) Any of the various units of temperature. In the United States of America, the unmodified unit "degree" generally means the degree Fahrenheit; in other countries, it means the degree Celsius.

(3) A unit measuring the hardness of water. Water is called "hard" if it contains a high concentration of mineral salts, especially calcium carbonate. This concentration can be expressed clearly in parts per million (ppm) or in milligrams per litre (mg/l). But starting in the mid-19th Century, several uses of "degree" for water hardness became well-established. In the United States of America and Britain, hardness is measured in **Clark degrees**, named for the scientist who devised the first reliable test for water hardness. The Clark degree is defined as 1 part of calcium carbonate per 70 000 parts of water; this is about 14.3 parts per million (ppm), 17.1 mg/l, or 1 grain per gallon (gpg, another popular measure of hardness). The French, properly decimal as always, used a degree equal to exactly 10 ppm, while the German degree was equivalent to 17.8 ppm.

Degree Baumé (°B or °Bé): A unit of relative density, as read on a type of hydrometer invented by the French chemist Antoine Baumé (1728–1804). Two scales are used, depending on whether the liquid is lighter than water or heavier than water. For lighter liquids, the relative density d in degrees Baumé is related to specific gravity S by the formula d = (144.3/S) - 144.3; for heavier liquids the formula is d = 144.3 - (144.3/S).

Degree Celsius (°C): A metric unit of temperature. The Celsius temperature scale is named after the Swedish astronomer and physicist Anders Celsius (1701–1744), who used a similar scale. The freezing point of water (at one atmosphere of pressure) was originally defined to be 0°C, while the boiling point is 100°C. Thus the Celsius degree is 1/100 of the difference between these two temperatures (The scale actually used by Celsius was inverted, so that 0°C was the boiling point of water and 100°C the freezing point.) In the SI system, the Celsius scale is defined so that the temperature of the triple point of water (the temperature at which water can exist simultaneously in the gaseous, liquid, and solid states) is exactly 0.01°C, and the size of the degree is 1/273.16 of the difference between this temperature and absolute zero (the temperature at which all molecular motion ceases). For practical purposes, this is equivalent to the original definition. See also **Degree Fahrenheit, Kelvin**.

Degree centigrade (°C): An older name for the degree Celsius. The Celsius scale is called "centigrade" because it has 100 (centi-) gradations between the freezing point and boiling point of water. About 1850 scientists began calling the unit "degree Celsius" in honour of its (presumed) inventor.

Degree Fahrenheit (°F): A traditional unit of temperature still used customarily in the United States of America. The unit was defined by the

German physicist Daniel G. Fahrenheit (1686–1736), who also invented the mercury thermometer. Fahrenheit set 0° at the coldest temperature he could conveniently achieve using an ice and salt mixture, and it is said he intended to set 96° as the temperature of the human body. (He was off a little there; normal oral temperature for humans is between 98°F and 99°F.) On this scale, the freezing point of water (at normal sea level atmospheric pressure) turned out to be about 32°F and the boiling point about 212°F. Eventually the scale was precisely defined by these two temperatures. 1°F equals 5/9°C, but in converting between scales we have to be careful to adjust the zero points as well. To convert a temperature in °F to the Celsius scale, we must first subtract 32° and then multiply by 5/9. In the other direction, to convert a temperature in °C to the Fahrenheit scale, we must first multiply by 9/5 and then add 32°.

Degree Kelvin (°K): An obsolete name for the kelvin. In the International System, temperatures on the absolute temperature scale are stated in kelvins, not in degrees Kelvin.

Degree of crystallinity: The amount, expressed as a percentage by mass, or linear polymer that is generally present in a crystalline form, the remainder of the polymer being present in an amorphous state.

Note: There are several methods used for the determination of the amount of crystalline polymer in a man-made fibre. The results obtained differ according to the method used, so comparisons should be limited to one method of measurement.

Degree of esterification: The extent to which the acid groups of terephthalic and/or other acids have reacted with diols to form ester groups in polyester polymer production.

Degree of freedom (for a set): The number of values that can be assigned arbitrarily and still get the same value for each of one or more statistics calculated from the set of data.

Degree of orientation: The extent to which macro molecules composing a fibre or film lie in a predominant direction. In the case of fibres, the extent to which the molecules in a fibre lie in the direction of the fibre length.

Degree of polymerisation: The average number of repeating units in the individual macromolecules in a polymer.

Degree of staining grey scales: A piece of untreated, unstained, undyed cloth is compared with the treated sample that has been in contact with the test specimen during the staining test and a numerical assessment of staining is given. A different set of grey scales is used for measuring staining. A rating of 5 means that there is no difference between the treated and untreated material. If the result is in between any two of the contrasts on the scale, a rating of,

for example, 3–4 is given and rating 1 shows a white and a grey sample. The other numbers show geometrical steps of contrast between white and a series of greys.

Degree of water hardness: A measure of water hardness salts available in a water sample.

Degummed natural silk: The silk yarn or fabric which has been gone through the degumming process only and now other process retaining the natural colour of the silk.

Degumming: Boiling off of silk. The removal of Sericin from silk fibre by a controlled hot alkaline soap or enzyme treatment. Degumming is done either at the yarn or fabric stage and is done normally at the first stage wet processing equivalent to desizing and scouring of cotton fabric/yarn.

Dehydration: (a) Removal of water from a substance; (b) Removal of the elements of water (i.e. hydrogen and oxygen in a 2:1 ratio) to form a new compound.

DEK: Deutsche Echtheitskommission (German Fastness Committee).

Dekagram or Decagram (dag): A common metric unit of mass, the dekagram is frequently used in European food recipes. One dekagram is equal to 10 grams, 0.01 kilogram, or 0.352 739 66 ounce. The symbol **dkg** sometimes used for this unit is incorrect.

Dekaliter or Decaliter (daL or dal): A metric unit of volume equal to 10 litresand comparable to the English peck. The dekaliter is equal to about 2.641 72 US liquid gallons, 1.135 10 US pecks, or 2.199 69 British imperial gallons (1.099 85 British pecks). The symbol **dkL** sometimes used for this unit is incorrect.

Dekameter or Decameter (dam): A common metric unit of distance equal to 10 meters (about 32.8084 feet). The symbol **dkm** sometimes used for this unit is incorrect.

Dekanewton or Decanewton (daN): A fairly common metric unit of force equal to 10 newtons. The dekanewton is equal to 1 megadyne, to 1.019 716 kilograms of force (kgf) or kilopounds (kp), to 2.248 09 pounds of force (lbf), and to 72.3301 poundals. In engineering, the dekanewton is a convenient substitute for the kilogram of force or kilopond, since it is nearly equal to those units.

Delaine: A light weight, all wool fabric, in plain weave, ornamented by printing. (a) French term, meaning “of wool”; (b) Trade term for combing Merino wool of medium fine quality; (c) Wool raised in United States is said to have the strongest staple of all wools; (d) Originally a light weight and plain

woven French fabric, made of all-wool and dyed in the piece; at the present it is made in England of a mixture of cotton and wool and often printed.

Delamination: Separation of backing from carpet.

Delamination strength: The tensile force required to separate the component layers of floor covering under specified force.

Delave': Describes washed-out or faded denim. Delave' can be used instead of washed-out to describe jeans made from this fabric.

Delay cure: A process where the curing step is delayed until the garment has been made and pressed.

Delayed curing: See **Delay cure**.

Delayed deformation: Deformation that is time-dependent and is exhibited by material subjected to a continuing load. Delayed deformation may be recoverable following removal of the applied load.

Delhi embroidery: Rich Indian embroidery, made in chain stitch, in gold, silver and silk over satin or other silk ground.

Delicate or gentle cycle (in washing): A washing cycle in which agitation is slow and time is reduced.

Delinere: French bleached linen of medium quality for the household.

Deliquescent: A hygroscopic compound is one that absorbs so much water from the atmosphere that a solution eventually forms.

Delft unit: See **DU**.

Delta (D or Δ): A symbol used to indicate deviation or difference.

Delta E*, Delta e*: The total colour difference computed with a colour difference equation (ΔEab or ΔEcmc). In colour tolerance, the symbol DE is often used to express Delta Error.

Delustreing: Subduing or dulling the natural lustre of a textile material by chemical or physical means. The term often refers to the use of titanium dioxide or other white pigments as delustrants in textile materials.

Delustreing in spinning: Adding of delustreing chemicals at the spinning stage of synthetic fibres so that the resultant fibre is already delustred and requires no delustreing in the further processing.

Delustrant: A substance that can be used to dull the lustre of a manufactured fibre. Often a pigment such as Titanium dioxide.

Demeshek: In the Bible means silk.

Demi- : A traditional prefix meaning 1/2. The prefix is derived from the Latin *dimedius*, meaning a cut in the middle of something.

Demi drape: Fine French woollen cloth of light weight, fulled lightly, shorn and calendared.

Demi londres: Loosely woven and lightly fulled French woollen, usually left un-finished.

Demi lustre:(a) Wool of fairly fine staple, not as long and lustrous as lustre wool; included are Cotswold, Devon, Roscommon, Romney, Wensleydale; used for yarns of 36s to 46s count; (b) Yarns of 36s–46s count, made of such wool; (c) See **Lustre Orleans**.

Demi mousseline: Very light French cambric of cotton or linen yarn, made plain or striped.

Demi ostade: Medieval Dutch woollen fabric, finished with a napped face without fulling.

Demineralisation: The process of removing minerals (Ca^{2+}, Mg^{2+}, Fe^{3+}, Cu^{2+}) from water, and fabric is known as demineralization. Usually it is done on fabric through deionization and chelation and water by deionisation, reverse osmosis, or distillation. Deionisation mechanism is as follows: Free metal and its oxide is converted to its ionic form by protonic treatment (demineralization) and this ionic form is water soluble $Fe \rightarrow Fe^{2+} + 2e$ and the following reaction takes place $4Fe^{2+} + O \rightarrow 4Fe^{3+} + 2O^{2-}$) In fabric processing, this metal ion in solution is chelated with a suitable wetting agent so that this does not interfere in the bleaching process.

Demirdji rugs: All-wool rugs, made in Asia Minor; the loose and medium long pile is tied in Ghiordes knot. The designs and colours show great variety.

Demittons: Stout English cotton cloths for the oriental trade.

Denaturation: The process of making a product undrinkable. See **Denatured**.

Denatured: A product that has been made undrinkable, e.g. alcohol (Ethanol, denatured) or sodium chloride for exemption of tax and reduced price for industrial purposes.

Denier: A weight-per-unit-length measure of any linear material. Officially, it is the number of unit weights of 0.05 grams per 450 metre length. This is numerically equal to the weight in grams of 9,000 metres of the material. Denier is a direct numbering system in which the lower numbers represent the finer sizes and the higher numbers the coarser sizes. In the US, the denier system is used for numbering filament yarns (except glass), manufactured fibre staple (but not spun yarns), and tow. In most countries outside the US, the denier system has been replaced by the tex system. The following denier terms are in use:

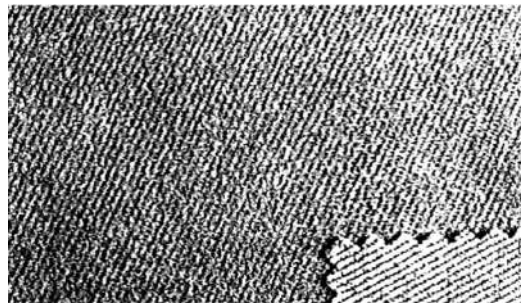
(a) *Denier per filament* (*dpf*): The denier of an individual continuous filament or an individual staple fibre, if it were continuous. In filament yarns, it is the yarn denier divided by the number of filaments.

(b) *Denier* (*yard*): The denier of a filament yarn. It is the product of the denier per filament and the number of filaments in the yarn.

(c) *Denier* (*total*): The denier of a tow before it is crimped. It is the product of the denier per filament and the number of filaments in the tow. The total denier after crimping (called crimped total denier) is higher because of the resultant increase in weight per unit length.

(d) *Denier variation*: Usually variation in diameter, or other cross-sectional dimension, along the length of a filament or bundle of filaments. It is caused by malfunction or lack of process control in fibre manufacturing and degrades resulting fabric appearance or performance.

Denim: A firm 2 × 1 or 3 × 1 twill-weave fabric, often having a whitish tinge, obtained by using white filling yarns with coloured warp yarns, generally white weft and blue warp. Lighter weight denims with softer finish are made in a variety of colours and patterns and are used for sportswear. This fabric has its origin in the traditional blue (indigo-dyed) overall cloth made and worn in Nimes; hence, the name 'de Nimes'. It is stiff and unyielding, but softens in wear and is very strong and hard wearing, but fades to whitish patches at creases or points of strain, hem edges, etc., and creases easily. A typical is 2/1 left hand twill weave with 66 × 40, carded cottonyarn in counts around 10s dyed usually in indigo or navy in the warp and in count around 16s in the filling. Used for dungarees, casual style clothing such as jeans, skirts, light weight jackets, suits and shorts, children's clothes, work clothes, men's and women's sportswear and for protective clothing. Made from all-cotton or cotton with polyester, cotton with modal, or cotton with polyester and viscose, etc. A very common construction is epi 68, ppi 52, yarn number both warp and weft 20/1.



Denim cord: A denim look fabric made from white and coloured yarn, with a slight Bedford cord effect produced by raised ribs. It is a mixture of polyester and cotton fibres, and creases less than all-cotton.

Denim finishing: Various processes done on garment, fabric, yarn and even in manufacturing stages to get the appearance and finish of the ultimate product which can be fabric or garment mainly, as per the fashion. It can include chemical shrinkage control, sanforizing, liquid ammonia treatment, stone wash, enzyme wash, chemical spray, etc. These are more important as the denim fabric undergoes vey less wet-processing.

Denitrification (in effluent treatment): The biological process by which nitrate is reduced to nitrogen and other gaseous end products. The removal of oxygen from nitrates in anoxic or anaerobic conditions, resulting eventually in gaseous nitrogen, which bubbles off and is thus removed. Many heterotrophic bacteria found in aerobic biological processes can adapt to using the oxygen that is combined in nitrates, if the dissolved oxygen is very low or zero (***respiration*** under anoxic conditions). The sludge in the bottom of a secondary sedimentation tank has little oxygen and with a nitrified effluent it may rise to the surface because of denitrification, as the nitrogen bubbles lift the sludge. In activated sludge treatment, denitrification can be achieved as with the AAO process or the Bardenpho process or the modified Ludzack–Ettinger process where the nitrified wastewater is recycled back to the anoxic tank at the start of the treatment process. Alternatively, an anoxic filter can be used for denitrification. If the anoxic treatment process is located after secondary sedimentation, methanol or other carbon sources may be added to the secondary effluent to act as organic carbon sources for the denitrifying bacteria. The denitrification of a nitrified effluent can also be achieved in ***biological aerated filters*** or ***biological fluidised beds***. ***Biological fluidized beds*** can be used to remove nitrate from drinking water. The denitrification process can occur in rivers when a nitrified effluent meets a polluted river water. *See* **Nitrification–denitrification**.

Denmark satin: Stout English worsted satin, dyed black and finished with a high lustre; used for slippers.

Density: Mass (weight) per unit volume. Knowing the density of one material makes it possible to reasonably approximate a required weight of the substance by measuring its volume which is more convenient; in case of liquids, approximations can be calculated in case of powder solids also. Mass of solution/Unit of volume, kg/m^3.

Density (bulk): See **Bulk density**.

Density (fibre): See **Fibre density**.

Density (fibres): Mass per unit volume of the solid matter of which the fibre is made of.

Density (linear): Mass per unit length.

Dent: A unit of a reed comprising of a reed wire and the space between the adjusted wires.

Dental floss: Slack spun strong silk yarn; used to clean the teeth with.

Dents per unit width: For woven pile yarn floor covering, the number of binding sites per unit width; dents being the reed spaces through which the warp yarns pass in the loom or the metal strips in the reed which form these spaces.

Dent (in screen printing): A damage mark on the rotary screen usually by handling where the rounding of the screen is not perfect.

Dent mark (in printed goods): A visible damage on the print due to the mark produced due to the dent on the screen.

Dentele: French for scalloped or festoon edge.

Dentelle: French term for lace since the 17th century.

Dentelle de Fil: French term for laces, made of one-ply thread.

Dentelle a la Vierge: French bobbin lace with double ground, similar to the **Ave Maria lace** (see).

Denting: Denting means drawing the warp thread through the dent as required by the reed plan and this determines more accurately the width and ends per inch of the fabric.

Dents: French for scallops or points, as in edges of laces.

Dents per unit width (in woven floor coverings): The number of binding sites per unit width; dents being the reed spaces through which the warp yarn pass in the loom or metal strips in the reed that form these spaces.

Deodorant: A substance used to remove or mask an unpleasant odour. Products suitable for use as deodorants include, inter alia, oxidizing agents (products containing chlorine or peroxide), adsorbents, fragrant finishes, chlorophyllin, etc. See **Fragrant finishes; Antiperspirants**.

Deodorisation: It refers to the bonding of odorous substances by sealing in the odour-emitting molecules (clathrate), a process which has not yet been fully explained. Odour molecules are bound according to their structure and thus rendered undetectable to the senses. There is a quantitative interrelationship between the odour-emitting substance and the deodorant. Zinc soaps are an example of a group of deodorants.

Deodorizing: Making a material odourless by odour suppression, masking, destruction (oxidizing agents) or adsorption (adsorbents). In solvent processes (dry-cleaning, solvent finishing, solvent sizing) deodorizing is carried out at the end of the process, after drying, by subjecting the goods to a current of fresh air in order to ventilate them and make them odourless.

Deodorising treatment: A procedure for removing substances responsible for generating undesirable odours from textiles.

Deora: Indian jute having a very dark, strong and coarse fibre; used for ropes.

Dependent variable: A variable that may respond to a change in another variable.

Depitching: The process of removing oily matters, tar, etc., from wool. It can be done by solvent extraction or by other methods.

Deployment (for inflatable restraints): The sequence of events related to the activation of a module.

Depolymerization: The opposite of Polymerization, i.e. the breakdown of polymers into their monomers, dimers, etc.

Depreciation: Amortisation; Service life of textile plant and equipment.

Depth gauges: Mechanical or optical devices which are used, e.g. to check the engraving depth when manufacturing printing rollers.

Depth (in dyeing): The deepness of colour quality in a shade, an increase in which is associated with increase in the quantity of the colourant present.

Depth: The colour quality (q.v.), an increase in which is associated with an increase in the quantity of colorant present, all other conditions (viewing, etc.) remaining the same.

Depth of shade (DOS): Ratio of weight of dye to weight of goods dyed, usually expressed as percentage; amount of dye owg Depth of shade (DOS), in these terms, is not really a very good way of comparing the darkness or intensity of colour of finished fabrics, due to inherent differences in the hues of different dyes within a family, differences between dye families, and differences due to the nature of the fabric. Dye manufacturers' shade cards are typically show one or two depths of shade for a particular dye, often between 1% and 4%, except for black, which is typically 3% to 6%.

Depth: The deepness or colour quality in a shade, an increase in which is associated with the increase in the quantity of colorant present.

Derbent rugs: Medium and large sized rugs, made in Caucasia. They are all-wool, the warp occasionally of goat hair, with long soft pile tied in Ghiordes knot and having a fine lustre. The weave is loose. The designs are geometrical,

star patterns often occurring. The chief colours are red, yellow and blue. The ends are finished with a long, knotted fringe.

Derby: Hosiery knitted with six ribs on the face and three on back alternatively.

Deregistering (CRIMP): Process of disordering or disaligning the crimp in a tow band to produce bulk. See **Threaded roll process**.

Derived unit: A measurement unit defined in terms of the BASE UNITS of a system of measurement, and not directly from a standard value of the quantity it measures. For example, the newton is a unit of force defined in base SI UNITS as a kilogram. Metre second^{-2} (kgms^{-2})

Derries: Cotton dress goods, made in brown and blue colours in India.

Desalination: Any of various techniques for removing the salts (mainly sodium chloride) from seawater to make it fit for drinking, irrigation, use in water-cooled engines, and for making steam for steam turbines. There are various methods. Those based on distillation depend on a cheap source of heat energy, of which solar energy is the most promising, especially in hot climates. Flash evaporation (evaporation under reduced pressure) and freezing to make pure ice are other methods, as are electro-dialysis, ion exchange, reverse osmosis, and the use of molecular sieves.

Design: A complete plan of the character of a textile fabric, giving both its construction and the decorative pattern.

Design right: Legislation to protect original designs for goods, products and packages against copying without the need of a breach of copyright.

Designed: Made specifically to some kind of plan.

Desize/Bleach one bath: A so-called combination process whereby the oxidising agents used for bleaching will also degrade starch and polyvinyl alcohol under certain circumstances. It is dependent on the type of size used.

Desizing: A process by which size from the greige fabric is removed. Desizing is an important step prior to dyeing fabric, since size can interfere with dye uptake. Some size materials wash out easily. Starch is commonly used for size, and can be quite difficult to remove. Amylase enzymes are often used industrially for starch removal. Few sizes can be readily removed by hot water washing, especially synthetic starches.

Desizing agent: A chemical or enzyme used for desizing a woven fabric.

Desizing polyacrylic acid: By converting the -COOH to -COONa, water solubility of the polymer is increased and hydrogen bonding with the fibre is overcome. Polyacrylic can readily be desized by saturating fabric with alkali and washing out the solubilized size.

Desizing PVA: One of the advantages of PVA is that a dried film will redissolve in water without having to degrade it first. Fabrics sized with PVA are desized by first saturating with water containing a wetting agent (for rapid penetration) and then by heating in a steamer or J-box (to hydrate the film). The desizing step is completed by rinsing in hot water to complete the removal.

Desizing with acids: Mineral acids will hydrolyse starch by attacking glucosidic linkages. Acid hydrolysis lowers the molecular weight and eventually reduces starch to glucose. Hydrochloric and sulfuric acids can be used. One problem with acid desizing is that cellulose fibres are also degraded which is why the method is not used much. One advantage with using acids is that cotton fibres can be demineralized more easily. Insoluble salts are solubilized by acids making the removal of such troublesome metals such as iron more thorough.

Desizing with oxidizing agents: Sodium hypochlorite, sodium hypobromite and sodium or potassium persulfate will also degrade starch. The reaction opens hydroglucose rings at the - 2,3-hydroxyls, converting them into carboxylic acid groups. This method is not used much either because it too degrades cellulose fibres. Hypochlorite is used for bleaching however.

Desk research: Where information is gleaned from work already carried out by other individual or groups.

Desmolases: A small sub-group of enzymes which are capable of rupturing C–C- or C–H-bonds generally preceded by or accompanied by simultaneous oxidation.

Desorption: The process in which the sorbed material is released from the material concerned, as desorption of moisture from the fibres or the process of removing an adsorbed material from the solid on which it is adsorbed. The reverse of sorption, absorption, adsorption, or both.

Desulphurising: An after-treatment to remove sulphur from newly spun viscose rayon by passing the yarn through a sodium sulphide solution.

Detached chain stitch: See **Daisy stitch**.

Detergency: The cleansing power of surface-active compounds (surfactants) or detergents in developing a washing or cleansing effect often associated with the emulsification of fatty soils and the prevention of soil redeposition.

Detergency efficiency: Detergency efficiency is a measure of the extent to which chemicals and foreign substances can be removed from the goods in a specific situation. However, this parameter is not representative of the overall efficiency of a machine.

Detergent: These are surfactants which do not precipitate in hard water and have the ability to remove soils from solid surfaces. Over and above reducing

water's surface tension, detergents must adsorb onto the soil's surface to aid in spontaneous release. Detergents must also keep the soil suspended to prevent redeposition.

Detergent booster: An additive to improve the performance of detergents. Usually based on fatty acid (mono) ethanolamides R–CO–HN–C_2H_4OH. These products improve foam stability (foam control) and detergency properties, and also protect the skin. It is a heavy duty detergent booster.

Detergents: A group of substances that improve the cleansing action of solvents, particularly water. The majority of detergents, including *soap*, have the same basic structure. Their molecules have a non-polar hydrocarbon chain (tail) that lacks an affinity for water molecules and is therefore said to be hydrophobic (water-fearing or repelling). Attached to this tail is a small polar group (head) that has an affinity for water molecules and is said to be hydrophilic (water-loving or attracting). Detergents reduce the surface tension of water and thus improve its wetting power by anchoring their hydrophilic heads in the water with their hydrophobic tails protruding above it. Consequently the water surface is broken up, enabling the water to spread over the material to be cleaned and penetrate between the material and dirt to which it has been exposed. With the assistance of agitation, the dirt can then be floated off. At the same time, the hydrophobic tails of the detergent molecules dissolve in grease and oils. The protruding hydrophilic heads of the molecules repel each other, causing the grease or oil to roll up and form tiny drops, which float off into the water to form an emulsion. Unlike soaps, synthetic detergents which are often derived from petrochemicals do not form insoluble scums with hard water. Synthetic detergents are of three types –

(a) *Anionic detergents* form ions consisting of a hydrocarbon chain to which is attached either a sulfonate group, $–SO_2–O–$, or a sulphate group, –O–SO –O–. Positive ions of the type $RNH3^+$, in which R has a long hydrocarbon chain.

(b) *Non-ionic* detergents are complex chemical compounds called *ethoxylates*. They owe their detergent properties to the presence of a number of oxygen atoms in one part of the molecule, which are capable of forming hydrogen bonds with the surface water molecules, thus reducing the surface tension of the water.

Determination process: The act of carrying-out the series of operations specified in the method whereby a single value is obtained.

Determination tolerance: As specified in a test method, the exactness with which a determination value is to be calculated and recorded.

Determination value: The numerical quantity calculated by means of the test method equation from the measurement values obtained as directed in a test method.

Developed dyes: See **Dyes**.

Developer (coupling components for diazo dyes): These are usually phenols, naphthols and amines which couple with previously diazotised dyes. This process leads to an increase in the size of the molecule and this significantly improves the wet-fastness properties of the dye.

Developing: A stage in dyeing or printing in which leuco compounds, dyes, or dye intermediates are converted to the final, stable state or shade.

Developing dyestuff: All dyes consisting of a pair of components such as Naphthols in dyeing and printing. Dyestuffs for coupling are seldom used.

Devil's cotton: A strong and silky white bast fibre, yielded by the abroma in India; used for cordage.

Devil's nettle: Fine, white and strong fibre, yielded by a species of nettle in Assam; used for cordage and coarse fabrics.

Devonia ground: A filling in Duchesse lace, consisting of irregularly spreading plaited bars and ornamented with pivots.

Devonia lace: Species of the **Honiton lace** (see), the flower petals or butterfly wings being made in raised relief effect.

Devonshire kersey: White English kersey, originated in the early part of the 15th century. Also called washers and wash whites.

Devonshire lace: Bobbin lace of old origin, influenced in the 17th century by Flanders. Some time ago Greek torchon laces with geometric designs, black laces, similar to the **Honiton** (see) and, also trolley laces were made at Devonshire.

Devore': A technique for "sculpting" fabric using *etchants* or burn-out paste.

Dew point: The temperature below which a gas begins to condense as a liquid at a given pressure and the atmosphere is cooled. Thus in air, it is the temperature at which the air becomes saturated when cooled with no further addition of moisture or change in pressure.

Dewatering of sludge: Removal of water from sludge. Various processes may be used, including mechanical dewatering of sludgeor sludge drying beds. The typical 65–80% water content of dewatered sludge varies with the method of dewatering and the nature of the sludge.

Dextrine: Dextrine is a modified starch, made by heating dry starch with a mineral acid. White dextrin is made by heating at moderate temperatures and

yellow dextrine is made by heating at higher temperatures with less acid. The degree of hydrolysis is higher than for thin boiling starch, so dextrine solutions have lower viscosities. Dextrin is used as a thickener for some textile printing processes, and as a resist for some direct application dyeing techniques (it generally isn't usable for immersion dyeing because it washes off too easily). See **Dextrine**, **Modified starch**.

Dextrine (modified starch): It is made by partially breaking down starch to smaller molecules using acids and/or heat. There are several different dextrins with different properties. Dextrin may also called British gum, but some workers regard them as distinct.

Dextrines: Degradation products of starch, yellowish to white friable granules or powders (crystal gum, British gum, roasted starch, burnt farina). They are further broken down (liquefied) to maltose or glucose by the action of diastases.

Dextrins: Intermediate products obtained in the transformation of Õ starch with the following properties: a) External characteristics: progressively low viscosity; b) Iodine reaction: blue-violet, red-violet, red, reddish-brown (achromatic); c) Solubility: cold water soluble; d) Sizing mechanism: hardens, strongly conglutinated dextrin films (size, proofing) are transparent and decrease rapidly in strength and elasticity with progressive decomposition.

DGN: Dirección General de Normas (General Office for Standards, including textiles).

DGQ: Deutsche Gesellschaftfür Qualität (German Association for Quality, with textile division), Frankfurt, Germany.

Dha: Native hemp from Senegal; used for "artificial" wool, by treating it with nitric acid and solution of natrium superoxide, which render the fibre transparent and crinkled.

Dhaka muslins: Very fine fabric woven by Dhaka artisans. In its heyday, Dhaka muslin just weighed just 3.8 g per square yard. The fabric was aptly called as fabrics which could not be seen or felt. With Mughal court as its chief patron, it was titled '*mulmulkhas*' or King's muslins and at 2.7 pounds per yard (Rs 27,000 at today's prices). Esteemed for its sheer web, Dhaka muslin hard traits that earned it lyrical names like *bafta-hawa* (woven air) *ab-i-rawan* (running water – it became invisible in water) and *shabnam* (evening dew – if laid wet on grass, it could not be seen). In 19th Century this technique was in decline, but there is record that a Dhaka muslin woven for Prince of Wales weighed 5.4g per sq.yard – 42 per cent heavier than Shah Safi's gift.

Dharwar: Indian raw cotton having a moderately strong and fairly clean staple of golden colour.

Dhollerah: Indian raw cotton, having a fairly strong and cohesive fibre of dull whitish colour; it is usually very dirty.

Dhooties: Originally a reversible hand woven cotton fabric, having a plain body and bright coloured borders and heads, woven with coloured filling where the coloured border stripes are; used for garments, scarfs and turbans in India and Africa. Now often made with the filling for the white or grey body, interlacing with the coloured borders. It is a soft and light cloth of which the body is woven in plain weave.

Dhoti: It is a traditional Indian dress worn on the lower part of the body. It is one piece of unstitched cloth draped over the hips and length. It is worn in different ways in different parts of India and worn by both men and women.

Dhurrie: Indian thick cotton drapery, made with warp ribs and broad weft stripes in blue or red.

Di- and Tri- arylcarbenium dyes: Di- and triarylcarbenium dyes belong to the class of polymethine dyes and can be considered as branched polymethines. The branches are created by two aryl rings, in which the polymethine chain is incorporated, and by another R group bonded to the central (meso) methine carbon atom. *Triarylmethine dyes* are usually divided into mono-, di-, and triaminotriarylmethine dyes. In some di- and tri-arylmethine dyes, the ring carbon atoms *ortho*to the central methine carbon atom are bonded via a heteroatom to form a heterocyclic six-membered ring. These include the acridine, xanthene, and thioxanthenedyes.

Diabiki: Medieval Arabic silk fabric with brocaded flowers.

Diacetate: A term used to describe fibres made from propanone-soluble ethanoate (acetate). The ISO generic term is acetate.

Diablefuerte: Bedford cords and corduroys in South American countries.
Diagonal: A worsted cloth with prominent diagonal ridges.

Diagonal flametest: See **Flammability test**.

Diagonal stitch: In embroidery, a couched gold or silk thread fastened down with diagonal stitches.

Diagonals: Textile fabrics characterized by (often fairly wide) stripes running in a diagonal direction. The term refers only to the pattern effect and not to any particular fabric quality. Mainly described as broad twill or stitched twill fabrics.

Dial: In a circular-knitting machine, a circular steel plate with radially arranged slots for needles. A knitting machine equipped with both a dial and a cylinder (q.v.) can produce double-knit fabrics.

Dial height (in knitting): The distance between the bottom edge of the dial section on a hitting machine at its perimeter from the corresponding upper edge of the cylinder at its perimeter.

Diamantee: Silk vesting made with two-ply warp, 20 leaves and eight fillings in a repeat.

Diamantine: (a) English twilled worsted dress goods with a high finish; obsolete; (b) 18th Century woollen fabric in England.

Diameter, Average fibre (in wool and other animal fibres): The average width of a group of fibres when measured on a projected image.

Diamine: A compound with two amino groups. Hexamethylene diamine, one of the intermediates in the manufacture of nylon 66 salt is an example of this chemical type.

Diamond: (a) A twill produced toy reversing the direction of the twill to form squares; (b) Matchings from the sides of down fleeces of 48/50 quality; (c) Worsted warp yarn, made by twisting a 4s with a 2/36s with eight turns per inch and then reverse twisting this with a 2/36s strand with four turns per inch; (d) Commercial variety of short staple, upland cotton in America.

Diamond braid: A soutache braid made with five threads, each thread passing alternately under and over two threads.

Diamond draught diaper: In Ireland, eight-leaf, twilled, linen diaper cloth, with diamond patterns.

Diamond stitch: In embroidery, rows of silk thread couched down by silk and gold thread running diagonally at opposite directions and forming small diamonds.

Diamond (in zippers): The wedge-shaped portion of slider between the throats.

Diammonium phosphate and Phosphoric acid: Phosphorus based flame retardants function in the condensed phase. Non-durable, semi-durable and durable treatments can be obtained with phosphorus based compounds. The presence of calcium ions negates the activity of phosphorous compounds. Whereas the ammonium salts decompose thermally into phosphoric acid by the loss of ammonia, the calcium salts do not. Presumably, the calcium salts are not volatile and buffer the acidity of phosphoric acid so the generation of char is diminished.

Diamond-wound package: See **Cross-wound package**.

Diamond (in zipper): A wedge shaped portion of a slider between the throats.

Diaper: (a) Rich silk fabric of the Middle Ages, made with single coloured patterns; used for church vestments, dresses, etc.; originated from the Orient; (b) A twill raising three warps in succession, followed by a pick after which the weave is reversed; also a pattern formed by twilled checks, originally with a five-leaf satin weave; (c) White linen or cotton fabric made with small diamond or bird's eye pattern, in the above described twill weave; used for towels, children's dresses, etc.; (d) A grade of damask linen, made in Ireland; (e) Stout and twilled cotton drill, made with coloured checks.

Diaper cloth: Diaper cloth or diaper gauze is similar to cheese cloth; but in this fabric, loosely twisted yarns are used for maximum absorbency. Usually it has got a construction of 44 × 44 with 28s carded cotton warp and weft. The fabric must be free of impurities.

Diaphragm: Porous dividing wall which (a) is water and ion permeable, (b) impedes diffusion from one side to the other (clarification), (c) renders impossible a mechanical combination of the liquids separated by the diaphragm.

Diastases: They are a more or less temperature-sensitive enzyme (Amylases) which converts insoluble carbohydrates (starch) via dextrines into soluble sugars (maltose, glucose). Malt diastase has a strong liquefying and saccharifying action. Bacterial diastase hydrolyzes the glucoside bonds in starch and has a strong liquefying and weak saccharifying action. Pancreatic diastases have a strong saccharifying action. The degradation of starch by diastases is always accompanied by various stages of degradation at the same time proceeding via dextrine to maltose resp. glucose.

Diazo-: An atomic grouping of the type –N=N– in Aryl compounds.

Diazo compound: They are characterized by the presence of the azo group (–N=N–). Isomeric diazo compounds are represented by the mostly unstable syndiazo compounds and the stable anti-diazo compounds (both in the cis-form).

Diazo fast salts: See **Fast colour salts**.

Diazo stabilizers: These are dispersing agents used in the diazo developing baths. A naphtholated fabric when it is padded with the diazotized base, some of the naphthols is invariably bled to the padding liquor. This naphthols forms pigment with the diazotized base and redeposits on the surface fabric, thus hampering the rubbing fastness. The diazo stabilizers, makes the pigments into a finely dispersed form and prevents the deposition on to the fabric.

Diazonium compound: Diazotized bases having a salt-like character (from hydrochloric, sulphuric or nitric acids). Diazonium compounds dissolve in

water like ammonium compounds with a neutral or alkaline reaction. They are formed, e.g. as unstable intermediate compounds by diazotization of an amino group in a direct dye.

Diazonium compound in stabilised form: They are stabilized form of complex Diazonium compounds. They are called Fast colour salts. They can be stable tetrachlorozincates, stable tetrafluoroborates of diazonium compounds. Another approach is the introduction of naphthalene Disulphonate in diazonium compounds.

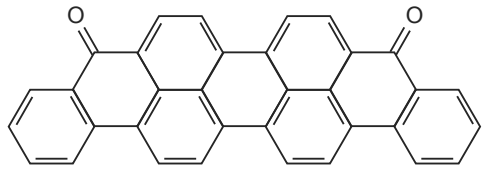
Diazotizable dyes: Includes direct dyes for cellulosic fibres containing one or several diazotizable amino groups. Limited shade gamut. Good wet-colour fastness, but only poor to moderate light fastness. Used for cheap washable articles, corduroy, hosiery and umbrella fabrics. Principle – Diazotization. Analogous to diazotizable disperse dyes for acetate, triacetate, polyester and mostly deep shades.

Diazotization: The reaction of an aromatic amine (e.g., aniline) with nitrous acid at low temperatures (below 5°C). During diazotization, the nitrogen atom resulting from the formation of nitrous acid (HNO_2). The acid is prepared *in situ* by reaction between nitric acid and sodium nitrite and combines with the nitrogen atom contained in the amino groups (NH_2) of the diazo dye to form a new compound which forms a new dye with higher fastness properties on the fibre after coupling or developing with a dye developer.

Dibah or Dibadj: Durable medieval silk brocade dress goods of Persian origin.

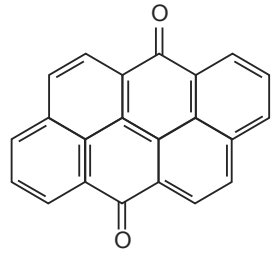
Dibasic: Term used to describe acids with two active acid hydrogen atoms which can be ionized and replaced by metals, e.g. sulphuric acid H_2SO_4 (sodium sulphate Na_2SO_4), phosphorous acid H_3PO_3 (sodium hydrophosphate Na_2HPO_3).

Dibenzanthrone or violanthrone: These are anthraquinonoid dyes with a perylene structure. Example is the dye manufactured by condensation of 9-anthrol with glycerol in the presence of sulphuric acid and fusion of the so formed benzanthrone with potassium hydroxide.



Vat dark blue BO

Dibenzpyrenequinone: These are anthraquinone dyes coming under the group-Anthraquinonoid dyes with a pyrene structure. Example is the dye manufactured by ring closure of 3-benzoylbenzanthrone with aluminium chloride and an oxidizing agent.



Vat golden yellow GK

Dicel: Courtald's trade name for its acetate fibre. It is derived from cellulose, it dyes well and has exceptionally good draping qualities. It wears well and has good crease recovery properties and is resistant to moths and mildew. Used for a wide variety of fabrics for clothing and furnishings including taffeta, brocade, lining fabric, velvet and in knit form for lingerie.

Dichromatic: Having or consisting of only two colours.

Dichromatism: Colour blindness.

Dickson: Commercial variety of early maturing American cotton, the staple measuring 23–26 millimetres and forming large clustered bolls; the yield is 31–32 per cent; also called Simpoon.

DID: Drawing-in draft. The drawing-in draft indicates the pattern of the arrangement of warp threads on different heald frames. Wherever possible, the ends which are to be woven similarly should be drawn through the same heald frame. There are different types of DID – straight draft, pointed draft, skip draft, fancy drafts, etc.

DID diagram: Drawing-in-draft diagram indicates which warp end is attached to which harness. Vertical column in the DID diagram represent the warp threads and the horizontal rows represent the harness frames which are sequentially numbered from bottom to top. See **DID.**

Die swell: The increase in diameter that procures as a visco-elastic melt or solution emerges from a die or spinneret hole.

Dielectric breakdown constant: In an electrical insulating material, the voltage at which electrical breakdown occurs, i.e., the voltage at which current will flow and/or the material melts.

Dielectric breakdown voltage: In an electrical insulating material, the voltage at which electrical breakdown occurs, i.e., the voltage at which current will flow and/or the material melts.

Dielectric constant: Measure of the ability of a dielectric material to store electrical potential energy under the influence of an electric field, measured by the ratio of the capacitance of a condenser with the material as the dielectric to its capacitance with a vacuum as the dielectric.

Dielectric strength: The average voltage gradient at which electrical failure or breakdown occurs. Expressed in volts per mil.

Diethylene glycolated DMDHEU (ULF): Glycolated DMDHEU is made by reacting two moles of diethylene glycol, (DEG), with one mole of DMDHEU. It is often referred to as a ULF (ultra-low formaldehyde) reactant. This product evolved from the successful experiences noted when DEG was added to the finish formulation. Precapping before it is applied insures that there are no pendent N-methylol groups so the HCHO release is even lower. The DEG still functions as a leaving group during cure so crosslinking with cellulose is not severely impaired.

Differential drop feed: A type of drop feed having two dogs arranged in tandem which move differentially. Material can be gathered or stretched by adjusting the stroke of the feed dog in front of the needle, so that it is longer or shorter respectively than the stroke of the feed dog between the needles.

Differential dyeing: Differential dyeing technology for synthetic fibre mixtures composed of normal and/or chemically modified polyacrylonitrile, polyester or polyamide fibres. Single bath piece dyeing is employed to produce solid shades, similar shades but in different depths, as well as multi-colour and contrast effects. Advantages include the avoidance of stockholding of dyed yarn, easier adaptation to changes in fashion and more rapid delivery of finished orders. *Applications* – predominantly in the carpet sector (tufted carpets) and also for woven and knitted fabrics (shirts, blouses, hosiery, beachwear, nightwear and sweaters).

Differential dyeing (Fibres): Descriptive of fibres of the same generic class, but that have potentially different dyeing properties from those of the normal fibre.

Differential dyeing behaviour of cotton: The tendency of cotton fibres to adsorb and retain selectively varying proportions of different dyes from a binary dyebath.

Differential dyeing polyamide fibres: There are many differential dyeing polyamides that are available: a) Dyeable with anionic dyes: R – Regular type

normal dyeing; D – Deep type dyes more deeply than regular polyamide; L – Low type very low dye uptake; b) Dyeable with cationic dyes: B – Basic type dyeable with cationic (basic) dyes.

Differential shrinkage (in zippers): The difference in longitudinal dimensional change between the zipper tape and the fabric to which the zipper is attached.

Differential thermal analysis: A method of determining the temperature at which thermal events occur in a material undergoing continuous heating.

Diffusion: (a) A more or less gradual movement of molecules or ions through a solution or fibre as a result of the existence of a concentration gradient or repulsive or attractive forces; (b) The random movement of gas molecules.

Diffusion coefficient: A proportionality factor which gives the number of moles of a dissolved substance diffusing through a cross-sectional area of 1 sq.cm per unit time for a given temperature and solvent when the concentration gradient is –1.

Diffusion rate (in dyeing): Diffusion rate is the rate at which dye is transported to the interior of the fibre material. A high diffusion rate leads to rapid establishment of dyeing equilibrium and rapid levelling-out of irregularities in dye absorption. It also facilitates washing off the hydrolysed dye. Increased dye substantivity is frequently combined with lower diffusability. The diffusion rate doubles with a temperature increase of 10.20°C.

Difluorochloropyrimidine (bis-FCP): Water soluble bifunctional cross-linking agent containing sulphonic acid groups based on difluoropyrimidine. It is used on wool.

Digested sludge: Wastewater sludge, which has undergone anaerobic sludge digestion or passed through an aerobic digester, should have a fibrous structure and a peaty smell that is not unpleasant, unlike raw sludge, but it still may contain some pathogenic organisms.

Digital device equipped clothing: Digital-devised clothing involves an application of digital devices, such as music players or cell phones, to clothing. It is now regularly sold in many countries.

Digital printing: See **Ink-jet-printing**.

Digitizer: Electronic pen for design processing in electronic equipment for the production of colour separations.

Dieppe lace: French bobbin lace of various fineness, originally made both in black and white, now of white flax thread with a ground of three threads. It is similar to the Valenciennes.

Diluent: A solid or liquid chemical used to dilute another. Sodium sulphate is a common diluent for dry dyes. Since the manufacturing of dyes does not always result in exactly the same strength of dye from batch to batch, manufactures routinely add a diluent to adjust the batch to a standardized strength. Diluents may make up a large portion of dyes designed to yield pale shades. For example, a dye that yields dark red at 2% o.w.g. may be diluted to yield a pale pink using 2% o.w.g. of the diluted dye. Diluting dry dyes in the way is done primarily as a convenience to the dyer.

Dimakso: Arabian term for raw silk.

Dimensional change: (1) The change in length and width of fabric which is subjected to specified condition/tests.

(2) The change in dimension due any processing or garment treatment. Mainly the changes in warp and weft way or width and length ways.

Dimensional change (consolidation): The dimensional change that takes place when a knitted fabric is gently agitated in water to overcome all frictional constraints in the fabric after it has been immersed in water without agitation to cause the relaxation dimensional change.

Dimensional change (due to felting): The irreversible dimensional change that occurs in a relaxed fabric when it is subjected to agitation in laundering.

Dimensional change (due to pressing and finishing of garments): The change in dimensions of a fabric caused by pressing and finishing during the garment manufacture.

Dimensional change (due to pressing and curing): It is self-explanatory.

Dimensional change in boiling water (felt): The change in length and width with any associated change in thickness produced by immersion in boiling water under specified conditions.

Dimensional restorability: The ability of a fabric to be returned to its original dimensions after laundering or dry cleaning, expressed in percent. For example, 2% dimensional restorability means that although a fabric may shrink more than this in washing, it can be restored to within 2% of its original dimensions by ordinary home pressing methods.

Dimensional stability to dry cleaning: The British Standard method [13] requires the use of a commercial dry cleaning machine. In the test, the sample is prepared and marked out according to BS 4931 [6]. The total load used is 50kg for each cubic metre of the machine cage made up of specimen plus makeweights. The solvent to be used is tetrachloroethylene containing 1 g/1 of surfactant in a water emulsion, 6.5 l of solvent being used for each

kilogram of load. The machine is run for 15 min at 30°C, the sample is rinsed in solvent and then dried by tumbling in warm air. The sample is then given an appropriate finishing treatment, which in most cases will be steam pressing, and it is then reconditioned and measured again.

Dimensional stability to dry heat: This test is intended to predict the behaviour of fabrics when heated in a hot press such as those used in various garment manufacturing processes including fusing and transfer printing. The ISO method [14] recommends that the samples are preconditioned at a low relative humidity before conditioning in the standard atmosphere. The samples are then marked and the dimensions in between two points determined. They are then placed in a press heated to 150°C under a pressure of 0.3 kPa for 20s. The samples are conditioned and measured again so that the dimensional change in each direction can be calculated.

Dimensional change (relaxation): The dimensional change that occurs when a knitted fabric is immersed in water without agitation and the strains and tensions put in to the fibre, yarn or fabrics during previous processing stages as spinning, knitting or finishing are relieved.

Dimensional change in thickness (in felt): The increase in thickness of the felt due to immersion in boiling water measured under specified conditions. See **Consolidation dimensional change**.

Dimensional stability: This is the stability of a textile, especially garments, in terms of its dimensions and shape due to any factor. Dimensional stability is tested for various factors as steam pressing, hot pressing, washing, etc.

Dimensional stability (carpet test): A supplementary test for the dimensional change of carpet tiles and needle felts to determine their suitability for use in humid environments. A customary accelerated test is used which involves 2 h dry heat at 60°C followed by a 2 h wetting treatment, drying at 60°C for 24 h and final conditioning for 48 h in a standard test atmosphere at 20°C/65% relative humidity. For special cases, more elaborate testing in climatic chambers is employed. The results are expressed as the percentage change in relation to the initial measurement made before the test.

Dimethoxymethyl-4,5-dimethoxyimidazolidone: $O=C\text{-}N_2\text{-}(CH_2\text{-}OCH_3)_4$. A resin finishing agent that is used for low-formaldehyde finishes.

Dimethoxymethylurea: $O=C(NH_2)_2(CH_2OCH_3)_2$ Resin finishing agent with better storage life than the free methylol compound. Finishes are less stiff, but otherwise similar to Dimethylolurea.

Dimethoxymethyluron: N,N´-bis (methoxymethyl) uron. It is produced from urea, formaldehyde and methanol. Because of their good stability,

methoxymethyl compounds are used as reactant resins. Chlorine retention is dependent the purity. Used in co-application with buffered Methoxymethylmelamine.

Dimethyl-4,5-dihydroxyethyleneurea: (N,N´- dimethyl-4, 5-dihydroxyethyleneurea). Formaldehyde-free resin finishing agent.

Dimethylfluidsilicones:Dimethylfluidsaremadefromdimethyldichlorosilane. The reaction conditions can be controlled to vary the number of repeat dimethyl siloxane units within the polymer. As the number increase, the viscosity increases so there is a range of commercially available fluids with varying viscosity fluids can be emulsified to make stable water dispersions for use as finishes. Fluids are water clear and do not discolour with heat or age. They impart soft silky hands to fabrics. In addition to softening, dimethyl fluids render fabrics somewhat water repellent; however being fluids, they are not durable.

Dimethyl formamide (DMF): $HCON(CH_3)_2$, colourless, mobile, liquid. Density 0.952, b.p. 153°C. Solvent for high polymers, natural and synthetic resins. Also used as a selective solvent.

Dimethyl terephthalate: [*p*-$C_6H_4(COOCH_3)_2$] An intermediate used in the production of polyethylene terephthalate, the polymer from which polyester fibres and resins are made.

Dimethyl-4,5, Dihydroxyethylene urea (DMeDHEU): DMeEU is the reaction product of dimethyl urea and glyoxal. The -4,5- ring hydroxyls are reactive with cellulose and form the same ether links as do the N-methylol groups. Even though the electronic configuration around the ring hydroxyls are the same as the pendant N-methylol groups, the reaction is much more sluggish because of steric hindrance and therefor require harder cures and more and stronger catalyst. Even with all this, the DP results are not near as good as the more conventional reactants. The product is more expensive; however, the fabric can truthfully be labelled as formaldehyde-free.

Dimethyloldihydroxy ethylene urea: See **Dimethyl-4,5, Dihydroxyethylene Urea (DMeDHEU)**.

Dimethylol Ethylene Urea (DMEU): The starting material for making dimethylolethylene urea (DMEU) is ethylene urea. A 5-membered heterocyclic, nitrogen compound (imidazolidone-2). It is made by reacting ethylene diamine with urea. Ethylene urea contains 2 NH- groups capable of reacting with formaldehyde and forms a bifunctional product. Since there are no other active hydrogen sites, the N-methylolated product cannot self-condense.

Dimethylol 5-propylene urea: (N,N´-dimethylol-5-hydroxy-hexahydro-2-pyrimidone). It is produced mainly by reaction of urea, 1,3-diamino-2-propanol and formaldehyde. Important reactant resin. The finishing effects are roughly similar to those obtained with the unsubstituted Dimethylolpropyleneurea (DMPU), but more reactive and somewhat more stable to hydrolysis.

Dimethylol glyoxal monourea: See **Dimethyloldihydroxyethyleneurea (DMDHEU)**.

Dimethylolhexahydro-2-pyrimidone: See **Dimethylolpropyleneurea (DMPU)**.

Dimethylolpropyleneurea (DMPU): N, N´-dimethylolhexahydro-2-pyrimidone. DMPU is produced mainly by reaction of urea, propylene diamine and formaldehyde. It is an important reactant resin for finishes with very good resistance to chlorine and fastness to washing at the boil, especially on white goods. Disadvantages – impairs the light fastness of textiles dyed with reactive or substantive dyes, DMPU finishes are sensitive to hydrolysis.

Dimethyloltriazone: Dimethylolhexahydrotriazone. It is also known as a triazone resin. It is produced inter alia by reaction of urea, formaldehyde and a primary amine. Important reactant resins (dimethylolethyltriazone, dimethylolhydroxyethyltriazone). Finishes produced with dimethyloltriazones have low chlorine retention and tend to have a fishy odour which makes an after-wash usually necessary. Reactant resin with good resistance to chlorine and hydrolysis. It does not impair the light fastness of dyed or printed fabrics. It is particularly suitable for resin finishes on cotton. On polyester/cotton blends, the finishes have a firm handle.

Dimethylol Urea (DMU): Condensation product of urea and formaldehyde. A preferred resin finishing agent, available commercially in powder or paste form and is very reactive. It is used to produce finishes with good crease resistance, non-shrink properties and high elastic resilience, especially on viscose. The finishes have only moderate fastness to washing at the boil and are not chlorine resistant. DMU has limited storage life.

Dimethylol-4,5-Dihydroxyethylene urea (DMDHEU): DMDHEU is the workhorse durable press finish. This and some of its modified versions account for over 85% of all crease resistant chemicals consumed today. DMDHEU achieved this prominent role in 1961 when delay cure processing came into being. In the trade, DMDHEU is often referred to as the Glyoxal resin. This jargon came as a way to distinguish it from DMEU, in that glyoxal was used to make the starting monomer. The starting heterocycle is made by reacting stoichiometric amounts of urea and glyoxal. The reaction is straightforward and can be carried out in regular laboratory glassware. The methylolation

step is also straightforward. While the synthesis is shown in two steps, commercially DMDHEU is made directly in one step. Urea, formaldehyde and glyoxal are all combined together and heated. The extent of reaction is followed by monitoring the free formaldehyde content. The product is sold as 45% solution.

Dimethyl polysiloxanes with reactive groups: Linear dimethyl polysiloxanes containing various end groups, possibly with additional isolated reactive side groups. As silicone cross-linking agents, polymers are obtained which are capable of producing finishes on textiles with high resistance to solvents, temperature, washing, good extensibility, high tensile strength and resistance to rubbing as well as a soft and elastic handle. Uses – for coatings, as silicone elastomers for finishes on woven and knits produced from fully synthetic fibres and synthetic fibre/cotton blends. Also used for low-shrink finishes on wool.

Dimity: The name comes from the Greek word meaning 'double thread' and the fabric is made from double or treble yarns, which creates ridges in plain areas. It is a fine or medium weight fabric, usually made from cotton and wears well. The basic weave of dimity is plain weave. The characteristic cards are made by letting several ends run parallel, that is, by putting two or three ends on the same harness or through same heddle. A typical construction is 90 × 60 with 60s warp and 80s weft. Combed yarns are used, the cloth is usually mercerized, bleached or dyed. It is often made in checks. Used for nightwear, children's cloth, curtains, etc.

Dimity binding: It has smooth edges and raised patterns.

DIN: German Institute for Standardisation The predecessor of the German Institute for Standardisation (DIN) was the Hindenburg programme set up in 1917. It is based in Berlin, Germany, and has about 4,700 committees which draw on roughly 25,000 specialists. It has adopted about 25,000 standards.

DIN colour chart: A system of colour filters (hues) which may be used for the determination of colours under standard illuminant C in terms of their appearance and characteristics (hue, chroma and lightness). Used for the systematic arrangement of colour collections (colour atlases), for the determination of colour tolerances, the evaluation of re-dyeing, and price calculations.

Dingy wool: Wool that is dark or greyish in colour and generally heavy in shrinkage. May be caused by excessive yolk, poor farming conditions or parasites.

Dinner jacket: An informal dress coat without tails, somewhat like a sack, for dinner wear, men's evening parties, but not where ladies are present, as at balls, operas, etc. Also called Cowes coat and tuxedo.

Dioxan: (1,4-diethylene dioxide), $C_4H_8O_2$ A colourless, oily, neutral liquid with a faint and not unpleasant odour. Very toxic (suspected carcinogen). Miscible with water and virtually all organic solvents for printing thickeners. Solvent for cellulose acetate, nitrocellulose, cellulose ethers, chlorinated rubber, resins (mostly acrylate and methacrylate polymers), oils, fats, waxes.

Dip: (1) A chemical (rubber) compound applied to cords or other fabrics designed to improve adhesion of the textile material to an elastomer.

(2) Immersion of a relatively short duration of a textile in some processing liquid. The term is usually used in connection with a padding or slashing process.

(3) A material applied to cords or other fabrics designed to improve the adhesion of the textile material to an elastomer.

(4) (a) The depth of liquor in the inner cylinder of a rotating-cage washing machine. (b) A term sometimes used to describe the treatment of cellulosic material with a chemic (q.v.).

DIP process: The abbreviation of "DIP" stands for diazotization in the paste (Naphthols in direct printing). It represents a variation of base printing: for preference liquid bases are stirred into a thickener together with sodium nitrite. A second thickener contains a medium strength acid, e.g. phosphoric acid. By gradually mixing the two stock thickeners together, the fast colour base is diazotized without the otherwise usual addition of ice (for cooling). Due to metered addition, no nitrous gases are released by this method. The print paste with the diazotized fast colour base must not be neutralized and is immediately ready for printing.

Dip dyeing: See **Dyeing, dip**.

Dip/extract method: To dye hank yarns and cheeses with reactive dyes by the cold pad-batch method. Cheeses are impregnated with the dye bath on a centrifuge. Interest is restricted to space dyeing.

Dip penetration: The degree of saturation through a tire cord after impregnation with an adhesive.

Dip pick-up: The dip or dip components present on the textile cord or other fabric after processing.

Dip pick up (in glass cords): The amount of dip solids present as supplied.

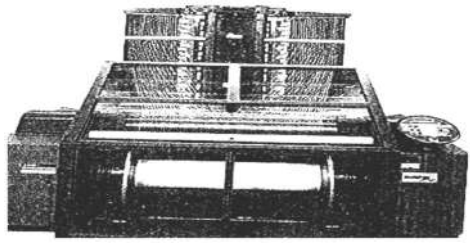
Dip treating: The process of passing fibre, cord, or fabric through an adhesive bath, followed by drying and heat-treating of the adhesive-coated fibre to obtain better adhesion.

Diphenyl: (biphenyl, phenyl benzene), $C_{12}H_{10}$, or $(C_6H_5)_2$, cyclic hydrocarbon containing two benzene rings. Starting material for the manufacture of benzidine.

Diphenylmethane dyes: Diphenylmethane and triphenylmethane dyes are monomethine dyes with two or three terminal aryl groups, of which at least one, but preferably two or three, are substituted by a donor group para to the methane carbon atom. The most important donor is the amino group.

Direct application: Usually used to mean a method where a dye solution is locally applied to areas of fabric, such as by painting, squirting, spraying, stamping, etc.

Direct beaming: The yarn cones are mounted in a large creel. Each yarn can be tensioned individually as they are led together to the beaming machine and wound onto a beam with parallel sides. Usually the beams are not large enough to accommodate all the yarns needed in the loom, so they have to be combined to form the final weavers beam. This is usually done at the sizing machine. Direct beaming is economical for large runs of standard fabrics and when all the yarns are of the same colour.



Direct beaming machine

Direct cabling: A system of producing a twist-balanced folded yarn from balanced (or untwisted) single yarns. The process is usually carried out on a modified two-for-one twisting machine.

Direct coating: The application directly on to the web of moderate and high viscosity polymers, both in the form of solutions, concentrated dispersions and in fused, thermoplastic state. This mainly applies to coating processes, as used in the manufacture of textile plastics composites. Following this process, material can be added indirectly using another web (textile, foam or film).

Direct costs: Those costs that can be directly attributed to a product or service. They can include raw materials, labour costs for manufacturing, as weaving, knitting, finishing, etc. (per metre, for example, for treating a fabric for flame retardancy), and distribution costs.

Direct dye: A dye-class based on application method, which is essentially by immersion of the fibre in a solution of dye without the need for other chemicals to bond the dye to the fibre (though other chemicals may aid exhaustion). Direct dyes have high substantivity, but bond weakly to fibres and therefore, usually have poor wash fastness. Light fastness varies from poor to very good. A post-dyeing fixative is often used to improve wash fastness. Brightness can be limited in direct dyes, because brightness often is associated with small molecules and small molecules tend to make poor direct dyes. "Household" dyes, of the sort that are sold in grocery stores, typically are union dyes which contain a direct dye and an acid dye.

Direct engraving process: Digital engraving like laser engraving, inkjet engraving, etc., where intermediate processes like exposure developing, etc., are absent.

Direct esterification: In the production of polyethylene terephthalate, the process in which ethylene glycol is reacted with terephthalic acid to form $H_3COOC - C_6H_4 - COOCH_3$ monomer with the generation of water as a by-product.

Direct printing: See **Printing**.

Direct spun: (a) A term used to explain filaments or yarn produced by direct spinning; (b) Descriptive of woollen yarns spun on a mule onto weft bobbins.

Direct style: A style of printing by which dyes are directly printed on to dyed or white ground and fixed by aging (steaming), curing or any other suitable methods.

Direct warping: The transfer of yarn from a package creel directly to the beam. See also **Sectional warping** and **Beaming**.

Direct yarn numbering system: A system that expresses yarn number in linear density.

Direction of slippage (in yarn slippage testing): The line of movement parallel to either weft or warp on a woven fabric in which minimum force is required to produce yarn slippage.

Direction of twist: The right or left direction of the helix formed in a twisted strand as indicated by superimposition of the capital letter 'S' or 'Z'. See **Twist (direction of)**.

Direction (width-wise): See **Width-wise direction**.

Directionally oriented fabric: Rigid fabric constructions containing inlaid warpor fill yarns held in place by a warp-knit structure. Used in geotextiles and coated fabrics.

Disc centrifuge (nozzle bowl c.): A common industrial centrifuge which produces a thick slurry rather than a sludge cake. The liquid moves up through a stack of conical discs, the solids moving to the outside of the centrifuge. They have been used to thicken waste activated sludge, but they cannot dewater sludge to a cake as this blocks the gaps between the discs.

Disc filter: A type of vacuum filter.

Disc test: An in-rubber test used to predict the fatigue resistance of tire cords and other industrial yarns.

Discharge: Localized removal of dye from fabric. Discharge is used to remove dye from fabric in printing and similar processes. Often another illuminating dye is applied to the area that is discharged. Sometimes the new colour is included in the discharge paste. Few dyes are quite easy to discharge, others are very difficult to discharge. This can be the case even within a single dye family (commercially dyed black fabric is notorious for producing unpredictable results in discharge. This is because most black dyes are mixtures of several colours). Industrial discharge processes use reducing agents such as thiourea dioxide, sodium formaldehyde sulphoxylate, zinc formaldehyde sulphoxylate or tin chloride. Art dyers will often use household chlorine bleach for discharge techniques (this author knows of no commercial use of chlorine bleach for discharge). Some discharge techniques decolorize the dye, but leave remnants fixed to the fibre; while others break the bond between the dye and the fibre.

Discharge print paste: The discharge print paste consists of a thickened discharging agent which may contain further additives, e.g. white pigments, discharge-resistant dyes if required, and other necessary chemicals, auxiliaries, etc. See **Printing**.

Discharge printing: (1) See **Printing**.

(2) A style of printing in which pre-dyed or pre-padded fabric is printed with a paste containing chemicals capable of destroying the ground colour to produce white effects (white discharges) in the printed areas, or coloured effects (coloured discharges) with the addition of a discharge- resistant dye.

Discharge printing assistants: These are the chemicals added along with the discharge paste which help in discharges in many ways. Mainly, these are products based on quaternary ammonium compounds. Hydrotropic auxiliaries accelerate or make possible the discharge process during dye fixation and also dissolve cleavage products thereby facilitating their removal in subsequent after-washing. Wetting agents are also employed in discharge print pastes or pad liquors to reduce the surface tension between water and air so that the

aqueous medium can penetrate air-filled capillary spaces in the fibres more easily. White effects produced by white discharges can also be improved by additions of zinc oxide and titanium dioxide (often as mixtures of both) as well as fluorescent brightening agents, to the discharge print paste. Thiodiglycol is also used as a dye solvent and hydrotropic agent, whilst glycerol is used as a hygroscopic agent and solvent.

Discharge resist printing: In contrast to normal resist printing, fixation of the dye to be resisted is not only prevented but also simultaneously destroyed by the discharging agent.

Dischargeable grounds: Dyeing made with dyes suitable for the production of white or coloured discharges. Direct, reactive and naphthol dyes are mainly used on cellulosic fibres; acid, metal-complex, disperse and cationic dyes are used on the appropriate synthetic fibres. An essential prerequisite is good discharge ability of the ground dyeing. Since there is a direct relationship between discharge ability and depth of shade, dye selection must be made by reference to recommendations given in the dye pattern card relative to the 1/1 standard depth.

Discharging: A destruction of colourant or mordant present on a cloth (dyed) by chemical means to leave a coloured or white pattern.

Discharging agents: The chemical used in discharge prints to discharge/remove the dyed colour on the fabric which is being discharge printed.

Discoloured pick: See **Mixed end or Filling**.

Discontinuous fibres: Tow and staple fibre.

Discontinuous or batch-type systems: In this system/process, all the operations are carried out on a single machine; it is therefore necessary to load the machine, carry out the treatments following a predetermined cycle, unload the machine and finally wash it thoroughly before starting a new cycle. This working process is extremely flexible and is suitable for processing small lots: for example, it is possible to a carry out a scouring treatment on a single machine, then a bleaching one followed by a dyeing process. For the production of large lots, the discontinuous process is labour-intensive, i.e. it requires many operators to load and unload the material; it also entails long processing times and results that can vary from one batch to another.

Discordant colour schemes: Most colour schemes are considered to be harmonious, but there are few that are considered to be discordant – this does not necessarily mean undesirable. There is also a recognised rule of harmony or discord when broken from a natural order of colour. When using the complementary pair yellow and violet, the yellow is naturally lighter. If white

is added to the violet and black to the yellow, this changes the natural order and is considered to be discordant. Another example of discord is where two colours do not share the same value, for example pink and brown. Pink is red and white; brown is orange and black. Again the results may not necessarily be undesirable.

Discrete variate: A variate that is a measurement based on a scale that has a limited or finite number of steps, such as count, a rating scale, or a ratio of success to total observations.

Diseased wool: The wool that is taken from the skin of a sheep that died from disease.

Disinfectants: Chemicals suitable for disinfecting, e.g. in particular oxidizing agents in the form of chlorine carriers (thermochemical disinfection of textiles), phenol derivatives, bactericidal finishes. It is probable that these agents mainly work by destroying the cytoplasm membrane of the bacteria.

Disinfection: Destruction of microorganisms that cause disease (bacteria).

Disinfection in the laundry: It is carried out in hospitals and similar institutions in pressure vessels using superheated steam and hot air, or in a washing machine using a disinfectant washing process.

Disodium hydrogen phosphate: Acid sodium pyrophosphate ($Na_2H_2P_2O_7$) fine powder, non-hygroscopic. Density 1.848. Solubility in water at 20°C up to 120/140 g/l. The solution has an acidic reaction at pH 4,2. It gives clear acidic solutions even in hard water. As a builder it improves the washing and foaming efficiency of detergents. Removes undesirable iron and manganese compounds in washing, dyeing, etc. (especially in iron dyeing vessels). Other uses include bleaching stabilizers and flame-retardant finishes.

Disodium phosphate: Sodium phosphate, dibasic (DSP, sodium orthophosphate, secondary), Na_2HPO_4. Colourless translucent crystals or white powder with a saline taste. Soluble in water, very soluble in alcohol. Hygroscopic, converted to sodium pyrophosphate at 240°C. Textile applications include weighting of silk, dyeing and printing, flame-retardant finishes.

Dispersant: A dispersing agent, often of a surface active chemical, that promotes formation of a dispersion or maintains a state of dispersion by preventing settling or aggregation.

Disperse dye: A dye that is almost totally insoluble in water. Disperse dyes exist in the dye bath as a suspension or dispersion of microscopic particles, with only a tiny amount in true solution at any time. They are the only dyes that are effective for “normal” polyester. Few types are used for nylon and

acetate. Polyester is dyed with disperse dyes by boiling with carrier chemicals, or by heating the liquor to about 130°C, which requires elevated pressure (like a pressure cooker). Thermosol dyeing, where the fabric is padded with dye liquor then dried and heated to about 200°C for about 90 seconds, is also used for polyester and for colouring the polyester component of poly-cotton blends. Disperse dyes on polyester are generally very wash-fast and resistant to bleaching. Nylon can be dyed at or below 100°C without the use of a carrier, but wash-fastness is only moderate. Disperse dyes are also used for sublimation printing of synthetic fibres and are the colorant used in crayons and inks sold for making "iron-on" transfers.

Dispersability: The degree to which particles can be broken down to some minimum size such that they will pass through the interstices of a standard filter paper.

Dispersing agents: These function in a manner similar to emulsifying agents. The difference is that solid particulate matter, rather than insoluble oils, is dispersed. The nature of the lyophilic part of the surfactant molecule must be such that it adsorbs onto the particle's surface. Surfactant molecules must be matched with their intended use.

Dispersion: (a) A system consisting of finely divided particles and the medium in which they are distributed; (b) Separation of light into colours by diffraction or refraction; (c) A qualitative estimation of the separation and uniform distribution of fibres in the liquid during the production of a wet-formed non-woven fabric.

Dispersion (degree of): See **Dispersivity**.

Dispersion medium: Continuous phase of a dispersion.

Dispersion spinning: Aprocess in which the polymers that tend to an infusible, insoluble and generally intractable character (e.g. polytetrafluoroethylene) are dispersed as fine particles in a carrier such as sodium xanthate solutions that permit extrusion into fibres after which the dispersed polymer is made to coalesce by heating process, the carrier being removed either by a heating or by a dissolving process.

Dispersivity: In Latin, the word *dispersio* means spread; degree of dispersion of a (colloidal) substance in an aqueous solution.

Dispersed phase: The dissolved or distributed substance (also known as a dispersoid). **Dispersion medium (also known as a dispersing agent or dispersant)**: The dispersant or solvent substance.

Disperse system: Combination of a dispersion medium and a disperse phase. The degree of dispersion can fluctuate considerably, depending on

the particle size of the dispersed substance. Important factors affecting the degree of dispersion are – particle size, molecule size, chemical constitution, concentration ratio, thermal influence, pH influence, influence of the addition of foreign materials (electrolyte, chemical reactions, physical processes, etc.).

Displacement resist: Displacement effect. A ground dye initially applied to a textile substrate is removed (displaced) by subsequent local application of chemicals, thickener and/or dye (or their combinations).

Disposable textiles: Articles of a more or less textile-like character intended for once-only or short-life usage, such as disposable laundry (e.g. bed linen, table linen, hand towels, underwear, diapers); disposable garments (e.g. coloured or printed holiday and party garments); disposable work wear (e.g. hospital gowns, painters' overalls); disposable sanitary goods, etc. Short-term serviceability ranges from "disposal after use" to "multi-wash/dry-clean" goods.

Dissimilation: In Latin, the word *dissimilis* means 'not alike'. The breakdown and consumption of nutrients to provide energy and simple compounds for intermediary metabolism. It is the opposite of assimilation. Also a term used in waste-water technology to describe the conversion of materials whereby energy is provided by the oxidation of organic compounds for the formation of new organic matter.

Dissociation (ionization): The electrolytic breakdown of acids, bases and salts on solution in water. This process involves the formation of ions, i.e. electrically charged particles – anions (-) and cations (+) from electrically neutral molecules. In practice, therefore, acidic reaction is due to electro-positively charged cations (H+ ions) and alkaline reaction is due to electro-negatively charged anions (OH- ions).

Dissociation (degree of): It corresponds to the respective (actual) strength of reaction (e.g., of acids, bases and salts). The degree of dissociation is of great practical importance since it is a term which denotes the strength and not the content of, e.g., an acid. The degree of dissociation can be used to determine the equilibrium constant for dissociation, an important factor in ascertaining the extent of a chemical process.

Dissolved air flotation (DAF):A treatment process in which water or wastewater or sludge is saturated with air and then flows to a tank where the air comes out of solution in tiny bubbles less than 100um that floats the sludge and enables it to be skimmed off. ***Coagulants*** may be added to help form ***flocs***. Two methods of DAF have been used. The less common is vacuum flotation, in which a short period of aeration at atmospheric pressure is followed by application of vacuum in a separate tank. The common technique takes a

small part of the flow to an air saturator in which water, wastewater or sludge is aerated for a few minutes at 3–4 atmospheric pressures. When the aerated and pressurized flow re-joins the main flow, the dissolved air coming out of solution attaches itself to the flocculated particles or sludge and makes them float.

Dissolved inorganics in wastewater: In organic constituents such as calcium, sodium and sulphate are added to the original domestic water supply as a result of water use and may have to be removed if waste water is to be reused.

Dissolved oxygen (DO): Oxygen dissolved in water is needed for the existence of ***aerobic*** water life, but the solubility of oxygen in water is low. The maximum at 0°C is only 14.6 mg/l at sea level, falling to 10mg/l at 16°C. At chlorides concentrations of 5000 mg/l (0.5%), the solubility falls to 9.5 mg/l at 16°C; with 10 000 mg/l of chlorides, to 9 mg/l. All this applies at atmospheric pressure. But when the external gas pressure increases many fold, as occurs in the deep shaft system, the solubility of oxygen rises and much more oxygen dissolves. In steam boilers, dissolved oxygen causes corrosion and must be removed from feed water before it enters the feed pump. The damage done by oxygen can be especially serious in boilers operating at pressures above about 17 atm. DO is measured by dissolved oxygen electrodes or by the Winkler test.

Dissolving pulp: A specially purified form of cellulose made from wood tissue.

Distillate: See **Condensate**.

Distortion (in fabric): A general term for a visible defect in the texture of the fabric caused by the uneven movement of the warp or weft in the fabric.

Distortion (in textile battings): Defects such as wholes, lumps, or thin area caused by movement of fibres.

Distressed (finish): Describes a finish that disturbs the surface of the fabric, giving it a used, beaten, or uneven appearance. Often done through sand or stone washing after the fabric has been pigment dyed.

Distribution length: In fibres, a graphic or tabular presentation of the proportion or percentage (by number or by weight) of fibres having different lengths.

District check: Acategory of small check designs, sometimes with contrasting over plaids, originally of Scottish origin. Glen plaids are part of this category.

Disturbed place: An area where the weave of the fabric has been disarranged, without damage to the yarns.

Divi-Divi: The dried pods of *Caesal pinacoriaria* growing in the West Indies and South America; they contain 20–35% tannin and a brown colouring matter.

Divided thread-line extrusion: Spinning of two separate thread lines from one spinneret.

Divider: Used in liquor compartments to decrease the liquor ratio, e.g. in padding machines including full width treatment machines and cheese dyeing machines.

Divinylsulphone compounds: They are derived from divinylsulphone CH_2=CH–SO_2–CH=CH_2, mainly with masked vinylsulphone groups, e.g. R–O–CH –CH_2–SO_2–CH_2–CH_2–O–R, where R = e.g. –SO_2Na_3,–CH_3, –H;

symmetrical and asymmetrical divinylsulphone compounds. Used as resin finishing agents, e.g.: Bis (b-hydroxyethyl) sulphone; Disodium salt of tris-(bsulphoethyl) sulphonium.

Diz: The small tool that is used to help form and even top in wool combing. Traditionally, a diz was made out of carved horn. Very nice ones can also be formed (or bought) out of wood. A cheap, non-classy alternative is to trim a piece of plastic and punch or drill a hole in the middle of it. It has been seen done with the bottom corners of a plastic milk jug or a crescent cut from a section of PVC pipe.

Djule: Knitted Persian wool rugs with long haired back.

DMC: Dimethylol (mono) carbamate.

DMDHEU: Dimethylol dihydroxyethyleneurea. See **Dimethylol dihydroxyethylene urea**.

DMEU: Dimethylol ethyleneurea. See **Dymethylol ethylene urea**.

DMF: Dimethyl formamide. See **Dimethyl formamide**.

DMPU: Dimethylol propyleneurea. See **Dimethylol propylene urea**.

DMT: (a) Dimethyl terephthalate; (b) Dimethylol triazinone.

DMU: Dimethylol urea. See **Dimethylol urea**.

DNS: Sodium sulphate.

DO: Dissolved oxygen.

DOB: Damenoberbekleidung (women's outerwear).

Dobbies: Dobbies are used for the production of plain or flat fabrics, that is, of fabrics characterized by maximum 28–32 threads in the weave repeat. Dobbies can be divided as follows:

According to the working principle: (a) Hattersley dobbies; (b) Rotary dobbies.

According to the raising motion of the heald frames: (a) Dobbies with positive drive; (b) Dobbies with negative drive.

According to the card reading system: (a) Dobbies with endless Pattern Card; (b) Dobbies with Magnetic Card

Dobbies (Hattersley): The Hattersley dobbies are the ones which control the movement of the heald frames through rods and rocker levers.

Dobbies (rotary): The rotary dobbies attain the raising and lowering of the heald frame through rotating members.

Dobby: (1) A mechanism of controlling the movement of the heald shaft of a loom. It is required when the number of heald shafts or the number of picks in a repeat of a pattern, or both, are beyond the capacity of the tappet shedding.

(2) A loom equipped with a dobby.

(3) An area where the weave of the fabric has been disarranged, without damage to the yarns. A fabric woven on a dobby loom.

Dobby mechanism: A shedding mechanism on looms or weaving machines (weaving). The harness motion can be either negative or positive by means of a controlled lifting gear. In negative-dobby shedding, the shafts are raised by the dobby and lowered by some form of spring under motion. In positive-dobby shedding, the dobby machine both raises and lowers the shafts. A distinction is made between single and double lift as well as between closed and open shed dobby machines.

Dobby shedding: A mechanism attached to a loom for controlling the movement of the shafts through which the warp yarns are threaded.

Dobby weave: A weave that has a pattern that requires the use of a dobby mechanism during weaving. Dobby designs have small figures such as dots, geometric designs and floral patterns woven into the fabric. The design is produced by a combination of two or more basic weaves and the loom may have up to 32 harnesses. Examples of dobby weave are shirting madras, pique, huck towelling. See also **Dobby**.

Doctor blade: Stripping device in the form of a fixed blade which extends across the entire treatment width in steel, as a wedge-shaped, tapered vulcanite strip or as a roller squeegee (squeegee systems in printing). It is used to form

an angle of incidence on a moving substrate by means of an incline. When moving, this then enables a highly viscous paste (for printing or coating) to become fluid briefly as a result of its intrinsic viscosity due to the shear forces which arise, and this can therefore be applied.

Doctor blade: (1) A metal knife that cleans or scrapes the excess dye from engraved printing rollers, leaving dye paste only in the valleys of engraved areas. Also used to describe other blades that are used to apply materials evenly to rollers or fabrics.

(2) A straight-edge whose function is to remove surplus material (e.g. filling, coating material and printing paste) from the surface of the rollers used to apply the material or from a fabric surface to which the material was applied.

(3) In effluent treatment, it is a sharp and hard blade that cuts the cake off the surface of a filter. Usually found on a rotary vacuum pre-coat or metal edge type filter.

Doctor roller: As opposed to the conventional blade used in rouleaux printing (stripping knife) and flatbed and rotary screen printing (doctor knife and roll doctor), which usually have a straight edge or surface, the doctor roller takes the form of a roller with surface engraving, fluting or helical grooving of varying depth. However because of the contact pressure on the padding roller, only a minor quantity of the liquor that is originally taken out of the trough remains on this doctor roller. Other forms include the comb doctor squeegee blade system in printing.

Doctor streak: A wavy white or coloured streak in the warp direction on the printed cloth made by a defective (damage in the sharpness in roller printing) doctor blade or imperfectly set doctor blade on the printing machine.

Doctors flannel: A soft, medium weight and inexpensive flannel. The fibres are mixed or wool. In white or red only. The type of fabric that could be used for interlining for warmth, lining children's clothes, nurse's cloaks, etc.

Doeuma: Very wide coarse gingham, often with large check design, having a medium soft finish; used in Turkey for bed and table covers, curtains, skirts, etc.

Doeskin: (1) A very close woven fabric from highest quality merino wool. It is made of high count, high twist worsted yarns woven with a 5 or 8 harness satin weave and given a suede finish. The cloth is milled and raised and given a napped finish on the right side. It is very soft and luxurious, with a sheen; expensive. Made in dress weight or heavier. Used for tailored suits, topcoats, sports jackets, leisure dresses and dresses and men's overcoats.

(2) A well-known glove-leather from lambs. It is readily available and very soft and easy to sew.

Doeskin finish: A soft low nap that is brushed in one direction. Cloth with this type of finish is used on billiard tables and in men's wear.

Doeskin rayon: Rayon twill or small satin which is napped or suede on one side. Used for suits, coats and sportswear.

Doff: A set of full bobbins produced by one machine (a roving frame, a spinning frame, or a manufactured filament-yarn extrusion machine).

Doffer: (1) The last or delivery cylinder of the card from which the sheet of fibres is removed by the doffer comb.

(2) An operator who removes full bobbins, spools, containers, or other packages from a machine and replaces them with empty ones.

Doffer comb: (1) A reciprocating comb, the teeth of which oscillate close to the card clothing of the doffer to strip the web of fibres from the card.

(2) See **Doffer comb**.

Doffing cylinder: Part of a combing machine. It is a wire-tooth-covered drum that helps to strip the cotton in a light film from the carding drum and which is stripped in turn by the doffing comb.

Doffer loading: Fibres imbedded so deeply into the doffer wire clothing that the doffer comb cannot dislodge them to form a traveling web.

Doffing: The operation of removing full packages, bobbins, spools, roving cans, caps, etc., from a machine and replacing them with empty ones.

Doffing comb: See **Doffer comb**.

Doffing cylinder: Part of a combing machine. It is a wire-tooth-covered drum that helps to strip the cotton in a light film from the carding drum and which is stripped in turn by the doffing comb.

Doffing tube (in rotor spinning): An extension to the navel to guide the withdrawn yarn towards the delivery rollers.

Dog hair: Once a valuable commercial ware (hat felt). Nowadays only of limited regional significance, e.g. for arts and crafts. Productive breeds include St Bernard, Newfoundland, chow-chow, poodle and spitz. It is spun alone or with wool.

Dogs-legs: A selvedge that varies in width.

NOTE: Variations in weft tension or lack of control of the warp ends within the selvedge may result in such unevenness. Pulled-in selvedge are caused by

pulling in of the edges by isolated tight picks. Dog-legged selvedge are the result of the characteristic gradual change in weft tension that occurs as some types of weft pirn are unwound, regular changes in selvedge width being present at each pirn change.

Dogskin: Heavy weft plush fabric, the pile being formed by mohair yarn.

Doggy wool: Wools that have no character and show the results of lack of breeding. These wools are usually short, coarse and lacking in feel.

Dolichos: Fine and silky stem fibre, yielded by the Dolichos trilobus in China and India; used for cloth.

Dolly: (1) A strip of fabric rolled up tightly and bound with tape or string at one end. It is used like a brush for applying moisture during pressing of a garment.

(2) A term used for various types of faller washing machines consisting of rectangular troughs in which the goods to be treated in a detergent solution are placed. Rotating beaters or fallers are lifted by cams and allowed to fall into the trough. At the same time, the trough moves backwards and forwards. The machine is also known as a tom-tom and is used by finishers of knitwear, hosiery and lace.

Dolly varden: Light cotton or silk dress goods, printed with highly coloured flowers.

Domestic furnishing: Furnishing used in the house.

Domestic washing (household laundering): The washing of domestic household laundry.

Domestico: (1) Liso grey cotton sheeting in Colombia.

(2) Crudo grey cotton sheeting in Venezuela.

Domestics: Cotton goods, shirting and sheeting made in America.

Domet: Imitation flannel made from cotton warp and cotton or cotton/wool weft, finished with a raised surface on both sides and used for linings, skirting and pyjamas having an approximate weight of 84g/m. See also **Domette**.

Domet flannel: See **Domet**.

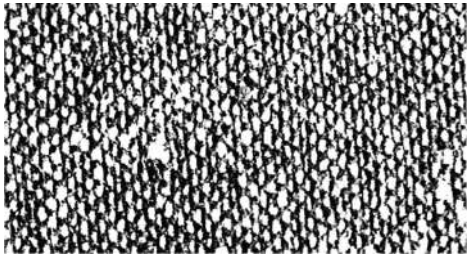
Domette: A very soft open weave fabric of wool and cotton with a long nap on the surface. Used for interfacing coats and jackets in which hair canvas is to be used. The domette is placed against the chest area of the coat and the hair canvas on top. The soft Domette prevents the hair from penetrating to the right side of the garment and avoid showing a hard ridge. Domette is also used as a padded interlining for quilting.

Domette flannel: Made of cotton plain and twill. Also spelled domet. Generally made in white. Has a longer nap than on flannelette. Soft filling yarns of medium or light weight are used to obtain the nap. The term domett is interchangeable with "outing flannel" but it is only made in a plain weave. Both are soft and fleecy and won't irritate the skin. Any sizing or starching must be removed before using. Outing flannel is also piece-dyed and some printed and produced in a spun rayon also. Uses: Mostly used for infants wear, interlinings and polished cloths.

Donchery: Stout French woollen serge.

Donegal: (1) Originally a rough woollen, hand-made Irish tweed typified by the use of several colours and particularly the use of white nubs, in the cloth. The word Donegal is now used to describe almost any plain weave tweedy looking cloth with white nubs in it. Fibres that are used include acrylic, cotton, viscose and mixtures and blend of these.

(2) A plain-weave tweed fabric made of wool and characterized by brightly-coloured randomly distributed slubs or flecks introduced at intervals into the weft yarn before spinning. The touches of colour are scattered throughout the cloth and show up usually against a light grey or natural coloured ground. Donegal is named after the county where it was first produced as a coarse woollen suiting in northwest Ireland. Originally, it was woven entirely by hand, but today power looms are used for its manufacture.



Donegal tweed: Named after an Irish county. Originally a woollen yarn fabric from knopped hand spun yarns. Now a general term to cover coarse woollen yarn fabrics in plain weave for men's and women's country wear. See **Tweed**.

Donkey: A pressing board in which an upper padded board is supported above the base. It is designed so that the parts of a garment may be pressed without creasing garment as a whole.

Donna Maria:(a) French silk fabric that is used for dresses, neckwear, etc.; there are eight leaves and twelve fillings in a repeat; (b) Very light and sheer silk fabric, used for veils by religious orders.

Donor: Latin word '*donare*' means to give. A term used in chemistry when the supply of certain functional groups is necessary for the initiation of a reaction, i.e. an atom, ion or molecule that provides a pair of electrons in forming a coordinate bond. Example: A proton donor is a compound which donates a proton for the initiation of a reaction (e.g. trans-esterification). In the case of hydrogen bonds, the water donor donates hydrogen ions and is therefore known as a proton donor.

Donskoi: Trade name for wools from Southern Russia; the staple is coarse, straight and loose, without kemps; used for carpets, etc.

Donsu: Silk Damask made in Japan.

Doorea: Fine Dacca muslin.

Dope: (1) See **Sizing**.

(2) See **Spinning solution**.

Dope dyed: See **Dyeing** and **Mass-coloured**.

Dope dyeing: Colouration of the polymer prior to manufacture of the fibre. This is really a misnomer, since the colorants are almost always pigments: "mass pigmentation" is a more accurate term. Some synthetic polymers such as polypropylene cannot be dyed after being made into fibres and coloration by adding pigments to the melted material is the only method available. Pigmenting prior to making fibres can also produce *wash fastness* and light fastness that is higher than can be obtained with any dyeing process.

Dope dyeing: In this system of dyeing, the colour is added in the dope itself before the synthetic yarn is spun there by dyed fibre is made in or in process itself. This eliminates the dyeing process in the fibre, yarn or fabric stage.

Doriah: (a) Grey, bleached or dyed blue or black, plain woven cotton goods, finished soft or hard; used for outer garments by the natives in Egypt; (b) A plain woven bleached cotton cloth in Arabia with prominent raised stripes produced by placing the warp ends closer.

Dornick twill: When you combine the idea of a broken twill with that of a reversing twill by using a threading that progresses in one direction so that the place at which the change occurs is staggered rather than pointed or symmetrical. This common twill is called a dornick twill.

Dornock or Dornek: (a) A coarse English linen diaper with check patterns; used for the table and for drapery; (b) Inferior damask of the 15th Century, made of wool, silk and gold.

Dorset: A fairly long and fine English wool.

Dorsetteen: A fabric once made in Britain using fine worsted warp and silk weft.

Doru: (1) Persian khilim (see), woven with solid cross stripes. (2) A long rope with which the thick woollen coat worn by the Gaddis is secured around the waist.

Dorure: French term for gold braids, tresses, etc.

DOS: Depth of shade.

Dosia: Chinese non-fashioned woollen hosiery.

Dosimetry: A method of studying colouring processes in molecular dye solutions, whereby a dye concentration that is constant over time is achieved using automatically-operating burettes, the replenishment from which over time provides the desired dye absorption curve. This makes it possible to perform a single dyeing test (without the need for analysis of the dyed material). Dosimetry is therefore regarded as a rational, fast and precise method (approximately 1% statistical error compared to conventional analysis). Principle: Concentration loss in a dye bath caused by dye absorption causes a potential change in a colorimeter, which activates the automatic burette via a controller, i.e. injects concentrated dye solution into the dye bath until the original bath concentration is restored.

Dosing tank: A tank in a waste-water treatment works in which wastewater collects until there is enough in it to operate the next treatment process. Where trickling filter in fluent is spread by distributor sturned by the reaction of the water flowing out of them, dosing tanks ensure that the flow is fast enough to rotate the distributors. When the dosing tank is full, it empties quickly through the dosing siphon. There is thus no flow except when there is enough influent to rotate the distributor.

Dosuti: Strong cotton cloth made in India of two-ply warp and filling in plain weave.

Dot coating: Process to produce hot melt adhesive materials using dot/pattern type paste coating of the non-woven fabric base by printing silk screen printing screens in the rotary screen printing method. In the dot process polyamide dots, for example, are “printed” onto the length of fabric in a wet-on-wet process. This process is particularly suited to non-woven bonded or siliconized fabrics. The moisture is removed from the dot in the drying chamber; it is baked at the same time.

Dot: A design dominated by circular spots which may be of any size, printed or woven on to the fabric. Small dots are often called pin dots, medium to large dots may be called aspirin dots and polka dots or coin dots.

Dot stitch: See **Point de Pois**.

Dotted Swiss: The original fabric as made in Switzerland is a sheer cotton fabric with crisp finish. The distinguishing feature is self-colour or contrast woven spots made from soft yarn and brought on the right side of the fabric. Woven dots are made by a lappet warp and a good grade Dotted Swiss may have a texture of 70 × 50 with 60s combed cotton warp and weft. The ground fabric is woven with a plain weave. The dots are made by introducing picks of very loose yarn or roving at regular intervals. The loose yarn is raised over 2–3 ends and then allowed to float on the back for about half inches more or less depending on the spacing wanted in between the spots. Floats on the back are sheered-off while finishing. A starch or permanent resin finish is given. The dull crisp finish is mainly a Swiss textile finish, but the name now applies to many fabrics that are fine and spotted. It is usually cotton, but may contain polyester and is hard wearing. Used for waisting, summer dress goods, curtains, baby clothes, etc.

Double: A process of twisting two or more single yarns together, as a rule in an opposite direction to the twist given the single yarns. See also **Doubling**.

Double back: A secondary backing glued to the back of carpet, usually to increase dimensional stability. See **Double backing**.

Double backing (double back): A secondary backing glued or laminated to the back of a carpet, usually to increase dimensional stability.

Double bonds: Atomic bonds (unsaturated); conjugated double bonds. A covalent bond between two atoms that includes two pairs of electrons, one pair being the single bond equivalent (the sigma bond) and the other forming an additional bond, the pi bond (ð bond). It is conventionally represented by two lines, for example $H_2C{=}O$. See **Multiple bond; Orbital**.

Double bow: Two fabric bows arcing in the same direction, as in a flattened M or W depending on the viewing angle.

Double braid (in rope): A braided construction consisting of two hollow braided ropes, one inside the other.

Double breasted: Coat or other garment tap over fronts having buttons and button holes on each forepart.

Double canvas: An open embroidery canvas usually made of cotton yarn. It is plain weave but with the warp and weft threads arranged in pairs, allows quite large holes to alternate with very small ones. It is a rigid canvas stiffened with size and is available in several weights.

Double carded: Yarn which has gone through the carding process twice.

Double cassinet: Satin, made of cotton warp and alternate cotton and woollen filling.

Double cloth: Cloth compound fabrics consisting of two component fabrics with two warp and two weft systems woven at the same time in a single operation. They are bound together by interchanging warp and weft threads between the face and back fabrics, or by using a special binder thread (e.g. ulster). The weave of the two fabrics can be different. They are produced in order to give the material greater weight or to achieve differently coloured face and back sides (e.g. double face or ulster fabrics). Used for blankets, coats and duffle coats.

Double cloth construction: Two fabrics are woven in the loom at the same time, one fabric on top of the other, with binder threads holding the two fabrics together. The weave on the two fabrics can be different.

Double cure process: A two-stage permanent press process. *Stage 1*: Pre-cure in the presence of swelling agents; *Stage 2*: Post-cure after garment making. This method allows the pleats, folds, etc., to be permanent.

Double damask: See **Damask**.

Double dyed fabric: Usually the blended fabric dyed in two different fabric is called double dyed. In many cases like polyester/cotton, second dyeing does not affect the first dyeing, but in blends like cotton/wool second dyeing on cotton can affect the wool (first dyeing) as almost all cotton dyes wool also.

Double end: Two ends woven as one in a fabric. A double end may be intentional for fabric styling, or accidental, in which case a fabric defect results.

Double face satin: See **Satin**.

Double faced carpet: See **Tree-ply carpet**.

Double Fold: A material which has been folded along the middle of its length normally with its face side inwards, so that the selvedges are in line.

Double hooked bow: One hooked bow at each side of the fabric that are in the opposite directions.

Double hosiery: Knit with single thread, has the toe or heel usually reinforced by the addition of another thread.

Double jersey: Although traditionally wool, which has become very expensive, this may now be made of acrylic fibre. It is a heavy fabric in plain colours and is characterized by the fact that both right and wrong sides are identical. Used for women's trousers, jackets, warm dresses and light coats.

Double knit: Made on machines with two rows of needles so that both sides look the same. Firm textured fabric suitable for skirts, trousers and jackets.

Double knit fabric: A fabric produced on a circular-knitting machine equipped with two sets of latch needles situated at right angles to each other (dial and cylinder).

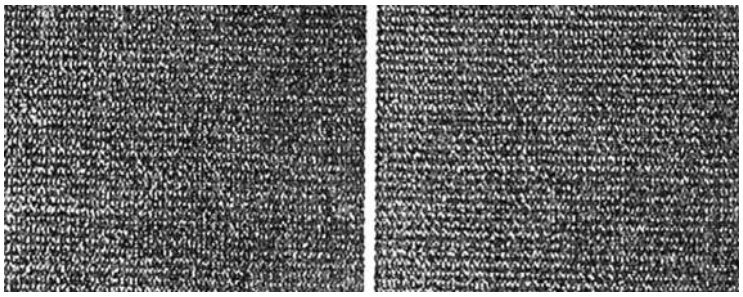
Double knitting yarn: A plied hand-knitting yarn with a diameter of a botany yarn of 4/8 worsted (resultant count 440 tex).

Double looped terry cloth: See **Terry cloth**.

Double mercerisation: Double mercerization of yarn (only applicable to high quality yarns). By double mercerization, any variations in the mercerizing effect on the yarn which may occur in single mercerization are avoided. The process is nevertheless very expensive.

Double pick (in woven fabrics): Two picks wrongly placed in the same shed.

Double pique: Double pique is made on rib machines by a selection of knitted loops and floats. The floats greatly reduce the width extensibility. This allows the fabric to be processed like a woven material without losing the comfortable wearing characteristics of a knit. Unlined fabrics have a tendency to bulge. Also known as weveknit, rodier and overknit.



Double pique (face and back)

Double plush (double velvet, double plush carpets): Produced by the double velvet technique to obtain two completely identical fabrics in design and colour which are bound to each other by shared pile yarns. These pile yarns are finally separated in the weaving machine by a knife giving two identical plush, velvet or carpet materials.

Double refraction: See **Birefringence**.

Double reverse bow: Two fabric bows arcing in opposite directions. See **Double hooked bow**.

Double roving spinning: A system in which two rovings are fed to each spindle of a ring frame, so to produce a pseudo two-fold or two-strand yarn. The rovings are separated in the drafting system by means of special guides and the two drafted strands are combined after the drafting system.

Double selvege: See **Rolled selvedge, Curled selvedge**.

Double serge: See **Serge**.

Double shed: In carpet weaving machines, two sheds are formed from the pile and binder warps, i.e. an upper and a lower shed, through which the weft is inserted.

Double-sided transfer paper: It is a transfer printing paper which has been printed on both sides to enable the simultaneous transfer printing of two fabric webs by using the sandwich principle (fabric/paper/fabric).

Double split complimentaries: Apart from using additional values of one or more of the complementary hues to make a tetrad colour combination, there are two specific types of combinations using complementaries. The first is known as a double split complementary, where one of the hues (either side of the first hue) is used and one of the colours on one side of the complementary hue is used. This is usually identified by an oblong within the hub of the colour wheel.

Double spot coating: A dot-coating process in which each dot consists of a lower melting core and a higher melting outer shell. The advantage is that, in pressing, the adhesive is prevented from sinking into the fabric thereby achieving a stronger bond.

Double squeegee: A squeegee system for wide printing widths in which the print paste is applied between two squeegee blades. Used in screen printing and screen printing machines.

Double stitch (double loop): Combination of stitch and loop.

Double-stitched seam-finish: A finish for the raw edge of a plain seam in which another row of machine stitching is made about 1 cm (3/8 in) away from the cut edge. Seam allowance is trimmed close to the second stitching. A double-stitched seam finish is used where a narrow seam means ease and comfort in wearing and a better fit. Used for crotch and under arm seams, other served areas and for the knitted fabrics. For knits, a narrow zig-zag stitch is used for both rows.

Double-topstitched seam finish: It is a decorative way to hold seams of a bulky fabric flat and open. A plain seam is pressed to open. Even-hand basting is sewn along the edge of the each seam allowance to hold the seam open and

flat while stitching. Topstitch is done on the right side of the garment leaving an equal distance on each side of the seamline crease.

Double velvet weaving machines: While loop pile velvets are produced with wire weaving technique, which is quite labour intensive, cut-pile velvets are produced on particular machines which permit to obtain two pieces of fabric at the same time. These machines are equipped with a 3 position shedding device (dobby or Jacquard machine), so as to form two overlapped and properly spaced out sheds and to permit to the pile warp to tie up the two fabrics together. Into each of the two shed a weft is inserted, usually by means of a pair of superimposed rods driven by the same gear. The pile warp is subsequently cut directly on the machine through a blade with horizontal traverse motion, thus forming the pile on both fabrics, which are then wound up separately. This system is largely used today owing to its high performance.

Double weave: Double weave fabrics are obtained by using five or more set of yarns. The most common types of double cloth have two set of warp and two set of weft yarns with an extra yarn interlacing both the cloths. The double cloth has additional bulk, strength and warmth. Examples are coatings, blankets, double brocade and brocatelle. Cutting the yarns that hold the two cloths together yields two separate cut-pile fabrics.

Double weft carpets: Woven carpets where each row of tufts is tied up by two wefts.

Double welt seam: A complex seam formed on the inside of the object with one trimmed raw seam edge enclosed and two rows of stitching visible on the face side.

Double worsted cloth: This name is given to the cloth because of the double-faced weave. A type of compound warp fabric consisting of two warp thread systems, but only one weft thread system. The warp and the weft are usually fine two-fold yarns in the case of worsted fabrics.

Fine, dense fabrics, sometimes worsted, usually in muted shades with discreet weave, yarn and silk effects; with a deliberately smooth finish. Dyed in loose stock, yarn and piece. Used in classic suits and formal wear.

Doublet: A sort of jacket prevalent during 15th–17th century.

Doubling: (a) The process of twisting together two or more singles or plied yarns, i.e. plying; (b) The operation of combining two or more strands without twisting; (c) A defect formed by forming a yarn from more than the required number of component strands; (d) A British term for twisting; (e) The term doubling is sometimes used in a sense opposite to singling. This is unintentional plying; (f) A yarn, considerably heavier than normal,

produced by a broken end becoming attached to and twisting into another end; (g) A process for combining several strands of sliver, roving or yarn in yarn manufacturing.

Doubling machine: A machine which folds cloth to half or quarter of its original width.

Doubling machine (folding machines): During the lengthwise passage of a fabric through such a machine, it is folded in the centre to half its width and either batched on rolls (doubling and batching machine) or plaited down (doubling and plaiting machine) as desired.

Doup: A special type of heddle, used in conjunction with ordinary heddles on the harnesses of a loom to cross and uncross warp filaments (in both a horizontal and vertical plane) when weaving cross thread tissues, such as guaze weave or leno weave.

Doupion silk fabric: Silk fabric made with dupion yarn.

Douppion: (1) A fabric with an uneven surface and rough texture made from yarns that are irregular in thickness. It was originally the term used to describe the particular type of silk yarn which was spun from silk of two cocoons nested together. The two silks were not separated in spinning and were therefore uneven. Douppion may still be made from silk, but it is also made from viscose, acetate, and other synthetic yarns which can be manufactured in uneven thickness, and is a firm, medium weight fabric of plain weave. Used for women's summer suits, wedding outfits, etc.

(2) A rough or irregular yarn made of silk reeled from double or triple cocoons.

Fabrics of douppioni have an irregular appearance with long, thin slubs. Douppioni-like yarns are now being spun from polyester and/or rayon staple.

Douppioni (doupion, dupion): Silk fabric with a characteristic irregular slubby texture. The effect is obtained by the use of irregular, raw, rough silk, reeled from double cocoons in the weft. The double cocoons are the result of two cocoons having been spun by two silkworms too close together. Nowadays, schappe silk slub ply yarns or raw tussah silk is often used in the weft. A schappe silk ply yarn is used in the warp.

Dowlas: Originally, a plain-weave coarse linen fabric. Now often used for a cotton fabric produced from coarse yarns and finished to imitate linen in handle and lustre.

Down: The soft fine feathers which grow under the contour feathers of ducks, geese and other waterfowl to prevent loss of heat. The eider duck has been the principle source for textiles as a filling material. (a) Pure down (also known

as "feather-free original duck or goose down") which is the softest quill-free plumage consisting of core down without any feather content; (b) Down, similar to pure down, but with a permissible content of 10% small feathers by weight; (c) Feathery down, like pure down, but with a permissible content of maximum 50% small feathers by weight; (d) Half down, which consists of feathers with at least 50% down content and occupies approximately half the volume of pure down since the latter is considerably lighter than feathers. Uses: Filling material for pillows, quilts, eiderdowns, etc. (approximately 30 geese produce 1 kg of down).

Down (pure): See **Down**.

Down proof batiste (maco down proof): A fine and tightly woven fabric made from particularly fine and uniform long-staple cotton (maco). Combed yarns are mainly used. Special finish – feather and down proof. Qualities – grey fabric and dyed. Used for tickings.

Down proof fabric: A woven cotton fabric of approximately 120 g/m2 made from very fine yarns (usually of maco cotton) and extremely tightly woven. It is used for pillows, quilts, etc., filled with down. Down proof fabric is very prone to creasing and the crease marks are highly visible after subsequent dyeing; it is also difficult to wash off because of the tightly woven construction. As a rule, it is only produced in plain weave and supplied in its natural colour for this reason. These fabrics are generally given a wax finish to make them down proof.

Down fibres: Detached barbs from down; plumules and detached barbs from the basal end of waterfowl feather quill shafts that are indistinguishable from the barbs of down.

Down twist: This is one of the two terms sometimes used when discussing plying. This refers to an "S-Twist". Alden maintains that people get so hung up trying to remember whether an S-Twist is spun clockwise, that they lose track of process. It really doesn't matter whether your singles are spun S or Z, you just need to ply them in the opposite direction.

Down wool: It is also called 'Hill wool'. Wool of medium fineness produced by such breeds as the Southdown and the Shropshire. These sheep are distinguished by their fine and curly wool of short staple, which is especially adapted for making loose, rough, moss-like, felted, carded yarns for the production of clothing. These wools are lofty and well-suited for woollen. Much of the down wool runs 1/4 to 3/8 blood in quality. This can be a great wool for felting.

Down (feathery): See **Down**.

Down (half): See **Down**.

Down (nestling): A down not fully developed with a sheath and with soft barbs emanating from the sheath.

Down draft metier: A dry-spinning machine in which the airflow within the drying cabinet is in the same direction as the yarn path (downward).

Down grade: In quality control, the lowering of the grade and/or value of a product due to the presence of defects.

Down proof cambric: Cream or white plain weave cotton of cambric weight with a wax or glazed surface to make it feather- or down-proof. Used for pillow coverings, cushion covers, duvet covers mattress covers.

Down time: Operationally dependent component of operating time.

Down twister: A cap, ring or flyer twisting frame.

Down twisting: A process for inserting twist into yarn in which the yarn passes downward from the supply package (a bobbin, cheese or cone) to the revolving spindle. The package or packages of yarn to be twisted are positioned on the creel and the ends of yarn are led downward through individual guides and stop motions to the positively driven feed roll and from there to the revolving take-up package or bobbin, which inserts twist.

Downright: Wool sorting term in the woollen trade, meaning the wool taken from the lower parts of the sides of a fleece. It is next to the finest sort.

Downs: English short and medium wools which are fuzzy; used for hosiery, woollens, etc.; included are Dorset, Oxford, Shropshire, Wiltshire, Southdown, Hampshire.

Dowtherm: Trademark of Dow Chemical Company for a series of heat transfer media. Dowtherm jackets are used around molten polymer processing lines.

Dozens: English kersey, worn under Henry VIII.

DP: Degree of Polymerization.

DP rating: The fabric must have a smooth appearance after it is laundered dried (line dried or tumble dried). Fabric smoothness is referred to as Durable press rating (DP rating) and is judged on a 1 to 5 scale. A 5 DP rating is the highest (most smooth) and a 1 is the most wrinkled. A 3.5 rating is considered commercially acceptable.

DPB: (a) Deutsches Bundespatent (German Federal Patent), now DB; (b) Dibutyl phthalate.

Drab cloth: Thick and strong woollen over-coating of grey colour in England.

Drabbet: Coarse, twilled linen duck, white or coloured, made in England.

Draft: In weaving, a pattern or plan for drawing-in.

Draft: (1) To reduce the mass per unit length of a fibrous assembly by attenuation.

(2) When drafting, the degree of reduction of linear density is usually expressed as either the ration of the input mass per unit length to the output mass per unit length or as the ratio of the surface speeds of the machine components which bring about the drafting.

(3) Fine and all-wool, warp ribbed cloth; used in churches.

Draft, in garmenting: (1) Constructed plan of the garment.

(2) The application of body or garment measurements to a flat plane.

Drafting: See **Drawing**.

Draft ratio: The ratio between the weight and length of fibre fed into various machines and that delivered from the machines in spun yarn manufacture. It represents the reduction in bulk and weight of stock, one of the most important principles in the production of yarn from staple fibres.

Drafting: The process of feeding the fibres from your drafting hand (usually your left) to your spinning hand (usually your right).

Drafting triangle: The small triangles of fibres that are formed between your drafting hand and your fibre hand. This should never be longer than the fibre length. Also called a "drafting triangle".

Drafting zone: A section in many spinning machines which reduces the cross-section of a fibrous strand (sliver, slubbing or roving) by drawing in order to decrease the linear density and bring the fibres into parallel alignment at the same time.

Drag: See **Fibre cohesion**.

Dragged in filling: See **Pulled in filling**.

Drainage fabric: See **Geotextiles**.

Drake cluster: A commercial variety of early maturing American upland cotton, the staple measuring 22–25 millimetres; the yield is 31–32 percent.

Dralon: Trade name for an acrylic fibre. It is mothproof, has good resistance to acids and alkalis and is unaffected by sunlight. It is washable, but hardly absorbs any moisture and is therefore quick-drying. It does not shrink, felt or pill. It may be blended with other fabrics. Used for upholstery and furnishings. Often as pile fabrics and for net curtaining.

Dram: In England and the United States, the weight in drams of 1,000 yards of silk yarn is the unit of measurement. See **Denier**.

Drap: French for woollen.

Drapd'alep: French dress goods and men's suiting, made of silk warp and woollen filling and fulled; obsolete.

Drapd'alma: A fine, close, flat-ribbed, twilled fabric of wool or silk and wool, finished on but one side.

Drapd'Arest: Rich silk cloth of the Middle Ages; used for church vestments.

Draps de baye: Stout French mourning dress goods, made with long napped shaggy surface.

Drap de beaucamp: A stout and coarse French twilled suiting, made of linen warp and woollen filling in solid colours.

DrapbresiIienne: French serge dress goods, made of pure silk or mixed with wool.

Drap de Chasse: A plain woven women's suiting, made with fine silk warp and heavy cotton filling, forming prominent cross ribs.

Drapd'Ete: A fine, light worsted fabric, woven in longitudinal cords.

Drap de Milord: Various kinds of French serge dress goods, made with 12 leaves and from 6 to 12 picks in a repeat.

Drap de Pauvre: Coarse serge, made of natural reddish-brown, undyed and unsecured wool. Formerly extensively used in France for clothes by the poorer classes.

Drap pique: Quilted silk fabric, made with fancy figures; used for men's vests.

Drap de prince: Silk or wool serge suiting made with eight leaves and three picks in a repeat.

Drap de Silesie: Light weight, all-wool French dress goods and fulled.

Drap de soie: (a) French term for heavy silk dress goods; (b) Various, closely woven serge dress goods and men's suiting, originally made in black colour.

Drapd'ete: A fine, light-weight twilled worsted dress goods, with warp ribs; used for summer garments, etc.

Drapedredon: Light, soft and warm winter coating, made of the finest wool, completely fulled.

Drapey: Refers to a fabric with good drape or supple and falls easily into graceful folds when hung or tailored.

Drapgeraldine: Heavy woollen dress goods, made in dark mixtures.

Draping: To hang or to adorn the body form with loose fabric and to obtain a body fitted garment by using adequate sewing techniques.

Drapnatte: Fulled woollen cloth of English origin, made in solid or several colours and having a raised nap on the back.

Drap imperial: Fine French dress goods, woven plain of wool and cotton.

Drap royal: (a) Lightweight twilled French woollen dress goods, made of organzine warp and very fine worsted filling in small cross ribs; (b) Obsolete, lightweight, fulled and printed French woollen cloth; used for vests, etc.

Drapsanglier: Rough faced French mourning dress goods, made of all wool in loose weave.

Drapsoleil: French dress fabric of high lustre, made of wool with wide weft ribs.

Drapzephii: Fine French woollen dress goods, similar to **Cachemire**.

Drape: The way the material of the garment hangs when worn. A term to describe the way a fabric falls while it hangs; the suppleness and ability of a fabric to form graceful configurations.

Draper: In French, a dealer in cloths; also a clothier, haberdasher or dry goods merchant. Also used in English.

Drapery: (a) Textiles, used for upholstery, curtains, hangings, etc., are generally known as drapery; (b) Dry goods are generally termed drapery in Britain.

Draps chats: French woollen dress goods, made of white wool warp and coloured wool-filling, dyed black in the piece.

Drapscroises: French for twilled cloths.

Drap de Dame: Very light, soft, all-wool French dress goods, similar to the flannel or Spanish stripes, slightly fulled.

Draps de Gobelin: Fine French woollen dress goods, dyed scarlet red.

Draps de Gros: Bureau Coarse French woollen suiting, dyed black, grey, or white; used by the lower class people.

Drawback: (1) A crossed end; an end broken during warping that when repaired was not free or was tied in with an adjacent end or ends overlapping the broken end. The end draws or pulls back when unwound on the slasher.

(2) A weave distortion characterized by tight and slack places in the same warp yarn.

(3) See **Sticker**.

Draw cord: A chord which passes through a channel and allow the garment to be gathered.

Draw crimping: See **Draw-texturing**.

Draw down: The amount by which manufactured filaments are stretched following extrusion. Also see **Drawing**.

Draw frame blends: Blends of fibres made at the draw frame by feeding in ends of appropriate card sliver. This method is used when blend uniformity is not a critical factor.

Draw pin: A stationary guide or pin which by inducing a localized change in yarn tension and/ or temperature may be used to stabilize the position of the draw point or neck in some processes of drawing of a manmade fibre yarns. *Note*: For the drawing of some fibres, e.g. polyester, a heated pin may be used and with other types the pin is not normally heated.

Draw ratio: (1) The ratio of the speed of the first and second pull roll stands, used to orient the flat polyolefin monofilament during the manufacture.

(2) The ratio of final to original length per unit weight of material like yarn, laps, slivers, slubbings, rovings, etc., resulting from drawing. Also see **Draft ratio** and **Draw down**.

Draw roller: Cloth-handling roller driven by cogs; See **Rollers**.

Draw sizing: A system linking draw warping and sizing in a continuous process. A typical system includes the following elements: (a) Creel, (b) eyelet board, (c) warp-draw machine, (d) inter-mingler, (e) tension compensator and break monitor, (f) sizing bath, (g) dryers, (h) waxing and winding units.

Draw sliver: The loose, untwisted strand of cotton fibres which is the product of the drawing frames.

Draw textured yarn: A yarn made by a process in which the drawing stage of man-made yarn manufacture in wholly or partially combined with the texturizing process on one machine.

Draw texturing: In the manufacture of thermoplastic fibres, the simultaneous process of drawing to increase molecular orientation and imparting crimp to increase bulk.

Draw thread (Lace): The removable threads included in the construction of lace either to act as a temporary support for certain parts of the pattern or to hold together narrow widths or units that are separated subsequently by their removal.

Draw threads: In knitting, threads that are introduced that, on removal, allow separation of pieces of fabric with welt edges.

Draw tow: A zero-twist bundle of continuous filaments that has been stretched to achieve molecular orientation (Tows for staple and spun yarn application are usually crimped).

Draw twisting: The operation of stretching continuous filament yarn to align and order the molecular and crystalline structure in which the yarn is taken up by means of a ring-and-traveller device that inserts a small amount of twist (usually 1/4 to 1/2 turn per inch) into the drawn yarn.

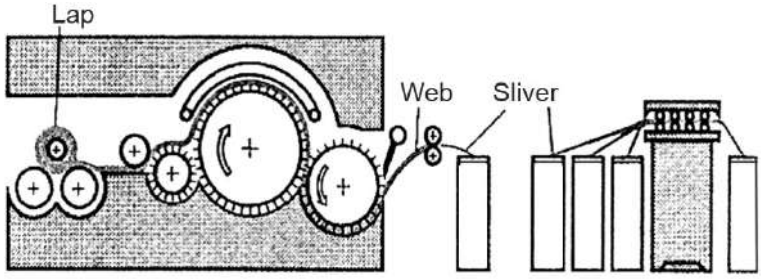
Draw warping: A process in which a number of thread lines, usually 800–2000 ends of POY feedstock, are oriented under essentially equal mechanical and thermal conditions by a stretching stage using variable speed rolls, then directly wound onto the beam. This process gives uniform end-to-end properties.

Draw wind: To orient a filament yarn by drawing it and then to wind it on to a package in an integrated process without imparting twist.

Draw winding: The operation of stretching continuous filament yarn to align or order molecular and crystalline structure. The drawn yarn is taken up on a parallel tub or cheese, resulting in a zero-twist yarn.

Drawers: Under-trousers.

Drawing: Operation by which the slivers are blended, levelled and by drafting reduced to the stage of sliver or roving suitable for spinning. In cotton spinning, the term is only applied to processing at the draw-frame. Various system of drawing are practiced in worsted spinning, but the machinery development and the greater use of man-made staple fibres, the differences are becoming less distinct. Most modern drawing gets in corporate three passages of pin drafting and a roving process. The system differs mainly within the means of fibre control between the major pairs of drafting rollers and the type of output package.



Carding Drawing (schematic)

Drawing: (1) The process of attenuating or increasing the length per unit weight of laps, slivers, slubbings, or rovings.

(2) The hot or cold stretching of continuous filament yarn or tow to align and arrange the crystalline structure of the molecules to achieve improved tensile properties.

Drawing, in processing: The process of stretching a material to increase the length per unit mass.

Drawing (cold): The drawing of synthetic filaments or films without the intentional application of external heat. Free drawing of filaments or films at a neck is also referred to as cold drawing, even though this may be carried out in a heated environment.

Drawing (hot): A term applied to the drawing process of synthetic films with the intentional application of external heat to support the drawing operation

Drawing frame: A machine in which several strands of sliver are combined into one strand and drawn out so that the combined strands approximate the weight and size of any one of the original strands.

Drawing (in hook): A tool similar to a crochet hook, used to draw the individual warp filaments through the heddles and reed of a loom.

Drawing (synthetic polymers): The stretching to near the limit of plastic flow of synthetic fibres of low molecular orientation. *NOTE*: This process orientates the polymer chains in the amorphous areas of the fibres in the direction of its length and this results in an increase in the crystalline regions. The ways of carrying out this process are by "hot drawing" or "cold drawing" (i.e. with or without the intentional application of heat).

Drawing in: (1) Forming a running stitch drawn to achieve gathering or gauging of the material holding folds in various forms of garments as in gowns of barristers for example.

(2) In weaving, the process of threading warp ends through the eyes of the heddles of the harness and the dents of the reed. The order in which this is done varies according to the weave and the nature of the fabric to be produced.

Drawing machine: Depending on the styles of the produced fabrics and on the company's size, this operation can be carried out manually, by drawing- in operating in pairs (a time consuming activity which requires also skill and care), or by using automatic drawing-in machines. The drawing-in begins by placing the weaver's beam, the harness and the row of healds on the proper anchor brackets, then the drawing-in program is typed in on the computer and the machine is started. A sort of long needle picks up in sequence the threads

and inserts them with only one movement into the drop wires, the healds and the reed dents, which are selected each time and lined up to that purpose. The machine can be used with the usual types of healds, drop wires and reeds and can process a wide range of yarn types and counts, from silk yarns to coarse glass fibre yarns. The drawing-in speed can in optimum conditions exceed 6,000 threads/hour.

Drawing process: The process of drawing in the yarn through the healds. See **Drawing in, Drawing machine**.

Drawing roll cleaner: A pad of felt or similar material attached to the underside of the cleaner box cover which serves to wipe away the dust and lint that collects on the drawing rollers as they draw out the roving or sliver.

Drawing rollers: Two or more pairs of rollers, each pair of which rotates at a higher speed than the preceding pair, serving to draw out or attenuate the roving or sliver passing between them.

Drawing-in frame: A frame for holding a beam of warp strands, harnesses and reeds, so that the strands may be drawn easily through the harnesses and reeds in a specified order.

Drawn selvege: See **Tight selvedge**.

Drawn tow: A zero-twist bundle of continuous filaments that has been stretched to achieve molecular orientation (tows for staple and spun yarn application are usually crimped).

Drawn work: Made by pulling out certain threads of loosely woven linen and fastening the remaining threads together with various fancy stitches into patterns.

Drawn yarn: Extruded yarn that has been subjected to a stretching or drawing process which orientates the long-chain molecules of which the yarn is composed, in the direction of the filament axis. *NOTE*: On further stretching, such yarn possesses elastic extension as compared with the plastic flow of undrawn yarn.

Draw-spinning: A process for spinning partially or highly oriented filaments in which the orientation is introduced prior to the first forwarding or collecting device.

Draw-texturing: A process in which the drawing stage of man-made yarn manufacture is combined with the texturing process on one machine. The drawing and texturing stages may take place in separate, usually consecutive, zones of a machine (sequential draw texturing) or together in the same zone (simultaneous draw-texturing).

Draw-texturing: See **Draw-texturization.**

Draw-texturization: A process applied in the spinning of thermoplastic manmade fibres to achieve optimum performance characteristics. Drawing involves a post-stretching of the freshly spun filaments (by 400–1200% depending on the type of synthetic fibre). The process brings about a deformation of the polymer structure and, at the same time, an increased orientation of the chain molecules in the direction of the fibre's longitudinal axis (Texture).

The long-chain molecules are pulled into alignment so that they become more closely packed alongside one another (chain packing) thereby forming crystalline regions (crystallites) which increase the fibre's tenacity through secondary valency forces (dye affinity is reduced in highly oriented fibres).

Draw-twist: To print a filament yarn by drawing it and then to twist it in integrated sequential stages.

Draw-warping: A process for the preparation of warp beams or section beams from a creel of packages of partially oriented yarn in which the traditionally separate stages of drawing and beaming are machine, also termed draw-beaming, warp drawing.

Draw-wind: To orient a filament yarn by drawing it, and then to wind it on to a package in an integrated process without imparting twist

Draw-warping: A process in which a number of thread lines, usually 800 to 2000 ends of POY feedstock, are oriented under essentially equal mechanical and thermal conditions by a stretching stage using variable speed rolls, then directly wound onto the beam. This process gives uniform end-to-end properties.

DREF (false twisting method): In this system a sliver, preferably produced by a draw frame, is drafted on a high draft drawing system. The drawn sliver is aerodynamically split on leaving the drawing system by being separated by force lateral to the roving axis. The slivers obtained in this way are combined by conventional means and twist is imparted by a twisting unit.

Dresden: (a) 18th Century woollen fabric in England; (b) Small flower design in pastel shades, usually in warp prints.

Dresden point lace: A fine linen fabric with threads withdrawn and embroidered to form a square mesh design.

Dresden ribbon: Silk or cotton ribbon, in various widths, the warp is printed in delicate coloured flower patterns before weaving.

Dress: (1) A clothing, partially outerwear.

(2) A type of adjustment made to one side of the trousers to improve it.

Dress carrier apparel: Career apparel which is not generally subject to abusive wear and for which appearance is more important attribute than durability.

Dress faced: Woollen fabrics having a fulled and slightly napped face.

Dress glove: A covering for the hand, often extending part way up the yarn, worn formally for formal or dress occasions.

Dress shirt (for boys): A shirt made with a specific collar size or numerical size, and designed to be worn with a tie and jacket.

Dress shirt (for men): A shirt made with a specific collar size and sleeve length where appropriate, and designed to be worn with a tie and jacket.

Dresser or drum (in sectional warping): The dresser or drum is composed of a big sheet steel cylinder with a precisely turned outer surface which bears at its end a series of slope control rulers (knives), which form a cone with variable taper. There are, however, also warping machines with fixed taper. The dresser is the creel element on which the threads coming from the creel and guided by the carriage are wound, section after section. The initial taper ratio serves as a support for the various thread layers superimposing each other during warping, and acts, therefore, practically as a backing flange.

Dressing (flax): A combing process applied to pieces of line flax fibre to parallelize the strands, remove naps or bunches of entangled fibres, and square the ends of the pieces by pulling or breaking fibres that protrude from the ends.

Dressing (lace): The process of applying stiffening agent or softening agents on stretching lace, net, or lace-furnishing products, etc., and drying. The application can be done on either a running or a stationary frame.

Dressing (silk): Size made of gum, starch, china clay, etc., to stiffen cotton, linen and silk cloths.

Dressing: A finishing process, consisting in sizing the fabric with gums, rice water, oil, etc., in order to give lustre, weight or stiffness to the fabric. See **Sizing**.

Dressmaker shears: Scissor used in cutting of the fabric (meant for sewing) with a bent handle which cuts the fabric while it is flat on the cutting table.

Dreze machine: One of the earlier loose cotton dyeing machine. It consists of a cylindrical cage with a false bottom and provided with a central puffer tube. A steam injector system is provided at the bottom. The material to be dyed is packed in the cage which is then lowered into the outer vessel. The circulation and heating of the dye liquor are effected by injecting live steam

which throws liquor upwards into the central puffer tube and later against a metal shield and thus percolates through the loose cotton package to the bottom and again thrown upwards by the injector. This machine can also be used for dyeing wool.

Drill: A warp-faced piece-dyed twill weave fabric that is occasionally satin weave (satin drill, mattress twill), usually cotton, linen, linen/cotton, made in different weights, usually medium to heavy weight, densely woven fabric that has a stout texture and a higher number of threads per centimetre in the warp than in the weft. The commonest fabric known as drill is in white or dark working colours and is thick and hard wearing fabric. Various terms are used as per the field of application such as bed drill, table drill, trousering twill, sacking twill, cotton drill, etc. It finds use in grey, bleached dyed or printed state for a variety of application like work wear, pocketing, shoe lining, uniforms, bookbinding, coated fabrics, industrial fabrics, ticking suiting, overalls, protective clothing, etc. *NOTE*: Some drills are made with five-end satin weave and it is recommended that these be called satin drills.

Drilled embroidery (Bohrware): It is made on hand machine or shuttle machine by cutting holes in the cambric and embroidering the cut edges.

Drillette: In England, a variety of weft faced, light weight drill, woven in a three, four or five shaft twill.

Drilling: A drill fabric. General term for various twilled cotton stuffs used for lining. Sometimes called “drill”.

Drip dry: A garment washing process, where the textile materials which are resistant to disturbance of fabric structure and appearance during wear and washing process. They require minimum of ironing or pressing.

Dripping: In testing thermal protective clothing, a material response evidenced by flowing of the fibre polymer.

Drive ratio: Ratio of wheel diameter to flyer whorl diameter (or bobbin whorl on a bobbin lead wheel). Governs how much twist you get in the yarn for each treadle. To measure wheel ratios, set up wheel, tie a bright-coloured piece of yarn to the flyer arm and adjust the treadle until it is at the bottom of its movement. Slowly rotate the wheel while counting the flyer revolutions until the treadle returns to its original point. The bright yarn tied to the flyer arm just makes it easier to count.

Droguet: (a) Collective term for various cotton wool and silk cloths, made in France and England. It is made plain, woven or twilled and patterned, usually slightly fulled; (b) Obsolete term for various ribbed French worsted dress goods.

Drop: (1) That part of a bed covering that hangs perpendicular to the floor.

(2) In body measurements, the difference between the chest girth and the waist girth.

Drop lea: The strong web which handmade rugs are started with.

Drop printer: Jet printing system for manufacturing sharp-edged prints (100 lines/inch). When leaving the end of the nozzle, the dye solution droplet is given a defined electrical charge (16 possible charge levels). Depending on the charge level, the droplet is either withdrawn, in which case no dye is applied, or electrostatically deposited over a width of 4 mm in a certain position (nozzles arranged at 4 mm intervals across the width of the material).

Drop spindle: A spindle that hangs freely from the fibre source (as opposed to a supported spindle). Probably so named by people who have not added enough twist.

Drop stitch: (a) An open design made in knitting by removing some of the needles at set intervals; (b) A defect in knit fabric.

Drop wires: A stop-motion device utilizing metal wires suspended from warp or creeled yarns. When a yarn breaks, the wire drops and the switch is activated that stops the machine.

Dropped stitch: In knitted fabrics, an unknitted stitch.

Dropped stitches: A defect in knit cloth characterized by recurrent cuts in one or more wales of a length of cloth.

Drosin: Suiting made of silk waste and worsted yarn. Made in Holland.

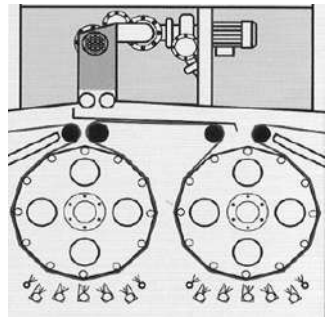
Drugget: (a) Plain, twilled or corded English fabric of the 18th Century, made with worsted warp and woollen filling; (b) Printed and felted woollen fabric; used for floor covering.

Druid: Cotton duck in England and Australia.

Drum drying machines: See **Drying systems, Sieve drum drier, Cylinder drying machines, Tumbler drier**.

Drum dyeing machines: Consist of a perforated and reversible rotating drum, sometimes consisting of several compartments. Liquor ratio 1:8–1:10. Finished items, such as hosiery and fully-fashioned garments, and piece goods, such as uncut and cut plush fabrics, towelling and raised goods, can be dyed or finished.

Drum washing machines: In a high-speed washer (see Fig) with special drum, the goods are advanced without conveyor belt, air cushion or pressure belt and the kinetic energy transformed into impact or compression forces.



Double drum washing Unit

The washing and relaxing effects on fabrics into impact or compression forces. The washing and relaxing effects on fabrics and blends with wool content are therefore achieved with short processing times, thus eliminating the undesirable running creases which often result from wet finishing of textile substrates in rope form.

Drummond: (a) Originally a twilled English worsted in Oxford grey, woven with dou'oie and twist yarn; (b) A Highland tartan with red as predominating colour and stripes running as follows, each way – A wide field of red, split with two pairs of narrow dark-blue lines, the centre stripe between the two pairs being about one third the width of the wide side stripes. The next group of stripes is as wide as both pairs of blue stripes, the centre has red stripes and one side also has red stripe and consists of the following: Narrow pale-blue line, narrow red line, dark blue stripe, narrow red line, narrow green line, narrow red line, wide green bar (being of the same width as the wide red bars mentioned above in the red group), narrow red line and narrow dark blue line. This is followed by a wide red stripe, after which the entire group described between the two is repeated in a reversed order.

Dry cleanable button: A button that can be solvent cleaned without damage such as dissolving or loss of finish.

Dry cleaning: Cleaning of garments/fabrics using solvents (other than water). A commercial process by which soil may be removed from textile products, or parts thereof, in a machine which uses petroleum, perchloroethylene, or fluorocarbon solvents.

Dry-cleaning detergent (dry-cleaning intensifier): These are used in dry-cleaning in normal organic solvents to considerably increase the cleaning action with maximum removal including water-soluble impurities. New concept introduced in 1953, replacing Benzine soap in terms of composition, efficiency and economic viability.

Dry cleaning fastness: Fastness of a fabric against dry-cleaning process. A bag of cotton twill containing 12 steel discs and the test sample is treated for 30 min in the appropriate machine at 30°C in 200 ml tetrachloroethylene (or other solvents) without added reagent, then spun and dried at maximum 65°C. In commercial dry-cleaning, consideration is also given to the following fastnesses.

Dry cleaning solvents: These are generally classified into two groups– (a) Flammable solvents: Light petroleum distillates, white spirit, Stoddard solvent and heavy petroleum spirit; (b) Non-flammable solvents: Chlorinated hydrocarbons such as trichloroethylene, tetrachloroethylene (perchloroethylene), 1,1,1-trichloroethane and trichlorotrifluoroethanes (solvents R11 and R113).

Dry (fabric): Dry fabric is the one that feels lacking in surface moisture or natural lubricant. Cotton are often referred to feel dry.

Dry combed cop: A wool top containing not more than 1% of fatty matter based on the oven dry fat-free weight as tested by the IWTO method which specifies soxhelet extraction with dichloromethane.

Dry crease recovery angle: Crease recovery angle; a measure of the tendency of a fabric to crease when dry.

Dry cross-linking: Cross-linking of cellulose in a de-swollen, i.e. dry, state with resin-finishing agents in the presence of resin-finishing catalysts at elevated temperatures (120–190°C) within a few minutes or seconds (resin finishing). Practical significance as dry cross-linking process with methylol compounds in the presence of acid-active catalysts, such as the classic curing process, the: shock-cure process and the permanent-press process.

Dry cylinders: See **Drying cylinders**.

Dry extraction cleaning: A method in which an absorbent compound is dispersed over the surface of a textile product by hand or machine, thoroughly brushed through pile, allowed to dry, and removed by suction.

Dry foam extraction cleaning: A process by which a highly aerated, low moisture content shampoo is brushed through textile floor covering pile or applied to the surface of upholstery.

Dry filling: The application of finishing chemicals to dry fabric, usually by padding.

Dry finish: (a) Final finishing;(b) Specifically relates to a dry finish applied to garments following dry-cleaning; it is used as a final finish for suits, wool garments, overcoats, skirts, which have become limp through wear and from

the effects of dry cleaning, especially those items which have been finished with solvent-soluble finish (softener). Application of a dry finish has the effect of enabling garments to stay clean for longer;(c) Term used for the mechanical processing of textile fabrics (dry finishing of fabrics), e.g. opening, brushing, decatizing, embossing, calendaring, polishing, pressing, pleating, raising, shearing, etc.

Dry forming: The production of fibre webs by methods that do not use water or other liquids, i.e. air-laying or carding.

Dry goods: General term in United States of America for all textiles.

Dry laid non-woven fabric: A fabric made from a fibre web or batt by carding and/or air laying followed by any type of bonding process.

Dry laying: A process for forming a fibre web or batt by carding and/or air laying.

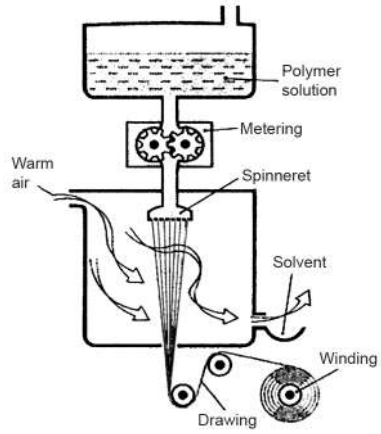
Dry mercerising: Mercerizing of dry cotton or cotton/viscose fabrics. Mostly carried out on grey goods (mercerizing of grey goods). Disadvantages – the finish is not as good as on scoured fabrics; heavy contamination of the caustic soda solution (size, lignin, etc.); addition of expensive wetting agent necessary (effluent problems). The advantage, however, lies in the mercerizing of blended fabrics with regenerated cellulose; as with dry mercerizing, the swelling and dissolving range of 12–13°Bé caustic soda where these fibres are particularly at risk is not undergone twice, as happens in the mercerizing of wet goods.

Dry scrubber: A method for cleaning gases in which no liquid is used. Odours in air can be scrubbed out by passing through activated carbon filters (GAC filters). An acid gas can be removed by spraying dry powder into the gases. The powder collects the unwanted gaseous pollutant and the powder is removed in a fabric filter or other device for particulate removal. For example, calcium hydroxide may be sprayed into the gases when cooled below 160°C to collect SO_2 and HCl from the gas as calcium sulphate and calcium chloride.

Dry setting: See **Heat setting**.

Dry solvent: Any organic solvent used to dissolve another material.

Dry spinning: A spinning process for man-made fibres in which the polymer, dissolved in an organic solvent, is converted into filaments by extrusion through spinnerets and subsequent evaporation of the solvent in warm air which allows the bundle of spun filaments to harden. The dry spinning principle is used for the production of acetate, triacetate, acrylic and polyvinyl chloride (PVC) fibres.



Dry spinning (schematic)

Dry spun: (a) Descriptive of a worsted yarn produced from a dry-combed top or of synthetic or blended yarn spun on similar machinery; (b) Descriptive of coarse linen yarn spun from air-dry roving (q.v.); (c) Descriptive of man-made filaments, the coagulation of which is effected by evaporation of the solvent from the spinning solution. See also **Wet-spun (b)**.

Dry spun flax: See **Dry spun.**

Dry steam: Steam without water droplets. Contrast with **Wet steam**.

Dry strength: Tensile strength.

Dry-cleaning: Dry-cleaning generally means the washing of garments or textile materials using a solvent which is usually recovered by suitable means. It is done in suitably designed machines and can involve washing in an appropriate liquor ratio using dry-cleaning solvents, spot cleaning if necessary, and pressing of the articles before delivering to the customer as per agreement.

Dryer creases: Sharp folds or lines running in any direction in a laundered or dried specimen. *NOTE*: Dryer creases are an unintended result of restricted movement of specimens in the washer or the dryer.

Drier (can): See **Contact drier**.

Drier (cylinder): See **Contact drier**.

Drier (drum): See **Contact drier**.

Dry crease recovery: Crease recovery angle; a measure of the tendency of a fabric to crease while it is dry.

Drying: A process to free a textile material of moisture, thermal hydro-extraction. Drying systems for textiles are based on, e.g. convection, contact heat, radiation, through-flow or combustion drying.

Drying cylinder: Any of a number of heated revolving cylinders for drying fabric or yarn. They are arranged either vertically or horizontally in sets, with the number varying according to the material to be dried. They are often internally heated with steam and Teflon-coated to prevent sticking of chemicals and dyes.

Dry-laid non-woven: Non-woven web made from dry fibre. Usually refers to fabrics from carded webs versus air-laid non-woven which are formed from random webs.

DS process: A direct stabilizing process for textile fabrics developed by Kannegiesser and Stockhausen. Instead of using adhesive interlinings, the outer material is coated in stripe form.

Dsedim or Jedim: Oriental rug, made of several strips of coloured knitted wool sewed together.

Dsujnabe or Jujnabe: Central Asiatic knotted wool rugs.

Dye recipe formulation: Formulation of a recipe for dyeing a particular shade. This can be done manually from personal experience of a dyer. Nowadays, recipe formulations are done with the help of a software where the formulation can be done based on dyeing parameters required like light fastness, dyes cost, etc.

DU: An arbitrary unit for the proteolytic activity of enzymes and biologically active washing agents, e.g. the enzyme preparation has a protease activity of 1000 DU/g if 1 ml of a 2% solution of the enzyme preparation gives an extinction difference of 0.400 under experimental conditions.

Dual anchor: Name for reactive dyes which have two or more reactive groups in the dye molecule. These kinds of dual anchor reactive dyes can have two "anchors" to the OH groups of cellulose molecules, i.e. for example, enter into a dual reactive bond (bifunctional).

Dubahi: A calico in Persia; used for clothing.

Ducape: A plain woven medium fine, soft ribbed silk fabric; used in the 17th Century in England.

Duchese lace: See **Duchess lace**.

Duchese satin: See **Duchess**.

Duchess: An 8–12 shaft satin. It is a dress fabric. Very fine yarns are used, particularly in the warp with more ends/inch than picks. The material is

string, has a high lustre and texture, and it is firm. Usually 36 inches wide. Characterized by grainy twill on back. Satin Faconne jacquard figured fabric with an all-satin weave background. Various types of striping effects are obtained. Jacquard figure are on a satin ground. Formerly with a grey warp and a tram weft. Now produced from silk, acetate or viscose filaments, also with a fine cotton weft for dress fabrics and blouses.

Duchess lace: A bar lace with a design of bands or tapes, which is very fine and is worked with fine threads. A very old type bobbin lace.

Duchess satin: See **Duchese satin**.

Duchester: Sort of English velvet.

Duck: (1) A variety of heavy, strong, compact, firm plain weave cotton or linen fabrics of canvas appearance in plain weave. The warp yarns are in pairs and form a distinctive effect. Mass per square yard about 06–50 oz. There are two types of duck – (a) Plied yarn duck with plied yarn in both warp and weft; (b) Flat ducks: Ducks having the warp of two single yarns woven as one and either single or plied filling yarn. Used for sails, awnings, etc.

(2) A closely woven heavy plain-weave fabric of mass per sq. yd., 6–50 oz., traditionally made from cotton or linen yarns, and similar to canvas. *NOTE*: The terms "canvas" and "duck" have become almost synonymous and are often qualified by terms which indicate the use of the fabric, e.g. navy canvas, artist's canvas, duck suiting and belting duck.

Duck (plied); flat: Plied yarn duck is a compact, firm and heavy plain weave cotton fabric which has plied yarn in both warp and filling. Flat duck has a warp of two single yarns woven as one and a filling of either single or plied yarn.

Duck eye: See **Pin holes, Spinning**.

Duck (waste): These are cheaper grades of flat ducks. A characteristic construction can be 60 × 24 with 16s warp and 3s filling made from cotton waste.

Duck canvas: A strong, firm, tightly woven, durable fabric usually of cotton but sometimes of linen, hemp or other fibres. It is usually plain weave, but sometimes with a crosswire rib. It is produced in a variety of weights and used in a variety of products such as tents, awnings, sails, upholstery, footwear, jackets and trousers

Duck-chair canvas: A fabric in plain, repp or twill weave, made of vegetable or man-made fibres or a combination of any of these fibres. Traditionally widths do not exceeded 500 mm (20 in) and weights have not been less than 6 oz./sq. yard.

Ducks flat: Another class of fabric usually used for tents and water proof clothing is made from single yarns. A typical construction being 76 × 30 with 12s warp and 8s weft, tightly woven in plain weave.

Ducks (light weight): Lightweight ducks are made for cloth shoes or sneakers. A characteristic construction for this type is 50 × 36 with 2/16s warp and 2/20s weft.

Duffel (duffle, duffields): A heavy and low-quality woollen cloth, napped on both faces. Napped duffel is similar to eskimo and is mainly woven in a 4-end warp cross twill construction. Other duffel qualities are given a Melton finish. Used for short coats and certain types of military or contract cloths.

Duffle: See **Duffel**.

Dul: Very strong and fine fibre, yielded by the stem of a climber in Ceylon.

Dull: (1) Noun. Low in lustre, that is showing relatively little tendency to concentrate the reflected light in specific directions.

Dull: (2) Adj. (Matt); (a) Descriptive of textile materials the normal lustre (q.v.) of which has been reduced by physical or chemical means; (b) The colour quality, an increase in which may be compared with the effect of the addition of a small quantity of neutral grey dye to the dyestuff and such that a colour match cannot be made by adjusting the strength.

Dull colour: Consists of grey elements, i.e. white and black, in addition to other colours. The opposite dull colour is clear colour.

Dull fibre: Fibre in which suitable chemicals or pigment is added or the structure of the fibre is made in such a way as to appear less bright.

Dumb singles: The finest of Mie reeled silk yarns; it has no twist.

Dumb-waiter: Rope Trade name for untarred cables or cordage of hemp.

Dumbells: A defect frequently seen in wet-formed non-woven fabrics; an unusually long fibre will become entangled with groups of regular-length fibres at each end, thus producing a dumbbell-shaped clump.

Dumican: Embroidery work made by the old Araucanians in Chile.

Dumobin: A fine grade of Scotch plaid.

Dunbai: A Highland tartan, made with green stripes and black lines on a red ground.

Duncan: Commercial variety of late maturing long staple cotton from Georgia, growing in large bolls.

Dunchee: Strong and very elastic bast fibre, yielded by the *Sesbania Aculeata* in India; used for ropes and as a substitute for hemp.

Dundas: A Highland tartan, the stripes running both ways as follows: Black stripe; navy blue stripe, twice as wide as the 'black and split in the centre by a narrow black line; black stripe, as wide as the first one; a wide field of dark green (made a little narrower than the above mentioned black, blue and black stripes combined) and split in the centre by a group of red, green, dark blue and green lines.

Dundee: (a) Soft, smooth, twilled woollen and having very little nap; (b) Coarse burlaps, crashes, bagging, etc., made of jute, flax and hemp in D., Scotland.

Dungaree: (a) Similar to denim, but the warp and weft are usually in the same colour. Hard earing cotton fabric for dungarees, overalls and jeans children's cloth; (b) A navy blue jean, used in England for sailors clothes; made also for the export trade, chiefly in India. The filling is dyed in the yarn, while the warp is white; (c) Blue drill in South Africa.

Dunging: A process in the mordanting of cotton fabric resulting in fixing the mordant to the fabric. Various sodium, carbonate of ammonium, etc., are used. It is obsolete.

Duotuft: Special tufting technique in which some of the pile loop that has already been tufted is re-engaged. This part of the pile loop is then pulled into the next pile loop. This improves cover whilst being relatively economic in pile yarn consumption.

Dupatta: (1) A veil-like unstitched piece of cloth worn by Indian women, draped loosely around the upper part of the body.

(2) Fine East Indian cotton muslin; used for veils and shawls.

Duplex machines: (a) In general, two machines running in tandem; (b) Special sanforizing or Montfort's compressive shrinkage machines with two felt calenders; (c) Special roller printing machines for printing both sides of a textile fabric.

Duplex printing: Double-sided patterning is possible using the duplex printing process, which can be carried out in both screen and roller printing. There are two screens and/or rollers per pattern and these print the pattern identically on both sides of the fabric. This is predominantly used for blankets and towels.

Duplosolv process: A continuous two-stage process for desizing fabrics which have been sized with polymer sizes. In the first stage, the size is swollen with water (80–150% based on weight of fabric) and brought into solution. In the second stage, this solution is displaced by tetrachloro-ethylene. The size can be regenerated from the aqueous solution. It is manufactured by Brückner.

Duplicate (in experimenting or testing): To repeat a run so as to produce a duplicate.

Dupont bleaching system: Cotton and cotton/synthetic fibre blends are bleached with hydrogen peroxide using J-boxes as reaction dwell chambers. After impregnation with bleach liquor, the goods are heated to the bleaching temperature by steam in a steam chamber immediately prior to entry to each J-box.

Dupont minute bleaching system: A two-stage continuous scouring and bleaching process. (a) Alkali scour stage; (b) Peroxide bleach stage. Each stage involves a 2 minute steaming treatment in a normal Mather-Platt continuous steamer.

Dupont shrinkage test (boiling test): A test method for determining the dimensional stability of textiles made from synthetic fibres from treatment in boiling wash liquors or for determining the efficiency of heat setting. A square of specific dimensions is drawn on the material, after which it is boiled for 30 minutes in soft water in a washing machine, hydro-extracted, allowed to dry in air and the square measured again. The difference in the dimensions of the square before and after the wash test provides a measure of the dimensional stability of the material.

Durability: A relative term for the resistance of a material to loss of physical properties or appearance as a result of wear or dynamic operation.

Durable finish: Any type of finish that is reasonably resistant to normal usage and to washing or dry-cleaning (or both).

Durable press: A term describing a garment that has been treated so that it retains its smooth appearance, shape and creases or pleats in laundering. In such garments, no ironing is required, particularly if the garment is tumble-dried. Durable press finishing is accomplished by several methods; two of the most common are the following – (a) A fabric that contains a thermoplastic fibre and cotton or rayon, may be treated with a special resin that, when cured, imparts the permanent shape to the cotton or rayon component of the fabric. The resin-treated fabric may be pre-cured (cured in finishing and subsequently pressed in garment form at a higher temperature to achieve the permanent shape) or post-cured (not cured until the finished garment has been sewn and pressed into shape). In both cases, the thermoplastic fibre in the garment is set in the final heat treatment. This fibre, when heat-set, also contributes to the permanence of the garment shape, but the thermoplastic component of the blend is needed for strength since the cotton or rayon component is somewhat degraded by the durable-press treatment; (b) Garments of a fabric containing a sufficient amount of a thermoplastic fibre, such as polyester, nylon, or acrylic,

may be pressed with sufficient pressure and time to achieve a permanent garment shape. See **Ease-of-care, Permanent finish,** and **Wash and wear**.

Durable press: Having the ability to retain substantially the initial shape, flat seams, pressed-in creases and unwrinkled appearance during use and after laundering or dry-cleaning.

Dura colour: The trade name for a process applied to curtain fabrics which guarantees that they will not fade.

Duralized: A commercial term for the effect produced on a fabric, preferably of pure cotton, by treatment in liquid ammonia (duralized process). Its manufacturer are Cluett, and Peabody & Co. (licensor).

Duro (durometer): A measure of the hardness of plastic, rubber, or similar material, made an instrument called a durometer. These instruments test the material with a steel pin, and the depth of the indentation made by the pin is read by a calibrated spring meter. There are various versions of the durometer, designed for materials of different kinds; to be called durometers, all versions must conform to standards set by standards organizations such as the American Society for Testing and Materials (ASTM). Durometer scales run from 0 to 100, with larger numbers indicating harder material. The different scales are identified by letters, including A, B, C, D, O, DO, and OO. However, since only one type is used for a particular material, the scale designation is often omitted. Typical notations used are "50 duro", "65 durometer A", and "D40 duro".

Duroplastics (Duromers): Plastics (synthetic resins) made from three-dimensionally cross-linked macromolecules that can be thermally hardened by means of cross-linkage. The thermal hardening process is irreversible (compared to thermoplastics). These materials cannot be melted and are insoluble in organic solvents, e.g. phenol-formaldehyde resins of the Bakelite type. Also logically includes rubber vulcanisation.

Duree quilt: Made with large patterns formed by coarse thread on a plain woven ground; made bleached or in colours.

Duria: Striped cotton muslin from India, made with a two-ply warp. **Durois**: Stout French coating of worsted yarn, made with a smooth finish. **Durry**: Cotton carpets woven by the natives in India.

Dust: Suspended particulate matter in gases or in the air that is able to remain in suspension for a relatively longer time due to its low particle size.

Dust extraction units: It is used for printing machines in order to remove lint, loose fibres and other loosely adhering matter from the surface of textile fabrics to be printed (which could impair printing quality, e.g., local resists

and screen blocking problems, etc.). A dust extraction unit is installed, e.g., immediately before the printing zone.

Dust eliminator; Lint eliminator (for printing): There must be no dust particles on the print ground while it passes through the printing zone, as these would act as resist agents. The ground is therefore cleared of dust by suction or adhesive techniques.

Dustprone fabrics: Goods that are prone to dust due to the fact that quantities of non-bound finishing agents (kaolin, delustring agents etc.) are too high.

Dust ruffle: A fabric which (a) lies flat over the box spring under the mattress on bed, and (b) has a pleated, tucked, or gather drop to the floor.

Duster: (1) Thin cotton or linen fabric, made dust-proof; used for coats.

(2) A light overcoat of linen, mohair, or other thin fabric, once extensively worn while traveling or driving.

Dusting: The second step in commercial wool processing (after sorting). The purpose is to remove as much dirt and sand as is possible before scouring.

Dutch camlet: Holland dress goods, warp and filling made of combed wool and rabbits' hair; the warp is two-ply and thinner than the filling, which forms cross-ribs.

Dutch carpet: Made with worsted warp which runs over and under a single filling; otherwise similar to the Venetian carpet.

Dutch tape: Trade term in England for linen tapes, the width graded from 11 to 15d, according to the number of threads supposed to be in it.

Duvedelain: See **Velour**.

Duvetine (duvetyn, duvetyne): It is derived from the French word *duvet* which means "down". Originally of cotton warp and spun silk weft. Sometimes made of fine woollen yarns. Constructed of six-, seven-, or eight-shaft satin weave and face finished to give a smooth, plush texture. The down-like surface, produced by several napping, shearing and brushing operations is characteristic of duvetine fabrics. Today it is made with a cotton warp and spun rayon or synthetic filling, or sometimes entirely of cotton. A characteristic texture will be 70 × 150, with 2/60s warp and 25s weft. Since practically the entire surface of the cloth is formed by the sift weft, it can be given an extremely dense suede finishing, resembling that of the fine velvet. In comparison to velours, the surface pile is shorter and less pressure-sensitive. Duvetine is mainly dyed in the piece. Soft handle and appearance similar to suède, drapes well, wears well, but spots easily. Used for ladies' outerwear, costumes and coats.

Duvetyne: See **Duvetine**, **Duvetyn**.

Duvetyn: Similar to Doeskin, but more velvety and lighter in weight. The soft velvet-like surface is made by napping, then shearing and brushing the right side. The weave is twill and usually wool, but may be other fibres also.

Dwell chambers: In order to complete the process, in many finishing stages it is necessary to batch the fabric or knitwear impregnated with chemicals for a period of time. This can take place in chambers of air, steam or gas. Two transport systems are used for this: conveyor belts and roller conveyors. The conveyor belts can be arranged in one or several levels above one another. This is the most common design. In addition, there are carousel type devices and towers, in which the conveyor belt is arranged in the form of a spiral. Since the time of reaction is given in the chambers, they are called dwell chambers.

Dwell process: Bleaching and dyeing process for fabrics and knitwear, whereby goods impregnated with chemicals or dyestuffs are rolled up in open width and are stored for the necessary length of time at room temperature or in heated chambers (e.g. pad roll chamber).

Dwell time: Phase of the processing cycle during which the actual reaction takes place, e.g. at the final temperature reached.

Dye: Dyes are coloured compounds which are absorbed or adsorbed by the fibre from a solution or suspension where they are subsequently fixed and are thus used for the coloration of textiles. The term also applies to certain colourless compounds (optical brighteners) and those which only form an insoluble dye through combination on or in the fibre (e.g. naphthols and turkey red). Between these groups are the mordant dyes. The final colour obtained on the fibre with these dyes is formed by applying the dye to a textile previously treated with a metal salt (mordant) or vice versa (colour lakes). Pigments do not fit this definition since they are water-insoluble colorants having no affinity for textile fibres; and for this reason, have to be applied with a binder capable of bonding to the fibre. Consequently, pigments must be regarded as a special case in textile coloration in textile terms, a soluble colorant that attaches in molecular form to the fibres, as opposed to a pigment, which exists as much large particles that are attached to the fibre with a binder. Dyes get classified by the application technique used and by their chemical structure. A class of dye based on chemical structure may have members in several different application classes. See acid dye, azonic dye, basic dye, direct dye, disperse dye, reactive dye, sulphur dye, vat dye. All commercial dyes are organic chemicals.

Dye absorption index (fibre affinity index SF): Fibre characteristic which gives information on the maximum dyestuff affinity of an acrylic fibre for cationic dyestuffs.

Dye activator: One dye seller's name for an *alkali* intended for use with reactive dyes; believed to be pure *soda ash*. This term is somewhat misleading. In the case of most reactive dyes on cellulosic fibres, it is the fibre and not the dye that is "activated" (an exception to this is *vinyl sulphone* dyes).

Dye affinity: In simple terms, dye affinity (also neutral affinity) is the dye absorbing capacity (of textile fibres). It varies between wide limits depending on the state of equilibrium between the fibre and the dye in solution. A number of factors play an important role in this process, e.g. liquor ratio, dye characteristics, additions to the dye bath (such as acids, salts and dyeing auxiliaries), dyeing time, dyeing temperature, and the degree of purity, extent of drawing and degree of crystallinity of the fibre being dyed, as well as the number of dye bonding groups available in the fibre.

Dye ager: A horizontal continuous-dyeing machine for all conventional textile fabrics (including difficult qualities such as cotton velvet and lining fabrics) with all classes of dye, by the pad-steam process and the wet-in-wet process of vat dyeing voluminous fabrics in which dye is applied on a preceding padder and the reducing agent padded on directly before the ager entry using a special applicator unit. A high degree of reproducibility is achieved by the ager.

Dye batch: A batch of textile material dyed in a single process cycle (charge).

Dye bath preparation: It is the preparation of a dye bath incorporating additives and chemicals or dyeing assistants using dispersing agents, sometimes solvent accelerators, and in the case of disperse dyestuffs also carriers, ethoxylates, etc., usually in pourable form as dye pastes of varying viscosity. Weighing apparatus may be connected to the dissolving plant.

Dye beam: A perforated cylinder (usually of stainless steel) on which woven or knitted textile fabric to be dyed in a beam dyeing machine is wound.

Dye beam batcher: Special batching unit for batching textile fabrics on to dye beams before dyeing and debatching after dyeing. The debatching operation takes place in the wet state.

Dye carrier: See **Carrier**.

Dye cations: See **Dye ions**.

Dye classification: See **Classification of dyes, Dyes (Classification of)**.

Dye diffusion: (a) The mechanism by which dyes dissolved in the aqueous liquor diffuse through the water-filled pores in the fibres and are adsorbed on to the walls of the pores at the same time. This case applies particularly to cellulosic fibres and porous acrylic fibres; (b) The mechanism by which dissolved or dispersed dye enters the fibre through the less ordered and

amorphous regions of a polymer substance. The rate of diffusion of the dye molecule is determined in this case by the mobility of the segments in the polymer chain molecules. The segment mobility starts at the glass transition temperature at which point the non-crystalline regions of the fibres or polymers are transformed from a glass-like into a viscoelastic state. Free-volume diffusion is particularly dominant in the case of polyamide.

Dye equilibrium: See **Dyeing equilibrium**.

Dye fixation efficiency in exhaust dyeing: An estimate of the average proportion of dye actually fixed on a textile substrate in exhaust dyeing. The same study can be made by investigating the proportion of unfixed dye remaining after the completion of dyeing. The proportion of dye lost in spent dye baths and rinse water are as follows:

(a)	Sulphur dyes	30–40%
(b)	Reactive dyes	20–50%
(c)	Vat dyes	05–20%
(d)	Direct dyes	05–30%
(e)	Naphthol dyes	05–10%
(f)	Disperse dyes	08–20%
(g)	Metal-complex dyes	02–05%
(h)	Cationic dyes	02–03%
(i)	Acid dyes	07–20%

Dye fixing agent: A cationic complex forming resin which is applied on the fabric dyed with direct and reactive dyes to improve wash fastness. The direct dye forms a complex with the fixing agent which is less soluble in water and hence reduce the bleeding and thus improves the fastness of the direct dyeing. In case of reactive dyeing, it works in a little different way. In reactive dye, the wash fastness is affected mainly by the hydrolysed dye which acts like a direct dye, which is complexed with the dye fixing agents. The dye fixing agents are also used in printed fabric washing to avoid tinting the white ground, discharges white area or lightly coloured printed area. The washed off colour, as soon as coming out of the dark coloured printed area, forms complex with these fixing agents thereby avoiding tinting white ground, etc.

$$R\text{-}SO_3Na \text{ (direct dye)} \rightarrow R\text{-}SO_3^- + Na^+$$

$$X\text{–}N^+\ldots\text{-}OOC\text{-}CH_3 \text{ (fixing agent)} \rightarrow X\text{-}N^+ + \text{-}OOC\text{-}CH_3$$

$$RSO_3^- + X\text{-}+N \rightarrow RSO_3^-\ldots.^+N$$

Dye fleck: (a) An imperfection in fabric caused by residual undissolved dye; (b) A defect caused by small sections of undrawn thermoplastic yarn that dye deeper that the drawn yarn.

Dye ions: Dye ions, which represent by far the greatest proportion of the dye molecule, and which are responsible for the dyeing properties at the same time, dissociate in aqueous solution. The resultant dissociated ions of the considerably smaller fraction of the molecule, which have opposite charges, are referred to as counter ions. All dyes which form dye salts or dye acids contain both types of ion together.

Dye jigger: See **Jigger**.

Dye kitchen: A part of the dye house where the dye or chemical is weighed, mixed along with necessary auxiliary, dissolved or emulsified or made into paste form, in case of printing, and made ready to be supplied to the bleaching, dyeing, printing or finishing machines. The dye kitchen can be automatic or manual or semi-automatic. See **Colour kitchen**.

Dye liquor: The liquid that contains the dye and the reagents necessary for dyeing. The dye liquor or solution consists of liquid medium (usually soft water), the dye and the additives necessary for the dyeing process in question such as levelling agents, retarding agents, padding auxiliaries and dispersants, etc. Concentrated liquor is used for padding textile fabrics. Dilute liquor is used for exhaust dyeing.

Dye migration: (a) Reduction of depth of colour in wool dyeing. Dyestuff migrates across to adjacent undyed wools. Migration test –it is a test for migration propensity of a dye; (b) In union dyeing, the migration of individual dyes to specific fibres, e.g., acrylic/wool mixes – cationic dyestuffs to acrylic, anionic dyestuffs to wool.

Dye migration in drying: The movement of dye molecule from one face to another face or on the surface or form one place to another place of any textile material during the drying of the same. This undesirable phenomenon causes previously level dyeing to become uneven due to incorrect drying. This migration phenomenon (migration during intermediate drying) mainly arises when dyeing with dyestuffs with low or no fibre affinity (but also in the case of proofing, synthetic resin finishes or similar). Typical dyeing processes include in particular the undeveloped pigment padding and leuco vat ester dyeings, non-coupled naphthols, and also disperse and similar direct dyeing.

Dye mist: A dye liquor which has been atomized by passing it through fine jets.

Dye mixtures: Dyestuff formulations pre-constituted by the dyestuff manufacturer for various fibre blends, for example:

(a) Wool/cellulose – mixtures of acid dyes and direct dyes with neutral or weakly acid affinity.

(b) Wool/polyester – mixtures of acid dyes and/or 1:2 metal-complex dyestuffs and/or reactive and disperse dyes.

(c) Cellulose/polyester – mixtures of vat and/or leuco vat ester dyes and/or reactive and/or sulphur dyes and disperse dyes.

Dye recipe formulation: Before dyeing a fabric, the most cost-effective recipe must be established, i.e. with the fewest possible or least expensive dyes and the shortest possible dyeing time. Thus, a dyeing process must be found which could minimise the recipe costs (dyes and auxiliaries) and the dyeing time for the particular dyeing machines available. The selected dye recipe must also be capable of achieving the desired requirement profile in terms of colour matching and fastness properties against the approved sample. A record is kept of the established recipes for each article number and the quantities are "scaled up" appropriately for a specific order.

Dye range: A dye range is usually a continuous dyeing machine consisting of a dyeing unit, an after-treatment unit, a soaper and a drying unit running in tandem. Its example is a pad steam unit which will have a padder, steamer, oxidizing unit, soaper, and drier.

Dye resisting agent: See **Dye retarding agent**.

Dye sites: Functional groups within a fibre that provide sites for chemical bonding with the dye molecule. Dye sites may be either in the polymer chain or in chemical additives included in the fibre.

Dye solubility: It is the extent to which the dye dissolves in the dyeing media, usually water. The dye solubility is affected by the other additions in the dyebath, like salt, auxiliaries and such chemicals. Hence, the dye solubility has to be checked along with other chemicals/auxiliaries in the dye bath for the type of dyeing to be followed. Dye solubility is important in pad dyeing methods where dye solutions of very high concentrations have to be used, especially in case of dark shades.

Dye springs: Dye centres which intermesh elastically and can be compressed slightly. Often used in the place of perforated tubes for dye packages in order to achieve better dye penetration.

Dye stain (defect): A discrete area of a colour different from that of the adjacent parts of the fabric.

Dye stick: See **Dyeing stick**.

Dye streak: See **Dye streak.**

Dye strength: The colour value of a particular dye, especially in dyeing. In the manufacture of dyes, the strength of dye from different batches is maintained constant by adding dispersants, electrolytes or by mixing different batches. Commercial dyes are always checked for dye strength in various supplies by the dyes to avoid dyeing variations.

Dye tubes: Tubes on which yarn is spooled for dyeing in the form of yarn packages (dyeing tubes for yarn dyeing), disposable dye tubes made of plastic, flexible tubes (flexible either axially or radially) for yarn with pronounced shrinking properties, non-disposable dye tubes made of plastic such as Biko dye tubes (which can also be made from stainless steel) and dyesprings.

Dye tube (split): Flexible dye tube made from perforated stainless steel, slit open in order to make it radially flexible.

Dye uptake: (a) The dye uptake is the quantity of dye absorbed by the fibre;

(b) Substantivity, exhaustion (diffusion) model.

N Dye-weave process: Polychromatic dyeing process in which the dye is supplied by moving nozzles. The jets of dye solution are directed onto the surface of an angled plate, from where they impinge upon the substrate and are then squeezed out on a vertical two-bowl padder.

Dye winch (paddle-dyeing machine, paddle vat): Dye vat of hemispherical or 3/4-spherical form made of wood, copper or stainless steel with a rotatable hank winch or paddle as a "moving device" sitting horizontally and to one side on the top. The ends of the winch or paddles extend down into the top of the liquor and when put into operation, they provide continuous movement to the liquor and material.

Dye works: Dye manufacturing plant (dye factory).

Dye (definition of): See **Dye**.

Dyeability: The capacity of fibres to accept dyes. As a prerequisite for the use of textile fibres, one of their most important properties is dyeability. In practice, the dyeability of a textile fibre is determined by the rate of dyeing and the degree of saturation which can be achieved. For example, the different dyeing properties of mercerized cotton compared to non-mercerized cotton can be characterized by results from the time of half dyeing (i.e. the reciprocal of the rate of dyeing) and the saturation concentration of the substantive dye. The range of application of some synthetic fibres has been, and still is, limited either because they have poor dyeability or the problem of dyeing these fibres has not yet been satisfactorily solved. For example, when 21/2 acetate fibres were first introduced, they were not successful for a long time because they could not be dyed with the known dye classes at that time.

Dye bath exhaustion: The adsorption of the dye from the dyebath on to the fibre. Usually some accelerators are added to the dye bath to increase the exhaustion of the dye. Example is the addition of the electrolyte in the direct and reactive dyeing of cotton. The exhaustion of the dye bath depends on the dye, fibre and exhaustion accelerators, bath temperature, etc. The dyebath exhaustion is proportional to the dye fixation.

Dyed and printed: The process of dying the ground shade and printing. Dyed print can be a direct style printing (over print) of a discharge printing. When over printing, the ground shade can have an effect on the final print shade.

Dyed in the grease: Large number of low grade worsteds are dyed as they come from the loom, without being scoured first. Dyeing in the grease is used only for black and blue colours.

Dye house: Dyestuff formulations. An industrial (textile dye house) or commercial plant (garment dyeing) for the dyeing of textiles.

Dye house laboratory: A laboratory under the control of the dyehouse mainly intended for carrying out laboratory dyeing and tests in addition to dyeing related analytical procedures in many cases.

Dyeing: The process of applying a comparatively permanent colour to fibre, yarn or fabric by immersing in a bath of dye. Dyeing is carried out in a dyehouse with dyestuffs and is used in (textile) finishing. The process depends on the type of fibre and form of the material in dyeing vessels, dyeing apparatus or machines. The dye is applied to a given substrate by a technological process, mainly consisting of deposition or adsorption and fixation (both processes being carried out simultaneously or in succession). If necessary, the process is preceded by pre-treatment and followed by post-treatment of the substrate.

Dyeing (batik): A resist-dyeing process in which portions of a fabric are coated with wax; during the dyeing process, only the uncovered areas take up dye. The process can be repeated so that several colours are used. Batik dyeing is often imitated in machine printing.

Dyeing (chain): A method of dyeing yarns and fabrics of low tensile strength of tying them end-to-end and running them through the dyebath in a continuous process.

Dyeing (cross): A method of dyeing blend or combination fabrics to two or more shades by the use of dyes with different affinities for the different fibres.

Dyeing (high temperature): A dyeing operation in which the aqueous dyebaths are maintained at temperatures greater than 100°C by use of pressurized equipment. Used for many manufactured fibres.

Dyeing (ingrain): Term used to describe yarn or stock that is dyed in two or more shades prior to knitting or weaving to create blended colour effects in fabrics.

Dyeing (mass coloured): A term to describe a manufactured fibre (yarn, staple, or tow) that has been coloured by the introduction of pigments or insoluble dyes into the polymer melt or spinning solution prior to extrusion. Usually, the colours are fast to most destructive agents.

Dyeing (muff): A form of yarn dyeing in which the cone has been removed.

Dyeing (pad): (1) See **Dyeing, Yarn dyeing**.

A form of dyeing whereby a dye solution is applied by means of a padder or mangle.

Dyeing (piece): The dyeing of fabrics "in the piece," i.e., in fabric form after weaving or knitting as opposed to dyeing in the form of yarn or stock.

Dyeing (pressure): Dyeing by means of forced circulation of dye through packages of fibre, yarn, or fabric under super atmospheric pressure.

Dyeing (reserve): (a) A method of dyeing in which one component of a blend or combination fabric is left undyed. The objective is accomplished by the use of dyes that have affinity for the fibre to be coloured, but not for the fibre to be reserved; (b) A method of treating yarn or fabric so that in the subsequent dyeing operation the treated portion will not be dyed.

Dyeing (gel): Passing a wet-spun fibre that is in the gel state (not yet at full crystallinity or orientation) through a dyebath containing dye with affinity for the fibre. This process provides good accessibility of the dye sites.

Dyeing (short liquor): A term used to describe any yarn or piece dyeing in which the liquor ration has been significantly reduced. The technique was designed to save water and energy.

Dyeing (skein): The dyeing of yarn in the form of skeins or hanks.

Dyeing (solution): See **Dyeing, Mass-coloured**.

Dyeing (solvent): A dyeing method based on solubility of a dye in some liquid other than water, although water may be present in the dyebath.

Dyeing (space): A yarn-dyeing process in which each strand is dyed with more than one colour at irregular intervals. Space dyeing produces an effect of unorganized design in subsequent fabric form. The two primary methods are knit-de-knit and warp printing.

Dyeing (stock): The dyeing of fibres in staple form.

Dyeing (thermal fixation): A process for dyeing polyester whereby the colour is diffused into the fibre by means of dry heat.

Dyeing (union): A method of dyeing a fabric containing two or more fibres or yarns to the same shade so as to achieve the appearance of a solid coloured fabric.

Dyeing (yarn): The dyeing of yarn before the fabric is woven or knit. Yarn can be dyed in the form of skeins, muff, packages, cheeses, cakes, chain-wraps and beams.

Dyeing accelerator: See **Carriers**.

Dyeing auxiliaries: The chemicals or a mix of chemicals used along with the main dye or chemicals used in the processing to help in the process or help in the effectiveness of the chemicals used in one way or other, etc. The process can be preparation, bleaching dyeing, printing, finishing, correction of processes or washing or any processes done in the process house. Normally, the details of formulations of the auxiliaries are kept as trade secret. Some groups of auxiliaries will include, mordanting, fastness improving agents, levelling agent, dyeing oils, wetting agents for dyeing and dyeing oils, dye solubilizing and dispersing agents, fibre protections agents, wetting agent, soaping agents, retarding agent, over boiling inhibitor, stripping agent, stripping auxiliary, etc.

Dyeing curves: See **Reflectance**.

Dyeing equilibrium: A concentration equilibrium between the amount of dye on the fibre and the amount of dye in the dyebath which becomes established by the end of every dyeing process.

Dyeing machines: Devices in which the material which is to be dyed (as distinct from dyeing machine, circulating) is agitated in more-or-less stationary liquor, for example –padder, rope-winch vat, jigger, continuous dyeing machine, paddle dyeing machine, star frame and, among others, modern processors such as the pad-jigger, pad-roll, pad-steam, pad-wet and pad-winch processes.

Dyeing parameters: Dyeing parameters are all the factors exercising an influence on the dyeing process.

Dyeing solution: See **Dye liquor**.

Dyeing sticks(dye stick): Dyeing sticks are used for the following purposes –(a) In yarn-dyeing for suspending the hanks (hardwood dyeing sticks made from hazelnut, hickory, etc., with a synthetic resin/ebonite coating as well as aluminium or toughened glass, bent into a U-shape); (b) In garment dyeing for moving/turning the goods during dyeing.

Dyeing time: In the practical sense, the term "dyeing time" must include the entire treatment time required for the batch, i.e. the times required for the pre-treatment, clearing, rinsing and after-treatment stages in addition to the actual dyeing time.

Dyeing vat (beck, tub): These are four-sided vessels for dyeing, bleaching, etc., made of wood, metal, earthenware, tiled or similar for hank yarn and loose stock; may be fitted with two squeeze rollers or with winch for piece dyeing. Heated by means of open and/or closed steam pipe.

Dyeing (batik): See **Batik dyeing**.

Dyeing (cross): See **Cross dyeing**.

Dyeing (high temperature): See **High temperature dyeing**.

Dyeing (ingrain): Ingrain dyes is an incorrect description of group colours produced in *situ* on the fibre by coupling, or reaction of one or more intermediates. The process involved in this method of the production of dye on the fibre is called ingrain dyeing. An example is the naphtolation and coupling process.

Dyeing (jet): See **Jet dyeing**.

Dyeing (methods of): These have been the subject of continual development over the years, especially because of the need to rationalize or for reasons related to colour levelness and dye compatibility or because of new problems appearing with new substrates. Thus, there is a whole series of possibilities for variation such as short-liquor dyeing, foam applications, thermosol processes, jet dyeing (jet-dye machines), overflow dyeing, (overflow dyeing machines), HT dyeing processes, pad-steam dyeing processes and continuous wet-steam processes among others. In order to optimise the dyeing process, the dyeing procedure is controlled according to a program and process control systems are used to control the operations.

Dyeing (muff): Muff is dyed both in accordance with the packing system and in accordance with the creel system in the circulation machine. (a) Short muff – height approximately 15 cm, 650–800 g; (b) Long muff – height approximately 25 cm, 1440–1700 g. See **Muff**.

Dyeing (mass coloured): Mass colouration is also called spin dyeing or jet dyeing. The method involves the mixing of finely distributed dye pigments which can withstand the temperature and process of spinning, to the spinning solution or melted synthetic polymers.

(a) *Continuous process* – dyes (liquid or in paste form) are dispersed in binders (polymers of different molecular weights or polyethylene

glycols of high molecular weight) and are injected into the molten polymer using additional extruder, which directly supplies the main extruder, in which polymer granules are melted.

(b) *Discontinuous process for polyester* – in a unit of production for the manufacture of polyester granules, the polyester chips are dried in a vacuum for several hours at 140–180°C in rotary driers or tumblers and at the end of this process specially selected dyes are added; they are fixed on polyester granules via thermos-diffusion. Suitable process for the manufacture of small quantities of spin-dyed fibres/ threads.

(c) *Discontinuous process for polyamide*– polyamide granules are simultaneously washed and dyed in the aqueous medium. After several hours drying at 180°C, it is melted under the same conditions as colourless granules. Granule dyeing is carried out in a machine with bath circulation. Used, for example, in polyamide for upholstery fabrics, carpets, floor carpeting, automobile articles; in polyester for upholstery fabrics, menswear, work clothing.

Dyeing oils: A now largely obsolete term for wetting agents used in dyeing which confer additional softening effects on the textile material.

Dyeing parameters: These include all the factors exercising an influence on the dyeing process.

Dyeing (piece): Dyeing of textile in the piece form. See **Piece dyeing**.

Dyeing (reserve): See **Reserve dyeing, Resist dyeing**.

Dyeing (short liquor): Dyeing of textile in low liquor ratio. Short liquor dyeing is advantageous in many ways such as saving of water, energy, time of treatment, reduction in pollution, etc. See **Short liquor dyeing**.

Dyeing (skein): Dyeing of textile yarn in the skein form. See **Skein dyeing**.

Dyeing (solvent): Dyeing of textile using a solvent as the dyeing medium instead of water. In solvent dyeing, usually the solvent is recovered. See **Solvent dyeing**.

Dyeing (space): See **Space dyeing**.

Dyeing (stock): Dyeing of textile in the loose stock or fibre form is called stock dyeing. See **Stock dyeing**.

Dyeing (union): Dyeing of textile containing wool. See **Union dyeing**.

Dyeing (yarn): Dyeing of textile in the yarn form. See **Yarn dyeing**.

Dye liquor: It is also called dyebath. The dye liquor consists of liquid medium (usually soft water), the dye and the additives necessary for the dyeing process in question such as levelling agents, retarding agents, padding auxiliaries and dispersants, etc. Concentrated liquor is used for padding textile fabrics. Dilute liquor is used for exhaust dyeing.

Dyer's spirit: Aqua fortis, 10 parts; sal ammoniac, 5 parts; tin, 2 parts; all these are dissolved together.

Dyes (acid): A class of dyes used on wool, other animal fibres, and some manufactured fibres. Acid dyes are seldom used on cotton or linen since this process requires a mordant. Acid dyes are widely used on nylon when high wash-fastness is required. In a few cases, even higher wash-fastness can be obtained by after-treatment with fixatives.

Dyes (aniline): Dyes derived chemically from aniline or other coal tar derivatives.

Dyes (anthraquinone): Dyes which have anthraquinone as their base and the carbonyl group (>C=O) as the chromophore. Anthraquinone-based dyes are found in most of the synthetic dye classes.

Dyes (azo): Dyes characterized by the presence of an azo group (-N=N-) as the chromophore. Azo dyes are found in many of the synthetic dye classes.

Dyes (azoic): See **Dyes, Naphthol dyes, Dyes, Naphthol**.

Dyes (basic): A class of positive-ion-carrying dyes known for their brilliant hues. Basic dyes are composed of large-molecule, water-soluble salts which have a direct affinity for wool and silk and can be applied to cotton with a mordant. The fastness of basic dyes on these fibres is very poor. Basic dyes are also used on basic-dyeable acrylics, modacrylics, nylons, and polyesters, on which they exhibit reasonably good fastness.

Dyes (cationic): See **Dyes, Basic dyes, Dyes, Basic**.

Dyes (developed): Dyes which are formed by the use of a developer. The substrate is first dyed in a neutral solution with a dye base, usually colourless. The dye is then diazotized with sodium nitrate and an acid and afterwards treated with a solution of *B*-naphthol, or a similar substance, which is the developer. Direct dyes are developed to produce a different shade or to improve wash-fastness or light fastness.

Dyes (direct): A class of dyestuffs which are applied directly to the substrate in a neutral or alkaline bath. They produce full shades on cotton and linen without mordanting and can also be applied to rayon, silk and wool. Direct dyes give bright shades, but exhibit poor wash-fastness. Various after-

treatments are used to improve the wash-fastness of direct dyes, and such dyes are referred to as "after-treated direct colours."

Dyes (disperse): A class of slightly water-soluble dyes, originally introduced for dyeing acetate and usually applied from fine aqueous suspensions. Disperse dyes are widely used for dyeing most of the manufactured fibres.

Dyes (fibre reactive): A type of water-soluble anionic dye having affinity for cellulose fibres. In the presence of alkali, they react with hydroxyl groups in the cellulose and thus are liked with the fibre. Fibre-reactive dyes are relatively new dyes and are used extensively on cellulosic when bright shades are desired.

Dyes (macromolecular): A group of inherently coloured polymers. They are useful both as polymers and as dyes with high colour yield. The chromophores fit the recognized CI classes, i.e., azo, anthraquinone, etc., although not all CI classes are represented. Used for mass dyeing, hair dyes, writing inks, etc.

Dyes (metallised):A class of dyes which have metals in their molecular structure. They are applied from an acid bath.

Dyes (naphthol): A type of azo compound formed on the fibre by first treating the fibre with a phenolic compound. The fibre is then immersed in a second solution containing a diazonium salt that reacts with the phenolic compound to produce a coloured azo compound. Since the phenolic compound is dissolved in caustic solution, these dyes are mainly used for cellulose fibre; although, other fibres can be dyed by modifying the process.

Dyes (pre-metallized): Acid dyes that are treated with coordinating metals such as chromium. This type of dye has much better wet-fastness than regular acid dye. Pre-metallized dyes are used on nylon, silk and wool.

Dyes (Sulphur): A class of water-insoluble dyes that are applied in a soluble, reduced form from a sodium sulphide solution and are then re-oxidized to the insoluble form on the fibre. Sulphur dyes are mainly used on cotton for economical dark shades of moderate to good fastness to washing and light. They generally give very poor fastness to chlorine.

Dyes (vat): A class of water-insoluble dyes which are applied to the fibre in a reduced, soluble form (leuco compound) and then re-oxidized to the original insoluble form. Vat dyes are among the most resistant dyes to both washing and sunlight. They are widely used on cotton, linen, rayon, and other cellulosic fibres.

Dye spot: See **Dye stain**.

Dyestain: An area of discolouration due to uneven absorption of a colourant.

Dyestreak: An unintended stripe in a fabric due to uneven absorption of a colourant.

Dyestuff (classification of): (a) For cotton, viscose, modal fibres and linen – direct (substantive) dyes: anionic dyes which exhaust directly on to the fibre, i.e. without pre-mordanting. They have only moderate wash fastness and some have very high light fastness.

- Reactive dyes: Anionic dyes which exhaust directly and react chemically with the fibre. Consequently, they are very fast to washing and offer a brilliant range of shades.
- Vat dyes: These are water-insoluble pigments which are dissolved (vatted) by reduction and dye the fibre in the reduced form. After subsequent oxidation, the original pigment is restored on the fibre. Vat dyes are very fast to washing and light (Indanthren) but there are no brilliant shades.
- Sulphur dyes: some sulphur dyes are available as unmodified pigments which are dissolved by reduction during dyeing, others are available in a pre-reduced form. Subsequent oxidation restores the original pigment on the fibre (analogous to vat dyes). Economical, but the shade gamut is restricted to browns, olives, dark blues and blacks.
- Azoic colorants: the dye is formed on the fibre in two stages, i.e. by pretreatment with a naphthol followed by a second treatment with a diazonium salt. High fastness properties.
- Pigments: these are deposited on the fibre and fixed mechanically with binders. They have low rub fastness but are very fast to light. They are used for dyeing pale shades and for printing all depths of shades.

(b) For wool, silk and polyamide fibres: – Acid dyes: anionic dyes. These include acid levelling dyes with moderate wash but high light fastness and milling dyes with high wash fastness.

- Chrome dyes: anionic dyes which are bound to the fibre in the form of chromium omplexes by means of an after treatment with chromium salts. Very high wash fastness.
- Metal-complex dyes: anionic 1 : 1 or 1: 2 metal dye complexes. They are characterized by high wash fastness and very high light fastness but include no brilliant shades.
- Reactive dyes: see 1, used especially for machine washable wool.

(c) Dyes for acetate, triacetate and polyester fibres:

– Disperse dyes: these are non-ionic dyes which are only sparingly soluble in water and are therefore applied as dispersions.

(d) For acrylic fibres: Cationic dyes: these are characterized by high wash and light fastness.

– Another classification system for dyestuffs is based on their chemical structure.

Dyestuff formulation: Depending on dyestuff type (reactive, disperse, vat, direct dyestuff) and application type (exhaust dyeing, printing, continuous), dyestuff formulations contain specific additives which give the commercial form the best possible properties in respect of storage stability, handling, results, etc. The usual additives are as follows:

(a) Dispersants, Surfactants – lignin sulphonates, naphthalene sulphonate, formaldehyde addition compounds, ethylene oxide-propene oxide-copolymers.

(b) Salts – sodium sulphate, sodium chloride.

(c) Dust-bonding agents – mineral oils, paraffin oils (+additives).

(d) Antifoams –ditertiary acetylene glycols.

(e) Antifreezes – glycerine, glycols.

(f) Thickeners carboxymethyl – cellulose polyacrylates.

(g) Buffer systems – phosphate, acetate.

Dynamic adhesion: The ability of a cord-to-rubber bond to resist degradation resulting from flexure.

Dynamic range: An instrument's range of measurable values, from the lowest amount it can detect to the highest amount it can handle.

Dynapoint process: A continuous computer-controlled process for manufacturing tufted carpets with intricate patterns from undyed yarn. The carpet is dyed as it is tufted, and the colours and patterns are clearly visible through the primary backing of the carpet.

Dynel: Trade name for acrylic fibre, which has the advantage of being flame resistant. It is warm handling and bulk well, and is often used in fur fabrics.

E

E Modulus: Modulus of elasticity. See **Tensile elasticity**.

EA: Elastane fibres.

Equivalent: A term applied to two or more methods, procedures, etc., expected to give the same average results.

Earth colours: The colours found in nature. Natural earth displays itself in a vast array of different colours dependent on the chemicals or minerals present. For example, carbon or magnetite will produce a black earth, cobalt, magnesium or zinc has a blue effect; iron silicate or ferrous oxide has a green effect; iron oxide or lithium a red effect; feldspar, kaolin and quartz produce a whitish earth and limonite and ferric oxide produce a yellow effect; the whole range of oranges, ochres, russets, umbers and browns.

Earth Flax: Same as **Asbestos**.

Ease-of-care: A term used to characterize fabrics that, after laundering, can be restored to their original appearance with a minimum of ironing or other treatment. An ease-of-care fabric generally wrinkles only slightly upon laundering. See **Durable press** and **Wash and wear**.

East improved: A commercial variety of late maturing cotton from Georgia, yielding 31–32% of long staple.

Eastern pulled wool: Wool is pulled from the skins after it has been loosened, usually be a depilatory. Pulled wool should not be confused with dead wool.

Easy care: See **Ease-of-care**.

Easy care finishes: In order to eliminate creasing (wrinkling) of cotton fabrics during wear and service (washing, drying, ironing) as far as possible, i.e. to make ironing or pressing superfluous if possible, cotton materials are treated with cross-linking agents. See **Wash and wear finishing**.

Eau de javelle (eau de Javel): Named after the district of Javel in Paris. Originally a clear aqueous solution of potassium hypochlorite also containing potassium chloride. Used for bleaching cellulosic fibres. Potassium hypochlorite solution has now been largely substituted by a cheaper but similar sodium hypochlorite solution under the same name.

Eau de nil: Light green; literally ‘water of the Nile’ and hence called Nile green.

Eaude labarraque: Sodium hypochlorite solution named after its French discoverer. Also, commercially available as Eau de Javelle.

Ebonite: Hard rubber.

Ebru' process: The precursor to Aquagraphics. This is an 800-year-old Turkish printing method which uses animal waste products including ox bile and boiled papyrus. Method as for aquagraphics.

Eburnean: Having the colour of or resembling ivory.

Ecaille: (a) French silk dress goods made with ply warps, six leaves and 32 fillings in a repeat; (b) Fish scale like work, made of flat quills over silk or velvet.

ECE: Europäische Convention für Echtheitsprüfung (European Convention on Fastness Testing).

Echantillon: Clipping; sample of a textile fabric.

Ecobalance: Comprises the description and listing of the primary effects of specific processes on the environment, i.e. on air, water and soil, taking additional account of energy and raw material requirements. An eco-balance should express by means of objectively produced figures the effects on humans, animals, plants and their environment occurring over the entire life cycle of a product.

Eco-labelling of textiles: For identifying the physiological and toxicological properties of the product in wear, disposal or recycling of "used" articles of clothing, ecology and human ecology of the production process.

Ecolabels: An ecolabel with well-founded, verifiable criteria provides the industry with the motivation for ecologically optimising textile products, security for the trade and confidence for the consumer in the textile product purchased. In this way, it fulfills the producer's obligations as to information on the one hand, and the buyer's safety requirements on the other.

Ecology: (Greek: oikos = dwelling; logos = science). Concept of the science of relationships in the living organism/environment system introduced in 1866 by Ernst Hackel. Ecological equilibrium is based on the natural capacity for self-regulation between different links of a long-term relationship (xenobiosis). This equilibrium is affected, disrupted or even broken up by massive environmental pollution. Ecological problems upset nature's equilibrium.

Economy trough: Padding trough normally supplied with high performance padders. Low liquor content to prevent tailing problems, etc. The fabric immersion path is designed to be as long as possible and the trough liquor volume is reduced by means of a divider.

Econ-Tex: This Babcock scouring machine looks like a roller vat at first glance (Fig. 1). It has actually taken over the roller vat's vertical fabric guiding system in single and double loop feed, with the possibility of scouring sections with different fabric contents, which can be adapted to different function definitions.

Ecossais: French and English dress goods made of all worsted, also with cotton warp with bright coloured plaid designs.

E-control dyeing: The E-control concept has been developed jointly by Monforts and Zeneca colours to provide a simple, rapid and economical continuous coloration process with minimum chemical usage. E-control brings together the innovation of the Thermex Hot Flue from Monforts with Procion reactive dye technology from Zeneca. The innovation utilises the physical laws of water evaporation from cellulose to provide the optimum temperature and moisture conditions within the Thermex Hot Flue drier, ideal for the efficient fixation of the specially selected Procion dyes. The control and maintenance of the humidity level in the drying process avoids the use of large quantities of chemicals such as urea and sodium chloride (salt).

Eco-tex standard 100: An ecological quality mark should embrace the following ideas – (a) a textile product, the nature of which is free of harmful substances and is skin-compatible;(b) a method of production (fibre cultivation, fabric production, finishing and making-up) which is perfectly ecologically harmless and environmentally compatible; (c) easy to dispose of in order to get rid of the used textile product by recycling, decomposition or combustion.

Ecru: (French for raw, unbleached). In general, the colour of fibres, yarns, or fabrics (especially of linen) that have not been subjected to processes affecting their natural colour, i.e. untreated, unbleached, undyed. Specifically: (a) ecru linen, unbleached linen; (b) ecru silk (bast silk) is barely degummed silk (maximum 4% loss) – only grease, wax and resinous substances removed.

Ecru lace: The geometrical designs are composed of ecru coloured plain and crinkled tape, connected with braids.

Ecru silk: Has only the most soluble part of the natural gum removed together with the colouring pigments.

ED: See **Elastodiene fibres**.

EDCO: Editing Committee. Special committee responsible for the editing of ISO recommendations.

Edelweiss lace: Another name for Aetzstickerei.

Edge abrasion resistance: See **Flexing abrasion resistance**.

Edge crimping: See **Texturing, Edge crimping method**.

Edge curling: A fabric defect which arises in the processing and finishing of woven and knitted fabrics due to faulty construction. In woven fabrics, it is due to excessive tension of warp threads in the selvedges (tight selvedges) or an unsuitable woven construction. Knit goods, in general, are particularly prone to edge curling.

Edge curling of knit goods: Problem encountered in processing knit goods in the open width state. The cause is mainly due to tightness of the fabric edges and is largely prevented by Edge gumming.

Edge gluing device: Device for gluing the edges of open-width knitted fabrics.

Edge guider (Expander): Selvedge guiding device; Edge uncurling device; Edge guiding sensors; Overfeed devices; Selvedge monitor, device to remove the fabric using clip openers or to lift the fabric from stenter pins and fabric take-off mechanism.

Edge gumming: A necessary measure to prevent the Edge curling of knit goods. The edge adhesive is applied from a special edge gluing device by spraying and drying, or by roller application from the edge gluing units on a stenter.

Edge roll: The curl that develops on the edge of a single-knit fabric preventing it from lying flat.

Edge-stitched seam-finish: A finish for the raw edges of a plain seam in which machine stitching is placed close to the raw edge of each seam allowance.

Edge stitching: (French: piquer = to quilt), lockstitch-type sewing of padding and its permanently elastic binding with the outer fabric (by means of an edge stitching machine).

Edge to centre levelness: Side-to-centre levelness of shade across the width of a textile fabric. An important quality parameter in continuous dyeing which can only be ensured by completely uniform dye uptake across the entire fabric width in pad dyeing.

Edge to edge unevenness: See **Listing**.

Edge trimmers (with suction device): Used to trim the needled edges of the run of cloth and to simultaneously aspirate the trimmed selvedges on exit from stentering and drying machines.

Edge uncurling device: Device used to remove the curl from selvedges that have a tendency to roll and make processing difficult.

Edge wire: A length of wire or monofilament yarn, drawn in through a heald and working as a warp thread at one or both edges of the warp, in a narrow fabric loom.

Edge-stitched seam-finish: A finish for the raw edges of a plain seam in which machine stitching is placed close to the raw edge of each seam allowance. See ***Top-stitching***.

Edging: (a) A narrow strip of material attached to another fabric or made up article by one edge usually for decorative purposes.

(b) Overstitching along the edge of the fabric to avoid fraying or ornamentation.

Edging (Fr.): Binding, edge binding and border on woven textiles and knitwear.

Edisto: The best grade of Sea Island cotton that has a very long, fine uniform and silky staple.

Edredon: Pine soft woollen woven in three-leaf twill, made with a filling thicker than the warp.

EDTA: Ethylene diamine tetra acetic acid. It is important in inorganic chemistry because the carboxylate ion can act as a ligand in forming complexes. EDTA is a hexadentate ligand, able to coordinate to a metal ion at the four COO– groups and the two nitrogen atoms. It is able to form octahedral complexes with certain metal ions. Complexing agent which can be used as a water softening agent by direct addition to hard water.

EEE pretreatment system (eee = efficiency, economy, ecology): Sandoz, Basle, Switzerland, offers the eee system, a series of tried and tested process combinations for all pretreatment requirements, which comply with strict quality control measures.

Effect side (weft knitted fabric): The side of a fabric intended to use outermost in a garment or other construction.

Effect thread: Yarns inserted in a fabric which are sufficiently different fibre, count or construction to form or enhance a pattern.

Effect yarn: Warp or weft yarn introduced into the cloth for the only purpose to produce certain effects, as in colour, knots, loops, etc.

Effective carriage mass: In CRL-type tensile testing machine – The force actually applied to a specimen by mass of carriage, plus added masses.

Effective carriage weight: A load actually applied to a fabric specimen by mass of the carriage plus added weight when used.

Effective fibre length (in tensile testing): The estimated length of the specimen subjected to a strain equal to that observed for the true gauge length.

Effective fibre length (in vibroscope test for linear density): That portion of the fibre free to vibrate between fixed supports or holders.

Effective gauge length (in tensile testing): The estimated length of the specimen subjected to a strain equal to that observed for the true gauge length.

Effective insulation ratio (in thermal transmittance of textile): The increase in insulation afforded by the fabric in comparison to the uncovered test plate under specified conditions of test.

Effectivity Factor(EF): The effectivity factor is extremely useful for the (relative) evaluation of the finish effect of various resin treatments:

$$EF = (A - B)/C$$

A = Dry crease recovery angle of resin finished fabric

B = Dry crease recovery angle of non-resin finished (unfinished) fabric

C = Loss of breaking strength of warp in %

Optimum values lie between 2.5 and 3.5. EF values > 4 indicate under-cured goods; values < 2 indicate over curing.

Efficiency of cleaning (of spinning machinery): During the cleaning operation of the fibres, some unavoidable fibre loss occurs during mechanical cleaning. When considering this fibre loss, normally the effective cleaning (EC) of a machine or a sequence of machines are considered

$$EC = 100.\ (W_t\text{-}W_f)/W_t$$

Wt = mass of waste; *Wf* = mass fibre in the waste.

Effilure: French term for unravelling of edges of the cloth.

Effile: French for fringed.

Efflorescence: Problem of finishing agents crystallizing out as powdery grey deposits on textile surfaces.

Effluent treatment (preliminary): Removal of waste water constituents such as rags, sticks, floatables, grit and grease that may cause maintenance or operational problems with the treatment operations, process and ancillary systems.

Effluent treatment (primary): Removal of a portion of the suspended solids and organic matter from the wastewater.

Effluent treatment (advanced primary): Enhanced removal of suspended solids and organic matter from waste water. Typically accomplished by chemical addition or filtration.

Effluent treatment (secondary): Removal of biodegradable organic matter (in solution or suspension) and suspended solids. Disinfection is also typically included in the definition of conventional secondary treatment.

Effluent treatment (tertiary): Removal of residual suspended solids (after secondary treatment) usually granular medium filtration or micro-screens. Disinfection is also typically a part of tertiary treatment. Nutrient removal also is usually included in this definition.

Effluent treatment (advanced): Removal of suspended materials remaining after normal biological treatment when required for various water reuse applications.

Eggshell: A pale beige; the colour of the shell of a hen's egg.

Egyptian blue: An ancient rich purplish-blue or turquoise colour made by heating copper, lime and quartz, also known as 'Egyptian frit'. Perhaps the first synthetic pigment. Sometimes called 'Pompeian blue'.

Egyptian cloth: Cotton cloth for wool embroidery.

Egyptian cotton: Fine top-quality cotton, originally from the Nile region; Plain weave soft cotton made into fabrics that could be plain or printed. It is used for making expensive baby clothes, blouses, summer dresses, nightwear, etc.

Egyptian flax: Very long and coarse fibre of reddish hue.

Egyptian lace: An expensive ornamental lace that is hand knotted and often elaborated with beads.

Egyptian red: A dark red colour.

Egyptian tape: A closely woven tape, traditionally made from a R20/2 tex (2/60s) Egyptian cotton yarn.

Egyptienne: (a) French silk dress goods, solid coloured or in various colours; obsolete;(b) Dress goods made of wool, camel's hair and waste silk;(c) Obsolete; dress goods with narrow satin stripes over ribbed ground.

Eiderdown:(a) A soft, elastic knitted fabric, made of thick and soft spun yarn; it is heavily napped on one side; (b) A loose and thick woollen fabric with a deep nap on one side.

Eider: Very soft knitting yarn, made of fine wool.

Eight harness satin: A warp-faced or filling faced weave illustrating that the entire face of the fabric surface that is covered with warp or filling yarn, respectively.

Eight lock fabric (weft knitted): A self-colour or two-colour double faced non-jacquard interlock based fabric, intended for use in either knitwear or as a double jersey fabric.

Eight lock: It is a 2 × 2 version of interlock that may be produced by using an arrangement of two long and two short needles, provided all the tricks are

fully cut through to accommodate them and knock-over bits are fitted to the verges to assist with loop formation on adjacent needles in the same bed.

Eis wool or Ice wool: Fine, two-ply worsted knitting yarn.

Ejoo: Very strong and dark coloured fibre, found at the base of the leaves of the sago palm in Malacca. It does not rot in water and is used for cordage, cables, etc.

Ell: 11/4 yards.

Enkatherm: A high temperature flame-proof fibre which is based on poly (terephthaloyl oxalic-bis-amidrazone) (PTO). This fibre is produced by wet-spinning and then drawn.

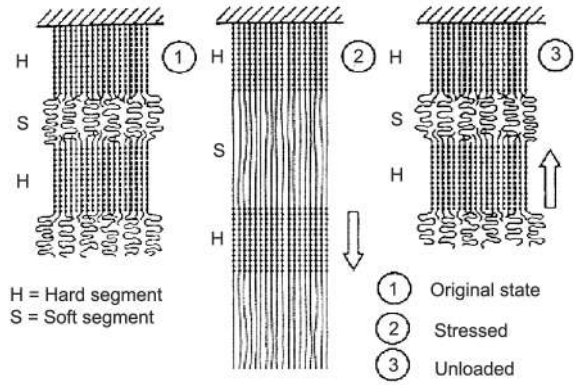
Eksuti: Cotton cloth made in India of single warp and filling.

EL: Elastane fibres.

Elance suede: A light weight suede suitable for shirts, dresses, etc.

Elastane: A term used to describe fibres that are composed of synthetic linear macromolecules and having in the chain at least 85% by (mass) of segmented polyurethane groups. They rapidly revert substantially to their original strength.

Elastane fibre: Manufactured fibres composed of at least 85% segmented polyurethane (Polyurethane elastomer fibres). Elastane fibres can be extended reversibly up to 500–700%. Compared to natural rubber fibres, they have the following advantages: almost white in colour (even transparent elastane fibres are commercially available), higher strength, good resistance to oils and cosmetics, more easily dyed. Structure: the macromolecules of elastane fibres contain hard (highly inextensible) segments alternating with soft (highly extensible) segments. Used for foundation and swimwear fabrics. They are lighter and longer lasting than rubber.



Elasticity: As in the case of strength, a distinction is made between the various types of elastic stress – Tensile elasticity, Bending elasticity and Torsional elasticity. In each case, the elasticity may be permanent or temporary. Inferences can be drawn from these parameters concerning dimensional changes in textiles which are of practical value with regard to their serviceability.

Elastic band: It consists of textile warp threads and elastic threads which are generally not covered by spinning, positioned between these at specific intervals.

Elastic binding: A light weight, elastic and narrow fabric of usually 09–25 mm wide; often with a scallop or picot edge and normally with a useful elongation of 120–160%.

Elastic cord: It has a rubber core with fine silk thread wounded around; used for men's hats.

Elastic fabric: A textile fabric made from an elastomer either alone or in combination with other textile material.

Elastic flannel: English knitted goods with raised nap on the face; used for women's garments.

Elastic gore: An elastic tape made with rubber threads; used for the sides of shoes, usually in black and tan.

Elastic in a casing: A piece of fabric is drawn up with elastic through a casing. See ***Self-casing***.

Elastic limit: The greatest stress that can be applied to a material without permanent deformation.

Elastic recovery: Recovery capacity of fibres. The degree to which the fibre, yarn, or cord return to their original size and shape after deformation from stress.

Elastic tape: A textile tape containing rubber or other elastomers to permit rubber-like stretch at least in one direction.

Elastic webbing: Textile webbing containing rubber or other elastomers to permit rubber-like stretch at least in one direction.

Elastication (in garment making): Fabric that is drawn up with elastic so that it is flexible rather than fixed.

Elasticity: The property of a material by virtue of which it tends to recover its original size and shape immediately after removal of force causing the deformation.

Elastics: Narrow fabrics with some of the warp thread made of elastomeric yarn; used for belts, suspenders, shoes, etc.

Elastik: A light weight, sheer, unbleached linen fabric, given a strong finish which is produced in Austria; used for underlining.

Elastin: Connective tissue protein, major component of elastic fibres as in blood vessels, ligaments, etc.

Elastique: A fabric with a high warp sett having a steep double twill line, used for making trousers, jackets and coats. This fabric is also referred to under a series of other names. For example, cavalry twill, whipcord, etc. In the 19th Century, the fabric was made in fine merino wool for over coating.

Elasticized fabric: A fabric that contains elastic threads. Such fabrics are used for girdles, garters and similar items.

Elastomer: Elastic polymers. As originally defined, this term refers to a group of synthetic thermosetting high polymers (such as polyisobutylene and its copolymers, polyurethane, "Thiokol", etc.) having properties similar to those of vulcanized natural rubber; namely, the ability to be stretched repeatedly to at least twice their original length at room temperature and to retract very rapidly to approximately their original length when released. The term was later extended to include uncross-linked polyolefins that are thermoplastic.

Elastodiene fibres: Generic name for man-made fibres based on polyisoprene or polymerized dienes (polybutadiene), with or without vinyl polymers. Extensibility characteristics similar to Elastane fibres.

Elastomer fibres: See **Elastane fibres***;* **Elastodiene fibres**.

Elastomer filaments: See **Elastane fibres**; **Elastodiene fibres**.

Elastomeric yarn: A non-textured yarn which can be stretched repeatedly at room temperature to at least twice its original length and which after removal of the tensile force will immediately and forcibly return to the approximate of its original length.

Elatche: Indian cotton and silk cloth with check patterns.

Elbow (in anatomy): The joint which articulates between the upper arm and the lower arm.

Elbow dart (in sleeves): Dart at elbow to allow ease for movement.

Elbow girth (in body measurements): With the arm bend at 90° and the clenched fist placed on the hip, the circumference of the elbow.

Elbow line (in sleeves): Cross grain at the elbow.

Eleanor blue: A blue colour made popular by Eleanor Roosevelt.

Electric blue: A brilliant light blue colour.

Electric velvet: English cotton or silk velvet, made with light coloured dots powdered over a dark coloured foundation.

Electrical conductance (G): It is the reciprocal of electrical resistance R. The derived unit is the Siemens (unit symbol: S).

Electrical conductivity: (a) A measure of the ease of transporting electric charge from one point to another in an electric field;(b) The reciprocal of resistivity.

Electrical finish: A finish designed to increase or maintain electrical resistivity of a textile material.

Electrical resistance test (volume resistivity): A test method for measuring the static charge on carpet or other textile material. In this test we measure the electrical resistance of a carpet – a property which is indirectly connected with its antistatic behaviour. A direct current voltage is applied via two electrodes in contact with the carpet which allows a direct measurement to be made of the volume resistivity. When the electrodes are placed on the back and face sides of the carpet, the mass or volume resisting force is measured; however, if they are placed on the surface only, a measurement of the surface resistance is involved.

Electrical resistivity: The resistance of longitudinal electrical flow through a uniform rod of unit length and unit cross-sectional area.

Electrode: Any part of an electrical device or system that emits or collects electrons or other charge carriers. An electrode may also be used to deflect charged particles by the action of the electrostatic field that it produces. Positive pole = anode, negative pole = cathode. See also **Half cell**.

Electrolyte: Substances which undergo partial or complete dissociation into positive and negative ions in solution (in water or other solvent). Alternatively, they may be molten ionic compounds that also allow ions to move freely. Liquid metals in which conduction is by free electrons rather than ions are not classified as electrolytes. The solution then acts as a conductor of electricity. The most important groups of electrolytes are acids, bases and salts. Colloids with electrical properties are known as colloidal electrolytes.

Electrolytic bleaching: Vegetable or animal fibres are either immersed in a bleach bath or saturated with bleach liquor, and subjected to the action of a medium to high frequency alternating current.

Electro-m-process: An electro-chemical process for wastewater treatment. It involves breaking down water by electrolysis. Impurities are oxidised or reduced by the resultant oxygen and hydrogen at the nascent stage. It may be supplemented by the perco-filter process (a series of multi-layer adsorption

and filtration processes operated under 5 bar pressure), giving water practically of drinking quality.

Electromagnetic spectrum: The massive band of electromagnetic waves which passes through the air in different sizes, as measured by wavelength. Different wavelengths have different properties, but most are invisible and some completely undetectable to human beings. Only wavelengths that are between 380 and 720 nano-meters are visible, producing light. Waves outside the visible spectrum include gamma rays, x-rays, microwaves and radio waves.

Electronic engraving: An electronic scanning and engraving system which converts the reflected light from a design sketch by means of an optical sensor into electrical signals which are transmitted to the engraving system via a computer.

Electroplated button: Plastic button that has been made conductive by chemical treatment followed by the electroplating of metallic coating. See **Spray printing**.

Electrospray process: This process is more rapid than mechanical spray printing methods and allows the production of finer details. Not yet applied in textile printing except, to some extent, carpet printing, because of high investment costs and the lack of genuine textile printing effects. On the other hand, it has found wide application in coding systems and the production of printed letters and policies, etc.

Electrostatic decay half-life (in textiles): The time in minutes for the maximum voltage induced on the textile to be reduced to one half of the maximum voltage by the various decay mechanisms – conduction and ionization of the air.

Electrostatic flocking: The process of applying a flock to an adhesive coated substrate in a high voltage electrostatic field.

Electrostatic propensity: The capacity of a non-conducting material to acquire and hold an electrical charge by induction (by means of corona discharge) or by triboelectric means (rubbing with another material).

Elmendorf tear tester: A test apparatus originally designed to determine the tearing strength of paper, but which is now specified as a standard test (BS 4253:1967 (1986); ASTM D 1424-83; M & S P-29) to measure the tearing strength of very lightweight fabrics and resin-finished apparel fabrics. A trapezoidal fabric test specimen is employed.

Element (in zippers): The device designed for interlocking, capable of being affixed along the edge of a tape.

Elementary colours: Leonardo da Vinci (1452–1519), the master of the Renaissance, considered that the six most important colours fell into a hierarchy and that each indicated one of the elements as follows:

(a) White – light

(b) Yellow – earth

(c) Green – water

(d) Blue – air

(e) Red – fire

(f) Black – darkness.

See also **essential colours** and **primary colours**.

Elephant: Light grey colour; sometimes a dark grey. Also 'elephant grey'.

Elephant towelling: Rough faced, coarse and strong cotton or linen cloth; used for towels, embroideries and drawn work in England.

Elevated temperature dyeing machine: See **High temperature dyeing**.

Elevation of boiling point: A colligative property of solutions in which the boiling point of a solution is raised relatively to that of the pure solvent. The elevation is directly proportional to the number of solute molecules introduced rather than to any specific aspect of the solute composition. The proportionality constant, *k*B, is called the *boiling-point elevation constant* or sometimes the *ebullioscopic constant*. The relationship is D*t* = *k*B*C*m.

Where, *t* is the rise in boiling point and *C*m is the molar concentration; the units of *k*B are kelvins kilograms moles–1 (K kg mol–1). The property permits the measurement of the relative molecular mass of involatile solutes. Compare with ***Depression of freezing point***.

Elken: Heavy cotton duck or sail cloth produced in Romania and Bulgaria.

Ellementes: 17th Century English worsted.

Elliot: A Highland tartan with a navy ground. Far apart from each other are pairs of nut brown stripes with a wide blue stripe between the half of each pair. This blue stripe is split in the centre by a narrow red stripe.

Ellsworth: Commercial variety of late maturing cotton from North Carolina. The staple measuring 21–24 millimetres; the yield is 30–33 percent.

Elongated twill: It has an angle more than 40 degrees.

Elongation: The ratio of the change in length of a material during the application of tension to the original length of the rope when new.

Elongation: (a) An increase in length.

NOTE: The increase may be expressed – (i) in units of length, (ii) as a percentage of the initial length or (iii) as a fraction of the initial length.

(b) The deformation in the direction of load caused by a tensile force. Elongation is measured in units of length (e.g., millimetres, inches) or calculated as a percentage of the original specimen length. Elongation may be measured at any specified load or at the breaking load.

Elongation at break: (1) The increase in length corresponding to the breaking force.

(2) The quotient of the change in length (elongation) and the original length obtained in a tensile strength test. In practical tests, it is the increase in length when the last component of the specimen breaks.

(3) The elongation corresponding to the breaking force.

Elongation at breaking load: See **Elongation at break**.

Elongation at breaking load (in fibre strength testing of cotton): The elongation corresponding to the maximum load and expressed as a percentage of the 1/8 inch (3.2mm) gauge length.

Elongation at rupture: The increase in length corresponding to the rupture of the last component of the specimen. Elongation at rupture may be equal to elongation at breaking load in most cases, but can be more also.

Elongation (non-elastic): See **Non-elastic elongation**.

Elongation percent: The increase in length calculated as a percentage of the original length. See **Percent elongation**.

Elongation (recoverable): See **Recoverable elongation**.

Elongation (residual): See **Residual elongation**.

Elongation (total): See **Total elongation**.

Elongation (working): See **Working elongation**.

Eluent (eluting agent): An auxiliary consisting of pure solvent or a multi-component solvent mixture used in chromatography.

Elysee: Applique work, the floral patterns being cut out of two sateen of different colours and then embroidered.

Elysian fabric: A thick or soft woollen fabric in which extra weft is floated to the surface and subsequently burst in the finishing treatment. The floats may be planned for various patterns, such as twills and waved effects. The ground structure may be a single weave or a double weave fabric.

Embauba: Very tough bast fibre yielded by the trumpet tree in Brazil; used for bags.

Embira: Several kinds of bast fibres in Brazil; used for nets by the natives.

Emboss (relief or surface printing): It offers various application options for producing single or multi-coloured print designs alongside or combined with permanent embossed finishes.

Embossed ciré finishes: Produced not by fluted engraving but by relief engraving with a smooth surface which involves operating against smooth, relatively hard mating rolls (ciré calender with a heated engraved steel roll, a cotton roll and to retain the smooth finish, a heated plain steel roll), in other words without forming a reverse image. The design is "fused in" between the smooth faces of the embossing cylinder and the cotton roll (e.g. into acetate fabric). With moiré relief engraving: ciré moiré finish.

Embossed deep finishes: Deep embossed finishes – simulated weave designs produced by relief engraving (e.g. honeycomb piqué), geometric motifs, figured designs and the like.

Embossed finishes: Embossed finishes – simulated lace and embroidery and burnt-out patterns (finely perforated contours and burnt-out designs), also delightful combination effects (burning-out and embossing, or printing and burning-out and embossing) on acetate and synthetic textiles, produced on the same calendar with steel roll relief engraving and at high temperatures (electric heating).

Embossed lustre finishes: Lustre finishes – vary in extent and definition, ripple lines follow the design or fill out the design areas framed by contours. See **Embossing**.

Embossed moiré finish: Varied matt-lustre patterned finishes created by fluted embossing (moiring).

Embossed satin: It is a satin fabric, usually heavier ones, on which designs are permanently embossed by different methods, embossing now is invariably permanent. Use more often as wedding gown fabric.

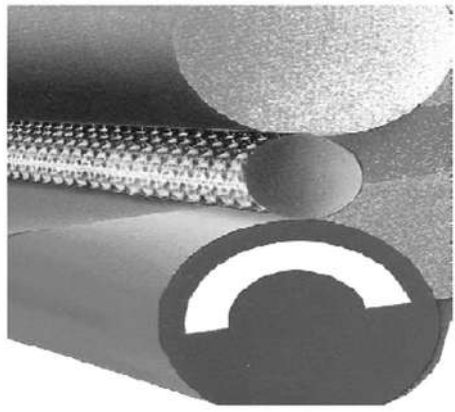
Embossed silk finish: Not produced by the fabric design, but rather light reflectance resulting from imprinting fine ripple lines ranging from a soft, silky matt shimmer to a high lustre, associated with virtually all possible handle variations (via the schreiner calender).

Embossed transfer printing paper: Transfer printing paper with an embossed effect which is "permanently" fixed in the textile material after transfer printing.

Embossed velvet: Ordinary pile velvet, but a pattern is introduced by pressing the pile flat in places.

Embossing: Also known as embossed finish, goffering, gauffering, fluting, schreiner finish, silk finish, high-lustre finish, impressing of patterns on normally smooth textile surfaces, produced under high pressure and at high temperature on the embossing calender, schreiner calender, etc., between a heated embossing cylinder and a mating or elastic counter roll.

Embossing calendars: Embossing calendars are normally two or three roll calendars with one engraved roll and one or two bowls. The patterns range from polished rolls or cire' to very deep floral patterns. Moire is a watered appearance which resembles paper after it has been wet with water. The moire effect can be obtained by using a moiré pattern embossing roll. Thermoplastic fabrics can be permanently embossed with heated rolls and the effect can withstand repeated laundering. Natural fibres are more difficult to emboss and usually starch is needed for the embossing to take; however, this effect is not durable to laundering. Certain melamine resins can be added prior to embossing and when properly cured, the embossing effect is more durable.



Embossing

Embossing felt: Usually tubular wool felt, 7–9 mm thick multiple fabric, for heated cylinders, ironing presses, etc.

Embossing foil: To produce shadow effects, transparent embossing foils with a granular surface are used for colour separations. They are laid on the design and the drawing is transferred with a suitable chalk. The shadow effects are created by applying heavy and light pressure when tracing.

Embroideries: See **Embroidery**.

Embrittlement: The formation of a brittle residue as the result of pyrolysis or incomplete combustion.

Embroidered chiffon: An open lace-effect chiffon often containing viscose with nylon or polyester. The added embroidery may be worked in cotton, viscose or sometimes metal thread.

Embroidered flouncing: Any plain fabric with an embroidered scalloped edge.

Embroidered knit: A lightweight synthetic, usually polyester knit fabric in plain colours with gold or silver metal embroidery; often in border designs.

Embroidery: The description came originally from an old English word meaning 'border', and was used for early decoration on ecclesiastical robes which were, presumably, worked in border designs. Now it is used for ornamental designs worked on a fabric, mostly light weight, with threads in contrasting or matching colours, often in yarn of a different fibre from the fabric, including metal. The fabric varies considerably in the fibre content and weight and also width. Uses mainly confined to saris and evening wear. Embroidery may be done either by hand or by machine. Originally a needlework of antique origin consisting in executing designs with thread, yarn or other flexible material on a textile or leather ground. It differs from lace that while embroidery always requires a ground to work on, which is essential part of the needlework, lace has no such ground or if it is built up on any ground (like the needle lace on a pricked pattern) it is not part of the fabric. The largest part of the embroidery now in use is produced by machinery.

Embroidery buttonhole: The embroidery buttonhole stitch has many possibilities and many variations. It is worked from left to right instead of from right to left as in a buttonhole. The thread from the work is carried under the point of the needle from left to right, just the reverse of the buttonhole. This stitch is used on flannel and in embroidery of all kinds; it may be padded or worked flat and the stitches may be taken a distance apart or near together.

See **Zig Zag Twill.**

Embroidery: Cotton slack twist two strand cotton thread; used for embroidery.

Embroidery lace: A lace construction obtained by working with a suitable stitching thread on a pre-existing ground of bobbinet, tulle, net or lace in order to produce an ornamental effect on that ground. See **Lace**, **Embroidery**.

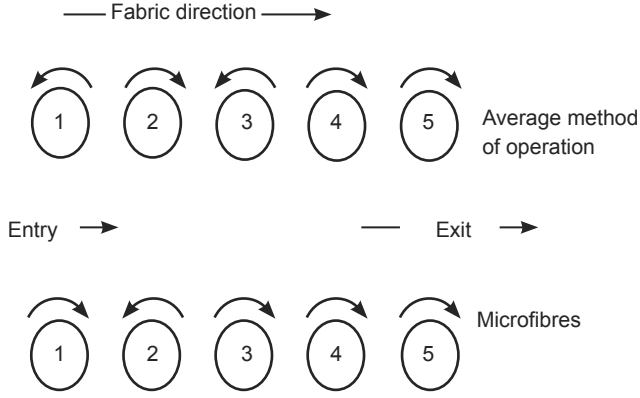
Embroidery linen: Linen fabric woven of even and round thread; used for embroidery.

Embroidery quilt: It has large patterns formed by coarse thread on a fine and plain-woven foundation.

Embroidery silk: Loosely twisted silk yarn composed of a number of untwisted threads.

Emerald green: A dark yellowish-green, originally made from copper aceto-arsenate (ite) which was also used as an insecticide. Used extensively by the artist Paolo Veronese (1528–1588) to a point where the colour was called vert Paul Véronèse in France. It was not commercially produced until 1822. Also called Schweinfurt (h) green which in turn is referred to as Paris green, Vienna green, imperial green and Brunswick green. Though toxic, it was used in the manufacture of wallpaper and was considered in the 1860's to be the cause of a number of deaths resulting from arsenic fumes.

Emerizing: Surface character processing of woven or knitted fabric. Through emerizing, the fabric structure is masked by a fine pile without destroying the knitted or woven construction. The effect is dependent on yarn and fabric structure. The shorter and finer the fibres in the yarn, the easier it is to produce a better pile. The finishing stages preceding emerizing also have an effect. This mechanical finishing produced by passing the fabric over a series of emery covered rollers produces suede like finishing.



Direction of emerizing roller rotation relative to fabric direction, for optimum emerizing effects

Emery: A mineral of corundum (aluminium oxide, $A1_2O_3$) containing some magnetite (Fe_3O_4), hematite (Fe_2O_3), or spinel ($MgAl_2O_4$). It is extremely hard and is used as an abrasive and polishing material.

Emery cloth: Strong cotton or linen fabric, coated with powdered emery; used for polishing.

Emission: What is sent out – "emitted", not only pollutants, but also the scent from a rose, or radio waves in broadcasting.

Emissive object: An object that emits light. Emission is usually caused by a chemical reaction, such as the burning gasses of the sun or the heated filament of a light bulb.

Empire blue: A greenish-blue colour.

Empirical test for water repellency (non-standardized test): A rapid and demanding assessment for water repellency often used by garment manufacturers. Literally, a handful of water is thrown against a hanging fabric sample. There must be no water penetration or wetting out of the fabric surface. Few fabrics are considered likely to pass this test.

Empress cloth: A heavy dress goods with napped or corded surface, named for the Empress Eugenia; sometimes called Electrol cloth or Beretz.

Empress fabric: A finely ribbed, backed, double-faced, woollen fabric in 1/2 twill face weave.

Empress gauze: Fine and flower figured fabric, made of all-silk or silk and linen.

Emulsification: The preparation of a finely distributed suspension or emulsion of mutually immiscible liquids.

Emulsifier: A product which makes the formation of an Emulsion possible or easier; e.g. in the production of emulsified textile lubricants, finishes and preparations, etc., to achieve specific effects.

Emulsifying agents: These are surfactants which convert water-insoluble oils into stable, aqueous suspensions. The lyophilic part of the surfactant molecule is absorbed by the oil droplet and the lyophobic head is oriented outward, surrounding the droplet with a hydrophilic sheath. Ionic surfactants add another dimension to the stability of emulsions; they set up a charge-charge repulsion field which adds to keeping the droplets separated.

Emulsion: A suspension of finely divided liquid droplets in a second liquid, i.e., oil in water or vice versa (small droplets with a diameter range 10^{-5}–10^{-7} centimetres). Emulsions are classed as lyophobic (solvent-repelling and generally unstable) or lyophilic (solvent attracting and generally stable).

Emulsion pad process: A pad-dyeing process in which low solids water-in-oil emulsions are used as thickeners for the pad liquor. Disperse, acid and metal complex dyes are applied to synthetic fibres, and vat dyes to cellulosic fibres. The process has not found wide application in practice.

Emulsion polymerisation: A three-phase reaction system consisting of monomer, an aqueous phase containing the initiator and colloidal particles of

polymer. Polymerization takes place in the colloidal phase. The process enables the production of very high molecular weights at increased polymerization rates. Only applicable to addition polymers.

Emulsion spinning: The process of spinning synthetic polymers in dispersion form, then heating to coalesce the dispersed particles. Normally, a matrix polymer provides support until coalescence is completed.

Emulsion thickener: A thickener for textile printing consisting of emulsifier, water and a water immiscible liquid (chiefly kerosene or white spirit). Depending on the type of emulsifier, either a water-in-oil or, as generally preferred in practice, an oil-in-water emulsion is formed.

Enamelled cloth: Plain woven, coarse cotton fabric coated with varnish; used for upholstery. See **American cloth**.

Encapsulation: A process in which the fibres of a fabric are coated with a filmy substance to create certain high-performance qualities, such as breathability.

Encapsulated dyes: Dyestuffs of various classes (cationic, acid, reactive, disperse and vat dyes) which have been encapsulated in fine granular form with hydrophilic film-forming substances of high molecular weight (e.g. gelatine, pectin, agar, methylcellulose or polyacrylic acid) by the microcapsule technique. The microcapsule diameter lies within the range of 10–200µm. Dyes in this form can be applied together with reactive compounds without any initial reaction; reaction eventually takes place during a subsequent steaming or other thermal treatment. Special effects, e.g. in Speck printing.

End (in fabric): An individual warp yarn (single or ply) or cord.

End: (1) An individual sliver, roving, yarn or cord.

(2) (a) An individual warp thread (weaving); (b) Each passage of a length of fabric through a machine as, e.g. in jig-dyeing.

(3) (a) Fabric – A length of finished fabric of less than a customary unit (piece) length. (b) Finishing

(i) Each passage of a length of fabric through a machine, for example in jig-dyeing

(ii) A joint between pieces of fabric caused by, for example, damage or short lengths in weaving, or damage in bleaching, dyeing and finishing;

(c) Spinning – An individual strand.(d) Weaving – An individual warp thread.

End and End: A plain weave fabric with a warp yarn of one colour, alternating with a warp yarn of white or a second colour. Often the weft yarns alternate with the same two colours while forming a mini check design.

End down: A break of a warp thread in the loom that, if not corrected, leads to a fault. See also **Broken end**.

End group: The chemical group at the end of the long chain of a synthetic polymer. Often the end group is the point of reaction with other chemicals dyes, etc., and hence will have an important say in the characteristic of the polymer/fibre. A liner polymer will have two end groups per molecule and the branched polymers with 'n' branch points will have n+2 end groups.

End-to-end uniformity: A term used for piece dyed goods which exhibit the same shade throughout the entire length of the batch, in contrast to defective dyed goods where ending or tailing problems have occurred during dyeing. See **Ending**.

End out: A void caused by a missing warp yarn. See **Broken end**.

End piece: A fabric threaded on the processing machine onto which the fabric which has to be processed will be stitched, and as the machine is running, this fabric is taken out and threaded on the machine when the machine is to be stopped and left on the machine itself.

End ring: Metal ring introduced into each end of a rotary printing screen to obtain a stable cylinder. End rings are bonded to the screen with a special adhesive.

End ring gluing device: A vertical or horizontal unit designed for the gluing of end ring to rotary printing screens.

End to end uniformity: A term used for piece-dyed goods which exhibits the same shade throughout the entire length of the batch, in contrast to defective dyed goods where ending or tailing problems have occurred during dyeing.

Ending: (1) A dyeing fault consisting of a change in colour from one end of a length of fabric to the other or a difference in colour between the bulk and the end of a length of fabric, commonly used with reference to batch-dyed material.

(2) A break of a warp thread in the loom that, if not corrected, leads to a fault. See also **Broken end**.

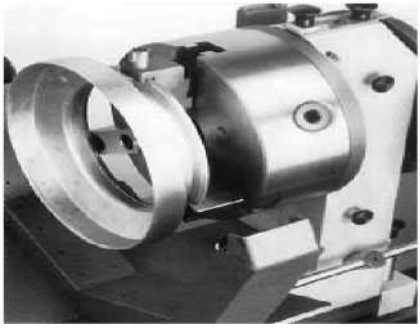
Endless conveyer: Continuous conveyor for piece goods. An enclosed track (rail) consisting of an electrically driven endless chain or endless rope.

Endless felt: See **Tubular felt**.

Endless screen: Emulsion is heated and allowed to cool back to room temperature. The electrolyte precipitated out from the saturated aqueous solution is filtered off, washed, and determined analytically.

End out: A defect caused due to a warp thread broken in between in a woven fabric.

Endring: Metal ring introduced into each end of a rotary printing screen to obtain a stable cylinder. End rings are bonded to the screen with a special adhesive.



End ring and gluing device

End-use (in wear testing): The use of which the textile product (garment, cloth, etc.) is intended for.

End-use: The final use of a product (textile) at the customer's end.

Energy absorption: The energy required to break or elongate a fibre to a certain point.

Energy-to-break: The total energy required to rupture a yarn or cord.

Engaeantes: Multiple lace flounces or ruches at the sleeve.

Engageantes: Lace cuffs with two or three rows of ruffles, finishing women's gown sleeves in Louis XIV's time. They were still worn in the 18th century with gowns a' la franchise.

Engineered design: Those designs in which the design is worked in such a way to fit the shape of the intended product. Examples of engineered designs include towels, rugs, duvets and head scarves.

Engineer's cloth: This includes all the fabrics used as uniforms, protective clothes, etc. It will include dungaree, denim, twills, moleskin and the like.

English: A collective term used in the 18th Century for processes involving the local application of indigo directly in the vetted form (orpiment).

English black: A term used to describe a black dyed cloth with logwood.

English blue: A collective term used in the 18th century for processes involving the local application of indigo directly in the vetted form.

English chintz: The 19th-century name for printed fabrics, made of all linen or linen warp and cotton filling in England.

English combs: The multi-pitch (commonly 4-pitch) hand combs used in preparing top.

English embroidery or eyelet embroidery: The pattern is formed of a number of eyelets which are embroidered in buttonhole stitches all around the edges. It comes mostly in white, but is also available in other colours.

English gum twill: A silk cloth manufactured from low twist yarns with diagonal rib weave. If it is printed, it is called Foulard.

English net: Made with hexagonal mesh.

English number: Cotton Ne_c.

English pink: Most curiously, English pink is the name of a brilliant yellow colour. But this curiosity is not, as one might expect, a manifestation of English eccentricity for each of ***French pink***, ***Italian pink*** and ***Dutch pink***, (as well as ***Bacon's pink***) are all yellow shades – so named because the process of manufacture resembles the one that is used to make **lakes**. There are also green pinks, brown pinks and rose pinks the last of which was probably instrumental in shifting the meaning of the word 'pink' from the process to the colour itself. Also, sometimes a pink colour.

English point: A 19th Century needle-point lace similar to the Spanish point.

English print: A French method similar to Orbis printing, using polychromatic rollers which have the required design on the surface made up of a pattern of dye platelets (number of colours optional). Printing (depending on colour layer thickness, 3,000–25,000 m of cloth, 20–40 m/min) is carried out on damp cloth (prewet, with additional additives after dyeing) with simultaneous steam injection, followed by usual fixing.

English rain sook: See **Rain sook**.

English red: Red iron oxide, also referred to as **Indian red, Pompeian red, Venetian red** and **Persian red**.

English rib: See **Rib fabric**, **Weft knitted**.

English tulle: See **Bobbinet**.

English welt: See **Roll welt**.

English yarns: Worsted yarns spun in oil according to the Bradford system.

Engraved roll applicator: Engraved rolls similar to ones used for rotogravure printing can be utilized as low-water finish applicators. In this technique, an etched metal roll revolves in a trough of finish. A "doctor" blade wipes off the surface leaving liquid only in the engraved depressions. The liquid in the engravings wick into the fabric as the fabric passes between the engraved roll and a pressurized backing roll. Engraved roll applicators have advantages over kiss rolls because wet pick-up is not influenced by changing fabric speeds, the depth of the engravings are responsible for metering the liquid. One disadvantage is that the roll must be changed, causing machine down-time, when one wants to change wet pick-up.

Engraving: Engraving can be classified into two types; (a) *Mill engraving* – This can be described as a predominantly mechanical process. The pattern is firstly engraved manually onto soft metal rollers/plates. The design will be transferred onto hardened steel rollers, the circumference of which corresponds to the repeat of the design; (b) *Pantograph engraving* – The pattern is transferred to the printing roller using a special machine, the so-called pantograph. The engraved plates are used as a model. Several engraving levers corresponding to the number of repeats are actuated across the width of the roller using a pantograph. A diamond is inserted into the tip of each of these levers. Using these diamonds, the pattern is engraved into a coat of lacquer with which the roller is evenly coated. The outlines are then retraced. The hatchings are later added, using a hatching plate. The roller scored in this way is etched more deeply in a nitric acid bath. A further development of this is the photo-electronic pantograph, which consists of two separate units. In the first unit, there is a roller to which the design is attached. The roller to be engraved in stored in the second unit. The design is in black/white and is scanned using a photoelectric cell. The light impulses obtained are converted into electric impulses. These are then chiselled relative to their intensity. The chisel impressions are made onto a roller which has been coated in lacquer and their close location forms into lines. Up to three rollers can be engraved at one time using this method; (c) *Photo-engraving* – Enables smooth surfaces and short runs to be printed. Firstly, colour separations are prepared from the design, i.e. each colour is transferred separately onto a film with an opaque colour. A reproduction camera is then used to copy the appropriate screen or hatching into the design by means of a screen plate or hatching plate.

Engrelure: French term for footing, or the part of the lace edging which is sewn to the cloth.

Enile: Hand knotted wool rug of Asia Minor, made with a thick pile.

Ensembles: See ***Tweed***.

Ensign: The dark blue colour of naval uniforms.

Ensign cloth: Plain–weave cotton used for making flags.

Entanglement: The extent or degree to which the filaments in a yarn can be interlocked and cannot be readily separated.

Entanglement (in processing): A term used to express the tangling of fabric in the rope form which prevents smooth running of the material in winch, jet, etc.

Entangling: (a) A method of forming a fabric by wrapping and knotting fibres in a web around each other, by mechanical means, or by the use of jets of pressurized water, so as to bond the fibres. Also see **Hydro-entangling** and **Spun-laced fabrics**. (b) See **Intermingling**.

Entering: The process of threading each warp yarn on a loom beam through a separate drop.

Enthalpy: Thermodynamic variable (H), defined as the sum of the internal energy and the displacement energy (pV) of a system, being the product of the volume under constant external pressure (p): $H = E + pV$. The enthalpy is equal to the heat content under constant pressure. Chemical reactions in a system at constant temperature and constant pressure only take place spontaneously towards a reduction in the free enthalpy G ($\Delta G<0$).

Entoilage: The mesh ground in laces.

Entre large: Medium width linen in the French trade.

Entredeux lace or embroidery: It is used as insertion being edged on both sides with some other material.

Entropy: (a) The entropy of a system is a measure of a lack of information or, simply, a measure of disorder. For calculation purposes, the entropy is subdivided into separate amounts capable of addition. The two most important are the thermal and configurational amounts. Entropy is used in defining the second law of thermodynamics; in irreversible (i.e. self-contained) processes in an isolated system the entropy always increases. (b) A process in which a transfer of energy takes place can only continue spontaneously if the entropy of the system and the surroundings increases overall.

Entry zone: In a stenter or drying machine, it is the area in which the edges of a textile fabric are taken up on pins or held by clips.

Enveloppe: Packing canvas in France.

Envers: French word for the back of the cloth.

Environmental conditions in testing: The atmosphere in which specified moisture levels, temperature ranges and concentrations of gases are controlled.

Enzymatic bio washing: Denim jeans manufacturers for many years have washed their garments with pumice stones to achieve a soft-hand as well as a desirable look called "stone wash". Jeans processors typically have found that they can achieve this stone washed look by using cellulose enzyme instead of stones. Enzymatic stonewashing has thus become more widespread over the last two years. As the name indicates, celluloses hydrolyse cellulose, partly yielding soluble products such as short-chain polysaccharides and glucose.

Enzymatic bio-finish: Enzymatic bio-washing. See **Enzymes**.

Enzymatic degumming of silk: Enzyme which can hydrolyse the sericin is classified as proteolytic enzymes. The proteolytic enzymes cleave the peptide/amide linkages and convert them into amino acid. Mainly there are three types of proteolytic enzymes such as zinc protease (e.g. carboxy peptidase A), serine protease (Chymotrypsin, Trypsin and Thrombin) and thiol protease (acts as cystine residue in the protein). The function of proteolytic enzymes in their degree of degumming depends on the pH of the bath and the optimum activity is found to be different at different pH for different enzymes. Usually enzymatic desizing of silk is a two-stage process. In pre-degumming stage, the cloth is treated with a solution containing soda-ash (1 g/l) at 95°C for 20 min at a liquor ratio of 30. In the second stage, further degumming is carried out by treatment in a solution containing protein enzyme (0.06–0.1 g/l), non-ionic detergent (1 g/l) for 30 min at 55–60°C. It is usually impossible to achieve full degumming of silk by enzymes. A short-time treatment in a third bath containing soda-ash or soap may be given toremove the remaining sericin.

Enzyme: The name is derived from the Greek word 'zymae', which means leaven/sour dough. Enzymes similar to the inorganic catalysts (Fig. 1) are so called biocatalysts. Technically impure enzyme products are diastases, for example. All enzyme names have the suffix 'ase' (amylase, cellulase, maltase and protease); enzyme decomposition products have the suffix 'ose'(dextrose, maltose and glucose).

Enzyme desizing: Enzyme desizing is the most widely practiced method of desizing starch. Enzymes are high molecular weight protein bio-catalyst that are very specific in their action. Enzymes are named after the compound they break down, for example, ***Amylase*** breaks down any lose and amylo pectin; ***Maltase*** breaks down maltose; and ***Cellulase*** breaks down cellulose. For desizing starch, amylase and maltase are used. Cellulase, on the other hand, is used for finishing cotton fabrics. Amylase will degrade starch into maltose,

a water-soluble disaccharide and Maltase will convert maltose into glucose, a simple sugar.

Enzyme washed: A fabric or garment which has been treated with an enzyme to bring a used or worn ('vintage') look to them. Usually cellulose enzyme is used which acts on the cellulose to give this appearance. The final effect is the stone washed effect, but enzyme wash is less detrimental to the fabric when done in the recommended way.

Enzyme washing: See Enzyme bio-washing.

Eolienne: Named from the Greek word *Æolus*, the god of the winds. Originally, a soft weft-ribbed dress fabric with a silk (or more seldom, cotton) weft and a worsted warp in a plain-weave construction. The cloth is a lightweight zephyr fabric and may be classed as a very fine poplin. Now also produced from man-made fibres, e.g. acetate, rayon.

Epichlorohydrin rubber: Synthetic rubber elastomer based on Epichlorohydrin.

Properties – shore hardness 40–90°, moderate to good adhesion strength and abrasion resistance, moderate to good resistance to diluted acids (moderate to concentrated acids), resistance to aliphatic hydrocarbon solvents is excellent and good to aromatic hydrocarbon solvents, resistant to oxidation and sunlight, excellent resistance to ozone.

Epidermis (in mammalian hair fibres): The outside or surface layer of the fibre consisting of flat, irregular, horny cells or scales.

Epidermis (in wool, flax): In wool structure, the term is used in the widest sense to mean the scale cell covering of the fibre comprising the scale-cell double layer together with the epicuticle. In flax stem structure, the epidermis is regarded as the external peripheral layer consisting of an outermost thin skin which covers the cuticle.

Epigamic colours: The colours displayed by animals during and as part of the process of courtship. The male South Australian cuttlefish can take on the colouring of a female cuttlefish to be able to mate by stealth with a rival's sexual partner. Once it pounces, it reveals the black and white stripes of the male. Researchers at Naples University have found that when a telephone is positioned near to squid, the squid changes colour. The 19th Century naturalists believed that almost all animal colour patterns developed for the purpose of **camouflage**. However, it is clear that many animals (particularly fish) change their body colour for a variety of other purposes, including locating members of the same species (see **episematic**), to frighten the enemy and courtship as referred earlier. Slow colour change is often effected by means of hormones,

whereas more rapid change is effected by the nervous system (as in the case of humans while blushing). See also **Camouflage**.

Epinard: The dark green colour of the vegetable spinach. The word *épinard* being the French word for spinach. There are many other French words which take on a close resemblance to the English equivalent word once the initial 'é'is replaced by the letter 's' – for example, école, écriture, épellation, épice, éponge, état, étage and étranger.

E'pinge: Very lightweight fabric in a plain close weave, traditionally worsted, but may now contain other fibres. Used for women's dresses and suits.

Epingle': A smooth ladies' dress fabric (silk and cotton) with a pattern of alternating delicate and heavy weft ribs.

Epingline: A warp ribbed dress goods, made with silk warp and worsted filling with a pebbled face.

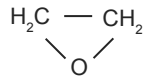
Epipolic: Fluorescent (optics).

Epitropic fibres (epitropics, antistatic epitropic fibres): Polyamide or polyester fibres containing embedded particles of carbon to make them electrically conductive. They are used as permanent antistatic fibres in 2–5% blends with other fibres for floor coverings, home textiles, protective clothing and technical fabrics.

E'ponge: A woollen or cotton fabric, open textured, with a spongy feel, and light in comparison to its thickness. Used for dresses, children's dresses, robes, sports shirts.

Eponge: Woven of loop yarn warp and plain filling in plain weave; used for dresses, etc. It is made of cotton, wool or silk.

Epoxides: Organic compounds (cyclic ethers) containing one or more epoxide groups:



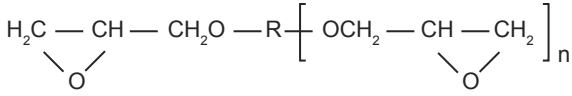
The epoxide group is a reactive group for cross-linking reactions, e.g. with cellulose in the presence of acidic (zinc fluoroborate) or alkaline (caustic soda liquor) catalysts. The application as resin finishing agents (e.g. diglycidyl ether, ethylene glycol derivatives, butanediol ether, glycerol diglycidyl ether) is problematic due to the toxicity of these compounds.

Epoxy functional silicones: Epoxy functional groups can be incorporated into silicone polymers by incorporating the appropriate group into the silicone

polymer back bone. Epoxy functionality offers a non-silicone cross-linking mechanism along with the ability to react with fibrehydroxyls. These softeners are more durable to repeated laundering.

Epoxy lining: A method of rehabilitating a water pipe, tanks, etc. The pipe/ tank is cleaned by boring or scraping and then 1 mm of epoxy coating is sprayed on to the inside of the pipe. The application is monitored and allowed to cure for 16 hours. Pipe diameters up to 1 m can be rehabilitated using this technique. The technique does not solve leakage problems. Epoxy linings are also used to line the insides of pre-cleaned concrete sewers that may be prone to corrosion due to the nature of the wastewater.

Epoxy resin: In textiles, a compound used in durable-press applications for white fabrics. It provides chlorine resistance, but causes loss of tensile strength. These are thermosetting resins based on the reactivity of the epoxides:



Epoxy resins are polyaddition products formed as epoxides with polyhydric alcohols, hexahydrophthalic acids, hydantoin, cyanuric acid, but mainly (up to 90%) from Epichlorohydrin and Bisphenol.

Equivalent per million (e.p.m.): The concentration of a substance in mg/l, divided by its ***equivalent weight***. This is the same as its milli-equivalent per litre, if the solution has a specific gravity of 1.

Equivalent single yarn number: See **Yarn number, Equivalent single**.

Equivalent weight (equivalent): Of an element or compound, the weight that will combine or react with or replace one atomic weight of hydrogen. For an acid, the equivalent weight is the molecular weight divided by the number of hydrogen atoms in the acid that react with an alkali.

Ercildun: A very fine, lustrous, soft and elastic wool of pure white colour, yielded by sheep in Tasmania; used for the finest grades of dress fabrics.

Ergonomics: (Gk.: *ergon* = work). The study of the relationship between workers and their environment.

Ergonomic seaming: This apparel construction technology is aimed at maximizing comfort and ease of movement. The key feature of this seaming technology is that the seams are constructed ergonomically. Therefore, the seams flow according to the body's natural movements, regardless of the

type of activity engaged in by the wearer. The seams are placed away from potential pressure points, in order to maximize comfort and movement.

Eri or Eria silk: A high quality wild silk produced by the *Phylosamia ricini* larva which is found principally in East Asia. The larva feeds on the castor oil plant. This silk is highly regarded in schappe spinning.

Erision control fabrics: See **Geotextiles**.

Erskine: A Highland tartan, consisting of the following colours in a repeat – wide red bar, split in the centre with a pair of narrow and closely placed green lines; a dark green bar, of the same width as the red, split as the latter with a pair of red lines.

Ermine: A soft, fine white fur from a type of weasel with distinctive black tail tip. It will discolour after time. Used as a trimming on ceremonial gowns.

Erne-coloured: Having the colour of an eagle. Also 'eagle hued'.

Eruc: A strong fibre, yielded by the Corypha urens in the Philippines; used for cordage.

Erythro- (G): Red.

Erythrophores: Chromatophores with a red pigment.

Escalier: (a) Ladder tape; (b) Lace, made with ladder effect.

Escoba: Fine, strong bast fibre, yielded by the sida plant in Venezuela; used for ropes.

Escobadura: Fine and white bast fibre, yielded by the Pavonia spinifex in Argentina.

Escot: A comparatively coarse French dress goods, made of hard twist worsted yarn in serge weave and dyed in the piece.

Escurial: (a) Spanish needle-point lace, similar to the Venise; (b) Rich design in trailing and winding pattern; used for laces and embroideries.

ESI: Ethiopian Standards Institution, Addis Ababa.

Eskimo: An all-wool, relatively heavy weight (approximately 800–1000 g) double-faced fabric (with 2 warps and 2 weft systems) mainly in cross-twill construction. Named after the inhabitants of Greenland. The face side is constructed mainly from fine count woollen yarns and the back side from coarser woollen yarns containing a proportion of reclaimed wool. The face side has a finely napped surface. Chiefly dyed in dark shades (black, navy blue). Used for winter coats.

Espagnolette: French fabric, originally made of Spanish merino wool, later of other carded wool in plain or twilled weave, finished smooth or with nap

raised on either or both sides and made similar to Melton. It was dyed in pieces and used for trousers, etc.

Esparto: Commercial name for a fine, transparent and clear leaf fibre, yielded by the esparto grass in Algiers, Spain, etc.; used for cords, sandals, baskets, also for carpets, etc.

Essential colours: See **Basic colours, Basic English colours, Bible colours, Elementary colours, Five original colours, Four colour theory, Primary colours, Rainbow, Simple colours**.

Essequibo: Cotton trade name for Brazilian cotton.

Estamenes: A loosely woven 2 × 2 twill worsted dress fabric with a rough finish. Similar to Serge, but having a rough, nappy face resembling cheviot.

Ester interchange: See **Transesterification**.

Estampados: Ordinary cotton prints in Latin American countries.

Esterases: Hydrolytic Enzymes belonging to the main group of hydrolases, which attack esters with the uptake of water, splitting off the acid (cleavage of C–O bonds). In the closest sense, esterases react specifically only with water-soluble esters.

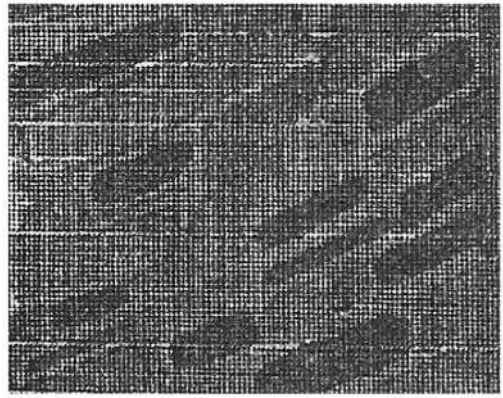
Esterification: The chemical process of combining an acid and an alcohol to form an ester. Cellulose acetate is an ester formed by the reaction of acetic acid and the hydroxyl groups of cellulose. Polyethylene terephthalate, the most common fibre-forming polyester, is a product of esterification of teraphthalic acid with ethylene glycol.

Estopilla: In South America, batiste-like cloth, made of fine linen yarn.

Estrella: A crepe-like, plain woven fabric, made with silk warp and very hard-spun Botany filling, consisting alternately of two rigs.

ETAD: Ecological and Toxicological Association of the Dyestuffs Manufacturing Industries. As in all sectors of industry, manufacturers of dyestuffs are confronted with questions relating to work safety and environmental safety.

Etamine: (a) Yarn – a term used mainly for multiple, soft, gassed ply-yarns (produced from cotton). (b) Fabric – a lightweight, open, thin gauze plain weave fabric, usually with a leno or mock leno construction. Used for net-curtaining, dress goods, etc., produced from cotton, viscose, wool (combed yarns) and silk. The name is derived from the French word *etamine, meaning* muslin, cheesecloth).



Etamine: Name usually used for porous open cloth like in Leno weave. Similar to Eponge, but thinner.

Etamine glace: Made of organzine warp and worsted filling; also known as Challis.

Etchant: Chemicals used for etching.

Etching: Diamond slivers are used to etch (scratch) the pattern into the lacquered roll on the pantograph. See **Printing, Burn-out printing**.

Etching machine: In pantograph engraving, a machine for etching copper printing rollers in an acid bath. In photo-engraving, a machine in which the unexposed lacquer is dissolved out of the printing roller surface. In case (a) a simple ether (e.g. methyl, or dimethyl ether, CH_3OCH_3) and in case (b) a mixed ether (e.g. ethyl methyl ether, $C_2H_5OCH_3$) is obtained.

Ether sulphates: These are used as anionic surfactants having typical structure –

$$CH_3(CH_2)_{10}CH_2O(CH_2CH_2O)_4SO_3\text{- Na+}$$

Alkyl ether sulphates, also called alcohol ethoxy sulphates, are prepared by addition of one to four oxyethylene groups to an alcohol which is then sulphated. Oxyethylation enhances water solubility and foaming over the analogous alcohol sulphate, giving a product useful in shampoos and in liquid and powdered detergents. The raw material for these products can be either natural fatty alcohols or primary or secondary synthetic alcohols, usually of C_{12}-C_{18} chain length. The analogous alkylphenol ether sulphates are found in industrial applications. Ether sulphates are not as sensitive to water hardness as are other anionic surfactants.

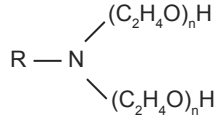
Ethers: Ethers are the anhydrides of alcohols. They are formed from (a) 2 molecules of the same and (b) 2 molecules of different alcohols, with the elimination of water, e.g. by dehydrating alcohols with sulphuric acid. In case (a) a simple ether (e.g. methyl, or dimethyl ether, CH_3OCH_3) and in case (b) a mixed ether (e.g. ethyl methyl ether, $C_2H_5OCH_3$) is obtained.

Ethical trading initiative: A United Kingdom based initiative to promote best practices in social standards in textiles and clothing.

Ethnic: Designs with elements suggesting or imitating the garments or garments itself; traditionally used by a group of people or culture.

Ethnic design: Traditional type of designs of non-western origin.

Ethoxylated fatty amines: These are chemicals used as levelling agents in textile dyeing. These are used for all types of dyes. It can be represented by the following general formula –



They are regarded as non-ionic, but exhibit weakly cationic behaviour in acidic liquors. Since the non-ionic character is predominant, they can also be applied together with anionic compounds.

Ethoxylated non-ionic softeners: Many polyethylene glycolated hydrophobes are oily or waxy in nature and function as non-ionic fabric softeners and fibre lubricants. They are important components of fibre spin finishes because of their dual ability to lubricate and function as anti-stats. Additionally, they are easily removed in downstream processing. There are two main routes for making this family of products, direct ethoxylation of the hydrophobe, or the reaction of fatty acids with polyethylene glycols. The former method gives mainly mono-fatty derivatives, whereas the second method gives a mixture of mono and di-fatty derivatives.

Ethoxyl ether of cellulose: Ethoxyl ether of cellulose can be obtained by the action of ethylene chlorohydrin on alkali cellulose according to the equation

$$[C_6H_7O_2(OH)_3]_n + nCH_2ClCH_2OH \xrightarrow{NaOH}$$
$$[C_6H_7O_2(OH)_2OCH_2CH_2OH]_n + nNaCl + nH_2O$$

The introduction of small amounts of ethoxyl groups into the cellulose macromolecule causes considerable changes in its solubility. Even when there

is one ethoxyl group per 4 or 5 elementary units of the macromolecule, the preparations of ethoxyl cellulose are soluble in dilute alkali solutions.

Ethridge: Commercial variety of late maturing cotton from Louisiana, the fine and glossy staple measuring 28–30 millimetres.

Ethyl acetate (acetic ether, acetic ester, ethyl ethanoate): $CH_3COOC_2H_5$, MW 88, density 0,9, b.p. 77°C. A colourless, readily flammable liquid with a pleasant fruity odour; less volatile than ethyl ether; water soluble up to 8,6%. Miscible with water (poor stability), alcohol, ether, chloroform, white spirit, etc. Uses: spotting agent for oil, grease, resin, fruit, and grass stains in particular.

Ethyl ether (ether, diethyl ether, ethyl oxide, diethyl oxide, sulphuric ether, ethoxyethane): $C_2H_5OC_2H_5$, MW 74, density 0,72, b.p. 35°C. A colourless, extremely volatile and mobile liquid. Very flammable (vapours form highly explosive mixtures with air). Characteristic aromatic (narcotic) odour, burning and sweet taste. Slightly soluble in water up to approximately 7%. Miscible with alcohol, chloroform, benzene and other solvents, as well as in concentrated hydrochloric acid. Uses: Highly effective spotting agent (for oils, fats, resins, fruit and grass stains); does not affect the colour of dyed goods (provided it is not heated).

Ethylene: A petroleum derivative (C_2H_4) that is the raw material for polyethylene.

Ethylenediamine:1,2-diaminoethane, $NH_2–CH_2–CH_2–NH_2$, MW 60,1, density 0,9, b.p. 116°C. A colourless, alkaline liquid with an ammoniac odour, soluble in water and alcohol. Uses: With copper salts a good solvent for cellulose (ethylene diamine copper solution); production of wash-resistant finishes with low wet crease resistance on regenerated cellulose fibres (60–90% solution); production of crease-resistant finishes, chelating agents, cationic textile auxiliaries, etc.

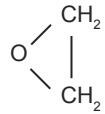
Ethylene diamine tetra acetic acid (EDTA; ethylene bis imino diacetic acid; ethylenedinitrilo- tetraacetic acid): $(CH_2COOH)_2NCH_2CH_2N(CH_2COOH)_2$. An organic complexing or chelating agent of the aminopolycarboxylic acid type. As an ion exchanger, it completely eliminates water hardness salts and heavy metals in water. More expensive than polyphosphates, but more effective and more stable than the latter; EDTA is effective at all temperatures and is resistant to alkalis and boiling temperatures. It can even bind magnesium in caustic alkali solutions, and dissolves rust and corrosion residues as well as already-formed lime soaps, but does not bind metallic iron.

Ethylene glycol: A viscous, sweet, colourless liquid, (CH_2OHCH_2OH), (ethylene alcohol; glycol; 1,2-ethanediol; 1,2-dihydroxyethane). Density

1,11–1,14, b.p. 197,5°C. A clear, colourless, syrupy liquid. Sweet taste, very hygroscopic principal uses are as intermediate in the manufacture of polyester fibres and as automobile antifreeze.

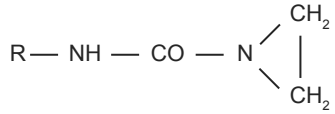
Ethylene glycol monoethyl ether: (2-ethoxyethanol; Cellosolve), $C_2H_5O(CH_2)_2OH$. MW 90, density 0,93, b.p. 130–138°C, flashpoint 40°C, evaporation number 43. Water soluble liquid, miscible with organic solvents. Does not dissolve acetate fibres. Uses: Solvent in dyeing and printing for cationic, acid and indigo dyes; solvent for nitrocellulose, etc.

Ethylene oxide: 1,2-epoxyethane, oxirane, colourless gas at room temperature, liquid at approximately 12°C, soluble in organic solvents, miscible with water. Extremely reactive with mobile H atoms in hydroxyl and amino groups to form numerous technically valuable products used in textile finishing, such as ethylene glycol and ethylene glycol derivatives of all types. Its principle use is for polymerization to 1,2-epoxide polymers.



Ethylene oxide adducts: Addition product of ethylene oxide in fatty alcohols, fatty acids and amines. Used alone or in combination as a detergent, fabric conditioner, anti-static agent, emulsifying agent, etc.

Ethylene urea (cyclic ethylene urea): Trivial name for imidazolidone-2 and derivatives, ethylene urea resins. As dimethylol compounds, ethylene urea are important reactant resins, e.g. DMEU, DMDHEU. Linear ethylene ureas are reaction products derived from alkyl isocyanates and ethylene imine, e.g. octadecylethylene urea.



Etiolin: A yellow pigment found in plants which grow in the dark.

Etoffe: French word for cloth.

Etramee: A French hemp cloth.

Etshigo silk: Very thin Japanese silk.

Etun: In the Bible, it denotes linen.

Eulan mothproofing: The development of mothproofing and beetle-protection agents for wool is relatively old and has its origins in the coincidental

observation that wool dyed with Martius yellow became resistant to moth attack, i.e. mothproof.

Eureka: A commercial variety of medium maturing American cotton, the strong fine and glossy staple measuring up to 40 millimetres, forming large bolls; the yield is 28–30 percent.

Evaluation period: The period of time an item is used before being evaluated on the specific performance properties.

Even running: Cotton containing fibres of even length.

Evenness (in wool fibre): This term refers to the uniformity of the fibre throughout the fleece.

Evenness testing: Determination of the variation in weight per unit length and thickness of yarns or fibres aggregates, such as roving, sliver or top.

Even weave linen: Fine linen cloth of fairly open construction in plain weave. It is used for embroidery.

Ever glaze: It is a permanent glazed fabric, the process of which is trade marked by Joseph Bancroft and sons. The finish is fast for washing and dry cleaning. The process also guarantees below 2 % shrinkage and soil resistance together with glazing.

Evergreen: A yellowish-green colour.

Everlasting: An all-wool or cotton-filling fabric with fine and very close and almost waterproof surface, woven in satin weave; used for shoe tops, gaiters, etc., and formerly for suits. It is very durable.

Ewes' wool: Shorn from female sheep.

Evlan: Cellulosic modified viscose fabric (courtalds). Developed for carpet industry and having property of resistance to dirt. Now it is also used for upholstery and wall coverings. Often used as blended with nylon, wool, acrylics.

Excessive clearer waste: A higher than normal amount of short and regular fibres that becomes attached to the drafting rolls and is transferred to the clearer brushes to accumulate in abnormal amounts until they are removed manually.

Excelsior: A commercial variety of American cotton, the staple measuring 26–30 millimetres; the yield is 33–35 percent.

Exfoliation: See **Lousiness**.

Exhaust dyeing (discontinuous systems): The dye is dissolved or dispersed in the dyeing liquor. The material is immersed in the dyeing liquor and is

removed only when the dye has mostly transferred onto the textile to be dyed, distributed homogeneously, well penetrated into the fibre and fixed. At the end of the process, the material is washed or rinsed to remove the unfixed dye.

Exhaustion: During wet processing, the ratio at any time between the amount of dye or substance taken up by the substrate and the amount originally available. See Bath exhaustion.

Exhaustion (in water treatment): In water softening or ion exchange, the point where the resin can no longer exchange additional ions of the type the process was designed for.

Exhaustion curve: A graphical representation of the progressive exhaustion of a dyebath (bath exhaustion). It corresponds to the quantity of dye taken up by the fibre.

Exhaustion process (exhaust dyeing methods): Processes which involve desorption and absorption of dyes and textile auxiliaries from dye baths due to substantivity (affinity) for a textile substrate.

Exocuticle: Term given to the Intermediate membrane of the wool fibre situated between the epicuticle and endocuticle.

Exomis: Worn by ancient Greek, a short robe, used mainly as men's working clothing, which left the right shoulder bare.

Exophilic (Greek): Directed outwards, e.g., the tendency of a hydrophobic molecular group not to enter into the homogeneous aqueous phase.

Exothermic: Denoting a chemical reaction in which heat is evolved (i.e. heat flows from the system or the temperature rises). Combustion is an example of an exothermic process. Compare **Endothermic**.

Exotic wools: Wools from North Africa, Iran and Asiatic countries (China, India, Mongolia).

Exotics: Braided hats or hat bodies produced from various leaf fibres of the bast fibre group from East Asia, Africa, and Central and South America.

Expander: Cloth guiders as attachments on equipment and machines which feed with the grain. Serves to reduce the shrinkage in width, to form good selvedges and to prevent formation of lengthwise creases. Simple expanders are stays produced from smooth tubes.

Expander (bowed): Bowed and stationary rod which stretches the goods widthways depending on the curve of the rod's setting angle.

Expander rollers: Rollers made from any material which, from the centre, has grooves or threads which run opposite to each other, and which have

progressive/constant gradient, to stretch piece goods to their full width on stentering and drying machines (expanders).

Expanding comb (in sectional warping): The expanding comb has the aim of placing all threads on a width corresponding to the beam width and the aim of maintaining them in order and without entanglements. The comb has a zig-zag shape, which permits its adjustment to the different beam widths. The comb has two traverse motions – a horizontal motion to deposit uniformly the threads on the beam and a vertical motion to avoid the local wear of the dents. A blowing system ensures that the comb remains constantly free from dust.

Expansion tank: Tank on high-temperature equipment used to equalize pressure and absorb fluids at temperatures above 100°C.

Expansion vessel: Expansion tank for HT equipment.

Exposed tape width (in zipper): The part of the tape extending beyond the shoulders of the interlocking elements to the outer tape edge.

Expression: Expression is a term used to express the efficiency of a nip, or padder or a squeezer. It is expressed as the percentage of water taken up by a nip or padder or squeezer.

$$\text{Expression} = \frac{(\text{Wt of the fabric after the padding-Wt of fabric before padding}) \times 100}{\text{Wt of fabric before padding}}$$

Extended length: The length of a face pile yarn required to produce one inch of tufted carpet.

Extender (fillers, diluents): Normally specific, inert additives used for standardizing the type or the commercial form, concentrated, also used for diluting and cheapening. Usual with dyestuffs (powder products e.g. + neutral salts, dextrine. hydrotropic substances, dispersing agents, preservatives and the like, with liquid products also + water etc.) and with tensides (e.g. + sodium sulphate, water, alcohol and the like).

Extensibility: That property by virtue of which a material can undergo extension or elongation following the application of sufficient force.

Extension: (1) The ratio of the change in length of a rope during the application of tension to the length of the rope immediately before application of that load.

(2) The change in length or width of a material due to stretching.

(3) Elongation/Initial length percentage. Breaking extension is the extension percentage at the breaking point.

Extension percentage: This measure is the strain expressed as a percentage rather than a fraction.

Extension (force): The force required to stretch a material.

Extension recovery chart (in elastic material testing): A continuously plotted graph of tension versus extension resulting from an extension-recovery cycle.

Extension recovery cycle (in tension testing): The continuous extension of a specimen with a momentary hold at a specified extension, followed by a controlled rate of return to zero extension.

Extra classical: Trade name for the very best silk yarn, made of the choicest cocoons of the year.

Extra super: A standard grade of ingrain carpet, having 1,000 warp ends in a yard and 13% pairs of filling in an inch.

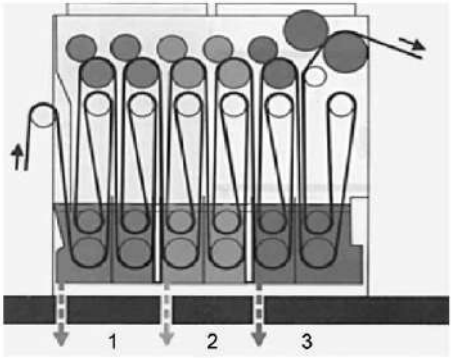
Extract: A term used for a preparation containing the active principle or concentrated solution of a material, e.g. an aqueous extract.

Extract printings: See **Printing**, **Discharge printing**.

Extract (aqueous): (1) The solution obtained by digesting a material in water. See **Aqueous extract**.

(2) Extracting a substance in another substance using water; usually distilled water to avoid the interference of any other matter contained in the water.

Extracta: Open-width washing machine with vertical zig-zag cloth passage (more efficient washing effect compared to horizontal arrangement). The additional division of an Extracta compartment enables different processes to be carried out with appropriate liquors in the individual sections.



Benninger design of washing unit; it consists of a 5-m washing chamber with 2 vertical roller pairs for double fabric immersion. Available with 3, 4 and 6 chamber compartments (15, 20, 30 m fabric dwell); each compartment has an

integral squeeze unit with 2 or 3 t pressure. Can be combined with e.g. a pre-treatment steamer.

Extractable matter: Non-fibrous material in or on a textile, not including water, which is removable by a specified solvent or solvents, as directed in a specified procedure.

Extractable: The material that can be removed from textiles by means of a solvent (in many cases, water).

Extraction: Removal of one substance from another, often accomplished by means of a solvent.

Extraction cleaning: A general term for a number of refurbishing methods in which the cleaning agent is delivered on to the textile product, agitated and simultaneously removed by suction.

Extraction cleaning (dry foam): See **Dry foam extraction cleaning**.

Extraction cleaning (hot water): See **Hot water extraction cleaning**.

Extraction cleaning (rotary): See **Rotary extraction cleaning**.

Extraction cleaning (steam): A deprecated term. See more preferred term Hot water extraction cleaning.

Extraneous fibres: Faults arising from the presence of foreign fibres in a textile material. Generally present in low proportion and occurring as a contamination caused either by erroneous fibre mixing, residues from other processes or fibre fly from packaging material, etc., that may be twisted, woven or knitted into a fabric. Consequences – irregular fabric appearance, colour differences, bleeding of dyes, etc. Evidence only microscopic.

Extruded composites: Flexible, net-like textile fabrics (bonded fabrics), produced by extruders from thermoplastic polymer melts for felt underlays, camouflage nets and for carpet anti-skid protection, etc.

Extruder: (a) Generally a machine in which molten or semi-soft materials are forced under pressure through a die to form continuous tubes, sheets, or fibres. It may consist of a barrel, heating elements, a screw, ram or plunger, and a die through which the material is pushed to give it shape. (b) In fibre manufacture, the machine that feeds molten polymer to an extrusion manifold or that which first melts the polymer in a uniform manner then feeds it to manifold and associated equipment for extrusion. Also see **Screw melter**.

Extrusion coating: A process used for the production of fusible interlinings. Principle – a molten thermoplast adhesive is extruded from a wide slitted jet and the resultant film is pressed on to the pre-warmed substrate (fabric or non-woven) surface with the aid of cooled rollers.

Extrusion ratio: See **Spin-stretch ratio**.

Extrusion: Speed of the melted polymer.

Eyelash: A type of fringing that is usually metallic or plastic, woven or knitted in the fabric.

Eyelet: (a) A series of small holes made to receive a string or tape. A buttonhole stitch is worked around the holes; (b) A type of yarn guide used on a creel; (c) A fabric style with areas of cut-outs surrounded by stitching.

Eyelet embroidery: The ground fabric is fine count plain weave batiste. Before the actual embroidering process begins, the required eyelet effects are stamped in (openwork effect). The holes are then embroidered with grey ply yarns according to the pattern. Eyelet or batiste embroidery receives its snow-white effect by bleaching. These embroideries are also offered coloured or additionally printed.

Eyelet stitch: Embroidery stitch.

Method – work a row of small running stitch round the circle. Pierce the centre with a stiletto and fold back the ragged edge. Closely overcast the folded edge and running stitch. Trim away any ragged edge at the back. Holes may be cut across the centre both ways and the cut ends folded back, instead of piercing with a stiletto.

Eyeletting: See **Eyelet embroidery**.

Elastodiene: A term used to describe fibres composed of natural or synthetic polyisoprene, or composed of one or more dienes polymerized with or without one or more vinyl monomers which rapidly revert substantially to their original length after extension to three times of that length.

Extrusion: (1) The process by which often the plastic, molten or dissolved state of polymer of the fibre is spun into filaments. The material is forced through the holes of a spinneret or die at a controlled rate and dried into fibres. There are five different methods of spinning or extrusion. In practice, this method or a combination of methods are used to produce the final product (fibre). (2) See **Spinning**.

Eyelet plate: A cross bar attached to the end of a creel immediately in front of each row of spindles. It is perforated with the same number of holes, as there are spindles in the row and serves to guide the individual ends from the packages on the spindles to the wrapping machine.

F

Face (of the fabric): Usually the right side or the better looking side of the fabric, or the side of the fabric which is meant to be used in making the garment for wearing. Sometimes the wrong side is also used for making garments, such as denim.

Fad: A fashion or style which is short lived. A fad will not have any lasting impact on the future fashion. They are suddenly seen everywhere for a short period and then suddenly vanish.

Faggoting: See **Fagoting**.

Falling bands: Linen or lace collars (or combined) with two distinct ends hanging down over the chest. It is also called Rabat or Hanging Collars. It is used by both men and women.

Fargul: A type of jacket.

Farji: Name of a jacket, possibly a long over coat like garment without sleeves, or with very short sleeves open in the front and worn usually over pyjama.

Farshi pyjama: A wide legged pyjama that trails on the ground, sometimes completely covering the feet. It is worn often with kurta or angarakha.

Fashion forecast: The prediction of the future fashion by fashion experts which gives the fashion trend of a specific period of time like fall, winter, spring, summer, etc. These could be trends of garment styles, colours, footwear, etc.

Fast fashion: A term to describe the way in which trends and products alter rapidly, with several changes occurring throughout the traditional spring/summer, autumn/winter seasons. Criticism of this approach is that the clothing becomes disposable and therefore uses excessive resources and ultimately contributes to landfill.

Fatuhi: A vest or a jacket without sleeves, with light padding of cotton wool and quilted.

Faux fur: A woven or knitted fabric of any fibre to look like animal fur. Acrylic and modacrylic are very common.

Faux leather (false leather): Fabric made to imitate animal leather. Generally of polyurethane laminate.

Faux linen: Fabric which looks like linen, made using slubbed yarn and later given finish to give linen handle. Often inexpensive.

Faux shearling: Fabric made to imitate shearling- the pelt of a sheep with wool in place.

Faux silk: A fabric commonly made with polyester, and woven/knitted and finished with drape, shine and softness to imitate silk. Often dyed into ecru shade to give the natural silk look.

Faz-vi: A jacket without sleeves.

Fibre ultimate: One of the unit botanical cells into which leaf and bast fibres can be disintegrated.

Fibrefill: Fibres specially used as fillers for making pillows, mattresses, sleeping bags, quilts, comforters and paddings for outer wear. These are specially engineered fibres or sometimes recycled materials.

Filament blend yarn: A filament yarn which contains separate filaments of two distinct types; the filaments being more or less randomly blended over the cross section of the yarn.

Filamentation: Breakage of filaments in filament yarn which causes fibrous or hairy appearance on the surface of yarn package or fabric.

Filler fabric: A rubber-coated cross-woven fabric which is placed around the bead section assembly of a tyre and serves to reinforce the joint between apex and casing plies. In all metallic radial-ply tyres, this filler often consists of a ply of wire cords.

Filler: A North American term for filling. See **Filler**.

Filling bobbin: A tapered core on which filling/weft yarn is wound for use in the shuttle.

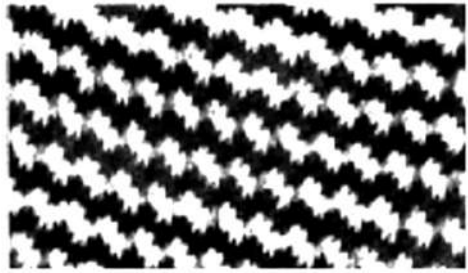
Filling yarn: Filling is also called woof or weft. It is the yarn which is used for weaving a fabric in which it is interlaced through the warp yarns.

Finished fabric: A fabric which has gone through the full process inclusive of finishing and ready for garment production.

Finisher picker: The second of the two units of older style picker machines. This unit receives partially cleaned cotton in the form of a lap from a breaker picker and completes the cleaning and fluffing process.

Firm: A fabric is called firm when it is relatively solid with compact texture, having good body and reduced drape.

Flame stitch: A zig-zag design that suggests a flame.



Flash spinning: A modification of the accepted dry-spinning method in which a solution of a polymer is extruded at a temperature well-above the boiling point of the solvent such that on emerging from the spinneret evaporation occurs so rapidly that the individual filaments are disrupted into a highly fibril form.

Flat (spinning): A flat piece of material covered with a special type of card clothing, held in a horizontal position on the flat top type of carding machine. Working in conjunction with a carding drum, it aids in opening the cotton fibres.

Flat crepe: The flattest all crepes with very little crepe or pebbled effect hard twist alternating 25 × 22 in filling, warp has ordinary twist. It is very soft and pliable which makes it good for draping. It may be white coloured or printed and light weight. It is also called French crepe. It is used for accessories, negligees, pyjamas, lingerie, blouses, dress goods and linings.

Flat fabric: A two-dimensional woven or knitted fabric that has no pile loops.

Flat knitting machine: A weft knitting machine having straight needle beds carrying independently operated latch needles. Rib machines have two needle beds which are opposed to each other in inverted V formation. Purl machines have two needle beds horizontally opposed in the same plane.

Flat metal yarn: A yarn consisting of one or more continuous lengths of metal strip or incorporating one or more continuous lengths as a major component. A notable example is a singles metal yarn in banknotes, which may be 0.50 mm (0.02 in) wode and 0.08mm (0.003in) thick. For this purpose, it must be without twist, i.e., flat throughout its length in the banknote. Analysis of the metal is proof of the authenticity of a banknote, twist inserted I flat metal yarns may form irregular facets, which reflect light accordingly to give decorative effects in fabrics.

Flat screen printed: A material which is printed using a flat screen. Flat screens will have advantages over rotary printing machine in the fact that in flat screen, there is more design flexibility; where as in rotary screen printing, the objects have to be adjusted as per repeat.

Flat screen printing: The method of printing where flat screens are used to transfer the designs on to the fabric. In this type of printing, a separate flat screen is created for each colour. The open mesh part of the screen corresponds to the area to be printed in that colour. The areas where colour is not required to pass are blocked. Dye paste is forced through the open mesh area with squeegee. The fabric is then moved or the screen replaced to allow printing of the next colour. In flat screen printing, the screens are in the form of flat panels; the width of which will be same as the repeat of the pattern.

Flat screens: The screens used in flat screen printing. See **Flat screen printing**.

Flat setting: The setting of fabric at open width. The term is particularly used in the finishing of woven wool fabrics, where setting is usually affected by steaming under pressure.

Flax fibre bundle: One of the aggregates of ultimate fibre that run from the base of the stem up to the top of the branches of flax straw. They are each composed of large numbers of ultimate fibres overlapping each other.

Flax fibre strands: Flax fibre after removal from the plant, consisting in the cross section of more than one ultimate fibre.

Flax yarn bundle: The standard length by which wet-spun flax yarns are bought and sold. The 'bundle' traditionally contained 60000 yards (about 55000 m) of yarn.

Flax-spun: A term applied to staple yarn which has been prepared and spun on machinery originally designed for spinning yarns from flax.

Fleecy fabric: A weft knitted fabric composed of three separate yarns, a ground yarn of normal count, finer binding yarn which is held into the fabric at close interval by the binding yarn. The fleecy yarn appears on the back of plain knitted fabric and presents an ideal surface for brushing or raising.

Flock (wool): Waste fibres obtained from wool during the different finishing process.

Floral (design): A design where the motifs are dominated by flowers.

Fluff: Lint or short fibres that has accumulated on a knitting machine and become incorporated in the fabric.

Fluoro fibre: A term used to describe fibres composed of linear macromolecules made from fluorocarbon aliphatic monomers.

Fly frame: One of the several machines which progressively combine two strands of partially processed roving into one, draw out the combined strands until they are of prescribed weight, and twist them loosely in order to give them sufficient strength to withstand subsequent operations.

Fly shot loom: A multi-piece loom for weaving narrow fabrics in which each shuttle is knocked through the open shed by means of a peg fixed in a slide. The term is also sometimes applied to single-head narrow fabric looms.

Foam backed fabric: A combined fabric usually having two layers, one of which is of cellular plastics material.

Foam lamination: A method of making breathable laminated fabric which is mainly used for footwear. In this method, a layer of polyurethane, PVC, or latex is bonded to the fabric with adhesive or fused to the fabric by heat.

Fontange: A bow on a ladies headdress worn in the late 17th and early 18th Centuries, named after the Duchess de fontanges. The term is sometimes incorrectly applied for the whole headdress.

Forehead cloth: Name used for a band covering the forehead of women used in the 16th and 17th centuries. It may be triangular in shape.

Forming trumpet: A short and flared metal tube at the front of a carding machine. The film of cotton fibres from the machine is passed through the tube which forms them into a sliver. A similar device is at the front of a warping machine. It is used for gathering a number of strands of yarn into a loose and untwisted rope in ball warping.

Forte of a garment: A term used to indicate the strong point of the garment.

French terry: A knit jersey with loops on one side. Sometimes napped to make fleece.

Frey: Threads which come out from the fabric during handling.

Friction twisting: The generation of false twist by a device in which the yarn lies in contact with one or more surfaces of high friction driven in a direction at substantial angle to the yarn axis. In practice, friction disks, belts, or bushes are commonly used.

Fugitive tint: A colour used as tint to identify textile materials during handling, generally in spinning. The colour should be easily and completely removed during the normal scouring or dyeing process and should not interfere in any wet processes.

Fuji: A light-weight plain weave fabric originally of silk, but now usually of polyester bi-component yarn which gives the appearance of a subtle texture on the surface; used in blouses and dresses.

Fujiette: A medium-weight fabric with filament yarn warp and a spun weft. Usually it has a fine cross-wise rib. It is commonly found in rayon and blends of acetate and rayon; used for blouses and dresses.

Full Cardigan: A variation of 1 × 1 Rib stitch manufactured with 2 sets of needles and by alternate knit and tuck on one course and tuck and knit on the next course. The garments that are shaped wholly or in part by widening and/or narrowing by loop transference to increase or decrease the number of wales.

Fulled: See **Milled**, **Milling**. **Fabinet**: A term used for a type of Artificial leather produced from natural fibres that have been bonded together with a binding agent.

Fabric accumulators (cloth accumulators): Storage units which are, in a few cases, identical with Dwell units in processing machines. They include, conveyor-type accumulators, scray accumulators, roller accumulators and open-width accumulators.

Fabric bagging: A fabric defect which can be caused, e.g. by milling. As a result, the longer interwoven warp or weft threads are milled to a greater extent than the shorter interwoven crossing threads.

Fabric batching machines: See **Batching machines**.

Fabric construction: The details of structure of fabric. It includes information as style, width, type of knit of weave, threads per inch in warp and fill and weight of goods.

Fabric content (cloth content): The fabric content of a textile processing machine or unit expressed either by length or by weight, e.g. the length of fabric (in metres) actually present in a continuous processing range (e.g. 15 m of fabric per roller vat), or in batch-wise processing as the charge of material being processed (e.g. 100 kg of fabric per tube in a jet-dyeing machine).

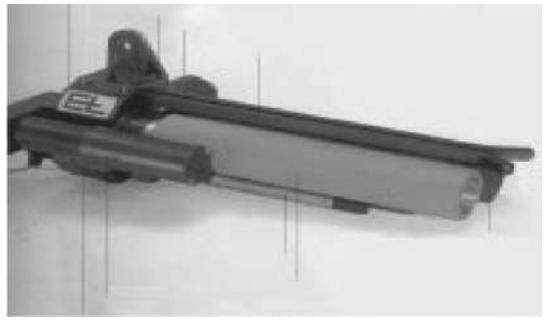
Fabric crimp: The angulation induced between a yarn and woven fabric via the weaving or braiding process.

Fabric crimp angle: The maximum acute angle of a single weaving yarn's direction measured from a plane parallel to the surface of the fabric.

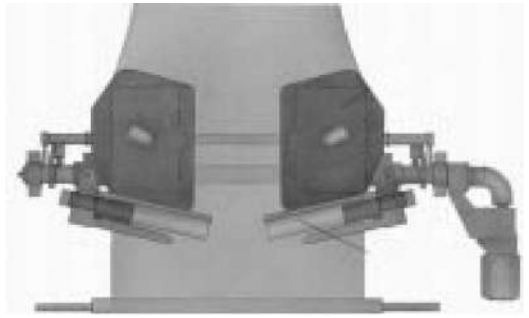
Fabric dip (for tyre fabrics): A chemical composition which is applied to a textile cord or fabric to improve its adhesion to rubber compounds.

Fabric folding machine: Machine for folding piece goods in layers of defined width and stack height.

Fabric guiders (cloth guiders): Devices for the sideways control of fabric passage in a pre-programmed horizontal or vertical direction. Guiding elements with axially-movable profiled slats.



E+L fabric guider



Fabric guide for knitter

Fabric handle: A large number of subjective and objective physiological and physical characteristics are involved in the determination of fabric handle. From various studies on correlations between the handle characteristics determined by subjective and objective means, it has been found that the measurable characteristics of stiffness, bulk and surface smoothness play a particularly important role in determining the handle of a textile material.

Fabric impregnation: Dipping of the fabric in the liquor and allowing proper absorption of the liquor into the body of the fabric.

Fabric inspection machine: Different types of machines for only inspection or for inspection and rolling, plaiting or packing, etc., of grey, finished or fabric at any stage.

Fabric length: The length between two fully interlaced weft threads measured parallel to the warp at both ends of the fabric in a relaxed condition. The fabric length does not include the zones at the start or end of the piece.

Fabric opening machine: See **Tubular fabric slitting machine, Rope opening machine**.

Fabric relaxation: See **Relaxation**.

Fabric roof-system: A system of coated fabric or laminated fabric along with support cables, edge ropes, clamps, neoprene, roof drains, arch wear strips and anchor bolts that constitutes the outside top covering of a building.

Fabric set: The number of warp threads per inch or other convenient unit.

Fabric sliver knitted: See **Sliver knitted fabric**.

Fabric slitting machine: See **Cutting of textile fabrics**.

Fabric slitting equipment: Used for separating the running fabric webs in the middle and into strips. Installed on production machines.

Fabric softener: (a) An auxiliary or a chemical used for improving the softness of the final fabric. It can be one which can be applied by padding (usually on a stenter or special pad application machines) or by exhaustion. Various softeners are having different effect on the handle of fabric and a few give multiple effects along with softening (a classic example is polyethylene emulsion, it gives softening, body, waxy feel and improvement in the tear strength of the fabric).

(b) Washing aftertreating product for preventing boardy handle resulting from washing in a rotary washing machine with a lot of mechanical action and drying in still air. Provides considerable improvement to the handle of washes, provides full softness and makes synthetic fabrics antistatic by using fabric softener in the form of emulsions of mainly quaternary ammonium compounds (such as distearyl dimethyl ammonium chloride), as a dilute aqueous emulsion, in the final rinse.

(c) Special softening agents (softeners) in liquid ready-for-use form, sometimes containing fluorescent brightening agents. Applied in the final rinse after washing in commercial laundries and in household washes in order to achieve a soft handle, antistatic effect, and easier ironing.

Fabric specifications/making particulars: Full instructions as to how to make the fabric.

Fabric stabiliser: Resin or latex treatment for scrims used in coated fabric manufacture to stabilize the scrim for further processing.

Fabric stability (in vinyl coated glass screening and louver cloth): The property denoting the ability to resist slippage of yarn segment in one direction over the yarn segments in the opposite direction.

Fabric straighteners: Devices for straightening distorted fabric webs. See **Weft straightening**.

Fabric stretch: The increase in length of a specimen, if a fabric resulting from a load applied under specified conditions.

Fabric take down: In knitting machine: fabric take down equipment has three main functions, fabric spreading, fabric tensioning and fabric winding. On circular knitting machines, fabric is knitted into a tube form on needles. The fabric is then stretched into a flat form by the spreader located above the take down system. The fabric is then pulled down by the fabric tensioning system (fabric take down roller) and wound into fabric roll by the fabric winding system

Fabric tension control: A system for tension-free running of woven fabrics in continuous machines. The control functions are designed so that drives (DC motors or geared servomotors) as well as brakes (pneumatic or electric) can be controlled. An additional pneumatic unit is available for use with control systems for pneumatic brakes.

Fabric (union): Blended fabric containing wool.

Fabric width: Commercially conventional widths.

130 – 150 cm wool fabrics for outerwear

80 – 90 cm silk materials

75 – 200 cm bedding

40 – 130 cm household linen

80 – 130 cm tablecloths

20 – 50 cm handkerchiefs

80 – 140 cm materials for industrial clothing

60 – 140 cm velvets

70 – 80 cm shirting, trend toward standardisation of 150 cm.

Fabric with nap: They are fabrics that have a texture or a definite "one-way" pattern to them, like suede, corduroy, velvets and velours. When using these fabrics, the pattern should always be placed on the fabric using the "with nap" layout.

Fabric (airplane): A plain weave fabric, well-woven, practically without imperfections, of mercerized two-ply yarns of width 36–56 in with maximum mass of 4.5 oz/yd and yarns per inch warp and weft 80–84.

Fabric, Backing (in tufted floor covering): The fabric on to which the pile yarn is stitched or a fabric on to which the pile are laminated in pile floor coverings.

Fabric, bonded: A lacquered fabric structure wherein a face or shell fabric is joined to a backing fabric, such as tricot, with an adhesive that doesnot significantly add to the thickness of the combined fabrics.

Fabric, braided: A structure produced by interlacing several ends of yarns in a manner such that the paths of the yarns are not parallel to the fabric axis.

Fabric, combustible: A fabric after ignition will continue to burn at a moderate to fast rate.

Fabric, highly combustible: A fabric which after ignition will flash or burn at a relatively high rate.

Fabric, impregnated: A fabric in which the interstices between the yarns are completely filled with the impregnating compound throughout the thickness of the fabric, as distinguished from sized or coated materials where the interstices are not completely filled.

Fabric, knitted: A structure produced by interloping one or more ends of yarn or comparable material.

Fabric, laid: A fabric made without the weft yarn, the parallel warp yarns being held together by means of binding material such as to rubber latex.

Fabric, laminated: A layered fabric structure wherein a face or outer fabric is joined to a continuous sheet material such as polyurethane foam in such a way that the identity of the continuous sheet material is retained, either by flame method or by an adhesive and this in turn normally, but not always, is joined on the back with a backing fabric such as tricot.

Fabric, non-combustible: A fabric which will neither ignite nor give off vapours that will ignite, when subjected to an external source of ignition.

Fabric, non-woven: A textile structure produced by bonding or interlocking of fibres, or both, accomplished by mechanical, chemical, thermal or solvent means and combination thereof.

Fabric, stable: A textile fabric which does not change in dimensions significantly with multiple passes through measuring devices. See **Stable fabric**.

Fabric, stretch: See **Stretch fabric**.

Fabric (textile): A planar structure consisting of yarns or fibres.

Fabric, treated: A fabric to which a finish has been applied in order to change the original level of a specific property or properties, for example: Water repellence, crease recovery, etc.

Fabric, union: A fabric made from yarns of two or more fibre types.

Fabric, woven: A planar structure produced by interlacing two or more sets of yarns, fibres, roving or filaments where elements pass each other essentially at right angles, and one set of elements is parallel to the fabric axis.

Fabricate (in button): The conversion of a blank in to a complete button.

Face: The side of a fabric that is intended to be used outermost.

Face goods: Usually all-wool fabrics; a full dense nap is raised on the face after a thorough fulling and is brushed down, resulting in a smooth face. Doeskin is such a fabric.

Face weight: Total amount of face yarn in the carpet, usually expressed in ounces per square yard.

Face-cloth: The term used to describe a smooth and plain-weave cloth that is luxurious looking with a nap on one side. Best quality face-cloth is wool, but offers may be acrylic or viscose. The fabrics are made in various weights. It is used mainly for coats and jackets, but inexpensive fabrics may be used for robes and dressing gowns.

Face finished fabric: A fabric in which the face side is finished selectively. Example, Raising.

Face side (in textile materials): The side of the material that is outward in the completed object.

Face-to-face carpet (double plush carpets): Carpets that are manufactured as a "sandwich" in a single operation, whereby the pile is attached to two substrates, one above the other. The pile weft forms the pile between the two warps, and two cut pile carpets are produced by cutting the pile yarns between the two substrates direct on the loom. See **Double plush carpets**.

Face-to-face tournay carpets (double tournay): A face-to-face carpet produced on jacquard looms.

Face (in button): That portion which will expose after attaching to the substrate.

Faced hem: A facing or faced hem is also used as a protection to the edge of a garment. A true bias or fitted facing should be used for a facing if the edges of the garment are curved. An extension hem is one in which the whole width of the hem is used.

Face-finished fabric: A fabric in which the finishing agent or a mechanical finished is applied on the face side of it. Chemicals can be applied on the desired side by coating machines, by nip rolls, etc. Mechanical finishes can be done only on the required side of the fabric only.

Fasciated spinning: In fasciated spinning, long staple sliver without twist is introduced into a limited space and subjected to a torque jet operating at right angles to the flow of the sliver thereby imparting a false twist to the sliver. As the sliver exits, the torque jet it rapidly untwists, and the outer fibres tend to

break away from the sliver and wrap around the inner sliver to give a strong yarn consisting of mostly parallel fibres with some fibres tightly twisted around the outside.

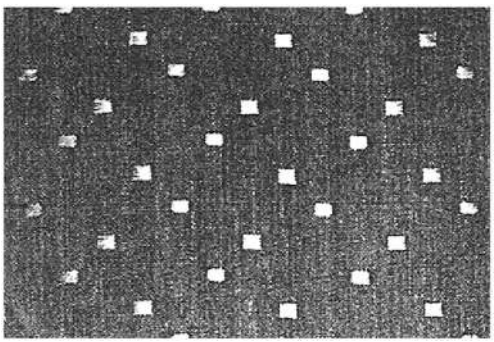
Faciated yarn: A staple fibre yarn which by virtue of its manufacturing technique consists of a core of essentially parallel fibrous which are bound together by wrapper fibres. The current technique of manufacture is often referred to as jet spinning.

Facing: A lining or trim that protects the edges of a garment, especially at collars, cuffs and front closings.

Facing silk: A fine lustrous fabric of silk used for facing, usually corded satin, twill weave or barathea.

Faconne: (1) A fancy material with a small pattern (including velvets and plush fabrics) of varying fibre types for scarves, blouses and ladies' cocktail or evening dresses.

(2) French word for figured or 'fancy weave'. It is used in relation to textiles to describe jacquard fabric. Generally, plain colour fabrics of soft floppy crepe with satin or taffeta effect patterns are called Faconne. Designs are always small, often shiny on dull background. Popular in the thirties when it was made of silk or ' artificial silk', it returned to fashion again in the seventies, made form viscose, acetate, polyester or blends. Used for blouses, soft dresses, evening wear, etc.



Faconne velvet: A patterned velvet of various fibres with the pattern produced by the burnt-out method of design.

Facultative process: A biological treatment (ETP) process in which the organisms are indifferent to the presence of oxygen. The organisms are called facultative micro-organisms.

Fade (in fastness testing): Any change in the colour of an object caused by light or contaminants in the atmosphere. Example, Burnt gas fumes. The change in colour may be in tone, depth or both.

Fade: Colloquially, a reduction in depth of the colour of an object, by any means.

Fade-o-meter: Laboratory testing device used to determine the fastness of a coloured textile material to light exposure. See **Light fastness**.

Fading: Loss of colour in dyeing and prints as a result of Photochemical reactions.

Fag end: (a) Untwisted end of a rope; (b) Unfinished end of the piece of cloth.

Fagara silk: Wild silk, produced by the Attacus atlas in India.

Fagoting: Fancy way of joining the seams of sheer, light fabrics, producing an openwork, the connecting thread running either in zig-zag line or in ladder effect (French fagoting); in embroidery consists in drawing out few of the threads and tying the cross threads.

Failine: French woollen serge.

Faille: A fine, cross-ribbed and poplin-like dress and coat fabric (silk, half-silk, viscose filament and staple fibres) in taffeta weave. A typical construction of this fabric is 180 × 60, with 75 denier rayon in the warp and 300 denier acetate in the filling. Another is 100 × 50 with 100 denier rayon warp and 16s spun acetate filling. It is sometimes made in cotton, simulating the look of the original silk fabric of that name. Such faille is given a glossy finish to imitate the lustre of the original silk fabric.

Faille Français: Pure silk, delicate and fine-ribbed.

Faille-luisant: Iridescent sheen.

Faille (luxury): Fine-ribbed viscose filament with lustrous and matt sides.

Faille-mirage: Moiré appearance, viscose filament in the warp and metallic yarn in the weft. **Faille-reversible (faille-satin)**: 2-sided effect, lightly ribbed and smooth on the reverse.

Failletine: Similar to ***Faille Français***, very fine ribbed and delicate.

Faille de Chine: A very rich, soft and all-silk faille.

Faille crêpe: A smooth, rich fabric resembling Crepe de Chine, but heavier. The fibre may be silk, but is usually more synthetic. Used for blouses, evening wear negligees.

Faille français: A soft, lustrous silk of wider cord than grosgrain, but narrower than ottoman.

Faille taffeta: A taffeta weave fabric made from silk or synthetic fibres, but with pronounced cross-wise rib effect that resembles faille.

Faille (heavy): Usually used for upholstery purposes, the warp of the fabric consists of fine silk or synthetic filament yarns or of fine mercerized cotton. The filling will be heavy two-ply cotton yarns.

Faille (ribbon): An adopted French term, at one time signifying a fabric in a 2/2 weave, also called double shot. It is woven typically with 20 picks per cm. In present day usage, it is nearly always in plain weave and a correspondingly thicker weft.

Faille (tissue): 200 × 50 construction with a 75 denier warp and a 2/75 denier filling.

Failure: An arbitrary point beyond which a material ceases to be functionally capable of its intended use.

Fair isle knit: Knitted fabric with coloured patterns resembling Fair Isle. The fibre is usually acrylic and the fabric has a great deal of elasticity. It is inclined to 'seat' or lose its shape under strain, hence garments made by this material should not be tight.

Fake fur: See **Fur fabric**.

Falding: Coarse English woollen, similar to the frieze; used for clothing and furniture cover in the 14th Century.

Faliegrijn: Cross ribbed, solid coloured wool camlet; used by the Dutch peasant women.

Falkland islands: Somewhat coarse cheviot wool; used for dress goods and knit goods.

Fall height: Function of action in application baths, e.g. the washing mechanism in drum washing machines (drum partitions). Fall height = drum diameter in m – liquor level in the drum in m.

Fall plate fabric (warp knitted): A fabric made on a Raschel warp knitting machine using one needle bar, involving the use of a solid metal plate (fall plate or chopper bar) to push the newly formed laps of the pattern bars down below the spoons of the open latches to be cast off with the ground laps of the previous course.

Fall weight: Trade term for medium weight coatings, dress goods and suiting.

Fall wool: Wool shorn in the fall following 5–6 months of growth.

Fall-on in printing: A partial overprint of a pre-printed print paste by another print paste, e.g. a pre-printed black outline overprinted with a coloured print

paste, or the overprinting of one coloured print paste by a print paste of a different colour = combination shade.

Fallblech: Three-dimensional optical fabric, made with high-pattern yarns and used as curtains.

Fibres used: Polyester, Polyester/Acrylic blends.

Fallen wool: Wool originating from dead sheep. It is generally removed from the skin using lime before tanning. Its affinity to dyes differs from that of virgin wool.

Fallers: (1) Protrusions on a drum interior surface which turn and submerge the item being treated during drum rotation, thus increasing the mechanical action.

(2) Straight pinned bars employed in the control of fibres between drafting rollers.

(3) Curved arms that are fixed to two shafts on a mule carriage and carrying the faller wires.

Fallow: Reddish-yellow or yellowish-brown; the colour of ploughed and unsown land, namely, pale or ruddy brown.

False brocade: In contrast to a genuine brocade, this is a woven fabric produced on normal looms where the brocade effect is formed as a rule by a second warp or weft thread system with figuring threads. "False" brocade produced on looms without a swivel embroidery slay can be recognized by its low mechanical resistance – the threads are easily drawn out of the fabric.

False damask: See **Damask (false)**.

False reed: A false reed is composed of short wires with a loop at the top which are threaded on a band of wires and is used in addition to an ordinary reed to keep the threads of a fibrous or high-set warp separated. The wires of false reed are passed through the warp behind the ordinary reed and divide the warp into three or four threads.

False satin: In designing a broken twill, a three-shaft twill cannot be broken because skipping one shed reverses the direction of the diagonal and skipping two sheds brings us back to the first shed again. One four-shaft twill, 3/1 twill, when woven as broken twill, is called false satin because it is warp-faced and the twill diagonals characteristic of simple twills are almost eliminated.

False selvedge chain: Small support belt (linen warp) for men's ready-to-wear products.

False twist: Turns inserted in opposite directions and in equal numbers in adjacent elements of yarn, silver (q.v.) or similar aggregations of fibres or filaments, and that are characterised by their temporary nature.

Note: False twist may be used as follows –

(i) To produce effects, e.g.
  (a) the entanglement of fibres while false-twisted;
  (b) a measure of permanence to the twisted form by heat-setting the false-twisted yarns.

(ii) To assist processing, e.g.
  (a) the passage of sliver from "noble" comb to can;
  (b) the attenuation of rovings (q.v.) on a condenser ring frame.

False twist direction: The direction, S or Z of twist generally by a false twisting device upstream of itself.

False twist spindle: A device for inserting false twist into a running yarn, sliver or similar assembly of fibres or filaments.

False twisting: A twisting operation applied to an intermediate position on a yarn or other similar continuous assembly of fibres, so that no net twist can be inserted, as direct from twisting at the end of a yarn where real twist is inserted.

False twist texturing: See **Texturing (false twist)**.

Falseh: Strong, harsh, wiry fibre, yielded by a species of Grewia in Persia; used for ropes, etc.

Famis: Silk cloth with gold threads interwoven, made for the Levant in France.

Fancies: Fabrics outside of the staples.

Fancy: A type of coarse flannel, napped on both sides, in linen or twill weave, of cotton or cotton-viscose blend. Double fancy is the name given to goods that are typically two-tone, e.g. with one side pink and the other a mottled blue. Used for cold-weather underwear.

Fancy cloth: Generally, any cloth where through the warp or filling either in one or more colour patterns are produced.

Fancy ply yarn: A collective term for particularly fancy yarns with knots, loops, etc. Special effect yarns are produced on twist frames with additional feeder rolls which supply the main feeder roll at varying speeds.

Fancy print: A term used for all types of printed articles which do not fit into the category of traditional Africa print styles. Fancy prints are usually produced with designs having large motifs. They are the cheap mass-produced printed fabrics in West and Central African countries.

Fancy yarn: See **Yarn (fancy)**.

Fangchow: Very light silk foulard, made in China; it is about 22 inches wide.

Fanpak: Closely woven soft wool flannel in China.

Fantaisie: (a) French for fancy (see); (b) A coarse and inferior grade of silk in France.

Fantasia: Dress goods in Italy.

Farasdanga: Fine cotton cloth, made on hand looms in India.

Fard: Indian printed cotton; used for floor covering.

Farmer satin: A lining of cotton chain or warp and wool filling, finished with a high lustre that is also called Italian cloth.

Farquharson: A Highland tartan.

Composition– wide dark green bar, one-eighth of which is taken up by a yellow stripe in the centre; black stripe made as wide as half of the above; two narrow dark blue and black lines follow; dark blue bar, with a red stripe in the middle, the latter measuring the same in width as the yellow; repeat group, described between the two in reversed order; wide dark green bar with yellow in the centre, as described above is repeated; black stripe, half the width of the green bar; dark blue, somewhat narrower than the black; group of narrow black, red and black stripes; repeat stripes, described between the last two in reversed order.

Farthingale: Earliest hoop dress; a conical frame of thin, flexible switches was worn below the underskirt. Mainly used by Spanish.

Farrell prolific: A commercial variety of very prolific American cotton, the staple measuring 30–35 millimetres; the yield is 28–30 percent.

Fash: Cloth clippings or fringe produced in England.

Fashion adoption: The take up of new styles.

Fashion colours: (1) Colours within a colour range, perceived as being fashionable or ‘of that moment’.

(2) Those colours which the haute couture fashion houses have determined as the colours of the season.

Fashioned: Hosiery and underwear; knitted flat and shaped by means of dropped stitches, forming flat edges.

Fashioning: The process of shaping a fabric during knitting by increasing or decreasing the number of needles in action. Fashioning is used in manufacturing hosiery, underwear, and sweaters.

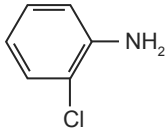
Fast back: (1) Name for welts where the wadding filling is more or less interwoven with the warp;

(2) Trade term for quilts, having the stitching warp interwoven on the back.

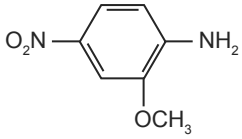
(3) Marseilles bleached cotton quilt, having two sets of warps and two sets of fillings, woven plain on the face and back of the fabric, and having a heavy wadding weft between the two cloths. It is woven in embossed patterns.

Fast colour bases: Coupling products for the development of Naphthol AS dyes (Hoechst). They are not dyes, but soluble intermediate products with a basic character due to the presence of

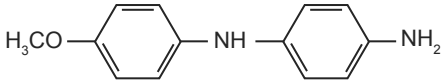
Amino groups. Before use, these amino groups must first be diazotized before they can couple, exactly like Fast colour salts, with Naphthol AS components to form insoluble dyes.



Fast yellow G base



Fast bordeaux B base



Variamine blue B base

Fast colour salts: These are already diazotized, water-soluble coupling products (so-called stabilized diazo compounds) of the corresponding fast colour bases, used for the development of Naphthol AS dyes (Hoechst). Compared to fast colour bases, the salts offer advantages of better keeping properties, easy solubility, greater reliability and simpler application.

FAST system of fabric assessment: The FAST system (Fabric Assurance by Simple Testing) was developed in Australia by the CSIRO. This system is used to determine the properties of woollen fabrics affecting both the way the fabric performs during cutting and making up and the visual appearance of clothing fabrics when worn. The system comprises three simple instruments and a testing method and was developed principally for use by fabric manufacturers, finishers and dressmakers.

(a) FAST-1 consists of a compression measurement device that measures the thickness of the fabric under two different loads.
(b) FAST-2 is a device for measuring flexural rigidity which measures the bending length of the fabric (the bending length can be used to determine the flexural rigidity).
(c) FAST-3 is a device for measuring the elasticity, measuring the elongation of the fabric under two different loads in the warp and weft direction and diagonally.
(d) FAST-4 is a measuring method for the determination of the dimensional stability of the fabric (relaxation shrinkage and hygral expansion).

Fastness: Resistance of a dyeing or a dye for a particular process. The process can be one which is done during the processing of the fabric or after the consumer usage.

Fastness commission: The German organisation (EK = Echtheits-Kommission) for colour fastness. Most member countries of the International Organisation for Standardisation(ISO) support its Technical Committee 38 (TC38) which was made responsible for all matters concerning textiles and, within TC38, Sub- Committee 1 (SC1), which became specifically responsible for all colour fastness test methods through the national committees of ECE countries.

Fastness improvement: See **Fastness improving agents**.

Fastness improving agents: Textile auxiliaries or chemicals used to improve the colour fastness of dyeing and prints by means of an after-treatment. For this purpose, products are used which form virtually insoluble compounds with dyes on the fibre (especially direct and acid dyes, as well as wool/cotton union dyeing). Other products are used to remove unfixed dye from the fibre (e.g. in naphthol dyeing).

Fastness standards (colour fastness standards): The drawing up of international standards for colour fastness determinations is an ongoing activity of ISO in cooperation with various national standards organizations. It is recommended that guidelines issued by national fastness testing commissions for determining the colour fastness of textiles should only contain slight amendments from the ISO standards.

Fastness test specimen: IT is used in fastness testing, often together with adjacent fabric. *Guidelines* – only textile materials in the flat state are suitable for testing. Yarns are knitted or otherwise converted into a flat form for this purpose. Loose fibre is converted into a fleece. Minimum size of test specimen

is 10 cm × 4 cm. The adjacent fabric specimen and the test specimen, of equal size, are joined together by sewing before the fastness test.

Fastness testing: The purpose of colour fastness testing is to determine the resistance of dyed and printed textiles to various agencies at different stages of the manufacturing process (colour fastness to processing) as well as in subsequent use (colour fastness of textiles in use). Examples of the former category include – colour fastness to kier boiling; chlorination; bleaching (sodium chlorite); bleaching (hypochlorite), bleaching (hydrogen peroxide); decatizing; degumming; carbonizing; mercerizing; vulcanizing; soda boiling; cross-dyeing; stoving; metals in the dyebath; potting; milling; pleating; sublimation; resin finishes, etc., whilst examples of the latter category include colour fastness to light; weathering; washing; water; perspiration; rubbing; burnt gas fumes; chlorinated water (swimming bath water); seawater; ozone in the atmosphere.

Fastness to acid spotting E05: The specimen is spotted with either acetic, sulphuric or tartaric acid which is rubbed into the fabric with a glass rod to form a 20mm diameter spot. The specimen is then dried and compared with the grey scale for colour change.

Fastness to alkali spotting E06: This is carried out as the above test for acid spotting while using a 10% sodium carbonate solution.

Fastness to bleaching with sodium hypochlorite NO1: In this test, the sample is wetted out and placed in sodium hypochlorite solution of a standard strength (2.0 g/1 available chlorine pH 11) and liquor ratio for 1 h; it is rinsed, immersed in hydrogen peroxide solution (30%) for 10 min, rinsed again, dried and assessed for change in colour.

Fastness to bleaching with peroxide N02: A composite specimen is placed in a test-tube with standard bleaching solution (composition, temperature and time vary for different fibres, e.g. wool in hydrogen peroxide solution for 2h). It is then removed, rinsed, squeezed out, opened out, dried and then assessed for colour change of the test fabric and staining of the adjacent fabric.

Fastness to carbonising X02: The composite specimen is immersed in sulphuric acid solution (50 g/1) for 15 min at room temperature; removed, squeezed, dried and then baked for 15 min at 105°C. The colour change is then assessed. A control specimen is treated at the same time to ensure that the test has been correctly performed. This is a fabric that has been dyed to a given formula and that should change colour to a known degree, if the procedure has been carried out correctly.

Fastness to cross dyeing (wool): Colour fastness to cross-dyeing is determined in accordance with DIN 54 049 or BS 1006 X07. In this test,

composite specimens are treated in different dye baths containing all the chemicals except the dye (e.g. sodium sulphate and acetic acid for wool). It is than rinsed and dried. The composite specimens are then separated and assessed for colour change of the test fabric and staining of the adjacent fabric.

Fastness to decatizing E1O: The specimen is wrapped around a perforated steam cylinder for 15min (mild or severe treatment as required) together with a test control specimen. The control specimen is one that has been dyed to a given formula and that should change colour to a known degree, if the procedure has been carried out correctly. The specimen is then dried and assessed for colour change.

Fastness to degumming: This test determines the resistance of dyeing or prints to the effects of soap solutions used for the degumming of raw silk. Test specimens, sandwiched between undyed adjacent fabrics, are gently boiled under reflux in a soap solution (7 g/l) for 10 min (liquor ratio 100:1). After this treatment, the test specimens are rinsed in distilled water, followed by rinsing for 10 min in cold tap water, than dried in air (< 60°C). Change of colour and staining of adjacent fabrics are assessed with the standard grey scales.

Fastness to hot air vulcanisation: Fastness of dye to the effects of a typical caoutchouc mixture and its decomposition products during hot air vulcanization. The sample is placed on the non-vulcanized bed of caoutchouc and suspended in the heating cabinet for 30 min at 125°C with air circulation. The test piece is allowed to cool and removed from the caoutchouc. The change should be assessed immediately and after conditioning for 4 hours at 20°C and 65% relative humidity.

Fastness to hot water (fastness to crabbing): Resistance to hot water. Test piece is wrapped around a glass rod, treated with 100 ml of acetic acid solution (7 mg/l of pure acetic acid) in a round flask for 30 min at 70°C and dried at max 60°C without rinsing. Assess using grey scale.

Fastness to milling (alkaline): Determines the resistance to alkaline milling conditions.

(a) Mild (light): The test specimen is treated in mechanical washing machines with 10 stainless steel balls for 30 min at 40°C with 10 g/l soap (liquor ratio 3:1), after which water at 40°C is added until a liquor ratio of 100:1 is reached, and the treatment iscontinued for a further 10 min followed by rinsing and drying at a temperature up to 60°C.

(b) Strong (severe): Treatment as in (a) above, but with 50 stainless steel balls and 50 g/l soap as well as 10 g/l sodium carbonate (anhydrous) for 2 h at 40°C followed by a further 10 min at 40°C at a liquor ratio of 100:1.

Assessment: Change of colour and degree of staining are assessed visually by comparison with the standard grey scales. Establishing dyeing recipes to select dyes with adequate fastness properties.

Fastness to milling (acidic): It determines resistance to acidic milling conditions.

(a) Mild (light): The test specimen is treated with 1 ml/l concentrated sulphuric acid at 60°C for 1 hat a liquor ratio of 40:1.

(b) Strong (severe): Treatment with 1 ml/l concentrated sulphuric acid and/or 5 ml/l acetic acid 30% at 90°C for 30 min. The test specimen is constantly moved in the liquor and pressed with a glass rod every 2 min to ensure complete penetration during this period. After rinsing, the test specimen is opened from three sides and dried at a temperature up to 60°C.

Assessment: Change of colour and degree of staining are assessed visually by comparison with the standard grey scales. Establishing dyeing recipes to select dyes with adequate fastness properties.

Fastness to organic solvents: Resistance of dyed and printed textiles to the action of organic solvents, as used in dry cleaning. The guideline for all fibres is treat test subject for 30 min at room temperature (liquor ratio 1:40) separately in each organic solvent. In manual testing, push the test subject to the bottom every 2 minutes, using a glass rod. Then squeeze out any excess solvent and dry in warm air at 80°C.

Assessment: Colour change and bleeding, using grey scales.

Fastness to potting E09: The composite specimen is rolled around a glass rod, tied with thread, boiled for 1 h in water; the dyed specimen is then separated from the undyed cloth, dried and assessed for colour change of the test fabric and staining of the adjacent fabric.

Fastness to Pressing XII: Fastness to pressing can be carried out under three different conditions, dry, damp or wet.

(a) Dry – the specimen is placed on dry undyed cotton adjacent fabric and pressed for 15 s with a heated press (a domestic iron may be used, cotton 200 ± 20°C; wool 150 ± 20°C). It is then assessed immediately after a 4h interval for colour change and the adjacent fabric for staining.

(b) Damp – the dry specimen is placed on dry cotton adjacent fabric, covered with wet cotton adjacent fabric and pressed for 15s. It is then assessed as before.

(c) Wet – the specimen is wetted and placed on dry cotton adjacent fabric and then covered with wet cotton adjacent fabric and pressed for 15s. It is then assessed as before.

Fastness to sea water: Textile dyeing resistance to sea water. Wet the test piece and accompanying fabric with solution (distilled water containing 30 g/l of sodium chloride). Place test piece between two plastic plates in apparatus such as the Hydro-test and expose for 4 hours at 37°C. Dry the sample and the accompanying fabric separately in warm air (<60°C). *Assessment*: Colour change and bleeding using the appropriate grey scales. AATCC test 106–1972: 30 g/l of sodium chloride and 5 g/l of anhydrous magnesium chloride, 38°C, 18 hours (DIN 54 007 or ISO 105).

Fastness to soda boiling: Resistance of dyes. The resistance of dyeing or prints to the effect of dilute boiling sodium carbonate solution. Test methods are applicable to cellulosic fibres. Two treatments with and without the addition of a reduction inhibitor are used.

(a) 10 g/l anhydrous sodium carbonate and 4 g/l sodium m-nitrobenzenesulphonate in distilled water.

(b) 10 g/l anhydrous sodium carbonate, without addition, in distilled water. The test specimen is rolled around a glass rod and boiled for 1 h in the test solution under reflux after which it is unrolled, rinsed for 10 min, squeezed, and dried at 60°C.

Assessment: Standard grey scale for assessment of change of colour.

Fastness steaming Ell: This test is carried out to determine the effect that the steaming stage in printing has on the colours. In the test, steam is passed at atmospheric pressure through the composite specimen for 20 min, the adjacent fabric is then assessed for staining.

Fastness to super-heated steam vulcanisation: Treat test subject for 30 min at room fastness of colour to the effects of a typical caoutchouc mixture and its decomposition products during vulcanization using open steam that (a) is prevented from penetrating the test material, (b) penetrates the test material. The sample is placed on a non-vulcanized bed of caoutchouc and wrapped around a steel pipe. Accompanying fabric, cotton and material impermeable to steam and water are placed on top (in condition a) or only accompanying fabric and cotton (in condition b). This assembly is treated for 20 minutes in pre-heated autoclaves at a heating jacket temperature of 141°C and vessel temperature of 138°C, then air cooled.

Assessment: Colour change and staining onto accompanying fabric using grey scales.

Fastness to washing: Fastness to washing is one of the properties of a dyeing of importance to the consumer. Most washing tests are carried out at relatively low temperatures for short times and the dye–fibre system does not come to equilibrium. Most testing standards include several tests of increasing severity. These tests have successively higher washing temperatures, increasing wash times, possibly decreasing liquor ratios, and the more severe tests may have higher levels of mechanical agitation as well as small amounts of chlorine bleach in the wash. Few tests are carried out in typical domestic washing machines, others use a wash wheel.

Table 6.1 Conditions of the ISO washing fastness tests

	Temperature Test (°C)	Time (min)	Steel balls	Chemicals
ISO 1	40	30	0	Soap
ISO 2	50	45	0	Soap
ISO 3	60	30	0	Soap + Na_2CO_3
ISO 4	95	30	10	Soap + Na_2CO_3
ISO 5	95	240	10	Soap + Na_2CO_3

Fastness to wear(wear fastness properties): In colour fastness testing, a distinction is made between those colour fastness properties that are of particular relevance to the end consumer, e.g. colour fastness to light, washing, chlorinated water, sea water, water spotting, perspiration, rubbing, dry cleaning, etc., i.e. properties which relate to the performance of a dyed or printed textile in use, and those which are only important in textile manufacturing processes, e.g. colour fastness to decatizing, stoving, sublimation, vulcanizing, etc.

Fastran process (dyeing): A process for the continuous dyeing of loose wool in which dye fixation is achieved by high frequency heating.

Fastran process (printing): A wet transfer printing process for wool and polyamide in which transfer paper screen printed with water-soluble dyes is brought into contact with pre-wetted textile material in sandwich form under defined conditions of pressure in a calendar and subjected to the action of a high-frequency current. As a result, dye migrates from the paper to the textile material and is fixed thereon in a quasi-steaming process. An after-treatment is still necessary however.

Fat liquor: Fat-liquoring agent used to treat leather after tanning in order to achieve the desired softness, suppleness, fullness, improved tensile strength and resistance to water.

Fat liquoring: See **Tanning**.

Fat quarter: It is a quarter yard of fabric that is cut in a particular way. First a half yard piece is cut and then cut across the length so it ends up 18 by 22 inches. This is a convenient size for appliqué projects or for incorporating many different fabric pieces in your quilt project.

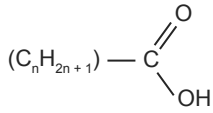
Fatigue: Refers to the resistance of a material to weakening or failure during alternate tension-compression cycles, i.e., in stretch yarns, the loss of ability to recover after having been stretched.

Fathom: Standard measure of length for ropes; one Fathom is six feet.

Fatigue load (in testing sewn seams): The force that is repeatedly applied to a test specimen.

Fats and waxes: Chemically, fats and waxes are esters of fatty acids; fats are triesters of glycerine and waxes are monoesters of fatty alcohols. Fats, also known as triglycerides, are abundantly produced by nature as vegetable oils (corn, olive, coconut, linseed, castor and soy bean oil) and, as fatty deposits in animals (beef, mutton, pork and fish). Marine animals produce both fats and waxes while land based animals produce only fats. Another source of waxes is vegetable matter, predominately the hard shiny outer coating on tropical leaves.

Fatty acids: They are having the following general formula:



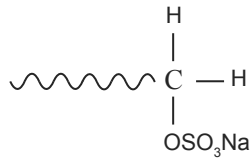
Most saturated fatty acids have wax-like properties. Stearic palmitic and myristic acids function as waxes. Fatty acids of low and frequently high molecular weight, containing more than 20 carbon atoms, are made use of for particular applications. Fatty acids with 12 and 14 carbon atoms are primarily of interest for synthetic detergents. By contrast, fatty acids with 16 and 18 carbon atoms, although still of interest on account of their detergent-building properties are, however, chiefly used for the production of synthetic softeners, sizes, finishing agents, etc. Soaps are obtained by treatment of fatty acids with alkaline liquors.

Fatty acid condensation product: (a) Condensed oils – these products are based on the principle of condensation and saponification, e.g. polyricinoleic acid with sulphonic acid groups and a reduced content of free carboxyl groups.

(b) "Masked" fatty acid (sulphonate) products – these are products in which the carboxyl group is protected by masking, i.e. by blocking the carboxyl group in its former position at the end of the long fatty acid chain.

Fatty alcohol derivatives: With sulphonic acid groups in the middle position, fatty alcohol sulphates, fatty alcohol esters, pyrophosphoric acid esters, condensates with sulphonic acids, fatty alcohol ethoxylates, etc. Properties: most have high stability with good wetting, levelling, cleaning, and softening properties.

Fatty alcohol sulphates: There are two types. (a) The type of sulphate that contains $-C-O-SO_3Na$ as a fatty ester of sulphuric acid with the sulpho group connected to carbon through an oxygen atom. (b) Fatty alcohol sulphates (primary alkyl sulphates) are formed by the esterification of fatty alcohols with acids, e.g. sulphuric acid (after neutralization). In textile these have many uses. A range of properties are obtained from mixtures of fatty alcohol sulphates, e.g. "synthetic detergents" with combined wetting, levelling, washing, softening and dye penetrating properties. They are also used as brightening agents, delustrants, degumming and lubricating agents, besides oxidative bleach stabilisers, emulsifiers, etc.



Fatty alcohols:When the complex R–COOH (Fatty acid) is reduced in the high pressure hydrogenation of fats to $R-CH_2OH$, as a result of which higher fatty alcohols with C8–18 are formed from the corresponding fatty acids. Fatty alcohols are insoluble in water, but soluble in many organic solvents. Together with soaps, turkey red oils, fatty alcohol sulphates and other solvents; they are used in textile auxiliaries as softeners and finishing agents. With paraffin they are also used for water repellent finishes, etc. Low molecular weight fatty alcohols are useful as antifoams. The most technically important fatty alcohols are Lauryl alcohol, Dodecyl alcohol, Myristyl alcohol, Tetradecyl alcohol, Palmityl alcohol, Cetyl alcohol, Stearyl alcohol, Octadecyl alcohol.

Fatty amines: Higher Alkylamines of the type($R-CH_2-NH_2$).

Uses: Synthesis of surface-active compounds; corrosion inhibitors; as the acetates for emulsifiers and textile auxiliaries. Secondary fatty amines

(distearylamine) are used as starting materials for the manufacture of laundry softeners. An interesting class of fatty amines are the hydroxy amines (cationic surfactants).

Fatty amidoamides (softeners): Aminoamides are made by the condensation of polyamines with fatty acids. Ethylene diamine, N,N-diethylethylene diamine and diethylene triamine are examples of polyamines that are condensed with fatty acids. Usually, the fatty acids are commercial grades such as would be derived from tallow or coconut oil. The products would then carry a generic name such as tallow amino-amides or coco amino-amides. The amino-amides are neutralized with a variety of acids and sold as the salt. Acetic acid, hydrochloric acid, sulphuric acid and citric acid salts of many of them are commercially available for use as softeners. The acid salts are water soluble or water dispersible, making them much easier to use.

Fatty aminoesters (softeners): Aminoesters are made by reacting alkanol amines with fatty acids. Aminoesters containing one or more amine groups are commercially available. These materials also become cationic under acidic conditions, the strength of the cationic charge is proportional to the number of amino groups. Examples of alkanol amines are ethanol amine, diethanol amine and hydroxyethyl-ethylene diamine. Disadvantage of esters is poor hydrolytic stability under alkaline conditions.

Faulty thread: A thread or pieces of thread which are coarse, fine, irregular owing to higher or lower twist or to other twist direction, of different colour, with two or three ends.

Faulty weft: A weft or pieces of weft which are coarse, fine, irregular (slubs, etc.), twisted, reversed, with different twist, of different colour, double weft.

Fautunn: In Chinese markets, a brocaded or cross-ribbed fabric having silk warp and a heavier worsted filling.

Fauve: Vivid or bright in colour after the Fauvists – a group of French artists [including Henri Matisse (1869-1948)] who were renowned for their celebration of colours in art. Their vibrant paintings elevated colour to a point where it became the single most important element in their work.

Faux uni: Giving illusion of a single colour, though made with multi-coloured yarns.

Faveur: Narrow coloured ribbon produced in France.

Fawn: Light yellowish-brown colour.

Fawn canton: A twilled fabric, made with cotton warp and wool filling; used in the manufacture of waterproof cloth.

Fayence prints: Cotton fabrics printed with indigo paste, which afterward is fixed in an alkaline bath.

Fayetta: A fine, thin and soft dress goods, made of organzine warp and fine woollen filling in a close warp plush twill weave; used for dresses, umbrella covers, etc.

FBA: Fluorescent Brightening Agent.

FCR: [German] abbreviation for Forschungsstelle Chemischreinigung (Research Unit for Drycleaning).

FCT: Fog chamber technique.

Fear nought: A stout thick woollen fabric with a heavy appearance, used chiefly as a covering for port-holes and doors of powder magazines and also for scarves and coats. See **Willey**.

Feather cloth: Coating, made by weaving soft feathers into undyed wool cloth; the filling is made of wool and feathers twisted together.

Feather edge: Same as **Picot**.

Featheredge braid: Picot braid of white cotton or linen; used for laces.

Feather fibre: Detached barbs of feathers which are not joined or attached to each other.

Feather proof: Feather proof finishing of duvets and eiderdowns.

Feather stitch: A stitch used in embroidery, imitating feather by branches from a main vein.

Feather (crushed): Feathers and feather fibre resulting from curling or chopping feathers without removing the quill. See **Crushed feather**.

Feather (damaged): Feathers that have been broken or damaged by insects, by mildew or rot or otherwise injured. See **Damaged feather**.

Feathers: The outgrowth forming the contour and external covering of fowl.

Feathers (land fowl): See **Non-waterfowl feathers**.

Feathers (nestling): Immature feathers in which the barbs are held together and covered by a sheath. See **Nestling feathers**.

Feathers (non-water): Feathers derived from chickens, turkeys or other land fowls. See **Non-water fowl feathers**.

Feathers (quill): Quill feathers. Feathers are over 100 mm (4 inches) in length or which have a quill point exceeding 9.5 mm (6/16 inches) in length.

Feathers (waterfowl): Water fowl feathers which are derived from ducks, geese or both.

Feather proof finishing of duvets (eiderdowns): Finishes for this purpose are mainly based on the application of thermoplastic synthetic resins followed by a calendar treatment. In order to produce a satisfactory finish, a distinction must be made between bed ticking and down proof fabrics and, in the case of the filling material, between down and feathers.

Feather stitch: Single, double and triple feather or coral stitches may be made very ornamental and are used in all kinds of sewing and on all materials. They are always made towards the worker; the stitches being taken alternately to the right and left of the line of the design. The thread should always be carried under the needle as in a buttonhole stitch. The design may be varied by taking the stitches diagonally or straight, by making them close or separated, etc.

Feed roller: A roller that forwards a yarn to a subsequent processing or take up stage.

Feed unit: The device which presents the feed stock to the opening roller by either a feed roller and feed plate combination or interacting feed rollers in an open-end spinning machine.

Feed unit (processing): A delivery system for feeding non-batched textile fabrics in open-width, rope or plaited form.

Feed water or feed: The input solution to a treatment/purification system including the raw water supply prior to any treatment.

Feeder density (in knitting): This is the number of feeders through which yarn is fed, per inch diameter of circular knitting machine. For example, a circular knitting machine with 90 feeders and a diameter of 30 inches has a feeder density of 3.

Feeding addition: A finishing term for the regular feeding of finishing liquors during continuous processing.

Feel: The term describing the physical character of a cloth when handled. (Sensation or perception of the textiles by touch. E.g., Soft Feel, Harsh Feel etc.).

Feeler motion: A mechanical device to detect when the weft on a pirn in a shuttle is becoming exhausted.

Fehling's solution: The Fehling's solution is freshly prepared from 69,278 g of copper (II) sulphate and Rochelle salt solution (173 g potassium sodium tartrate tetrahydrate in 400 ml water + 100 g sodium hydroxide made up to 500 ml). Both solutions must be mixed before use. Used for detecting hydrocellulose, oxycellulose and photo cellulose as well as sugars (analysis of finishes). The test is carried out by heating the material with 10% of a freshly

prepared Fehling's solution to the boil on a water bath. An approximately quantitative evaluation is made with the aid of a colorimeter. The colour of the copper (I) oxide which is precipitated onto the affected area of the textile is pink to brick-red.

Feille: A glossy, soft, finely-ribbed silk-like woven fabric made from cotton, silk, or manufactured fibres. Made in crosswise rib weave, it has a definite crosswise rib effect. It is a very soft material that drapes well. It is finer than gross grain, but in that family – ribs are also flatter than in grosgrain. Some belongs to the crepe family. It is rather difficult to launder and will give good wear if handled properly. Has a lustrous finish. Uses: Dresses, blouses, soft evening purses, some dressy coats.

FEK (Greek): Französische Echtheits Kommission (French Fastness Commission) Paris. Technical and professional organizations.

Feldspar: A creamy or yellowish-white; the mineral feldspar is white or red in colour.

Fell: (a) The end of a piece of fabric that is woven last; (b) In weaving, the last filling pick laid in the fabric at any time.

Felled seam: A fell is a seam hemmed down to the goods to protect the raw edge. It is usually made in night dresses, drawers, corset covers, etc. Baste with the piece farthest from the worker extended one-eighth of an inch beyond the other and sewed *with the grain* of the goods, beginning at the widest part of any bias. Press the seam with the nail on the right side, turn the wide edge down flat to cover the raw edge and line of sewing, and hem flat either by hand or machine. Care should be taken to keep the seam flat on the right as well as on the wrong side. If the felling is done with the machine hemmer, the wide edge must be on the opposite side. The seam may be basted with both edges; even if preferred, cutting off one edge after stitching.

Felling silk: A two-ply silk thread with a left hand twist.

Fellmongered wool: Skin wool.

Fellmongering: The removal of the wool from sheep pelts by any process or the process of gathering wool from the fleeces of a dead sheep.

Felt: A textile structure characterized by densely matted condition or interlocking and consolidation of most or all of its constituent fibres it is composed of which achieved by the interaction of a suitable combination of mechanical energy, chemical action, moisture and heat but without the use of weaving, knitting, stitching, thermal bonding, or adhesives. There are two broad classes of felt – (a) fabrics relying for their construction upon the ability of the constituent fibres to matt together in order to form a composite body

with neither warp or weft; (b) Materials having a woven fabric structure. Best quality felt is rigid and doesnot drape, so it is not very useful as dress fabric. It does not wear well, and it loses shape as it has no elasticity. Best quality felt is made from good quality wool, but other qualities are made by using viscose, cotton and kapok, and waste as well. The result is more brittle than wool. Used for hats, protective coverings, etc., and is useful as it has no grain.

Felt calender: A special type of calender usually, but not necessarily, (it can be a separate unit also) at the delivery end of a stenter used especially for linings.

Felt cloth: See **Felt** and **Felt fabric**.

Felt fabric: (1) This is an ordinary woven fabric, usually cotton or wool, but many other fibres also, that have been milled on the surface to produce a felt like appearance which disguises the weave beneath. The fabric may be of any weight, and the process is sometimes applied to cheap base fabric to give it more warmth and interest.

(2) A term used to describe a milled felt of a similar type to "Feltine" which is not woven, bonded or stitched. It is made, for e.g., from wool fleece (with/ without man-made fibres) which has been bonded into a web by felting in a plate felting machine followed by subsequent milling.

Felt ground: See **Needle-punched carpets**.

Felt jacket: Analogous to Tubular felt, for pulling over working rollers, or as back cloth, etc.

Felt mat: Hand-crafted flat carpet made of firmly felted natural wool, figured effects are worked in, natural-coloured felt sections; used as carpet and wall hangings.

Felt press: See **Pressing**.

Felt sleeve: See **Tubular felt**.

Felt (needled): A textile composed of natural, man-made or a combination of natural and man-made fibres physically interlocked by the action of a needle loom, with or without combination of other textile fabrics and with or without suitable combination of mechanical work, moisture, chemical action and heat, but without weaving, knitting, stitching, thermal bonding or adhesives.

Felt, needled, unsupported: A textile material composed of natural, man-made or a combination of natural and man-made fibres physically interlocked by the action of a needle loom with or without suitable combination of mechanical work, chemical action, moisture and heat, but without weaving, knitting, stitching, thermal bonding or adhesive bonding.

Felt (part wool): A felt composed of wool fibres and one or combination of natural or manmade fibres.

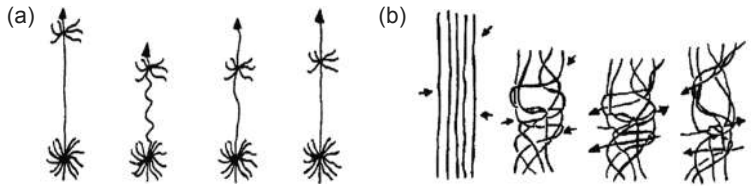
Felt (wool): A textile composed of wholly wool fibres interlocked by the inherent felting properties of wool and produced by a suitable combination of mechanical work, chemical action, moisture and heat, but without weaving, knitting, stitching, thermal bonding or adhesive.

Feltabilty: The degree to which a sample of fibres will consolidate in a specified time by interlocking under prescribed combinations of mechanical action, chemical action, moisture and heat.

Felted yarn: A wool-rich yarn produced by felting sliver, slubbings, rovings, or yarn.

Feltine: Proper name of a milled felt which has no woven structure and no chemical bonding, the textile fabric instead being created by the intensive felting of loose virgin wool. Feltine is piece dyed and may be impregnated. The brilliancy of the colours is typical. These materials are produced to defined thickness and handle (stiffness). Their use is traditional in certain types of clothing.

Felting: An undesired process of superficial "felting" of woollens or an intentional process. This is used to mean the processing of loose fibres to form a dense and durable fabric, whereby theoretical felt formation sequences (a) movement of the open knot (above) in direction of the fixed knot (below) by the action of the elastic, operative fibre; (b) transfer of model (a) to multiple fibres. Mechanical effects (pressure, impact, friction, wear) aided by moisture and warmth achieve a homogeneous combination of the fibre material. Milling is similar to felting.



Felting density: See **Felting (degree of)**.

Felting needle: A barbed needle mounted in a needle loom to cause fibre reorientation and entanglement during needling.

Felting propensity of wool: This is a characteristic found in animal fibres, which shrink under certain conditions. The causes of felting are not precisely

understood. There are many familiar felting theories; the most important theories are discussed here.

We referred earlier to individual characteristics of wool, and these are reflected in the felting theories: (a) Primary (causal) characteristics such as surface structure, frictional behaviour (DFE), lengthways or cross elastic characteristics; (b) Secondary characteristics such as fineness, length, crimp, grease content; (c) External factors, which represent the conditions during felting and milling, such as pH, temperature, milling auxiliaries.

Felting shrinkage: In contrast to **Relaxation shrinkage**, felting shrinkage results primarily from the frictional properties of the component fibres which cause them to migrate within the structure under conditions of moisture. This behaviour is normally considered to be significant only for fibres having scales on their surface such as wool and which can be counteracted by shrinkproof finishing. Adding synthetic fibres to wool counteracts the felting shrinkage. Effective improvement is achieved only with additions from 40–60%.

Felting, degree of: Measure of the tendency to felt according to the Aachen felting test, expressed in terms of felt density in g/cm^3.

Fents: Finished textile piece goods in short lengths (as metre goods) for retail sales. See **Cut fabric**.

Feraghan: Small Persian rugs of cotton warp and weft and close and short wood pile tied in Senna knot. The design consists usually of small fish in a blue field and trailing vine in the borders. Many saddlebags are also made this way.

Fergusson: A Highland tartan, made as follows – two heavy black stripes with a still wider dark blue stripe between; a green field, almost as wide as the above three stripes combined. This green field is split in the centre with a group of black, white and black lines, the two side green bars thus formed being again split in the centre by a single narrow red line.

Ferrous (ferric): Iron is generally 2, 3 or 6 valent iron(II) ferrous hydroxide is quite a strong base, iron(III)ferrous hydroxide is a weak base (has the effect of an extremely weak acid against strong bases).

Fesse: A light blue colour.

Festoon ager: A steaming chamber for short print runs. The fabric is transported in loops suspended on rotating upper rollers so that there is no roller contact with the printed side.

Festoon drier: See **Short loop drier**.

Festoon dwell chamber: A dryer in which cloth is suspended in loops over a series of supporting horizontal poles and carried through the heated chamber in this configuration. See **Festoon store**.

Festoon scouring machine: Mezzera continuous scouring machine. Machine used in silk and artificial silk finishing for creping and shrinking, also used on knitted fabrics.

Festoon steamer (steaming chamber): A chamber-type steamer of brickwork or cast-iron construction suitable for long runs (1000 m and above). The fabric is transported through the roof-heated steam zone suspended in loops from support rods attached to an endless moving chain. Disadvantages of this type of steamer are (a) extraordinarily large dimensions (up to 10 m in height), (b) high steam consumption and (c) difficulty in achieving uniform steam circulation.

Festoon stitch: Identical with the so-called "buttonhole stitch".

Festoon store: Acts as a relaxing unit. Fabric is introduced via an adjustable slit and suspended on supporting rods. Open-width submerged fabric passage, tension-free, does not cause creasing. External direct and indirect heaters, automatic temperature control.

Festoon tape: It is thin, batiste-like edging and bordering tape with a dog-legged selvedge and decoration resembling eyelet embroidery.

Festucine: Greenish-yellow straw colour.

FEU: A unit of cargo capacity, especially for container ships. These ships carry cargo in standard metal boxes, called containers that can be transferred easily to trains or trucks. FEU is an abbreviation for "forty-foot equivalent unit." One FEU represents the cargo capacity of a standard container 40 feet long, 8 feet wide, and (usually) a little over 8 feet high. One FEU equals roughly 25 register tons [see Ton (c)] or 72 cubic meters.

Feuille: A light green colour.

Feuillemorte: Having the brown colour of dead leaves. Also referred to as filemot, philimot, philomot, philamot, phyllamort, phylamort and other variations. Also 'dead-leaf brown'.

FFT applicator: Union Carbide and Gaston County developed a low-water finish applicator based on metastable foams. The finish bath and air are continuously metered into a foam generator and the foam is routed through distributing heads directly onto the fabric. Being metastable, the foam immediately breaks on contact with the fabric and the fabric becomes wet

with finish solution. The wet pick-up is regulated by controlling the ratio of liquid feed rate into the foam generator with the cloth speed.

FI: Fique fibre.

FIANN (French): Fédération Internationale des Associations Nationales de Normalisation (International Federation of National Standards Associations).

Fibei: (a) Filaments used as raw material for textile fabrics are divided as follows

i. animal fibres, as wool, hair, silk,
ii. vegetable fibres, as cotton, linen, jute, hemp, ramie, etc.,
iii. mineral fibres, as asbestos,
iv artificial fibres, as glass, metal threads, various artificial silks, etc.

(b) Yarn, made of twisted and prepared paper; used for rugs and mats.

Fibre: Spelling of fibre used in The United States of America.

Fibre (in textiles): A generic term for any one of the various types matter of smallest unit of any textile material, that form the basic elements of a textile and that is characterized by having a length at least 100 times its diameter. The so-called raw fibre (fibres) is converted by spinning into threads (yarns of various types).

Fibre length: (a) Crimpled length – The extent [see (b) below] of crimped fibre substantially freed from external restraint and measured with respect to its general axis of orientation. (b) Fibre extent – The distance in a given direction between two planes (each perpendicular to the given direction) that just enclose the fibre without intersecting it. *Note*: If the fibre is in a sliver (q.v.) (or yarn, roving, etc.) and the direction of the extent is not specified, the "given direction" is to be taken as the axis of the sliver. It should be noted that the extent of a fibre is a variable property that differs from the straightened length of the fibre according to circumstances; thus in a card web, for example, where the fibres are in a state of considerable disarray, the extent of a fibre after it has been passed through one or more drawing processes. If, for any reason, a fibre is subject to a stretching force, its extent in the direction of the force may be greater than its straightened length. (c) Staple length – A measurement by which a sample of fibrous raw material is characterised according to its technically most important fibre length. *Note*: The staple length of wool is usually taken as the length of the longer fibres in a hand-prepared tuft or "staple" in its naturally crimped and wavy condition (see crimp). In cotton, on the other hand, the staple length corresponds very closely to the modal or most frequent length of the fibres when measured in a straightened condition.

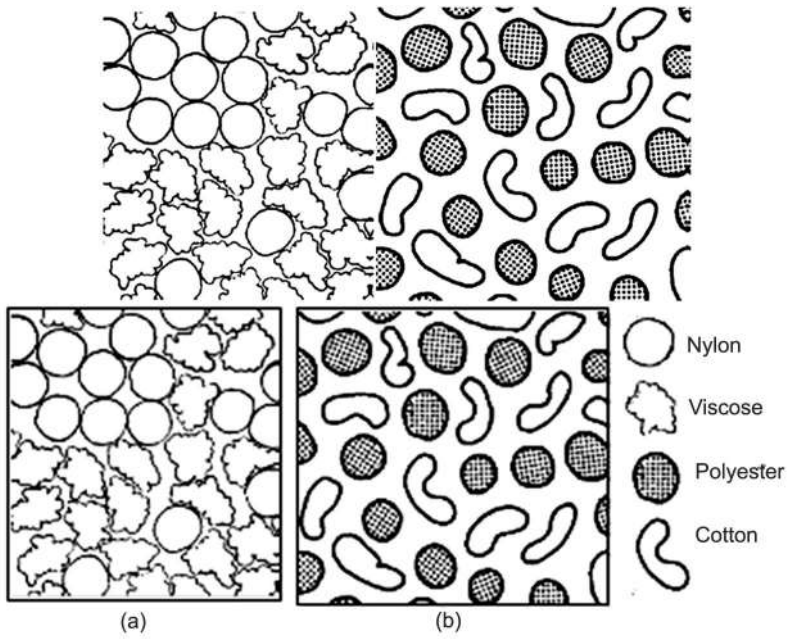
Fibre affinity: Textile auxiliaries with fibre and dye affinity in wool dyeing. See **Affinity**; **Dye affinity**.

Fibre architecture: The spatial arrangement of fibres in the preform. Each architecture has a definite repeating unit.

Fibre attraction: Forces acting between soil particles and textile fibres – (a) mechanical retention, (b) chemical bonding (stains), (c) adsorption, (d) electrostatic attraction. The attachment of fat-free soil particles (pigment soil) is mainly due to geometrical factors, i.e. dimensional relationships between fibre surface roughness and pigment particles in aqueous dispersion which are not based on energetic bonding (e.g. adsorption, absorption).

Fibre beard: In length testing of fibres – Fibres caught randomly on a comb which are subsequently straightened and parallelised without stretching or damaging.

Fibre blend: A mixture of two or more fibres. The fibres can be mixed in the fibre stage or as yarn in the twisting of yarn or in the manufacture of fabric. The percentage of each fibre in the mixture is often called blend percentage. Examples are Polyester/cotton blend (60/40), cotton/lycra (92/8), etc.



Blend of Nylon and viscose (A) and cotton polyester (B) (cross section enlarged)

Fibre bonding device: Heat bonding of thermoplastics.

Fibre bundle strength: The tensile strength of a cotton fibre bundle at zero gauge length per unit cross-section. It is determined in accordance with the **Pressley index** (see).

Fibre composites: Flexible, porous fabrics (bonded fabrics) consisting partially or entirely of textile fibres formed by the bonding of non-woven.

Fibre damage in cotton (cellulose): Fibre damage can happen due to various reasons, especially due to processing and action of various chemicals. In case of cotton (cellulose), it can be measured by the presence of hydrocellulose, oxycellulose, photo cellulose and pyrocellulose. These can be identified and determined by the following characteristics –

(a) reducing action,
(b) determining the fluidity,
(c) dye uptake of basic groups (oxycellulose), alkali solubility,
(d) Fehling solution: Brick red colour,
(e) Ammoniacal silver solution: red-brown colour,
(f) Lead-cochineal solution: Blue colour (Oxycellulose),
(g) Methylene blue reaction: Blue colour,
(h) Nessler reagent: yellow colour turning grey later,
(i) Schiffs reagent: red colour, Berlin blue reaction,
(j) Boil in caustic soda solution: blue to brown colour,
(k) and can be quantitatively determined by Copper number: Hydrocellulose,
(l) Permanganate number: Oxycellulose and hydrocellulose,
(m) Methylene blue number : Oxycellulose, etc.

Fibre density: Mass per unit volume of the solid matter of which a fibre is composed and measured under specified conditions.

Fibre distribution: In a web, the orientation (random or parallel) of fibres and the uniformity of their arrangement.

Fibre dust: Small fibre particles dispersed in the atmosphere.

Fibre engineering: The production of tailor-made fibres which are structural modifications of basic manmade fibres types to meet specific requirements, i.e. fibre construction tailored to produce special types of fibre with preprogramed properties in accordance with exact physico-chemical principles (molecular engineering).

Fibre fineness: The mean fibre diameter which is usually expresses in microns.

Fibre length: The staple length of the fibre. On combing wools, this is often 3–8 inches, on the down wools 1.5–3.0 inches. With cotton, it may be 0.25–1.00 inches long. Bast fibres, likes flax, may have a staple length of 36 inches.

Fibre (manmade): They are synthetically manufactured. There are two types of manmade fibres:

(a) Produced from natural polymers –(i) of vegetable origin; (ii) of animal origin.

(b) Produced from synthetic polymers –(i) polycondensation fibres; (ii) polyaddition fibres; (iii) polymer fibres; (iv) bicomponent fibres.

Fibre migration: Fibre migration, more correctly lateral fibre migration, popularly refers to the radial movement of a fibre within the yarn cross-section. Fibre migration (variable helix angle at different positions along the fibre length) determines the yarn structure and properties and can be characterised by (a) mean fibre radial position (b) migration amplitude (c) mean migration intensity (i.e. rate of change of radial position). See **Migration**.

Fibre modification: Some of the fibre modification used by processors are (a) weight reduction of polyester fibres, (b) acetylated cotton and (c) affinity modification.

Fibre moisture content: Moisture absorption of fibres; moisture regain.

Fibre number: The linear density of a fibre expressed in suitable units as tex, denier, millitex, etc.

Fibre placement: In general, refers to how the piles are laid into their orientation, i.e., by hand, by a textile process, by a tape layer, or by a filament winder. Tolerances and angles are specified. Microprocessor-controlled placement that gives precise control of each axis of motion permits more intricate winding patterns than are possible with conventional winding and is used to make composites that are more complex than usual filament-wound structures.

Fibre protective agents: Fibre protective agents are based on, e.g., protein degradation products, fatty acid protein condensation products, ammonium salts of alkyl sulphates and alkyl sulphonates as well as lignin sulphonic acid salts. Products of this type are used particularly for the protection of animal fibres in bleaching, dyeing and stripping In the wet processing of cellulosic fibres, fibre protective agents provide protective screening against oxidative/reductive changes in vat dyeing and in oxidative bleaching, etc.

Fibre reactive dye: See **Reactive dyes**.

Fibre rope: A rope produced primarily from textile fibres.

Fibre saturation value: It is a measurement of the dye up-take potential of a fibre.

Fibre shape: Cross section of fibre.

Fibre sheath: The covering layer of a fibre.

Fibre silk: Commercial term for good quality of artificial silk.

Fibre softening range: See **Softening range**.

Fibre surface area: It includes both the external and, predominantly, internal surfaces of the fibre. The latter is dependent on the numerous capillary-like canals and inter-micellar spaces. The surface area of 1 g of cotton is approximately 5000 m^2, and the area of wet-table surfaces is approximately 100–400 m^2 for 1 kg of fibres. It is accordingly much greater than the surface area of the liquor at the fibre sites where surfactant molecules responsible for the wetting process are located.

Fibre texture: Fibre texture describes the state of order or orientation of the macromolecules in fibre structure. It can be understood by the presence of crystal aggregates with individual arrangements of crystallites in such a way that all the crystallites possess a definite lattice structure in approximately the same direction, i.e. a symmetry of the fibre axis exists which is detectable by X-ray crystallography. Fibre texture is characterized in other respects by the anisotropy of fibre crystallite orientation, i.e. higher orientation in the direction of the longitudinal axis due to primary valency bonds (which means greater strength, lower extensibility and swell ability as well as easier cleavability) and lower orientation in the transverse direction due to secondary valency bonds (which means lower strength and higher swell ability).

Fibre thickness: The average diameter of the fibre.

Fibre tow: See **Tow**.

Fibre transport tube: See **Fibre channel**.

Fibrefill: Virgin man-made fibres especially engineered as to linear density, cut-length, and crimp for use as a textile filling material such as pillows. This is not a good choice for your quilt interior.

Fibre length array: A series of individual fibres that are arranged in order based on fibre length or a series of groups of fibres that represent essentially uniform lengths within a group and which are arranged in order based on group length.

Fibre (birefringence): The algebraic difference of the refractive index of the fibre for plane polarized light vibrating parallel to the longitudinal axis of the fibre and the refractive index for light vibrating perpendicular to the long axis.

Fibre (channel): A component of an open-end spinning machine through which the fibres are conveyed by an air current from the opening device to the rotor.

Fibre (chip): In manmade textiles – staple fibres that are massed together as a unit and that maintain a single geometry or alignment.

Fibre cohesion: The resistance to separation of fibres in contact with one another.

Fibre (crimp): (1) The waviness of a fibre expressed as waves or crimps per unit length.

(2) The difference in distance between two points on the fibres as it lies in a non-stretched condition and the same two points when the fibres is straight.

Fibre (manmade): These are fibres manufactured from chemicals. There are many types:

(a) Produced from natural polymers –(i) of vegetable origin, (ii) of animal origin. The specific properties of viscose and modal fibres may be discussed under this category. The raw material for the manufacture of these fibres is cellulose. Whilst the chemical structure is identical to that of cotton, important differences in the physical structure of both these fibre types can be identified.

(b) Produced from synthetic polymers –(i) polycondensation fibres, (ii) polyaddition fibres; (iii) polymer fibres; (iv) bicomponent fibres. The synthetic man-made fibres include the three important polymer groups of polyester, polyamide and polyacrylonitrile. Although of somewhat lesser importance in terms of quantity, the polyolefins such as polypropylene, polyvinyl derivatives and elastomers based on polyurethane also deserve to be mentioned here.

Fibre (soft or bast): See **Soil or bast fibre**.

Fibre (hard): The non-elastic yarn wound around an elastic core in covered elastic yarns. See **Hard fibre**.

Fibre (hard or leaf): Elongated fibre strands from leaves or leaf stems of plants usually used for making rope, twine, net, etc. See **Hard or leaf fibre**.

Fibre (high tenacity): Manmade fibre having exceptional breaking strength. See **High tenacity fibre**.

Fibre (man-made): A general name for synthetic fibres produced from fibre forming substances which may be (a) polymers synthesized by man from simple chemical compound, (b) modified or trans formed natural polymers and (c) glasses.

Fibre (natural): A class name for various general of fibres of (a) animal, (b) mineral, or (c) vegetable origin.

Fibre (regenerated): Manmade fibres made from naturally occurring polymers. For example, Viscose.

Fibre (soft or bast): Flexible elongated strands from the inner bark of various plants usually used for making twine, nets and even woven fabrics.

Fibre, Synthetic: A fibre that has been manufactured by synthesis of suitable linear polymer followed by extrusion of the molten or solution of the material through a spinneret

Fibre (textile): (a) General – A generic term for the various types of matter that form the basic elements of textile fabrics and other textile structure; (b) Specific – A unit of matter that is characterized by having a length at least 100 times its diameter or width and which can be spun into a yarn or made into a fabric by interlacing in a variety of methods including weaving, knitting, braiding, felting, and twisting. See **Textile fibre**.

Fibre-bonded floor covering: A textile floor covering which is composed of entangled textile materials bonded together by a mechanical, physical or chemical process (example – needle punching, stitch bonding, heat treatment, or resin impregnation) or by combination of two or more of these processes.

Fibreset process: A resin finishing process for cotton and polyester/cotton fabrics in which a reactive prepolymer is applied together with N-methylol compounds. Polymerization and crosslinking of the applied finish is achieved by treatment in the vapour of a low boiling chlorinated hydrocarbon.

Fibrets: Very short (<1mm), fine (diameter <50μm fibrillated fibres that are highly branched and irregular resulting in very high surface area. Fibrets can be produced from a number of substances including acetate, polyester, nylon, and polyolefins. By selection of polymer type and incorporation of additives, they can be engineered to meet a range of specialized requirements.

Fibreweigh: An instrument having a capacity for weighing a 51 grain (3.30 g) specimen with a sensitivity of at least 0.2% of the mass being weighed.

Fibrids: Synthetic binding elements with a fine structure resembling that of "wood pulp", i.e. a netted filamentary or fibrillar structure, produced from polyamide, polyester, polyacrylonitrile, etc. They are used as a binding medium after the extraction of water fromsynthetic fibres on paper making machines.

Fibril: A tiny thread-like element of a synthetic or natural fibre.

Fibrillae: Specks visible on the surface of silk yarns.

Fibrillar proteins: High molecular weight polypeptides consisting of long threadlike or chain molecules (e.g., Silk fibroin, Wool keratin). They are formed from Amino acids.

Fibrillated film tow: An assembly of textile films.

Fibrillated film yarn: Yarn produced by fibrillation film that has been converted into a longitudinally fibrillated structure.

Fibrillated yarn: A yarn produced by the process of fibrillation.

Fibrillating film: A polymer film in which molecule orientation has been induced by stretching to such a degree that it is capable of being converted into yarn or twine by manipulation.

Fibrillating roller: A pinned roller used in fibrillation.

Fibrillation: The act or process of forming fibrils. The act of breaking up a fibre, plastic sheet, or similar material into the minute fibrous elements from which the main structure is formed.

Fibrils: (a) A very fine cellulosic fibre (Ø = 0.4 μm) formed from lamellar filaments resp. individual filaments (approximately 100 fibrils); (b) Fine fibrils have also been detected in cellulosic fibres under the electron microscope; (c) In wool structure, the fibrils are spindle shaped, tightly packed, twisted, fine fibres in the so called spindle cells. These fibrils are composed of fibril bundles which themselves are composed of individual fibrils; (d) By analogy with wool, individual fibrils and fibril bundles are likewise present in the structure of silk. In the case of silk, however, fibrils are also understood to include the individual small fibres projecting from the surface of silk fabrics formed by the action of abrasion.

Fibrogram (in testing cotton fibres for length): The curve representing the second accumulation of length distribution of fibres sensed by the length measuring instrument in scanning the fibre beard.

Fibroin: Structural component (from Fibroinogen) of silk (comprising 71–82%), in the form of a double fibroin filament which is covered by sericin in the form of silk gum. Contains the amino acids alanine, glycine, serine comprising approximately 75% as essential components of high molecular order crystallites, whereas with tyrosine the remaining amino acids which represent the low-molecular portion are the presumed components of the amorphous areas, which may include the "cuticulin".

Composition ($C_{15}H_{23}N_5O_6$):49% carbon, 25% oxygen, 19% nitrogen and 6% water. Fibroin is insoluble in water, can be hydrolysed to form amino acids and detectable as a polypeptide in a similar way to wool keratin, but without the cysteine content.

Fibroin fibre: A man-made protein fibre produced from silk fibroin. A fibroin solution is obtained by the dissolution of silk wastes which can be spun into fibre again. Fibroin fibre has no commercial importance.

Fibroinogen: Soluble and water-extractable protein that is a precursor of silk fibroin. After standing for several hours, a fibrous precipitate forms spontaneously as a linear aggregation of individual fibrils (length up to 0.35 μm, diameter 0.01 μm). Can be considered to be analogous to Prekeratin of wool.

Fibronaire: An instrument that determines the micronaire reading of raw cotton fibres using the 'porous plug' air flow technic.

Fibronia: Proprietary name for a fibre made of grass; It is carded with shoddy and used for carpets or belting yarns.

Fibula: Pinned clasp for holding robes together in ancient period and middle ages.

Ficelle-coloured: Having the colour of twine.

Fick's equation: It describes the diffusion processes for the quantitative diffusion of dye in terms of rate of transfer per unit area within, e.g., a fibre

$$n = \frac{-D\,dc}{dx}$$

From this equation, the term $\frac{dc}{dx}$ is a concentration gradient, which represents an important prerequisite for the Diffusion.

Fitchu: Cloth square for covering the décolletage used by the English.

Fid: A wooden or hard plastic tapered tool used as an aid in rope splicing.

FID: (a) (French) Abbreviation for "Fédération International de Documentation", international association for documentation, with headquarters in The Hague, Holland; (b) Abbreviation for Flame ionization detector.

Fiddle string: A particular form of tight end or tight pick that becomes evident only after wet processing.

Field grey: The grey colour of military uniforms particularly those worn by the German infantry.

Field research: Information found directly- by going out and looking; by asking questions to relevant individuals and groups; by using mailed questionnaires, setting up focus groups and interviewing people.

Field of vision: In the resting position, the human field of vision with both eyes extends from an angle of approx. 65π to both sides of the direction of view and can measure approx. 50π in the upper and lower directions. The powers of vision are greatest in the centre of the field of vision and lowest

at its periphery. This fact can be explained by the higher image definition in the Fovea central is where the greatest number of retinal cones are located which, in contrast to the rods (lightness/ darkness receptors), are responsible for colour vision. Towards the periphery, the capacity for colour perception decreases greatly, and the sensitivity to lightness/darkness increases due to the higher number of rods.

Fiery: Having the appearance of flames or fire as in 'fiery-red'. 'Firy' is an obsolete form.

Fiesta: A reddish shade of orange.

Fiesta pink: A bright pink colour.

FIFT: (German) Abbreviation for Forschungs Institut für Textiltechnologie (Chemnitz), Research Institute for Textile Technology, Chemnitz.

Figuartoes: Wool fabric, made in Norwich, England, in the 17th Century.

Figure: Large weave patterns (figured).

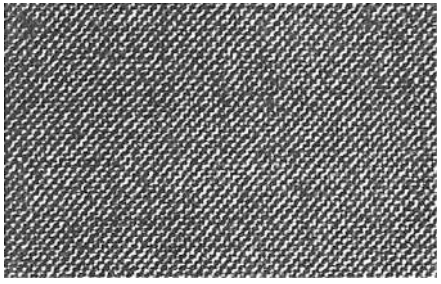
Figured casement: A casement cloth in which patterns has been introduced by weaving.

Figured fabric: A fabric in which patterns or motifs are woven using dobby or jacquard or any other mechanism.

Figured velvet: A patterned velvet with some pile cut and some uncut, but also with areas of backing fabric visible.

Fiji silk: Crisp silk, heavier than jap and therefore much more expensive. Usually found in natural colours and cream. Used for making blouses and dresses.

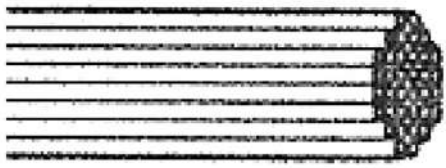
Fil a-fill: Dark and light yarns alternate in both warp and weft. With a 2/2 twill constructions a miniature staircase effect results.



Fil-a-fil

Filamel: See **Antistatic tricot**.

Filament: A fibre of indefinite length. Also used in connection with the now obsolete term



Flat filament

Artificial silk

Filament blended yarn: A filament yarn which contains separate filaments of two distinct types, the filament being more or less randomly blended over the cross section of yarn.

Filament count: The number of individual filaments that make up a thread or yarn.

Filament fibre: A fibre of indefinite or extreme length, e.g., silk filament, which runs from 300 to 1400 yards (274 to 1280 mn) and more in length: the extreme length of filament permits their being used in yarn without twist or with very low twist, and they are generally made into yarn without the spinning operation required of the shorter staple fibres, such as wool, cotton, man-made fibre staple. Yarns made of filaments are usually smoother than yarns made of staple.

Filament number: The linear density of a filament expressed in units such as denier or tex. See **Fineness**.

Filament winding: In the fabrication of composites, the process of placing reinforcing fibres over a rotating form (mandrel) to make the product shape. Prepare fibres or dry fibres that are treated in a resin bath immediately prior to winding may be used. The wound form can be cured or consolidated after the fibre winding is complete to product specifications.

Filament yarn: A yarn composed of (continuous) filaments assembled with or without twist. Yarn which is composed of filament yarns produced from one or more filaments are preferably referred to as monofilament yarn or multifilament yarn, respectively.

Filament (in steel cord): The individual element in a steel strand or cord.

Filament (in textiles): A continuous fibre of extremely long length.

Filament (steel): See **Steel filament**.

Filamentation: Damage to multi-filament yarns that results in broken filaments.

Filemot: The colour of a dead leaf. See **Feuillemorte**.

Fillet: A long, narrow strip of wire card clothing with which the doffer and cylinder of the card are spirally wrapped.

Filet lace: A mesh fabric of square design with some squares blocked into form a design.

Filet net: Any type of square ground-mesh of lace; a woven net.

Filler: Non-fibrous material, such as insoluble clays or gypsum, together with starches, gums, etc., added to a fabric to increase its weight or to modify the appearance or handle of the fabric.

Filler (in knitting): This is the yarn length which lies between successive sinker loops in the vertical direction.

Filler yarn: See **Stuffer yarn**.

Filling: In a woven fabric, the yarn running from selvage to selvage at right angles to the warp. Each crosswise length is called a pick. In the weaving process, the filling yarn is carried by the shuttle or other type of yarn carrier.

Filling band (in woven fabrics): A visual defect across the width due to a change occurring in the yarn for a large number of picks. See **Barre', Mixed filling**.

Filling band: See **Filling bar, Weft bar**.

Filling bar (in woven fabrics): A visual defect across the width of the fabric which contains a limited number of picks of different appearance than normal.

Filling bar (coarse): A weft bar seen along the full width or a portion of the cloth due to the use of yarn of a larger diameter than normally used in the fabric or due to more number of picks than the normal picks used in the fabric.

Filling bar (fine): The opposite of filling bar, coarse. A bar caused due to yarns of diameter less than that normally used in the fabric or less picks than normally used in the fabric.

Filling barre': See **Barre'**.

Filling bow: See **Bow**.

Filling crepe: Filling crepe is made by weaving a plain warp with crepe yarn weft. Box crepe is made using alternating ends and picks of S twist and Z twist. Since these are made on box looms, these crepes are called box crepe. See **Crepe**.

Filling end: A smaller than normal diameter warp end.

Filling elongation and tension: Stretch or tension measured at right angles to the warp direction of the fabric.

Filling fibre: Used to fill cushions, duvets, sleeping bags, etc. Nowadays, it mainly consists of synthetic fibres.

Filling finish: A type of finish used to increase the weight of a textile fabric by the application of so-called filling agents (which are cheaper than the textile material).The finish also produces a "compacting" effect and a fuller handle which may or may not be resistant to washing. Weighting.

Filling material (of feathers or down): The contents of an industry product containing feathers or down of any kind or type with or without other natural or synthetic materials.

Filling skew: See **Skew**.

Filling snarl: See **Snarl**.

Filling (mixed): See **Mixed filling**.

Filling (run out): See **Broken pick**.

Filling tests (in cloth testing): Tests in which the filling yarns are torn.

Filling to filling seam: A sewn seam in which the yarns in the filling direction on both sides of the sewn seams are perpendicular to the seam.

Filling warp: Consists of coarse warp threads which provide fabrics with a coarse fullness and allow less interlacing. Filling warps are supplied for weaving on separate beams.

Fill leakage (in comforters): Either partial or total penetration of the stuffing material through the outer or face fabric.

Film: Any thin layer of a substance, e.g. size film, synthetic resin film, paint film, etc., which can also be removed from the surface of the parent substance and is likewise referred to as a film.

Film-forming agents: Polymers which form coherent film after evaporation of their solvents or dispersants. The minimum film forming temperature is important in textile applications.

Film yarn: See **Slit-film yarn**.

Final finishing: (a) All finishing processes after dyeing or certain specific mechanical finishing processes for coloured woven fabrics (dry finishing) – rubberizing and proofing, waterproofing, drying, shearing, pressing, decatizing, crease-proofing, calendaring, embossing and suchlike; (b) Post-

finishing of dry-cleaned garments – Dry finishing of fabrics;(c) Final finishing means that all the chemical finishing treatments applied to a textile fabric after dyeing and/or printing which provide fitness for purpose resp. the desired wear characteristics, e.g. wash-and-wear finishes, easy-care finishes, etc.

Filter: A true filter separates solids from a gaseous or liquid flow that is passing through it. The solid media or woven fabric in the filter allows air or water to pass through, but retain the solids. Filters may remove particle sizes smaller than the pore size due to adsorption to the surface of the filter medium. In air pollution control, particles may be removed by ***fabric filters*** or ***depth filters***. In water pollution control, ***rapid deep bed filters*** and ***slowsand filters*** remove particles throughout the filter body. ***Microfiltration*** is an example of a depth filter used in water treatment. ***Surface filters*** in water and wastewater treatment include ***microstrainers and drum filters***. ***Ultrafiltration*** and ***nano-filtration*** can filter out large molecules from water. Filters used for sludge dewatering include the ***belt press filter, filter plate press*** and ***vacuum filter***. The ***trickling filter*** and ***biological aerated filter*** are not true filters, because the treatment of the wastewater is by adsorption, absorption and biodegradation in ***the biofilm***.

Filter aid: A powder added to a solution to be filtered that forms a porous bed to improve filtration.

Filter cake: (a) Dewatered sludge from a belt filter press, filter plate press, vacuum filter, etc. It has a friable consistency; (b) In air pollution control, the dust collected on a fabric filter.

Filter cloth: Any cloth used for filtering purposed. Nylon, polyester, vinyon, PBI, and glass fibres are often used in such fabrics because they are not affected by most chemicals.

Filter fabric: See **Geotextiles, Filter cloth**.

Filter medium: The permeable material that separates particles from a fluid passing through it.

Filter plate press, filter press, plate press, pressure filter:A collection of 50–100 parallel, ridged, rectangular, recessed, cast iron plates which can be separated or bolted together. The internal surfaces of the plates are covered with a textile sheet, the filter cloth. Plate presses are used in many industries, including dewatering wastewater sludge and water treatment sludge. The sludge is invariably conditioned before pressing. After the plates have been joined together, the sludge is pumped into the press at a pressure of 5–7 bar which is maintained for 6 to 18 hours. The liquor passes through the cloth as pressure is applied and drained away through holes in the plates. When the

filtration cycle is complete the plates are separated to release the sludge cake which is 25–35% solids. The press effluent is highly polluting. This type of dewatering device has the disadvantage that it is a batch process, unlike the ***belt filter press***. The ***membrane press*** is a development of the filter plate press.

Filter system: The combination of a filter and associated hardware required for the filtration process.

Filtrate: Liquid that has passed through a ***filter*** and so has lost some of its suspended solids.

Filtration: Cleaning of water or air by ***filters, air filters***, etc. ***Adsorption*** on the medium is important in both types.

Filtration rate: The volume of liquid that passes through a given area in a specified time. Usually expressed as gallons per squarefoot per minute (or hour).

Final twist: The number of turns per unit length in a single yarn component of a plied yarn or the plied yarn component of a cabled yarn as the component lies in the more complex structure.

Findings: (a) Miscellaneous items attached to garments and shoes during manufacture. Included are buttons, hooks, snaps, and ornaments; (b) Miscellaneous fabrics in garments such a zipper tapes, linings, pockets, waistbands and facings.

Fine structure of fibres: The fine structure of a fibre denotes the composition of the smallest components such as the chemical constituents (polymer chains), their bonding into crystalline and non-crystalline (amorphous) regions and fibrils. The colloidal structure when spinning a synthetic fibre or during the biosynthesis of a natural fibre affects the fine structure of the fibre and its morphology, i.e. the whole structure is composed of its smallest components.

Fine end: A warp yarn smaller in diameter than normally used in the fabric.

Fine filling: See **Thin filling**.

Fine pick: See **Thin filling**.

Fine rib fabric: 1 × 1 rib fabrics are double-face knit goods. The fabric has a similar appearance on both sides and single wales of face loops alternate with single wales of back loops. Rib fabrics are very elastic width-wise and are therefore used for cuffs, collars and trimmings as well as underwear.

Fine wool: Wool, mostly from merino sheep, which is used in good quality clothing and fabrics.

Fineness: A relative measure of size, diameter, linear density, mass per unit length expressed in a variety of units.

Fineness (of textile fibres): A relative measure of size, diameter, linear density, or mass per unit length expressed in a variety of units.

Fineness of natural fibres: This describes the 'thickness' of textile fibres and is usually expressed in dtex as a rule (linear density of fibres and yarns) or, in special cases, in λm (diameter) or, the micronaire value for cotton. The fineness of fibres is an important factor which has a direct influence on yarn properties with regard to strength, spin ability limits, yarn character and uniformity. The usual fineness ranges of the main natural fibres are:

Cotton 1.5 – 5.0dtex

Flax 10 – 40 dtex

Wool 02 – 15 dtex

Silk 01 – 04 dtex

The fineness of man-made fibres is controlled by the spinning process.

Fineness of synthetic fibres: The man-made fibre industry has been successful in producing finer and finer fibres. In the filament yarn sector, fibres of 1.0–0.3 dtex have been produced by European fibre manufacturers, i.e. the so-called micro-fibres. In the meantime, Japanese developments have been aimed at fibres with a fineness of <0.3dtex. Such fibres are logically described as so-called super micro-fibres. In the staple fibre sector, fibre fineness of up to 2.4 dtex for polyester have been available for some time.

Finger mark: An irregular spot showing variation in picks per inch for a limited width.

Finger press: It is utilizing your thumb and forefinger to flatten or press small fabric sections without an iron.

Finger test: Used to evaluate dye penetration in transfer-printed textile floorcoverings. The complete back-coated and printed carpet sample is wrapped around the little finger. If no white fibres are visible, penetration is considered to be satisfactory, even for carpet laying on staircases which is one of the most critical carpet applications.

Finger-tip towel: A textile product with fringes and side hems or selvedges which is smaller than a hand towel generally used for decorations and to dry hands.

Fingering yarn: A plied hand-knitting yarn normally produced in a 2, 3, or 4 ply to a specific diameter. The count of the 4 ply yarn is half that of a double knitting yarn.

Fingram: Eighteenth century coarse English and Scotch serge.

Finishing, Special: A general term for fabric finishes imparting special properties such as water repellency, crease, stain and flame resistance.

Finish: Can be either chemicals that change the fabric's aesthetic and/or physical properties or changes in texture or surface characteristics brought about by physically manipulating the fabric with mechanical devices. It can also be a combination of the two. Final treatment, Proofing, Dressing; (more generally, also) Improving, Processing; (often also) Ironing, Pressing, etc. (cleaned or dyed clothing).Terms used broadly, as follows, to include added materials, the process employed (finishing) and the final result:

(a) A substance or a mixture of substances added to textile materials at any stage to impart desired properties.
(b) The type of process, physical or chemical, applied to produce a desired effect.
(c) Such properties, for example smoothness, drape, lustre, or crease resistance, produced by (i) or (ii) above (or both).
(d) The state of the textile material as it leaves a previous processor.

Note: The mechanical operations of spinning, weaving and knitting, though they may largely determine the result, are excluded.

Finish (verb): To apply or produce a finish.

Finish (in garmenting): It refers to any means of completing the raw edge of the garment.

Finish, velour: The fabric is moistened and an erect and loose nap is raised on the face, then dried and lightly shorn.

Finish, Saxony: The fabric is first fulled properly, then rolled and stretched, gigged, shorn short, then brushed and pressed.

Finish, serge : The goods are carefully burled and singed, crabbed and scoured and shorn, producing a clear face.

Finish, melton: The goods are fulled, steamed, dyed and shorn and finally lightly brushed.

Finish, Kersey: After thorough burling, the goods are fulled, gigged and the nap laid. The fine grade goods are then steamed and pressed, while the lower grades are given a water finish.

Finish, beaver: The goods are fulled, the lower grades also weighted with flocks, gigged and the nap well laid, then steamed and finally shorn short.

Finish, calico: The cloth is singed, bleached, boiled off and printed.

Finisher: Proofer, dresser.

Finished (for glass laminates): A descriptive term for woven fabrics that have passed through a treating procedure which is compatible with a resin matrix or facilitates manufacturing or both.

Finish (in buttons): The surface conditions or texture.

Finished: The completion of all manufacturing process/operations.

Finished fabric weight: Mass per unit area expressed in grams per square metre (ounces per square yard) grams per unit linear metre (ounces per linear yard) or inversely as metre per kilogram (linear yards per pound) or square metre per kilogram (square yards per pound).

Finished goods: Fabric which has been gone through all the required processes and finished ready for inspection and cutting.

Finished (in textile floor covering material): The completion of all manufacturing operations.

Finished pile yarn floor coverings: Pile yarn floor covering which has undergone all steps of the manufacturing process.

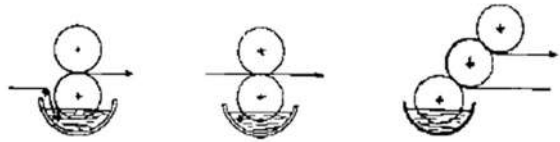
Finished yield (in knitted fabrics): The number of finished square yards per pound (square metres per kilogram) of finished fabric.

Finishing: It is the last manufacturing step in the production of textile fabrics. As an integral part of wet processing, finishing is the operation where the final fabric properties are developed. Finishing is not restricted to wet processing alone since any operation for improving the appearance or usefulness of a fabric after it leaves the loom or knitting machine can be considered a finishing step. Besides washing, this includes desizing, steaming, setting and the production of various effects such as Calendaring, raising, etc., as well as treatments to improve serviceability properties such as water-repellent, shrink-resistant, wrinkle-resistant and soil-release finishes, etc. Finishing is understood to involve all those processes which cannot be classified under dyeing and printing.

Finishing agents: Auxiliaries applied on the fabric to achieve different finishes.

Finishing bar: Uneven appearance across the entire width of the fabric, usually caused by the machine stoppage during processing.

Finishing mangles: The padding mangles which are used in the finishing machines. Even though the expression of the mangle is not very critical, still the mangle has to be of good quality, with average expression, since the expression will also affect the efficiency of the drying part of the finishing range.



Finish padder types [immersion path in a trough (left),slop padder (centre), inclined padder (right)]

Finishing spot: A discoloured area on the fabric.

Finish stains: Such stains are usually stiffer than the surrounding material and are mainly round, oval or of matt appearance with a distinct dark ring. They may be removed by (a) a suitable detergent (with glycerol and, if necessary, ammonia); (b) 1% ammonia solution. Care is necessary in the case of poor colour fastness. Ring removal: water/acetone. If necessary, matt areas (on wool) can be removed by covering with a piece of damp cloth after drying followed by hot ironing.

Finishing stitches: Stitches which are used to finish raw edges of fabric are finishing stitches. For example – Button hole stitch.

(a) *Overcasting*: This is a method of sewing over two edges of fabric to bind then together and to prevent them from fraying. To make this stitch, take two layers of fabric together. Now insert the needle at the point where you have to start overcasting stitch at a distance of one-fourth inch after taking it from above the fabric.

(b) *Double overcasting*: This is also a stitch used for finishing of raw edges. To make this stitch, first do overcasting and then repeat it again, but now from the night opposite side.

(c) *Overhand stitches*: This stitch is used to hold unfinished edges of fabric together and to finish them. The method to form this stitch is same as overcasting. The only difference is that we do not maintain any distance between two stitches. This is a very strong stitch and it also gives a beautiful effect when a strong, secure and invisible seam is needed.

(d) *Button hole/blanket stitches*: This stitch is used to make button holes also to finish and to hold unfinished edges of fabric together. And since the edges of the blankets are used to be finished with the help of this particular stitch, it is also known as blanket stitch. To form this stitch, bring the thread out on the lower line, insert the needle in position in the upper line while taking a straight downward stitch to form a loop and repeat. This stitch may also be worked on even weave fabric.

Finishing machine stitches: Seam edges are given finishing machine stitches (finished) to prevent them from fraying in use and during washing or dry cleaning; to improve the appearance of the inside of your garment; and to strengthen the same itself. Seams in a garment should be finished as the garment is made and before being crossed by another seam. The seam finish must be without bulk, so that it is not visible when the garment is worn and does not from a ridge on the right side when the garment is pressed. Main finishing machine stitches are –

(a) *French seam*: A French seam is a "seam within a seam" and can be used on sheer fabrics or lingerie. It is not recommended for curved seams.

(b) *Mock French seam*: Use this seam in fine and lightweight fabrics, children's clothes and blouses, in place of the conventional French seam. Both straight and curved seams may be finished in this way.

(c) *Flat felled seam*: The flat-felled seam provides a neat attractive finish to both sides of the garment. This type of seam is usually used for sport clothes and reversible garments.

(d) *Welt seam*: This seam finish method allows the plain seam to be "detailed" with top stitching in the same colour thread as the garment or in a contrasting colour thread.

(e) *Open welt seam*: This seam forms a small tuck and emphasizes a construction detail. This, of course, will add interest to a plain fabric.

(f) *Bias-bound seam*: Trim notches from seam edges, wrap bias binding around it (use ready – made binding, or cut your own from bias binding fabric). Stitch does to edge of top fold, catching underneath fold in stitching. Bias binding is especially good for finishing seams in an unlined jacket or coat. Fold and press the bias strip so that the under-section is slightly wider and this will help to ensure the stitching through both edges of the binding.

(g) *Broad seam*: This seam is used to give broad turnings or folds in a garment to make tunnels for cards in salwar (Indian traditional lower wear) or pyjama, or to give bottom turnings in a garment. Fold the margin by 0.5 cm and then take a broad fold towards the wrong side of the fabric and give a plain straight seam, stitching the fold back onto the fabric. The seam is grain from the wrong side of the garment.

(h) *Pinked seam*: Use a pinked seam only on fabrics. This will not fray. After stitching, a plain seam, pink the seam edges with pinking shears. Remove only the seam edge. Cut with a medium stroke; do not fully open the shears or cut right to the point. Press the seam in the same position as it was stitched. And then press it open.

(i) *Pinked and stitched seam*: This seam finish may be used on almost any fabric which would fray. Stitch a plain seam. Place a line of stitching about .6 cm (1/4 inch) from the seam edge. Using a 1 – 1.5 mm (20) stitch length. Pink the edges. The stitching will prevent the seam from fraying and curling.

(j) *Edge–Mattering stitched seam*: Use to give finish to on seams on lightweight and medium-weight fabrics as well as on unlined jackets and coats. Stitch a plain seam. Press the seam flat, and then press it open. Then turn the edges of the seams 0.5 cm alone margins and give a straight seam. This will finish the seam edges on both sides. Pink the edges; then fold them under 0.3–0.6 cm stitches will help you keep this stitching straight and parallel to the edge.

(k) *Seams overcast by hand*: If the fabric has a tendency to fray, a machine finish would be too harsh. Finish the seam edges by hand. Stitch a plain seam and press it open. Make slanting stitches over the seam edge by hand, about 6 cm (1/4 inch) apart and about 0.3 cm (1/8 inch) in depth, depending on the weight of the fabric. Do not pull the threads too tightly.

(l) *Zig-zag seam*: Zig-zag stitching is an ideal seam finish for jersey, double knit and other fabrics with 'give' because the stitch is as flexible as the fabric. Either the plain or multi-stitch zig-zag may be used. After stitching a plain seam, press it open. Select a plain zig-zag stitch, medium stitch with and between 1.5 and 1 mm (15 and 20) stitch length. Stitch near the seam edge, but not over it. Press and trim off the seam edge close to the stitching.

(m) *Herringbone seam*: A herringbone seam is used where the garment is interfaced or mounted. This is an excellent means of preventing seam edges from rolling when the garment is dry-cleaned. Use it in shoulder seams and notched collars and where collar and facings join. Trim the interfacing or mounting seam allowances close to the stitching. Press the plain seam open. Then herringbone the seam edges by hand. Working from left to right, with the needle pointed to the left, catch only one or two threads in the seam allowance, then only a single thread outside the seam allowance and in the interfacing or mounting. Alternate the stitches along the seamline. The stitches will not show from the right side.

(n) *Seams that cross*: Seams that cross occur at the shoulder line. Waistline and underarm and where darts join a seam or tuck. Press the seams open and finish the edges as required by the fabric. To ensure accurately matched seams that cross, pin with a fine needle, with only

the point nipped into the fabric at the stitching line; then pin on each side on the seamline. The needle prevents one seam from slipping beyond the other during stitching and will not mark delicate fabrics. Trim away the excess seam allowance at the point where the seams cross.

Finishing wash: A treatment carried out after the production of textile fabrics in order to remove substances present in, or applied to, the fibre during previous stages of processing and thereby achieve a further improvement in the properties of the material (e.g. scouring of wool fabrics). In the discontinuous finishing wash, the material remains in a machine and wash/rinse liquors are introduced and exchanged as required by the process.

Finishing, Basic or Regular: All processes required to convert gray (or greige) goods into merchandise saleable to the consumer or ultimate processor. Basic finishes are mechanical and/ or chemical. Finishes that appeal to the eye include shedding, singeing, brushing, beetling. mercerization, stentering, calendaring, moireeing, pressing, embossing, crimping, glazing, polishing, inspection and repair. Finishes that appeal to touch include napping, weighting, coaling, sizing or dressing and starching. Functional or Special finishes are other types of Finishes.

Finishing, Functional: Treatments that are applied to fabrics to make them better suited for specific uses. These finishes include: Absorbent Finish, Air Conditioning (fabric), Anti-bacterial Finish, Crease-resistant, Durable Crease, Durable Press, Flame-resistant, Metalizing, Mildew-resistant, Moth Repellent, Shrinkage Control, Wash-and-wear, Water Repellent, Water-proofing.

Finishing, Regular: See **Finishes, Basic.**

Fineness of fibres: A relative measure of size, diameter, linear density, or mass per unit length expressed in a variety of units.

Fique fibre (Cabuya): Very strong, straight, smooth fibre, yielded by the leaves of the Furcraea gigantea of South America; used for bagging, etc. See **Mauritius hemp**.

Fir green or fir-green: A dark muted green.

Fire engine red: A bright vivid red.

Fire hydrant: A branch pipe, usually in a street, connected to the water main, which enables a fire hose to be connected to the main. In low fire risk areas, hydrants may be placed at every 100–150 m in high risk areas, sometimes as close as 30 m. The minimum flow from one hydrant should be 1.4m^3/min, but 25m^3/min may be needed in a highly populated area; this flow is obtained by grouping several hydrants.

Fire (as related to textile flammability): An uncontrolled conflagration in which materials are destroyed by burning as evidenced by flames of varying size and shape, and a high intensity heat source of 5kw or greater, such as burning contents of a room, a burning basket, burning building, or forest fire.

Fire-orange: A reddish-orange colour.

Fire resistant fibres: Fibres based on inorganic materials (mineral fibres) take first place here, e.g. glass, ceramic or asbestos. High temperature fibres.

Fire retardance: The resistance to combustion of a material when tested under specified conditions.

Fireproof: This term relates to the property of remaining unchanged through the action of fire, e.g. as in the case of asbestos. All other textile fibres can be given aflame-retardant finish, but these are not normally fireproof. Developments in the spinning technology of carbon fibres have resulted in the production of fibres with heat resistance up to 2500°C which therefore qualify as fireproof fibres. Fireproof properties begin at 1500°C; the most common oven temperatures are between 1500–2000°C.

Fire-retardant treatment: Any process such as spraying, padding, dipping, brushing, or otherwise applying a material onto the pile of a carpet or rug at any stage of manufacture, which has as its primary or secondary purpose the reduction its flammability.

Firmness factor: A term derived from cloth setting theories. It takes both of the thread spacing relative to the yarn diameter (cover factor) and the frequency of the interlacing.

Fique: A fibre from the leaf of the plant Furicraea.

Fish: A dart cut at the waist of a garment to give a closer fit.

Fishbone stitch: An embroidery stitch. This stitch is useful for filling small shapes. Bring the thread through at one point and make a small straight stitch along the centre line of the shape. Bring the thread through again at a point slightly lower and away from the initial point and make a sloping stitch across the central line at the base of first stitch. Bring the thread through at a point at the opposite side to the second point and make a similar sloping stitch to overlap the previous stitch. Continue working alternatively at each side until the shape is filled.

Fish test: Procedure for monitoring the contamination of bodies of water. The average lifespan of certain species of fish under such conditions is used as a measure of the contamination of the water. Specially bred fish are released at given intervals of time into a section of water (or tributary) which is isolated

by wire netting. The occurrence of dead fish is counted and from the mean lifespan the degree of contamination is derived. See ***Lethal limit; Toxicology***.

'Fished' wool: Short-fibre wool, which has been "fished out" of the wool washing plant. It is usually returned for process in the woollen yarn spinning system.

Fisherman's knot: See **Weaver's knot**.

Fisherman's lace: See **Point Pecheur**.

Fisheye cloth: A fabric with a woven diamond-effect pattern, constructed in a similar way to birds eye, but larger. It is often a woollen cloth, but may contain other fibres such as polyester.

Fishnet (weft knitted): A weft knitted structure, knitted on machines having facilities for activating one set of needle individually. The fabric structure is a combination of float stitches and plated stitches. A common fishnet structure is knitted by plating a thick yarn with a thin yarn in such a way that alternate stitches in the fabric consists of plain plated loops in which the thick yarn and the thin yarn have been knitted up together. The stitches between the plated stitches are knitted from the thin yarn only, whilst the thick yarn is floated at the back of these stitches. The fabric is knitted on the basis that where, in one course, odd needles knit the plain stitches from the thin yarn only, this is done by the even needles at the next course, and so on. This produces an openwork structure.

Fitted carpets: Carpets as floor coverings, in roll form, for wall-to-wall fitting. See **Contract carpet**.

Fitted sheet (in textiles): A product usually made with boxed corners, sometimes elasticized with shape and size to conform to the contours of the mattress and used for covering the mattress on a bed.

Five O' clock: Fine damask linen table cloth; used in England.

Five original colours: In painting, the colours red, green, yellow, blue and purple are sometimes referred to as the 'original colours' (in addition to black and white). Aristotle's theories indicated that all other colours could be produced by adding black or white to these five colours. In the 17th Century, Guido Scarmiglioni and Robert Boyle regarded black, white, blue, red and yellow as the five simple colours from which all others were derived. See **Essential colours**.

Fivette: A lightweight French cotton or woollen lining, woven in diagonal twill.

Fixation: Formation of the "final" bond between the dye and fibre. The bond type formed between the fibre and the dye varies with the type of dye and the

fibre. As examples, reactive dyes fix by covalent bonding while acid dyes fix by a variety of mechanisms such as ionic bonding and hydrophobic forces. Disperse and vat dyes are fixed in the fibre largely by physical entrapment of insoluble dye within the fibre. The bond that causes final fixation is not necessarily the same type of bond is first made as the dye *exhausts* onto the fibre.

Fixation accelerator: A fixation accelerator increases the diffusion of a disperse dye in a print thickener to such an extent that it is no longer a rate-determining step in the rate of reaction during the fixation of prints on polyester. A fixation accelerator thus speeds up, or lowers the temperature required for reaction. Moreover, the fibre structure is changed by a fixation accelerator in such a way that diffusion of dye into the substrate is improved without the accelerator itself remaining behind. Fixation accelerators also have wetting and dye-dissolving properties.

Fixation temperature: The temperature range in which dyes become firmly anchored (fixed) to an appropriate textile material.

Fixation time: The time span required for a dye to become firmly anchored (fixed) to a textile substrate at a specific **Fixation temperature** (See).

Fixative (in dyeing): A chemical that helps improve wash fastness of dyed fabric. A few types of dyes do not bond strongly to fibres, and will wash out over time. ***Direct dyes*** are notorious for this. Fixatives applied after dyeing can help, although some will degrade light fastness or cause shade changes. Some fixative contain a small amount of formaldehyde, which is now regarded as carcinogenic. Much care is warranted in use of these fixatives, and garments should be thoroughly washed before being worn. Many of the newer fixatives do not contain formaldehyde. The mechanisms by which fixatives work vary, but typically form large, relatively insoluble complexes with dye molecules inside the fibre. ***Soda ash*** is sometimes called a fixative for reactive dyes, but it actually creates the high-pH conditions that allow the reactive dye to bond directly to cellulose fibres, and is not a fixative in the accepted sense.

Fixed fees: Fees for a project that do not alter.

Fixed mean integrator (in yarn testing): An integrator that uses deviations from a fixed mean namely, the true linear of the mean density for the specimen passed during its operation.

Fixed retainer (in zippers): A device permanently attached to the retainer pin at the bottom of one stringer.

FL: (a) Finnish Patent; (b) See **Polyfluoroethylene fibres**.

FLA: See **WRAP/FLA**.

Fl: Flax.

Flagging (in sewn seams): Refers to a sewing problem caused by the fabric moving up with the needle as the needle rises from the bottom of its travel causing poor loop formation and leading to skipped stitches or thread breakage.

Flag: Similar to the dark blue of the flower iris; violet.

Flagging (in inspection): Marking by thread, plastic flag, etc. A fabric at the selvedge to show a minor mistake across the width of the fabric which can be seen/checked in the next process easily.

Flake yarn: Two-ply cotton, wool, or silk yarns, having flakes or nubs in a different colour at certain intervals.

Flambé: The yellow colour of the yellow iris.

Flambé: A crimson and blue glaze originating in China in the Sung Dynasty (968–1280), giving the appearance of flames.

Flame: (1) A bright yellowish-red akin to the colour of flame. Also called 'flame-red'.

(2) A hot luminous zone of gas or matter in gaseous suspension or both that is undergoing combustion and is relatively constant in size and shape and that produce relatively low heat flux. A region in which combustion occurs in the gas phase accompanied by the evolution of heat and visible light.

Flame (as related to ignition of textiles): A controlled, hot, luminous zone of gas or matter in gaseous suspension, or both, of constant size and shape that is undergoing combustion as evidenced by a low intensity heat flux of less than one kw, such as candle flame or match flame.

Flame (retardant chemicals): Most of the processes developed for cellulose are all based on achieving a permanent reduction of combustibility through the *in situ* insolubilization on the fibre (covalent reactions with the hydroxyl groups of cellulose and/or polymerization) of organic phosphorus compounds in the presence of nitrogen. It has been recognized that nitrogen contributes to the efficacy of organic compounds. The high nucleophilic character of nitrogen and the high electrophilic character of phosphorus in flame-retardant chemicals are important conditions for the achievement of an effective nitrogen/phosphorus synergy.

Flame laminating: A process used for bonding woven or knitted textiles to a layer of foam which is melted by application of a flame.

Flame lamination: See **Laminating**.

Flame pink: A dark orangey-pink colour.

Flame-proof finishes: Flame-retardant finishing.

Flame-red: A bright red colour.

Flame resistance: The property of a material whereby flaming combustion is prevented, terminated, or inhibited following application of or non-flaming source of ignition, with or without subsequent removal of the ignition source.

Flame resistant: Fabrics treated with special chemical agents or finishes to make them resistant to burning. Today many fabrics achieve this property by using fibres that have this property built directly into the polymer. A fabric is considered flame resistant, if it passes federal specifications for specific end-uses.

Flame resistant: The fabric which is resistant to fire which can be treated for fire resistance or naturally having the property.

Flame retardancy: The property of inhibiting or suppress the propagation of flame.

Flame retardant: A chemical applied to a fabric, or incorporated into the fibre at the time of production, which significantly reduces a fabric's flammability.

Flame retardant finishes: The finishes which impart the flame retardant property to the material when applied to it.

Flame retardance: The property of a textile material, either inherent or by virtue of an applied finish, to inhibit or suppress the propagation of flame.

Flame retardant: This term should not be used as an adjective, except in the terms "Flame retardant treated" and "Flame retardant treatment".

Flame retardant: A chemical used to impart flame resistance.

Flame retardant treated: Having received a flame retardant treatment.

Flame retardant treatment: A process for incorporating or adding flame retardant(s) to a material or product.

Flame-retardant fibres: Fibres which are developed with flame retardant property during the manufacturing stage itself.

Flame-retardant finishing: The oft-quoted expression "flameproof" is incorrect, since only certain fibre materials can be said to be flameproof or inflammable, mainly those of inorganic origin. Polyacrylonitrile fibres and cellulose fibres are the easiest to ignite and burn. The flame proofing procedure therefore mainly concentrates on these textiles.

Flame-retardant treated: Materials which are treated with flame retardant finish.

Flame spread: The propagation of a flame away from the source of ignition.

Flame-spread time: The time taken by a flame on a burning material to travel a specified distance under specified conditions.

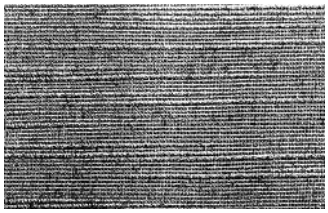
Flame-yellow: A bright orangey-red colour.

Flamingo: A reddish-orange shade.

Flamingo pink: A strong pink colour; an orange-pink colour.

Flamme': (1) (a) A woollen dress fabric made from printed yarns; (b) Plain weave fabric produced from yarn dyed linen warp and cotton weft. Used for table cloth and curtains.

(2) Irregular appearance produced by using slub yarns.



Flamme

Flammability: Those characteristics of a material that pertain to its relative ease of ignition and relative ability to sustain combustion.

Flammability testing: Various (defined) ignition sources are used in this test. The textiles to be tested are subjected to these sources for a specific time. The textile finisher's problem is that

each country has its own testing methods that stipulate different test subject positions and ignition sources, e.g. glowing cigarettes, different kinds of gas flame, even alcohol flames, waste paper baskets filled with wood shavings, electrical radiators, wooden cribs, hot metal nuts, cigarette lighters and matches. In principle, the combustion time after the source has been removed or burned off is used as a criterion for measuring and evaluation, as is the after-glow, and above all the size of the destroyed area of the test subject.

Flammability tests: The following demands have been placed on test methods for flammability:

(a) Determination of flammability (from a small flame to independent ignition with flames); (b) Fire propagation speed (flame spread rate, burning rate); (c) Determination of the heat of combustion generated; (d) Tendency to form burning melt droplets; (e) Flammability of home textiles at high ambient temperatures and high ventilation; (f) Determination of smoke and/or (toxic) gas development; (g) Determination of heat shock behaviour.

Flammable textile: Any combustible textile that burns with flame.

Flanders flax: Very fine flax of long, white, soft fillers, grown in Belgium.

Flamme- (L): Flame-colour.

Flammeous: Having the colour and other qualities of flame – a reddish-orange colour.

Flamme' yarn: (a) Hank-printed yarn, e.g. for shirt flannel; (b) Dyeing – Dying of ombré or shaded effects; (c) Spinning – a yarn spun with irregular thicknesses (slubs, nepps, etc.).

Flameproof: To render a textile incapable of propagating flame beyond the edges of a charred area produced by the application of a specific test flame.

Flange dart: A dart that is only partly stitched, the rest of it being laid free rather like a pleat. This example shows an armhole with flange dart.

Flange lock slider (in zipper): A slider with notches in the flanges of the slider that block the shoulders of the elements when the sringers are pulled apart, thus preventing further separation of the chain.

Flanges (in zippers): The edges of the slider formed to contain the chain.

Flannel (as applied to bed sheeting): A napped fabric used in the fabrication of sheeting products.

Flannel: (1) A soft wool fabric with a felted surface (degree of felting can be varied) woven in twill; cheaper cloth also woven in plain. Colouration can be obtained by melanging, for men's suiting. Not to be confused with flannelette, the surface of which is raised. The term may be used to describe the old woollen underwear material which was rather coarse and scratchy, but it is more likely nowrefers to a plain, dull-surfaced, slightly fuzzy cloth. In all-wool or worsted fibre, top-class flannel is of plain or twill weave, the yarns milled during manufacture. A good wool flannel construction is 56 × 56 with a 5 run warp and filling, in 2/2 twill weave. Lower quality woollen flannels are made with coarser yarn in plain weave. The finest flannels are made of soft spun worsted yarns. It is soft, warm and elastic with all the properties of woollen cloth and makes well-tailored dresses. A small percentage of polyester is added sometimes and with viscose addition cheaper varieties are made.

(2) From the numerous test methods for the determination, collective term for single-sided or two-sided napped fabric made from wool, cotton, union fabric or viscose filament; usually with plain or twill weave. The soft, supple handle is characteristic and is created by milling, with the clear nap still allowing the weave pattern to be clearly seen. The napping process causes the colours to merge gently into each other; the fibre nap is fairly short in these

materials, and is sometimes evened out by emerizing. Wool flannels are either made from worsted or woollen yarn, usually soft-spun from fine merino, i.e. easily milled wools. Flannels are mainly light mixture shades (grey and beige shades), light weight (approximately 240–440 g/m^2) materials. Variously named according to fibre type, weave or end-use (wool, twill, crepe, dress, blouse or shirt flannel). Type of finish: light to medium Melton finish. Used for dress, costume, suit and coat materials (wool) and sports shirts or pyjamas (cotton).

Flannel (cotton): (a) *Light weight* – lightweight cotton flannels are made with plain weave are often called flannelettes. Texture 44 × 44 with 22s warp and soft twist 12s filling. The fabric may be woven in grey or piece dyed or printed before napping. Low priced flannelette is sometimes made by using short fibres, such as comber waste in the filling.

(b) *Medium weight* – It is also sometimes called canton flannel, after the Chinese city where it originated. A typical construction will be 74 × 44 with 20s warp and 10s filling. Woven in 2/1 twill for the fabric to be napped on the back and 2/2 for fabric to be napped on both sides.

Flannel (worsted): Twill weave. Made in a variety of weights. More closely woven and harder than wool flannel. Can have a very slight nap on one side. It tailors very well. Presses well and holds a hard crease. *Uses:* Men's suits, jackets and trousers, women's coats, suits, skirts and tailored dresses.

Flannel hems: The French hem is used for table linen. Fold as in an ordinary hem, then fold the hem back on the right side and overhand the edge formed, taking fine stitches. Press the hem flat from the right side.

Flannel seams: Flannel seams should be stitched, opened and pressed flat, either on the right or wrong side of the garment. If on the right side, taffeta ribbon should be basted over the seam, so that the raw edges of flannel will not show, and cat stitched or buttonhole stitched on both sides of the ribbon, or any fancy stitch (not too long) may be used. This is the Dorothy seam. For the seam on the wrong side, the edges should be cat stitched with fine thread. Any ornamental stitch may be used on the right side of the seam. Always press flannel seams and hems before finishing. Flannel should never be hem stitched.

Flannelette: A light weight imitation of wool flannel. It is made from cotton, viscose, modal or mixtures. Soft yarns are used so that the fuzzy warm surface is easily achieved. Made in plain colours or stripes or prints. Creases easily, but wears well. A heavy, soft material with a napped finish, usually only on one side. In cheaper qualities, the nap comes off. Launders well, easy to manipulate and is warm to wear. There are many types in the market. It may

be bleached, dyed, printed, or woven in coloured stripes. Uses: Infants' and children's wear, men's, women's and children's sleeping wear, pocket linings, quilts, shirting.

Flannelette sheeting: Slightly brushed cotton fabric. Brushing is done for warmth of the sheeting. Highly inflammable unless treated for flammability.

Flanelle de Chine: A plain woven French fabric, made of all-wool and given a very smooth face. It is dyed with indigo in the piece, the selvage being left white.

Flannellette: Twilled, lightweight washable cotton fabric, made of slack twist single yarns; it is woven in stripe effects or printed on the face and has a short nap raised on the back; used for kimonos, house dresses. See **Flannel, (light weight).**

Flannelette sheeting: Fabric made of cotton and slightly brushed for warmth. Highly inflammable.

Flap: A shaped piece of material which provides a covering for a pocket mouth or is for ornamentation.

Flare: A sudden burst of flame.

Flare (in cord): The spreading of the filaments at the cut end of a strand or the spreading of the strand ends at the cut end of a cord.

Flaring: Descriptive of bright colours.

Flash ageing: A modern form of the two-phase printing process. The flash ageing process is characterized by the use of short steaming times at high temperatures. Principle – thickened vat dyes are printed without fixation chemicals, dried, padded with an alkaline solution of a reducing agent (caustic soda liquor and sodium dithionite), then steamed immediately without intermediate drying for 20–60 s at 120–140°C in a special rapid steamer (rainbow or arch steamer, tower steamer).

Flash ager: The machine designed to do flash ageing process. See **Flash ageing**.

Flash point (FP): The lowest temperature at which sufficient vapour builds up over a flammable liquid to form a combustible mixture with air near the surface of the liquid. The application of a small naked flame at the flash point temperature produces a momentary flash only, since the temperature is still too low for sustained combustion.

Flash spun fabric: A non-woven formed from the fine fibrillation of a film by the rapid evaporation of solvent and subsequent bonding during extrusion.

Flat: See **Wrong draw**.

Flat bed: A type of bed which provides a flat unbroken surface with the table on which it is mounted.

Flat carpet: (a) Smooth carpet, a carpet without pile or napped surface as per DIN 61151. Examples are coir and sisal mats, Gobelin tapestry; (b) Carpets without pile or nap such as hand-woven carpets, Kilim carpets, and carpets with extraneous decorative effects (allgaeu carpets, applique carpets, skin rugs, felt mats with and without decorative materials incorporated, or mechanically woven carpets in plain weave made from hair yarn, wool, coir, sisal, cotton).

Flat crepe: See **Crepe**.

Flat duck: Duck having warp of two single yarns woven as one and either single or plied filling yarn. See **Duck**.

Flat-felled seam: A complex seam formed on the outside of an object with raw edges enclosed and two rows of machine stitching visible on the face side. It is a thick seam, so avoid using it with bulky fabrics.

Flat foam: A smooth, non-structured, foam carpet back coating.

Flat goods: Knit goods made in flat stitch without any ribs or fashioning.

Flat iron: A pressing iron used for the manual Ironing of garments.

Flat plate printing: Flat plate printing is a method that first appeared in Europe in the mid-eighteenth century. This process involves images being incised or engraved onto a metal plate (usually copper) and is known as an intaglio method. Dye is applied to the surface of the plate; the excess is then scraped away, leaving the remainder only within the incised lines. This dye is then transferred to cloth by applying pressure.

Flat point lace: Made perfectly flat without any padded or raised parts.

Flat press: A hydraulic press used for Pressing in which transverse-folded layers of woven fabric (or, more rarely, knitgoods) are interleaved in the open-width state with heated or cold press papers and the pile so formed is subjected to pressure. Heating is achieved by inserting pressboards heated by electrical resistance wires at intervals throughout the batch.

Flat screen printing: A discontinuous form of Screen printing in contrast to continuous Rotary screen printing using Flat screens. Flat screen printing on long tables (hand screen printing) is the original form of screen printing and is still used for printing short runs of high quality prints. In manual method the length of textile fabric is glued or pinned on to the printing table and then

printed by hand with flat screens using squeegees. Fully-automatic screen printing carriages take care of screen transport, stopping at the repeat point, and electrically- driven squeegee operation.

Flat screens: Screens made using mesh or bolting cloth and designs engraved on them, to be used in flat screen method of printing.

Flat sheet (in textiles): A flat, hemmed product, usually rectangular, used for covering the mattress on a bed and used for sleeping on under.

Flat stitch (in embroidery): Take a small stitch alternatively on each side of the shape to be filled with the point of the needle always emerging on the outside line of the shape. Two lines may be drawn down the centre of the shape as a guide for the size of the stitch. The stitches should be close together and fold into one another.

Flat yarn: By slitting a polyolefin flat sheet, flat yarns of a rectangular cross-section are formed. These can be spool wound for weaving and knitting; they may be processed directly onto weaving or knitting machines. Mono- and multi-filament forms can also be combined with conventional yarns. Twisted/doubled flat yarns have the character of round yarns or round twist yarns. Using another method, by means of fibrillation or capillarization, split film yarns can be used to create flat yarns as pseudo-multi-filaments, or similar connected in a net-like manner, with further processing via twisting/doubling (split round yarns, split twist) or crimp texturing and twisting (split crimp yarn, e.g. for carpet pile). Similarly also from tape yarns (a) directly into flat yarns (for warp beams or cross-wound bobbins) or (b) likewise via splitting fibrillation (split or fibrillated yarns) and crimp-textured and twisted (split crimp yarn). A further process involves passing the yarns through a subsequent processing of tape yarns, is through splitting through fibrillation, crimping or fibre cutting into split fibres (split non-woven) and by twisting into split fibre yarn. Used for bast fibre substitutes, binder warp/backing fabric for tufted carpets, needle-felt carpets, coating fabric, pile for outdoor carpets, furnishing fabrics, automobile/furniture upholstery fabric, wall coverings, the packaging sector (for textiles and sacks, slip-proof/stackable through the application of wax), work wear, rainwear, high-visibility clothing, tablecloths, awnings, tarpaulins, tent materials, filter fabrics, technical purposes.

Note: The term is still used in respect of these yarns after a small amount of twist has been introduced by subsequent processing, e.g. as in over-end winding.

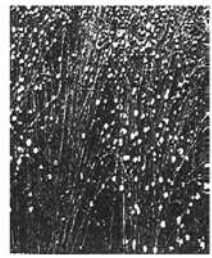
Flax: (1) Of the colour of flax, a yellowish-beige colour.

(2) Bast fibres belonging to the natural cellulosic fibres (up to 120 cm long) with a smooth surface structure and increased natural lustre. Preformed in

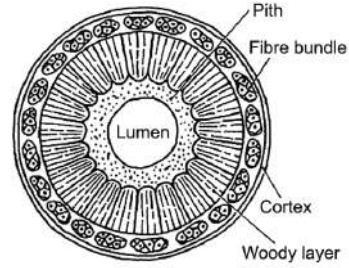
the stem of the flax plant (small seed form = fibre flax, large seed form = oil flax; also hybrids; different fibre content) as described under flax long fibre structure. Microscopic: cylindrical, smooth, narrow lumen, transverse fracture is typical, wall displacement, knotty. A slender annual plant, the bast fibre of which is called linen. The plants are pulled before ripe, retted (submerged in water until the woody parts of the stalk are decomposed), after which the straw is crushed, broken between rollers, scutched (causing the removal of the woody parts with revolving blades) and hackled (or drawn through iron combs). The fibre ranges from creamy to greenish or bluish colour before bleached. The most important grades of the flax are: In Russia the motchenetz and slanetz (see each), the first containing the following varieties: Pochocon, Uglitz, Rieff, Jaropol, Stepurin. The varieties of the slanetz are called Bejetsky (usually best), Krasmoholm, Troer, Kashin, Gosposky, Nerechta, Wologda, Jaroslaw, Gresowetz, Kostroma. The flax marketed through Riga, Dunabourg, and Kowno, is graded K, HK, PK, HPK, SPK, HSPK, ZK, GZK, HZK, RG. The Archangelsk (Russia) grades for dew retted toales are first, second, third, and fourth crown, and first and second zabrack. The marks for Dorpat and Pernau (Russia) flax are: IX, E, OD, D, HD, R, G. The marks for water retted flax from Hoffs (Russia) are: HD, PHD, FPHD, SFPHD, XHDX, XRX. The marks for Pskoff are: OD, PWW, OW, O, OO, OOO, PI, PII, PHI. The marks for the flax from Reval and Dorpat, exported in bobbins, are: GR, HD, D, OD, OOD. The Petrograd marks are classed, comprising: Fabrichng, Otbornoi, first crown, second crown; superior siretz, comprising Polochno, Fabrichng, Otbornoi, first crown, second crown; medium siretz; common siretz, comprising Otbornoi, first crown, second crown. The Koenigsberg (Germany) marks are: FWPCM, FGPOM, WPC1M, LPCM, FPCM, PCM, PI, P2. In Belgium, the Courtrai flax is graded I/III, II/III, I/IV, II/IV, I/V, II/V, VI; the Flemish or blue flax grades are II/IV, I/V, II/V, VI, VII, VIII, IX. The flax from Fumes and Bergues is marked A, B, C, D; from Zealand, IX, VIII, VII, VI; from Friesland, D, B, Ex, F, Fx, Fxx, G, Gx, Gxx, Gxxx; the Walloon flax is marked II, III, and IV. The flax from Ireland and France is known by the names of the counties and district it comes from. Dutch flax is graded II/IV, I/V, II/V, VI, VII, VIII, IX. In chemical properties the pure bleached linen is similar to cotton, the following tests serving to distinguish unbleached linen from cotton: treated with olive oil, linen becomes translucent and cotton opaque and white; when burned the ends of the cotton fibres are tufted, those of the linen round; treated with concentrated solution of caustic soda both cotton and linen shrink and curl, the former becoming grayish, the latter yellow in colour; treated with concentrated sulphuric acid and then with diluted ammonia water, linen remains unchanged, while cotton becomes soluble in water. In fabrics the tests are: if it is a white fabric a piece is boiled in 50 per

cent solution of caustic soda, which renders the cotton pale clear yellow and the linen dark yellow. A sample of the fabric is washed in a solution of cyanin in alcohol, then rinsed and after treated with thin solution of sulphuric acid, after which the linen will become blue, while the cotton stays white. Under the microscope the linen fibre discloses regular cylindrical or polygonal cells, with many transverse joints and a lumen in the centre.

Flax Plant



Ripe Flax Field

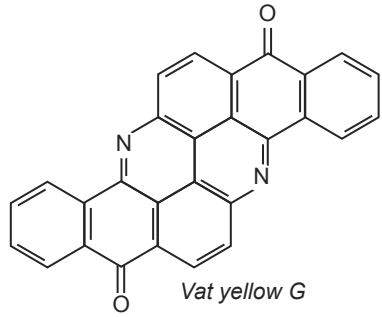


Flax canvas: A few tailoring and embroidery canvases are referred to as flax canvas.

Flax fibre: See **Linen**.

Flax tow: Flax fibre removed from carding engine cylinders. It is often matted and dirty.

Flavanthrone: Group of dyes coming in the Anthaquinone class and are derivatives of anthraquinone with a fused ring structure. Example is the dye manufactured by treatment of 2-aminoanthraquinone in nitrobenzene with titanium tetrachloride or antimony pentachloride at 100–175°C.



Vat yellow G

Flavid: Yellow.

Flecked: Yarn or cloth with a flaw caused by a spot of some strange colour.

Fleece: The wool of one sheep as obtained by shearing.

Fleece (in wool): The fibre coat that covers a sheep.

Fleece : (a) A heavy wool or wool mixture with a long soft nap. The cloth may be woven or knitted or woven on the pile principle with a dense pile of highly resilient wool. The long nap or pile provides air spaces which make the fabric very warm and the basic weave is not visible from the right side. Different qualities are available and the fabric may be composed of stock or skein dye yarns or it may be piece dyed. The weight of the fabric will be around 15–25 oz. per yard. The nap wears out on cheaper cloth. Mainly used for overcoats. (b) The skin of an animal, e.g. sheep, goat, to be used for making clothes.

Fleece wool: See **Fleece**.

Fleeced: A term applied to fabric that has a napped surface. The process is often applied to knitted fabrics.

Fleecy: A word used to describe the feel and implied warmth of any fuzzy surfaced fabric. The fabric may be cheap cotton or acrylic, or it may be wool. Often used as a lining fabric and there for the term 'fleecy lining' is often mentioned.

Fleecy fabric: (a) Term in the hosiery trade for fabrics having at the back a thick yarn which is brushed to raise a pile. (b) Any woven apparel cloth raised on one or both sides and made to resemble a fleece.

Flesh: A moderate pink. Also 'flesh pink'.

Flemish Holland: Stout, plain woven, unbleached linen fabric, made in Belgium.

Fleur de Soie: High grade French satin. The face is a satin de Lyon (2-1 twill) with a backing interlaced on the 12-shaft satin principle.

Fleur volante: Loops or other ornaments on the outer edge of the cordonnet.

Flexibility: That property of a material by virtue of which it may be flexed or bowed repeatedly without undergoing rupture.

Flexibility: The extent of the ability of a textile to be flexed or bowed repeatedly without being ruptured/broken.

Flexometer: American NBS testing device for determining bending resistance and evaluating crease-resistant finishes. The torque and the angle of the folded test subject are used to determine the amount of work that is required

for folding and unfolding the subject. The bending resistance level during unfolding is used as a measure of crease resistance.

Flexual rigidity: (1) Resistance to bending. The flexural rigidity is the ratio of the small change in bending moment per unit width of the material to the corresponding small change in curvature:

Flexural rigidity G = M × C.C.C × 9.807 × 1/1000000uNm

Where, C = bending length (mm), M = fabric mass per unit area (g/m^2).

(2) The couple on either end of a strip of unit's width bent into unit curvature in the absence of any tension.

Flick: In England, the nap raised on flannelette and other fabrics.

Flicker: A hand tool that looks like a small hand card on a long handle. To use it, hold one end of a lock of wool in your left hand rested on your thigh and "flick" the tool up and down with your other hand catching the end of the fibre. This will open the lock and make it easier to spin. It is recommended to wear a sturdy pair of jeans or place a leather pad on your left thigh.

Flipper: Name given to tension-free open-width washing and relaxing machine for woven and knitted fabrics. Control by free-floating rollers with no mechanical drive, super-light rotation due to hydrostatic buoyancy. Almost tension-free cloth passage produces relaxing action due to positive control by floating hollow rollers, whose hydrostatic drive produces extremely

light rotation and therefore low-tension material movement. Gravity driven by the downwards path of the liquor-saturated cloth.

Flix courts: A French linen fabric.

Floak coating: A method of flocking for the manufacture of fabrics in which textile fibres are bonded at one of their ends to a textile or non-textile base material by means of an adhesive.

Float (in woven fabric): The portion of a warp or weft yarn that extends unbound over two or more filling or warp yarns.

Float: A defect in which a warp or filling yarn extends unbound over the ends with which it should be interlaced. This happens due to inaccurate drawing-in or improper shedding.

Float stitch: This is the yarn length which extends over stitches in the horizontal direction and is limited by a tuck stitch or a knit stitch. Structures having float stitches tend to be narrower and have less width-wise elasticity. Float stitch of more than four successive float stiches in the vertical direction

of the fabric or more than six adjacent float stiches in the horizontal direction of the fabric should not be used, otherwise the knitting process will not be possible due to yarn breakage or stitch ravel. Weft: This is the yarn length which lies between plain and purl stitch in the horizontal direction.

Floc: Coagulated groupings of formerly suspended particles which then settle by gravity.

Flocculant: A chemical or physical reagent such as a polyelectrolyte, which promotes flocculation. It acts as a bridge to bind the suspended particles together. A flocculant may act also as a coagulant. Compare ***flocculent***.

Flocculation: The combining of the particles of a finely divided precipitate, such as a colloid, into *flocculent* clumps that sink and are easier to filter off. See **Coagulation**.

Flocculator: A stirrer used in mechanical flocculation.

Flocculator clarifier: A tank used in the treatment of water which consists of both a ***flocculation*** zone and a separation (***clarification***) zone to remove the flocs from the water. Various types exist, normally based on ***solids contact clarifier*** (e.g. ***sludge blanket clarifier,*** and ***solids recirculation clarifier***). Smaller or older treatment works may have tanks with a completely separate flocculation zone and settling zone, sometimes known as one pass (or single pass) flocculator clarifiers. These may be rectangular or circular and up to 50 m diameter. In circular clarifiers, a central flocculation zone is surrounded by the settling zone. The ***surface loading rate*** is from 24 to 60m^3 per day per m^2 of surface area, depending on raw water quality.

Flocculator DAF unit: See **Dissolved air flotation**.

Flocculent: Description of particles in water or wastewater or sludge that form ***flocs***.

Floches: Fine sewing silk produced in France.

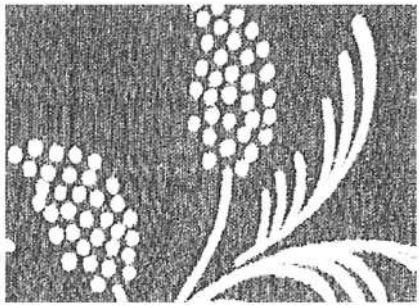
Flock: (1) A material obtained by reducing textile fibres to fragments as by cutting, tearing, or grinding, to give various degrees of comminution.

(2) Many fabrics may be flocked and their characteristic is that the right side of the fabric has tufts of fibres added in dots or patterns. The fabric is light and floaty, the flocking may be in contrast or self-colour and it may be worked in a different type of fibre. The flocks are normally stuck on with an adhesive which is applied to the fabric in a pattern. The surplus flock fibres are afterwards blown off. Flocked nylon is often used for sarees.

Flock (to): Short pieces of monofilament fibre, i.e. short fibre material made of viscose, polyamide, polyester, polyacrylonitrile, acetate or natural

fibres (wool, cotton) and frequently also so-called metal flock made from aluminium, brass or bronze powder prepared for flocking and flock printing. The most frequently-used fibre titres are in the range of 0.9–22 dtex, and the usual fibre lengths are between 0.5 and 2 mm. "Glow" or reflective flock is always prepared by static electrical means using electrolytes, and therefore conducts electricity to a certain extent.

Flock print: The velvet-like relief pattern is obtained by printing the design with adhesive and then flocking with small snippets of fibres. It is used for making dresses and blouses.



A flock print

Flock printing: Once the adhesive has been applied to the entire surface of the substrate, i.e. including the motif, and this has been produced in the flocking zone using templates, sharpness and resolution power are established by flocking. Flocking may be performed in a downward or upward direction with the parameters of the flocking process determining the sharpness of the contours of the flocked motif.

Flock silk: The outer irregularly spun cocoon layers (approximately 25% of the material) regarded as best raw material for schappe' silk (also called Frison, Stursa, Kibizzo).

Flock transfer printing: A process for the individual application of flock patterns to e.g. ready-made garments such as T-shirts. No after-cleaning is required although the preparation is laborious as far as the printing technique is concerned: a flocked release paper is screen printed with a single or multicolour design first of all. Next, a cover adhesive is then also applied by screen printing. It is most important here to ensure that the flock is only surface printed with adhesive in this operation, i.e. the adhesive layer must not penetrate through the flock. Immediately afterwards, a hot-melt granulate is strewn on to the adhesive layer whilst still wet before intermediate drying. Excess granulate is removed by brushing after the material has been dried.

Flock yarn: Velvet-like polyamide-based compound yarn, manufactured using a carrier thread with a firmly bonded adhesive sheath consisting of almost right-angled radial flocking. The flock cannot be removed without damaging the core thread, which will mean high abrasion resistance, resistance to shedding, resistant of high frequency fusion, easy to clean, tetrachloro ethane resistant. Used to add texture to woven fabric, warp-knitted fabric and knitwear with high-bulk yarns, as an appearance, to impart visual, handle and abrasion-resist properties for raised and velvet-like areas, particularly car upholstery, upholstered furniture and decorative materials.

Flocked blanket: A blanket made with a fish-net type scrim sandwiched between two thin layers of foam with flock adhered to the outside of the foam.

Flocked fabrics: See **Flocked Textiles**.

Flocked textiles: These are defined as fabrics in which textile fibres are bonded at one of their ends to a textile or non-textile base material by means of an adhesive.

Flocked carpet: Contract carpet produced by flocking on to a substrate consisting of a ground fabric, non-woven, or rubber sheeting. The applied flock is in the form of, e.g. short cut polyamide fibres.

Flocking: The application of short fibres to a base fabric by the direct printing of adhesive on to the fabric in the desired areas and then sticking the fibres to these areas.

Floconne': In French, the word *flocon* means "flock". A term used for thick, soft double fabrics (900–1000 g/m^2) made from carded yarns produced mainly with high-grade merino wools. The characteristic appearance is achieved by means of a separately picked 3rd weft yarn, the flock weft, which floats lengthways, and is subsequently raised (it is therefore also referred to as "napped cloth") which gives rise to flock-like fibre tufts on the surface of the fabric. Depending on the weave, it is produced with rib, diagonal or herringbone effects; wool or piece-dyed. Used for high quality men's coats.

Flocculation: Flocculation is the term used to describe the aggregation of smaller particles in to larger particle that can be removed by sedimentation and filtration. Flocculation is brought about by Brownian movement, differential velocity gradients and differential settling in which large particles overtake smaller particles and form larger particles.

Floor covering: An essentially planar material, having a relatively small thickness in comparison to its length or width, which is laid on a floor to enhance the beauty, comfort and utility of the floor.

Floor covering (finished pile yarn): See **Finished pile yarn floor covering**.

Floor covering (pile yarn): See **Pile yarn floor covering**.

Floorcloth: In England, a coarse and stout, plain woven hemp or flax fabric, heavily coated with varnish; used as inexpensive floor covering.

Florameda: A fabric mentioned in 17th-century English manuscripts, believed to have been woven with flower patterns.

Florence brown: A greyish shade of red.

Florentine: Heavy grey woven, 3/1 twill cotton fabric used for overalls and uniforms, having a construction 38 × 19 and 37 × 49 tex cotton yarn.

Florentine brown: A copper colour, also called Hatchett's brown and Roman brown.

Florentiner-Tulle: Flimsy and embroidered tulle for curtains.

Floret or Flor linen: An open face cotton or linen canvas, both warp and weft yarns being equally spaced from each other.

Floret: (a) Figured wool satin, made with a high finish; used in England for dresses; (b) French term for brocaded silks; (c) Yarn made of the best kind of silk waste.

Floretta: (a) See **Floss silk**; (b) Very fine, plain woven and bleached Belgian linen.

Florida: (a) A very fine grade of Sea Island cotton, having a uniform, long, fine and silky staple; (b) Trade name in Romania for a printed madras; (c) In Austria, a coarse, bleached, plain woven cotton fabric, with a heavy size finish; used for stiffener in collars, cuffs and shirt bosoms.

Flooring material: Any pliable planar structure used as a base surface in camping tentage, but excluding such things as rugs or carpets placed in the tent that are not integral parts of the item.

Florence: Very light, plain woven silk lining, the warps and wefts being placed the same distance apart, made with single warp. Sometimes mixed with wool.

Floret silk: Schappe (silk).

Floss (Duvet, Fiochetti, Pelosität): Partially fluffy silk, caused by stray drops of secretion from the silk worm or as a result of aberrant spinning process, localized fluffing during the degumming process, effects of wear, etc.

Floss: (1) Very short tangled fibre of waste silk.

(2) A silky embroidered yarn.

Flots: In laces, several rows of picots partly covering each other.

Flounce: A ruffled drop on a bed covering.

Flouncing: Fabrics of any type or fibre which have one selvedge shaped in scallops. The edge is finished off, usually with embroidery.

Flouncing laces and embroideries: These are made as yard goods intended for flounces on dresses.

Flourishing thread: Lustred linen thread; used for embroidering.

Flow dyeing: An old method of dying for achieving cheaper dyeing. The warp or weft yarn is immersed in a strong dye, dried without rinsing and woven with non dyed weft or warp yarn. The fabric is simply passed through hot water on the padder, whereby dye is transferred

to the non-dyed material. Not practiced now.

Fluff: Down.

Fluff formation: Pile formation.

Fluff threads: Refers to texturized polyester or nylon threads. These threads provide excellent seam coverage when sewn in serger or overlock machines.

Fluid bed process: In this process sand or glass pearls of 100–200 μm diameter are used as a heat transfer medium from the heat source to the material being treated. In the case of materials produced from synthetic fibres, the fluid-bed process is used for heat-setting, thermosol dyeing, the curing of pigment dyeings and prints, the curing of synthetic resins and drying operations. The material being treated passes through the mass of hot sand/glass pearls in a V-shaped chute.

Fluidity (of a cellulose solution): A measure of the ease of flow or motion of a solution, and therefore an indicator of the molecular weight of the cellulose.

Fluidization: The suspension of a finely divided solid, e.g. a catalyst, in an upward flowing liquid or gas. This suspension mimics many properties of liquids including, allowing the solids to 'float' in it and achieve a uniform temperature with the fluid medium. Fluidized beds so prepared are used industrially to carry out catalytic reactions and to minimize the production of pollutants from coal-fired furnaces.

Flume: Variety of Egyptian flax which yields coarse fibres.

Fluorocarbon polymers: Group of chemicals including, Polytetrafluoroethylene, fluoroalkyl esters of acrylic acid which are used in soil-release and stain-release finishes. They are used as synthetic resins and is important in the area of coating of rolls which are non sticking and withstand temperatures from 180 – 240°C.

Nonstick surfaces are obtained by spraying these synthetic resins on to metal rollers which are used e.g. in sizing and finishing machines.

Fluocarbon resins: Polymers of Fluorocarbons. See Polytetrafluoroethylene; Polytrifluorochloroethylene.

Fluorocarbon chemicals: See Perfluoro compounds.

Fluorocarbon fibres, Fluorofibres: According to textile labeling regulations and the EDP code system, fluorocarbon fibres are classified as Polyfluoroethylene fibres.

Fluorocarbon finishing: Finishing of textile with fluorocarbon based polymers for water and stain repellency. Fabric finished with Fluoropolymers modify the surface properties of these textiles with regard to staining and dirt repellency Whereas paraffin or silicone-based water repelling only has a water-repelling effect on the textile fibres, fluoric chemicals repel both water and oil. Compared to conventional waterproofing, fluoric chemicals have the advantage of being resistant to washing and dry-cleaning. The "breathability" and therefore wearer comfort and handle of the fabric are not affected.

Fluorocarbon plastics: See **Fluorocarboin resins.**

Fluorocarbons: These are hydrocarbons in which the hydrogen atoms have been substituted by fluorine atoms. Mixed fluorocarbons contain other halogens in addition to fluorine, e.g. chlorine Chlorofluorocarbon. Fluorocarbon polymers are thermoplastic Fluorocarbon resins.

Fluorofibres: See **Fluorocarbon fibres.**

Fluorescence: When the molecule absorbs light, it is excitedfrom the lowest vibrational level in its ground state (S1) to a range of vibrational levels in the singlet first excitedstate (S2).

Fluorescence occurs if the molecule then emits light as it reverts from this level to various vibrational levels in the groundstate. Non-radiative processes, the most important of which is generally collisional deactivation, also gives rise to dissipation of energy from the excitedstate. As a result, there will be a reduction in the intensity of fluorescence andin many cases, it will be absent altogether. A type of Luminescence in which substances exposed to a light source emit light of another wavelength or colour.

Fluorescent brightening agent (optical brightening agents, brighteners, white dyes): Organic compounds which add fluoresce in a colour and is complementary to that of the textiles and can be used to compensate the natural colour. The brightening effect comes from fluorescence, which depends on the property of certain organic compounds to convert short wavelength light, in the 300–400 nm range, into longer, 400–500 nm, wavelengths.

Fluorescent dyes: (a) A group of organic dyestuffs which, when applied to a textile material, give rise to fluorescence under UV radiation (some in

daylight; dayglow colours); (b) Range of so-called luminous dyes that are highly fluorescent in daylight and under UV light. Suitable for coloration of plastic mass (polyvinyl chloride, celluloid, urea formaldehyde resins, lacquers), used in a similar way in pigment printing.

Fluorescent lamp: A glass tube filled with mercury gas and coated on its inner surface with phosphors. When the gas is charged with an electrical current, radiation is produced. This, in turn, energizes the phosphors, causing them to glow.

Fluorescent UV lamp: A lamp in which radiation at 254 nm from a low pressure mercury arc is transformed to longer wavelength UV by a phosphor.

Fluorescent whitening agents (fluorescent brightening agents): A fluorescent brightening agent is a compound which, when applied to a textile material, absorbs the short wavelength electromagnetic radiation (UV light) which is invisible to the human eye and converts it into visible light of longer wavelength which is emitted either as violet, pure blue or greenish blue.

Fluorescent quenching: Removal of Optical brightening agent from a material which is already applied with it.

Flush: Same as **Float**.

Flushed printing: Overprinting with extremely fine colour transitions and colour mixtures, usually on silk, viscose, or triacetate; e.g. on viscose, triacetate with azo print or print with cationic dye. Dry the print, steam for 30 minutes using wet steam and then treat with hydrophilic polymers (e.g. polyacrylate) for 5–10 minutes. Later rinse and dry.

Flux (in water/effluent treatment): In crossflow filtration, the unit membrane throughput, usually expressed in volume per unit time per area, such as gallons per day per ft^2 or litres per hour per m^2.

Fly: (1) A material covered opening to conceal a fastening in a garment.

(2) Fibres which fly out into the atmosphere during carding, drawing, or spinning or any other textile processes.

(3) Unwanted loose fibres on a textile material. It is caused by the attraction of fibre dust (mainly as a result of electrostatic attraction).

Fly ash: The light ash from an ***incinerator***, coal burning electricity generating plant, etc., that is carried off in the ***flue gas***. It can be removed from the flue gas by ***fabric filters*** or ***electrostatic precipitators***. Fly ash may be considered as a hazardous waste due to toxic contaminants being carried over from the incinerator and collected in the ash. It may contain activated carbon that is sometimes injected into the gas stream to remove toxic components of

incinerator gases. The activated carbon is then collected as a particulate with the fly ash.

Fly catch: An under lap of a material providing a backing to an opening to take buttons or zip tape for fastening, etc. Fly catch, Button catch, etc.

Fly catcher: Devices used to clean fibre dust, fly, loose pieces of yarn, etc., from machinery in order to prevent possible malfunctions due to their accumulation which could impair machine functional performance. Manual or electrically-operated fly catchers areavailable.

Fly stitch: Embroidery stitch. Bring the thread through at the top left, hold it down with the left thumb, insert the needle to the right on the same level, a little distance from where the thread first emerged and take a small stitch downwards to the centre with the thread below the needle. Pull through and insert the needle again below the stitch at the centre and bring it through in position for the next stitch. This stitch may be worked singly or in horizontal rows or vertically.

Flyer: A rotating device that adds twist to the slubbing or roving and winds the stock onto a spindle or bobbin in a uniform manner. See **Loom fly**.

Flyer bearings: Holds the flyer, same material as used in wheel bearings.

Flyer lead: A single band drives the flyer. The bobbin has an adjustable friction band to slow it.

Flyer spinning: A spinning system in which yarn passes through a revolving flyer leg guide on to the package. Yarn is wound on by flyer and spinning package rotating at slightly different speeds.

Flying filament: A loop of non-crimped filament protruding from the surface of a false twist draw textured yarn. The fault is caused by a filament failing to become crimped during texturing or subsequently losing its crimp.

Flyline: The line of the fly fastening from the centre of the fork to the top of the waist band on a pair of trousers.

F:**M ratio (Food and Micro-organism ratio), organic loading, sludge loading rate, SLR**: The number of kg of ***BOD5*** per day applied to an ***activated sludge*** plantper kg of (dry) activated sludge. F:M calculation can be based on ***MLSS*** (mixed liquor suspended solids) or ***MLVSS*** (mixed liquor volatile suspendedsolids).

For the United Kingdom:

$$\text{F:M} = \frac{\text{BOD}_5 \text{ of wastewater (mg/l)} \times \text{flow of waste water (m}^3\text{/d)}}{\text{MLVSS (mg/l)} \times \text{aeration tank volume (m}^3\text{)}}$$

For the United States of America:

$$F{:}M = \frac{BOD_5 \text{ of wastewater (mg/l)} \times \text{flow of waste water } (m^3/d)}{\text{MLSS (mg/l) aeration tank volume } (m^3)}$$

The units of F: M are days^{-1}. As about 70% of the sludge is volatile, the MLVSS is about 0.7 × MLSS. Therefore, the F:M based on MLSS is approximately 0.7 × F:M based on MLVSS for the same BOD, flow and aeration tank volume. It is the common design criteria for calculating the size of an activated sludge aeration tank.

The micro-organisms in the activated sludge process metabolise faster in warmer climates and so the F:M is higher. Nitrificationis a slow microbial process and so the F:Ms are reduced.

FNA: Fachnormenausschuß (German) (Technical Standards Committee).

FNM: Fachnormenausschuß Materialprüfung (German) (Technical Standards Committee for Material Testing).

Foam: Foams are micro-heterogeneous colloidal systems in which gases are distributed within a liquid or solid dispersing agent. See **Foam applicator**.

Foam application: Processes used for the low wet pick-up of concentrated foamed finishing liquors, especially for wash and wear finishes on textile fabrics with a possible pick-up of 40% and mainly between 10–20%. Foamed liquors are applied to the textile directly then brought to the desired thickness by means of squeeze rollers or a knife coater, e.g. two-sided foam application in a horizontal 2-bowl padder, one-sided application to carpets and foam application with an air-roll squeegee.

Foam applicators: Foam (a collection of bubbles) is created when air is whipped into a liquid. Since a bubble is a sphere of air entrapped by a thin layer of liquid, a volume of foam can be considered a quantity of liquid diluted by air. The volume of foam produced by an amount of liquid is called the blow ratio. Blow ratio is a way of describing foam density since collections of large bubbles result in low density foams, whereas small bubbles yield higher density foams. Not all liquids foam when whipped with air. Pure water alone will not foam, a surfactant must be added to lower the surface tension before it will foam.

Foam backing: Back coating of carpets.

Foam bonding: A method of making non-woven fabrics in which a fibre web or batt is treated by the application of a liquid in the form of a foam.

Foam breaking: See **Defoamer; Anti-foams; Dry-cleaning anti-foams**.

Foam cleaning: A process in which prepared foam is applied to a textile product, scrubbed in, allowed to dry and encapsulated soil is removed by suction.

Foam coating: The process can be carried out on certain foam application machines. A foam coating system consists of the following elements: mixer for mixing the compound with the required volume of air, roll-coater, drying unit, pressing cylinder, kiss-roll or padder and curing oven.

Foam decay: Occurs by self-drainage of a foamed liquid. The self-drainage rate (collapse rate) of a foam can be established by determination of the foam decay half-life period.

Foam degumming: A process for the degumming of natural silk under mild conditions. Instead of immersing hanks of yarn in the soap bath, they are suspended in the soap foam produced by the introduction of live steam into the bath. The foam action has a tendency to dissolve and eliminate sericin. This method, however, is not popularly adopted.

Foam density: The foam density is calculated according to the formula: (volume of solution consumed foam density)/(volume of foam)

Foam dyeing: Dyeing processes based on the use of finely porous foam, either as a dyeing medium itself or as a dye carrier. Foam dyeing can be carried out by exhaust and continuous methods. Foaming of the dye liquor serves to increase the liquor volume and is hindered by the presence of electrolytes.

Foam finishing technology (FFT technology): A foam application in which precisely metered quantities of foamed chemicals, etc., are applied to a textile substrate. Penetration of the porous textile fabric by foam results in a uniform distribution of the concentrated solution of chemicals at a minimum liquor pick-up of approximately 10%. Migration problems are also eliminated at the same time. The applied foam breaks immediately on contact with the fabric. Foam density is below 0.2 g/cm^3. In contrast to padder applications, the liquor pick-up can be considerably reduced to 10–25% of the fabric weight with this process. Since the greatest part of the water required in conventional padder applications is substituted by air in this process, energy consumption in subsequent drying is also reduced.

Foam formation: (a) Unwanted formation of foam during wet-processing operations. Causes problems in dyeing and printing, etc., and should be prevented. See foam as a source of problems in textile wet processing; (b) Foam formation as a desired effect for applications in dyeing and finishing. When solutions of substances with low surface activity are used for foam generation (e.g. short-chain alcohols or acids), the resultant foam is often only stable for a few seconds. Foams with considerably greater stability

are produced with substances capable of causing a considerable reduction in the surface tension of water (e.g. soaps, non-ionic, cationic and amphoteric surfactants). See **Foam application**.

Foam generators: Nowadays, foam technology represents an important technique in the carpet and textile industries for various stages of finishing. The high and varied demands placed on these foams, which are not only used in the carpet industry, call for mixer concepts which can be adapted to the actual operating conditions as far as performance and control are concerned. The foam generators that are used to produce foam of high quality which supports the foam application and finished products. Foam generators are of two types, static and dynamic. In static mixers, air and liquor are brought into contact with each other in a mixing head containing glass beads or Raschig rings. A dynamic mixer consists of a stator and a rotor. This system provides control of foam supply quantity, air dosing and gelling agent quantities according to the speeds of the coating plant. The quality of the foamed compounds stands or falls on the quality of air dosing. The smallest fluctuations in air content will change the litre weight of the foam and consequently reduce the quality of the end product. It is therefore necessary to apply a very rapid air measurement with a high degree of linearity.

Foam (in cleaning of textiles): A frothy mass of fine bubbles generated by whipping or agitating a suitable surface active agent.

Foam intensifier: The auxiliary used in the foam generators or otherwise to intensify the foam formation. It is usually a chemical which increases the foaming power of the surfactant itself.

Foam lamellae: Liquid interfaces between individual bubbles of Foam. Foam is therefore said to possess a "lamellar structure". Due to capillary action in foam lamellae, strong attraction forces for soil particles are released, as a result of which the latter are loosened (by mechanical action such as liquor movement, friction, pressure and squeezing) and removed from the fibre surface. The foam lamellae contain a film of liquid between the surface pellicule layers which consist of a monomolecular surfactant film, i.e. so-called inter-lamellar liquid.

Foam padder: The foam padder is a foam dyeing unit for carpets which does not require a foam generator. A dye liquor is applied to the carpet pile with the aid of a kiss-roll and subsequently foamed *in situ* by mechanical action on passing between a rotating cylinder of rods and a pressure plate at the back of the carpet. See **Foam applicator**.

Foam printing: A textile printing variant of low wet pick-up in which a large proportion of the water in print pastes is substituted by air; thickening agents

are superfluous and therefore do not need to be washed out. The advantages are reduced soiling of water during after washing and lower energy requirements in drying and steaming. The main disadvantage is the need for a separate foam generator for each print paste in the design and the resultant increase in costs. Printing of outlines is also difficult with foam print pastes.

Foam rubber (latex foam): An expanded foam produced from rubber or synthetic rubber. It consists of approximately 15% rubber and 85% entrapped air or gas cells. Foam rubber is of low weight, odourless, elastic, dimensionally stable, absorbs body transpirations and conducts them away, prevents heat accumulations, provides noise insulation, is resistant to parasites, washable and has a long service life (especially synthetic foam rubber, as well as natural foam rubber which is protected against the action of sun and air).

Foam sizing: The process of foam sizing calls for a change in the auxiliaries by which the "add on" to the yarns is applied. An emulsion which typically contains 20% solids or "additives" and 80% water is converted into a foam by the careful introduction of air, the viscosity of which is adjusted empirically in such a way that a good wet add-on is achieved.

Foam stabilizers: Special products used to increase foam stability.

Foam stability: The ability of a foam to remain in a stable condition.

Calculation: (foam volume after x min)/(foam volume immediately after preparation)

Foam suppressants: Products used to prevent the formation of foam or considerably reduce foam stability. In general, a foam suppressant should (a) be sparingly soluble in water, so that it is already present at low concentration on the lamella surface, (b) have a positive spreading coefficient relative to the surfactant solution, and (c) should form quasi-gaseous interfacial films. See **Defoamers**, **Antifoams**.

Foam tear: A condition wherein the foam portion of a laminated fabric ruptures prior to the failure of the bond.

Focus groups: Groups of customers/potential customers brought together by market researchers to find out likes/dislikes, etc.

Foil: A term in general use for materials in thin, sheet-like form, e.g. aluminium, plastic foil, etc. In this context, therefore, a plastic foil is a flat, autonomous, and more or less elastic material with a thickness of approximately 0.01–0.1 mm, whilst the still thicker forms are described as plates largely because of their stiffness. The term foil should not be confused with ***Film***.

Fold marks: These are usually seen as length-wise creases which can cause considerable problems, e.g. in the case of dyeing sensitive polyester fabrics

that are thermo-plastic, or alkaline treatment in cellulose processing. For cellulose, similar conditions may be found during bleaching processes but, due to the lower quantities of alkali, heavy creasing is rare and is easier to remove.

Fold (book): The fabric is doubled selvedge to selvedge, and folded back and forth upon itself in predetermined lengths. When the piece is completed, the fold edges on each side are folded once more upon themselves so that the fold edges are inside forming a compact package as long as on half width of the goods. See **Book fold**.

Fold (shoe): The fabric is folded from both ends into 12-16 folds to the piece, the length of fold depending upon the length of the piece. See **Shoe fold**.

Folded selvedge: See **Curled selvedge**.

Folded yarn: Another term for plied yarns. See **Plied yarn, Yarn, Plied**.

Folder: (1) A sewing machine attachment which folds material as it is fed through, so that it is sewn into the desired configuration.

(2) A sample booklet to show samples of fabric print, finish, etc.

Folding hems: A hem is a fold of goods twice folded to protect a raw edge. The first turn or fold of the hem is the most important. It should be straight and even, *folded to a thread*, for upon it depends the beauty of the hem. The hem should always be turned towards the worker and creased firmly, but never pleated along the fold. First crease the narrow fold, then crease the second fold the desired width, marking by a measure and baste not too near the edge. The first fold *along* the *woof* threads should be at least one-fourth of an inch in width, as the woof threads give or stretch more than the warp threads; otherwise it will not lie flat.

Folding machine: Used (a) for make-up of piece goods on completion of finishing or (b) for individual laundry items. Can be directly connected to a packaging machine (Fabric folding machine).

Folding of yarns: The doubling of single yarns as a partial stage in the process of Twisting. The folding process represents a stage in the production of ply yarns.

Folk weave: Coarse yarn, loosely woven fabrics with a woven pattern often including several colours. Fabrics are woven on dobby or jacquard looms. Yarns used are cotton, acrylic, viscose. Patterns are usually striped with possibly diamonds or other small patterns between them. These fabrics do not crease easily and are used for bedcovers, curtains, loose covers and cushion covers.

Fond: In hand-made laces, the ground over which the patterns are spread out. It is either a mesh or is made up of brides.

Fondant pink: A pastel red colour.

Fond de Neige: A fancy ground in old laces, consisting of braids with groups of knots on them.

Fond d'or: French term for brocades with gold ground.

Fontage: Head-dress with stiff, folded lace ruches at the front and standing up like organ pipes.

Foot traffic units, for pile floor covering: The number of passes by human walkers over a specific group of carpet samples.

Footing: (a) The edge of the lace flouncing which is sewn to the fabric; (b) The repairing of holes in the foot of stockings.

Footman: The vertical connection between the treadle and the crank.

Forbes: A Highland tartan, made as follows – A wide dark green bar, split in the centre by a group of black, white and black lines; black stripe, measuring half the width of the green; a navy blue bar (as wide as the green), split in the centre with a pair of black stripes, placed close together.

Force: A physical influence exerted by one body on another which produces acceleration of bodies that are free to move and deformation of bodies that are not free to move.

Force at break: See **Breaking force**.

Force-at-rupture: The force applied to amaterial immediately preceding rupture.

Force at specified elongation (FASE): The force associated with a specific elongation on the force- extension or force-elongation curve.

Force-deformation curve: A graphical representation of thee force and deformation relationship of a material under conditions of compression, shear, tension, or torsion.

Force-elongation curve: A graphical representation of thee force and elongation relationship of a material under tension.

Force-extension curve: A graphical representation of the force and extension relationship of a material under tension.

Fore: The fronts of jackets, coats and similar garments.

Forecasting: Predicting fashion trends.

Forecasting services: Publishers and other organisations offering fashion prediction advises.

Fore-runner: A length of fabric used in processing to lead a piece of fabric through the equipment and so enable the piece to be processed from end to end, with minimum wastage. Other names like leader cloth, cheda, wrapper cloth, etc., are also used.

Foreign matter (in cotton): Non-lint material, commonly referred to as waste or thrash such as dust, sand, seed-coat fragments, leaves, and stems normally present in raw and partially processed cotton.

Forest-green: An olive-green colour, slightly darker than ***Lincoln green***; sometimes a yellowish-green or a dark muted-green.

Forest wool: Fibres extracted from pine needles; used for coarse blankets, mixed with cotton or wool.

Forestieri: Various coloured, mostly scarlet red and fulled woollens produced in Egypt.

Forget-me-not blue: The pale blue colour of the forget-me-not flower – a symbol of constancy.

Forfars: Unbleached coarse and heavy linen, made in England; used for towels.

Fork: The region of the garment corresponding to the fork of the human body. Commonly the place at which inside seam join; also called crotch, cratch.

Fork quantity: The allowance of material in bifurcated garments provided for the thickness through the trunk from front to back at the crotch.

Formal balance (in designing): Where the design elements are almost equally distributed.

Formaldehyde determination: The formaldehyde released by hydrolysis is extraordinarily dependent on the test conditions. Total formaldehyde is understood to be the total amount of formaldehyde detectable in finishing agents, finishing liquors and on textile fabrics. It represents the sum of free and combined formaldehyde. The combined formaldehyde is subdivided, in turn, in methylol and methene compounds. The determination of formaldehyde released from textiles by hydrolysis is also important. After hydrolysis in the distillate, the total formaldehyde can be determined iodometrically. The determination of free formaldehyde is mainly carried out by the sulphite method and, in a different manner, by the hydroxylamine method. Methylol formaldehyde can be determined together with the free formaldehyde. The determination of free and hydrolytically-released formaldehyde on textiles can be carried out according to various methods. However, these test methods determine not only the actually available free formaldehyde, but also the formaldehyde released by partial hydrolysis in the preparation of the sample.

Formaldehyde: H_2-C=O; (methanal), MW: 30, density 0.81. A readily polymerizable colourless gas. It is commercially available as an aqueous solution with a pungent and characteristic odour; 30–40% solution (formalin) which usually contains 10% methanol to inhibit polymerization. *Properties*: powerful reducing action; causes proteins to coagulate (principle of tanning) and the hardening of casein fibres; it is a powerful germicide either in solution or vapour form.

Uses: After-treatment of substantive dyeing (improved wash fastness); wool protection agent; hardening of casein fibres (during wet finishing); cross-linking agent in resin finishing (formaldehyde finishing); manufacture of resin finishing agents (methylolation); addition to naphthol dyeings; preservative; component in disinfectant solutions; component in numerous fillers, adhesives, etc.

Formaldehyde after-treatment of direct dyeing: Improves the colour fastness of suitable direct dyes to water, washing and perspiration. Suitable direct dyes contain free amino or oxy groups; mainly black dyes.

Formaldehyde content in resin finishing agents: The free formaldehyde content results from the state of equilibrium which is dependent on the chemical constitution, concentration and temperature.

Formaldehyde fastness: A form of 'colour fastness to storage conditions' test for finished and packed coloured textiles to possible formaldehyde-containing adhesives in packing paper, pleating paper, etc.

Test procedure: A dyed or printed textile specimen is exposed in the dry state for 24h to rising formaldehyde vapours (contained in a small open bowl under a glass bell jar or in closed boxes). The grey scale is used to evaluate change of shade.

Formaldehyde finishes: Cross-linking processes for cellulose with formaldehyde or so-called Formaldehyde-liberating compounds in the presence of acid catalysts. The formaldehyde is mainly applied from aqueous solution by the wet crosslinking process. Such finishes were originally applied to textiles composed of regenerated cellulose to reduce fibre swelling, increase wet tensile strength and improve shrink resistance; also used for the wash-and-wear finishing of cotton. Disadvantages: severe losses in tensile strength and abrasion resistance.

Formaldehyde free finishes: These finishes are based on the use of compounds which do not contain formaldehyde or do not release formaldehyde due to the action of heat or during the storage of finished fabrics (low-formaldehyde resin finishing) such as 4,5-dihydroxy-1,3-dimethylurea and 4,5-dihydroxy-1,3-bisethyleneurea. A finish with reaction products of acrylamide and glyoxal

or glutaraldehyde gives poorer effects than usual. A comparison of both basic structures of a low-formaldehyde type finish and a formaldehyde-free finish clearly shows that the number of reactive hydroxyl groups for cross-linking with cellulose in low-formaldehyde glyoxalmonoureins is approximately double that in the formaldehyde-free dimethyl dihydroxy ethylene urea.

Formaldehyde-free finishing agents: These are, more precisely, formaldehyde-free resin finishing agents used to produce formaldehyde-free finishes on cellulosic materials. Cross-linking agents are available for the resin finishing of cellulose which contain no formaldehyde and do not release formaldehyde in the finishing process or during storage of the finished goods.

Formaldehyde release: Formaldehyde release, not to be confused with free formaldehyde, is the amount of formaldehyde that escapes from a fabric into the atmosphere. It is determined by the mason jar method, AATCC Test Method 112. The method calls for suspending 1 gram of fabric in a sealed quart mason jar containing distilled water in the bottom. The jar is incubated for 20 hours at 49° C. The formaldehyde that collects in the water is analysed and the results are reported in ppm or μg/g fabric. There are other fabric test methods used for determining formaldehyde in fabric. For example, the Japanese method calls for titrating the free formaldehyde in the fabric by a cold procedure. The box below shows a comparison of the results obtained on the same piece of fabric tested by the different analytical procedures. The results obtained by the mason jar method are much higher than the Japanese method, so the reader is cautioned to be sure of the details of what is being reported before jumping to conclusions.

Formaldehyde (tests for):Simple preliminary test (e.g., on fabrics containing formaldehyde-based finishes)– briefly boil a 03–04 cm^2 fabric specimen in a test tube with 5 ml approximately 2% sulphuric acid in the presence of formaldehyde, formaldehyde vapour escapes during this test and can be easily recognized by its odour. Other preliminary tests can also be carried out with Nessler's solution or Fehling's solution. More precise methods of formaldehyde detection are based on, e.g. chromotropic acid, Schiff's reagent, carbazole-sulphuric acid and xanthydrol.

Formaldhyde resins: Compounds which contain formaldehyde mainly in the form of methylol compounds which may also be etherified, and which are capable of cross-linking reactions (self-crosslinking resins; reactive resins). The term "formaldehyde resin" is mainly understood to refer only to the self-crosslinking resins such as aminoplasts and phenoplasts.

Formaldehyde scavengers: These are substances which are capable of binding formaldehyde. They are used variously in resin finishing, especially

in low formaldehyde finishes, e.g. urea, ethylene urea. In the case of formaldehyde scavengers such as urea, ethylene urea, dicyandiamide and hexamethylenetetramine, adjustment of the pH at the same time is of considerable importance. Hydrazides and carbohydrazides are also recommended, among other products, to reduce the content of free formaldehyde from glyoxal cross-linking agents. Ethylene glycol and diethylene glycol also reduce the release of formaldehyde and do not cause chlorine retention.

Form D process: A formaldehyde finish for cotton in the partially-swollen state (moist cross-linking process) with formaldehyde dissolved in organic solvents in the presence of water.

Form V process (formaldehyde vapour process): A formaldehyde finish for cotton in the gas phase which takes advantage of the fact that pure formaldehyde is a gaseous compound. Formerly, gaseous hydrochloric acid was used as a catalyst.

Form W process (formaldehyde wet process): A formaldehyde finish for cotton in the swollen state (wet cross-linking process). Formaldehyde dissolved in water is allowed to react with cotton in the presence of aqueous hydrochloric acid.

Formasan dyes: Formazan dyes bear a formal resemblance to azo dyes, since they contain an azo group, but have sufficient structural dissimilarities to be considered as a separate class. The most important formazan dyes are the metal complexes, particularly copper complexes, of tetradentate formazans. They are used as reactive dyes for cotton.

Formasul: A trade name for Sodium sulphoxylate formaldehyde.

Formatted piece method: Used to determine edge/centre evenness (tailing; ending) in rotary screen printing. A specified quantity of material is mechanically cut into pieces of exactly the same format. The pieces are weighed, printed on the right or left side or centre of the backing cloth using a non-patterned rotary screen and then re-weighed. The dye paste quantity differences that are measured provide a way of gauging whether the printing mechanism and the screen produce level results.

Formed yarn: See **Plied yarn**.

Formic Acid: HCOOH; An organic *weak acid* Formic acid is commercially often used with acid dyes for wool. It produces a pH lower than that of acetic acid, but higher than that of sulphuric acid. It is a pungent, flammable liquid. Formic acid is not easy for art dyers to procure.

Fota: Thick, strong and durable cotton cloth, made in India; used for garments for native women.

Fougeres: Various linen and canvas cloths made in France as coarse packing canvas or bleached household linen.

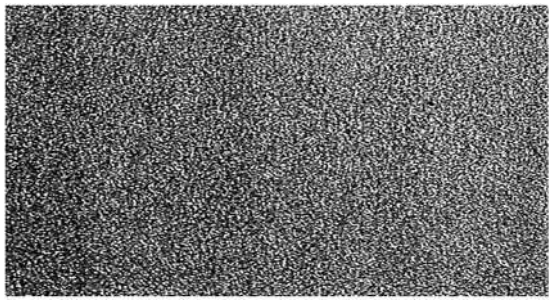
Foulard: A soft, printed, light weight, plain or twill weave fabric, which can be made of silk, acetate, viscose, polyester, or triacetate, very fine cotton, very fine worsted. Made in Twill, two up two down. Very soft and light fabric. Noted for its soft finish and feel. It is usually printed with small figures on a dark or light background. Similar to Surah and Tie silk, but finer. It was originally imported from India. The printed pattern usually take the form of small figures on contrasting background colour. Used for soft-styled dresses and blouses, robes, scarves and men's light dressing gowns, neckwear of all kinds. First made for the handkerchief trade.

Foulard (in designing): Small patterns repeated directly under and across from one another at measured interval. The name comes from the French word for scarf or necktie.

Foulardin: A light, plain woven cotton fabric, starched and highly finished; used for sleeve lining that is made in Austria.

Foulardtherm process: A process developed by Ciba-Geigy for the application of fluorescent brightening agents to polyester; also applicable to polyamide, polyvinyl chloride, acetate and triacetate. Fixation of the fluorescent brightening agent is achieved with hot air (150°C) in the heat-setting zone of stenter driers.

Foule': In French language, the word *fouler* means "milled". A soft, serge-like worsted fabric with a rough, fibrous Melton-like surface. Its characteristic appearance is produced by prewashing and subsequent raising and milling of the face side; the weave (usually a 2 up, 2 down twill) can still be easily recognized on the back side of the fabric. Used as a ladies' dress fabric, either plain-dyed or as coloured checks. Also used for men's outer wear, mostly piece-dyed in black.



Foule

Fouling: Irreversible adsorption of dyestuffs.

Fouling (in effluent treatment): In cross flow filtration, the reduction of flux that is attributed to a build-up of solids on the surface of a membrane.

Foundation garments: The requirements for these materials involve consideration of the following four factors –

(a) easy-care properties
(b) fashion
(c) wearing comfort
(d) functionality

The nature of the chosen finishing route and the selection of finishing products are very much dependent on the above quality standards as well as on the respective substrate (the parameters include, e.g. fabric weight, weave, type of fibre blend). In the case of knit goods for so-called "elastic articles" in the swimwear and sportswear sectors, as well as foundation garments, blends of polyamide filament yarns and polyurethane filaments have established themselves. The dyes normally used are anionic (acid) dyes, disperse dyes, 1:2 metal-complex dyes, reactive disperse dyes, after-chrome dyes.

Four-colour printing: A subtractive printing technique based on the half-tone process with the three primary colours of yellow, magenta and cyan. A fourth printing in black or grey is added to enhance the final result. See ***Trichromatic printing***.

Four-way stretch: A fabric that stretches both on the crosswise and lengthwise grains of the fabric. It is the same as two-way stretch.

Fourre: Another French term for matelassé.

Fox: (1) A reddish- or yellowish-brown; a colour in Winifred Nicholson's 1944 '*Chart of Colours*'.

(2) This is fur fabric, blue-grey, red or silver in colour, the tail is often used as trimming and an interesting effect can be achieved by adding the fur from the paws.

FP (fp): Freezing point.

FPT textiles: American term signifying Fire Proof Textiles. Textile meeting the legal fire prevention regulations in the United States of America.

FR additive: Flame-retardant additive.

FR fibres: Flame-retardant fibres.

FR finishes: Flame-retardant finishing.

Fractional solubility of dyes: A method used to investigate the homogeneity of dyes which is based on the different solubility of individual dyes in various solvent mixtures. The solvents mainly used are water, ethanol, ether, benzene, methanol, carbon tetrachloride, etc., or mixtures such as aniline and amyl alcohol (pentanol) 1:1; ethanol and chloroform 3:2; dichlorohydrin and carbon tetrachloride 1:3.

Fractionated dyeing: Dye uniformity investigation, based on the fact that the dye mixtures can be identified by the different rates at which the individual dyes are absorbed. For example, fresh pieces of material are dyed in succession in a normal dye bath (extremely inaccurate method) for instance for about 1–2 or 15 minutes. After the dye having a quick absorption rate has been fully exhausted, the dye with a slow absorption rate remains and can now also be dyed out separately. The conditions can be varied with regard to temperature, liquor pH, fibre material, etc.

Fragrant finishes: Prepared fragrance complexes. These complexes impart a fragrance for the fabric or garment which has been made out of these finishes. The basic materials are natural or synthetic odours with a characteristic smell of their own (for example, phenyl acetaldehyde and cinnamon alcohol are the odours in hyacinths and cinnamon alcohol or geraniol or nerol are the odours in roses). Additional substances for rounding off a more delicate fragrance are esters, aldehydes and alcohols. Fixing agents reinforce the uniform overall effect, reduce the vaporization pressure of the easily volatile components, slow down evaporation and increase permanence. Modern technology has made finishes which have prolonged fragrance even after many washes, and there are finishes which have been developed to be reloaded with the fragrance during the washing/laundering process.

Frailejon: White or rust coloured woolly fibre taken from the surface of the leaves of the Frailejon in Venezuela, Colombia and Ecuador.

Framboise: The red colour of the raspberry.

Frame: Sheets of pile yarn normally of one colour which are fed to the jacquard loom, i.e. Wilton or Gripper axminster.

Frame tape: A stout, half bleached linen or cotton mixed tape in England.

Frame wheel: The flyer is usually mounted above the wheel, which means less floor space is used. Also called a “castle wheel”.

Frame yarn: Pile yarn in a Wilton-type carpet.

Framework: Knitted fabrics made from horizontally knitted or weft threads in plain, rib or pearl stitches.

Franella: A napped cotton cloth in Paraguay; canton flannel and coloured and printed flannelettes in Chile.

Franneru: Flannelette in Japan.

Fraser: A Highland tartan with a red ground, composed as follows – A group of two dark green (on the outside) and two dark blue stripes (on the inside), separated from each other by narrow red lines; a red field made as wide as the above group and split in the middle by a narrow white line.

Fray: Unravel.

Frayed weft: A weft yarn with broken filaments resulting from abrasion during weft insertion, winding or excessive tension.

Frazadas: Cotton blankets in Latin-American countries.

Free formaldehyde: Free formaldehyde is defined as the uncombined monomeric formaldehyde that exists in finish solutions. Usually, its sources are stoichiometric excesses that may have been included in the resin manufacturing step to drive the reaction and/or the amount arising from the equilibrium established by the particular reactants. Free formaldehyde is determined by suitable analytical titration procedures.

Free liquor: The state of a liquor which is difficult to control under practical conditions, since the "free" volume is always dependent on the type of material/quantity of material. On the other hand, terms such as "short or long liquor" represent definite relationships between liquor volumes – weight of material, i.e. the ***Liquor-to-goods-ratio***.

Free-Radical Copolymerisation: In the free-radical copolymerisation reaction, free-radical initiator, R, is used with monomers Ml and Mu and mixed well for polymerisation. The free-radical R* attacks on M_l and M_2. This is an initiation step as

$$R^*+Ml \rightarrow RM^*_1$$
$$R^*+M2 \rightarrow RM^*_2$$

In the propagation step, the above chain can further attack on MI or M2.

$$RM^*_1 + M_1 \rightarrow RM_1M_1^*$$
$$RM^*_1 + M_2 \rightarrow RM_1M_2^*$$
$$RM^*_2 + M_1 \rightarrow RM_2M_1^*$$
$$RM^*_2 + M_2 \rightarrow RM_2M_2^*$$

Free wools: Usually means wool that is free from defects, such as vegetable matter.

Freezing point: The temperature at which a liquid is in equilibrium with its solid phase at standard pressure and below which the liquid freezes or solidifies. This temperature is always the same for a particular pure liquid and is numerically equal to the melting point of the solid.

French back: It is a cloth with corded twill backing in a weave different from that one used for the face of the cloth, which has a clear finish. The back weave is usually made with a yarn that is inferior to the worsted yarn used for the face of the cloth; often backing is cotton. Weight per yard will be around 15-20 oz. This cloth is seldom used today.

French back serge: See **Serge**.

French beige: A light brown colour.

French blue: A greenish-blue; sometimes a purplish-blue colour.

French cambric: The finest grade of cambric.

French chalk: Talc.

French combing wool: Wools that are intermediate in length between strictly combing and clothing. French combs can handle fine wools from 1.25:2.5 inches in length. Yarns that have been produced with the French combing method are combed dry(without oil added). See **Bradford spinning**. The yarn is softer and loftier than the Bradford (worsted) yarn.

French crêpe: Used for negligees and underwear. It is composed of flat warp yarn and fine voile twisted weft. The voile twist which is comparatively low, adds roundness to the weft yarn. Construction ranges from 92 × 50 to 150 × 104 with 075–150 denier rayon yarn in the warp and weft. Now usually made of polyamide. See **Crepe**.

French facing: The inside facing of a coat, extending around the armholes.

French flannel: Soft and very slightly napped twilled wool fabric, made with stripes, checks or solid colours; used for men's and women's wear.

French foot: Hosiery made with a seam in the middle of the sole.

French green: A yellowish-green colour.

French grey: A bluish-grey colour.

French hem: The French hem is used for table linen. Fold as in an ordinary hem, then fold the hem back on the right side and overhand the edge formed while taking fine stitches. Press the hem flat from the right side.

French knots: French knots are used in connection with other stitches for borders enclosed in outline and chain stitches, in initials, centres of flowers, and as a filling-in stitch. The simplest method is of taking a small back stitch, bringing the thread from the eye of the needle under the point from right to left and drawing the needle perpendicularly from the cloth. Place the needle back of the knot and bring the point out in the place where the next knot is to be made. The size of the thread will determine the size of the knot.

French navy: A shade of navy.

French ochre: An orange-yellow colour.

French pink: A pale yellow. See **English pink**.

French purple: A purple dye, very popular in the 1850's, made from lichens and instrumental in giving rise to the word 'mauve' which moved from describing the dye to designating the colour of the dye. See **Mauve**.

French seam: (1) A complex seam formed on the inside of the object with both raw edges enclosed and no stitching rows visible on the face side. A French seam is sewed twice—first on the right side as near the raw edge as possible. Cut off all frayed edges, turn the material by folding *on the seam* or line of sewing, so the seam is folded inside and the second sewing is on the wrong side below the raw edges. This is not a good seam for underwear worn next the body, as it leaves a ridge on the wrong side, but it is useful for skirts of thin material, etc. It is more easily made than a fell.

(2) A seam in which two pieces of material are superimposed, stitched together and the folded over and stitched again to cancel the edges, thus producing a flat folded seam with only one row of stitching visible.

French serge: A very superior quality serge used for women's tailored clothes.

French ultramarine: See **Ultramarine**.

French system: French system used in spinning worsted yarns. The wool is combed dry, the sliver is drawn between rolls, but the fibres are parallel and not twisted until the actual spinning. The yarn is not as smooth as that made according to the Bradford system.

French yellow: A yellowish- or orange-brown colour.

Frequency distribution (of a sample): A table giving for each value of a discrete variate, or for each group of values of a continuous variate, the corresponding number of observations.

Frequency distribution (of a population): A function that, for a specific type of distribution, given for each value of a random discrete variate, or each group of values of a random continuous variate, the corresponding probability of occurrence.

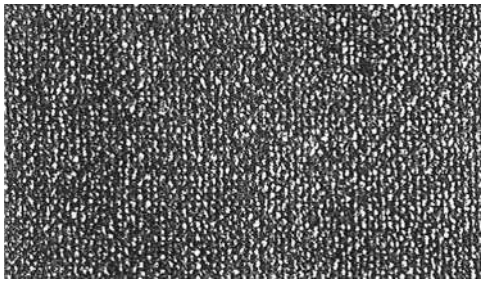
Fresco (Ital.: **fresco = fresh, new)**: (1) (a) *Fresco twist yarn* – high-twist, 2 to 6-fold yarn, composed of relatively fine individual yarns, produced by multiple twisting stages.

(b) *Fresco fabric* – light-weight, worsted or woollen fabrics, in plain weave, woven with the twist yarn of the same name; relatively harsh, slippery handle

(due to the high twist), open set; usually yarn dyed, but also piece dyed. The special attribute is the high air permeability and considerable resistance to creasing. A distinction is made between:

(i) Fine worsted frescos (Tropicals), 220–330 g/m^2; all-wool or mixed with polyester (55%); smooth finish.

(ii) Woollen frescos (Fresco imitations), not as fine, approximately 500 g/m^2, usually only made from 2-fold yarn in crossbred wool; clear finish. Used for summer suits and dresses.



Fresco

(2) An orange-red colour.

Fribs: Short second cuts of wool from merino fleece.

Fribby wool: Wool containing an excessive amount of second cuts and/or sweat locks.

Friction: The resistance to the relative motion of one body sliding, rolling, or flowing over another body with which it is in contact.

Friction calendars: In the treatment of cotton fabrics, the gloss finish imparted by calendar bowls rotating at the same speed only is insufficient to achieve a high surface glaze with a greater closing of the yarns. For this purpose, friction calendars are used in which a highly polished chromium-plated steel bowl travels at a higher circumferential speed than the fabric itself, so that the fabric receives a lower or higher degree of glazing depending on the preselected advance speed (friction) of the calendar bowl.

Friction calendar compactors: A method of compacting fabrics with calendar rolls. The fabric passes between two metal cylinders, one cylinder rotates faster than the other. The fabric is restrained by shoes that are positioned against the cylinders. The fabric delivery cylinder rotates faster than the take-off cylinder and the action is similar to stuffing a string into a straw. The friction causes filling yarns to move closer together and a loss of fabric length.

Friction calendaring: As the name implies, friction calendars apply a friction force to the face of the fabric. This is done by driving the pattern roll faster than the support bowl. Friction is created by speed differentials ranging from 5% to 100%, so it is necessary to have a strong fabric to withstand the strains. The process of friction produces a high degree of lustre on one side and the final effect is similar to ironing with a hot iron.

Friction marks: These defects are formed, e.g. in the dyebath by friction between the surface of a fabric and the walls of the dyeing vessel and/or other hard surfaces. Fabrics of acetate and silk are particularly susceptible to this kind of defect. Appearance of affected areas: darker, matt and roughened surface, fabric surface bulges on one side; often accompanied by tears and holes. Individual fibres exhibit pressure marks. Some improvement may be possible by rubbing the affected areas with a paraffin-gasoline solution.

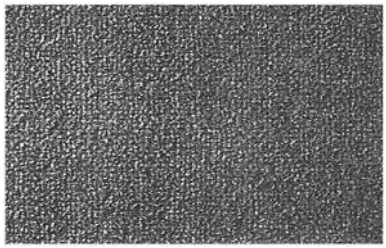
Friction spinning: In friction spinning, twist is inserted into the yarn by a rolling action due to frictional forces generated between, for example, two perforated rollers and the yarn surface, it being relatively easy to produce core-spun yarns by introducing a filament yarn which is then wrapped by a sheath of staple fibres. Friction spinning can also be classified under the broad category of 'open-end spinning', since the sliver feed is 'broken' (i.e. discontinuous) prior to yarn formation (twist insertion). Friction spun yarn are weaker and more twist lively than other yarns, although plying can reduce these drawbacks.

Friction texturizing: Texturing method in which appropriate over twist is applied to the running thread using overlapping friction discs (torsion discs, friction discs). The required false twist is achieved by subsequent counter twisting and twist setting. Up to 1960, a rigidly mounted spindle with axial drive was used (friction elements). As entirely uniform, reproducible speeds could not be obtained, spring-mounted magnetic spindles are now used (instead of rigidly mounted friction components).

Frictional constraint: The force imposed by the multitude of fibre to fibre contacts within a fabric.

Frise: (1) Made of rayon, most popular, also mohair and silk, and synthetics. The ground or backing yarns are usually made of cotton. Sometimes jute or hemp are combined with cotton. Made usually with uncut loops in all-over pattern. It is sometimes patterned by shearing the loops at different lengths. A few are made with both cut and uncut loops in the form of a pattern. *Uses*: Upholstery, also used widely as transportation fabric by railroads, buses, and airplanes. Frise is also spelled Frieze, but frieze really refers to a rough, fuzzy, rizzy, boardy woollen over-coating fabric which originated in Friesland

Holland. Often used for over-coating material for soldiers. Much alteration is given to the cloth. Irish frieze is quite popular and more reliable and is called "cothamore".



(2) Surface with curls or fine loops, made from boucle' yarns.

(3) (a) Originally the finest grade of linen made in Friesland, Holland; (b) A French term meaning "curled"; (c) A coarse ratiné fabric made with slub yarns in a plain weave; (d) A looped pile fabric, usually of uncut loops which may be cut at various heights to provide a pattern; (e) A coarse, stout, cotton or linen fabric made in a plain weave with a flat, wiry texture and a pronounced rib; (f) This term is sometimes used for terry or bouclé fabrics; (g) Light patches occurring in viscose crepe in the warp direction consisting of flat, deformed, viscose capillaries, that are in fact dyed but reflect much more light because of their flat shape. Visible under the microscope as short, thin, and apparently white capillaries that can be proven to originate from the feedstock and can no longer be rectified. These patches are created during the viscose spinning process and appear to be due to some kind of local stretching.

Frieze: (1) A heavy woollen fabric made out of shoddy and other recycled wool, originally used for servicemen's overcoats. Cloth weight ranges from 22 to 30 oz. per yard and a common stock may be 67% of wool and 33% of shoddy and recycled wool.

(2) (a) Hand-knitting and craft yarns with brushed woolly finish; (b) Soft, thick, woollen fabric in plain or twill weave, can also be double cloth with two warp and weft systems, generally with pepper-and-salt effect on face and checked on reverse. Mossy thick hairy nap, either heavily raised on both sides or lightly raised on reverse only. Friezé cloth is similar to velour, but with rougher longer nap. Distinction may be made between randomized nap (with non-directional lay) and brushed nap (with directional lay). Used for ladies winter skirts, jackets and coats; (c) Thick and soft woollen material with raised and laid nap (milled and raised) or may be closely cropped.

Frieze Flannel: Heavy and twilled flannel that is made of cotton and wool in mixture effect.

Friezing: A process used for the production of local patterning on a pile fabric where the pile has usually been formed by raising. The fabric passes between a fixed friezing bed and a moving friezing plate mounted above it which is clothed with sandpaper, plush, cloth or rubber.

Fringe: (a) An edging or border of loose threads, tassels or loops. The edging or border may be produced by the constituent threads or by threads added to a fabric after weaving or knitting. (b) A trimming (narrow fabric) that has, on one or both edges, cut or looped weft threads that form a decorative edge, and that are sometimes bunched or knotted together to increase the decorative effect.

Note: (a) Tassels, balls or other adornments may be added. (b) The part of the fringe comprising both warp and weft is known as the heading. (c) The part of the fringe containing only weft is known as the skirt.

Friquette: A machine-made lace, having fine and clear meshes and made of fine thread. It is made as a veil and also embroidered in a light flower design along the edge.

Frise carpet: A cut pile carpet of twisted yarns in solid colour or produced with various-coloured yarns. According to few standards, a carpet with alternating closed and cut loops.

Frisette: Fine fabric of which the face is covered with small loops and is made of cotton and wool in Holland.

Frison (silk); Flock silk (Bourette): The first silk waste obtained in the course of cocoon preparation for reeling by agitation in a water bath.

Frisonette: A low grade of frison.

Frisons, Kibisu, Knubbs, Strussa: The first waste obtained in the process of reeling cocoons. It is composed of a tangled leading end of the filament that is removed before it begins to reel properly.

Frisure: (a) Core thread with a gold or silver thread wound around; used in passementeries; (b) Thin gold or silver wire braid for military uniforms.

Frizzing: Name for the chinchilla finishing process in England.

Frog: Ornamental facings, made of braid for uniforms, pyjamas, etc.

Front (stitched down): A front that has a double-turned hem that is stitched down full length of the front. The term may also refer to the shell (outside) front of self-goods.

Front falls: Trousers, not made with a single fly opening, but with a wide front flap, buttoning on both sides.

Front high-hip (in body measurements): The distance from one imaginary side seam to another imaginary side seam at the high-hip level.

Front loading washing machine (Front loading washer): Cylinder washing machine with a one-piece internal cylinder that is supported at one end and has a loading/unloading opening at the front end, usually with a transparent door made from heat-resistant safety glass. Capacity is 08–50 kg of dry material.

Front notch (in sleeves): One notch on front of the sleeve seam line to mark match point.

Front rest: Weaving technology term. See **Cloth fell**.

Front-break point (in anatomy): The location on the front of the body where the arm separates from the body.

Frosted wool process: A process for the degreasing and removal of all impurities from raw wool by cooling to –10 to –17°C, followed by beating to break off the solidified brittle foreign matter (grease, burrs, sand, etc.). Burrs become so brittle in this treatment that they are easily pulverized by attrition.

Frosting: (1) A change in colour in a limited area of a fabric caused by abrasive wear.

(2) (a) Sandwich effects in dyeing; (b) Whitish sheen on carpets containing wool and

polyamide pile that have been continuously dyed by the pad-steam process. When the padded carpet enters the steamer, condensing steam rinses dye liquor from the tips of the pile; thus, giving it a whitish appearance. A remedial measure is to add film and foam-forming agents to the padding liquor. Foam pushes the dye liquor back towards the tips of the pile and thus, compensating for the loss of dye.

Frosting in carpet printing (tippiness): Rather than remaining uniformly distributed along the individual pile fibres, in the printing of carpets (especially those with a high pile) the print paste may flow from the tips of the pile towards the carpet backing before the dye fixation stage. This results in a depletion of dye at the tips of the pile, i.e. frosting.

Frotte': Imitation terry made with loop yarns.

Froth dyeing: A variant of foam dyeing. *Principle* – The process is carried out in an open vat as the dyeing vessel. Foam is produced by the vigorous boiling of a dye liquor containing soap or other high-foaming detergent. The dye liquor occupies approximately 20% of the dye vessel volume, and the material is dyed by suspension in the foam above the dye liquor.

Froth flotation (flotation): An industrial technique for separating the required parts of ores from unwanted gangue. The mineral is pulverized and

mixed with water, to which a frothing agent is added. The mixture is aerated, after which particles of one constituent are carried to the surface by reactions and as a result of chemical decomposition at high temperatures. Free radicals are extremely reactive and can be stabilized and isolated only under special bubbles of air, which adhere to it preferentially. The froth is then skimmed off. Various additives are also used to modify the surface properties of the mineral particles (e.g., to increase the adherence of air bubbles). Some effluent treatment plants use this method to separate precipitated matters from the treated effluent.

Frotte': French word for towelling.

Frotté: Name for (a) *Yarn*: 5–7 fold-effect twist yarn in form of knop yarn, loop yarn, in cotton, viscose, wool (woollen spun); (b) Plain-weave fabric with smooth warp and knop yarn weft, irregular, contoured surface; brushed, rough finish. Sold as piece goods or by the metre; also used in outerwear.

Frotté/Bouclé: A drape fabric. Frotté and bouclé-fabrics are produced with loose yarn which have nap-, bow- or loop- effects. For this reason, a structured fabric is created with small loops or naps. All fibres can be used. Frotté should not be confused with towelling cloth, where the loops through the weave are built up by a third thread.

Frowzy wool: A waste, lifeless-appearing, dry, harsh wool, lacking in character.

Fruit fibres: Fibres of the coconut fibre type.

FSDC: Fellow of the Society of Dyers and Colourists, Bradford, United Kingdom, Professional qualification.

FSW: Forschungsstelle Wäscherei (Laundry Research Unit), Hohenstein.

FTC: (a) Federal Trade Commission. A United States government customer protection agency which, amongst other activities, has been responsible for the definitions of most of the internationally valid manmade fibre classifications; (b) Fastness Tests Commission.

FTCC: Fastness Test Coordinating Commission, the British Fastness Tests Commission.

FTI: Fellow of the Textile Institute, Manchester, United Kingdom, Professional qualification.

FTU: Formazine Turbidity Units. A measure of turbidity – by a nephelometer.

Fuchsia: Purplish-red colour, as in the fuchsia flower, named after the German biologist Leonard Fuchs (1501–1566). According to a MORI poll referred to

on BBC television on 23rd September, 1998, fuchsia (with white and grey colour) are the most unpopular colours in the United Kingdom.

Fuchsia pink: A purplish-pink colour.

Fuchsin B: A cationic dye used *inter alia* as a special indicator for anionic substances: aqueous. Fuchsin solution + anionic solution = colour change from red to cornflower blue.

Fud: Waste of the wool carding machine; used after mixing with shoddy.

Fuel gas: Natural gas; Liquefied gas.

Fuel oil: Liquid fuel, mainly from mineral oil processing. Production and use almost exclusively restricted to EL fuel oil (extra light) which is mainly used for space heating and is also used for heating processes in commerce and industry, and S fuel oil (heavy), which is the preferred fuel for most industrial heating processes. L fuel oil (light) and M fuel oil (medium heavy) are the exclusive products of tar oil processing and only play a quantitatively minor role.

Fugitive colours: Dyes that fade, especially those that lose colour relatively quickly when exposed to natural light.

Fukuji: Hand-woven Japanese cotton goods, made both in plain and twill weave, usually like a fine duck, ply yarns being used; police and schoolboys' uniforms are made of this material.

Fukusa: A square piece of silk, often richly embroidered or decorated; used in Japan to cover boxes containing presents.

Fuligin- (L): Sooty.

Full bath treatment: A dyeing process carried out at a long liquor ratio by Exhaust dyeing, in contrast to the Foulardtherm process. See **Foulardtherm process.**

Full bottom wig: High, long and curly wig for men.

Full box: Trade term for a very loose effect in overcoats.

Full cover print: A printed design which covers the entire surface of a textile fabric.

Full depth shade in printing: The maximum depth of shade which can be achieved with a normally engraved screen or printing roller.

Full-dress: Black "claw-hammer" coat, low cut vest and trousers to match.

Full gauze: Weave having the warps cross other warps in both directions.

Full penetration in dyeing: The full penetration dyeing of fibres or textile materials occurs when a completely uniform distribution and penetration of

the fibre occurs, i.e. when the interior of individual fibres is fully penetrated (not ring-dyed) and when the closely packed fibre material in slivers are completely dyed.

Full regular: Hosiery and underwear having hand-knitted seams.

Full set: A term that indicates that all guide eyes in a guide bar each have a yam from the warp.

Full-toned: A colour with an intense hue.

Full (to): To treat or beat cloth for the purpose of cleansing and thickening it.

Full-bust girth: See **Bust girth**.

Full-cut: Not tapered.

Fulled: Woollen fabric which is napped and then felted or made thicker and more compact by shrinking.

Fullers earth: Impure clay (refined and pulverized) with a greyish-green to yellowish-brown colour and a greasy feel, often of variable composition (e.g. 11–18% aluminium oxide, 44–42% silica, 5–4% lime, 2% magnesia, 10–6% iron oxide, 5% sodium carbonate, 3% water). *Uses*: after-washing and milling of woollen materials which have been washed in soap (especially for fine cloths, white and semi-coloured flannel, woollen blankets, etc.).

Fulling: The operation of shrinking and felting a woollen fabric to make it thicker and denser. Also called “milling”. One can also full woollen yarn to produce a lovely knitting yarn (If one is going to weave with the same yarn, wait until the fabric has been woven).

Fulling agent: A chemical, usually a surfactant, that acts as a lubricant during the process of fulling.

Fulv- (L): Tawny.

Fulvid: Reddish-yellow, tawny, yellowish-grey or yellowish-brown colour.

Fully fashioned: A term used for knit goods produced on a flat-knitting machine that have been shaped by adding or reducing stitches. The material has ribbed edges (not cut) as it leaves the knitting machine. Fully fashioned flat-knitted materials are referred to as true to shape articles. Fully fashioned knit goods are used, e.g., for socks, stockings, tights, underwear, outerwear, pullovers, etc. Fully fashioned fabrics are the opposite of ***Cut fabric***.

Fully fashioned dyeing: Garment dyeing.

Fully fashioned knitwear: Knitwear from garment pieces shaped (fashioned) on the knitting machine to the correct size and shape required.

Fully-washable textiles: Finished textiles which can be washed in a washing machine without excessive shrinkage, creasing or other significant deterioration in quality. The term is particularly applicable to blend fabrics of polyester/cotton or polyester/acrylic (Machine-washable wool; Easy-care finishes).

Fulpat: Commercial term in India for weak and gummy, immature jute fibre, cut before flowering; it has a good colour.

Function: A mathematical expression describing the relation between variables; an expression having a definite value, or values, when special values are assigned to other quantities called the arguments, or independent variables of the function.

Functional clothing: Clothing that is designed to be light, comfortable, pleasant to wear and easy-care; e.g., Active wear; sportswear.

Fundamental units: The base units of a measurement system, especially those that deal with force and motion. In most systems, these are the units for length, mass, and time, plus at least one electrical unit. The fundamental units in the SI are considered to be the meter, the kilogram, the second, and the ampere.

Fungicidal finishes: These finishes are applied especially to textiles which frequently come into contact with the ground, soil, wind and weather, such as tenting, truck tarpaulins, fire hoses, etc. Suitable preservatives for such articles include, in particular, organic acid salts of zinc, copper, and mercury, phenols, chlorophenols, anilides of aromatic acids, sodium salts of chlorocresols, chloroxylenols, tri and pentachlorophenols, copper salts of cellulose glycollic acid, as well as quaternary ammonium bases, etc.

Fungicide: The material which kills fungi.

Fungistat: Material which inhibits fungal growth.

Funiculi: Plural of funiculus.

Funiculus: The slender stalk of an ovule or seed by which a growing seed is attached to the placenta of the boll.

Fur: It refers to Animal fibres.

Fur and leather cleaning: Garment cleaning terms; (a) *Fur cleaning* – non-liquid cleaning or drum with dry particle compound and fur glazing or fur ironing; (b) *Leather cleaning* – special leather care methods are required on suede, leather and plastic goods.

Fur beaver: A long napped cloth imitation fur.

Fur dyes: Metallizable types. These dyes are applied on the same principle as metallizable wool dyes and produce fast dyeing on fur skins by brushing

or dipping. The classical dyeing technique is based mainly on the application of aromatic amine bases at a temperature of 30°C from which dyes are synthesized on the fur hairs by oxidation (probably by a process analogous to Aniline black) and fixed with the aid of metal mordants. Appropriate azo dyes capable of exhausting on to mordants are also used in fur dyeing.

Fur fabric: See **Plush**.

Fur finishing: The finishing of fur materials covers all the processes and technical operations which affect the original character of the fur. These changes are mainly concerned with the fur's natural colouring.

Furnisher roller (colour furnisher roller): Used in roller printing to supply the engraved printing roller with print paste from the colour box in which it rotates. Both brush furnisher rollers and smooth rubber-coated rollers are used. See **Brush furnisher roller**.

Furnishing fabric: Collective term for printed, plain-dyed or jacquard-woven textile fabrics for room decoration purposes, e.g. upholstery fabrics, curtains, drapes, etc. Dyes with very high colour fastness to light are required for these applications.

Furniture covering: A general term for attached upholstery fabric, slipcovers and throws.

Furniture cord: Two pairs of case cord and two grimp cords, the four components being twisted together.

Furniture unit (in upholstered furniture): A complete single piece of upholstered seating, such as a sofa, love seat, lounge chair, rocker, or recliner.

Fuscescent: Having a dark brownish colour.

Fuschia: A bluish-red colour named after a flower which is named after Herr Fuchs. See **Magenta**.

Fusco-piceous: Reddish-black colour.

Fusco-testaceous: A reddish-brown colour.

Fuscous: Brown, dingy, dark, sombre; also a brownish-grey colour.

Fused bonded non-woven: Bonded fabrics which have been bonded, e.g. through the loops of the warp threads with a thermoplastic compound.

Fused collar fabric: See **Fusible fabric, Fusible interlining**.

Fused fabric: A type of bonded fabric made by adhering a single fusible fabric to another fabric, such as for use in an interlining.

Fusible fabric: A utilitarian fabric which has a thermoplastic adhesive applied to one side, sometimes in a pattern of dots, so that the surface can be bonded to another fabric surface by the use of heat and pressure.

Fusible fibres: These are used in the form of fibres, threads and monofilaments to achieve adhesive-free consolidation/permanent bonding of textile fabrics. After thermal fusion with the aid of an ironing press, hot air, etc., the cohesive strength is intense and permanent. Fusible fibres are of particular interest for non-woven, textile floorcoverings and in the making-up of garments. See **Binder fibres**.

Fusible interlining: Interlining produced with a fusible adhesive coating by the powder-dot process.

Fusible seaming: A textile bonding technique in which fabrics are joined by fusion of the thermoplastic fibres in the fabric or a thermoplastic resin that has been applied to the fabric.

Fusible web: It is a special fabric used to bind two pieces of fabric together. The fusible web is placed between the two fabrics and ironed to adhere the fabrics together.

Fusing: The process of adhering the fusible fabric to another applying heat, pressure or both.

Fusion bonded: A method of creating carpet pile construction by adhering loops or lengths of yarn to the face of primary backing.

Fussy cut (in sewing): It is when you cut a piece of fabric for a quilt so that a feature of the print is on the centre of the piece.

Fustian: (1) A general term used to describe a group of cotton fabrics, usually heavily wafted, raised on one or both sides and produced in various weaves, e.g. twill fustian, satin fustian, corduroy fustian. The description also refers to the end-use, e.g. bed-fustian, lining fustian, dress fustian.

(2) An old Egyptian cotton or linen fabric, supposed to date from Roman times. Fustian is now used to describe a range of cotton fabric including pile fabrics.

(3) (a) Medieval stout and heavy worsted fabric produced in England; (b) In the I5th century, a printed fabric, made with linen warp and cotton tilling, produced in England; (c) A variety of closely woven and heavy cotton fabrics, being either cut pile goods or having a stout weft face. They are woven with one set of warp and two sets of filling. They are known as velveteen, swansdown, moleskin, beaverteen, canton, or diagonal corduroy and imperial. They are mostly used for clothes.

Fustic: (a) Brazil wood, Cuba wood, fustic wood – tropical dyewoods; hard, solid, light yellow or pale lemon-yellow, turning darker with age. Available commercially in block form, rasping and powder; (b) Yellow dyes of the flavone type.

Futahaba: Kanakin grey shirting in Japan, made about 30 inches wide; used also for printing.

Futako: Trade term in Japan for striped cotton fabrics (used mostly for kimonos), made with ply warp.

Fuzz: A term analogous to lint, used mainly to describe small hair, fibres, etc., projecting from, or lying on, the surface of a textile fabric.

Fuzz ball: Loose and frayed fibres which have formed into a ball and have then been woven or knitted into the fabric.

Fuzzy: Characterised by hairy appearance due to broken fibres or filaments.

Fuzzy gout: A gout is also called fuzzy gout because it is formed due to the entanglement of fuzz during weaving.

FWA: Fluorescent whitening agent (Fluorescent brightening agents).

Fyrol 76: It is an oligomeric phosphonate containing vinyl groups. The finish is applied with N-methylol acrylamide with a free radical initiator (potassium persulphate), dried and cured.

G

G: Symbol for giga, i.e. 10^9. A prefix used in the metric system to denote one thousand million times, e.g. 10^9 joules = 1 gigajoule (GJ).

g: Symbol for gram, a metric unit of mass equal to one thousandth of a kilogram.

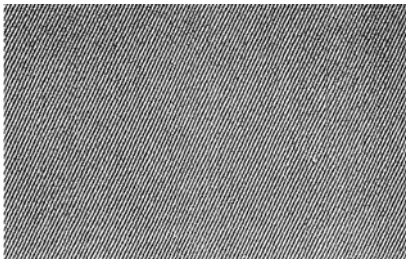
1 g = the weight of 1 cm^3 of water at + 4°C.

1 cm^3 = 1 g = 1000 mg.

1000 cm^3 = 1 l = 1 kg (of water).

1000 l = 1 m^3 = 1000 kg = 1 t.

Gabardine: The word gabardine (alternative spelling in United Kingdom = gaberdine) is a collective term for certain woven fabrics and also describes a type of woven pattern. Gabardine is generally a fine, tightly woven, warp-faced fabric, and is one of the most popular apparel fabrics. The warp density is generally considerably greater than the weft density and the diagonal cord or rib with characteristic distinct steep twill line caused by a construction that has many more ends than picks per inch, closely set, and raised. A characteristic texture is 100 × 50 with 18s yarn in the warp and weft. Fairly hard twisted yarns are used so that the face of the fabric may be clear. Long floats make the diagonal lines, and there are short floats between the wales. This effect is often accentuated by singeing. The fabric is light weight and due to the close weave and steep slope of the rib, gabardine (especially gabardine worsted) is amazingly water repellent. Other fibres used include cotton, viscose, wool, silk, polyester and cotton. Tightly woven cotton gabardine after waterproof finish is sometimes used for raincoats. An inexpensive gabardine can be made of 88 × 44 with a 2/1 twill weave. Used for outerwear, including raincoats, anoraks and trousers and for women's skirts, and suits. It is very hard wearing.



Gaberdine: Basically same as Gabardine. A firm twill fabric (e.g., with worsted warp and cotton weft) with warp predominating in the surface; used for dress and suiting cloths and light shower proof over coatings. All cotton gaberdine is also used for similar garments. E.g., This may be made of 24s worsted warp and weft with a 100 × 56 with 3/2, 63 degree twill weave. The best worsted gabardine is a rugged fabric made of ply yarn. Made in a 2/2 twill, the cloth may have a construction of 100 × 50 with 2/40s high twist worsted warp and weft.

Gaberum: An Indian cotton fabric, made with check patterns.

GAC: Granular Activated Carbon.

GAC filter: See **Activated carbon filter**.

Gajj: Indian satin of high finish; used for dresses by the native women.

Gage: See **Gauge**.

Gaiting (in warp knitting): The setting of a guide bar one or more needle spaces to the right or left in order to increase the pattern possibilities.

Gaiting (interlock): The opposed alignment of one set of needles with the other on a knitting machine.

Gaiting (in warp knitting): The setting of a guide bar one or more needle spaces to the right or left in order to increase the pattern possibilities.

Gaiting (purl): The opposed alignment of tricks of two needle beds lying in the same pane on a machine equipped with double-headed needles.

Gaiting (rib): The alternate alignment of one set of needles with the other on a machine equipped with two sets of needles arranged to knit rib fabric.

Gala: Coarse cotton cloth; used for servants' clothes in Scotland.

Galanga gum: A medium quality grade of Senegal gum.

Galatea: A cotton fabric in twill weave, made plain, or simple stripe patterns, for nurses' uniforms, children's clothes and linings. It is given a hard lustrous finish which repels dirt.

Galb- (L): Yellow.

Galettame: See **Bassine**.

Galettame (Italian): Waste silk, obtained from the inner skin of the cocoon, which is left over after the reeling process.

Galette: Pierced, fuzzy or very thin cocoons; used for waste silk; also, the silk made of such cocoons.

Galettes: Lustrous silk taffeta produced in France, made of hard twist silk waste.

Galiclia: Pile cotton carpet, made in India.

Gallini: Egyptian cotton derived from the Sea island, having a very strong, long staple of light golden colour.

Gallipoli: Sort of raw cotton grown in Southern Italy.

Gallon (gal): (1) A traditional unit of liquid volume, derived from the Roman *galeta*, which originally meant a pailfull. Gallons of various sizes have been used in Europe ever since Roman times. In the United States, the liquid gallon is legally defined as exactly 231 cubic inches; this is equal to the old English **wine gallon**, which originated in medieval times but was not standardized until 1707, during the reign of Queen Anne. A few scholars believe the wine gallon was originally designed to hold 8 troy pounds of wine. The United States gallon holds 4 liquid quarts or exactly 3.785 411 784 litres; a United States gallon of water weighs about 8.33 pounds. American colonists were also familiar with the Elizabethan **beer and ale gallon**, which held 282 cubic inches (4.621 litres).

(2) A historic British unit of dry volume still used implicitly in the United States of America. In the United States, the term "gallon" is not used in dry measure, but if it were it would be equal to ½ peck, or 4 dry quarts, or 268.8025 cubic inches, or approximately 4.404 884 litres. This unit is the English **corn** or **grain gallon**, standardized during the reign of Elizabeth I in the 16th Century. The earliest official definition of a dry gallon in Britain is a 1303 proclamation of Edward I, where the gallon is defined as the volume of 8 pounds of wheat; the current U.S. "gallon" contains about 7.5 pounds of wheat. Grain gallons have tended to be larger than liquid gallons throughout the history of British units, apparently because they were based on heaped rather than "struck" (levelled) containers. A container in which grain has been heaped above the top will hold as much as 25% more grain, and the traditional corn gallon is in fact 16.4% larger than the wine gallon

(3) Currently the British use a gallon larger than either of the two American gallons. The Imperial Weights and Measures Act of 1824 established a new unit for all volumes, liquid or dry, replacing all the other gallons in previous use in Britain. The **imperial gallon**, designed to contain exactly 10 pounds of distilled water under precisely defined conditions, holds exactly 4.54609 litres or approximately 277.4194 cubic inches. The imperial gallon equals 1.20095 US liquid gallons (British wine gallons) or 1.03206 US dry gallons (British corn gallons).

(4) A traditional unit of volume in Scotland equals to 4 Scots quarts. This is almost exactly 3 British imperial gallons, 3.6 US liquid gallons, or 13.63 litres.

Gallon (imperial): In Britain and Canada, a gallon is approximately 4.55 litres. An imperial gallon of water weighs approximately 10 pounds.

Gallon (USA): In the USA, a gallon is approximately 3.79 litres. A US gallon of water weighs approximately 8.3 pounds.

Galloon: (1) Narrow tape or binding of cotton, wool or silk, showing usually fancy weave; used for trimming dresses, uniforms, also for lacing. The English widths are: Two penny, four penny, sixpenny, eight penny, and ten penny, the old penny pieces having been taken as gauge.

(2) A narrow band of cord, embroidery, braid, etc., used as a decorative trimming. See **Braid**.

Galloon lace: Any lace fabric with a finished scalloped edge on both sides.

Galvano screen: See **Rotary screens for screen printing**.

Galway: (a) Coarse, thick, scarlet coating, made in Ireland of Irish wools; (b) Also, a thick and coarse red flannel.

Gambiei: A fast brown dye, obtained from the leaves, flowers and wood of various acacia trees in India, marketed as a dark coloured paste.

Gambier: A Chinese textile speciality consisting of deep black clothing suitable for everyday use, made from non-degummed, heavily-weighted butterfly silk (lightweight base fabric, plain weave) glaze-calendered on one or both sides (with polished stone rollers). Highly resistant to wear (washable, suitable for dry cleaning). The deep black is produced by piece dyeing with a reaction product from a gambier-like tanning substance (juice of the so-called kaki fruit) and a river sludge containing iron.

Gamboge/camboge: A strong yellow; reddish-yellow colour. A yellow resin pigment originating from Cambodia and used in England from the beginning of the 17th century. Replaced in 1851 by **Aureolin**.

Gambroon: (a) Strong, light and twilled union linen or union worsted; used for summer garments; a men's over coating, called G., originated in England in the 19th century; made with ply yarn, composed of cotton and worsted strands; (b) A twilled linen lining.

Gamelotte: Fibre yielded by the 'Fim bristylis complanata' in Sri Lanka; used for ropes and cordage.

Gamma cellulose: One of the three forms of cellulose. With beta cellulose it is called hemicellulose. See **Alpha Cellulose and Beta Cellulose**.

Gamut: A term used in the dyeing and finishing industry for colour scale or palette (e.g. dye ranges illustrated in pattern cards).

Ganse: French for round or ridged soutache, or braid of silk, gold or silver.

Gantt chart: Simple horizontal bar chart that graphically displays the time relationships of the stages in a project. Each step in the project is represented by a line or block spaced on the chart in the time period in which it is to be undertaken. When completed, the Gantt chart shows the flow of activities in a sequence, as well as those that can be under way at the same time.

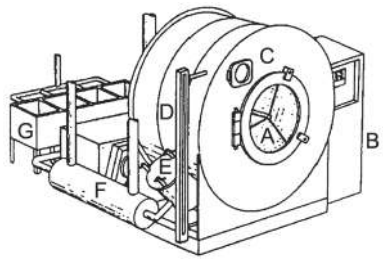
Garber: Commercial variety of upland American cotton from Alabama, the staple measuring 18-22 millimetres; the yield is about 34%.

Garden carpets: Oriental carpets with designs representing gardens, e.g. the garden carpet of Chosroes, a Persian carpet of the Sassanid dynasty (AD 224–641) in which the whole design depicts a garden in springtime.

Gare: Glossy and hair-like fibres grown on the legs of the sheep; they look and behave like kemp.

Garment blank: Panel of fabric knitted for cut and sewn knitwear production.

Garment dyeing (fully fashioned dyeing): For garment dyeing, textile material passes through all stages of manufacturing (with the exception of dyeing) up to the completed garment stage in order that garments can be stored and dyed in appropriate shades on demand. The dyeing of completed garments in the greige state has become increasingly important in recent years, especially in the leisurewear and sportswear sectors. Because of the reduction in lead times between garment dyeing and traditional dyeing methods (e.g. 4/5 days compared to 2/3 weeks), the dyeing of ready-made garments has proved so successful that the market place now has a tremendous demand for leisurewear and casualwear garments produced by the garment dyeing route, and these types of garments are very much colour and fashion orientated.



A garment dyeing machine

Garment leather: Leather manufactured from skins and hides subjected to various tanning and dressing treatments suitable for the production of leather garments of all kinds.

Garment manufacturing: A term for the standard production of garments, garment pieces and various items of clothing.

Garment-making accessories: These include all the various items necessary to produce a completed garment, e.g. underarm pads, interlinings, linings, belts, buttons, sewing thread, zip fasteners (zip fastener tapes), buckles, shoulder pads, edgings, stiffeners, waddings, etc.

Garment making technology: Even though the normal garment making involves cutting, arranging, pre-fabrication, intermediate ironing, assembling, final ironing, press finishing, this process-related sequence is not suitable for discerning technological trends in manufacturing technology. Accordingly, it may be better to subdivide it into the following production terms:

(a) *Original forming* – injection moulding, e.g. buttons, creation of endless threads (polymer shape forming).
(b) *Re-shaping* – ironing, styling, shape fixing, hot forming, knitting to shape, etc.
(c) *Separating* – cutting, stamping, pinking and weldstamping.
(d) *Joining* – sewing, fixing, gluing, welding, riveting, tacking and clipping.
(e) *Changing the material characteristics* – heating, steaming, drying and cooling.
(f) *Coating* – printing, applying adhesive.

A precise study of this system shows that a manufacturing process changes the work piece in order to achieve a certain state and a certain appearance. As a rule, tools and machines are necessary for this. Through mechanisation, automation and control, the individual elements are linked together, in conjunction with planning and organisation, to form garment technology.

Garment steamer: A steaming unit for garments; usually on steaming dummies.

Garment twist: A rotation, usually lateral, between different panels of a garment resulting from the release of latent stresses during laundering of the woven or knitted fabric forming the garment. Twist may also be referred to as torque or spirality.

Garnetted yarn: A yarn that has little bits ("garnets") of other fibres carded in. Usually the garnets are of a different colour, but they can also be from a different fibre.

Garnetting: A process for reducing various textile waste materials to fibre by passing them through a machine called a garnett that is similar to a card.

Garniture: French word for trimming.

Garter-blue: The blue colour of the ribbon of the Knights of the Garter. A dark blue shade though previously light blue colour.

Garter webbing: A form of elastic narrow fabrics, sometimes multi-coloured and characterized by selvedges that form a frill on relaxation. It may also be a medium strength elastic narrow fabric for supporting socks or stockings.

Gas fading: A change in shade of dyed or printed fabric caused by chemical reaction between certain disperses dyes and gaseous contaminants in the atmosphere, chiefly acidic gases from fuel combustion (NOx; SO_2). Colour fastness to atmospheric contaminants: nitrogen oxides; Burnt gas fumes.

Gas fastness: Colour fastness to atmospheric contaminants: nitrogen oxides; Burnt gas fumes.

Gas fume fading: Colour fastness to atmospheric contaminants: nitrogen oxides; Burnt gas fumes. An irreversible change in hue which occurs when textile, particularly cellulose acetate and triactetate dyed with certain blue anthraquinone disperse dyes are exposed to oxides of nitrogen which arise from, for example, gas or storage heaters.

Gassed yarn: Yarn or fabric, which underwent the gassing process.

Gassing: An industrial defibrillation process for yarn, where yarn travelling at high speed passes through a gas flame in order to burn off fibres which poke out to reduce its fuzz and give it a greater sheen. The term gassing is usually reserved for treatment of yarn. Singeing is the term usually used for fabric. See **Singeing**.

Gassing machines (yarn singeing machines): Machines used for the singeing of yarns.

Gathered frill: A narrow, straight piece of cloth is drawn up and fixed within a seam or at the hem of a garment to create a decorative finish.

Gathering: Gathering, gauging, casing, etc., are used for drawing up the fullness of skirts, ruffles, flounces, etc., into a given space. The running stitch is used for these. For gathering, the cloth is held in the same manner as for running. The needle, ordinarily, need not be taken out of the work, the stitches being pushed back over the eye as they are made; but for running long skirt seams in delicate material which would crinkle at the line of sewing and roughen the seam, the needle should be drawn through and the line of sewing smoothed on the thread at each needle-full of stitches.

Gathers on a band: Fabric is drawn up, arranged and fixed within a flat band.

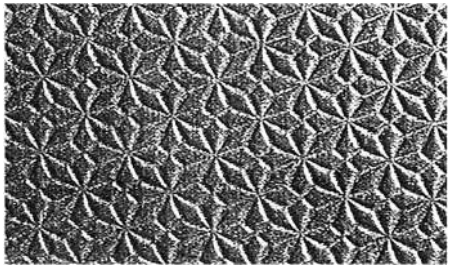
Gathering threads: Either done by hand by hand or else the longest stitch on a sewing machine is used with the tension suitably adjusted. Two rows of stitching are urn through a piece of fabric, then the threads are drawn up to create gathers.

Gattar: Indian satin, made with silk warp and cotton filling.

Gatti: Indian cotton fabric with diamond patterns.

Gaufre: The French word *gaufre* means‘waffle, emboss’. Flat fabrics in plain-weave, twill, or satin construction as well as plush materials and velvets with an embossed waffle-like pattern (embossing) or a low lying pile (= velvets). Gaufre fabrics include, e.g. Moiré fabrics; Reversible, etc.

Gaufrer: French for pressing various embossed patterns on fabrics with hot calenders during finishing. Used for ladies outerwear.



An example of gaufre fabric

Gauge (ga): (1) A traditional unit measuring the thickness of sheet metal. Larger gauge and umbers represent thinner metal: 10 gauge represents a thickness of 0.1345 inch (3.416 millimetres) and each increase of 1 in the gauge number corresponds to a reduction of about 10% in the thickness. A table is provided.

(2) A traditional unit measuring the thickness of plastic film. For this purpose, 1 gauge equals 0.01 mil or 10-5 inch (0.254 micrometre).

(3) A unit expressing the fineness of a knitted fabric, equal to the number of loops per 1.5 inches (38.1 millimetres). The same unit is also used to express the size of the knitting needles used to create a fabric of that fineness.

(4) A traditional unit measuring the diameter (or the cross-sectional area) of a wire. Various wire gauge scales have been used in the US and Britain. In traditional scales, larger gauge numbers represent thinner wires. (For very thick wires, repeated zeros are used instead of negative numbers, so gauges 00, 000, and 0000 represent -1, -2, and -3, respectively.) In the American Wire Gauge (AWG) scale, 0000 gauge represents a wire having a diameter of 0.46

inch and 36 gauge represents a diameter of 0.005 inch (5 mils). Diameters for the other gauges are obtained by geometric interpolation, meaning that the ratio between successive diameters is a constant, except for necessary round off. Thus *n* gauge wire has a diameter of .005·92[(36-*n*)/39] inches. The metric wire gauge number is equal to 10 times the diameter of the wire, in millimetres; thus, a metric 8 gauge wire has diameter 0.8 millimetres. A table of wire gauge equivalents is provided.

(5) A traditional unit measuring the interior diameter of a shotgun barrel. The gauge of a shotgun was the number of lead balls, each of a size just fitting inside the barrel, that were required to make up a pound. In other words, if a lead ball weighing 1/12 pound just fit in the barrel of a shotgun, then it was a 12-gauge shotgun. Today, the internal diameters for each gauge number are read from a table.

(6) (a) A measure of the number of needles per unit length in knitting and hosiery. The greater the number, the closer and finer the knit. (e.g., raschel machine = 2English inches; fully-fashioned knitting machine = 1.5 English inches; circular hosiery knitting machine = 1 English inch); (b) The number of wales per inch in a knitted fabric.

(7) (a) Pitch – The distance measured horizontally between spindles drive drum centres or adjacent yarns on any multi-position machine; (b) A generic term for various measurement instruments such as pressure or thickness gauges; (c) The number of needles per given distance in a knitting machine; (d) The thickness of the knitting needle in the shank and the hook; (e) The number of wales per inch in a knit fabric; (f) On spinning or twisting frames, the distance from the centre of one spindle to the centre of the next spindle in the same row.

Gauge length: The gauge length is the original length of that portion of the specimen over which the strain or change of length is determined.

Gauge (Gage) length (effective): See **Effective gauge length**.

Gauge (Gage) length (in tensile testing): The length of a specimen measured between the points of attachment to clamps while under uniform tension.

Gauge (Gage) length (nominal): See **Nominal gage length**.

Gauge (Gage) (of tufting machine): The average centre line distance between the needles.

Gauge (in full fashioned hosiery): A measure of fineness expressing the number of needles per 1.5 inch on the needle bar.

Gauge (in knitted fabrics): A measure of fineness expressing the number of needles per unit of width (across the wales).

Gauge (knitting): A term giving a notional indication of the number of needles per unit length along a needle bed or needle bar of a knitting machine. The current practice is a common unit length of 1 'English' inch (25.4 mm) that is used for all types of warp and weft knitting machines.

Gauge (in warp knitting): For simplex, tricot, Milanese, number of needles per English inch; for raschel, kayloom, twice the number of needles per English inch.

Gauge length: The length of a specimen measured between the points of attachment to the clamps while under uniform tension. See **Gauge, Knitting**.

Gauge length, effective (in tensile testing): The estimated length of the specimen subjected to a strain equal to that observed for the true gauge length.

Gauge (linking): A term specifying the spacing of points in linking and point seaming achenes and expressed as the number of elements per unit of length.

Gauge (English): Points in an arc of 38.1 mm (1½ in).

Gauge (American): Points in an arc of 25.4 mm (1 in). The term 'gauge' and 'points', respectively are used to define the two systems, e.g., an English 36 gauge linking machine has 24 points per inch and an American 24 point linking machine has 24 points per inch.

Gauge (wire): Used with an extra filling yarn during weaving, this type of standing wire controls the height of the fabric pile.

Gauging: The gauging stitch is usually longer on the face than on the back, draws the material up into distinct plaits, making it easy to dispose of the fullness neatly, regularly and securely by over handing the top edge of each plate to the bottom edge of the band. The right side of the skirt and the right side of the belt are placed against each other and each gather over sewed to the belt. The space into which the material is to be gathered determines the length of the long stitch. The succeeding rows of stitches should be *directly* under those of the first.

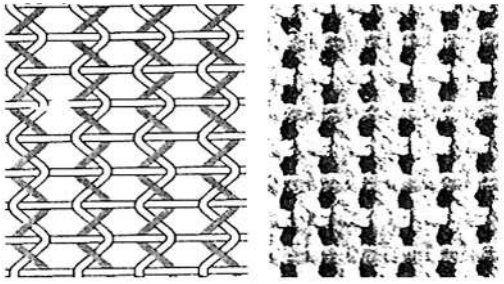
Gauging (gathering): The shortening of the material length by drawing together and holding succession of small folds or material by stitching machine gathering or gauging is achieved by the use of a special press fast or attachment.

Gaugoli: See **Indian yellow**.

Gauze: Light weight, open-texture, net-like woven fabrics named after the Palestinian town of Gaza where they were originally used for veils. They mostly consist of thick yarns with a full finish or fine yarns with a veil-like appearance.

Gauze flannel: Very light and striped shirting flannel, having silk warp.

Gauze weave: A weave used in very thin fabrics, e.g. gauze, or for the production of woven effects (see Fig.). With a full leno weave, the warp threads are made to cross one another between the picks. In simple leno weaving, one warp thread (generally referred to as a crossing or leno end) is caused to lift alternately on one side and then on the opposite side of the neighbouring thread (usually referred to as the standard end) thereby producing "crossed" or "open" sheds. The leno ends are also drawn through a second heald which changes its position between the individual weft insertions. Advantage of leno weaves is that the weft is anchored and hence resistant to slippage.



Gauze or Leno

Gaws: In a few places, a term denoting thin places in the cloth.

Gaze Barege: Very light dress goods, made of silk warp and wool filling or of all wool. It is often printed.

Gaze bluter: Very fine and light silk gauze; used for sifting flour.

Gaze brillantine: Very light, French silk dress goods, with a high lustre.

Gaze de Paris: Very light French silk dress goods, made of fine organzine warp and trame filling.

Gaze lisse: French gauze, very light and sheer, made of natural silk yarn.

Gaze ondee: Very light dress goods or trimming fabric, made of organzine warp and filling of "ondee" silk.

Gaze Tour Anglais: French for leno.

Gazzatum: Fine and sheer silk or linen gauze of the Middle Ages, said to have originated in Gaza, Asia.

Gear crimping: See **Texturing**.

Gebanga: Leaf fibre yielded by the Corypha gebanga, a palm in Java; used for making cloth, nets, ropes and bags.

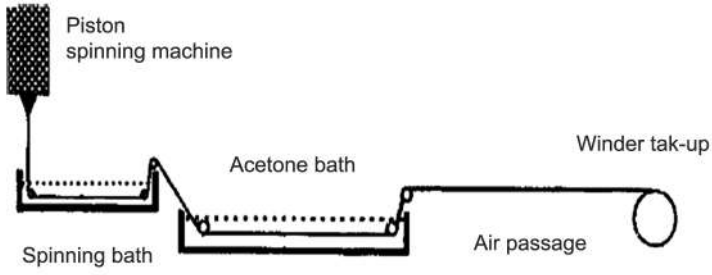
Gebauer kier: The unit consists of two concentric vessels on one inside and perforated inner jacket on the other. The heated scouring liquor is injected at the top between the two concentric walls. In this system, the flow of liquor is radial instead of vertical circulation and thus, the cloth more or less floats. The pressure difference between top and bottom is eliminated.

Gedda gum: See **Gum Arabic**.

Gel: A gelatinous, glassy, easily deformable mass, comprising of a disperse system of at least two components, i.e. of a colloidally distributed solid substance (e.g., gelatine; silicic acid) and a liquid (lyogel; xerogels).

Gel dyeing (wet tow dyeing): Here, polyacrylonitrile fibres which have been produced by the wet spinning method are passed, still in the swollen state, through an aqueous dye bath (40–60%) during or immediately after drawing. A subsequent drying (heat treatment at 105–150°C) closes the pores of the fibre surface, by which the dye is fixed.

Gel spinning: With this technique, it is possible to produce fibres with high tenacity and modulus from polymers with flexible molecular chains. The main characteristics of this process are the use of polymers having ultra-high molecular weights and the processing of dilute spinning solutions. The strength of the fibre increases with increasing molecular weight. The low concentration of the spinning solution allows a high draw ratio to be applied to the fibre. A linear increase in modulus with draw ratio exists.



Schematic representation of gel spinning

Gelatine: The pure glue obtained by hydrolysis of collagen by boiling hides, cartilages and bones. Available as thin flakes or powder.

Properties – Transparent, glassy, lustrous material; colourless, odourless and tasteless. Water-soluble after prior swelling giving more or less viscous solutions. The addition of formaldehyde reduces water-solubility.

Quality evaluation – 1 g in 100 ml water must still set to a jelly above 0°C.

Uses – Finishes, sizes and printing thickeners.

Genappe: Ply and hard twist gassed yarn, made of worsted, mohair or alpaca, often mixed with silk; used for fringes, etc.

Genapping: Process of gassing worsted yarns.

Generic class (as used in textile fibres): A group having similar chemical compositions or specific chemical characteristics.

Generos: Bleached cotton sheeting produced in Latin-America.

Generos crudos: General trade term for grey cotton goods produced in Latin-America.

Geneva embroidery: Made by sewing velvet bands to form checks on coarse canvas foundation and filling out the square with coloured silk or wool.

Genghis: Rugs made by the nomad Turkmans west of Persia. They are small, heavy, all-wool rugs, the warp made sometimes of goat's hair, the long loose pile is tied in Ghiordes knot. The design shows crude geometrical patterns in which white colour is used extensively. The sides are finished with selvage and the ends with selvage and fringe.

Genoa: In England, the one-and-two twill used in various heavy materials.

Genoa embroidery: The patterns are worked with a corded outline over fine muslin, this being cut away from between the patterns.

Genoa lace: (a) Imitation Cyprus lace of gold, now obsolete; (b) Fine bobbin made collars, handkerchiefs and fichus made in the 17th Century; (c) See ***Macrame***.

Genoa velvet: An elaborate velvet of satin ground fabric with a multi-coloured pile. The pile is sometimes left uncut.

Gentian: The reddish-blue of the plant from the genus *gentiana*.

Gentian violet: A violet dye derived from coal-tar and used also as an antiseptic.

Geogrid: Manufactured polymer constructions characterized by large openings made by one of the following methods – (a) coating woven or knit products to form a grid; (b) welding oriented strands to form a grid; (c) punching holes in flat sheets then drawing them to align the polymer molecules. Used for soil stabilization, drainage, and erosion control applications. See **Geotextiles**.

Geomembrane protective fabric: See **Geotextiles**.

Georgia Prolific: Commercial varieties of short staple upland cotton from Georgia.

Georgienne: French silk dress goods, made with ply warp. There are 10 or 16 leaves and 10 or 16 fillings in a repeat.

Georgette: (1) A filmy fabric with a crepe appearance, woven with very high twisted yarns. It is a springy fabric, plain or printed, and made from a variety of yarns, including, wool, silk polyester, nylon. Georgette does not crease readily and polyester-georgette will hardly crease at all. Used for blouses, dresses (must be lined), evening wear, etc.

(2) A sheer, lightweight, somewhat transparent open-texture fabric with a fairly pronounced crêpe effect, usually produced in a plain weave with crêpe yarns from almost all types of fibres. It is generally woven with alternating pairs of S- and Z-twisted yarns in both warp and weft. The handle and appearance are characteristic, i.e. the fabric has a crinkly texture and is harsher and more opaque than chiffon.

Georgette crepe: It is a sheer and dull textured fabric which is known more as georgette than georgette crepe. A typical construction is 60 × 50 (to 80 × 80) using 75 denier Rayon (or silk) in both warp and weft, with two S twist alternating with two Z twist in both warp and filling.

Geotextile: Manufactured fibre products made into fabrics of various constructions for use in a wide variety of civil engineering applications, including several described below.

Asphalt overlay fabrics: Fabric systems installed between the old and new asphalt layers during pavement resurfacing. The fabric absorbs the tack coat sprayed on the old surface thus, forming a permanent moisture barrier to protect the subgrade from strength loss due to water intrusion. The fabric system also helps retard reflective cracking by serving as a flexible layer to diffuse stress.

Drainage fabrics: Fabrics used as filter media or separators in subsurface drainage systems. The fabric is installed around the drainage pipe, or coarse stone in the drain; it allows water to pass freely from the soil to the drain, but prevents soil particles from migrating into the drainage system. These fabrics are also used as outer coverings in prefabricated drainage composites and serve the same function as a filtering medium.

Erosion control fabrics: Fabrics used in the stabilization of embankments and the containment of silt run-off from erodible slopes. In embankment stabilization, the fabric functions as a filter medium behind stabilizing rip-rap revetments. In siltation control, the fabric acts as a filter to contain silt while allowing excess water to drain freely. In turf reinforcement, the mat is used to retain soil while allowing roots and stems to grow through. In fabric-forming systems for the construction of revetments, a double-layer, water-permeable fabric is positioned, then pumped full of structural grout. These systems are alternatives to rip-rap.

Geomembrane protection fabrics: Fabric systems used in the construction of landfills to protect the membrane liner from puncture and installation damage. The fabric may be installed on one or both sides of the liner. It can also be used in the leachate collection system since it is permeable to fluids and gases.

Reinforcement fabrics: Fabric system used in the construction of steep slopes and retaining walls. By stabilizing the soil mass, they reduce the stress on the retaining wall with corresponding decrease in load-bearing requirements for the wall design. In slope reinforcement, the stabilization permits steeper slope construction than would be possible, based on soil properties.

Subsurface stabilization fabrics: Fabrics used in the construction on access roads, railroads, parking and storage areas over soft and unstable soil. The fabric is placed between the subgrade and the stabilizing fill material where it provides separation of subsoil and fill, filtration of moisture at the subsoil/fill interface, and added tensile reinforcement of the compacted fill.

Geranium: The vivid red of the geranium flower, a colour popular in the 1950's.

Geranium pink: A deep pink colour.

German hardness degree (°d). : An obsolete unit of measurement for water hardness. It is not an SI unit. Now replaced as a unit of measurement by mmol/l. Water hardness units.

German Institute for Standardization: With its 81 standards committees, the German Institute for Standardization (DIN) is the responsible standardization body of the Federal Republic of Germany. Within the framework of its terms of reference, DIN is the German member in the European and international standardization organizations. DIN represents the interests of German standardization at both the national and international levels. Maintaining a collection of more than 38,000 documents, DIN offers standards covering everything from textiles to standard methods for the analysis of contaminants in water to screws and bolts. Standards offered by DIN provide companies and individuals doing business in Germany or with German businesses a solid basis for quality, safety, and minimum functionality expectations.

German prints: Medium or coarse cotton print goods in South Africa, especially in blue with white patterns and a good finish.

German stitch: Stitch in embroidery used where the foundation can be exposed; it is composed of tapestry and tent stitches alternating parallel with part of the ground between them.

German serge: A serge fabric of the 18th century, made with worsted warp and woollen filling.

German wool: See **Berlin wool**.

Germantown yarn: Thick and slack twist woollen yarn, made four-ply and used for hand-knitting and other fancy work, made originally in Germantown, Pa., United States of America.

Germuset: Damask made in Asia with cotton and silk warp and coloured patterns.

GF: See **Glass fibres**.

GH: Gesamtwasserhärte (German) (Water hardness units).

Ghagi: Highly finished Indian/Bangladeshi silk satin; used for dresses by the native women.

Gharbasti: Indian fabric, made of cotton warp and wild silk filling.

Gharchola: The type of bandhani saris made in places of Jamnagar, Saurashtra, India. The gharchola traditionally made for weddings has checks in gold thread with tie and dye pattern within the squares and are crafted by the local Khatris of Bhuj. Motifs within each compartment range from elephants, parrots and flowers to dancing girls. Other traditional patterns include the *Baavan bagh* (fifty two gardens) and scenes from *Krishna Ras Leela* (Krishna's dances with lovers). See **Bandhani (Sari)**.

Ghatto gum: Asiatic gums.

Ghent lace: Narrow bobbin lace, similar to Valenciennes, the threads of the square mesh ground being twisted two and one-half times.

Ghetee: Indian bleached cotton cloth, gassed and given a high finish.

Ghiordes knot: In oriental rugs, the ends of the hand knotted pile alternate with every two threads of the warp. This knotting produces less knots to the square inch than the Senna knotting.

Ghiordes: Ghiordes rugs are the cream of Turkish manufacture. They are rugs of ancient origin and their design has affinities with the very beautiful and rare 16th-century prayer mats. They are named after the town of the same name in western Turkey, some 100 km from the port of Izmir. Ghiordes rugs are woven with 150,000–300,000 knots/m^2. Various colours are used for Ghiordes rugs.

Ghost print: A defect in transfer printing which takes the form of unwanted (usually paler) "ghost" design images on the printed fabric due to the transfer of disperse dye from one layer of the rolled printed transfer paper to the layer of paper lying immediately on top of it. Such ghosting effects are dependent on the dye, thickener, paper quality and the storage conditions (temperature) of the printed transfer paper.

Ghosting in transfer printing: A defect in sublimation transfer printing due to inadequate storage stability of the transfer printing paper. During the storage of transfer printing papers, an undesired migration of dyes can occur, which cause disruptions in the sublimation can transfer printing process and defects in the transfer printed fabric.

Gifu dyeing process for polyester: A Japanese dyeing method which employs phenol as a swelling agent and organic or inorganic acids at high concentration.

Gigging: The process of raising a nap on fabrics by means of a teazle machine.

Gilan: A grade of Persian raw silk.

Gilham: A Chinese silk dress goods.

Gill: A non-metric English and American unit of liquid measure, equal to one quarter of a pint.

Gilling: A commercial process called "pin drafting" used to produce top fibres. See **Pin drafting**.

Gimian: Fine velvet rugs, made in Asia Minor.

Gimp: (1) A helically wrapped core yarn in the form of a stiff cord. Often consists of cotton or wire wrapped with silk or viscose yarn for use in embroidery, lace or trimmings. Gimp can be used to sew buttons on clothing.

(2) A special thread used to support and raise the buttonhole stitching.

(3) A narrow strip of fabric used for trimming furniture; often has a stiffening of wire or heavy cord running through it.

Gingham: A yarn dyed fabric, with the yarns balanced in strength and usually cotton or polyester/cotton. Regular gingham is made in stripes, checks and plaids from yarns dyed with fast colours. It is woven with a plain weave, a typical construction being, 66 × 54 with 25s warp and 35s filling. Very fine ginghams are sometimes called Madras ginghams or Zephyr ginghams and are made with a construction of 100 × 80 worth 50s combed yarn in the warp and weft. A firm and very hard wearing cloth with stripes or checks woven in; white is always used with a different colour. Medium ginghams are favourable for women's and children's dresses, table clothes, napkins, curtains, etc., and fine ginghams are used for blouses and summer dresses.

Ginghamet: Cotton muslin with striped or figured patterns.

Gingeras: An Indian silk cloth.

Ginned lint: Cotton fibres that have been separated from their seeds by ginning but not subjected to any further processing after ginning. It is also

called raw cotton, i.e. at ginnery it is called ginned lint and when it is received in a textile mill it is called raw cotton.

Ginning: A process for separating cotton fibres from the seed in such an order that the fibres may be spun into yarns. Machines used for ginning may be either saw gins or roller gins.

Giselle: A sheer fabric in France, woven of worsted yarn.

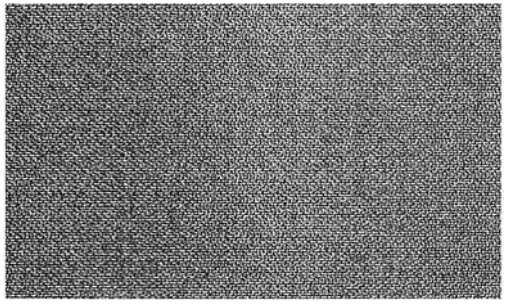
Givrene: Silk, acetate or polyester fabric that is very similar in appearance to Grosgrain.

GL: Glass Fibres.

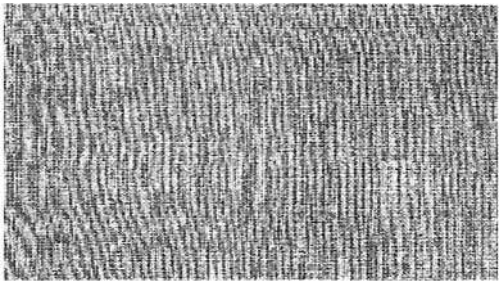
Gl: Gill.

Glace: Dress goods, made of fine and well stretched cotton warp and mohair filling in plain colours or figured.

Glace': (a) A term used for glazed yarn or polished thread; (b) Fabrics – a high-lustre fabric, a lining fabric with a lustre-imparting finish, a lustrous satin lining, etc.; (c) A woven wool fabric; (d) A lightweight British fabric with a cotton warp and mohair or lustre worsted weft produced in a plain weave. In French, the word *Glacer* means "to glaze".



Glace, batiste: Fine, plain woven cotton made lustrous, transparent, and stiff by parchmentising. Used for blouses, trimmings and evening wear.



Glace' leather: Glossy leather.

Glanzstoff: German copyrighted name for an artificial silk.

Glass: An alkali calcium silicate. Fusion product of silica (silicon dioxide), calcium oxide (lime), and sodium carbonate (soda ash) will produce common lime-soda glass. Potash glass is obtained by substituting soda ash with potassium carbonate (potash).

Glass batiste: A glass-like, almost transparent and usually stiff batiste fabric. The character of this pronounced stiff and glassy material, produced by a special chemical treatment, is also resistant to washing. As far as cotton materials are concerned, which were formerly used exclusively for this purpose, the finish consists essentially of mercerization, leaching, and a treatment in concentrated sulphuric acid.

Glass cloth: A plain weave cloth made from twisted linen yarns, often woven in stripes or checks, but sometimes printed. The fabric is made without any surface fuzz, yet it readily absorbs moisture because it is of medium weight. It is very durable. Used to make tea towels for drying glass and china.

Glass count: An indirect yarn numbering system, equal to the number of 100 yards of lengths per pound.

Glass fibre: A manufactured fibre in which the fibre-forming substance is glass. In the continuous filament process, glass marbles are melted in an electric furnace and the liquid flows in fine streams through small orifices at the bottom of the melting chamber. The resultant filaments are caught and drawn by a high-speed draw winding mechanism. In the staple fibre process, the streams of molten glass are attenuated into fibres by jets of high-pressure steam or air. These fibres are gathered on a revolving drum and then wound on tubesto form staple fibre sliver or bands that can be drafted, twisted and plied.

Characteristics – Glass fibre is incombustible and will tolerate heat up to 1000°F without material damage. Potential strength is not realized in woven fabrics or even in yarns, because the fibre is brittle and fracture points may develop, but nevertheless, very high tensile strength is obtained in woven fabrics and is retained at elevated temperatures. The fibre originally was difficult to colour, but methods have been developed to accomplish this. Moisture absorption is low. Electrical and insulation resistance is high.

End uses – Glass fibre is used for heat and electrical insulation, filter cloth in the chemical and dye industries, reinforcing belts in tires, novelty fabrics, tablecloths, and fireproof draperies. Because of its brittleness, it is not used in wearing apparel or in household fabrics that have to withstand frequent flexing. Because of the relatively low price, glass textiles have, in the meantime,

found wide application, e.g., in chemistry, chemical technology, insulation of machines, pipes and containers, in sound insulation and in electronics.

Glass plate test: A commonly used test to check the correct vatting of vat dyes in dyeing as well as the rate of re-oxidation after dyeing (greening).

Procedure – A glass plate is dipped in the prepared vat and immediately removed; if vatting is correct, the dye liquor should remain clear as it drains off the plate without revealing any solid dye particles. Indigo vats should, e.g. drain off clear yellow and only begin to green after 20–30 s, i.e. colour change to blue.

Glass roving: A form of glass fibre consisting of a multitude of parallel glass filaments without any significant twist.

Glass transition temperature: The temperature above which a material changes from a brittle, "glassy" nature to a rubbery nature; on cooling, the material changes back to glassy synthetic fibres, such as polyester and nylon show this change of physical character. The rate of dye uptake increases dramatically when the fibre is near or above the glass transition temperature. If the glass transition temperature is above the boiling point of water, as it is with polyester, the dyeing rate is extremely slow even at the boil.

Glass-rubber transition temperature: See **Glass transition temperature**.

Glass wool: See **Glass fibres**.

Glass yarn: A collective term for multifilament, spun and textured yarns produced in a range of different yarn thicknesses from glass fibres.

Glass yarn (continuous): Continuous yarn made of glass filaments that extends substantially throughout the length of the yarns. See ***Continuous glass yarn***.

Glass yarn (fabricated): See **Fabricated glass yarn**.

Glass yarn (staple): Yarn made from glass fibres that are nominally 200–375 mm in length.

Glass yarn (vinyl coated): Continuous filament glass yarn coated with a pigment and plasticized vinyl chloride resin. See **Vinyl coated glass yarn**.

Glass (textile): Glass in a form suitable for spinning or weaving. It is manufactured in two common forms, (a) filaments and (b) staple fibres of spin able length.

Glauber's salt: Sodium sulphate. In the dye industry, few use "sodium sulphate" to refer to the anhydrous form, and "Glauber's salt" only to refer to the decahydrate form ($Na_2SO_4 \cdot 10H_2O$). Used as an electrolyte in dyeing especially for turquoise and such similar shades.

Glaze finish: Refers to a finish put on 100% cotton threads made from starches, waxes or other additives. This coating is then brushed to give the thread a smooth surface. A glaze finish protects the thread during sewing giving better ply security and abrasion resistance.

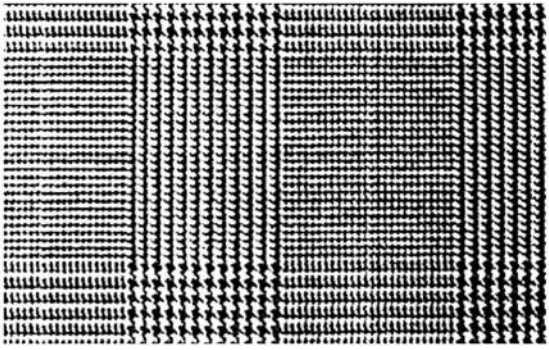
Glazes (sewing thread): This is a process in which cotton threads are treated with starches and special chemicals under controlled heat and then polished to a high lustre. The glazed process results in a thread with a hard finish that protects the thread from abrasion and enhances ply security.

Glazes yarn: See **Glacé**.

Glazing: (a) A finishing process that produces a smooth, highly polished, or lustrous surface on a fabric, such as chintz. The fabric is treated with starch, glue, paraffin, or shellac, then friction calendered. Synthetic resins are used for a more permanent finish; (b) A shiny fabric appearance produced unintentionally, e.g., by pressing at excessive temperature.

Glazing Calendar: See **Friction Calendar**.

Glen Checks or Glen Urquhardt: Originally Scotch cheviots and home spun, made in combination of two checks of different sizes, having an equal number of threads in each size. The checks are usually only in two colours, often having additional coloured ornamental threads. The fabric is made now in woollens and worsteds for men's wear.



Glen Check

Glen urquhart plaid: The name comes from a Scottish clan. The cloth is also sometimes called overplaid, because the blocks of check weave are arranged at right angles, and then there is a larger outliner check effect over this, often in another colour. It may be wool or worsted and is made in various weights from light suiting to over coating. An ornate plaid, used for golfing clothes, cloaks, men's sporting hats and overcoats.

Glengarry: All-wool, mottled English tweed.

Glenshee: A plain weave mercerized cotton or linen made in a wide variety of weights and used for all types of embroidery.

Glenshee crash: A rough, uneven plain weave fabric of equal quantities of cotton and linen fibre. Used mainly for curtains and loose covers and as a base for embroidery.

Glissade: A closely woven satin-weave cotton fabric that is polished in finishing. It is made in plain colours, an uninteresting fabric used only where cotton lining is needed.

Glitter pigments: A distinction is made here between polyester and polyoxide glitter pigments. They are produced by the comminution of metallized foils followed by sieving. Because of the risk of blocking screens or engraved rollers in printing, these pigments are only suitable for screens with a maximum of 9 threads per cm or engravings with a minimum depth of 30/100. Other problems may be caused by the print pastes separating out during printing. For this reason, the use of high viscosity, short print pastes is recommended.

Glitter threads: Man-made fibres with a ribbon shaped cross-section in coarse counts, mainly produced in a variety of spun-dyed colours.

Gloria: A thin and very closely woven fabric, made with silk warp and worsted or cotton filling in a three harness warp face twill weave; it is dyed in the piece, and used for umbrella covering and also dress goods.

Gloria silk: Smooth and closely woven fabric; warp – cotton or (originally) organzine silk; weft – schappe silk or fine worsted yarn; in twill or satin weave for linings, umbrella cloth, etc.

Gloria suede: A firm and heavy suede for jackets and coats.

Glorietta: A lighter version of gloria made of cotton.

Gloss: The luminous fractional reflectance of a fabric specimen in the specular direction. An additional parameter to consider when determining a colour standard, along with hue, value, chroma, the texture of a material and whether the material has metallic or pearlescent qualities. Gloss is an additional tolerance that may be specified in the Munsell Colour Tolerance Set. The general rule for evaluating the gloss of a colour sample is the higher the gloss unit, the darker the colour sample will appear. Conversely, the lower the gloss unit, the lighter a sample will appear. Gloss is measured in gloss units, which use the angle of measurement and the gloss value (e.g. 60° gloss

29.8). A 60° geometry is recommended by the American Society for Testing and Materials (ASTM) D523 standard for the general evaluation of gloss.

Gloss (specular): See **Specular gloss**.

Gloss value: A measure of lustre for e.g., textile filaments for before delustering (e.g. 40) and with increasing delustering additives (to below 4) or for raw cotton (15–17) before mercerising and with increasing density of caustic liquor after mercerization (up to 30° Bé = 76, after which it decreases again).

Glossing: A mechanical after-treatment given to hanks of silk, linen, cotton and synthetic fibre yarns to loosen up the yarn structure, achieve increased lustre and a softer handle. Originally, wet hanks were placed over a wooden peg and wrung out.

Glossop: Plain woven bleached cotton fabric, made in England in pieces that are 50 yards long and one yard wide, with 76 ends and 88 picks in a square inch; used for calicoes.

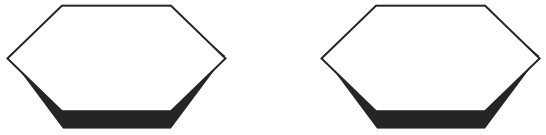
Glossy printing: See **Chintz prints, Lacquer printing**.

Glove silk: A fine warp knit silk fabric made in basic colours and used mainly for glove lining, although it was once also used for lingerie.

Glovers' wool: The wool which was removed with lime from the skin of slaughtered sheep.

Glow: Visible and flameless combustion of the solid phase of a material. Burning without forming flames, but with visible light.

Glucose (dextrose; **grape sugar)**: A white crystalline sugar ($C_6H_{12}O_6$) occurring widely in nature. Very hygroscopic, readily soluble in water up to 817 g/l at 15°C (anhydrous glucose) and up to 878 g/l (glucose containing water of crystallization). The oxidation of glucose results in the formation of gluconic acid. Like other monosaccharides, glucose is optically active: most naturally occurring glucose is dextrorotatory. Like all known sugars, it exists in two isomeric α and β-forms, i.e. α-glucose and β-glucose. Both forms differ only in the position of the OH group relative to the 1st carbon atom.



Glue: Most familiar are glues derived by boiling or steaming animal hides, tendons or bones which are high in collagen. Glues may be classified in order of quality as follows – isinglass, hide glue, leather glue, cartilage glue, bone glue and fish glue.

Glued carpets: These fall into two categories; (a) Hand bonded, e.g., appliqué carpets. (b) Machine bonded, e.g., flocked carpet as bonded bouclé carpets, bonded chenille carpets and similar products.

Glued composite fabrics: Imitations in the style of woven cloqué fabrics are produced (Adhesive bonded textiles) by, e.g. the superimposition of a crêpe fabric on top of a flat fabric (taffeta) and bonding them together locally. They can also be produced to a pattern, if desired, through application of the bonding agent by screen or roller printing. After damping, blister-like motifs appear in the upper fabric as in, e.g. adhesive-bonded cloqué. Fibre webs can also be included in a similar manner.

Glued seam: A seam formed by an adhesive.

Glueing carriage: Used to glue fabrics on to the screen printing tables for printing. The liquid glue is applied by means of a roller applicator and the fabric is brought into contact with glue film by means of pressure rollers.

Glueing unit: A device for the application of glue on the printing blankets on screen printing machines.

Glycerol: (glycerine; glycyl alcohol;1,2,3-propanetriol; 1,2,3,-triol) A trihydric alcohol, $HOCH_2CH(OH)CH_2OH$. Glycerol is a colourless sweet-tasting viscous liquid. It is widely distributed in all living organisms as a constituent of the glycerides, which yield glycerol when hydrolysed. MW 92. A clear, colourless (pure 30°Bé, lightly coloured 20°Bé), odourless, hygroscopic and very sweet-tasting syrupy liquid. It is combustible. Miscible with water, alcohol and acetic acid; insoluble in ether, white spirit, benzene and chloroform. Used as a universal solvent for salts, sodium carbonate (soda), sodium tetraborate (borax), potassium iodide, alkalis, alkaline earths, certain metal oxides, water-insoluble lime soaps, etc., dyes which are insoluble in alcohol become soluble in alcohol, if previously mixed into a paste with glycerol.

Applications – As a hygroscopic agent (sizing; softening finishes), dye solvent in textile printing in amounts up to 100–130 g/kg of print paste. Component in print pastes for discharge printing (e.g. for wool and silk). Spotting agent (solvent action improved when warm).

Glycidol: (2,3-epoxy-1-propanol), colourless liquid, b.p. 162°C, soluble in water. As a glycerol anhydride, the simplest alcohol with an epoxy group, glycidol is used as a reactive solvent for epoxy resins, textile auxiliaries

(levelling agents, dye-binding agents, etc.) and for the stabilization of halogenated hydrocarbons.

Glycine fibres: Regenerated protein fibre from the soya bean protein, glycine. Developed in the 1930s, but no longer relevant today due to the inadequate strength values (5–7cN/tex, wet strength 50%).

Glyoxal (ethane diol): HCO-HCO, a low melting point yellow crystalline solid, CHOCHO, m.p. 15°C colourless liquid, b.p. 162°C. It is a dialdehyde. It gives off a green vapour when heated and burns with a violet-coloured Ûame. Glyoxal is made by the catalytic oxidation of ethane diol and is used to harden the gelatin employed for photographic emulsions. It is soluble in water.

Properties – Mild odour, readily rearranged into polyglyoxal, soluble in water tetrahydroxydioxan), alcohol, ether and other solvents, powerful reducing action. Used in the manufacture of resin finishing agents, e.g. DMDHEU, tetramethylol acetylene diurea, glyoxal resins. Glyoxal can also be used under mild curing conditions for formaldehyde-free finishes; catalyst – aluminium sulphate and polyhydric acids, shock catalysts. The addition of ethylene glycol prevents yellowing.

Glyoxal cross-linking agents: A term in common usage for resin finishing agents which are representative of the reaction products of Glyoxal with urea in particular, e.g. Dimethylol dihydroxy ethyleneurea.

Gminder fabrics: Hard-wearing fabrics of various types (similar to linen/cotton unions) produced from cotton and cottonized hemp (process developed by the firm Gminder, Reutlingen, Germany).

Gnafi: Very fine mat, made of the leaves of the pandanus; used for garments in Tonga Islands.

Goats' hair: Some of them, like the cashmere, are among the finest fibres and are used for the costliest fabrics; the mohair is yielded by the Angora goat; the alpaca is taken from a Peruvian goat; common goats' hair is coarse, thick and does not felt well and is used for coarser rugs and fabrics.

Gobelin: (1) French tapestry. Genuine Gobelin tapestries are hand-woven and have a similarity to Rib fabrics with coloured designs (occasionally with gold and silver threads). Imitation Gobelin tapestries are produced with jacquard designs (3–5 warp and 3–4 weft systems) or by printing. Used as tablecloths, heavy upholstery and wall coverings, etc.

(2) A tapestry fabric, made of wool or silk, the filling entirely covering the closely set warp threads (which form tine ribs), and show various designs with human animal floral, etc., figures. The genuine Gobelin is made by hand with the use of needles or small, flat shuttles, the different coloured yarns reaching

only as far as there is call for them in the design, instead of extending from selvage to selvage. The fabric is free of all nap or nubs and the pattern is shown in its completeness, but reversed on the back. The Gobelin was invented by a man of that name in Paris in the 15th Century, and the factory purchased from his descendants by the government of Louis XIV. This factory still turns out the finest hand-made Gobelin; (a) A loom woven fabric, made with heavy warp and fine filling, printed afterwards to imitate genuine Gobelin; used for curtains, hangings, and drapery; (b) An obsolete silk and wool dress fabric with pastel coloured brocaded figures.

Gobelin stitch: Also termed as ***Tapestry stitch***; it is used in gobelins and embroideries. The straight stitches are passing across and over a padding of braid, thus being raised.

Godet roll: Roll used for transporting and controlling the movement of bundles of fibres and yarns in the processing of these materials.

Goghari: Variety of raw cotton grown in Baroda, India. The staple is white and woolly.

Gold dust or Tennessee: An early maturing commercial variety of a very prolific upland cotton; the staple, measuring 25–28 millimetres, forms small bolls; yield of lint is 32–34%. It is also called King.

Gold purple reaction: A very sensitive and specific test for oxycellulose. A test specimen is soaked in a weak acetic acid solution of stannous chloride [tin (II) chloride] and then placed in gold chloride solution. Oxycellulose absorbs tin (II) oxide, and as a result assumes a red-brown colour.

Gold thread: Thread covered by core spinning only or with combination of electroplating gold alloys to get the gold appearance for the thread. Nowadays, synthetic materials with gold colour are also called gold threads; sometimes not necessarily of gold colour also.

Gold tissue: Transparent metal cloth that is very soft and luxurious, consisting of metal warp in gold colour and silk or synthetic weft. Used mainly for evening dresses and sarees, etc.

Golden moss: Trade name for a yellowish, curly and soft fibre, yielded by the leaf stalks of the tree fern in China; used for stuffing.

Goldthwait test: A differential dyeing test developed by Goldthwait et alas a practical method for estimating the maturity of cotton. The test is especially helpful in mill situations for detecting the presence of thin-walled or immature fibres which often cause problems in processing. The test employs a mixture of Chlorantine Light Green BLL (C.I. Direct Green 26) and Direct Fast Red 5B (C.I. Direct Red 81), two dyes with different dyeing properties and

contrasting colours. Mature fibres absorb the red preferentially and immature fibres absorb the green.

Golf coat: A red flannel coat for golf playing, single breasted sack style.

Golf cloth: Double faced woollen over coating, the two sides being different in colour and pattern.

Golf hose: Heavyweight wool stockings, made with fancy patterns at the top.

Golfers: Reclaimed wool from pullovers and knitted garments.

Golgas: Two faced printed flannel.

Gomuti: Dark coloured and strong fibres that are yielded by the base of the leaves of the sago palm in Malacca; used for cordage.

Goods, heavy: See **Heavy goods**.

Goose: A tailor's iron.

Gordon: A Highland tartan, made as follows in a repeat – Dark green bar, split in the middle with a group of black, yellow and black lines; black stripe, half the width of the green bar; blue line, black line, blue line, black line; blue stripe, half the width of the green; repeat group described between the two, in a reversed order.

Gordon cord: In European countries, a twilled cord weave.

Gore: A wedge shaped piece of material inserted into a garment part to obtain width at a specific place.

Gorevan rugs: Fine Persian rugs of medium size, made with cotton warp and the close wool pile are tied in Ghiordes knot. The design is usually a centre medallion with curved outlines on a cream coloured field.

Gorge: The edge of the fore part to which the collar stand or neckband is joined.

Gospodsky: Trade term in Russia for a grade of carefully cultivated, retted and scotched flax.

Gossamer: (a) A very soft and fine silk gauze used for veils; (b) Light silk fabric that is water proofed and used for wraps.

Gossypium: Generic scientific name for cottons.

Gothrough: A machine-made lace.

Gouache print: A fashion print in the style of a water colour painting.

Gout: Foreign matter trapped in a fabric by accident, usually lint or waste.

Gouzlieh: A striped, heavy cotton shirting, with small dobby designs, or twilled produced in Turkey; used for long outer robes. See ***Cheviot***.

Governo: Sort of raw cotton from Brazil.

Goza variety: Variety of raw cotton from Afghanistan. The staple is greyish and harsh.

Gpd: Gallons per day.

Gpg: Grains per gallon.

Grab strength test: See **Grab test.**

Grab test: A tensile strength test in which the central part of the width of the specimen is gripped in the clamps.

Grab test (modified): See **Modified grab test**.

Gradation (in designing): Employs a series of motifs patterned to relate to one another through a regular progression of steps. This may be a gradation of shape or colour. A few shape gradations may in fact create a sequence of events, not unlike a series of images in a comic strip. See **Rhythm**.

Grade: To assign a numerical value based on number, size and severity of defects seen during visual inspection.

Grade (in warp knitting): A term used to indicate the defect index evaluation of fabric determined by the number of defects per unit, for example per pond, per linear yard or per square yard.

Grade (in wool and mohair): A numerical designation used in classifying wool and mohair in their raw, semi-processed and processed forms based on average fibre diameter and variation of fibre diameter.

Gradel (Grad'l): Dense twill canvas, made using strong thread (of linen, as half-ticking), plain or multi-coloured; also cotton and linen cloths in herringbone weave, the latter often having a striped pattern.

Grade: A measurement used in knitted garments that reflects the size of the needles used to knit the garment. The larger the gauge, the smaller the needle the finer the knit.

Grades: Classes into which cotton, wool and other fibres are classified according to length, evenness, strength, colour, etc., of the fibre. For the grades, see under the various fibres (cotton, wool, flax, silk, etc.).

Grades of chemicals: Chemicals are graded according to purity and appropriateness for end use. Common grades include "reagent" or "analytical" (very pure, for laboratory work, very expensive, often in small packages), "U.S.P." or "B.P." (United States Pharmacopeia or British Pharmacopeia, usually for use in or as drugs, quite high purity, medium price, small to very large packages), "*food grade*" and "*technical grade*". Dyes for textile use

are rarely graded, and are often quite crude and impure, compared with other chemicals.

Grading: (1) The classification of cotton, wool and other fibres according to the strength, length, evenness, etc., of the staple.

(2) The process of producing a range of patterns of different sizes from a master pattern.

Grading (finished fabric): Inspecting and grading the finished fabric as per predetermined level of faults allowed in each grade.

Graphite fibre: Although the terms carbon and graphite are used interchangeably to describe these fibres. Graphite fibres are more accurately defined as fibres that are 99% carbonized, while the term carbon is used for any fibre carbonized to 93–95% or more. See **Carbon fibre**.

Graft copolymer (graft copolymers): Polymers to which side chains from other building blocks are subsequently "grafted" on to the backbone of an already formed macromolecule (which may be obtained by polymerization, polycondensation or polyaddition, or as already existing polymers from natural sources resp. modified natural products).

Graham: A Highland tartan, one repeat made as follows – Dark green bar with a narrow, pale blue stripe near the edge; black stripe, measuring one third of the green bar; navy blue bar, as wide as green bar and split in the centre with a black stripe as wide as the pale (blue; black stripe, measuring one-third of the green bar).

Graham of Menteith: A Highland tartan, composed of green bars, split by white lines, running over a black and blue ground.

Grain: (1) The direction of the warp in a fabric. Hence, cutting straight grain means cutting with the grain; cross grain means cutting across the grain.

(2) As a unit of mass (weight), approximately 64.8 milligrams.

Grain (in yarn spinning): A direct yarn numbering system for sliver, top, or roving, equal to the mass in grains of 120 yards.

Grain (in measuring mass): 1/7000 lb avoirdupois.

Grain d'Orge: (a) Fine, bleached and figured French linen; obsolete; (b) Solid coloured French serge dress fabric, made with eight leaves and six picks in a repeat; (c) A very strong, durable, twilled woollen cloth in France, originally made with designs imitating seeds, hence the name. It is dyed in the piece.

Grain de Poule: French serge dress goods, having eight leaves and six picks in a repeat.

Grainline: It is the lengthwise thread in the fabric, parallel to the selvage and the lengthwise arrow on the pattern.

Grainline (in sleeves): Lengthwise grain of the material. It generally extends from shoulder point to the back of the wrist.

Grains grossiers: Coarse French ticking.

Grains per cubic foot: A unit sometimes used for measuring the amount of solids suspended in smoke or air:

7000 grains = 1 lb, or 15 432 grains 1 kg, or 15.43 grains = 1 g, and $1m^3 = 35.31\ ft^3$.

Consequently,

$$1\ g/m^3 = \frac{15.43}{35.31} = 0.437\ grain/ft^3$$

$$1\ grain/ft^3 = 2.28\ g/m^3$$

Grain leather: The term used to describe all leather that has had a finish applied to the right side. Most leather skins available for sewing are referred to as grain leathers.

Gram calorie: Calorie.

Gram equivalent: The quantity of a substance by weight which corresponds to a gram atom of hydrogen.

Gram stain: A stain in which bacteria are classified by whether they retain or lose their primary stain.

Grams per litre: The most commonly used measure of concentration in the textile bleaching, dyeing, printing and finishing industries and indicates the number of grams of a solid substance dissolved in 1 litre of a liquid.

Granada: An old term meaning 'grained', the fabric is fine worsted cloth with a face finish on the right side. The weave has a broken appearance. The cloth is normally black. It is used for women's coats and men's lightweight overcoats.

Grand Lez: All-wool, white army coating in France.

Grand lion: Figured table linen, made in France.

Grande venise: Very fine damask table linen having large flowers for design, made in France and Holland.

Grandine: 18th-century woollen fabric in England.

Grandrelle: (a) A ply yarn spun of strands of different colours; (b) Cotton shirting, made in warp satin weave. The two-ply warp contains different coloured strands.

Granite: An irregular, mottled and pebbled effect in the weave, produced by an irregular wide twill.

Granite weave: Broken 2/2 twill, woven with a light warp and dark weft (or vice versa), is sometimes called granite weave because of its resemblance to evenly speckled granite rock.

Grant: A Highland tartan with a red ground, the repeat made as follows – Wide red field, split by two pairs of narrow dark blue lines; narrow pale blue and narrow red lines of same width as blues; dark blue stripe, three times as wide as narrow 'blue lines; dark green field of same width as red field, with red, green, red lines (of same width as narrow blue lines) at each side, and red, blue, red, blue, red lines (of same width as narrow blue stripes) in the middle; repeat group described between the two, in reversed order.

Graphic tufting machine: Tufting machine, capable of producing patterns.

Grass cloth: A fine, smooth, linen woven in checks of blue and white, red and white, etc., used for dish towels; also a thin dress material of ramie and cotton, etc.

Gratel: Twilled, coloured linen cloth, made in Germany.

Gravure print: An intaglio printing process using etched copper cylinders or plates. In order to achieve a perfectly smooth substrate surface as a prerequisite for gravure printing, it is necessary to apply a ground coat before printing (Ramisch- Kleinewefers), i.e. before print paste transfer takes place by contact between the inked roller and the substrate using an applied pressure The process is also used for the production of high quality printed papers for transfer printing.

Gravity separation: In the treatment of gaseous or liquid or solid wastes, gravity is the basis of settling. For air pollution control, gravity based processes include air classification, gravity settling chambers, etc. In water and wastewater treatment, gravity based processes include clarification, sedimentation, gravity thickening, etc.

Gravity settling chamber (gravity settler): A long ***expansion chamber*** that allows particles to settle from a gaseous effluent. It is mainly used for particles greater that 100 m and is very inefficient for particles less than 10 m. The efficiency can be increased by the incorporation of a spray within the chamber (known as a gravity spray chamber) or by adding baffles that vary the flow direction.

Gravity thickening: The thickening of sludge by allowing the sludge to settle is common in the treatment of water and wastewater sludge. The thickening tank often has a stirrer which slowly rotates, helping the sludge to settle and

thicken. The supernatant from sludge thickening of wastewater sludge can be high in BOD and suspended solids. The design is based on ***solids loading rate*** and varies from 10 to 100 kg of dry solids/d per m^2 of tank, depending on the type of sludge.

Gray: Unbleached and undyed cotton or linen fabric. See **Grey** *and* **Greige**.

Gray, Gy: The SI unit for the amount of energy radiation absorbed by a material, i.e. the absorbed dose. One gray is the 1 joule of radiation energy absorbed by 1 kg of matter.

Gray: The USA spelling of grey.

Gray goods: A fabric in the condition in which it leaves the loom or knitting machine, i.e. before any bleaching, dyeing or finishing treatment has been given to it. See also **Greige goods, Loom-state fabrics**. *Note*: In few countries, particularly on the North American continent, the term "greige" (or griege) is used. For woven goods, the term "loom state" is frequently used as an alternative. In the linen and lace trades, the term "brown goods" is used.

Gray fabric: See ***Gray goods***.

Gray wash: A process in the bleaching of cotton piece goods, consisting of soaking the fabric in water and keeping it wet for a couple of hours.

Gray wool: Fleeces with a few dark fibres, a rather common occurrence in the medium wools produced by down or black-faced breeds.

Grayson: A commercial variety of prolific and early ripening upland cotton, the staple measuring 23–25 millimetres; the yield is 34–36%.

Grey felt: A blend of white fibres with naturally coloured or dyed fibres, or both, that has an overall gray appearance.

Grease dyeing: Process used in dyeing serge and cotton warp woollen cloths without scouring the first.

Grease trap: A small *skimming* tank typically with a retention time of 10–30 min, large enough to hold and cool the grease delivered in the wastewater from premises generating high quantities of grease, such as restaurants and a range of other food sector establishments. Only the wastewater from the grease producing areas should go to the grease trap. Other wastewater from the premises, particularly from toilets, is not connected to the grease trap. It should be regularly emptied. The inlet is below the surface and the outlet is at the bottom, normally separated from the inlet by a baffle that holds back the grease.

Grease wool: Wool taken from the living sheep and which has not been commercially scoured.

Grebe cloth: Long napped cotton cloth; used for underwear.

Grecian: (a) A name for a huckaback weave; used for coarse towels; (b) Woven quilt, made of bleached ply yarn of low count for warp and filling. The pattern being geometrical diapers.

Greek lace: Cut or drawn work embellished with various stitches or additions of needle-point lace; also called Reticella.

Green: The colour of growing grass. From the old English 'gréne' and the old Teutonic root 'grô' from which we derive 'grass' and 'to grow'. Green is said to have more variations than any other colour and yet, despite the richness of our language, there is a woefully inadequate supply of words to describe the variety of greens in the British landscape. It ranges from approximately 575 to 500 nanometres. It is one of the three ***additive primary colours***. A symbol of hope; associated in medieval times with the Zodiac signs Libra and Taurus and with the planet Venus. The holy colour of Islam and used on the flags of many Muslim countries. Associated once with fertility and springtime and now with environmentalism. Why the surgeons' gowns are usually green in colour and first aid kits are also often green? Is it perhaps that (as *chromotherapists* believe) the colour green can help to staunch the flow of blood? One of the 140 colours in the *X11 Colour Set* having hex code #008000. In English folklore, green is widely supposed to be unlucky especially as regards items of clothing – '*wear green and you will soonwear black*'. Why this should be so is uncertain but is sometimes explained by reference to the fact that green is the colour taken to be worn by fairies who punish others for wearing it. Research in Münster has found that green police cars generate little respect in Germany – green having been adopted in Germany for this purpose as a rejection of militarism. It was found that blue and white or blue and red patrol vehicles had a much more powerful effect.

Green linen: Trade term for linen cloth woven of unbleached or "green" yarn.

Green cotton: A brand name for T-shirts produced in accordance with specific ecological requirements. Manufacturers of these shirts which are labelled with a number and the inscription "green" are bound by a self-obligation to fulfil the following conditions:

– only cotton grown under ecologically acceptable conditions may be used;
– only the most environmentally-friendly wet processing treatments are to be used.

Green gold: A name for sisal fibres.

Green tack: A term used in fabric bonding for the preliminary bond created in the first stage of curing by the wet adhesive process. At this point, the bond is not fully cured and hence is "green".

Green unripe cotton: Cotton seed hair which has developed too late on the outer skin of the cotton seed or which originated from cotton balls which have been harvested too early. These immature cotton fibres are thin walled and generally have only few convolutions in contrast to mature fibres. The natural green colour of immature cotton fibres cannot be destroyed by the usual bleaching processes. Cotton with a high proportion of immature fibres is therefore unsuitable for white goods.

Green yarn: Trade term for undressed jute or unbleached linen yarn.

Grège raw silk: The raw silk strands or filaments (reeled from several cocoons), i.e. silk still covered by sericin (gum).

Greige (French): Grey-beige; North American equivalent to British grey. In North America, greige is often used to describe loom state fabric that is unbleached, contains size and lubricants, and may be a bit dirty. Greige goods are made ready for dyeing by singeing, desizing, scouring and usually bleaching.

Greige fabric: Loom state fabric or fabric which has not undergone any wet processing after weaving.

Greige goods: Textile fabric that have received no bleaching, dyeing or finishing treatment after being produced by any textile process.

Greige thread: Undyed or unfinished sewing thread in the state of following final plying or equivalent steps in processing sequence, such as extruding, or braiding.

Greige yield (in knitted fabrics): The number of finished square metres per kilogram (yards per pound) of greige fabric.

Greiz-geraer fabrics: Greiz-Geraer ladies' dress fabrics, obsolete German brand name for fine worsted fabrics made of merino wool, plain coloured or patterned, and in designs following Paris and Milan fashions. In the "Greiz-Geraer genre", 80% of the ladies' dress fabrics were woven in worsted spun yarns and 20% in pure silk.

Grenada: (a) A variety of Indian raw cotton; (b) Light fabric, made with black cotton warp and mohair or alpaca filling in a five-leaf weft satin weave.

Grenade: (a) French table linen, made in plain weave or with small dobby design; obsolete; (b) A fine fabric, made in France of wool and silk; used for table cover.

Grenadine: (1) Term used to describe an outer garment like cloak, but now refers to a loosely woven gauze-type fabric. It may be cotton, polyester and nylon acrylic or mixtures. Used for making filmy dress or blouse fabric.

(2) A yarn made from three very highly basic yarns. The fibre may be silk, cotton or synthetic. The yarn is woven into a variety of fabrics of different weights including, voile, organdie and satin.

(3) Silk yarn produced from doubled twisted organzine, but with a higher degree of twist organzine silk; (a) A term used for various fabrics. Grenadine that is produced with a silk warp and worsted or mercerized cotton weft is called satin grenadine which is executed in a satin weave. The term also applies to a lightweight, almost transparent, type of Étamine (silk/mercerized cotton) and fine loosely-woven women's dress materials similar to marquisette, or damask type fabrics. The term has also been used for fine stockings (viscose filament), from which crêpe stockings (yarns with a half voile twist) were developed (1933).

Grenadine crepon: All-wool black dress goods, having open check patterns and ribs.

Grenadine (silk): Silk yarn from two or more threads, similar to organzine, but more strongly twisted, 1200–1800 twists per metre for the pre-yarn, 1000–1800 for the subsequent yarn. The threads have very closed effect, show high abrasion resistance and are used as both warp and weft material or special weaves as well as ladies hosiery.

Grenadine yarn: See **Yarn (silk); Grenedine (silk).**

Grenfell cloth: Closely woven reversible twill fabric, mainly used for raincoats, because the close twill weave causes it to be water repellent. The fibres used are worsted or polyester or blends; similar to gabardine in appearance.

Grex: An obsolete direct yarn numbering system for fibre yarn or other textile strand equal to the mass in grams per 10000 m.

Grey: (1) British term equivalent to North American *greige*.

(2) The colour of lead, of ash and of the hair of the middle-aged; a mixture of black and white. A bleak colour, but perhaps resurrected by the Chinese government's decision to paint the buildings of Beijing grey as part of its bid to stage the 2008 Olympic Games – 'Grey matches our climate, cultural background and tradition' says Beijing as reported by *The Times* (7.11.00) in what must be one of the very few Leaders devoted to a colour. An achromatic hue. An example of how colours are used as nouns occurs in Marks & Spencer's explanation of why their 1999 half year pre-tax profits halved to £546.1 million – '*we bought too much grey*'. A colour used in this way, that is in a referential sense, is intended to include all shades of the colour, whereas a person using a colour term in an adjectival or descriptive sense has a particular

hue in mind. The part of the brain which perceives and processes grey-scale images is different from that part of the brain which deals with colour. The United States spelling is 'gray'.

Grey goods: The term refers to any fabric from the loom, regardless of colour or fibre content, that has been woven but has not yet undergone any finishing treatment either wet or dry. Many companies produce only grey goods, sending them to specialists to be finished.

Grey fabric: Loom state fabric which has not undergone any wet processing.

Grey scale: An achromatic scale ranging from black through a series of successively lighter grey to white. Such a series may be made up of steps which appear to be equally distant from one another (such as the Munsell Value Scale), or it may be arranged according to some other criteria such as a geometric progression based on lightness. Such scales may be used to describe the relative amount of difference between two similar colours. In textile mainly two types of grey scales are used –

(a) *Grey scale for the assessment of staining*: Consists of a scale of 5 pairs of grey and white coloured plates in which each pair of plates indicates a different degree of contrast with the 5 full steps being arranged in geometrical progression. The number of the contrast pair in the grey scale (from 1 to 5) which corresponds as closely as possible to the degree of staining that is noted and serves as the fastness rating. Half steps are provided in the grey scale to improve the accuracy of assessment –

i = heavy staining,
ii = moderate staining,
iii = medium staining,
iv = slight staining,
v = no staining.

(b) *Grey scale for the assessment of change in colour*: Consists of a scale of 5 pairs of grey-coloured plates in which each pair of plates indicates a different visible degree of contrast. In a like manner to that in (1) above, the visual difference between the grey scale and the test specimen is compared and rated as follows –

i = very poor (severe change),
ii = poor,
iii = fairly good,
iv = good,
v = very good (negligible change).

Besides the numerical rating for change in colour, the rating may be supplemented by a letter to indicate an accompanying change of hue or brightness, e.g. D = duller, Br = brighter, R = redder, Y = yellower, Bl = bluer, G = greener.

Grey thread: Undyed or unfinished sewing thread in the state following final plying or equivalent step in the processing sequence such as extruding or braiding.

Grey tufted carpets: Grey form tufted carpets, back coated only and kept in the store to reduce the lead time in supply. When the order is received, the grey tufted carpets are taken and cut into the required sizes, dyed, finished, and dispatched to the customer.

Gridelin: Violet grey; greyish-violet colour. From the French *gris-de lin* (grey of flax). Also a mixture of red and white.

Griffin: Commercial variety of cotton from America, yielding the finest and longest staple known; the bolls are large, yielding 28–29% lint.

Grin: A flaw in the cloth which results from the warp rib showing through the covering threads.

Grin (in sewn seams): To stress a seam, so that the individual seam can be seen.

Grinning in printing: A term used in textile printing to describe a printing defect in the form of small, unprinted areas in a design caused by the printing of colours bordering each other with screens or printing rollers where the engraving allowance for the bordering colours has not been sufficiently generous to ensure an unbroken border between the adjacent colours thus allowing small white (unprinted) areas to "grin" through.

Grinning in dyeing: In dyeing, lighter appearance of a fibre type in dyeing mixed fibre fabric. In printing, irregular or light-coloured, unprinted places, poorly wetted out as a result of too highly concentrated thickener (Print definition).

Grinning: Gapping of seam under stress, usually due to inadequate thread tension at sewing.

Grinny cloth: A cloth with an unsatisfactory cover. It is sometimes called Hungry cloth. See **Hungry cloth**.

Grip (in tensile testing): To hold, grasp, or secure, for example, to grip the specimen by the jaws of the clamps.

Gripper axminster: A machine-woven velour carpet in which the differently coloured dyed yarns for the warp pile are supplied as required from bobbins

carried on a creel behind the weaving machine. Jacquard operated yarn carriers present the appropriate coloured yarns to the grippers which grasp the required length of pile, which is then severed. The grippers, holding the tufts, then swing down to insert the tufts of yarn at the point of weaving across the entire width of the carpet. The maximum number of colours is usually limited to 8, but may be as high as 12. See **Carpet**.

Gripper looms: Shuttleless looms. These looms employ a projectile with a jaw that grips the end of the filling yarn during the insertion of the pick.

Gripper shuttle machine: A weaving machine in which the weft thread is gripped by jaw(s) that are fitted in a projectile which is then propelled through the shed.

Gripper, Gripper web, Gripper tape: A narrow fabric, typically 30 mm wide, which may be woven or knitted, having one or more raised stripes in the warp direction formed of a high friction material. It is used in the inside of the waist band of skirts and trousers to keep it in place.

Gris: Grey.

Gris: Grey cotton goods in the Philippines.

Gris fer Bleute: French army cloth; used for coats.

Gris- brun: French military cloth, made about 48 inches wide after fulling; made of long staple wool, one-third white and two-thirds black wool, in natural colour, being mixed.

Grisaille: (a) French for grey mixture (pepper and salt) effects; (b) Plain woven French dress goods, made with a black and white printed warp and worsted filling.

Grise- (L): Grey.

Grisette: Originally light, grey coloured dress goods, made in France of mixture of silk, cotton and wool, or of all-wool, and used for garments by the lower classes. Later made in all colours and in very good qualities, similar to etamines. G is the original but obsolete name for a strong, wool etamine.

Griseous: Bluish-grey colour.

Grist: (1) In Scotland, the standard size for ropes, meaning one inch diameter and three strands, each of them twisted together of 20 yarns.

(2) The yards (or meters) per pound (YPP). A finished yarn that came up to 890 YPP, one pound of yarn would equal 890 yards. The grist (or "count") may range from 300 yds/lb to 3,000,000 yds/lb for a single filament of silk (theoretically).

Grit: In air pollution, particles larger than 75 m. In wastewater, grit includes sand, gravel, ashes, metal, glass, earth from vegetable washing, etc. It settles more easily than the ***organic*** solids in wastewater and usually increases in amount after rain. In desert areas, the grit content in waste water may be high because of wind-blown sand. In cold climates, gritting of roads in icy weather increases the grit content of ***storm water***. The volume of grit removed from domestic waste water is normally 15–30cm^3 per person per day.

Gritty wool: Wool with a dry and hard feel, owing to the presence of sand.

Grizzle: Grey.

Grog: English technical term for any fabrics woven ends together, irrespective of the construction of the fabric.

Gros or Grosse: French for stout and thick fabrics. Also a name for large variety of cross-ribbed fabrics.

Gros Forts: Strong, stout French linen; used in upholstery.

Gros d'Afrique: Plain woven, all-silk dress goods. The warp consists of single threads of ecru silk and double or triple strands of boiled silk. It is double-faced with a velvety and cross-ribbed effect.

Gros d'Afrique Corde: Double-faced, plain woven dress goods, made of two silk warps, one being a single thread of ecru silk. The other double or triple strand of boiled silk. The filling is of heavy, loosely twisted cotton yarn. The effect is heavy and velvety cross-ribs.

Gros d'Alger: French silk fabric, made with two sets of warps; it has cross-ribs.

Gros de Berlin: Cross-ribbed French silk fabric made with two sets of warp; also made of alpaca.

Gros de Chine: Cross-ribbed French silk fabric, made with two sets of warp and heavy filling.

Gros d'Ete: Silk fabric, with two sets of warps. It has cross-ribs.

Gross De Londres: A cross-ribbed fabric with alternating heavy and fine ribs, or ribs of different colours. Made in plain weave and plain weave variations. A glossy finish is applied and is fairly stiff to handle. The fibres used are viscose actetate, triacetate, polyester or silk. Used for millinery and also for evening dresses.

Gros de Lyon: Cross-ribbed French silk fabric, made with a heavy filling and two sets of warps, one containing one third, the other two-thirds of the warp ends.

Gros de Messine: Silk dress goods with fine ribs and organzine warp, which forms the face.

Gros de Naples: Plain woven silk fabric of Italian origin, made with ply warp of organzine and a heavier two-ply (filling, forming cross ribs; used for coats, hats, etc.).

Gros d'Oran: French silk brocade; used for dresses.

Gros d'Orleans: Twilled ribbed fabric, made with two sets of filling, one being of the same colour as the warp and the other a glazed yarn.

Gros de Suez: Finely ribbed silk lining for hats.

Gros de Suisse: French silk fabric, having cross-ribs on the face. It is made with two sets of warps and heavier cotton filling in plain weave.

Gros de Tours: (a) Jacquard figured cotton bed spreads in Argentine; (b) Plain woven cross-ribbed French fabric, made of silk and other materials, the ribs being formed by two picks, the warp having two or three plies.

Gros de Tours weaves: In this weave, the working of the warp is the same as in taffeta, except that instead of one pick, two or more are inserted in the same shed. It is mostly used in selvedges, where it serves to give more firmness to the edge of an otherwise loosely woven cloth, and prevents the weaving ahead of the edge in a tight weave. Gros de Tours is sometimes used, especially when cotton or wool filling is employed, with a view to lay two picks nicely side by side, whereas a thread entered two ply with the taffeta weave will always receive some twist, which may disturb the perfect evenness of the fabric.

Gros des Indes: Plain woven, all-silk dress goods, made with two warps – one single and the other double or triple, and two fillings, one very fine, the other reeled from 8 to 10 natural strands, resulting in a cross-ribbed effect.

Grosgrain: (1) A heavy fabric with prominent ribs, grosgrain has a dressy appearance and is used in ribbons, vestments, and ceremonial cloths.

(2) A plain weave cloth with a prominent rib effect. The fibres may be silk, worsted, cotton or viscose, acetate, nylon. The cords are heavier than those in poplin and rounder than those are in Faille, and it is a fairly stiff fabric, made only in plain colours. Used in formal clothes, such as ceremonial gowns and church vestments, but also for ribbons (Synthetic), hard wearing

Grosse chainette: Solid coloured plain French serge, made with eight leaves and six picks in a repeat.

Grosse cote: Solid coloured plain French serge, having eight leaves and eight picks in a repeat.

Grosse draperie: French term for all woollen fabrics which are felted or shrunk, irrespective of the fineness, weave or other characteristics.

Grosse Grenadine: French serge, made with 12 leaves and four picks.

Grotto: A strong greenish-blue colour.

Grotto blue: A vivid greenish-blue colour.

Ground: See **Fond**.

Ground colour: A term describing the plain background colour against which a design is created.

Groundwater: Water contained in the soil or rocks below the ***water table,*** i.e. in the ***zone of saturation***. It is the immediate source of well water. If too much is drawn off the water table, ***piezometric surface*** is lowered.

Group (in upholstered furniture): A number of individual upholstered furniture units that are related by one or more physical characteristics such as styling, colour, shape or covering.

Growth: (1) An increase in one or more dimensions of an object or material.

(2) The increase in length of a specimen caused by the application of a continuing load or force under specified conditions.

Growth (of a fabric): The difference between the original length of a specimen and its length after the application of the specified load for a prescribed time, and the subsequent removal of the load.

Growth (in tyre cord): The increase in length of a specimen caused by the application of a continuing load or force under specified conditions.

Gru Gru: Very fine and soft fibre yielded by the leaves of the palm of same name in the West Indies.

GSB test: Test for determining the maturity of cotton, otherwise called the Red/Green Test or simply Goldthwait test, devised by Goldthwait, Smith and Barnett.

Guana: (a) Silky and yellowish seed hair of the Bombax tree found in Cuba; (b) Fabric made of the bark of the lace tree found in Jamaica.

Guaxima: Very strong fibre yielded by the *Urena lobata* in Brazil; used for making bags and ropes.

Guayanilla: Variety of white, lustrous and strong raw cotton from the West Indies.

Guanaco: The yellowish-brown hair of the guanaco, a llama-like animal that roams wild over a large area of South America. Guanaco belongs to the group

of natural protein fibres. Only the under hairs are of textile value. The fibre is extremely soft and silky, the finer hairs are approximately 20 μm and the coarse hairs approximately 75 μm in diameter.

Guar or Guar gum: A plant-derived gum – Guar gum is used as a thickener in few printing pastes for acid dyes and in *etching* paste for cellulose fibres. It is reasonably resistant to acids. Guar is unsuitable for use with reactive dyes, since it will itself react with the dye. Modified guar gums are also used.

Guar gum (Guaran): Asiatic type of gum (*Cyanopsis tetragonoloba*), fraction of the endosperm ground from the seeds (diameter approximately 5 mm) of the guar plant, a grey-white powder comprising 65% mannose and 35% galactose (*Galactomannan*), aqueous-colloidal neutral solution, has an approximately 8-fold starch thickening power and is used as a fine powdery thickener in carpet printing and dyeing processes, amongst other things.

Guard hair: The long, stiff and usually coarse fibre which projects from the woolly undercoat of a mammal's pelt.

Guembipi: (a) Fibre yielded by the stem of a species of Philodendron in Brazil; used for ropes; (b) A dark coloured, very strong and durable bark fibre, yielded by a creeper of the *Aroideae* family in Paraguay; it will not rot; used for ropes.

Guendje: See **Genghis rugs**.

Guernsey: A close-fitting knitted woollen shirt.

Guibert: Stout bleached French linen shirting.

Guibray: In France, a thick cotton yarn; used for wicks.

Guide bar: A mechanism on a warp-knitting machine that directs warp threads to the latch needles.

Guide rod: Fixed rod for guiding the cloth.

Guide roller: Device, fitted on textile machines, for guiding the cloth by means of an idler roller which rotates freely as the cloth is passed over it. The purpose of guide rollers is to ensure the correct passage of the cloth, i.e. at low tension, and free of creases (poor guide rollers are the main cause of creasing).

Guides: Fittings of various shapes for controlling the path of a thread line.

Guignet's green: A bright bluish-green colour patented in 1859 by the chemist Guignet, C. E. and sometimes referred to as permanent green. See ***Viridian***.

Guillotine: Cutting device that consists of a single blade that descends between guides for chopping fibres, plastic strands, etc.

Guimhas: Cotton or woollen ribbons produced in Latin America.

Guimp: (a) In laces, a heavy thread placed on the edge of the sprigs; (b) The design or pattern of the lace.

Guinea: Having the colour of a gold guinea coin.

Guinea cloth: A soft, napped cotton fabric of England, woven with two sets of warp, about a yard wide and dyed indigo blue. It is sold in the West African markets.

Guipure: (a) Originally gold and silver lace made with the bobbins or the needle, the patterns being formed by heavy cords padded with parchment (called cartisane) or by a thick thread. It was also called parchment lace; (b) Tape laces in the 16th and 17th Century with the outline of the patterns formed of needle-point or bobbin made tape over a coarse round meshed ground, occasionally ornamented with brides ; (c) At the present, laces with large patterns without any brides or mesh ground are called guipures.

Guipure lace: Although now entirely made by machine, this was once handmade. It is Italian type of lace. It is composed of thick, heavy patterns, often with quite large motifs, joined together with bars or brides. The ground fabric is made from nylon acetate or sometimes cotton. The thick embroidery is worked and then ground fabric is dissolved with chemicals and that will not affect the embroidery.

Guipure de Flandres: Old Flanders bobbin lace with raised patterns.

Guipure renaissance: Embroidery and applique work, composed of cheese cloth, cord and sewing silk; used for mats, etc.

Gulbadan: See **Amritsar silk**.

Gulbani: A very light and transparent Indian cloth made of silk and interwoven with gold thread.

Gull: A very old name for a shade of grey.

Guly: Red.

Gulnagai: Fine, plain cotton muslin of India.

Gum: A term covering a wide range of substances. Strictly, gums are carbohydrate high polymers, either soluble or dispersible in water, that are derived from vegetable origins. Loosely, the term gum is used to mean resins, saps, natural rubber, chicle, starch, cellulose derivatives, and many other products. In textile printing, the term refers to print-paste thickeners.

Gum Arabic: Senegal gum, acacia gum, African vegetable gums which contain up to 80% Arabic acid. Most highly prized is gum kordofan from Sudan (2 cm droplet length, slightly yellowish or of a deep amber colour,

rarely colourless). Much less pure is ***Geddahgum*** from the area around Aden (grainy, deep yellow, brown to black; when dissolved leaves quite heavy insoluble sediment), similar in appearance and quality to Moroccan Mogador gum.

Gum (silk): Sericin.

Gum spots: Print mistake. The spots where the gum is not washed off properly.

Gum tragacanth: See **Tragacanth**.

Gumming: A Highland tartan, composed of the following on a red ground – A narrow dark green stripe, two wide green bars and another narrow green stripe, separated from each other by red stripes half the width of the narrow green stripes. The wide green bars are about four times as wide as the green stripes and are split in the centre by a single white line. Each group of green stripes and bars is alternated with a wide red surface, split with a narrow black stripe.

Gummy wool: Scoured wool that still has some yolk in it.

Gun patch: A reinforced patch is placed on the shoulder – here for protection when shooting.

Gunclub check: A wool fabric with distinctive checks. The checks are usually woven in the greens, browns and sometimes worth an over-check. Used as sports jackets, plus fours, golfing skirts, etc.

Gunmetal: The dull blue-grey colour of gunmetal; a dark grey colour. Also ‘gunmetal blue’.

Gunn: (a) A commercial variety of short staple upland cotton from the Mississippi; (b) A Highland tartan, the repeat made as follows – wide, dark green bar, split in the middle by a single narrow red stripe; black stripe, half the width of the green; very fine green line; navy blue bar, same width as green bar, split in the middle by a very fine green line; another very fine green line; black stripe, measuring half the width of the green bar.

Gunny: Very coarse and open, plain woven bagging, made of jute, also of hemp. See **Bagging**.

Gur or Gurra: Indian coarse white muslin.

Gusset: A piece of material let into a garment to strengthen, shape, or enlarge it.

Gut (thread): See **Stuffer yarn**.

Gutta: French for “resist”, which forms a barrier on the fabric to create a pattern. May be water soluble, solvent soluble, or a heat fixable resin.

Gutta percha (trans-polyisoprene): The name is derived from Malay getah = gum + percha = name of a tree from which it is extracted. A natural latex product, similar to rubber, from the latex of any of several tropical trees of the *sapotaceous* genera palaquium and payena. It may be used for painting on silk in the form of a solution with a honey-like consistency to produce resists on the fibre (it forms a film on drying which is impervious to water and dyes) and thus makes separation lines in coloured designs possible.

Guttar: Indian satin made with silk face and cotton back.

Guzieh: An inferior and plain woven Indian cotton cloth.

H

H ions: See **Hydrogen ions**.

HA: (a) Hairs; Standard abbreviation for textile fibres; (b) Hemp.

Ha: Hemp; standard abbreviation for textile fibres. See **HA**.

Haberjet: Coarse and medieval woollen broadcloth, made in England. It is said to have been worn by the monks.

Habit cloth: Medium weight suiting material made of wool in satin weave with a fine warp and a thicker weft and a dress face finish. Used for suits and winter dresses.

Habitat: The natural environment or location of a plant or animal.

Habutae: See **Pongee**.

Habutai: (1) Japanese word meaning 'soft and light'. Originally used for Japanese waste silk, but now used for silk material made on powerlooms in plain or twill weave. It is heavier than traditional Chinese silk, but similar. Very light weight and soft. Sold by weight measure known "momme" (1 momme = 3.75 g). Made from waste silk that can be twisted. It is piece dyed or printed and sized. Has many defects in the cloth which has a "shot-about" appearance, but this does not affect the cloth. It comes from Japan – originally woven in the gum on Japanese hand looms. Lighter than shantung, but heavier than silk.

Uses: Dresses, coats, shirting, lamp shades, lingerie, curtains, men's jackets, women's shirt waisters and skirts.

(2) This is a cheap silk which is excellent as a soft, lightweight lining fabric for evening dresses, wedding dresses, etc. It is used as lining for people who find synthetic lining uncomfortable or allergic.

Hackles: The comb for dressing flax or hemp.

Hackling: A mechanical process given to flax stems after scutching. Its purpose is to remove short fibre, motes (or neps) and non-fibrous material. Hackling involves drawing the fibres through inclined steel combs, each successive comb being finer than the previous one. As a result, the coarse bundles of fibre are separated into finer bundles and the fibres are thereby aligned parallel to

one another. The outcome is approximately 20–70% hackled flax (long fibre), 60–20% flax tow (short fibre) and remaining motes. See **Flax processing**.

Haddat: Square printed cotton cloth; used as head covering in Asia Minor.

Hadjai: A hand-spun gold thread in India, used for embroidery.

Haifa: Native Algerian name for esparto.

Haining wool: A Chinese fine grade carpet wool.

Hair: Natural animal fibre other than sheep wool or silk.

Hair canvas: A woven interfacing material in various weights. Coarse goat hair combined with wool, cotton or rayon is used in the weft. Used in coats and jackets made from suiting and coatings.

Hair cloth: Cotton, polyester, linen or other fibre with which horse hair has been mixed to make it strong and inflexible. Used in upholstery, and also as chest canvas in tailoring.

Hair-dye: Dye which is used to colour hair. In ancient times, the Greeks used **saffron** to dye their hair. The Romans used vinegar and fermented leeches as a black dye with the caution to keep oil in the mouth during use to prevent one's teeth also going black. Blonde hair was more often the fashion until Elizabeth I created a move towards red hair. See **Dissembling colour** and **Tattoo**. A few modern hair dyes, particularly those containing para-phenylene diamine, are known to be capable of affecting people who suffer from allergies (and possibly of causing anaphylactic shock) making it essential to carry out a skin test before use. Researchers at the University of Southern California have also found that permanent hair-dyes can increase the risk of women getting bladder cancer. Even semi-permanent hair-dyes (especially those in dark colours) have been linked with an increased risk of certain cancers.

Hair fibres: This group includes all animal fibres with the exception of wool (natural protein fibres).

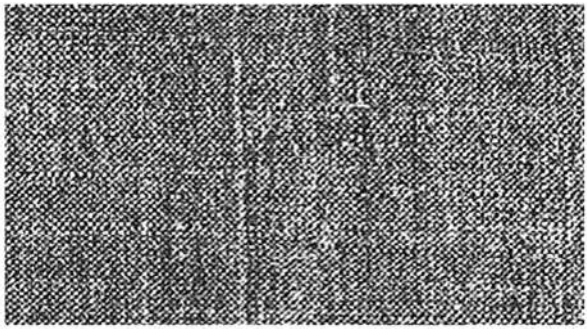
Hair papilla: See **Human hair**.

Hairas: Yarn made of coarse oriental wool and has little lustre.

Hairbine: An 18th-century English woollen fabric.

Haircloth: (1) A very resilient in the weft direction cloth, woven of horse hair of the horse's mane or tail which does not form a continuous yarn and is not twisted (or sometimes camelhair), from which it takes its name, for weft with cotton, wool or linen warp. It clings to the outer cloth because of its rough surface texture. It is woven in plain or satin weave and is used for interlining,

for facings, furniture cover, front part of suits, jackets and coats made from medium to heavy weight fabrics, etc. Used also as chest canvas in tailoring.



(2) An imitation of the real horsehair cloth is made by using hard-spun cotton yarn entirely, which is heavily sized to give stiffness. This fabric is used as dress interlining.

Haircord: A plain woven cotton fabric characterized by fine rib lines in the warp direction created by alternate coarse and fine ends or by having two or more end weaving as one alternately with a single end. A possible construction is 28 ends per cm by 26 picks per cm; 2 ends 18 tex and one end 21 tex cotton warp and 21 tex soft spun cotton weft.

Haircord carpet: A low level loop pile carpet with pronounced rows of loops in the weft direction. The pile is 100% hair.

Hairiness: A term used to describe the projection of free floating fibre ends or loops from the surface of a fibre assembly. It is a desirable characteristic in raised, brushed, fleecy fabrics (confers good heat retention properties). However, hairiness reduces the strength of yarns.

Hairiness (in raw silk): The condition of the yarn when there are numerous loose ends of cocoon filaments projecting from the surface.

Hair line: Woollen or worsted dress goods or men's wear, made with very fine continuous stripes, produced by single warp yarns crossed by a filling of the same colour. The fabric is given a clear finish; (b) Fishing line made of horsehair.

Hair net: Made of silk or human hair with large mesh; used to prevent the hair getting disarranged.

Hairline: Very fine lines.

Hairy: See **Fuzzy**.

Haitien: Plain woven silk dress fabric, made with fine warp and heavier filling, alternately in white and coloured picks.

Hakamaji: A Japanese cotton fabric made on hand looms, mostly in plain weave. It comes usually in blue and white stripes and has cross ribs. It is used for making men's skirts.

Hakir: Strong warp striped cloth in East India, made with silk warp and cotton filling.

Hakistery: Black and white ground prints, used in Persia for clothing.

Half backs: Woollens partly made like backed goods.

Half basket: A variation of basket weave is usually woven with double warp ends but single picks. The vertical lines in this cloth, where the weft passes over the double ends, are called ribs or cords.

Half back stitch: The half-back stitch is made by taking one stitch and placing the needle half way back, then bringing it out twice the length of the stitch and placing the needle half way back each time from where the last stitch ended. The appearance on the right side will be of regular space as in the running stitch.

Half bleach: A term used to describe a bleaching effect which is adequate for goods to be subsequently dyed (but not for whites).

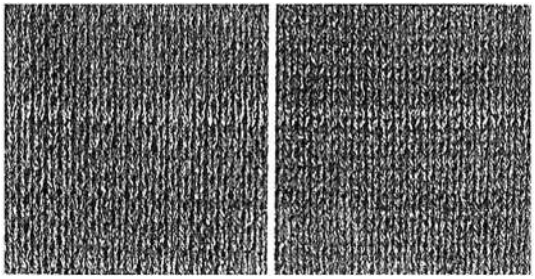
Half-blood: American designation of wool compared in fineness to the full blooded merino as standard.

Half damask: Made in England of silk and cotton or silk and wool.

Half-dyeing(time of): The time taken in minutes for a textile substrate to absorb 50% of the dye it will absorb at equilibrium under the same conditions. As a dye characteristic, it is less suitable for the selection of combination dyes for dyeing acrylic fibres with cationic dyes. In this case, the Compatibility value K, is a much more reliable parameter.

Half emulsion: Combination of an Emulsion thickener and a conventional thickener (e.g. alginate). Used in direct printing for the application of most dye classes with the exception of indigo and oxidation dyes.

Half Milano (ripple): A weft knitted fabric. In half Milano, a course of 1×1 rib is followed by a course in which only the back needle bed knits plain. The loops in the front bed are held over and are extended. The extensibility in the width is reduced by the plain course. If more than one course of plain loop is knitted, either on the front or back needle beds, the result is a ripple fabric. The plain courses are thrown in to relief (without special patterning). These fabrics are used for pullovers and waist coats.



Half Milano face and back

Half pick: A fabric fault is caused when a pick is broken and is not removed in weaving.

Half resists: See **Half-tone resists; Resist printing**.

Half silks: Silk fabrics made partly (warp or filling) of cotton.

Half-tint: Intermediate tone between light and dark.

Half-tone: Tone-in-tone effects in printing, i.e. a range of tones or tonal gradations in addition to the full depth tone with a sharp or gradual transition from the latter. Half-tone process.

Half tone resists: Resist effects produced by pre-printing a colourless print paste, i.e. containing no dye (with or without the inclusion of resist agents) followed by overprinting with a normal coloured print paste. A lighter colour is produced in those areas of the printed design where the second print paste falls on the first. Pre-printing with a high solids content thickener alone will already give a certain resist effect which can be further intensified by the addition of a white pigment (e.g. titanium dioxide, zinc oxide) or a white pigment incorporated into a plastics dispersion (matt white).

Halina: Coarse and checked woollen cloth with long hair on the right side, made in Austria.

Hallencourt: Twilled French table linen.

Hallescrues: Strong unbleached linen made in France.

Halluin: Coarse serge used by the French army.

Halo: (a) A narrow pale (often blurred) outline surrounding a coloured discharge or resist print caused by the outward diffusion of the resist or discharge chemicals into the ground; (b) A ring surrounding the area of a stain on a textile material following attempts at stain removal by local application of a spotting agent (organic solvent). The ring or halo thus formed is caused by the outward diffusion of colouring matter, soil particles, grease, etc.

Halo: Off-shade colour fringe effect, often seen in direct application dyeing when used mixed-colour dyes. It is common for different colour dyes of the same family to migrate at different rates when solutions are applied to fabric. For example, a purple made by mixing Red MX-8B (usually called fuchsia) and Turquoise MX-G tends to produce strong turquoise halos. If a drop of dye solution is applied to soda ash pre-soaked fabric, the red component quickly stops moving outward, but the turquoise continues to migrate outward much longer, resulting in a too-red centre with a turquoise halo. This can be very difficult to control, other than by selection of the dyes used for mixtures. Because black dyes are almost always mixtures, haloing often occurs with black.

Halogenation: A reaction in which a halogen atom is introduced into a molecule. Halogenations are specified as *chlorinations*, *brominations*, *fluorinations*, etc., according to the element involved. There are several methods.

(a) Direct reaction with the element using high temperature or ultraviolet radiation:

$$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$$

(b) Addition to a double bond:

$$H_2C{:}CH_2 + HCl \rightarrow C_2H_5Cl$$

(c) Reaction of a hydroxyl group with a halogenating agent, such as PCl_3:

$$C_2H_5OH + PCl_3 \rightarrow C_2H_5Cl + OH–$$

(d) In aromatic compounds, direct substitution can occur using aluminum chloride as a catalyst:

$$2C_6H_6 + Cl_2 \rightarrow 2C_6H_5Cl$$

(e) Alternatively in aromatic compounds, the chlorine can be introduced by reacting the diazonium ion with copper(I) chloride:

$$C_6H_5N_2^+ + Cl^- \rightarrow C_6H_5Cl + N_2$$

Hamadan carpets: Especially hardwearing rustic mesomeric resonance (Methyl sulphinyl carbanions). Knotted carpets from the region around Hamadan which rises above the Iranian tableland at some 2000 m above sea level. Hamadan and the villages of the province are the most important centres of carpet production in Iran. In the main, they have a typical brown natural colour from the wool and camel hair used in theirchlorine, bromine, iodine and fluorine. They react with metals to form ionic halide salts, e.g. iron chloride $FeCl_3$. Their hydrogen compounds are called hydrohalic acids,

e.g. hydrochloric acid, HCl. Halogens production. Hamadan carpets are, on the whole, rather mundane as far as decoration and weave are concerned. The materials, by contrast, are of a very good quality. Approximately 250,000 Turkish knots per m^2.

Hambourgeoise: (a) French silk dress goods of the 18th Century. It had a taffeta foundation with napped patterns; (b) A French double-faced silk fabric of the 19th Century, made with stripes. Hamburg Point Drawn work ornamented with coloured silk thread.

Hamamlik: Turkish name for Oriental bath rugs, usually square.

Hamme: (a) Woollen dress fabric made from printed yarns; (b) Plain weave fabric produced from yarn died linen warp and cotton weft, used for table cloth and curtains.

Hammer mill: A device used in the chemical industry for crushing and grinding solid materials at high speeds to a specified size. The impact between the particles, grinding plates, and grinding hammers pulverizes the particles. Hammer mills can be used for a greater variety of soft material than other types of grinding equipment. Compare **Ball mill**.

Hamburg: Wool; glossy embroidery wool yarn in England.

Hamburgo: Americano name for unbleached cotton sheeting in the Canary Islands.

Hamidieh: Fabric made of silk and cotton in Syria.

Hammer blow effect: A defect which occurs in various types of textile fabrics, e.g.,

(a) A generally structure-related colours which are not in level in cotton velvet, especially in the form of "lumps" caused by the presence of a large proportion of motes (these can be detected under the microscope as hard fibre tufts adhering to seed husk residues) which disrupt the pile uniformity.

(b) A "hammered" surface appearance in crêpe fabrics produced from man-made filament yarns by the change of direction of highly-twisted yarns as well as changes between flat and crêpe yarns.

(c) A moiré appearance in plain weave wool fabrics after crabbing.

Hammock cloth: Strong, soft cloth, usually woven of all-cotton with bright coloured warp in plain or fancy weave. Used for hammocks, drapery, etc.

Hamouli: Raw cotton, formerly grown in Egypt; now little cultivated.

Hanabishi: A Japanese silk fabric with gold brocaded diaper pattern.

Hand (or handle): The feel of a fabric. The tactile qualities of a fabric, e.g., softness, firmness, elasticity, fineness, resilience, and other qualities perceived by touch. Hand of a fabric is quite subjective, and often difficult to describe. Both chemical and mechanical treatments are frequently used to alter the hand of a fabric. See **Softener** and **Hand-builder**.

Hand block printing: The cloth to be printed is attached to the resilient surface of a strong and relatively short table (approximately 8 m long). The actual printing operation is carried out with hand-printing blocks on which the design is formed in relief. The printer presses the block on to the surface of a print paste contained in a vessel known as a "swimming tub" or "sieve" in two opposite directions to ensure an even coating of colour paste on the block. When the block is correctly positioned on the cloth, it is struck with the fist or a printer's mallet in order to transfer the print paste from the block to the cloth. This process is then continued as necessary by repositioning the printing block on the cloth each time in accordance with the design repeat.

Hand builders: The purpose of applying hand builders is to add bulk, weight or stiffness to a fabric. For few fabrics, this change must be permanent and withstand washing and dry-cleaning. In other applications, the change is temporary so hand builders are classified as either durable or non-durable. A treatment that makes a fabric feel firmer or stiffer. Hand builders are essentially the opposite of fabric softeners. They may be applied to make a fabric easier to manage in sewing, or to make it feel more robust (as for work clothing). Hand builders may be temporary, such as starch, or permanent, such as polymer resins. Hand builders can interfere with dyeing. Some are impossible to remove.

Hand coater: A simple and effective system for the manual production of colour strike-offs on paper (or textile material) with the aid of short stainless steel rods. The quantity of colour paste applied is determined by the circumferential grooves in the rod surface which range from fine to coarse.

Hand creasing test: By means of the so-called fist method, the fabric to be tested is crumpled, wrinkled, pressed or folded for a few seconds in the tightly clenched fist and assessed, after opening the fist, whether the fabric recovers immediately from its creased state, or only after some time by hanging or lying, or whether the creases can only be removed after smoothing out or ironing.

Hand knotted carpets: Carpets produced by the manual knotting of pile yarn tufts in a warp yarn substrate. See **Knotted carpets**.

Hand loom: It is a loom in which every operation is performed manually.

Hand modifying finishes: Finishes which modify the handle of the fabric.

Hand overcast seam-finish: A finish for the raw edges of a plain seam in which hand stitches are taken over the raw edges of each seam allowance (overcast stitches) about 3 mm (1/6 in) deep and spacing about 6 mm (1/6 in) apart. Ideal for elegant or sheer fabrics like organdy, chiffon, silk, and velvets which deserves that special touch.

Hand-painted mordanted cotton: Cotton fabrics coloured by patterning with mordants manually and then dyeing.

Hand printing blocks: Blocks which are used in hand printing. The blocks are equivalent to screens in screen printing or roller in roller printing. Probably the roller in roller printing is a development of blocks for continuous printing. The blocks are dipped carefully in inks (dyes) and printed on fabrics laid in a table. The setting of the design is done using pin points at the corner of the blocks.

Hand screen printing: Textile printing carried out with flat screens on long tables up to 100 m in length. The process is mainly limited to the production of high quality prints today as it is more labour-intensive and less productive than screen-printing by machine.

Hand sewing machine: (1) Sewing machine that is normally used at home, the drive is done by the hand. It is probably rare now.

(2) Used in wet processing departments for joining loose piece ends, e.g. after taking fabric quality control samples at various stages of processing, joining successive batches of fabric at processing machines, etc. The majority of these machines produce a seam joined by the chain stitch.

Hand wash dip dry: A washing instruction, meaning to be washed by hand only and not in machine, no wringing or machine spinning (centrifuge), and to be dip dried only. Usually this instruction is given for very fine, loose woven, and soft weak fabrics and fabric which have chances for distortion, say silk fabrics.

Hand-washed Wool: Wool washed before it is shorn from the sheep.

Hand-builders: See **Handle**.

Handewarpes: Coloured English woollen fabric of the 16th century.

Handkerchief designs: Engineered prints to fit into a square of fabric.

Handkerchief linen: Also called handkerchief lawn, it describes the finest cotton or linen lawn, or cambric, used for handkerchief. Made in plain colours or printed or even checks. In addition to handkerchiefs, it is also used as baby clothes, christening gowns and table linen.

Handle: Hand or handle are the terms used to describe how a fabric drapes around an object or feels to the touch. When the fabric becomes stiffer or bulkier, the hand of the fabric is said to be built. Chemicals that accomplish this are called hand-builders. When the hand is made to drape more or to feel silkier, the fabric is said to have been softened. Chemicals that do this are called softeners.

Handle: The subjective assessment of the roughness, smoothness, harshness, pliability, thickness, etc., of a textile material and that is obtained by the sense of touch. The handle of a textile fabric is determined by numerous different parameters. In commission finishing, the finisher is usually presented with a sample of finished fabric by the customer, in addition to a colour sample, which he is required to match in bulk production. Comparisons between the sample and the production batch are, however, subjective. It is for this reason that efforts have been made to find precise methods for the measurement of handle, e.g., nozzle test; handle-o-meter, drape test. In Japan, attempts have been made to evaluate the handle of a textile fabric by measuring 15 mechanical and physical properties. Kawabata system of handle assessment; FAST system of fabric assessment.

Handle modifier (hand modifiers): Descriptive term for a group of textile auxiliaries, the primary function of which is to modify the handle of textile fabrics. They represent a sub-group of textile finishing agents. See **Handle-modifying finishes**.

Handle-o-meter: An instrument for evaluating the handle of textile fabrics including the determination of flexibility, compressibility, extensibility, elastic resilience, density, surface friction and thermal properties. The test procedure involves placing the textile material over a 6.35 mm wide slit where a rotating load arm brings pressure to bear on the sample in the slit. A load-measuring device determines the various resistance values of the fabric sample, the sum of which can be read off an electrical display.

Hand washing: The gentlest form of home laundering using hand manipulation without the use of a machine or device such as a scrubbing board.

Hand wheel; balance wheel: A wheel located at the end of the machine arm that controls the movement of the take-up lever and needle bar.

Handwoven: Fabric woven using a hand loom.

Hang pick: A pick caught on a warp yarn knot for a short distance producing a triangular shaped hole in a fabric.

Hang shot: See **Hang pick**.

Hanger: A looper loop fixed on a garment for hanging up.

Hanging black: See **Aniline black**.

Hanging sleeve: It is a tube of fabric sewn to the wrong side of a finished quilt so a dowel can be slipped inside the sleeve and the quilt can be hung easily onto a wall.

Hank: (1) (a) A synonym for skein – a textile material in a coiled form; (b) A definite length of sliver, slubbing, roving or yarn, e.g. in metric system it is 1000 metres; (c) A synonym for count as applied to sliver, slubbing or roving.

(2) Unit of measuring yarn; silk hank being 1,000 yards; worsted hank 560 yards long; cotton hank 840 yards; woollen skein 1,520 yards; linen and jute 3,600 yards. For both cotton and wool, these traditional hanks are equal to 7 leas or to 12 cuts. In the United States, however, a hank of woollen yarn is generally 1600 yards (1463 meters). In retail trade, a hank is often equal to 6 or 7 skeins of varying size.

Hank dyeing: Dyeing of yarn in the hank form. There are machines available for dyeing hanks, usually called a cabinet dyeing machine. Since it is labour intensive, this method is now adopted for yarns which are difficult to dye in the cone or cheese form. E.g., silk.

Hank dyeing machines: Machines used for dyeing yarn in the hank form. The dyeing of yarn in hank form is the oldest method of yarn dyeing. Traditional rectangular-type machines in which the dye liquor is heated by open or closed-coil steam pipes, and the liquor is circulated over a weir and through the yarn by means of a reversible impeller mounted at one side of the machine, are still widely used for the dyeing of carpet yarns (hanks up to 5 kg and machine capacity up to 4000 kg). More recently, vertical cylindrical dyeing machines (with or without pressure) in which the hanks of yarn are contained in special cages, represent alternatives to the rectangular-type machines.

Hank Dyeing Machine

Hank yarn printing machine: A machine used for flammé yarn printing on hanks made of wool, polyamide, staple fibre, cotton and silk. With the

automatic Timmer hank yarn printing machine, printing is effected in four phases. In every phase, one quarter of the total circumference of the hanks is printed. Movement in longitudinal hank direction is automatic, so that the next quarter can be printed in the next phase. Movement in transverse direction and stopping are also automatic. This means that the hanks are passed four times through four pairs of rolls.

Hank, skein, reel: The traditional unit of length for yarn in hank form. In metric notation, a hank (consisting of 70 turns, each of 1.428 m circumference) 1/10 of a standard hank = 100 m. For ply-yarns, different numbers of turns are used. In general, hanks are loosely fastened at various positions around the bundle of yarns with tie-bands to maintain the integrity of the hank and prevent tangling during processing. If the tie bands are too tight, the yarn in these parts of the hank will resist the dye during dyeing and thereby resulting in undyed patches.

Hanolchade: Navajo blanket made with black and white stripes with small diamonds of blue and red in the black stripes. Worn usually by the tribal chiefs.

Harakake: Moori; name for the New Zealand flax.

Harami: Large size Indian rugs made for the mosques.

Harateen: A cloth used for furnishing in the 18th and 19th Centuries, when it was considered to be interchangeable with moreen. It was made with a worsted warp and a thicker worsted weft to form horizontal ribs, then finished by watering and stamping.

Hard COD: The COD remaining after effective biological treatment. It is a measure of the organic material that is non-biodegradable or only very slowly biodegradable.

Hard detergent: A synthetic detergent that does not easily biodegrade and so may cause foaming in rivers at concentrations as low as 0.3 mg/l. Modern soft detergents are biodegradable in biological treatment, and so have greatly reduced foaming problems in rivers.

Hard colours: See **Warm colours**.

Hard crepe: Plain woven, light silk crepe, dyed black and gummed; used for mourning.

Hard end: See **Tight twist end**.

Hard fibre: Stiff and elongated fibres obtained from leaves or stems of plants. As they are coarse and stiff, they are used in matting and industrial products.

Hard shot: See **Tight twist end**.

Hard size: (1) Sections of cloth containing an excessive quantity of size.

(2) A condition found in areas of fabric where the warp contains an excessive quantity of sizing.

Hard soap (household soap): A soap with an approximately 60–70% fatty acid content used for domestic washing and cleaning, etc.

Hard spun or twist: Yarn spun with more revolutions per inch than usual.

Hard waste: See **Waste, hard**.

Hard water (in textile conservation): Water having a concentration of more than 60 ppm (3.50 gr/gal), hardness calculated as calcium carbonate.

Hardanger cloth: A plain weave cotton fabric of coarse construction. It is prepared in such a way that the weave is easily visible. Used for embroidery, especially the type where threads have to be counted. The threads are usually arranged in pairs.

Hardness: Hard water is water that will not readily form a lather with soap owing to the presence of dissolved calcium, iron, and magnesium compounds. Such compounds can react with soap to produce insoluble salts, which collect as solid scum. They can interfere with some chemical processes in preparation and dyeing. Soap, for example, forms insoluble compounds when it reacts with hardness minerals. Calcium carbonate or calcium hydroxide, formed when soda ash or sodium hydroxide is added to hard water, are quite insoluble and will precipitate from solution. The effectiveness of the cleansing solution is thus reduced. Hardness of water is of two types, temporary hardness and permanent hardness. Only temporary hardness can be removed by boiling the water. The precipitate can be deposited on fabric, adversely affecting the hand of the fabric. Sequestrate chemicals can be added to hard water to reduce the effect of the hardness ions. Sodium hexametaphosphate is generally the preferred chemical for this purpose for many dyeing processes. Hardness of water is usually expressed by assuming that all the hardness is due to dissolved calcium carbonate, which is present as ions. It can be estimated by titration with a standard soap solution or with EDTA. See also **Permanent hardness; Detergents; Temporary hardness; Water softening**.

Hardness (in water): Dissolved salts of calcium, magnesium and other cations which destroy the action of soap; expressed as parts per million (ppm) or grains per gallon (gr/gal) of calcium carbonate.

Hard rubber (ebonite): A hard form of Rubber in which the latex molecules have been cross-linked with 30–35% sulphur by curing at 100–150°C. Lime or magnesia is used as activator. *Properties* – Black, hard and brittle mass

which on heating becomes sufficiently plastic to be moulded into shapes. Hard rubber is resistant to water, chlorine, alkalis, most acids, gasoline, oils and alcohols.

Uses – Tank linings, pipes, handles, cocks and valves, etc.

Hards: The coarse fibres separated from flax in scutching.

Hardwickia: A tough, pliable bast fibre of India used for cordage.

Hare: The hair texture of hare is soft and woolly and can be spun with wool, producing a similar result to a wool and rabbit mixture.

Harlem checks: Linen from Holland with blue or red window plaid.

Harlequin: (a) Large plaid checks in more than two colours; (b) 18th Century checked woollen fabric in England.

Harmala red: A red colouring agent from the harmala or harmel plant.

Harn: In England, a coarse and low grade flax yarn.

Harrateen: All-worsted English fabric of the 18th Century.

Harness: A frame holding the heddles in position in the loom during weaving.

Harness chain: A mechanism used to control the vertical movements of the harness, or shaft, on a loom.

Harness skip: See **Float**.

Harris tweed: A homespun, all-wool tweed, of soft feel and peaty odour, made originally on the island of Lewis Harris, Uist and Barra and other islands off Scotland, using the best native blackface or cheviot wool in natural colours or dyed with vegetable dyes. The fabric is still hand-woven, even today, on the islands of Lewis, Harris tweed is made with carded yarns produced from pure Scottish virgin wool in twill or plain weave with a loose construction. Used for overcoats.

Harsh fibre: Fibre that is rough or coarse to the touch, but not fused or bonded filaments.

Harvard: A somewhat hard washable cotton shirting, woven mostly in 2 and 2 twill with coloured warp and white weft, forming stripes or zig-zag lines which cover a large part of the fabric.

Harvester duck: See **Duck**.

Haslock: Scotch term for the finest part of the fleece, taken from the throat.

Hasp: Linen or jute yarn measure, equal to 3,600 yards. See **Hank**.

Hatters' plush: Made with fine silk pile; used for men's and women's hats.

Haul-off roller: The first driven roller around which an extruded yarn passes after leaving the spinneret and whose surface speed determines the spin-stretch ratio.

Haute couture: Literally means 'high fashion'.

Haute lisse: French for high warp tapestry, viz. made with the warp placed in vertical position.

Haute nouveautee: French for novelty fabrics.

Havana: A dark shade of brown resembling Havana cigars and formerly applied to breeds of brown cats and rabbits. Also 'Havana-brown'.

Hawking: A process in dyeing. Several pieces of the fabric are sewed together end-to-end and passed between two rubber rolls, constantly kept under the surface of the dye in the vat.

Hawkins: Early maturing, short stapled commercial variety of American cotton, the fibre measuring 18–22 millimetres; the yield of lint is 32–34 percent.

Hawser twist: The construction of cabled yarn, coed, or rope in which the single and first-ply twist are in the same direction and the second-ply twist are in the opposite direction, and S/S/Z or Z/Z/S construction.

Hay (a): (1) A light olive-green colour.

(2) A Highland tartan that is composed of green stripes over a red ground, narrow white and yellow lines splitting the field.

Hays China: A late maturing commercial variety of cotton from Mississippi, the fine and lustrous staple measuring over 30 millimetres; the yield is about 28–30 percent.

Hayti: Variety of Indian raw cotton.

Hazardous waste: Waste that is dangerous because it is toxic or inflammable or explosive, etc. In the United Kingdom, hazardous waste is based on the hazardous wastes listed in the ***European Waste Catalogue*** (*see* **Hazardous Waste Regulations**). In the United States of America, hazardous waste is a solid or semi-solid waste that poses a threat to public health or the environment. The waste must be specifically listed as a hazardous waste by the ***USEPA*** or exhibit one or more of the characteristics of hazardous wastes (ignitability, corrosiveness, reactivity, and/or toxicity).

Hazel: A brown colour tinged with red.

Hazen colour unit: A colour scale for determining the colour of chlorinated hydrocarbon solvents based on a platinum-cobalt stock solution designated as 500 Hazen units.

Hazen stock solution: 1.245 g potassium chloroplatinate + 1 g cobalt chloride ($CoCl_2 \bullet 6H_2O$) dissolved in 100 ml concentrated hydrochloric acid and made up to 1000 ml with distilled water. Dilution of 1:100 with distilled water = 5 Hazen; 3:100 with distilled water = 15 Hazen. A chlorinated hydrocarbon control is contained in a small glass tube of the same diameter and filled to the same level with/without a comparative solution. The sample is viewed from above against a white background with the exclusion of side light.

Hazen-Williams formula: A formula used in evaluating ***pipe flow*** in water distribution systems:

$$V = 0.849\ C\ R0.63S0.54$$

Where V = velocity (m/s), R = hydraulic mean radius (m), S = hydraulic gradient and C is Hazen-Williams roughness coefficient.

HB yarn: High-bulk yarn.

HCB: Hexachlorobenzene.

HCFCs: Hydrochlorofluorocarbons.

HCH: Hexachlorocyclohexane.

HDPE: High-density polyethylene.

HE: Henequen fibre.

Head: The upper, movable and working surface of the pressing machine which may incorporate the shape which mates with that of the back. The head comes into contact with the garment with or without pressure.

Head circumference: See **Head girth**.

Head dress: Various confections made from stiffened cloth, veils, padded rolls, jewels, brooches.

Head dye: See **Illuminating dye**.

Head end: (a) The beginning of a new piece of fabric in the loom that bears appropriate identification; (b) A small sample of fabric that may be submitted to a customer for approval.

Head girth (in body measurements): The maximum circumference of the head above the ears.

Head rail: Shoulder shaped head square used in the gothic period.

Head (in zippers): The portion of the element that engages the pocket.

Head (in zipper): The portion of the scoop/element that engages the pocket.

Headband: A tape normally 12–22 mm wide, used in book binding and having a coloured piped or ‘beaded edge woven integrally. Headbands are

calibrated 0–6 according to the size of the head, traditionally of a diameter from 1.5 to 6 mm.

Heading: (a) That edge of the lace flouncing which is sewn to the garment; (b) Trade name for that end of the piece of bolt of cloth which is on the outside; (c) In short length fabrics, both ends of the material that are usually decorated with stripes.

Heald: Part of loom. Same as Heald.

Health crepe: See **Crepe de sante**.

Heart: The core strand of a rope around which other strands are twisted.

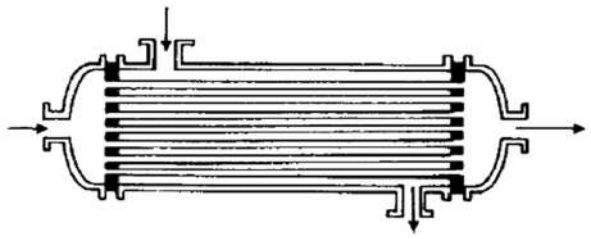
Heart yarn: The centre of a core yarn.

Heat: Energy transferred as a result of a temperature difference. The term is often loosely used to mean internal energy (i.e. the total kinetic and potential energy of the particles). It is common in chemistry to define such quantities as *heat of combustion*, *heat of neutralization*, etc. The unit is usually the kilojoule per mole (kJ mol–1). By convention, *.H* is negative for an exothermic reaction. Molar enthalpy changes stated for chemical reactions are changes for standard conditions, which are defined as 298 K (25°C) and 101325 Pa (1 atmosphere).

Heat durability: The extent to which a material retains its useful properties at ambient air conditions, following its exposure to a specified temperature and environment for a specified time and its return to the ambient air conditions.

Heat durable: Having heat durability.

Heat exchangers: Devices that enable the heat from a hot fluid to be transferred to a cool fluid without allowing the two fluids to come into contact. The normal arrangement is for one of the fluids to flow in a coiled tube through a jacket containing the second fluid. Both the cooling and heating effect may be of benefit in conserving the energy used in a chemical plant and in controlling a process.



Schematic diagram of a shell and tube heat exchanger

Heat flux: The thermal intensity indicated by the amount of power per unit area.

Heat losses: Radiation heat losses from dye liquors and dyeing machines.

Heat-measuring papers: See **Thermometer papers**.

Heat of atomization: The energy required in dissociating one mole of a substance into atoms. See **Heat**.

Heat of combustion: The energy liberated when one mole of a substance burns in excess oxygen. See **Heat; Heat capacity**.

Heat of crystallization: The energy liberated when one mole of a substance crystallizes from a saturated solution of that substance.

Heat of dissociation: The energy required to dissociate one mole of a substance into its constituent elements.

Heat of formation: The energy change when one mole of a substance is formed from its elements. See **Heat**.

Heat of a liquid: The quantity of heat required to raise the temperature of 1 kg of a liquid from 0°C to the boiling point (expressed in J resp. kJ).

Heat of neutralization: The energy liberated when one mole of an acid or base is neutralized.

Heat of reaction: The energy change that happens when molar amounts of given substances react completely. See **Heat**.

Heat of solution: The energy change that happens when one mole of a substance is dissolved in a given solvent to infinite dilution (in practice, to form a dilute solution). Bond in the hydrogen molecule could be described by quantum mechanics. Heitler extended this work to a more complicated level.

Heat of vaporization (heat of evaporation): The heat required in J/g to convert 1 g of a substance from the liquid to the gaseous state at the boiling point. The heat of vaporization for water is high, as is also that of alcohol because of the strong intermolecular forces (hydrogen bonds) in the liquid. By contrast, non-polar solvents have considerably lower heats of vaporization.

Heat recovery: Heat can be recovered from waste incinerators typically by the use of boilers to generate steam. The steam may then be used for electric power generation or for district heating systems. The equipment required for effective heat recovery can be expensive.

Heat resistance: The extent to which a material retains useful properties as measured during exposure of the material to a specified temperature and environment for a specified time.

Heat resistant: Having heat resistance.

Heat resistant finishes: Finishes which are intended to improve the resistance of textiles (strength, etc.) against the effects of high temperatures below the point of ignition. Such finishes are important for ironing cloths, paper machine felts and, possibly, tyre cords. Heat-resistant finishes for cotton include, e.g., acetylation, treatment with dicyandiamide, etc.

Heat retention (thermal retention): This is an important serviceability characteristic of a garment (Wesel triangle). It follows from the thermal conductivity coefficient of textile fibres, that all fibres, without exception, are better conductors of heat than air. Consequently, the heat retentivity of textile fabrics and similar materials is largely dependent on the respective pore volume and air content (porosity).

Heat retentivity: See **Heat retention**.

Heat sealing: A thermoplasticizing operation representing a primary stage in the bonding of non-woven, collar interlinings and the fusing of fusible interlinings, etc. The temperature and duration of thermal bonding depends on the type of resin coating and the end-use of the substrate.

Heat-set garments: Heat-set garments are made from circular-knit fabrics where the desired body shape has been permanently set on heated three-dimensional metal manikins. Collars and sleeves are welded to the main garment. This process eliminates the need for side seams and darts.

Heat setting: The effect of heat setting is greater in fibres with an increasingly hydrophobic character and is carried out on polyolefin, polyester, polyurethane, polyacrylonitrile, polyamide, triacetate, acetate and viscose fibres (the fibres are listed in order of decreasing hydrophobic character). The objectives of heat setting processes include structure homogenization and the elimination of internal tensions within the fibre resulting in reduced shrinkage, improved dimensional stability, reduced creasing propensity and reduced edge-curl in woven and knitted fabrics. To this extent, the process may be better described as thermal relaxation.

Fibre	Min T. °C	Max. T. °C	Time (in seconds)
Polyamide PA 6.6	170	210	15–40
Polyamide PA 6	160	180	15–40
Triacetate	160	180	15–40
Acrylic (PAC)	160	180–200	15–40
Elastomers	170	180–200	15–40

Heat setting of carpet yarns: Polyamide carpet yarns are set continuously in hot air at 205°C or in equipment where heat setting is carried out in saturated steam. See also **Carpet yarns** (**setting**).

Heat setting zone: The dry zone in stenter driers for the heat setting of fabrics composed of synthetic fibres or their blends with special supplementary heating.

Heat shrinkage: A change in dimensions of fabric specimen exposed to heat. A negative shrinkage is designated as growth or expansion or elongation.

Heat stability: The stability of dye dispersions/solutions to treatment temperatures in dyeing, for example especially when dyeing under HT conditions. The term must not be confused with dispersion stability since, under the action of heat, changes in the dye molecule can also occur which may result in reduced dye yields.

Heat stabilized: A term used to describe fibre or yarn heat-treated to reduce the tendency of the fibre to shrink or elongate under load at elevated temperature. See **Heat resistance**.

Heat transfer: See **Convection**.

Heat transfer coefficient: See **Thermal transmittance**. The capacity of a material (or combination) associated with heat transport to oppose the passage of heat through it with greater or lesser resistance. See **Heat transfer**. A low heat transfer coefficient (k) corresponds to good heat insulating properties. In contrast to thermal conductivity, this parameter is not related to the length but to the heat flow per unit time through unit area.

Heat transfer medium: Heat transfer liquids for circulating hot oil unit used in the textile industry and as heat transfer fluids in heat exchanger. They are used exclusively in liquid form.

Heat transfer number: A numerical expression of heat retention.

Heat transfer oil: See **Heat transfer medium**.

Heat transfer oil circulation plant: See **Circulating hot oil unit**.

Heat transfer printing: See **Transfer printing**.

Heat transfer printing with cationic dyes: Acrylic fibres, which only absorb sublimable disperse dyes at low colour yields, as well as cationic-dyeable polyester, can be transfer printed with transfer papers produced with cationic dyes in brilliant shades at acceptable colour yields. Improved colour yields are possible by means of a pretreatment with a 2% ammonium sulphate solution (3–5 min at 88–98°C) as a result of which the sodium ions contained in the fibre are exchanged by ammonium ions. See **Transfer printing**.

Heat transmission: The heat transfer coefficient is that quantity of heat which can be transferred from a hotter to a cooler medium through a metal surface of 1 m^2 per hour per 1°C difference in temperature. Heat transfer plays a considerable role in, e.g. the thermosol dyeing process.

Heat transmission coefficient: The heat transmission coefficient is a characteristic for the heat exchange or heat transfer between the boundary layer of a body and the adjacent medium (e.g. air). A high heat transfer coefficient corresponds to a rapid heat exchange. See **Heat transfer**.

Heat transmission resistance: See **Heat transfer coefficient**.

Heat transmission surface: See **Heating surface**.

Heat tube roller: A device to improve the heating of fabrics in thermosol dyeing ranges. Heat tube roller are installed in hot flues which transfers heat to the fabric by contact with the uniformly heated roller as well as hot air circulated through recessed nozzles in the roller surface.

Heather: A yarn that is spun using pre-dyed fibres. These fibres are blended together to give a particular look. (For example, black and white may be blended together to create a grey heathered yarn.) The term, heather, may also be used to describe the fabric made from heathered yarns.

Heather mixtures: This phrase describes a combination of greens and purples, or Scottish heather colours, found in both woollen cloth and knitting wool. The colours are often used in equal amounts so that no one colour predominates.

Heather yarn: A term describing mottled or melange-type yarns.

Heating gas: See **Natural gas**.

Heatsetting: Heat treatment of fabrics containing thermoplastic synthetic fibres. Stabilizes fabric by reducing shrinkage and distortion.

Heavy chemicals: Inorganic chemicals for industrial purposes produced in bulk quantities and often in a relatively impure state (technical grade), e.g. acids, alkalis, salts, chlorine, etc.

Heavy coating: See **Heavy duty waterproof finishes**.

Heavy duty detergent: A universal detergent suitable for all washing processes and usually for all wash temperatures.

Heavy duty detergent booster: Intensifier for exceptional circumstances (difficult washing conditions) or where the laundry is particularly soiled, e.g. more intense soiling appearing locally, such as soiled edges on collars and wristbands. Generally, pasty concentrate of suitable surfactants and compounds. See **Detergent booster**.

Heavy duty waterproof finishes: A term used for waterproof finishes applied to tarpaulins and similar articles to provide resistance to water pressure.

Heavy end: (1) See **Coarse end; Thick end**.

(2) The higher boiling fraction in distillation. **Heavy filling**: See **Coarse pick**.

Heavy filling bar: See **Filling bar (coarse)**.

Heavy goods: Name applied in Calcutta quotations to material called 'sacking' in the United States.

Heavy metals: The term "heavy metal" is understood to apply to metallic elements with a density greater than 6 g/cm3. Effluents from textile wet-processing plants can be contaminated with heavy metals such as copper, cobalt, nickel and chromium. They may be separated off by precipitation or the use of ion exchangers specifically designed for heavy metals.

Heavy pick: See **Coarse pick**.

Heavy wool: Wool that has considerable grease or dirt and will have a high shrinkage in scouring.

Hecto (Gr.): Metric prefix denoting 100 = 102, e.g. hectolitre (hl), a measure of capacity equivalent to 100 litres.

Heddle: A cord, round steel wire, or thin flat steel strip with a loop or eye near the centre through which one or more warp threads pass on the loom so that the thread movement may be controlled in weaving. The heddles are held at both ends by the harness frame. They control the weave pattern and shed as the harnesses are raised and lowered during weaving.

Heddle eyes: Each of the heddles or healds contains aperture, like the eye of a needle, through which one end may be threaded. These apertures are called heddle eyes. See **Heddle**.

Heer: Linen and jute yarn measure, equal to 600 yards.

Height (in body measurements): The vertical distance from the crown of a standing subject to the soles of the feet.

Helanca: A Swiss elastic fibre made from nylon and polyester. Fabrics made from it have two-way stretch and are very hard wearing and washable. These are used for sportswear, ski-wear, swimsuits, trousers and panels in maternity clothes.

Helianthine: Identical to Methyl orange.

Helio: A bright orange colour.

Helio-Klischograph: An electronic engraving system used in the production of gravure printing rollers for heat transfer printing. Prints from Helio-

Klischograph engravings produced by etching can be used to advantage on synthetic fibres, especially on fine woven fabrics with a smooth surface. This procedure is currently employed by print works already in possession of a Helio-klischograph and/or those who produce paper for transfer printing with such engravings, and are also engaged in the printing of textiles themselves. In addition, the process is suitable for independent printers with appropriate design selections and colorations.

Helix (wool, hair fibres): An elementary building block of the Macrofibrils in animal fibres with a screw-like structure. According to Pauling, the microfibrils are formed with a central helix in the chain molecules of wool keratin in order to combine with others by means of a right-hand twist to form a unit. The helix has a high elastic recovery and can be pulled apart (breakdown of stabilizing hydrogen bonds) and relaxed again (reformation of hydrogen bonds), a property which is referred to as reversible denaturation.

Helix angle: (a) The angle formed by the path of a ply and the major axis in a yarn or tire cord; (b) The angle between the tangent to a yarn and the minor axis of the package on which it is wound. Also called wind angle.

Helminthosporin: A maroon-coloured pigment from fungus.

Hem: An edge to a piece of textile fabric (edge reinforcement) made by folding the raw edge under and stitching it to the body of the fabric.

Hemming: The process of producing a hem.

Hemstitch: A decorative edging stitch, usually for a hem, in which the cross threads are stitched in groups. Hemstitching is used for ornament in making hems and tucks. The first step in hemstitching is the drawing of threads. Rubbing the cloth along the line of threads to be drawn will make the drawing easier if the cloth is sized. After the threads are drawn, the hem is turned and basted even with the lowest edge of the drawn space. Insert the needle into the edge of the hem and material, taking up a cluster of threads bring the thread under the needle to form a buttonhole stitch or make a simple stitch in the edge of the fold. The number of threads drawn and the number in a cluster must be determined by the coarseness or fineness of the material, the greater number being drawn and taken in fine material. There are several methods of hemstitching, but the results are about the same.

Hem (wired):The hem provides a tunnel through which wire can be threaded. The wire can be light and flexible, forming slight flutes; or it can be firmer, giving the effect of a steel hoop.

Hematine (hematein, haemateïn): See **Logwood**.

Hematoxylin (haematoxylin): See **Logwood**.

Hematron: An electronic device for the control of rope length and milling shrinkage on rotary milling machines.

Hemicellulose: Besides cellulose and lignin, hemicellulose is a component of wood and to a slight extent, also of natural cellulosic fibres. It consists of an ill-defined group of various complex polysaccharides. Hemicellulose has a lower molecular weight than cellulose (degree of polymerization of 150 or less) and lower chemical resistance. It is only sparingly soluble or insoluble in water, and is broken down by plant ferments into sugars, but does not reduce Fehling's solution.

Hemicyanine dye: In the hemicyanine dyes, one of the charged terminal atoms is part of a heterocyclic ring, and the other is a nitrogen atom directly linked to the methine chain. The lowest vinylogous hemicyanine dyes (cyclomethine dyes) do not contain a methine chain, and the donor and acceptor groups are in the same ring system.

Hemp: Flax and hemp are bast fibres. It is derived from the stem of the hemp plant (*cannabis sativa*) 50–250 cm tall, similar to jute, accompanied by a fair amount of woody matter. When spun, it is rather like flax but thicker and coarser. It is a very strong, lustrous, and very durable but harsh fibre and is used in the manufacture of carpets, rugs, ropes, etc., but has limited use because bleaching is difficult. The best grades are fine and white; used chiefly for cordage, twine and sail cloth. The following commercial varieties are cultivated: The common hemp, the Bologne hemp (known also the piemontese or great hemp), the Chinese hemp (called Japanese hemp in California), the Smyrna hemp, the small hemp and the Kentucky hemp. The Italian hemp is the best, with the following principal grades: Gorgiola (G), Gorgiola Bolognese (GB), primo cordaggio extra (PICE), primo cordaggio (PC), primo basso (PB), secondo basso (SB), Napoli extrissimo (N), secondo cordaggio (SC), terzio basso (TB), quarto basso (QB), and strappature. In Russia, the mark for the longest and best hemp is RH, for shorter SF1SPOH, for the shortest (.pass hemp) SFSPPH. A good grade of Polish hemp is marked G.FSPRH. The current qualities in Petrograd are: Clean, out shot and half clean. The hemp marketed through Konigsberg (Germany) is classed as clean, cut and schicking. The numbering for the fine hemp yarns is the same as for linen yarn; for rope yarn the number gives the number of threads required for one of the three strands found in a rope of three-inch circumference.

Hemp tow: The short fibre stock of varying lengths removed in breaking, scutching, hackling, or combing. It is often very gnarled, matted and very irregular.

Hemp line: Fine, straight, parallel hemp strands produced by hackling long hemp fibres.

Henequen: A vegetable fibre, closely resembling sisal, belonging to the Hard fibres group. Henequen is produced from the leaves of the Mexican plant (*agave fourcroydes*).

Henna: Reddish-brown colour.

Hepepetwan: Rich and double-faced Chinese silk satin.

Henrietta: Fine, diagonal, twilled dress fabric, made with silk warp and fine worsted filling which makes it resemble cashmere cloth. Once in great demand, but it has not been very much in evidence for years.

Heart: Very durable all-wool rugs made in Persia and Afghanistan, the medium long pile is tied in Ghiordes knot. The design is of floral and flash patterns or of a centre medallion. The colours are blue, red and yellow.

Hercules braid: (1) A flat braid made with seven threads, each thread passing alternately under and over three threads; (2) Very wide flat braid, made cxf mohair, wool or silk; used for trimming on dresses and uniforms.

Hereke carpets: Especially valuable knotted carpets from the time of the last Turkish sultans (beginning of the 19th to the 20th Century). The carpets are woven with a wool or silk pile on a fine cotton or silk ground fabric. 300,000–400,000 Turkish knots or over 1,000,000 Persian knots/m2. The design consists of tightly arranged strewn flowers as well as, to some extent, motifs inspired by the French rococo period.

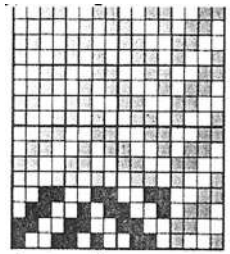
Herez rugs: Fine Persian rugs made with cotton web and close wool pile tied in Ghiordes knot. The design is usually a centre medallion with straight outlines and floral patterns in blue and various reds. The border is in light colour.

Heris: Persian camel's hair rug, made with old patterns in dark brown.

Herlong: A late maturing commercial variety of prolific cotton from Alabama, Georgia, etc., the staple, measuring 22–25 millimetres, forms medium size, round bolls; the lint yield is 30–32 percent.

Hernarvi: French dress goods, similar to Grenadine (only lighter), made of silk and wool.

Herringbone: (1) A combination of twill weaves in which the direction of twill is so reversed (usually by drafting) as to produce stripes that resemble herring bones.



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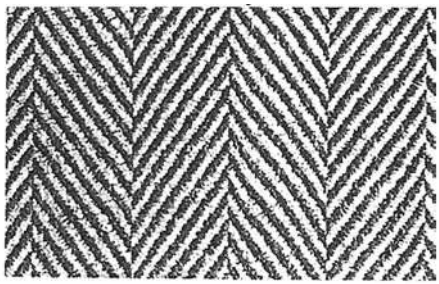


Herringbone

(2) The name is often applied to any woollen cloth made in a herringbone design, i.e. with a broken twill effect in two colours producing an up and down striped effect. Any fibres can be used for making a herringbone cloth.

Herringbone Stitch: Bring the needle out on the lower line at the left side and insert on the upper line a little to the right, taking a small stitch to the left with the thread below the needle. Next, insert the needle on the lower line a little to the right and take a small stitch to the left with the thread above the needle. These two movements are worked throughout. For the best effect, the fabric lifted by the needle and the spaces between the stitches should be of equal size. This stitch can be laced with a matching or contrasting thread. Use a round pointed needle for lacing and do not pick up any of the fabric. Herringbone stitch may also be worked on even weave fabric. See **Plaited stitch**.

Herringbone weave: Herringbone is executed in a broken twill weave with alternating twill direction in a balanced chevron pattern that resembles the skeleton of a herring.

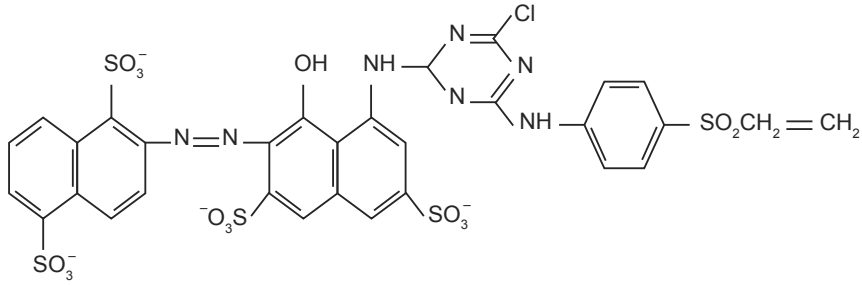
Herringbone (pointed 2/2 straight or symmetrical): A 2/2 twill in which symmetrical reversals take place in the weft direction is called a symmetrical or pointed 2/2 herringbone. This structure can be woven on a straight draw on four shafts at any time simply by changing the direction of the treadling progression.

Hessian: A coarse, heavy and plain-weave fabric of jute or similar yarn. Its natural colour is brownish. It is used for wrappings, wall hangings, etc.

Hessians: Name applied in United Kingdom and India, and on the Continent to material called 'burlap' in the United States.

Hetero bi-reactive dyes: Depending on their reaction mechanism during reaction with the fibre, reactive dyes with a single reactive group are subdivided into two types, i.e.: (a) substitution type, (b) addition type.

Bifunctional reactive dyes such as C.I. Reactive Black 5 (20 505) can also react twice with the fibre (bi-reactive, bifunctional). Reactive dyes with two different reactive groups, which can react according to both the addition as well as the substitution mechanism, are heterobire active. They react both in the sense of a nucleophilic substitution as well as in the sense of a nucleophilic addition at a double bond.



Vinyl sulphone/monochlorotriazine

Hetero yarns: Core-spun yarns, i.e. yarns produced from two filaments combined in spinning which, e.g. contract differently in thermal treatments to give a texturing effect (e.g. heteroyarns from triacetate and polyamide). Heteroyarns are not bicomponent fibres.

Heterofil fibres: Core-sheath bicomponent fibres in which a core of polyamide 6.6 is surrounded by a sheath of polyamide 6. Due to their different melting points, nonwovens and needlefelt floorcoverings can be permanently bonded by a simple thermal treatment (the fibres being bonded at cross-over points through sintering of the outer sheath) without the need for a binder.

Heterofilament: See **Heterofil fibres**.

Heterogeneous: Composed of dissimilar, unrelated or differing parts or elements; e.g. from a dyeing point of view, the wool fibre has heterogeneous properties since, in contrast to the cortical cells with high dye affinity, the outer scale cells have a very much lower affinity due to their different composition.

Heteropolymerisation: See **Polymerization**.

Heteroyarns: Core-spun yarns, i.e. yarns produced from two filaments combined in spinning which, e.g. contract differently in thermal treatments to give a texturing effect (e.g. heteroyarns from triacetate and polyamide). Heteroyarns are not bicomponent fibres.

Hexachlorophene (dihydroxyhexachlorodiphenylmethane): White, free-flowing powder; odourless; insoluble in water; soluble in alcohol, acetone,

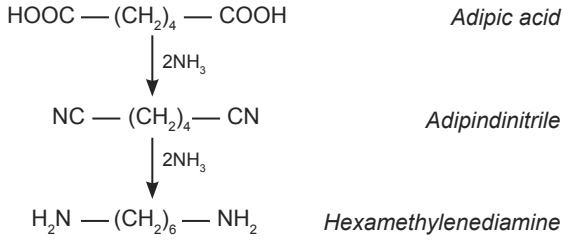
dilute alkalis and soaps. It does not cause skin irritation and is a powerful bactericide. Prevents bacterial decomposition of perspiration.

Hexachlorophene test (colorimetric method): A colour which can be measured in a colorimeter is produced from a solution of Hexachlorophene in methanol with an ammoniacal-alcoholic solution of copper chloride. The test is likewise suitable for the detection of pentachlorophenol and trichlorophenol.

Hexafluoropropene: Teflon.

Hexalin(hexahydrophenol, cyclohexanol): Used in soap making for the incorporation of grease-solubilizing solvents; spotting agent; thinner for paints, lacquers and varnishes, etc.

Hexamethylenediamine: 1,6-diaminohexane, [$H_2N(CH_2)6NH_2$]. It is used in the polymerization reaction to form nylon 66.



Hexamethylenetetramine (hexamine; methenamine; urotropine): $(CH_2)_6N_4$. White, crystalline, hygroscopic powder. Soluble in 1.5 parts water and 10 parts alcohol, readily soluble in chloroform, insoluble in ether.

Uses – e.g., metal powder printing.

Hexapod drum test (carpet): Appearance retention test instrument using a hexapod in a drum.

Hexoses: Carbohydrates with six carbon atoms –sugars; carbohydrates.

Hi Kanakin: In Japan, cotton cambric dyed Turkey red.

Hiapu: Light Chinese cloth, made of ramie.

Hickory: A dark grey-brown colour.

Hickory: A very durable stout but pliable cotton trousering and shirting, made with coloured stripes in the warp and white filling, woven in warp twill weave.

Hickory cloth: This cloth resembles ticking, but is lighter in weight and not so firmly woven. It is made from cotton or polyester/cotton. It is used for protective clothing, overalls, etc.

High-bulk yarn: See **Bulk yarn (textured).**

High-bust girth: See **Chest girth**.

High-hip girth (in body measurements): The circumference of the body at the point approximately 7.5 cm (3 in) below the waist and parallel to the floor.

High-low pile: A pile construction characterized by the presence of two or more pile heights. High-low pile carpets sometimes combine looped and cut-surface yarns.

High-shrink fibres: High shrink fibres are produced to increase the bulkiness of the fibre. Physically modified types of synthetic fibres which undergo shock shrinkage (by approximately 40–45%) in boiling water or hot air (heat-setting temperature 185°C). Normal acrylic and polyester fibres are used in blends with pre-shrunk fibres for the production of high bulk yarns. See **Textured yarns**.

High-shrink staple: Staple with a higher degree of potential shrinkage than regular staple of the same generic fibre. When blended with regular staple and treated (in yarn or fabric form) to induce shrinkage, it produces a high degree of bulk in the product.

High-speed spinning: The demands for higher quality, increased productivity and lower production costs which began in the 1970's, led to modifications in spinning technologies. In the classic melt-spinning process, filament extrusion speeds of approximately 1000 m/min are employed. The desired physical and textile properties are achieved in subsequent drawing. Initially, the combined spin-draw-wind process represented an alternative to this technology. Filament yarns produced by this method gave similar properties to those produced by the classic technologies.

High-tech fibres: Due to the irregularities, partial crystallinity and the molecular weights, the common synthetic filaments and fibres with breaking strengths of 3–10 cN/dtex and emodulus of approximately 35–130 cN/dtex, which are presently used in great quantities, achieve only approximately 10– 25% of the theoretically possible strength or E-modulus. By using materials with an extremely high molecular weight and drawing the filaments to the limits of possibility, a much closer approach can be made to the theoretically possible strengths and E-modulus. In the case of polyethylene, molecular weights of 2.10^6 with filament strengths of 30–35 cN/dtex have been achieved. Compared to the classical synthetic fibres, these so-called "high-tech fibres" are of increasing importance for technical textiles (geotextiles, filter materials, composites, protective clothing, etc.). The properties of these fibres (with differences in relative importance) include high tensile strength,

high thermal stability, low combustibility, high chemical resistance and good electrical resistance.

High capacity yarn packages: Yarn packages with a maximum diameter of 300 mm weighing up to 3.6 kg which are used particularly for wool and acrylic yarns. They offer advantages of shorter liquor ratios, e.g. down to 4.5:1, and a doubling of the dyeing machine capacity.

High concentration bleach: Continuous bleach process in which high quantities of chemicals are applied by impregnation resp. padding, and bleaching takes place by a subsequent dwell stage or steaming.

High density: A term to describe a material with heavier than normal weight per unit volume. See **Density**.

High density polyethylene: H. D. polythene, HDPE. A thermoplastic plastic used extensively since the 1970's. It has a density of 0.955 g/cc which is greater than medium or low density polyethylene. It is light and flexible and it can suffer some surface damage without rupturing and affecting performance. It is resistant to corrosion and easy to weld together into long lengths. It is used for water pipes or landfill liners. It is also present in municipal waste because HDPE is used for bottles for household chemicals. It is also used for sewers or in the rehabilitation of sewers. See **Polyethylene**.

High frequency current: An alternating current with over 1,00,000 oscillations (frequencies) per second. Whilst the tension (volt) can certainly be high at these frequencies, the current (ampere) is greatly reduced.

High frequency driers: High frequency driers employ high frequency electromagnetic waves at frequencies from v = 105–1012 Hz with corresponding wavelengths from λ= 3 km (radio waves) up to 300 μm (Hertzian waves). However, officially designated frequencies

have been allocated for industrial applications in order to avoid possible interference with radio communications. Frequencies approved by international agreements for industrial use are:

13.56 MHz ± 05%

27.12 MHz ± 0.60%

40.68 MHz ± 0.04%

Most high frequency driers work with voltages of 10,000–30,000 V at an operating frequency of 13.56 or 27.12 MHz.

High frequency drying (HF-drying, RF-drying, dielectric drying): Drying takes place between two capacitor plates supplied with a constant

high frequency AC voltage. The textile material is heated and dried by high frequency electrical oscillations whereby the depth of penetration is independent of material thickness so that HF-drying is particularly suitable for drying yarn packages. High frequency drying can also be used for warp sheets, tops, loose stock, hanks and garments.

High frequency dye fixation: Dye fixation with the aid of high frequency energy. For high frequency applications, the form of the electrodes is of decisive importance.

High grade synthetic resins: Pure synthetic resins free of fillers. Mainly phenolic plastics, used for a variety of applications.

High loft: General term for a fibre structure containing more air than fibre. Specifically, a lofty, low-density, non-woven structure that is used for applications such as fibrefill, insulation, health care, personal protection and cleaning material.

High modulus: A term that refers to a material with a higher than normal resistance to deformation. Also see **Modulos**.

High modulus (aramid): Those aramid yarns with an initial modulus of at least 400 gf/den (35 N/tex).

High modulus fibres: See **High wet modulus fibres (HWM fibres)**.

High pH finish: A finish, basic in nature rather than acid or neutral, that is applied to yarn or fibre.

High pressure atomizers: Atomisers high pressure atomizers are used in sanforizing (zero-zero) machines to moisten the fabric which acts as a lubricant during the shrinking operation. These atomisers employ centrifugal force high performance jets for lubricant emulsions subjected to liquid pressures between 50–150 bar and higher produced by high pressure pumps.

High pressure drier: These driers were very common for drying yarn packages in which the packages, supported on a carrier frame, are hydro-extracted/dried with high velocity hot air. Disadvantage of these driers are that they are high energy consuming and presently other type of driers like RF driers are more common.

High pressure dyeing: See **High temperature dyeing**.

High pressure kier: The prototype of modem high pressure kier with multi-tubular heater is often referred to as Walsh's kier and considered to be the best. A 2 ton capacity kier is most common which is about 9 inches high and 6.5 inches in diameter and mounted on R.C.C. columns. The kier is generally made for a maximum likely working press sure 40 lb/in^2 (2.812 kg/cm^2) at

141~ and is composed of mild steel plates with countersunk rivet heads inside to give a smooth surface. The goods in rope form are piled either manually or by mechanical plaiting on the perforated false bottom. The cloth can be saturated with alkaline solutions containing caustic soda (2–3%), sodium silicate (0.75–1.0%), sodium carbonate (0.5–1.0%) and wetting agent (0.1%) during piling. Sufficient scouring liquor is then admitted to the kier from below to sweep out entrapped air from the goods to avoid the formation of oxycellulose. The lid is then closed, but the air valve is kept open. Steam is turned on and liquor is circulated by centrifugal pump (C) coupled to an electric motor. High pressure kier operates at about 130°C (2.109 kg/cm^2) for about 8 to 10 h with a liquor ratio between 5:1 and 6:1. After scouring, the drain cock is opened at reduced pressure (5 to 6 lb/in^2) and equivalent amount of hot water is admitted from the top. After circulating cold water, the goods are removed and washed in a rope washing machine. The liquor is withdrawn from the bottom of the kier and forced through the heater and spread over the top of the load by the distributor.

High pressure steam: Steam at a pressure greater than 2 bar. Both saturated steam and superheated steam can be handled in this form. The difference between the two is given by the respective temperature.

High pressure steamer: See **HT pressure steamer**.

High rise: Term applied to trousers cut high in the waist.

High shrinkage yarns: High-bulk yarns containing 30–40% High-shrink fibres, also used in blends with wool. See **Textured yarns**.

High temperature amylases: These are enzymes used for desizing at higher temperatures. These starch-degrading enzymes obtained by microbiological processes can be active at working temperatures of 100°C and above, thereby requiring extremely short reaction times.

High temperature contact process: A process used for surface bonding of fibrous webs, coated and milled or needled felts, back-coated and tufted carpets on a contact drying machine. The process is based on the principle of direct contact drying between the coated side of the substrate and the cylinder surface at high temperature.

High temperature dyeing (HT dyeing): The dyeing of textiles at temperatures above 100°C in pressurized equipment high temperature dyeing machines. The chief advantage is prevention of pump cavitation and consequent secure liquor circulation. High temperature dyeing has specific advantages for the dyeing of various fibres, especially the low-swelling or non-swelling synthetic fibres without reactive groups, i.e. above all polyester and triacetate fibres and their blends with other fibres.

High temperature dyeing machines (HT dyeing machines): These machines offer the possibility of a closed dyeing system suitable for all dyeing temperatures under pressure (besides temperatures near the boil below 100°C) to achieve the objectives of high temperature dyeing by raising the boiling point of the dye liquor and eliminating pump cavitation problems.

High temperature fibres: Organic and inorganic fibres such as, ceramic fibres, glass fibres, aluminium silicates and metal fibres. A collective term especially for fire-resistant fibres and heat-resistant fibres whose strength only falls to zero under normal atmospheric conditions at approximately 3000°C.

High temperature incineration: Incineration at temperatures in excess of 1100°C. It is used for incineration of hazardous wastes in a two stage incinerator. The waste is fed to the primary chamber and the gases produced go to a secondary combustion chamber which is in excess of 1100°C. The gas stream is retained for a minimum of one second in the second chamber before being extensively treated in an air pollution control plant.

High temperature light fastness tests: In addition to the usual requirements (surface uniformity, shade conformity, rubbing fastness, fibre comfort), extremely high requirements have now been placed on the high temperature light fastness of textiles for automobile interiors. It has been found that the ***grey scale*** is more suitable as an evaluation standard than the co-exposed blue standards.

High tenacity: High breaking strength. See **High tenacity fibres**.

High tenacity fibre: A manmade fibre either (a) belonging to a generic class of fibres having exceptional breaking strength; or (b) having a breaking strength significantly greater than the average strength of other (regular tenacity) fibres in the same generic class and of equivalent linear densities.

High tower: A commercial variety of cotton from Alabama, having a medium long staple.

High visibility fabrics: Fabrics which contain fluorescent materials in order to make the wearer visible in dim and dark lights. These fabrics have the ability to reflect on-coming lights which cause them to glow in the dark.

High wet modulus fibres (HWM fibres): Modified regenerated cellulosic fibres of the modal fibres group. The strength and wet modulus of these fibres are similar to cotton. They have lower strength but higher extension than polynosic fibres. Used alone or in blends for easy-care textiles, etc.

High wet pickup: With conventional padding techniques, however, it is difficult to exceed a maximum pick-up of 70–90%. Higher applications of liquor are described as high wet pick-up (wet on dry) or addition impregnation

(wet on wet). There are special methods machines available to make wet pick up to 130-160%.

Highly sulphonated oils: See **sulphonated surfactants**.

Hilliard: A commercial variety of upland cotton, the staple measuring about 23–24 millimetres; the yield is 34–36 percent.

Himalaya: Like shantung in appearance and weight, but made from slub cotton yarns. Easier to sew than silk shantung.

Himation: Large and rectangular woollen outer robe for men and women.

Hinrop: Indian silk fabric, made with flower patterns.

Hip (in anatomy): The laterally projecting region formed by the lateral parts of the pelvis and the upper part of the femur together with the flesh covering them.

Hip girth (in body measurements): The maximum circumference of the body at the level of maximum prominence of the buttocks.

Hirschburger process: A space dyeing method for yarn sheets. The working speed of the winding head is between 600 and 1000 m per min, and can be varied in three stages. The dwell time in the steamer is 1–5 min and depends on the kind of winding (close winding or widely spaced winding), i.e. it depends on the speed of winding and transport as well as the thickness of the material.

Histogram: A graphical representation of a frequency distribution characterized by (a) values or groups of values of a property plotted on one axis and (b) columns perpendicular to that axis with areas proportional to the count of the frequency with which each value or group of value occurs.

Hitch back: See **Draw-back**, **Sticker**.

HL process: A process for dry cleaning establishments in which a dry cleaning detergent/water emulsion may be added directly to the cleaning liquor with a dry cleaning detergent concentrate.

HM process (H = Habis Textil AG, M = Monforts): A plant for the curing of finishes and fixation of prints on woven fabrics in textile finishing. It combines a rapid heat-up phase in hot air and a short dwell time in a steam atmosphere.

Hoar: Greyish-white colour, especially as regards frost.

Hobble skirt: Very narrow and long skirt; very difficult to walk in.

Hocirunck: A plain woven cotton fabric produced in East Africa, dyed in cinnamon brawn; used for outer garments by the native men. Similar to ***Khudurangi***.

Hockle (in rope): A strand kink in a rope causing yarn displacement in the strand resulting in rope deformation and damage.

Hog: Wool yielded by one-year old sheep which has not been shorn previously.

Hogget wool: Hogget wool comes from sheep that is 12–14 months old and that have not been previously shorn. The fibre is fine, soft resilient and mature, and has tapered ends. Hogget wool is a very desirable grade of wool and because of its strength, it is used primarily for the warp yarns of fabrics.

Holbein embroidery: Outline embroidery for table cloths, towels, etc.; both sides made alike.

Holbein rugs: Oriental rugs or carpets mainly from the Bergama area in Western Turkey and named after the painter Hans Holbein the Younger, who portrayed a few examples in his pictures.

Hole etcher: A variant of the burn-out print style. The print pastes containing an acidic component are applied to 100% cotton in order to burn holes out of the fabric in specific areas corresponding to the printed design. Fraying of the burned-out holes in the fabric during washing is avoided by selecting tightly woven fabrics for this style of printing. The problem does not arise if the burned-out areas are surrounded by a border printed with pigment colours since, in this case, the polymer film of the pigment binder prevents frayed edges by bonding the exposed fibres.

Hole (in fabric): An imperfection where one or more yarns are sufficiently damaged to create an aperture.

Hole (in milling): A technical term for a fabric defect (hole) caused by sudden high pressure or impact during fulling or milling (rotary cylinder, perforated roller).

Hole spacing (on a button): The distance from the centre of one hole to another.

Holes (tow): In tow opening processes, partial or complete filament breakage within a confined spread of tow, usually circular or oval in shape. Not to be confused with splitting or partial crimp deregistration, which are linear.

Holi: In Arabian countries, a woollen fabric, similar to Baracan; used for men's clothing. See also **Baracan**.

Holland: (1) General term for a great variety of light weight and coloured cotton goods made in Greece.

(2) Finished with a stiff finish, plain woven cloth, made from linen or cotton yarn. Medium weight fabric mainly used in upholstery for an under covering, as it is from and hard wearing.

(3) A canvas interfacing.

Holland cloth: A completely filled woven fabric having a smooth gloss finish on both sides, used as separating medium for sheeted rubber compounds.

Holland finish (for cotton): A glazed or unglazed finish consisting of oil and a filling material applied to cotton material to make them opaque or semi-opaque, resembling a beating linen fabric formerly known as 'Hollands'.

Hollandas: Coarse, starched cotton fabrics in the Philippines, made with black, blue or red warp stripes on white ground and white filling.

Hollands: In Cuba, a finely striped linen; used for children's dresses and for summer trousers.

Hollie point: Old needle-point church lace with scriptural patterns. See **Holy Lace**.

Hollow braid (in rope): A braided construction of either plain or twill braid, having an empty centre.

Hollow cop (tubular cop): A Cop of yarn with no internal support, i.e. a form of yarn package consisting of wound yarn only without any bobbin or tube. The yarn is unwound from the inside of the hollow cop.

Hollow cut: Cotton corduroy woven first with even pile, the runs between the ribs are hollowed out with a shearing machine. It is also made by holding the knife at various angles while cutting the corduroy. Also known as velvet cord.

Hollow filament fibres: Manufactured and continuous filament fibres, having voids created by introduction of air or other gases in the polymer solution or by melt spinning through specially designed spinnerets.

Hollow spindle spinning: Also called wrap spinning. A system of yarn formation in which the feed stock (sliver, roving) is drafted and the drafted non-twisted strand is wrapped with a yarn as it passes through a rotating hollow spindle. The binder or wrapping yarn is mounted on the hollow spindle and is unwound and wrapped around the core because of the rotation of the spindle. This technique may be used for producing a range of warp spun yarns or fancy yarns.

Hollow squeegee: A squeegee system used on flat-bed screen printing machines consisting of a pair of parallel rubber squeegee blades mounted in a single support. The print paste held between the two blades is transported across the printing screen by the rear blade only during each pass, the leading blade being raised at the same time. Thus, the leading blade for the first pass becomes the rear blade for the subsequent pass. See **Double squeegee**.

Hollow filament yarn: See **Hollow filament fibres**.

Holly green: Olive-green colour.

Homage: A deep ultramarine blue.

Homard: The pinkish-red of the lobster.

Home: A Highland tartan composed of dark blue and black stripes, split by red and green lines.

Home furnishings: Together with household textiles, home furnishings account for approximately 30% of all textile fibre consumption. Apart from woven articles such as upholstery materials, carpets and bed covers, various special techniques are also used for the manufacture and finishing of home furnishings.

Home laundering: A process by which textile products or parts of them may be washed, bleached, dried and pressed by any customary method designed for use in a residence, or non-professional use.

Homespun: (1) Plain-weave coarse fabrics originally produced in the British Isles from hand-spun Cheviot wool, generally undyed and characterized by their uneven quality which was due to the hand weaving and spinning. Today, homespun is frequently used as a general term for loosely woven fabrics produced from very coarse, rough-haired, mottled or even slubby woollen yarns mainly in plain-weave constructions, often with a light Melton finish. Used for lightweight suits, men's jackets, costumes and coats.

(2) This fabric was hand woven in many countries; but now it is made on power looms with plain weave, made of wool and having a coarse appearance. Hard wearing serviceable cloth made with cotton or wool in plain weave. Coarse and rugged yarn is used. Originally an undyed woollen cloth that is spun into yarn and woven at home by peasants and country folk worldwide. It has substantial appearance and serviceable qualities. Made with irregular and slightly twisted uneven yarns. It has a spongy feel with a hand-loomed tweedy appearance. Genuine homespun is produced in a very limited quantity and much powerloom cloth is sold as genuine homespun. Many qualities made – the best is an ideal rough-and-ready type of cloth.

Uses – Coats, suits, separates and sportswear.

Homiak: Good grade of home reeled silk in Central Asia. It is exported to other countries.

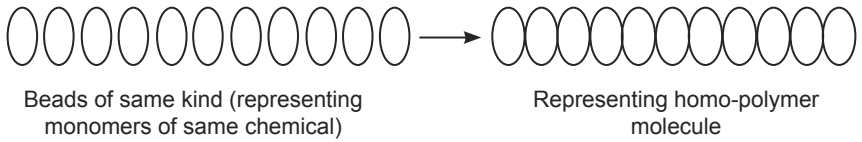
Homienchow: Fancy silk fabric in plain weave, made of spun silk in China and is about 23 inches wide.

Homogeneous: Composed of similar or identical parts or elements. A composition in which the components are of the same kind. A homogeneous system consists of a single phase, e.g. a common solution such as a salt or sugar solution.

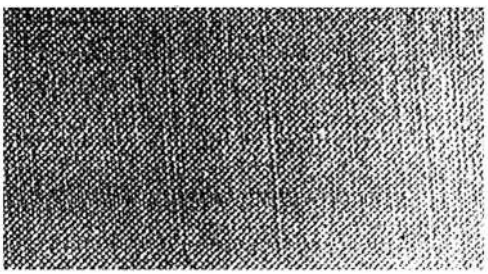
Homogenization: Intimate mixing, e.g. of importance in the preparation of particularly fine emulsions.

Homogenizers: High-speed mixers in which coarse and polydisperse emulsions are transformed into almost monodisperse systems by subjecting the liquid to high shear forces.

Homopolymers: Natural or synthetic polymers derived from a single type of building block (monomer) in contrast to copolymers. Poly (styrene), for example, is composed only of styrene monomers, and is therefore is classified as a homopolymer.



Honan: Silk fabric made from silk yarn that is obtained from wild silkworms raised in the Honan area of China, which is the only type of wild silk that dyes evenly. The fabric is light and rough textured. Nowadays made from silk or from manmade synthetics in plain weave. It is the best grade of wild silk. Very similar to "pongee", but finer. It should not be fitted too tightly. *Uses* – Dresses, ensembles, blouses and lingerie.



Honan/Henan fabric (silk): Fabric of tussah yarn woven on a hand loom warp of raw geige or tussah greige and weft of either raw tussah greige or tussah tram. The predominant general impression is of linen, as relatively strong warp and weft bars appear. This fabric is also often called raw silk. In accordance with new designation, it is also called Honan or Henan.

Honey: Greyish-yellow colour; also 'honey-coloured'.

Honeycomb fabric: Cotton fabric in which the warp and weft threads form ridges and hollows to give a cellular appearance which may be evident on one or other or both faces of the fabric. The honeycomb weave is achieved with

groups of short running warp and weft floats. The structure makes the fabric more absorbent than other fabrics. It can be dyed, printed or with woven patterns. Once made only from worsted yarn, it is now made with cotton and is used for children's clothes, dresses, kitchen curtains, table clothes, and comes in plain or printed forms.

Honeycomb: (a) Hexagonal mesh found in laces; (b) Patterns similar to cells on cotton or other fabrics, made with fine warp and much coarser filling, producing reversible effect; used on towels, also on some dress goods.

Honeycomb canvas: Bleached cotton canvas, made in square honeycomb effect; used for embroidery.

Honeycomb backing (embossed foam, structured foam): Back coating of carpets with foam having an embossed honeycomb-like pattern.

Honeycomb reseau: In laces, a ground composed of diamond shaped squares.

Honeycomb screen: An arrangement with a honeycomb grid used in the transfer of designs on to rotary printing screens during exposure to a light source in which oblique incident rays from all directions are, for the most part, screened out by the honeycomb grid so that they have no effect on the copying process.

Honey dew: (1) A yellowish-pink; an orangey-pink colour.

(2) A descriptive term for secretions on cotton hairs caused by whitefly or aphids during cotton growing. The sticky deposit is composed of various sugars. The spread and intensity of honeydew infestation almost always has a direct correlation with the use of various insecticides.

Honeysuckle: Pale pinkish-yellow; a yellowish-brown colour.

Honghow silk: Piece dyed silk foulard, made in China. It is about 29 inches wide and used for wrapping.

Hongkong seam finish: A finish for the raw edges of a plain seam in which a binding fabric (bias- 1.0–1.5 in or 2.5–3.8 cm. strip from a lightweight fabric like lining or underlining) encloses the raw edge of each seam allowance; the binding fabric has one raw edge cut and the other raw edge exposed. Stitch one edge of the bias strip to the seam allowance, right side together and stitch 6 mm (¼ in) from the cut edge. Then fold the bias strip over the raw edge to the underside of the seam allowance. Stitch in the crease of the first row of stitching to secure the back edge of the bias strip to the seam allowance. Trim away the extra bias.

Hongroise: Plain French serge dress goods of eight leaves and four picks in a repeat.

Honiton lace: A handmade lace that originated in Devonshire. It is characterized by the design of flowers and leaves on a very fine mesh ground.

Hook and loop fastener: A touch fastener, comprised of two flexible mating strips, the surface of one mating strip being covered with tiny, stiff protrusions shaped like hooks which engage the other mating strip which is covered with pliable loops.

Hook: A device which acts as a loop taker and carries the needle thread around the bobbin containing the lower thread in order to form the lock stitch.

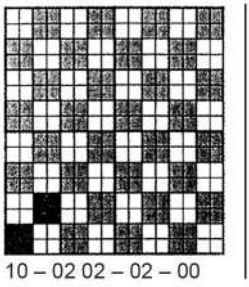
Hook and loop fastener: A touch fastener comprised of two flexible mating strips, the surface of the mating strip is covered with tiny, stiff protrusions shaped like hooks which engages the other mating strip which is covered with pliable loops.

Hook reed: See **Reed**.

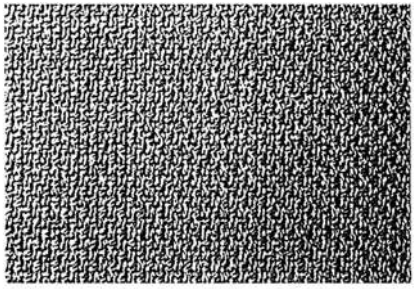
Hooked bow: A fabric condition in which the filling or course yarns are in the proper position for most of the fabric width, but are pulled out of alignment at one side of the fabric.

Hop pocketing: Jute bagging which is used for hop bags and is similar to tarpaulin.

Hopsack: Originally hopsack was a coarse double yarn sacking, made from jute or hemp, and used as sacking by hopgrowers. Now the name has been given to a plain-weave suiting weight cloth made by using two yarns in each direction. It can be made in synthetic or natural fibres; but if made of synthetic, the fibres are usually bulked to produce the traditional cloth. It may be used for curtain and furnishing.



Pattern Draft



Hopesack

Hopsack weave: Also called mat weave, matt weave and panama weave. A modification of a plain weave in which two or more warp yarns weave together as one and two or more weft yarns weave together as one.

Note – The basic hopsack weaves may be modified in a number of ways such as: (a) by introducing additional interlacing to give a firmer cloth, e.g. stitched hopsack weave; (b) by arranging the interlacing in diagonal lines, e.g. twilled hopsack weave.

Hopsacking: A plain woven canvas dress fabric of wool.

Hop-sacking: The English name for American basket weave. In woollen and worsted trade, hopsacking refers to a suiting fabric made with the 2/2 basket weave. It comes in wide range of textures and weights. A characteristic hopsacking material may be made of 2/8 worsted warp and filling. Instead of coarse worsted, 3-run woollen yarn may be used; a characteristic texture is 24 × 24. Also, cotton warp and a soft spun woollen filling may be used for hopsacking.

Horauf process: A space dyeing process for yarn sheets in which yarns from cross-wound packages/cops are passed through a dye liquor applicator. The amount of dye applied to the yarn can then be reduced to the desired liquor pick-up by means of a patented procedure (which is similar to the OPI method). The yarn is then conducted to a winding machine (Buddecke system) to obtain a continuous, hank-like wound package consisting of individual layers of yarn held by four endless conveyor bands. These layers are transported along a bar over a distance of 2.7 m through a steamer in a tension-free state to fix the dyes. The winding rate can be varied between 400 and 1200 rpm. The dwell time in the steamer is 7.25 min for yarn which is generally closely packed (16 threads per cm), the winding speed being 600 rpm. The dwell time is only 3.6 min if the yarn is spaced wide apart during winding (4 threads per cm) at a winding speed of 300 rpm. After steaming, the yarn is drawn off from the carrier and wound on bobbins.

Horizon blue: A light greenish-blue colour.

Horizontal emerizing machine: For woven fabrics with emerizing rolls and a dust bag filter for dust extraction from the machine. Fabric feed and delivery via batch rolls.

Horizontal flame test: See **Flammability tests**.

Horizontal line: See **Ring**.

Horizontal migration: Selective horizontal migration is due to the different migration rates of the components in a dye combination. It causes dichroism which results in an irregular and uneven appearance of the dyed fabric.

Horizontal organisations: Companies (often small but not always) specializing in one production process such as knitting, dyeing, printing and finishing.

Horizontal open-width washing machines: This design of washing machine has wash compartments in which the guide rollers are arranged in vertical banks between which the fabric passes upwards in the open-width state in a series of almost horizontal loops with liquor flowing from top to bottom.

Horizontal pad: A horizontal pad with a controlled gap between the rollers is a variation of knife coating. Banks of foam can be placed in the crevice between the rollers and the fabric so when the fabric passes downward, the roller will act as the knife allowing a measured amount of foam to pass through. This method applies foam to both sides of the fabric at the same time.

Horizontal padder (horizontal foulard): A padder, without a liquor trough, in which fabric is padded through a wedge of liquor held in the nip between two horizontally arranged padder rolls.

Horizontal stenter: A stenter with an air-cushion nozzle system for the drying and heat-setting of textile fabrics. The machine can be incorporated into an integrated finishing line for the finishing of woven and knits and is provided with a double batching system on giant batch rolls at the delivery end for fully continuous operation.

Horizontal two-bowl padder: A padder in which piece goods are run vertically downwards through the nip of a horizontal padder containing the liquor in between the two bowls.

Horizontal washer (tangential washing machines): Industrial long drum washing machines mostly with Pullman divisions (horizontal separators) for larger units and a lengthwise (tangential) opening for loading/unloading.

Horrocks: Old English calico, named after its maker.

Horse cloth: Double-faced twilled jute; the back is often made of wool. It is usually single-coloured or striped; used as horse blanket.

Horse hair: Coarse and stiff elastic hairs which are usually white, brown and black in colour. Natural horsehair is obtained from the tail of the horse (60–80 cm in length, 80–400 m) or the mane (25–45 cm in length, 50– 200 m). Long lustrous hair; sometimes used in furniture seats, underlinings, etc. It is spun into yarn by gluing the hair to a cotton binding thread and then twisting it. The glue is insoluble. According to another system, two fine cotton threads are twisted around the hair.

Hose: A tubular woven fabric for covering liquid under pressure. Hose is manufactured both in underlined and lined forms. When unlined, the weave is plain and the material is generally flax or hemp with a weaving density so arranged that, when the fibre swells on wetting, the fabric becomes tight enough to reduce percolation under pressure, to a negligible amount. For the lined hose, fibres other than flax or hemp may be used in a plain or twill

weave. Light weight hose woven from synthetic yarns mainly incorporate an independent tubular plastic lining which is introduced during a weaving process or afterwards.

Hosiery: Can mean all types of knitted fabrics, and goods made from knitted fabrics.

Hosiery goods: Knitted fabrics.

Hot dissolving method: Dissolving method for naphthols in piece dyeing and in printing for generating insoluble azo compounds on the fibre material. The naphthols are made into a paste with, for example, Turkey-red oil and caustic soda solution and then made into a solution with boiling water. Other classes of dyes in powder form, such as direct, acid, reactive and cationic dyestuffs, are applied according to the hot dissolving method.

Hot dyeing dyes: Vat dyes which exhibit their highest affinity for cellulosic fibres at 50–60°C and are applied by the IN dyeing method. They are referred to as hot-dyeing dyes to distinguish them from so called cold-dyeing vat dyes which have the highest affinity for cellulosic fibres at 25–30°C and are applied by the IK dyeing method.

Hot orange: An intense orange colour.

Hot tack: Cohesive strength of a coating when molten.

Hot melt sizing: Process developed by Burlington, USA, for sizing with a thermoplastic, water soluble polymer (hot melt), which is applied via a roller at 135–155°C. Each individual warp thread runs in a groove.

Advantage – Energy saving on conventional methods.

Disadvantages – High investment costs, expensive sizing material, non-recoverable, additional operation of assembling.

Hot mercerisation: Mercerisation with an alkaline solution of approximately 60°C on raw goods causes less change in dye up-take on dyeing. Swelling of the fibres is less, and thus hot and cold mercerisation is often combined. Since swelling is an exothermic process, the hot impregnation of cotton fabrics promotes the even penetration of the less swollen mass of fibres with caustic soda solution, while a subsequent reduction in temperature initiates the swelling process.

Hot notcher: A machine with a heated blade used for making position marks on the edge of cut fabric parts.

Hot pink: An intense pink colour; a colour particularly popular in the 1950's.

Hot water extraction cleaning: A process in which a heated solution of detergent is sprayed on to the textile material and immediately removed by a wet suction nozzle behind the spray-head.

Hot-air shrinkage: Generally, the reduction in the dimensions of a fabric, yarn, or fibre induced by exposure to dry heat. Specifically, a fundamental property of fibres.

Hotflue: Hot-air drying machine for fabric, preferred for intermediate drying. Passage of fabric is usually either vertical, alternating up and down through a drying area with circulating hot air, or diagonally in an up and down zig-zag fashion with double-sided air flow (air jets) from above and below.

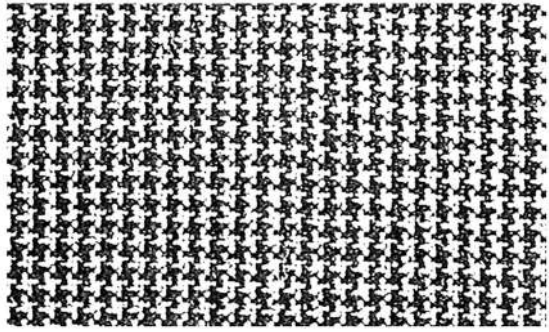
Hot-head press: A pressing machine capable of generating high temperatures and pressures. Used for pressing and processing permanent-press fabrics.

Hot-melt adhesive: A solid material that melts quickly upon heating, then sets to a firm bond upon cooling. Use of this type adhesive provides almost instantaneous bonding.

Hottenroth number: A measure of degree of ripening of viscose. See also **Salt figure**. Hottenroth number is expressed as the number of millilitres of 10% ammonium chloride solution that is necessary to add to a somewhat diluted viscose solution to induce the incipient coagulation under standard conditions.

Hot water extraction (in carpet cleaning): A method of cleaning carpet by injecting a heated cleaning solution into the pile and quickly removing the solution and soil by vacuum. Hot water extraction is often erroneously called steam cleaning. Hot water is used at a temperature of 60 ± 3°C (140 ± 5°F). These temperatures are far below the temperature of steam of 100°C (212°F). See also **Steam cleaning**.

Hounds tooth check or Hounds tooth: A four pointed star check design in a broken twill weave. The checks are medium sized and one of the colours is often white. It is used for men's sports suiting. Particular form of shepherd check shaving short diagonal extensions at corners. These patterns also can be printed. It is used in suits and costumes. See **Pepita**.



Hounscot say: A 17th Century English worsted.

Houppelande: Cloak-like outer garment for men and women; long and heavily folded, mostly open at the front and belted.

House flannel: Lightweight flannel, made with cotton warp and woollen filling; used for household purposes.

Household textiles: Textile products used within the home, except furnishings.

Included are bedsheets, pillow cases, towels, blankets and table clothes.

Howell: (a) An early ripening commercial variety of upland cotton from Louisiana, the staple measuring up to 25 millimetres; the yield of lint is 34–36 percent; (b) General trade term for T cloths in Greece.

HPD dyeing process for sulphur dyes: A hotpad-dry continuous dyeing process for lightweight cotton or regenerated cellulose fabrics. The liquor contains dye, sodium sulphydrate, caustic soda, glucose and thiourea. After padding, the material is dried or steamed and then after-treated.

Hsiu: Chinese embroidery; the designs are filled out with coloured silk or gold and silver threads.

HT beam dyeing machine: High temperature dyeing machines in which piece goods can be treated horizontally at temperatures above 100°C (up to 140°C). The fabric is wound on perforated beams; the liquor is pumped through in either direction.

HT bleach: Peroxide bleaching at temperatures of 110–120°C on HT machines autoclaves or in special pressure steamer for cotton piece goods.

HT bleaching process: By using pressure reaction chambers, e.g. Vaporloc (Mather & Platt) with hydrogen peroxide, it is possible to obtain a good bleaching effect on cotton and cotton/polyester blends in two minutes.

HT dyeing machine: Any dyeing machine like jig, jet dyeing, winch, beam dyeing machine, etc., which can dye at high temperatures (able to withstand high pressure).

HT fabric beam dyeing machine: High temperature dyeing machines.

HT jigger: A jigger for the high temperature dyeing (HT-dyeing) of textile fabrics in open-width under pressure (at pressures up to 4 bar). Now it is largely replaced by HT beam dyeing machines.

HT loop steamer: Used as a universal continuous steamer. Characteristic features are low-tension cloth guide, high productivity and the facility for operating with both saturated steam (100°C) and superheated steam (up to 180°C). This allows synthetic fibres (such as polyester, triacetate) to be

continuously steamed. In addition, HT loop steamers are ideally suited to setting fabric that is sensitive to tension, such as knitted fabrics made of textured polyester.

HT pressure steamer: Pressure steamer in which woven and knitted fabrics are steamed on a continuous basis with saturated steam at temperatures up to 140°C and can thus be used for pad dyeing/print development.

HT rapid draining device: Controlling the HT rapid draining device on any HT dyeing machine allows the liquor draining temperature to be adjusted as preferred, e.g. to 130–140°C and in a range where oligomers are not attached to the fibre and can be discharged to drain. The hot dye-liquor is mixed with used, cold process water under controlled conditions and eventually led into the effluent discharge system when the temperature is suitable.

HT steam: Steam at a higher temperature (Superheated steam) can also exist under normal pressure and be further used at atmospheric pressure See **High pressure steam, Superheated steam**

HT steaming: This takes place in continuous HT loop steamer. Hot steam above 100°C is the heat transfer medium. Especially suitable for fixing polyester or triacetate when printing with disperse dyes. It is possible to work tension-free so they are especially suited for processing tension-sensitive knitwear. Operates at temperatures between 160–180°C for 6–8 minutes. Higher fixation temperature and dwell time require careful selection of dyestuff (above-average fastness to sublimation); as a rule, printing paste contains a fixation accelerator. They are also used, with suitable dyestuff choice and fibre type, with saturated steam (100°C) so these steamers have a temperature range between 100–180°C. See **HT Loop Steamer.**

Huampo: Bark fibre, yielded by the Cheirostemonplatanoides, in Peru; used for garments by the natives.

Huasi ma: Coarse, reddish-brown bast fibre, yielded by a species of the Guazuma tree in Mexico and Trinidad; used for cordage.

Huchaback: A corruption of huckster-back, meaning originally pedler's ware – Towelling made of all linen, linen and cotton, cotton and wool, either by the yard or as separate towels; the part wool huck always separate towels.

Huck: The nickname for Huckaback; it is more commonly used name. See ***Huck back***.

Huck, towel: A plain weave non-terry foundation product constructed with small warp and weft floats, having hems or selvedge, which is used to dry a person's hands and utensils such as glasses, plates, bowls and flatware.

Huckaback: A linen or cotton cloth with a square weave in which the yarns are twisted to add its absorption qualities as it is used almost exclusively for towels in hotels, schools, etc. It is made in white or plain colours, sometimes with woven contrast stripes or name included. Very hard wearing and fairly stiff and heavy.

Hudson's bay blanket: A well-milled and raised heavyweight blanket made from coarse long-staple wool supplied to the Hudson's bay company since the 17th century. It is natural with coloured border, or striped all over or solid colour with darker border.

Hue: Shade, tint, colour. (a) The first element in the colour-order system, defined as the attribute by which we distinguish red from green, blue from yellow, etc. Munsell defined five principal hues (red, yellow, green, blue and purple) and five intermediate hues (yellow-red, green-yellow, blue-green, purple-blue and red-purple). These 10 hues (represented by their corresponding initials R, YR, Y, GY, G, BG, B, PB, P and RP) are equally spaced around a circle divided into 100 equal visual steps with the zero point located at the beginning of the red sector. Adjacent colours in this circle may be mixed to obtain continuous variation from one hue to another. Colours defined around the hue circle are known as chromatic colours; (b) The attribute of colour by means of which a colour is perceived to be red, yellow, green, blue, purple, etc. White, black and grey possess no hue.

Hugicion: Fibre yielded by a species of the fig tree in Peru.

Huitoc: Fibrous bast of a species of Genipa in Peru; used for rough clothing by the natives.

Human tissue burn tolerance (in the testing of thermal protective clothing): The amount of thermal energy which causes a second degree burn in human tissue.

Humectants: They are hygroscopic compounds (glycerine, ethylene glycol and urea) which absorb moisture and reduces the brittleness of starch films. They help to reduce shedding caused by fracturing the film. In a few dyeing techniques such as direct application, it is necessary to prevent the dye solution applied to the fabric from drying out before the dye has time to fix to the fibres. A humectant, often urea or occasionally glycerine, may be used for this purpose. Humectants may be unnecessary if it is possible to wrap the fabric in plastic sheeting or put it in a closed plastic container to keep it from drying out.

Humidity: The condition of atmosphere in respect to water vapour. The mass of water vapour present in a unit volume of air. For example, Grams per cubic metre.

Humidity relative: The ratio of the pressure of water vapour present to the pressure of saturated water vapour at the same temperature. The ratio is generally expressed as percentage or as a decimal fraction.

Humum: Old and plain Indian cotton cloth of coarse quality.

Hungry cloth: Loose and transparent knitwear. Not always faulty production. Such cloth is deliberately manufactured according to fashion trend demands in a suitable character (e.g. fine, extremely thin lisle stockings).

Hungry fine: A term used to describe a fine wool caused by poor nourishment as opposed to careful breeding.

Hunnicutt: Early maturing commercial variety of prolific cotton from America, the staple measuring 22–25 millimetres; the yield is 30–32 percent.

Hunter coordinate system: This occurs through converting the CIE tristimulus value to the illuminant D65/2observer according to the following relations:

$$L = 10(Y)1/2$$

$$a = 17.5(1.052.\ X - Y):Y1/2$$

$$b = 7(Y\text{-}0.919Z):Y1/2$$

L is the luminosity axis (achromatic axis) analogous to the Y axis in the standard valency system. a and b characterize the chromaticity (and can have positive and negative values). The physical ideal white here has the coordination L = 100 and a = b = 0.

Hunter's green: A dark yellowish-green colour.

Hup dyeing apparatus: Serves to dye fully milled (not well balanced) hat bodies in a floating liquor: relatively low liquor ratio (max. 1:30); liquor is circulated by a propeller which automatically changes its direction of flow; the dye liquor is pushed and drawn through the mass. Attainable dyeing temperatures with closed apparatus around 98°C. Best results with level dyeing acid dyestuffs.

Hurdle drier: Box drying machine for flock, hank yarn and cross wound spools with perforated floors (cabinet drier).

Husking cloth: Stout and heavy cotton ticking; used for working gloves.

Hussong loose cotton dyeing machine: A machine used in the earlier days to dye loose cotton. It consists of a vat with steam pipes in the bottom and a perforated partition above these pipes and is divided into two compartments, one bigger for holding the cotton and other for liquor. Machine works in the same principle as Schmidt's machine (See **Schmidt's machine**). Liquor is

heated after loading the material and guided to the top by working a paddle fitted in the lower compartment and poured over the loose cotton in the next compartment and percolated through the package to the bottom due to the vacuum produced at the bottom. This process continues and the dyeing takes place.

HVM: High wet modulus fibres (HVM fibres).

Hwachow: Dressed silk gros de Naples, made in China; it used to be made at about 24 inches wide. The warp is organzine and the filling a six-ply greige tram.

Hwa mien: Chow cotton poplin, made in China.

Hwasienchow: Very soft silk gros de Naples, made in China; does not crease.

Occasionally made similar to crepe.

Hwayong: A Chinese silk velvet made in green or poppy colours.

Hwayutwan: Wool poplin, made in China.

Hybrid composite: Advanced composite with a combination of different high-strength continuous filaments in the matrix. Also, composite in which continuous and staple fibres are used in the same matrix.

Hybrid fabric: Fabric for composite manufacture in which two or more different yarns are used in the fabric construction. This provides design flexibility to meet performance requirements and controls cost by permitting some lower priced fibres to be used.

Hybrid fibres: Fibres based on polymer blends. The extrusion spinning occurs from a common solution (or melt) of at least two fibre-forming polymers, of which one is a native polymer, e.g. cellulose or casein. Ideally hybrid fibres may be regarded as filament composites. Examples of hybrid fibres (polymer blends and solvents) are

(a) PAI/Cell (HCHO)X/DMSO

(b) PAN/Cell (HCHO)C/DMSO

(c) Cell/PAN N204/DMF

(d) LiCl/DMAC

(e) PAN-Co/Cell $ZnCl_2/H_2O$

(f) PAN-Co/Fib $NaSCN/H_2O$/DMSO

(g) PAN-Co/CA DMF

(PAI = polyamidimide, Cell = cellulose, PAN = polyacrylonitrile,Co = Copolymerisate, Fib = fibroin, CA =acetate).

Hybrid yarn: In aerospace textiles, a yarn having more than one component. Also see **Commingled yarn**.

Hybrid yarn manufacture: Since the development of new high-temperature resistant thermoplasts, interest in using these materials as a matrix with high performance composites has increased particularly in the air and space travel industry. The techniques illustrated above are principally available for the manufacture of suitable prepegs.

Hyacinth blue: A purplish-blue; a colour popular in the 1930's.

Hyacinth red: A reddish-orange colour.

Hyacinthine: The purplish-blue of the hyacinth; blue-red; hyacinth violet or pink.

Hydrangea pink: A yellowish-pink. Also hydrangea blue and hydrangea red.

Hydrate: (Gk.: hydor = water), molecular compound formed through hydration with bound water molecules.

Hydrated cellulose: Regenerated cellulose.

Hydrated lime: Calcium hydroxide, $Ca(OH)_2$.

Hydration no.: A value indicating how many water molecules are associated with each molecule of some other compound in a crystal of that compound. Many chemicals have one or more water molecules associated with each chemical molecule in the commercially-sold form of that chemical. For example, sodium carbonate (soda ash) may be sold as anhydrous (containing no water molecules), monohydrate (one water molecule per sodium carbonate molecule, written as $Na_2CO_3 \cdot H_2O$) or decahydrate (ten water molecules per sodium carbonate molecule – $Na_2CO_3 \cdot 10H_2O$). This water is not visibly present as water – it does not cause dampness, though it may change the appearance of the dry chemical. The hydration state must be considered when measuring the chemical by weight. For example, 1 gram of sodium carbonate decahydrate contains about 0.37 grams of sodium carbonate, and 0.63 grams of water. If chemicals are exposed to air for long periods, the hydration may either increase or decrease depending on conditions. See **Hygroscopic**.

Hydraulic: A very common driving media used in process house. Hydraulic means 'moved by the pressure of fluid (pumped)'; e.g., high-pressure atomizers for increasing air or fabric humidity (jets) or mechanical drives for step-less speed control (control devices) consisting of driven oil pump and driving fluid motor.

Hydraulic entanglement: See **Hydroentanglement**.

Hydrolytic stability: The ability to withstand the environmental effects of high humidity.

Hydrolysis, sensitivity to: In the USA, it is normal to neutralise alkaline laundering of resin finished goods with the addition of acidic reacting salts (e.g. zinc silicone fluoride) in the final rinsing-bath, in order to prevent yellowing that can easily occur as a result of hot tumble drying. Overdosing of the acidic salt will create acidity on the fabric, which will affect the finished effect. Hence, fabrics destined for the American Market require the best hydrolysis stability.

Hydrolysis, stability to: Resistance of a type of finish, particularly an easy care finish or the resin-finishing agent itself, to acidic or alkaline Hydrolysis. With insufficient stability to acid hydrolysis, splitting of the cross-linked resin-finishing agent may occur, which considerably impairs the finishing effects; there is no risk with resin finishing in the alkaline range.

Hydro (hydros in few countries): Dye house term for sodium hydrosulphite.

Hydro extraction: See **Hydro-extraction**.

Hydro-cellulose: Mineral acid damage to cellulose is shown through water absorption and splitting of oxygen links between glucose building blocks.

Properties– Reduced strength, increased reducing power and modified dye affinity.

Detection – Hydrocellulose alone.

Ammoniacal silver nitrate solution. Also with Prussian blue reaction, Turnbull's blue reaction, Fehling solution, methylene blue and solubility test (which also indicate oxycellulose). No staining with Diamine Blue 2B, Congo red or Benzopurpurine.

Hydrochloric acid: A strong inorganic acid; solution of HCl in water, typically about 37%; often called muriatic acid. Hydrochloric acid is not much used in dyeing, but is used in some processes to strip certain finishes from fabric. It can cause skin burns and the fumes are very noxious. Handle and store it with great care as it is a strong acid.

Hydro-entangling: A Process for forming a fabric by mechanically wrapping and knotting fibres in a web through the use of high-velocity jets or curtains of water. Also see ***Spunlaces Fabric***.

Hydro-extraction: This process removes the water (the water quantity varies according to the type of fibre) dispersed in the fibres by mechanical action; this process aims at reducing energy consumption and is carried out before the final fabric drying or between the various wet processing stages (washing, dyeing). Different methods are available like squeezing, centrifugation, steam pressure (jet force).

Hydro-extraction by centrifuge: Water extraction by centrifuge.

Hydro-extractor: See **Centrifuge**.

Hydro-fixation: Heat setting of polyamide piece goods in HT beam dyeing machines using hot water (up to 140°C), mostly combined with bleaching, scouring or dyeing.

Hydrogen bond: A hydrogen bond is a type of electrostatic interaction between groups in molecules that have hydrogen atoms bound to electronegative atoms (e.g. so-called Donor, such as oxygen, nitrogen, sulphur, chlorine, fluorine). Hydrogen bonds may therefore be regarded as electrostatic bonding forces between dipole molecules with a high dipole moment, in which the hydrogen atom is at the positive end of one polar group and forms a linkage with the electronegative end of another polar group. A chemical bond in which hydrogen that is already covalently bonded to one atom is electrically attracted to a lone pair of electrons on another atom Some atoms such as oxygen are said to be very electronegative, which means that they strongly draw bonding electrons toward themselves. If hydrogen is bonded to such an atom, the hydrogen "appears" to have some positive charge. Lone pairs (that is, not involved in bonding to other atoms) of electronegative atoms tend to attract hydrogen from other molecules, but a new compound is not formed. Hydrogen bonds are weak to moderate in strength, but there can be very large numbers of hydrogen bonds between molecules of compounds like cellulose. It is hydrogen bonds between cellulose molecules that keep the molecules together as fibres (and it is because they are easily broken and re-formed that cotton wrinkles). Hydrogen bonds play a role in dyeing with direct dyes, and may be present as "temporary" bonds with other dye types.

Hydrogen peroxide: (Hydrogen superoxide, hydroperoxide Peroxide), H_2O_2, normally as a solution in water, structure H–O–O–H. Molecular weight 34.016. Besides water, hydrogen and oxygen form hydrogen peroxide H_2O_2. In its anhydrous state, this is a liquid whose physical properties are very similar to those of water. The boiling point is at 150.2°C, the freezing point –0.43°C. The molecule is diamagnetic; its structure is reproduced in the metastable original state of H_2O_2 is separated from the product water in the model by an energetic barrier, the "activation peak". Hydrogen peroxide is extensively used in commercial bleaching of textiles, especially cellulose fibres and wool. It is effective and non-polluting. The hydrogen peroxide sold in drug and grocery stores is about a 3% solution. Industrial strength hydrogen peroxide may be 35%, 50% or 70%. At these strengths it is quite dangerous to handle, and spills can cause fire. Hydrogen peroxide can behave as either an oxidizing agent or a reducing agent. It is sometimes used as an antichlor.

Sodium percarbonate and potassium monopersulphate are dry chemicals derived from hydrogen peroxide.

Hydrogen peroxide bleaching: Bleaching of textile fabric using hydrogen peroxide. It can be done in batch or continuous process and in various types of machines. See **Hydrogen peroxide**.

Hydrogen peroxide bleaching regulators: Bleaching systems contain regulators to reduce fibre damage and oxygen release. Buffers are used to maintain the correct pH for activation since alkali is required to neutralize the cellulose breakdown products. In addition, complexing agents are required to chelate any heavy metals present. Bleaching systems with built-in catalyst present do not inevitably cause a corresponding breakdown of cellulose – the catalyst also needs to be activated.

Hydrogenation: The process of passing hydrogen into an unsaturated chemical in the presence of a catalyst to convert the material to a more saturated state (i.e., containing more combined hydrogen).

Hydrolases: The most extensive main group of Enzymes which catalyse the hydrolytic cleavage of C– O and C–N bonds in the breakdown of large molecules.

Hydrolysis: In general, the decomposition of a chemical by reaction with water to form more molecules or ions. A typical example is the hydrolysis of cellulose, i.e., hydrolytic splitting of cellulose, known as hydrocellulose, i.e. hydrolytic splitting of cellulose. Some chemicals, such as reactive dyes, are effectively destroyed by hydrolysis. Others, such as soda ash, are made useful because of hydrolysis. Hydrolysis will occur when susceptible compounds are in aqueous solution, but can also occur because of water absorbed from moist air, without the compound ever appearing wet or damp. This is why many dry chemicals must be kept in sealed containers.

Hydrolysis (reversible): The effect of water on the ions of a dissolved salt lead to a state of equilibrium where ions and molecules of the acid or base forming the salt exist together. If the conditions change, acid or base molecules may change back into ions. This is especially significant with salts of weakly organic acids or weakly organic amines with large hydrophobic tails.

Hydrolysis (sensitivity to):In many countries, it is normal to neutralise alkaline laundering of resin finished goods with the addition of acidic reacting salts (e.g., zinc silicone fluoride) in the final rinsing-bath, in order to prevent yellowing that can easily occur as a result of hot tumble drying. Overdosing of the acidic salt will create acidity on the fabric, which will affect the finished effect.

Hydrometer: A device for measuring the density of liquids consisting of a sealed cylindrical glass tube with a density scale at the upper end and weighted with mercury or lead shot at the lower end. When placed in a liquid, the hydrometer floats upright with the tube partially immersed, the degree of immersion depending on the density of the liquid which can be read off directly from the scale at the liquid/air interface.

Hydrophilic: Having strong affinity for or the ability to absorb water.

Hydrophilic group: Group of molecules whose behaviour towards water is Endophilic.

Hydrophilic property: Tendency of a material to take up water (opposite to ***Hydrophobic***).

Hydrophilic-lyophilic balance (HLB): For a molecule to function as a surfactant, it must have the proper balance of water and oil solubility. The molecule must not be too water soluble otherwise it will not form micelles, yet at the same time it must be sufficiently soluble to do its job. The solubility of a surfactant molecule in water verses oil depends on the water-solubilizing group. Ethoxylated nonyl phenol is a good molecule to describe this concept. Nonyl phenol (considered as the hydrophobe), is slightly soluble in water. It is highly soluble in oils (organic solvents). If one mole of ethylene oxide is added, the water solubility is increased slightly while oil solubility is decreased. As more ethylene oxide is added, water solubility continues to increase at the expense of oil solubility. When 5 to 9 moles of ethylene oxide have been added, the molecule is equally soluble in water and in oil. Above 9 moles of E.O., the water solubility continues to increase at the expense of oil solubility.

Hydrophobic: Property of a material to have a water-repellent effect (opposite Hydrophilic property).

Hydrophobic group: Group of molecules whose behaviour towards water is exophilic.

Hydroplastic: Materials that is deformed in the wet state, e.g. cotton through hydrate formation of the cellulose OH groups, where even slight quantities of water in humid air are enough to break the hydrogen bonds produced by OH groups. See **Thermoplastics**.

Hydroplasticity factor: The wearing properties of textiles made from regenerated cellulose fibres depend, among other things, on the wet and dry crease angles. Both should be in a certain ratio to each other. A good dry crease angle in itself is not sufficient.

Hydros: See **Hydro**.

Hydroscopic: Having the ability to absorb moisture from the atmosphere. All fibres have this property in varying degrees.

Hydro-setting (a setting method): The hydro-setting or aqueous heat-setting of polyester is done with hot water in a high temperature liquor circulating machine at about 130°C. A typical cycle may require 30 minutes. Water (or steam) promote swelling of fibre and may cause some hydrolysis in the ester groups in polyester chain. This causes partial destruction of intermolecular bonds and depolymerisation of fibre with a result in loss in tenacity. However, the hydrosetting temperature can be lowered by adding some selected organic or inorganic substances causing swelling of polyester, but such conditions have not yet found industrial application.

Hydrosulphite: Sodium dithionite.

Hydrosulphite discharges (reductive discharges): Sodium dithionite has not completely replaced tin salt- and zinc-dust stripping (too rapid decomposition in alkaline solution). Against it, formaldehyde sulphoxylates strips are widely used (better stability and protection of cellulose fibres).

Hydrosulphite vat: Reduction vat used in vat dyeing and in indigo-sodium dithionite vats. Sodium dithionite reduction baths produce sulphate as an end-product (concrete-aggressive).

Hydrotrope: Registered trade name for a group of substances which show hydrotropic property and are used in the detergents industry.

Hydroxy ethyl cellulose: Non-ionic and water-soluble cellulose derivatives (cellulose ether) in various states of viscosity.

Hydroxyethyl or hydroxypropyl starches: Important starch ethers as conversion product of starch with ethylene or propylene oxide (in presence of alkali). Degree of etherification of 0.3–0.5 produces good water-solubility and avoids any tendency to reversal of the reaction.

Hydroxyl group (OH group): Typical component of bases, alcohols and acids (as an auxochrome in dyestuffs), caustic soda liquor, phenol. As a dissociated component of water-soluble compounds, the hydroxyl group is the source of the alkaline reaction and degree of alkalinity (hydrogen-ion concentration).

Hydroxyl end group: A polymer chain-terminating (-OH) group.

Hygral expansion: It is a property of fabrics made from fibres that absorbs moisture, in particular fabrics made from wool. It is a reversible change in dimensions which takes place when the moisture regain of a fabric is altered.

Hygrometer: Any instrument for measuring the relative humidity of the atmosphere.

Hygrometer (assmann): This is a more sophisticated instrument than the sling hygrometer in that a fan is used to draw air across the thermometer bulbs at a constant predetermined speed. The temperatures are read when they have reached a steady value.

Hygrometer (hair): Human hair increases or decreases in length as the humidity of the surrounding air increases or decreases. By attaching a bundle of hairs to a suitable lever system, the relative humidity of the atmosphere can be indicated directly and, if required, recorded on a chart. The accuracy of this method is limited to within 3 or 4% of the true value for the range of relative humidity between 30% and 80%. A combined temperature and humidity recording instrument is often used in laboratories and is known as a thermo-hygrograph. The hair hygrometer requires frequent calibration and has a slow response to changes in atmospheric conditions.

Hygrometer (sling or whirling): This instrument works on the same principle as above, but the two thermometers are mounted on a frame with a handle at one end. This allows them to be rotated by hand at a speed of two or three revolutions per second, so giving an air speed of at least 5 m/s past the thermometers. After half a minute of rotation, temperature readings from the two thermometers are taken and the procedure is then repeated until the readings have reached minimum values.

Hygrometer (wet and dry bulb): See **Wet and dry hygrometer.**

Hygroscopic agents: Water-absorbing products as additives for finishes, printing pastes, sizes, to balance and influence the fabric weight and handle.

Hygroscopic: Having a tendency to absorb water (usually meaning absorbing it from air). Some of the commonly used chemicals in dyeing are hygroscopic. If they are left exposed to moist air, they will absorb water from the air. This may lead to caking and increases the ratio of weight to volume of the chemical. For many chemicals there are no visual signs that water has been absorbed. For others (such as copper sulphate), the colour will change. Some, such as sodium hydroxide are deliquescent – they will absorb so much water from air that a liquid solution will form. Hygroscopic chemicals should be stored in tightly sealed and moisture proof containers.

Hypo: Short term for hypochlorite bleach. Don't confuse this use of "hypo" with the use in photographic processing where it means something very different – sodium hyposulphate (more commonly called sodium thiosulfate). See **Bleach (chlorine)**.

Hypochlorite bleach: Bleaching with sodium hypochlorite or calcium hypochlorite (bleaching agent) is known as hypochlorite bleach, even though it is seldom used now. Since peroxide bleaching is associated with a tendency to cause catalytic damage to cellulosic fibres in the presence of heavy metal ions, the inclusion of a prior hypochlorite bleach in the continuous bleaching of woven fabrics has made it possible to employ milder conditions in subsequent peroxide bleaching.

Hypochlorous acid: Hydrolysis of sodium hypochlorite under pH neutral to slightly acid conditions. Hypochlorous acid, though effective at bleaching, is also believed to be very damaging to cellulose. For this reason, chlorine bleach baths are maintained at pH between about 9 and 11.

Hypothetical: As yet unproven scientific assumption, e.g. listing of hypothetical structural formulae.

Hysteresis: (Gk.: remaining behind), elastic aftereffect, i.e. the change in form by which some rubber-like substances do not recover fully or only recover slowly once the elastic stress has ceased to be applied.

I

I and M: Inspection and Maintenance.

IAQ: International Association for Quality (United States based quality control organization).

ICA: International Colour Authority. Colour forecasting publishers, publishing forecasts twice a year and 24 months ahead of the season.

Ice-blue: Greenish-blue; a pale blue.

Ice colours: Produced directly on the fibre by preparing cotton with beta-naphthol followed by development with ice-cooled diazotized aniline. Obsolete process; now substituted by Naphthol AS types.

Ice-green: An extremely pale shade of green.

ICR: Informationsstelle Chemischreinigung, Stuttgart, Germany (German Information Office for Dry-cleaning); Technical and professional organizations.

IC/TC: Intelligent Colour/Trash Co-ordinator.

ICSID: International Council of Societies of Industrial Design. An international, non-profit making, non-governmental organisation, established to advance the discipline of industrial design.

Icteritious: Jaundiced yellow.

Ida canvas: Soft and open face canvas that is made of unbleached linen.

Ideal black (physical): A black colour, which absorbs 100% of the incident light at all wavelengths, i.e. the reflection amounts to zero. See also **Ideal white**.

Ideal white (physical): Also described as normal white; closely approximated with barium sulphate with a reference point approximately equal to 00. In colour space, it corresponds to the Achromatic point to which a colour approximates after bleaching. Ideal white is a borderline case as far as 100% of the incident light is reflected at each wavelength (counter term: Ideal black).

Idle machine time: Useful working life of a machine.

IDT: Intelligent Data Terminal.

IDFC: International Dry-cleaning Research Committee. Contact organization of the dry-cleaning research offices of different countries. Technical and professional organizations.

IEK: Italienische Echtheitskommission (Italian Fastness Commission); technical and professional organizations.

IFAI: Industrial Fabrics Association International.

IFAT: Internationale Fachmesse für Abwasser und Abfalltechnik, Munich, Germany (German international trade fair for waste water and waste technology).

IFATCC: International Federation of Associations of Textile Chemists and Colourists.

IFT: Institut für Textiltechnik der RWTH Aachen, Germany (Institute for Textile Engineering); Technical and professional organizations.

IFVTCC: Internationale Föderation der Vereine der Textilchemiker und Colouristen (International Federation of Associations of Textile Chemists and Colourists); Technical and professional organizations.

Ignition: The initiation of combustion. In the sense of flammability testing, ignition represents the initiation of the burning process. See **Burning behaviour of textiles**.

Ignition loss (in glass textile): The amount of organic material consumed by ignition.

Ignition point: (a) Spontaneous ignition temperature (SIT); (b) The specific point on a textile specimen at which a flammability test is initiated.

Ignition temperature: The lowest temperature to which a given substance can be heated before it ignites (without the application of a spark or flame). It is often called the auto ignition temperature. See **Flash point**.

Ignition time (minimum ignition time): The ignition time is the time required to ignite a textile material under the conditions prescribed in a flammability test. That is, the time of flame contact on the surface of a material just sufficient to ignite the material so that it continues independent combustion after the removal of ignition.

IIC: International Institute for Cotton (GB); technical and professional organizations.

IIRSC: Irish Standards Organization; technical and professional organizations.

IK dyeing method: Dyeing method for vat dyes (IK dyes) which have the highest affinity for cotton at 25–30°C. Because of inferior fastness properties,

the so-called cold-dyeing vat dyes which can only be applied by this method have diminished in importance.

Ikat: The word "ikat" is derived from a Malaysian word *mengikat*, which means to tie, knot, bind or wind. The uniqueness of ikat lies in it being a combination of two methods – 'tie and dye' as well as weaving. In ikat, dyeing takes place in the yarn stage, following which it is woven. This process is either applied on warp or weft when it is called 'single ikat' designs or done on both warp and weft to form an overlapping or 'double ikat' pattern. The beautiful trade mark of ikat – the jagged weave in striking colour sequences, is an outcome of the enormous skill that goes into tying the yarn. Though it is a complex method, the depth of India's textile tradition is visible in the way weavers plot the design with a dexterity matching modern aids. Rarely will any two motifs, in the same running length, be facsimile yet they look strikingly similar and therein lies the beauty of ikat. It's another highlight is that both the sides of the fabric appear similar. The technique is highly developed in Indonesia, India, Madagascar, Central and South America, etc.

Illuminant: (1) Mathematical description of the relative spectral power distribution of a real or imaginary light source — i.e., the relative energy emitted by a source at each wavelength in its emission spectrum. Often used synonymously with "light source" or "lamp," though such usage is not recommended.

(2) An Illuminating material.

Illuminant A (CIE): Incandescent illumination, yellow-orange in colour, with a correlated colour temperature of 2856K. It is defined in the wavelength range of 380 to 770nm.

Illuminant C (CIE): Tungsten illumination that simulates average daylight and bluish in colour with a correlated colour temperature of 6774K.

Illuminants D (CIE): Daylight illuminants, defined from 300 to 830 nm (the UV portion 300–380nm being necessary to correctly describe colours that contain fluorescent dyes or pigments). They are designated as D, with a subscript to describe the correlated colour temperature; D65 is the most commonly used, having a correlated colour temperature of 6504K, close to that of illuminant C. They are based on actual measurements of the spectral distribution of daylight.

Illuminating dye: Dye mixed with discharge paste in printing techniques, also called head dye. In a few discharge printing techniques, dye is mixed with the discharge paste so that the discharged area is given a new colour. Illuminating dyes must be selected carefully, since they must resist the effects of the discharge chemicals.

Illuminating dyes: In textile printing, illuminating dyes are those dyes which are used to substitute the missing shades in a particular dye class, e.g. vat leuco ester dyes as coloured resists under naphthol and aniline black dyeing. In discharge printing, a distinction is made between white discharge printing and coloured discharge printing. In coloured discharge printing, coloured grounds (produced with dischargeable dyes) are printed with discharge printing pastes containing dyes resistant to the discharging agent.

Illuminating colours: An old term for textile colours used in resist and discharge printing. Illuminating colours are produced mainly with brilliant dyes from a different dye class to supplement the shades missing from a particular dye range.

Illumination (in lighting): The density or flux of light on unit area of surface.

Illusion: Fine French silk tulle that is used for trimming; also a net with star mesh, used for making veils and dresses.

Imagdong: A plant in the Philippines. The fibres of this plant are used for making cords and ropes.

Imbabura: Cotton grown in Peru; the staple is fine, white and clean.

Imbe: Fibre yielded by the stem of a species of Philodendron in Brazil; used for ropes.

Imbibition: A measure of the liquid or water-holding capacity of a textile material.

Imidazolines (softeners): Amino esters and amino amides are converted to cyclic imidazolines by heating them under reduced pressure to split out a second mole of water. One nitrogen in the ring reacts as a simple amine, so it can form acid salts to become cationic or it can be quaternized. The imidazolines are less viscous than their parent amino amide and therefore have better softening properties. Imidazolines are less likely to discolour with age than their corresponding parent compound.

Imirat: A bast Indian cotton fabric of plain weave.

Imitation fur (simulated fur, imitation skin): A collective term for numerous imitations of natural furs and skins. Synthetic fibres are predominant as raw materials for the production of simulated fur pile fabrics with increasing use being made of hollow fibres. Imitation fur fabrics are often foam-backed.

Imitation horsehair: Narrow plain woven fabric, made of heavily sized vegetable fibres to imitate horse hair cloth and used for interlining.

Imitation suede (imitation suede leather): These materials may be subdivided into the following categories depending on the manufacturing process –

(a) Imitation suede 1st generation: Artificial leather produced mainly from textile random webs, woven or knitted base fabrics
   (i) either by flock coating or
   (ii) artificial leather coatings (mainly polyurethane and polyvinyl chloride).

(b) Imitation suede 2nd generation: Available commercially since the middle of the 1970's as special fibre laminates in, e.g., polyurethane resin compounds.

Imitation wool: Made by treating Senegal hemp in cold solution of caustic soda, peroxide of sodium and soluble oil or in bath of peroxide of sodium and ammonia in equal parts. The hemp is then treated with an acid solution.

Imitation yarn: Soft-twisted, bulked coarse cotton yarn consisting of short fibres spun in the manner of carded yarn (condenser yarn).

Imi-wax: An abbreviation for imitation wax print. The purpose is to imitate real wax prints by avoiding the laborious wax resist printing process. The crackle or veining effect in imi-wax Africa prints is produced by direct printing and the indigo of real wax prints is imitated by printing blue diazo fast colour salts on naphtholated grounds. In the vast majority of cases, the same typical designs and colours are used as for real wax prints. The production of imi-wax prints is mainly carried out on roller printing machines.

Immature cotton: Cotton picked before it is fully mature. The fibres are not properly formed and the yarn made from them is generally weaker and inferior. Immature cotton tends to form small neps in the spinning process. In contrast to dead cotton, the fibre contains a considerable amount of protoplasm and therefore has different dyeing properties.

Immature fibres: (1) Cotton fibres treated with sodium hydroxide solution. Fibres that either –(a) have swollen and assumed a spiral form or (b) remained flat, thinly outlined and almost transparent. Total wall width is less than the lumen width.

(2) Cotton fibres observed under polarized light. Fibres that appear purple, indigo, or blue, turn orange or yellow-orange upon rotation to the subtractive position, and upon removal of the selenite plate show parallel extinction.

Immediate elastic deformation: Recoverable deformation that is essentially independent of time, i.e., occurring in (a time approaching) zero time and recoverable in (a time approaching) zero time after removal of the applied load.

Immediate elastic recovery: Recoverable deformation which is essentially independent of time, that is, occurring in (a time approaching) zero time and

recoverable in (a time approaching) zero time after removal of the applied force.

Immersion bleach process: A process in which the material to be bleached is kept immersed in the bleaching liquor for a predetermined duration, e.g. in a "wet" J-box (or sump) in contrast to other continuous bleaching processes where the fabric is simply impregnated with bleach liquor and plaited down in a storage unit. Even though this method is not very common now as other more efficient methods have been introduced, it has certain advantages as more complete removal of impurities from the substrate, greater uniformity of the achieved effects and the prevention of crease and rope marks, development or preservation of particular fabric characteristics, reduced chemical concentrations with consequent protection of the material against excessive chemical damage and sensitivity.

Immersion centrifuge: Textile material is wetted out in the basket of a particular type of centrifuges and subsequently centrifuged. An immersion centrifuge is used to saturate or impregnate textile materials with liquors by centrifugal force as well as for rinsing, souring and neutralizing. Processing liquors may be collected during centrifuging and re-used.

Immersion jigger: A type of jigger which was often used in the past for dyeing with vat dyes. In this type of jigger, the draw rollers are not mounted above the liquor as in a normal jigger but below the surface of the liquor so that the problem of atmospheric oxidation of the vat dyes during dyeing is prevented.

Immersion squeezing: In order to intensify the liquor exchange in wet-on-wet processing or the wetting out of textile fabrics in wet-on-dry treatments at high production speeds in a padder trough with a low liquor content (i.e. with a short immersion path), squeeze rollers are also employed below the level of the liquor in addition to the usual squeeze rolls mounted above the trough.

Immersion test: A test method for water-repellent impregnations on textiles (especially for yarns and knitted fabrics). Procedure – The textile test specimen is weighed and then submerged in a sieve for 5 min under 10 cm of water (the sieve is jerked a few times to remove collected air). The specimen is then taken out of the water, allowed to drain for approximately 10 min, weighed again and the water uptake is calculated.

Impact resistance: Resistance to fracture under the sudden application of an external force.

Imperfection: A departure of a quality characteristic from its intended level or state.

Imperial blue: A deep blue; a dye.

Imperial cloth: A coating fabric of fine worsted in twill weaves. Firm and durable cloth, usually dyed in navy blue and used for coats, capes and rain coats, if shower proofed.

Imperial green: See **Emerald green**.

Imperial red: A deep bluish-red colour.

Imperial satin: It is a closely woven cotton fabric, made with an eight-leaf weft-face satin weave, two contiguous warp ends raised together. There are at least about twice as many picks (of soft spun filling) than warp ends. They are napped on the back or on the face when they are called lambskins. The reversible imperial is very closely picked, showing the filling at each side.

Imperial serge: Another name for perpetuana.

Imperial yellow: A deep yellow colour originating from the yellow porcelain produced in China. The colour was considered to be the reserve of the imperial court. See also **Yellow**.

Impermeable: Waterproofed.

Impid: A Philippine fibre used for cordage.

Impregnated fabric: A fabric in which the interstices between the yarns are completely filled with the impregnating compound throughout the thickness of the material, as distinguished from sized or coated materials where the interstices are not completely filled.

Impregnating machine: Roller vat or rope device with squeezing unit used for wetting with bleach concentrates in rope bleaching and open-width continuous bleaching, e.g. J-box.

Impregnation: In Latin, the word *impregnare* means “to soak, saturate”. In a general sense, impregnation refers to treatment of textiles by impregnation with solutions, dispersions or emulsions. Impregnation is one of the most important operations in finishing, less for yarns than for fabrics and knitwear. It is required for all continuous and semi-continuous processes including boiling off, bleaching and dyeing.

Impressioning machine: A single-colour roller printing machine for the production of test prints as a means of checking the engraving quality of engraved printing rollers, or to produce strike-offs of new designs, as well as small samples.

Impression mark: The relief print-off of defects, e.g. slubs, under excessive rolling tension. Improved multi-volition cross.

Improved prolific: A commercial variety of upland cotton from North Carolina, the staple measuring up to 25 mm; the yield is about 30% lint.

In the grease: Signifies wool in its natural state, as it comes from the sheep's back with all the grease and other impurities attached to it.

In the gum: The natural silk fibre before the gum covering is removed by boiling out.

Inaja: Strong leaf fibre yielded by the Inaja palm in Brazil; used for cordage, etc.

IN dyeing method: A method for dyeing those vat dyes (IN dyes) which have the highest affinity for cotton at 50–60°C. See **Vat dyeing**.

In between: Name of a curtain fabric which is used because of its construction and optical effect, as a curtain and/or decorative cloth. In between is more transparent and lighter than a normal decoration cloth, but is of high density. In between often have large designs and are used as coloured sails.

Inca brown: A dark brown colour.

Incandescence: The quality of a body which, as a result of its high temperature, emits light.

Incandescent: Shining brightly; emitting light as a consequence of reaching a high temperature. Thus 'incandescence'.

Inch quality: A measure of quality of warp knit fabric, the number of inches of fabric per rack.

Inches per rack (IPR) (in warp knitting): The length of fabric in one rack measured on the machine under operating take-up tension.

Incubation: Holding a sample, microbial culture, etc., for a suitable time at a temperature, appropriate to the investigation, at which microbes are likely to multiply. Typical temperatures are 55°C for thermophils, 44°C for ***E. coli***, 37°C (human body temperature) for the coli form group of bacteria and 20°C for incubating samples in the BOD test.

Incorrectly woven yarn: A thread which in some parts only of the fabric is not interlaced in the standard way.

Indanthrene IK process: See **Indanthrene IW process**.

Indanthrene IN process: See **Indanthrene IW process**.

Indanthrene IW process: Vat dyes are divided into groups according to their affinity for the fibre and the amount of alkali required for dyeing – IK (I = indanthrene, K = cold), IW (W = warm), IN (N = normal). The IK dyes have a low affinity for the fibre; they are dyed at 20–30°*C* and require little alkali. Salt is added to increase the absorption of these dyes. The IW dyes have

a higher affinity than IK dyes. Dyeing is performed at 40–45°*C* with more alkali and little or no salt. The IN dyes are highly substantive and applied at 60°*C*. They require much alkali for vatting, but with no addition of salt.

Indanthren yellow paper (vat yellow paper): Yellow indicator paper (strips) coloured with indanthrene yellow. Indanthrene yellow paper is used to test vats in vat dyeing. If the vat conforms to regulations, then the yellow visibly changes colour to cornflower-blue within 3 s.

Indanthrone: See **Anthraquinone-N-hydroazine**.

Inde blue: A greyish purple; a dye.

Indentation: Permanent pile deformation in upholstery velour fabrics visible as pressure marks resulting from the normal everyday use of upholstered chairs and seats.

Independent variable: An assigned variable associated with a dependent variable so that when the value of the assigned variable is changed, the dependent variable may also change.

Index of refraction: Ratio of the velocity of light in one medium to its velocity in a second medium as the light passes from medium to medium. If a medium is crystalline, the velocity may depend on the direction of the light with respect to the crystalline axes and the substance may have several indexes of refraction, i.e., it may be birefringent. See **Refractive index** and **Birefringence**.

India chintz: A thick, stout chintz with large patterns; used for upholstery.

Indian brown: A dark reddish-brown colour.

Indian cicicliа: Silk brocade with gold and silver flowers over a ribbed ground.

Indian crepe': A cotton crepe of rough unfinished appearance, used for blouses, men's shorts, etc.

Indian dimity: Fine, plain woven, light cotton dress goods, having cross ribs formed by the filling. It is printed in floral warp stripes, and also between the ribs.

Indian mull: A fine, undressed, plain woven mull, dyed in the piece, made originally in India; used for dresses.

Indian orange: A vivid reddish-orange colour.

Indian red: A dark brownish-red originally made from iron oxide. See **Venetian red**.

Indian silk: Hand-loomed silk, not always made in India. This fabric has a slightly wrinkled impressed appearance, but it is a crisp fabric. Made in plain

colours, used for sarees, evening wear and sometimes for furnishing, such as cushion covers.

Indian yellow: A vivid golden-yellow pigment known in India for many years, but now synthetically produced. It was originally made from earth on which mango leaf eating cows or camels had urinated over many weeks. Since mango leaves give insufficient nourishment, the export of Indian yellow was banned to avoid cruelty to animals, and by the beginning of the 20th Century it had ceased to exist. Also referred to as purree, puri, peoli and gaugoli.

Indicator: The Latin word *indicare* means "to point out, compare". A reaction-sensitive substance which allows the progress of a chemical change to be followed, but generally a substance which marks a precise stage in certain chemical reactions, e.g. acidic, alkaline, neutral reaction, by a characteristic change in colour. The determination of pH is a typical application for indicators of this kind. Thermopapers, which show when a particular temperature has been exceeded, represent another type of indicator.

Indienne: Indienne was formerly a term used to describe printed cotton fabrics from India. Today it is used as a general term for lightweight cotton prints achieved by specific printing techniques.

Indigo: Originally, a natural blue vat dye extracted from plants, especially of the *Indigofera tinctoria* genus grown principally in eastern India and China. Indigo is probably one of the oldest colourants used for textiles. It represents the oldest blue vat dye. The active component, indigotin, is obtained by fermentation, oxidation and boiling the dried plant leaves; in this process, 100 kg of dried plants yields 1.5–2.0 kg of indigo dye; but now it is usually synthetic. It is of low substantivity, so multiple 'dips' are required to produce strong shades. Unlike other vat dyes, it exhibits quite poor wash-fastness. Natural and synthetic indigo are chemically the same. Natural indigo quickly declined in importance with the development of synthetic indigo in 1880.

Indigo carmine (sodium salt of indigo disulphonic acid): It is a blue water-soluble powder. Very sensitive to oxidizing agents. *Uses:* test for nitrates, chlorates, wool damage.

Indigo dyeing/sizing machines: Continuous plants for dyeing warp yarns with indigo in full open width followed by sizing.

Indigo print (blue print): Cotton fabric with white motifs on a blue ground. The existence of blue prints in Egypt had been reported by Pliny the Elder (c. 23–79 AD). The technique was first introduced into Europe at the end of the 17th Century by Jeremias Neuhofer of Holland via Augsburg in Germany. The technique is still occasionally practised today in Westphalia and Bavaria and more extensively in Slovakia. It involves the production of a white or coloured

resist as an illuminating colour under indigo blue. The printing operation is carried out with the aid of wood blocks.

Indigo style in African prints:

(a) *Real wax* – the oldest and most artistic technique involves covering (resisting) parts of the textile material with a wax-colophony mixture. The design is produced by subsequent dyeing with indigo. Since the wax resists are fairly brittle, irregular and extremely fine cracks are formed which results in the typical veining or crackle effects. After dyeing, the wax is removed (e.g. by saponification) and the remaining colours are applied either by repeating the wax resist treatment or by block or screen printing.

(b) *Imi-wax* – the industrial production of real wax prints is extremely laborious and costly. For this reason, a technical imitation under the name imi-wax has been introduced in practice. The imi-wax technique is based on the same designs and colours typically used for real wax prints. However, imi-wax prints are mainly produced on naphtholated grounds in order to imitate indigo with diazo fast colour salts which are also used to obtain all other shades that are technically possible. Other dye classes are used to obtain shades which cannot be achieved with diazo fast colour salts.

(c) *Real indigo* – for this style, the white cotton fabric is printed directly with indigo followed by fixation and washing off. This technique is used to produce high coverage blue/white prints often supplemented by other colours.

(d) *Imi-Indigo* –the real indigo style described above is also imitated industrially. In this process, all the dyes are applied in a single operation and then fixed.

(e) *Plangi* – this is a very old technique for the production of resist effects by gathering, folding, or rolling the fabric, usually held with stitching, to form specific patterns on subsequent dyeing.

Indigo test: It is the most commonly used test for the identification of indigo dyeings. Spotting with concentric acid produces a yellow stain surrounded by green edges (= oxidation of indigo to the yellow coloured satin).

Indigo white: The colourless form to which **indigo** is reduced to enable it to be taken up by wool for dyeing blue.

Indirect costs: Those costs associated with manufacture that cannot be directly attributed to any individual product or job. Such costs are also termed overheads.

Indirect warping: The transference of yarn from package creel on to a swift from which it is subsequently wound onto a beam.

Indirect yarn numbering system: A system that expresses yarn number as the reciprocal of linear density.

INDITECNOR (Sp.): Instituto Nacional de Investigaciones Tecnólogicas y Normalización, Santiago, Chile (Chilean Standards Institute).

Individual Fibrills: Also known as elementary fibrils, basic fibrils, microfibrils, protofibrils, capillaries. This refers to the initial developmental stage of the next highest cell organisation of the fibril bundle or fibrils and is constructed of micelles or crystallites in parallel bundles. Approximate diameter in wool – crystallite 0.005 μm, individual fibril 0.01–0.04 μm, fibril bundle 0.1–0.3μm.

Indoor furniture: Furniture manufactured for the use in the interior of a building.

Indophenols: All quinoneimine derivatives are commonly called indophenols by dye manufacturers, even though they are often indoanilines or indamines. The following methods can be used to prepare indophenols –

(a) Oxidation of the starting materials with hypochlorite at 0°C, with MnO_2, or with dichromate. (b) Condensation of the starting materials in concentrated H_2SO_4, in some cases at 0.25–0.35°C. (c) Condensation of compounds containing activated chlorine with amines or aminophenols.

(d) Condensation of naphthols with *p*-aminophenol in $NaHSO_3$ solution or by dry heating.

(e) Condensation of amines with hydroquinone.

Industrial waste-water management: The objectives should be to minimize wastewater production and to recover and reuse wastewater here economically viable. This enables the cost of waste-water treatment to be minimised. The options for the industrialist is to

(a) treat or partially treat at source within the site;

(b) treat at a centralised works effluent plant within the industrial complex or

(c) discharge the wastewater to a sewer and pay for off-site treatment. For off-site treatment, the chemical constituents in the industrial effluent must be checked so that problems do not occur with sewer corrosion or toxicity to the existing biological treatment. The extra BOD load from the industrialist can affect the biological treatment and may generate more sludge (many toxic compounds accumulate in the sludge). The discharge of industrial effluents to a sewer must also consider the hydraulic capacity of the sewers (and waste-water treatment works).

Industrial yarn: A yarn composed of continuous filaments, usually of high breaking tenacity, produced with or without twist, and intended for

applications in which functional properties are of primary importance; for example, in reinforcing material in elastomeric products (tyres, hose, belting), in protective coverings, and in cordage and webbings, etc.

Industrial fabric: A broad term for fabrics used for non-apparel and non-decorative uses.

They fall into several classes –

(a) A broad group including fabrics employed in industrial processes (e.g., filtering, polishing, and absorption).

(b) Fabrics combined with other materials to produce a different type of product (e.g., rubberized fabric for hose, belting, and tires; fabric combined with synthetic resins to be used for timing gears and electrical machinery parts; coated or enamelled fabrics for automobile tops and book bindings; and fabrics impregnated with adhesive and dielectric compounds for application in the electrical industry).

(c) Fabrics incorporated directly in a finished product (e.g., sails, tarpaulins, tents, awnings, and specialty belts for agricultural machinery, airplanes, and conveyors). Fabrics developed for industrial uses cover a wide variety of widths, weights and constructions and are attained, in many cases, only after painstaking research and experiment. Cotton and manufactured fibres are important fibres in this group, but virtually all textile fibres have industrial uses. The names mechanical fabrics or technical fabrics sometimes have been applied to certain industrial fabrics.

Industrial nylon: A heavy-duty plain weave nylon fabric made in limited range of colours. It is fairly stiff and does not crease. Used for overalls and protective clothing, but is also useful for the bags of men's trouser pockets as it is extremely hard wearing.

Industrial gums: It is also known as industrial printing gum, crystal gum, labiche gum, sheet rubber, drying rubber. Industrially manufactured vegetable gums, preferably from Asia. Gum and Rosaceae rubber which is dissociated under pressure or using oxidation methods, as a result of which the gum is already cold water soluble and suitable for sprinkling in powder form to thicken print dye pastes.

Industrial soaps (technical soaps): Special soaps used for particular technical applications, e.g. textile soaps, etc.

Industrial textiles: (a) A term used in few countries in the sense of technical textiles which are not always used for industrial purposes, but also for consumer goods with a technical function; (b) A term used for rental linen.

Industrial yarn: See **Yarn (industrial)**.

Inert: In Latin, the word *inertia* means "inactive, sluggish". Slow to react, unreactive, indifferent and passive. Polytetrafluoroethylene, for example, is practically inert to all organic solvents and common chemicals.

Infamoda inc.: Fashion and trend forecasting agency.

Inflatable restraint: A vehicular safety device designed to cushion an occupant or equipment during collision; airbag.

Inflatable structure: Structures opened or enlarged by input of air and, once enlarged, able to retain the air to maintain the distended position.

Inflator: A device for generating and directing expansion gases into a cushion.

Inflow quench: Cooling air for extruded polymer filaments that is directed radially inward across the path of the filaments. The thread line is completely enclosed in a quench cabinet in inflow quenching.

Infrared: Electromagnetic radiation with longer wavelengths than visible radiation. The wavelength range is approximately 0.7 μm to 1 mm. Many materials transparent to visible light are opaque to infrared, including glass. Rock salt, quartz, germanium, or polyethene prisms and lenses are suitable for use with infrared. Infrared radiation is produced by movement of charges on the molecular scale, i.e. by vibrational or rotational motion of molecules. Infrared spectroscopy is of particular importance in organic chemistry and absorption spectra are used extensively in identifying compounds. Certain bonds between pairs of atoms (C–C, C=C, C=O, etc.) have characteristic vibrational frequencies, which correspond to bands in the infrared spectrum. Infrared spectra are thus used in finding the structures of new organic compounds by indicating the presence of certain groups. They are also used to 'fingerprint' and thus identify known compounds. At shorter wavelengths, infrared absorption corresponds to transitions between rotational energy levels, and can be used to find the dimensions of molecules (by their moment of inertia). Infrared (IR) radiation is long-wave radiation which is not visible to the human eye which is 400–780 nm. The entire IR-spectrum extends from 780–4,00,000 nm of which only the smaller component of the vibration spectrum between 780–3000 nm is of most interest. (Lat.: *infra* = below, beneath).

Infrared absorbing dyeing: Infrared dyeing are such that can absorb the infrared radiations from the sunlight. Such dyeings are particularly suitable for heat-retaining winter clothing. Since approximately 50% of sunlight is made up of infrared radiation, dyes which have a pronounced absorption capacity for infrared (IR) offer the possibility to convert absorbed radiant energy into heat.

Infrared drying: The drying process where IR radiation is used for drying. In IR drying technology, the invisible IR-radiation from electromagnetic wave radiation, referred to by physicists as infrared radiation, is used by preference. In terms of drying technology, the most significant spectral range is 700–3000 nm. In this range, the particles are displaced in more rapid, random vibrations; thus, warming the product. In order to achieve a high level of profitability when heating materials, IR radiators with emissions essentially within the area around 3000 nm must be used. As the absorption ratios of textile fabrics and water are also very favourable in the order of 3000 nm (virtually 100%), radiation temperatures of 500–800°C are used.

Infrared fixation: For example, the two-phase infrared process (Hoechst) – printed fabric is padded and rapidly heated up without steam. No condensation occurs, so there is less tendency for the printed fabric to mark-off or bleed. The recommended wavelength is 1300 nm at which a maximum radiation absorption of 80–85% is achieved.

Infrared laboratory dyeing machines: The use of a liquid heat transfer medium (e.g. glycol) in laboratory dyeing machines can be substituted by heating the rotating dye beakers with infrared radiation; a particularly intense absorption of heat is achieved with black beakers by this means.

Infrared pre-driers: Radiation driers are generally only used in the first stage of drying. As they have a high power density and achieve a high spec. evaporative capacity with well-balanced emission and absorption ratios, there is a risk of surface damage to the goods if the wet bulb temperature is not adhered to. Water-tight infrared radiation fields in working widths up to 6 m are employed especially as pre-driers in printing, dyeing and finishing applications. Both electrically-heated and gas-heated radiators are available. See **Infrared drying**.

Infrared radiation: Radiant energy for which the wavelengths of the monochromatic components are greater than those for visible radiation and less than about 1 mm.

NOTE: The limits of the spectral range of infrared radiation are not well-defined and may vary according to the user. Committee E-2.1.2 of the CIE distinguishes in the spectral range between 780 nm and 1 mm –

IR-A 780–1400 nm

IR-B 1.4–3.0 μm

IR-C 3 μm–1 mm

Infrared reflectance: As far as textiles are concerned, infrared reflectance is, in general, the diffuse reflection of light rays with wavelengths between 700–

1200 nm. Infrared reflectance plays an important role in camouflage dyeing and prints.

Infrared-reflecting dyeing: These are dyeing using IR reflecting dyes. These dyeings represent the opposite of infrared-absorbing dyeings. Such dyeings are particularly suitable for cooling summer or tropical wear. Selected dyes with a pronounced reflecting capacity for IR-radiation, which are also described as "cold dyes", are used for this purpose.

Infrared spectroscopy (IR-spectroscopy): An optical technique for measuring the absorption spectra of solid, liquid or gaseous organic compounds in the IR-region. The technique is also used for the determination of isomers and homologues. The IR-absorption curve obtained is compared with the known curves in a catalogue (e.g. Landolt-Börnstein) which permits a rapid identification of constitution.

Infusion technology: An infused polymer construction process that reinforces the fabric of outerwear garments in the places where they take the most abuse – zipper and pocket flaps, and other high-abrasion areas. The technology blends polymers, penetrates deep into the inner fibres, and surrounds them to form a permanent bond. This tough, resilient matrix ensures a highly wear-resistant surface while allowing the fabric to remain lightweight and flexible. The infused polymer process eliminates the need for heavier-weight abrasion overlays, tapes and bindings, and adds increased strength to the most crucial points on the garment, which dramatically extends the life of the garment.

Ingénue: Yellowish-green colour.

Ingrain dyes: An imprecise description, formerly used for all colourants which were produced *in situ* on the fibre by the development or coupling of one or more intermediate compounds.

Inherent flame resistant: Flame resistance that derives from an essential characteristic of the fibre from which the textile is made.

Inherent viscosity: Viscosity of a polymer dissolved in a solvent.

Inherently flame resistant: (1) Having inherent flame resistance.

(2) As applied to textiles, flame resistance that derives from an essential characteristic of the fibre from which the textile is made.

Inhibitor: A substance that retards or prevents a chemical or physical change. In textiles, a chemical agent that is added to prevent fading, degradation, or other undesirable effects.

In house/staff designers: Designers employed by a company, usually on a fulltime basis (although some may be employed part time).

Initial modulus, in stress strain curve: The slope of the initial straight line portion of the stress-strain (or force-elongation) curve. The modulus is the ratio of the change in stress, expressed in Newton's per tex, grams-force per tex, or grams-force per denier, to the change in strain expressed as a fraction of the original length.

Initiator: A chemical added to start a reaction such as polymerization. Unlike catalysts, initiators may be consumed during the reaction.

Injection moulded (button): A method of forming which requires the filling of a cavity under pressure with polymer that will take the form of a cavity under pressure with polymer that will take the form of the mould when cooled.

Injection moulding: The process of forming a material by forcing it, in a fluid state under pressure, through a runner system [sprue, runner, gate(s)] into the cavity of a closed mould.

Injector: A device used in the colour kitchen of a printing plant for the preparation of, e.g. thickeners. The substance to be dissolved is sucked into the injector by low pressure. The low pressure is produced by spraying water through nozzles with an overpressure. By this means, the substance is wetted-out at the same time. The concentrate thus formed then passes from the injector into a mixer turbine.

Ink: (1) A dark blue colour.

(2) Coloured inks are aqueous solutions of coal tar dyes with suitable additives. Both cationic dyes (e.g. rhodamine, fuchsine, and methylene blue) and acid dyes (e.g. eosin, ponceau, nigrosine, and acid blue) are used. Black inks consist mainly of a mixture of Gallic acid, tannic acid and an iron (III) salt (iron gall ink). Uses: dyeing, dry-cleaning and varnishes.

Ink jet: A stream of liquid in the form of a dye solution produced by a spray nozzle.

Inkjet printing: Dye liquors (inks) are squirted through fine microprocessor controlled jet nozzles. This operation is carried out almost silently at high speed on surfaces which can be in any form, e.g. eggs, wadding, metal cans, etc. Special requirements are placed on the inks and their additives both for the ink jet technology itself as well as for the various media to be printed. The inks must be of low viscosity, have adequate fastness to light and water, and a pH as close as possible to neutral. They must also be rapid-drying without, at the same time, drying-out in the printer head, and must also be non-corroding and possess a certain surface tension. The first functionally-reliable apparatus.

Ink-jet printing technology: (a) Continuous ink-jet printing – In this form of ink-jet printing, the continuous stream of dye liquor forced out of a fine jet

nozzle is controlled either by deflection or superimposition of a deflector plate (electro-colour process) or deflection by means of compressed air (Millitron process). The excess dye liquor is collected and returned to the storage tank. (b) Drop on demand ink-jet printing – In this case, discrete drops of dye liquor are jetted by switchable electromagnetic valves located in the dye liquor feed tubes in a predetermined sequence determined by the pattern being printed chromotronic process.

(c) Quantitative control of the ink jet as in the Agfa ink-jet process, etc. Ink-jet printing in the non-textile sector.

Inkle: A narrow fabric, a ribbon, tape or webbing.

Inkle loom: A simple form of narrow handloom. It consists of a frame with pegs which hold a narrow continuous warp (a characteristic of an inkle loom).

Inlay: An extra seam allowance inside the garment for letting out if required or for strength at a given position.

Illusion: Made in silk in Gauze or made on bobbinet machine or knotted. A very fine, all-silk tulle which originated in France. It has a cobweb appearance. Hexagonal open mesh. Made in 52 inch and 72 inch widths. Uses: Veiling, particularly for weddings, trimmings.

Inorganic fibres: Also described as mineral fibres. More exacting requirements in the field of environmental protection, the performance of materials, or the productivity of existing systems also calls for the development and use of newer types of fibres. The importance of inorganic fibres of oxide or non-oxide basis is due, above all, to the extremely high temperature resistance of various physical or chemical properties up to temperatures greater than 1100°C.

Inseam: (1) The inner seam of the leg of a pair of trousers; sometimes also called the "crotch seam"; the forearm of the sleeve.

(2) The distance from the bottom of a trouser leg to the crotch. The measurement is taken along the inside leg seam that joins the front and the back leg panels.

Insect repellent: An odoriferous substance (repellent) for insects which is particularly effective against flying insects (insect protection). Insect repellents are used to produce insect repellent finishes on textiles which are effective for a limited period of time. Not to be confused with insecticide.

Insect repellent finishes: Finishes applied on textiles which can repel mosquitoes. Useable repellents are, as a rule, neutral, viscous oils of low volatility or crystals with low melting points and, almost without exception, a bitter taste. In order to maintain the longest possible activity, such substances

must, in addition, not give rise to skin irritations or cause damage to textiles. Suitable products for textile impregnations include, e.g. indalone, undecenoic acid, mandelic acid hexyl ester, N-cyclohexyl-2-(butoxyethoxy) acetamide, etc., and sometimes plant products are also used now a days. Some insect repellent hosiery recommends saturation with quaternary ammonium compounds followed by subsequent drying and heating to approximately 100–150°C.

Insect screening (in coated glass yarn fabrics): Woven netting having an approximately even spaced mesh of 12 by 12 yarn or more per 25.4 mm (1 inch).

Inserted seam: A seam in which single or number of plies of material is inserted between two others which are turned in. The complete assembly is sewn in one operation.

Insertion lace: This is usually narrow and often with slits for threading ribbon through, but it always has two straight edges. It is inserted as decorations and the backing fabric is usually curt away afterwards.

Inside seam: A seam formed in which the completed seam allowance is located on the interior of the object, usually on the back side of the fabric.

Inside-leg length (in body measurements): The vertical distance from the crotch to the soles of the feet.

Inspection: The process of measuring, examining, testing, gauging, or otherwise comparing a characteristic or property of a material with applicable requirements. In this case, only by visual examination.

Inspection machine: Textile fabrics are examined on inspection machines after completion of the final finishing process. The fabric inspector carries out the following tasks – quality inspection, detection and recording of faults, defect marking. The fabric runs at full width over an inspection table, an inclined table top which, under certain circumstances, is illuminated from below towards the fabric inspector (matt glass plate).

Inspection (in fabric grading): The process of viewing, measuring, examining, or otherwise comparing the visual characteristics of a fabric with applicable requirements.

Institutional fabric: Household textiles used in the contract market.

Instron tensile tester: A high precision electronic test instrument designed for testing a variety of material under a broad range of test conditions. It is used to measure and chart the load-elongation properties of fibres, yarns, fabrics, webbings, plastics, films, rubber, leather, paper, etc. May also be used to measure such properties as tear resistance and resistance to compression.

Instrumental detection level, effluent analysis (IDL): Constituent concentration that produces a signal greater than five times the signal/noise ratio of the instrument. IDL is, in many respects, similar to 'critical level' and 'criterion of detection'. The later level is stated as 1.645 times the standard deviations of analyses.

Insulation: With respect to a fabric, a material that protects from the loss of warmth or the penetration of cold.

Insulation ratio (effective): An indication of the increase in insulation afforded by the fabric in comparison to the uncovered test plate under specified condition of test. See **Effective insulation ratio**.

Intaglio: A method of printing in which the design is engraved beneath the surface of a printing plate or cylinder, e.g. as in roller printing.

Intarsia: It is a special method of producing designs in knitted loops that form self-contained areas of pure colours. Unequalled colour definition is achieved, with a large number of colours and no adverse effect on the physical properties of the structure such as reduction of extensibility.

Integration dyeing: A method of dyeing which involves the maintenance of the concentration of dyestuff in the dye bath at the lowest possible level throughout the dyeing process. This is achieved by gradually introducing a dyestuff to the dye bath in accordance with the known diffusion rate of the dyestuff or dyestuffs in question. Integration dyeing is of particular advantage when dyeing using dyestuffs which have a high affinity to the fibre, but a low diffusion rate which makes possible the use of direct and vat dyes with which level dyeing is difficult.

Integrator (in tensile testing of textiles): A device that calculates the coefficient of variation unevenness or the mean deviation unevenness. A device for obtaining the time integral of the load.

Integrator (linear): See **Linear integrator**.

Integrator (quadraic): See **Quadraic integrator.**

Intensity: (a) The amount of energy per unit (space, charge and time); (b) The brilliance of a colour; (c) The brightness of light.

Interaction: The condition that exists among factors when a test result obtained at one level of a factor is dependent on the level of one or more additional factors.

Intercellular: A term meaning between cells, and refers to the non-crystalline (amorphous) regions, e.g. in fibres.

Interfacial polymerisation: Polymerization in which two reactive monomers, each dissolved in different solvents that are mutually immiscible, react at the interface between the two solutions.

Interfacing: Woven or non-woven fabric used to give body to certain area of the garment. It adds to the outward appearance of the garment if some areas are reinforced, e.g. collars, buttoned openings, cuffs, pocket flaps, etc. And this structure also makes the garment last longer. Variety of interfacings such as fusible or non-fusible depending on the need is available.

Interference (in testing): An effect due to the presence of a constituent or characteristic that influences the measurement of another constituent or characteristic.

Interfibrillar swelling: Swelling which results from the penetration by water (or other polar solvents) of cotton fibres. The swelling agent may break hydrogen bonds between adjacent chain molecules.

Interlace: Interlace is a mechanical yarn cohesion of (carpet) yarns which are manufactured with zero twist and formed by the interlacing of the individual filaments.

Interlacing: The passing of a thread over or around another thread or loop of another thread.

Interlining: (1) Any textile which is intended for incorporation into an article of wearing apparel as layer between an outer shell and inner lining.

(2) More or less heavily finished fabric. Interlinings such as buckram, linen interlining, horsehair cloth, non-woven material, etc., as well as wadding, shoulder padding, etc., which are fused or sewn inside specific parts of a garment (i.e. between the inner and outer layers) to improve shape retention, strength, warmth or bulk.

Interlining (linings): Interlinings are the "skeleton of clothing" which ensure a lasting fit. They are sewn to the outer fabric in the form of fabrics, knitwear or non-woven or combined directly with these (fixed). A layer of material inserted in certain parts of the garment between the inner and outer fabric for shape retention, strength, warmth, or bulk.

Interlock: Interlock materials are fine meshed knit goods produced on the circular knitting machine equipped with two sets of needles. It is double-faced rib-based structure consisting of two 1 × 1 rib fabrics joined by interlocking sinker loops which are used for close-fitting undergarments, etc. An alternative form of this is referred to as cross tubular goods. Only plain stitches are visible on either side of the fabric as the reverse stitches are found inside the knitted fabric.

Interlock knit: To produce an interlock knit, long and short needles are arranged alternately in both the dial and cylinder; the needles in the dial and cylinder are also positioned in direct alignment. When the long and short needles knit in alternate feeds in both needle housings, a fabric with a type of cross 1 × 1 rib effect is produced.

Interlock knitted fabric: Like rib fabrics, there are several types of interlock fabrics such as 1 × 1 interlock, 2 ×2 interlock. 1 × 1 interlock fabrics are thicker, heavier, narrower and more stable and expensive than plain and rib knit fabrics. It has less width-wise recoverable stretch than plain and rib knit fabric. The V letter appearance is dominant on both sides of the fabric. The yarn can be unrobed easily from the last course of the fabric. 1 × 1 interlock fabric does not curl from the sides and the top/bottom. However, it is less productive than rib and plain knitted fabrics.

Inter-looping: The passing of a loop of thread through another loop formed by the same thread.

Intermingled yarn: A multifilament yarn in which cohesion is imparted to the filament bundle by entwining the filaments instead of or in addition to twisting. The effect is usually achieved by passing the yarn under light tension through the turbulent zone of an air jet. *Note*: (a) Some manufacturers describe such product as an interlaced yarn; (b) Intermingling should be distinguished from air-jet texturizing when a high level of entanglement is achieved with the objective of producing texture or bulk.

Intermingling: (a) Use of air jets to create turbulence to entangle the filaments of continuous filaments yarns, without forming loops, after extrusion. Provides dimensional stability and cohesion for further processing but is not of itself a texturing process. It is compatible with high-speed spin-drawing and high-speed take-up. When compared with twisting processes, it also permits increased take-up package size; (b) Combining two or more yarns via an intermingling jet. Can be used to get special effect yarns, i.e., mixing dye variants to get heather effects upon subsequent dyeing.

Intermittent pattern: A pattern occurring in interrupted sequence.

Intermittent roller printing machine: This is a type of roller printing machine which is used in printing of saris, African prints saorngs etc which cannot be printed in normal roller printing because of the speciality of the designs. These machines have two sets of engraved printing rollers. For example taking the case of saris, one set of the rollers will print the body designs for a particular length of the fabric while the second set of rollers are idle and away from contact with the pressure cylinder. When the pallu area comes the second set of the rollers come into action when the previous

set of rollers 'jump away' from contact with the pressure cylinder. After the predetermined length of the pallu has been printed again the first set of rollers take offer and the present set of rollers are taken away.

Intermolecular forces: Secondary valence forces among different molecules.

Internal dye variability: The change from point to point in dye uniformity across the diameter and along the length of the individual filaments. Affects appearance of the dyed product and is a function of fibre, dye, dyeing process and dye bath characteristics.

International grey scale: Two series of pairs of chips which show increasing contrast within pairs and are used visually for comparing the differences in colour of textile specimens or the degrees of staining of transfer cloths attached to the test specimens, that occur during colour fastness testing. (a) *Basic scale for assessing change in colour*– a scale that consists of five pairs of non-glossy grey-coloured chips, and in which a fastness rating of 5 (indicating no colour change) at one end of the scale is represented by two identical grey chips, and a fastness rating of 1 (indicating a severe colour change) at the other end of the scale is represented by a pair of grey chips having a colour difference of 13,6 cielab units. (b) *Basic scale for assessing staining* – a scale that consists of one pair of white and four pairs of non-glossy grey- and white-coloured chips, and in which a fastness rating of 5 (indicating severe staining) at one end of the scale is represented by the pair of white chips, and a fastness rating of 1 (indicating severe staining) at the other end of the scale is represented by a pair of chips having a colour difference of 34,1 cie lab units. *NOTE*: Both scales may be augmented to form a 9-step scale by the provision of similar chips that illustrate the perceived colour differences corresponding to the half-step fastness ratings.See **Grey scales for fastness testing**.

International orange: A vivid orange colour.

International system of units: SI System of units.

International Textile Club (ITC): International professional organization of leading specialists from all branches of the textile industry; technical and professional organizations.

International Textile Service (ITS): A Swiss publishing house providing information on textile production. Publishes the quarterly technical journal "International Textile Bulletin" in several languages.

International Wool Secretariat (IWS): Independent organization for publicity and research service in the entire wool economy. Founded in 1937. Supported by the wool producers of Australia, New Zealand and South Africa with headquarters in London and branches in almost all textile countries.

International Wool Textile Organization (IWTO): Head organization of the world wool economy, resident in the United Kingdom.

Intimate blend: A technique of mixing two or more dissimilar fibres in a very uniform mixture usually by mixing the fibres in loose stock form before or at the picker, in contrast to normal mixtures of warp and weft (e.g. polyester warp wool weft, and vice versa).

Intracellular: A term describing processes within the cell (crystallite), e.g. the further penetration of intracellular reactions from the intercellular spaces through the crystalline surface of the cell causing changes in the structure of the cellular building blocks. Of importance in severe fibre damage (acids: cellulose, caustic alkalis: wool).

Intrafibrillar swelling: A more intensive swelling, which can result in a molecule rearrangement of the cellulose chain molecules. Interfibrillar swelling always precedes intrafibrillar swelling.

Intramolecular forces: Secondary valency forces within the same molecule.

Intrinsic clo: See **Clo**.

Intrinsic viscosity: Ratio of the specific viscosity (R.V.-1) of a solution of known concentration to the concentration of solute extrapolated to zero concentration. Also called the limiting viscosity number. It is directly proportional to the polymer-average molecular weight.

Intussusception dyeing: (Lat.: *intus* = within, *susceptio* = deposition). A deposition dyeing in which new dye is progressively inserted into the thickness of an existing fibre wall. The cross-section of an intussusception dyeing is fully penetrated by dye, i.e. homogeneously dyed throughout, e.g. acetate acid wool and cationic dyeing. Compare **Apposition dyeing**.

Inverness: A long, loose overcoat with cape, without sleeves, for full dress wear.

Invisible green: A very dark green colour, so called because it verges on black.

Invisible waste (in cotton testing): Weight loss due to dust, moisture, loose fibres, etc., carried away by the air stream during the test.

Iodine number (iodine value): A measure of the amount of unsaturated acids present in fats and oils (i.e. the number of double bonds). It is obtained by finding the percentage of iodine by weight absorbed by the sample in a given time under standard conditions, i.e. the number of grams of iodine absorbed by 100 g of a fat or oil.

Iodine starch test: The normal concentration of an enzyme in a desizing bath has an activity in the range from 50–300 Kilo-Novo-Units per litre

(KNU/l) depending on the quantity of enzyme preparation used. The activity of desizing liquor can be determined by the following method. The alpha-amylase in the desizing liquor degrades starch substrates. An iodine solution is used as an indicator so that the course of the reaction can be followed, and the time required to complete the degradation process is a measure of the enzyme activity.

Iodine-Potassium Iodide solution (iodine test): 2 g iodine in 10 ml saturated potassium iodide solution (or 3 parts potassium iodide and 2 parts iodine in 45 parts water). Iodine is so loosely bound that it is liberated immediately in reactions.

Iodine yellow: A bright yellow.

Iodo-, iono- (G): Violet.

Ion: An electrically charged particle resulting from adding or removing electrons to an atom or a group of bonded atoms. Many chemicals ionize in solutions in water. For example, sodium chloride in solution ionizes to positively charged sodium ions (Na+) and negatively charged chlorine ions (Cl^-) – one electron that was shared between the sodium and the chlorine in the molecular form of salt leaves the chlorine and goes with the sodium (sodium chloride is actually an ionic solid). Some chemicals used in dyeing, such as *acetic acid* and *sodium carbonate*, partially ionize in solution, with some remaining in intact molecular form. With chemicals of this nature, if some of the ions in solution are used up in reactions, more of the molecules will ionize.

Ion exchange: A process that takes place in certain insoluble materials, which contain ions capable of exchanging with ions having the same charge in the surrounding medium. ZEOLITES, the first ion exchange materials, were used for water softening. These have largely been replaced by synthetic resins made of an inert backbone material, such as polyphenylethene, to which ionic groups are weakly attached. If the ions exchanged are positive, the resin is a CATIONIC RESIN. An ANIONIC RESIN exchanges negative ions. When all available ions on the resin have been exchanged (e.g. sodium ions replaced by calcium ions from the medium) the material can usually be regenerated by passing a concentrated solution containing the original resin ion (e.g. sodium chloride) through it. In the example cited, the calcium ions will be replaced by sodium ions. Ion-exchange techniques are used for a vast range of purification and analytical purposes. For example, solutions with ions that can be exchanged for OH^- and H^+ can be estimated by titrating the resulting solution with an acid or a base.

Ion exchange resins: Synthetic ion-exchange resins consist of various insoluble copolymers having a cross-linked three-dimensional structure to

which ionic groups have been attached. An anionic resin has negative ions built into its structure and therefore exchanges positive ions. A cationic resin has positive ions built in and exchanges negative ions. Ion-exchange resins are synthetic organic polymers containing side-groups that can be ionized. Organoliths.

Ionic bond: It is also known as electrostatic bond, polar bond, hetero-polar bond, electrovalent bond. A chemical bonds which is based on the strong electrostatic attraction forces between cations and anions, and which owes its stability to the fact that certain atoms readily give up electrons and other atoms take up such electrons again.

Ionic bond: A chemical bond as a result of electrical attraction between positive and negative ions; also called salt linkage In ionic bonding, typically an electron is transferred from one atom to another, leaving one with a positive charge and one with a negative charge. These electrical charges produce strong attraction between the different charged ions. Ionic bonds are quite strong, but not generally as strong as covalent bonds (where pairs of electrons are shared equally) between nuclei. Such bonds are important with acid dyes and basic (cationic) dyes.

Ionic copolymerisation: In ionic copolymerisation, copolymer is formed by monomer units, which are polymerised by ionic initiators. The fundamental principle of ionic copolymerisation is almost same to free-radical copolymerisation. There is, however, a major difference that in free-radical copolymerisation, the reactivity ratios ‘1 and ‘2 are dependent only on the monomer pairs M1 and M2, and temperature of polymerisation, whereas in ionic copolymerisation, the reactivity ratios dependent not only on the monomer pair and temperature, but also on the solvent and the initiators which are used in that system.

Ionic formula: A type of formula which provides information on the composition of ions, their charge and charge sign, e.g. Na^{+}, $Fe^{2+,}$ S^{2-}, SO_4^{2-}.

Ionic strength: The ionic strength of a solution is measure of the concentration of dissolved chemical constituents.

Ionization: (a) The process of producing ions. There are several ways in which ions may be formed from atoms or molecules. In certain chemical reactions, ionization occurs by transfer of electrons; for example, sodium atoms and chlorine atoms react to form sodium chloride, which consists of sodium ions (Na^{+}) and chloride ions (Cl^{-}). Certain molecules can ionize in solution; acids, for example, form hydrogen ions as in the reaction $H_2SO_4.2H^{+} + SO_4$.

(b) The ‘driving force’ for ionization in a solution is solvation of the ions by molecules of the solvent. H^{+}, for example, is solvated as a hydroxonium

(hydronium) ion, $H3O^+$. Ions can also be produced by ionizing radiation; i.e. by the impact of particles or photons with sufficient energy to break up molecules or detach electrons from atoms: $A.A^+ + e^-$. Negative ions can be formed by capture of electrons by atoms or molecules: $A + e^-.A^-$.

Ionization potential: (IP; Symbol: *I*) The energy required to remove an electron from an atom (or molecule or group) in the gas phase, i.e. the energy required for the process: $M.M^+ + e^-$. It gives a measure of the ability of metals to form positive ions. The second ionization potential is the energy required to remove two electrons and form a doubly charged ion: $M.M_2^+ + 2e^-$. Ionization potentials stated in this way are positive; often they are given in electron volts. *Ionization energy* is the energy required to ionize one mole of the substance, and is usually stated in kilojoules per mole ($kJ\ mol^{-1}$). In chemistry, the terms 'second', 'third', etc., ionization potentials are usually used for the formation of doubly, triply, etc., charged ions. However, in spectroscopy and physics, they are often used with a different meaning. The second ionization potential is the energy to remove the second least strongly bound electron in forming a single charge ion. For lithium (ls22s1) it would refer to removal of a 1s electron to produce an excited ion with the configuration 1s12s1.

Ionizers: Ionizers are devices which ionize the air by means of high voltage therefore removing the electrical charge on textiles.

Ions: (Gk.: *ienai* = to go, move). Atoms or groups of atoms carrying one or several positive or negative electrical charges. The ions present in an aqueous solution migrate to the oppositely charged electrodes when a direct current voltage is applied.

Ionomer: A polymer having covalent bonds between the constituents of the long-chain molecules and ionic bonds between the chains.

IONTEC: Colombian standards organization; Technical and professional organizations.

IOS: Iraqi Organization for Standardization, Baghdad, Iraq (technical and professional organizations).

IPN: Interpenetrating polymer network. Mutually penetrating networks of polymers at the molecular level.

IPR: Inches per rack.

IR: Infrared.

IRAM: Instituto Argentino de Racionalización de Materiales, Buenos Aires, Argentina (Argentinian Standards Institute, including textile standards).

Iraq red: A deep red colour.

IRCT: Institut de Recherches du Coton et des Textiles Exotiques, Paris, France (French Research Institute for Cotton and Exotic Fibres).

Iron grey: A dark grey colour.

IRS: Irish Standard.,

Irish lawn: A lawn fabric produced from linen yarns. See **Lawn**.

Irish linen: The fine quality linen, full bleached fabric plain woven Ireland using Irish flax. Used for various purposes like handkerchief (fine varieties), towels and glass clothes (coarser varieties), shirts, collars and cuffs; usually 36 inches wide.

Irish point: (a) Lace with needle-point or bobbin-made sprigs sewn to machine made net, this sometimes being cut away under the patterns; (b) Curtain lace, with patterns mounted on a machine made net.

Irish poplin: A poplin originally made from a dyed pure silk organzine warp and a fine worsted weft. Polyester is sometimes used as an alternative to silk.

Irish stitch: In embroidery used for grounding; it is a long stitch, carried over five or more threads and it requires fine foundation canvas.

Irish tweed: See **Tweed**.

Irish work: White embroidery on white ground, mostly on handkerchiefs.

Iron (II) chloride: Ferrous chloride; $FeCl_2$. A compound prepared by passing dry hydrogen chloride gas over heated iron. White feathery anhydrous crystals are produced. Hydrated iron(II) chloride ($FeCl_2.6H_2O$) is prepared by reacting excess iron with dilute or concentrated hydrochloric acid. Green crystals of the hexahydrate are obtained on crystallization from solution. Iron (II) chloride is readily soluble in water, producing an acidic solution due to salt hydrolysis.

Iron (III) chloride: Ferric chloride ($FeCl_3$). A compound prepared in the anhydrous state as dark red crystals by passing dry chlorine over heated iron. The product sublimes and is collected in a cooled receiver as brownish-black iridescent scales. The hydrated salt ($FeCl_3.6H_2O$) is prepared by adding excess iron (III) oxide to concentrated hydrochloric acid. On crystallization yellow-brown crystals of the hexahydrate are formed. Iron (III) chloride is very soluble in water and undergoes salt hydrolysis. At temperatures below 400°C, the anhydrous salt exists as a dimer, Fe_2Cl_6.

Iron (II) sulphate: Ferrous sulphate; green vitriol; $FeSO_4.7H_2O$. A compound that occurs in nature as the mineral *melanterite* (or *copperas*). It is made industrially from iron pyrites. In the laboratory iron(II) sulphate is prepared by dissolving excess iron in dilute sulphuric acid. On crystallization, green crystals of the heptahydrate are obtained. Careful heating of the hydrated

salt yields anhydrous iron(II) sulphate; on further heating the sulphate decomposes to give iron(III) oxide, sulphur(IV) oxide, and sulphur(VI) oxide. The hydrated crystals oxidize easily on exposure to air owing to the formation of basic iron (III) sulphate. A freshly prepared solution of iron (II) sulphate absorbs nitrogen monoxide.

Iron sulphate: Iron (II) sulphate, read iron two sulphate, ferrous sulphate, FeSO (archaic terms include copperas, green 4 vitriol and iron vitriol. Iron (II) sulphate is a common *mordant* for natural dyes. Solutions are not very stable, since reaction with air will cause precipitation of insoluble iron oxide. Fabric can be coloured by dipping into a solution of iron sulphate, then hanging in a moist environment to allow conversion to iron oxide (rust). Post-treatments such as *tannic acid* can be used to alter the colour.

Ironing: A method of pressing using a heated hand iron, sometimes together with moisture or steam and a gliding motion. Care labelling for garments in ironing – Hot iron: Highest temperature setting; Warm iron: Medium temperature setting; Cool iron: Lowest temperature setting; Do not iron: Items not to be smoothed or finished with an iron; Iron wrong side only: Article to be turned inside out for ironing or pressing; No steam: Steam in any form not to be used; Steam only: Steaming without contact pressure; Steam press or Steam iron: Use iron at steam setting; Iron damp: Article to be ironed should be made moist before ironing; Use press cloth: Use a dry or damp cloth between iron and fabric.

Ironing fastness: Resistance of the shade to ironing. Test: duration 15 s, temperature 200°C (cotton), 150°C (wool, silk, viscose), 120°C (acetate, polyamide, polyester, acrylic); (a) Dry: The heated upper plate of the heating device is placed on the sample for 15 s; (b) Moist: Place a dry sample on dry cotton fabric, cover with cotton fabric which has been wetted to 100% moisture; 15 s as in I; (c) Wet: The sample and cotton fabric are saturated in water and squeezed off to 100% moisture. The wet sample is placed on a dry cotton fabric and covered with the wet cotton fabric; 15 s as in 1. Where methods 2 or 3 are used, bleeding is also assessed.

Iron-on canvas interfacing: An iron-on woven canvas does not give the shaping advantages of the sew-in varieties. However, it is quick to use and is effective on flat areas such as coat fronts, pocket flaps, hemlines (where added body is needed), etc.

Iron-on cotton: A soft cotton, almost like muslin, with adhesive granules on the wrong side. It would add slight stiffness to sift fabrics.

Irradiance: Radiant power per unit area incident on a receiver, typically reported in watts per square meter, W/ (m^2nm).

Irradiation: The time integral of irradiance expressed in joules per square meter (J/m^2).

Irrorate: Coloured with dots or small speckles of colour.

IRS: Irish Standard.

IRSFC: International Rayon and Synthetic Fibres Committee.

Isabel (Isabella): A dingy yellow-grey colour which chambers suggests is possibly named after either the daughter of Philip II who wore the same underclothes for three years or Isabella of Castile who had a similar predilection for keeping on her apparel.

Isabel yellow: The same as ***Isabel***.

Isabelle: French dress goods made with single warp in eight leaf and six filling repeats.

Isabelline: Greyish-yellow; See **Isabel**.

Isbahani: Medieval silk fabric of Arabic origin.

ISCC-NBS:A US system devised in 1955 for allocating names to colours using the adjectives

'vivid', 'brilliant', 'strong', 'deep', 'light', 'dark' and 'pale'.

Isfahan carpet: Isfahan carpets are woven in the Iranian city of the same name as well as in the neighbouring villages. Isfahan, which is situated in the fertile plain of the Zaiandeh river in the centre of Iran, is the second largest city in the country. Isfahan carpets are woven on vertical looms.

-ish: A very old suffix, first used in the description of origins such as 'Pictish'. Also used to mean 'resembling' as in 'childish'. The suffix is now used with adjectives (particularly colours) to indicate the quality of being 'somewhat', 'nearly' or 'slightly' as in 'reddish' and 'bluish'. Some colours are capable of bearing this suffix including black, white, pink, red, brown, yellow, green, blue, grey, ochre and purple, but not orange, gold, silver, or olive or many other colours. Fielding refers to 'duskish' and Albers to 'violetish'.

ISI: Indian Standard Organization.

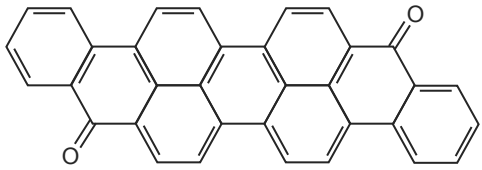
'Islands-in-the-sea' fibre: A term used for bi-component fibres similar to the matrix/fibril type and described as a multiple interface or multicomponent fibre. The "islands" are fibrils of one or more polymers embedded in the "sea" (or matrix) consisting of a different polymer. The matrix is often dissolved away to leave ultra-fine filaments. The number and titre of these fine filaments is pre-programmed. Such fibres have been used in ion-exchange products as well as in imitation fur materials and in textile fabrics to achieve a different handle.

Island designs: Prints where the pattern unit making up the designs are surrounded by substantial portions of the ground.

Ismaili: Pale and dark striped cotton fabric with a border of red, white and yellow stripes and a selvage of red, in East Africa.

ISMIU: Acronym for the "Institut por Standardizacia, Merki i Izmeritilni Uredi", i.e. the Bulgarian Institute for Standardization, Metrology and Measuring Instruments; technical and professional organizations.

Isodibenzanthrone or isoviolanthrone: These are Anthraquinonoid dyes with a perylene structure. Example is a dye produced by the chlorination of benzanthrone and treatment with alcoholic potassium hydroxide.



isoviolet anthrone

ISO: International Organization for Standardization Acronym for the International Standards Organization, based in Geneva, Switzerland, founded in 1947. ISO is the international organization responsible for standardization and includes national standards bodies from numerous countries among its members.

ISO 14000 series: A series of international standards on the environment. ISO 14001 gives general guidance on the use of Environmental Management Systems (EMS) and ISO 14004 deals with principles, systems and techniques for EMS. ISO 14010 gives general guidance on auditing environmental management systems. ISO 14011 relates to procedures for auditing environmental management systems. ISO 14012 relates to the qualification of environmental auditors. ISO 14031 details the methodology for environmental performance evaluation.

Isotactic polymer: A polymer structure in which there is a regular spatial or stereo relationship from one repeat unit to the next. A polymer in which all the pendant groups are arranged on the same side of the polymer backbone. Also see **Atactic polymer, Syndiotactic polymer** and **Tactic polymer**.

Isotherm: Constant temperature line used on graphs of climatic conditions or thermodynamic relations, such as pressure-volume relations at constant temperature.

Isotropic: Having the same physical properties in every direction in the plane of a fabric. It is related to the random distribution of fibres in non-woven manufacture.

Isoviolanthrone: See **Isodibenzanthrone**.

Ispahan: Persian woollen rug made with hand tied knots.

Isparta carpet: Most of the carpets known by the name Isparta, or Sparta, have been woven at Smyrna (Izmir) in Turkey. The Persian knot is used. Sparta carpets are among the best from this particular area of Turkey. The decoration and techniques employed in Sparta carpets are very like those of the rough Tabriz carpets, but they can be distinguished from the latter by the different feel of the fabric, i.e. they are limper.

Issits shaker: See **Shoddy shaker**.

Istaberk: An East Indian silk satin, woven of opalescent wild silk.

ITA: Instituto Textil Argentino, Buenos Aires, Argentina (Argentinian Textile Research Institute).

Italian cloth: Smooth, highly lustrous lining fabric (cotton, or cotton warp and worsted weft = half-wool Italian cloth) in satin weave.

Italian ferret: Silk tape or binding for flannels and dressing gowns.

Italian pink: A brilliant yellow lake made from quercitron bark. See **English pink**.

Italian stitch: Same as Holbein stitch.

ITC: International Textile Club.

ITCRA: International Textile Care and Rental Association, United Kingdom.

Item: (1) An object or quantity of material on which a set of observations can be made.

(2) An observed value or test result obtained from an object or quantity of material.

ITF: Institute Textile de France (French Textile Research Institute).

ITMA: Internationale Textilmaschinen-Ausstellung (German) (International Textile Machinery Exhibition).

ITMF: International Textile Manufacturers' Federation, Headquarters – Zürich, Switzerland. Founded in 1978 as the successor to the IF-CATI. Umbrella organization of 32 textile associations in 38 countries on all continents; technical and professional organizations.

ITS: International Textile Service.

IW dyeing method: A method for dyeing those vat dyes (IW dyes) which have the maximum affinity for cotton at 40–50°C. Vat dyeing.

IWS: International Wool Secretariat.

IWS cold-dwell printing process for wool: A printing process for the production of fast and brilliant shades on wool with reactive dyes of high reactivity which are stable to sodium bisulphite. The print pastes contain approximately 300 g/kg urea and 0–20 g/kg sodium bisulphite depending on the dye concentration. After printing, the fabric is allowed to stand in the wet state for approximately 24 hours. Shorter dwell times are sufficient on chlorinated or Hercosett-treated wool.

IWS finish: A process for the setting of wool fabrics. The fabric is moistened with Si-Ro-Set solution (MEAC/MEAS) by padding and squeezing. The fabric is permanently set by wet steam or gloss decatizing in the still moist state for 3–5 min. Finally, the fabric is dried without tension.

IWS Flame retardent finish of wool: Wool is treated with potassium hexafluorozirconate (K_2ZrF_6) or potassium hexafluorotitanate (K_2TiF_6) from a long liquor at 60°C or also from short liquors in various combinations with dyeing processes and/or anti-felting crease-resist finishes.

Iws superwash process: See **Superwash**.

IWTO: International Wool Textile Organization.

Ixtle fibre (istle fibre, Tampico fibre): A fibre obtained from various tropical Central American agave and yucca trees (also palm fibres). Ixtle fibre belongs to the group of hard fibres and is similar to Sisal although not a hemp variety. The fibres, of variable length, are stiffer and coarser than sisal. Uses: cords, ropes, brushes, flat carpets and coarse fabrics.

Ivory: The off-white colour of an elephant's tusks.

Ivory black: A black pigment with a brown tinge originally made from carbonised bones. The impressionists stopped using this colour because they considered that black did not occur in nature.

Ivory white: The white of ivory.

Ivory yellow: A light yellow approaching white.

Ivy green: A dark olive-green.

J

J-Acid: 2-amino-5-naphthol-7-sulphonic acid. Organic intermediate used in the manufacture of azo dyes.

Jacinth (e): Reddish-orange; sometimes yellow colour.

Jacinthine: The dark purple colour of the jacinth, and sometimes a brilliant reddish-yellow.

Jacitara: Very strong and elastic bast fibre, yielded by the Jacitara climbing plant in Brazil.

Jack (loom): Part of a dobby head designed to serve as a lever in the operation of the harness of a loom.

Jack (knitting): The jack is a secondary weft knitting element which may be used to provide versatility of latch needle selection and movement. It is placed below and in the same trick as the needle and has its own operating butt and cam system.

Jacket: A textile product, woven or felted into tubular or sleeve form and ready for covering and shrinking on a machine roll.

Jacket: A short coat.

Jackson turbidity unit (JTU), Jackson candle unit (JCU): A measure of turbidity in water. It can be defined in two ways– (a) The turbidity resulting from 1 mg/l of fuller's earth suspended in water; (b) The depth of the column of water that just obscures the image of a burning standard candle viewed vertically through the sample.

Jackson's kier: It is used for cotton scouring. It consists of a horizontal shell and a carriage which supports three rollers. The two outer batch rollers rotate in the fixed bearings at either end of the carriage. The roller or drum is large, hollow and perforated and is carried on oscillating arms pivoted at either end of the base of the carriage. The fabric is saturated with scouring liquor outside in an iron tank. The batch roller is then placed on the carriage and pushed into the kier on guide rails and then door is closed. The fabric is wound from one roller to the other during the scouring process. Hot scouring liquor is circulated by the centrifugal pump and is continuously sprayed over the fabric as it passes from one roller to the other. Scouring is done under a pressure of about 30lb/in^2.

Jacobite tartan: It was worn by the Jacobite people in Scotland at the beginning of the 18th Century. The design is composed as follows – Bright yellow stripe; group consisting of white, blue, red, white, red, blue, white stripes, the entire group being of the same width as the yellow stripe and the three white lines being very narrow; yellow stripe as above; group, as above; solid green stripe, of the same width as yellow; group, as above; solid green stripe, of the same width as yellow; group, as above.

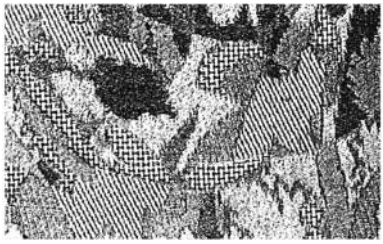
Jaconet: A thin plain-weave cotton fabric that is heavier than cambric but similar in type, it is glazed on the right side to produce a high lustre. May be plain or have a stripe or check pattern. May now contain a proportion of polyester fibre. Used for men's shirts, children's clothes and pyjamas.

Jacqueminot: The red colour of the Jacqueminot rose.

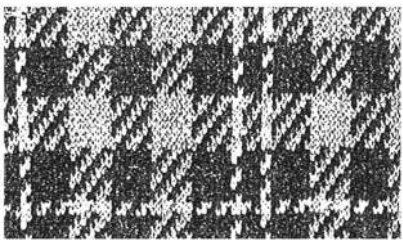
Jacquard: This is a weave by which designs are made on the fabric. Jacquard weave fabric can be identified by examining both sides; the design will appear in relief in the underside and long threads will show on both sides where they are carried from one part of the design to the other. Any fibre can be woven in a Jacquard pattern; most designs are elaborate and may be of one colour or multi-coloured. Fabric may fray readily as there are more floats in making the design and more so if silk or other slippery fibres are used. Fabric may be called as cotton jacquard, silk jacquard depending on the material used.

Jacquard drill: Stout drill made with linen face and cotton back.

Jacquard mechanism: (1) Knitting – a term in general use in the knitting industry and applied to mechanisms for selection of knitting elements; (2) Weaving –a shedding (q.v.) mechanism (attached to the loom) that controls up to several hundred warp threads individually and thus enables intricate figured designs to be produced.



A woven jacquard



A knitted jacquard

Jacquard fabric: Collective term for a figured fabric woven with a design produced by lifting individual warp threads. Finely drawn and large repeat designs of great variety are obtained by this method which cannot be

reproduced by dobby weaving. Typical jacquard fabrics include – damask, brocade, matelassé, and tapestries.

Jacquard harness (in weaving): The series of cords and their attachments.

Jacquard knit: A weft double-knit fabric in which a Jacquard type of mechanism is used. This device individually controls needles or small groups of needles and allows very complex and highly patterned knits to be created.

Jacquard machine: The name Jacquard machines originates from the designer who improved its operation; today the name ″Jacquard″ is used to identify all machines with a capacity higher than 28–32 threads which are therefore used to produce figured fabrics. The indication of the capacity of the machine, which in the past was used to differentiate the various machine models, has today no significance, as the hook number is no more strictly related to the mechanical structure of the machine.

Jacquard mechanism: A shedding mechanism on a weaving machine which controls the lifting of the warp threads via a harness with healds. Lifting of the ends is controlled by a data carrier, e.g. a chain of punched cards or by a loop of punched paper. The warp threads are lifted individually, corresponding to the required design (analogous to jacquard mechanisms on knitting machines).

Jacquard technology: Knitting and weaving technology for the production of large repeat designs in which each warp thread can be lifted or each loop-forming operation can be individually controlled via a jacquard mechanism. Named after the inventor Joseph Marie Jacquard (1752–1834).

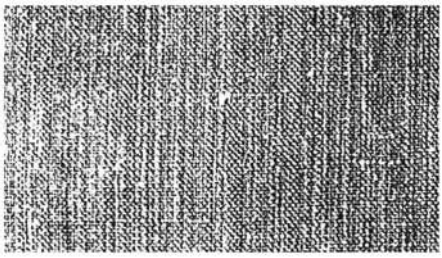
Jade: Green colour in various shades, but mainly yellowish-green.

Jade green: A blue-green or yellowish-green colour.

Jaeger: Knitted or woven fabrics, made of fine, pure, natural wool and camel hair. They are very porous and are considered hygienic.

Jafferson-Walker's kier: Kier of this type is also a vertical kier but utilises a vacuum system for circulation of the kier liquor. In this system, there is a small subsidiary receiver kier between the actual kier and supply pipe. About one-fifth of the liquor in the kier is withdrawn into the receiver kier and this creates a partial vacuum, drawing fabric together. The kier liquor is periodically withdrawn, heated and then returned to the kier. The entire liquor is circulated every 10–12 minutes.

Jagarleinen, Bavarian linen, Strawcloth: In German language, the word *Jager* means "Hunter" and the word *Leinen* means *Linen*. Plain woven, green–brown fabrics from linen, half linen, or cotton. Used for suits and costumes.



Jagenburg machine: It is one of earliest dyeing machine designed for dyeing loose cotton by Jagenburg. This machine consists of a metal rectangular or conical shaped vat fixed on supports and can be heated from beneath shaft with paddles fixed just above the vat is turned by hand or motor to mix the cotton. The disadvantages of the machines are entanglement of the fibres, un even dyeing, limitation of dyes used, etc.

Jago: A linen cloth.

Jaldai: Indian cotton muslin, figured with net-like designs.

Jamawar: Indian shawl, made of coarse wool with wide stripes.

Jamdani: See **Jamdane**.

Jamadane: Very fine brocaded or embroidered-like muslin made in India by laying short lengths of gold or coloured threads parallel with the warp in the hand looms.

Jamkhana: Indian cotton carpet with generally stripe patterns.

Jangipurl: Inferior quality of Indian jute having a reddish-brown and weak fibre.

Janus cord: Black dyed dress goods with warp ribs, made alike on both sides; made of cotton warp and worsted filling.

Jap silk: Even though the name is Jap silk, it is made in China. It is also called China silk, made in Northern China. It has insufficient weight or durability for outer clothes and is used as lining light weight garments.

Japan blue: Dark blue.

Japanese red: A reddish-brown colour.

Japan silk (Japanese silk): A fine slub-free natural silk fabric with a satin weave produced from absolutely uniform yarns reeled from mulberry silk (warp and weft: raw silk). Also a collective term for fine natural silk fabrics without slubs for apparel use and lampshades. Specific constructions include pongé, Habutai, Helvetia silk, and Ningai. Japanese silk fabrics are sold in

specific widths and lengths for export (22.8 × 3.8 m).The quality is indicated by an official quality stamp on the piece ends: red = first quality, blue = second quality and black = reject quality. The fabric weight is given in Japanese momme units per square yard (1 momme = 3.75 g). The lightest Japanese silks weigh 3–4 momme units, which corresponds to 13–18 g/m^2.

Japan wax: Japan wax is a triglyceride. It is obtained from the sumac tree's berries and is high in palmitic acid. Its wax-like properties makes it useful for candles, textile finishes, crayons, cosmetics and the like.

Japanese rugs: Pile or tapestry rugs, made of cotton or jute in Oriental scroll designs.

Japergonsi: Fine East Indian muslin with gold selvage.

Japonette: Printed cotton crepe in Canada.

Japrak: Green, red, orange and blue Smyrna rugs.

Jardiniere: Designs composed of flowers, fruits and leaves.

Jasmine:A pale yellow colour.

Jaspé: (1) A ply-like yarn produced from two differently coloured rovings lightly twisted together; (2) A filament yarn produced from two intermingled or air-jet textured strands of different chemical composition and cross-dyed to achieve two different colours.

(3) A fabric used for suiting, draperies, or upholstery characterized by a series of faint stripes formed by dark, medium, and light yarns of the same colour; (4) A term describing carpets having a faint striped effect.

Jaspé mouliné: A French term for a ply yarn produced from two jaspé threads (cotton and viscose) having a fine flammé appearance.

Jaspee: (1) French term for yarn twisted of several coloured nub or plain yarns; (2) Cloth made of same yarn.

Jasper: Yellowish-green; a blackish-green colour.

Jaspe (jasper): A fabric that has a shaded appearance created by the warp thread colour pattern, may be multi-coloured or different shades of the same colour. Small matching dots are sometimes woven into the fabric. It may be woven plain or figured and is used for bed-spread, chair covers or curtains.

Jasper: Pepper and salt effect by having the warp black and the filling white or vice versa.

Jasper carpet: Carpet having a flame like regular pattern traditionally produced by using pile yarn dip dyed in the hanks to two tones of the same colour or two different colours in fixed proportion of the lengths of the hands in any one lot.

Jato: Jahres-Tonne (tons/annum).

Java: A cotton fabric with red ground and red-yellow and white stripes in East Africa; used for dresses by the native women.

Java canvas: Made of cotton, linen or worsted ply yarns with open face; used for embroidery; the yarns are grouped two or three together each way.

Java jute: See **Kenaf**.

Java print: A type of Africa prints with a particularly wide appeal among the indigenous populations of many African countries. A modern "Java print" may be based on practically any multi-coloured design having no connection with Java. A Java print generally consists of lemon-yellow and gold resists on a green, blue (mostly phthalocyanine), dark-red or brown ground. **Procedure**: Cotton fabric, prepared with a naphthol, is printed with a resist agent (together with reactive dyes for coloured resists). The formation of diazo compounds in those parts of the design printed with the resists is inactivated in subsequent development more quickly than coupling with the naphtholate can take place.

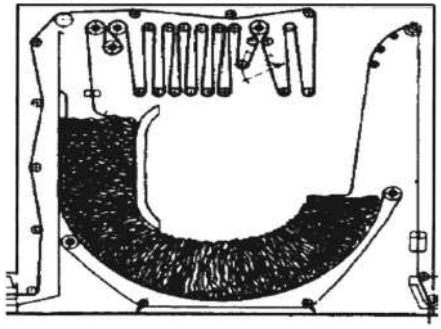
Javanese: Smooth, soft plain weaves viscose fabric with fluid drape. Filament warp and spun weft, giving a lightly ribbed appearance.

Jaw face (in tensile testing machine): The surface of a jaw which in the absence of a liner contacts the specimen.

Jaw liner (in tensile testing machines): Any material placed between the jaw face and specimen to improve the holding power of the jaws.

Jaws (in tensile testing machine): The elements of a clamp which grip the specimen.

J-box: A J-shaped holding device used in continuous operations to provide varying amounts of intermediate material storage such as in wet-processing of fabrics and in tow production. The material is fed to the top and pleated to fill the long arm before being withdrawn from the short arm.



J-box

J-cut: In tufting cut-pile carpet constructions, uneven cutting of the loops caused by poor adjustment of knives and hooks or excessive tension.

Jean: Originally an American term (now international) derived from Gênes (cloth from Genoa). The term was coined in the USA to describe tight-fitting trousers made of cotton twill, usually woven with a dark blue dyed warp and undyed weft (denim), stitched on seams and pockets and having copper rivets here and there. A very well-known fabric/garment all over the world. A very hard wearing cotton fabric, similar to drill but softer to handle. Made in plain colours, especially indigo (blue) colour, sometimes in herringbone weave. Used for overalls, dungarees, protective clothing, children's clothes. It is impossible to imagine today's clothing market without jeans in one form or another, e.g. "stone washed", "moon washed" "used look" or "rodeo washed".

(i) *Stone washed* – (a) the ready-made garment pieces are turned inside out and prewashed or desized; (b) they are then taken out of the washing machine, turned face side out again and washed with chalky sandstone at a ratio of 1:3 (1 kg of garments: 3 kg stones; (c) the garments are taken out of the machine, the stones removed, and bleaching is carried out with sodium hypochlorite (according to the desired shade). To minimise fibre damage, an alternative milder treatment can be given as follows: 1st bath: enzymatic desizing followed by an intermediate rinse. 2nd bath: chemical stone wash treatment with enzymes followed by 2–3 rinses. 3rd bath: application of softener.

(ii) *Snow washed* – (a) stones are soaked for 12 h in a solution of potassium permanganate; (b) the wet stones are then hydro-extracted for 30–50 s in a centrifuge; (c) the hydro extracted stones and garments are loaded into the washing machine for a cold treatment of 15–30 min; d) the stones are removed; (e) the brown stains from the permanganate are washed off the garments with sulphurous acid followed by neutralization; f) a final application of softener is given. To minimise fibre damage, an alternative milder treatment can be given

as follows: 1st bath: enzymatic desizing followed by an intermediate rinse. 2nd bath: chemical stone wash followed by 2–3 rinses. 3rd bath: bleaching. 4th bath: application of softener. There are many more other effects which are produced by other methods and innovations.

Jeannet: Stout, coarse warps twilled fabric, made of cotton warp and wool filling; used for working clothes.

Jeannette: (1) In England, a three shaft twilled wool fabric with a warp face; (2) Coarse jean, lighter in texture; (3) name for the one-and-two twill. See also Jean.

Jeans: See Jean

Jeans twill: Three end twills may be woven in two different ways: Warp-faced or weft-faced. The back of warp faced twill is weft faced twill and wise versa. These are the Jeans twill.

Jenappe: See **Genappe**.

Jenfez: A cross-ribbed Turkish silk fabric.

Jenkins: A commercial variety of early maturing American cotton, the staple measuring 22–25 millimetres; the yield of lint is 34–36 percent.

Jennets: Stout, twilled English cottons, come in white, figured or printed.

Jerked in filling: See **Pulled in filling**.

Jerk-in (in woven fabric): An extra filling thread dragged into the shed with the regular pick and extending only part of the way across the cloth.

Jequitiba: Native Brazilian term for the fibrous bast of the Couratari tree; used for blankets, clothing, ropes, etc.

Jerga: Coarse woollen fabric with plaid pattern; used by the natives of Mexico.

Jersey: (1) Originally, the description for a milled wool fabric produced on the British island of Jersey, in the Channel Islands and used for fishermen's clothing. The single weft-knitted fabrics which alone qualify, on technical grounds, for the description "jersey" are nowadays often referred to as "single jersey" and the term is in no way limited to wool fabrics. Today a jersey is warp or weft knitted comfortable fabric made of any fibre including cotton, wool, silk and nylon. Acetate, polyester, triacetate, acrylic, modal, etc. There are many types of jersey which are described under different names.

(2) A tricot fabric made with a simple stitch, characterized by excellent drape and wrinkle recovery properties.

Jersey blue: The blue of the uniform of New Jersey soldiers in Colonial days.

Jersey cloth: Knitted on circular, flat-bed or warp knitted methods (later popular as a tricot knit). Right side has length-wise ribs (wales) and wrong side has crosswise ribs (courses). It is very elastic and with good draping qualities. It also has special crease-resistant qualities due to its construction. It is knitted plain or has many elaborate tweed designs and fancy motifs as well as printed designs, can look very much like woven fabric, wears very well and if washable, it washes very well. First made on the Island on Jersey off the English coast and used for fisherman's clothing. Stretch as you sew. Uses: Dress goods, sportswear, suits, underwear, coats, gloves, sweaters, hats. See **Jersey made of wool, worsted, silk, cotton, rayon,** and **synthetics**.

Jersey (doubleknit): Made of cotton, wool, worsted, silk, rayon, and synthetics in circular or flat-needle bar type. A two-faced cloth, either face may be utilized as the right side. The fabric originated in Milan and Florence. Can be stabilized for shrinkage control and dry cleans satisfactorily.

Jersey gaberdine: The name given to a special effect knitted fabric, is a closely knitted jersey, having a twill effect made of polyester. Usually made in plain colours. Used for blouse tops, jumpsuits, T-shirts, etc.

Jersey stitch: A basic stitch used in weft knitting in which each loop formed in the knit is identical. The jersey stitch is also called the plain, felt, or stockinet stitch.

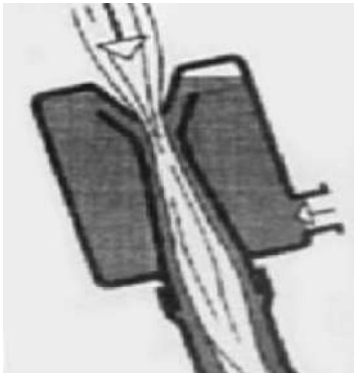
Jersey velour: It is knit fabric with a smooth ground knit structure and short soft pile on the right side. It has a plush surface and an attractive velvety appearance. Normally made with polyester base with viscose piles. Made in plain, attractive and bright colours.

Jersey (wool): Wool, worsted, silk, cotton, rayon and synthetics. Knitted on circular, flat-bed or warp knitted methods (later popular as a tricot-knit). Right side has length-wise ribs (wales) and wrong side has cross-wise ribs (courses). Very elastic with good draping qualities. Has a special crease-resistant quality due to its construction. It is knitted plain or has many elaborate tweed designs and fancy motifs as well as printed designs. Can look very much like woven fabric. Wears very well and if washable, it washes very well. First made on the Island on Jersey, off the English coast and used for fisherman's clothing. Stretch as you sew. Uses: Dress goods, sportswear, suits, underwear, coats, gloves, sweaters and hats.

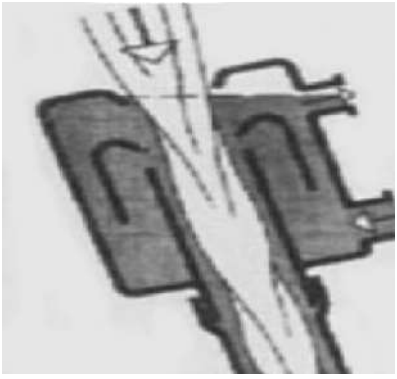
Jesuit cloth: Coarse, stout, black, plain woven woollen cloth made of hard twist yarn; used as suiting by religious orders.

Jet: (1) Black; jet-black. From the Greek word *gagates* meaning 'mineral' from Gagas – the Roman name for Lycia where jet was mined. Corrupted from 'jayet' (partridge).

(2) The part of a jet dyeing machine, usually in conical shape, through which the fabric in rope form is passed through and the bath liquor is pumped on to the fabric by a circulation pump and heat exchanger usually through the gap between the inner and outer shell of the jet. During this process, the fabric in the endless form (forming a ring) is passed continuously through the jet with the help of a reel.



A jet system in a jet dyeing machine



A soft flow jet

Jet black (jet-black): A deep black colour.

Jet driers (steam jet driers): The principle on which these machines are based involves directing jets of a superheated steam/air mixture with a high steam content to both sides of the textile fabric without the introduction of fresh air. The high flow rate of the steam/air mixture generated in the jet nozzles by relaxation of pressure gives a high heat transfer and results in short drying times in the region of 10–20 s for normal fabrics of approximately 150 g/m^2.

Jet dyeing: The process of dyeing in a Jet machine.

Jet dyeing machine: (1) Jet machines are similar to becks in that a continuous loop of fabric circulates through the machine. They differ however in that a stream of liquor is forced through a venturi tube. This provides the force to propel the fabric through the machine. In a jet dyeing machine an endless rope of textile fabric, sewn end-to-end, is transported in a constant direction with the dye liquor in a narrow tube or chamber at temperatures up to approximately 142°C under pressure. Depending on machine design, the tube system is subdivided into a flow-through section and a dwell compartment (Fig); several jet dyeing machines may be coupled together for high production. Liquor ratios from 5:1 to 10:1 or even lower are usual depending on fabric quality and type of machine.

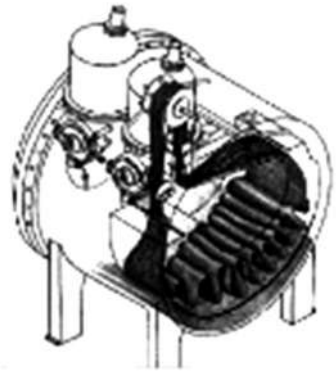


Diagram of jet dyeing machine

(2) (a) A machine for dyeing fabric in rope form and in which the fabric is carried through a narrow throat by dye liquor circulated at high velocity; (b) A machine for dyeing garments and in which the garments are circulated by jets of liquid rather than by mechanical means.

Jet loom: A shuttle-less loom that employs a jet of water or air to carry the filling yarn through the shed. See also **Weft insertion**.

Jet machines: Jet dyeing machines where dyeing is usually done using a jet flow of the dye liquor.

Jet printing: Ink jet printing.

Jet printing techniques: In these methods of textile printing, liquid dye solutions are applied to a moving textile fabric with the aid of controlled jet nozzles (e.g. Chromotronic process, Electrocolour process, Millitron process, Ink jet printing, polychromatic dyeing, TAK dyeing). Jet impingement.

Jet rapid washer: A washing machine for wool piece goods in rope form with an assembly of jet nozzles and perforated tunnel passages before the squeezer rolls. The fabric rope is sprayed with rinsing liquor from the jet nozzles which inflates the rope before the jet nozzle housing and between the jet nozzles and the squeezer rolls. This produces a very efficient washing and rinsing action at considerably higher running speeds than conventional washers.

Jet rope washing machine: The continuous rope wash in jet rope washing machines takes advantage of the excellent liquor exchange of the jet system as well as the dwell time in the storage chambers so that both phases are incorporated into the washing process in an alternating rhythm.

Jet simulator: A laboratory apparatus for pretesting the dispersion stability of disperse dye liquors, especially for use in rapid dyeing machines with large

pump capacities and greatly increased rates of liquor circulation, e.g. 60 l/min/kg.

Jet spinning: Also called Air-jet spinning – A system of staple fibre spinning which utilizes air to apply the twisting couple to the yarn during its formation. The air is blown through small holes arranged tangentially to the yarn surface and this causes the yarn to rotate. Majority of systems using this technique produce faciated yarns, but by using two air jets operating in opposite twist directions it is possible to produce yarns with more controlled properties but of more complex structure.

Jet stenter: The drying chamber in a typical jet stenter consists of a number of air ducts each of which as a type of closed air circulation and heating unit so that each drying chamber can be controlled to a specific temperature.

Jet washer: (1) The machine employs slit washing jets with stepless adjustable regulation of the minimum water quantity at speeds of 3–20 m/min (max 100 l/min water for every 1 m working width) before the suction pipe. After deflection, the water flows downwards through the carpet pile into a sump (consisting of circulation becks, filter with automatic lint separator, pump and jet); (2) An element in continuous open-width treatment plants consisting of an immersion trough with liquor circulation pump and a cascade zone from the upper limit of which a coherent surge of water is released through slit jets and flows over the material.

Jet (jetting): A narrow strip of fabric cut warp-wise sewn parallel to the pocket opening and turned over the pocket mouth edge.

Jetee: Lustrous and very strong elastic and durable bast fibre, yielded by the Rajinahal hemp in India; used for bowstrings, fishing nets, etc.

Jetted pocket: A packet having a mouth on which the edges are finished by application of jetting.

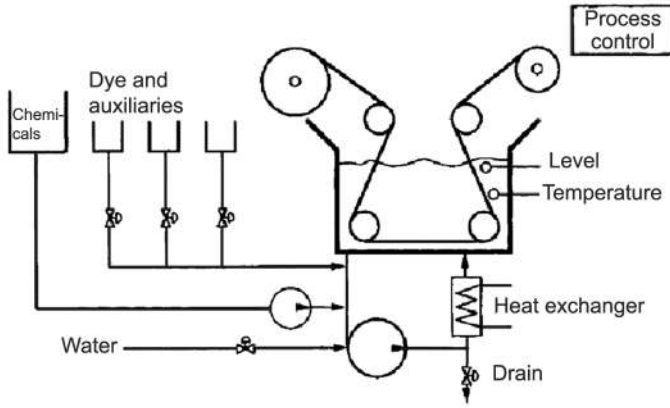
Jeypore: Indian cotton rugs having Persian designs with tree and animal forms in red, ivory and blue.

Jhilmeel: Very light East Indian silk fabric, made with an open weave.

Jhuganat: A stout bleached and glazed cotton fabric of inferior grade in East India.

Jig: Jig or Jigger is a batch machine which handles fabric in open width. It is a simple machine consisting of let-off and take-up rolls, a trough containing the processing liquor and guide rolls which allow the fabric to pass from the let-off to the take-up roll. After all the fabric transfers, the driving mechanism is reversed and the fabric makes a second pass

through the liquor by returning to the original let-off roll. The cycle can be repeated as many times as it takes to achieve the desired effect. Material is processed/dyed in open width and is transferred repeatedly from one roller to another and passes each time through a dyebath of relatively small volume. *NOTE*: Jigs are also frequently used for scouring, bleaching and finishing.



Schematic drawing of an automatic Jig

Jig dyeing: Dyeing fabric in open width using the dyeing machine named Jig or Jigger. In jig dyeing, the fabric is transferred alternately from one batch roller to another through a bath of relatively low liquor capacity during each passage. The process, unlike many others, is economical and universally applicable if the actual running speeds can be individually adapted to the respective requirements of the dyeing process and the particular fabric quality, and the selected fabric speeds and fabric tensions remain constant throughout the entire fabric run from one batch roll to the other.

Jigger dyeing: See **Jig dyeing**.

Jigger: The button inside of a double breasted coat (usually sewn with a long shank).

Jigger (jig): A dyeing machine used for dyeing cloth in full width.

Jigging stenter (jigging tenter): A type of stenter mainly used to "straighten" weft distortion in woven fabrics, e.g. bookbinder's calico. The two side chains are linked, one moving forward whilst the other moves back and vice versa which imparts an oscillating motion to the fabric. This diagonal or "to-and-fro" longitudinal movement helps to straighten the weft threads and reduce any inter yarn bonding between warp and weft, thereby producing a softer fabric.

Jipins rug: Commercial term for draperies and hangings, made of wool and used on doors and windows.

Jircaza: Originally, fine East Indian cotton lawn with woven coloured flowers.

JIS: Japanese Industrial Standard, issued by the Japanese Industrial Standards Committee (JISC), Tokyo, Japan trial activities in Japan. The standardization process is coordinated by the Japanese Industrial Standards Committee and published through the Japanese Standards Association. The JIS in many ways has been Japan's answer to ISO. The JIS is extremely sophisticated and complex and goes beyond the requirements of the ISO 9000 series, but essentially performs the same quality management function. The JIS is more rigorous and comprehensive in standards, making it extremely challenging for an developed by ASTM include test methods, specifications and definitions abrasion resistance, twist determination, fibre maturity, denier and yarn chemicals and therefore is concerned specifically with textile products. This in addition to the development of test methods, AATCC sponsors scientific Japanese Industrial Standards (JIS) specifies the standards used for Indo-organization to successfully implement. This fact has led to its adoptions almost exclusively in Japan and makes its requirement outside Japan very rare. Organizations that have a JIS certification can be considered to be at least as good as if not better than an organization that has an to be at least as good as if not better than an organization that has an ISO 9000 certification, with most JIS systems being closer in scope to ISO 9001.

JIT: Just in time.

Job dyeing: It is also called commissioned dyeing. Fabric which is supplied by the customer in grey or partly processed form is taken for dyeing and finishing on contract basis. Charges are levied on previously agreed rates as per process done on the fabric.

Jockey club: A deep blue colour.

Johnston: Highland tartan, made as follows: Wide dark green bar, split in the centre by three narrow stripes (black at the outside, yellow between) these stripes divided by green stripes of the same width; navy blue bar of the same width as green, split in the centre by three narrow black stripes, spaced their own width from each other.

Joining line: See **Seam**.

Jolocin: Coarse bast fibre, obtained from a species of the Heliocarpus tree in Central America; used for cordage.

Jones Number 1: A commercial variety of cotton from Alabama, the staple measuring 18–22 millimetres; the yield of lint is 33 percent.

Jonote: Coarse bast fibre yielded by a species of the Heliocarpus tree in Central America; used for cordage.

Jonquil: A pale yellow shade after the narcissus flower of the same name; also a vivid yellow.

Joree: Silk worm in Assam that lives on fig trees, yielding a strong and lustrous fibre.

Josephine tricot: A very open crochet work, consisting of closely crocheted rows connected by double yarns at intervals.

Josette: A strong, stout twilled cotton fabric; used for sporting wear.

Joule: Symbol **J**. The SI unit of energy and work, equal to the work done when the point of application of a force of one newton moves one meter in the direction of action of the force. 1 J = 1 N m. The joule is the unit of all forms of energy.

Jours: Open work in embroideries, laces or in fabrics. Designs in open work on fabrics are made by pressing the fabric against a plate having points arranged to form the design and then dress the fabric to hold the holes. See **Modes**.

Jour Deux Place (Jour Trois Place): French term for leno weaves, having two and three rows of holes respectively.

Jouy canvas: Printed cotton or silk fabric, showing small floral designs.

Jowers: Commercial variety of late maturing American cotton, the staple measuring 22–25 millimetres; the yield is 34 percent or more.

JPA: Japanese Standards Association.

JR: Urena fibre.

JS: Rosella fibre (roselle).

J-scray: A J-shaped trough used for short duration intermediate storage of textile fabric (usually in the open-width state) between one process and another. The long arm of the J takes the form of an inclined plane on to which the fabric accumulates before being withdrawn from the short arm after a short dwell period.

JSDC: Journal of the Society of Dyers and Colourists.

JTN: Japan Textile News, a leading Japanese textile journal published in English.

JU: Jute.

Jubbulpore: Hemp Of India, one of the very best grades of hemp, having a long, lustrous and very strong fibre.

Jumbo: Commercial variety of a prolific and early maturing American cotton, the staple measuring 18–22 millimetres; the yield is 32–34 percent.

Jumbo skein (jumbo hank): Hank of yarn of greatly increased weight, e.g. for wool = 2–5 kg per hank.

Jumel: Variety of Egyptian raw cotton. Same as ***Mako***.

Jumper: A knitted or crocheted garment similar to a pullover for covering the upper part of the body, usually made without fastenings at the front.

Jungle green: A deep yellowy-green; a dark or blackish-green colour.

Junker bar (in tufting machine): A yarn guide mounted on the needle bar assembly, for taking up the slack yarn on the needle upstroke of the tufting cycle.

Jupe: Underskirt, made visible by gathering up the overdress (manteau); usually different colour and richly decorated.

Jupon: Plain woven French dress goods made with cotton warp and woollen filling.

Jusi: A fine, sheer and plain woven fabric, made of hemp warp and pineapple fibre filling, or pineapple warp and silk or cotton filling. It comes in coloured stripes and checks and is made by the natives of the Philippines; used for women's dresses.

Just in time (JIT): A production management system of inventory keeping in which stocks are kept to a minimum and products delivered just before they are required. Likewise, finished goods are delivered to customers on demand.

Justaucorps: Elegant, knee length, close fitted men's coat of velvet or brocade and decorated with cords; later with flying tails.

Jute: (1) Soft fibres from the inner bark of the round pod jute (*Corchorus capsularis*, the long pod jute (*Corchorus olitorius*), and from the inner bark of other closely related plants, such as kenaf, sometimes referred to as Meshta (*Hibiscus cannabinus*).

(2) Very long, lustrous and strong bast yielded by the Corchorus in India. It is silver-grey or yellowish-brown; used for bagging, coarse ropes, cheaper carpets, etc. The jute fibre is not durable and rots quickly in water. The chief grades of jute in the native markets are: Uttariya, deswal, deora, desi, naraingunja, chatial, karimganji, bakrabadi, mirganji and jangipuri. In European markets the standard quality is the bale marked M, which is the basis for all quotations; this contains seragjung jute. Another important quality

in bale is marked D, containing Dacca jute. The bales marked CDM contain common jute for sacking. Jute is sorted into three qualities, of which the first one contains from 15 to 20 per cent of the total, the second quality from 25 to 30 per cent and the third from 50 to 60 percent.

Jute bagging (gunny): See **Hessian**.

Jute butts: The flaggy lower ends of the jute fibre 10–25 cm in length cut off in preparing jute for the market used in twines and coarse baggings especially in covering of cotton bales.

Jute count: The weight in pounds of a spindle of 14,400 yards of yarn.

Jute line: Fine yarn produced from long jute fibres after hackling.

JZS: Jugoslavenski Zavod za Standardizacija, Belgrade, Yugoslavia (Yugoslavian Standards Institute).