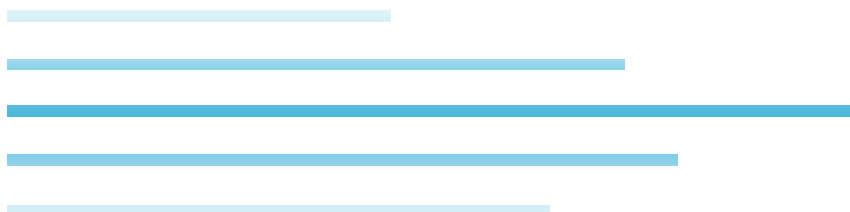


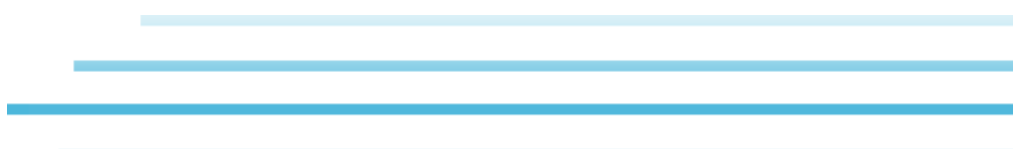
# BISFA

The International Bureau For The Standardization Of Man-Made Fibres



Terminology  
of man-made fibres  
2009 Edition  
(replaces the 2006 edition)

BISFA



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At the beginning of 2007 , BISFA decided to revise the 2006 edition recognizing the important change in business scope occurred in the last two decades in the man-made fibres industry towards technical textiles and nonwovens .

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# PREFACE

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In 1968, recognising a need to avoid a confusion of technical terms, BISFA published its first Terminology booklet. This contained those terms and definitions which describe the different forms in which man-made fibres are available, either as primary material or intermediate products. With the objective of avoiding translation difficulties and consequent misunderstanding, the booklet also contained a list in five languages of the principal technical terms used in the various internationally agreed methods booklets.

This booklet was revised in 1977, when new sections were added containing definitions of technical terms used in BISFA methods booklets, an explanation of the SI system of units, and a description of the ISO system for designating yarns in the tex system.

The revision of 1994 introduced the generic names. This edition having sold out was reprinted in 1997. Two elements have been added: definitions for airborne fibrous materials and an overview of ISO definitions to describe the accuracy of a measuring method and the currently used definitions for statistical process control.

In 1999, a complete review of the whole booklet was undertaken, adding or eliminating numerous details. The layout was changed. Terms in different languages are presented in a comprehensive view.

The definitions have been written with due consideration of recognised reference books such as *Textile Terms and Definitions* (The Textile Institute, 10<sup>th</sup> edition 1995), *Dictionary of Man-made Fibres* (H. Koslowski, International business press, 1<sup>st</sup> edition 1998), *Handbuch der Faser* (G. Schnegelsberg, Deutscher Fachverlag 1999), *Textile Dictionary* (several languages, by ITS). Relevant ISO, CEN and ASTM standards were taken into account where appropriate.

The terms and definitions are given in English in alphabetical order. A separate chapter contains the translations of terms into French, German, Italian, Spanish, and, for the first time Czech, Portuguese and Turkish languages. In the case of a disparity between languages the English text is to be used.

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# CHAPTER 1

## Generic names of man-made fibres

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### 1.1 Generic fibre names

#### General introduction

The chapter 1 provides a classification of the various categories of man-made fibres. Each of these categories is designated by a generic name and its definition. Generic names are generally used :

- for customs purposes**
- in defining public sector transactions**
- in technical standards**
- in textile product labelling.**

Through the EU Directive and related national legislation the fibre content of textile articles must be stated at point of sale using the generic names.

BISFA is careful to restrict this classification to those categories of man-made fibres which are produced on an industrial scale or are of commercial significance for special purposes and traded internationally. Fibres which have recently emerged from research or which are still at the stage of development are not included. A generic fibre name can cover different chemical substances. The table of generic names includes non exhaustive examples of chemical formulae representative of the different fibre categories. The producers in BISFA have also adopted a coding system based on generic names as an aid to communication.

BISFA defines generic fibre names only (which are then found in ISO standard 2076 and in EU regulations). BISFA does not define specific substances (polymers, copolymers, etc...).

Generic names are completely distinct from trademarks which are used by individual producers to identify their own products

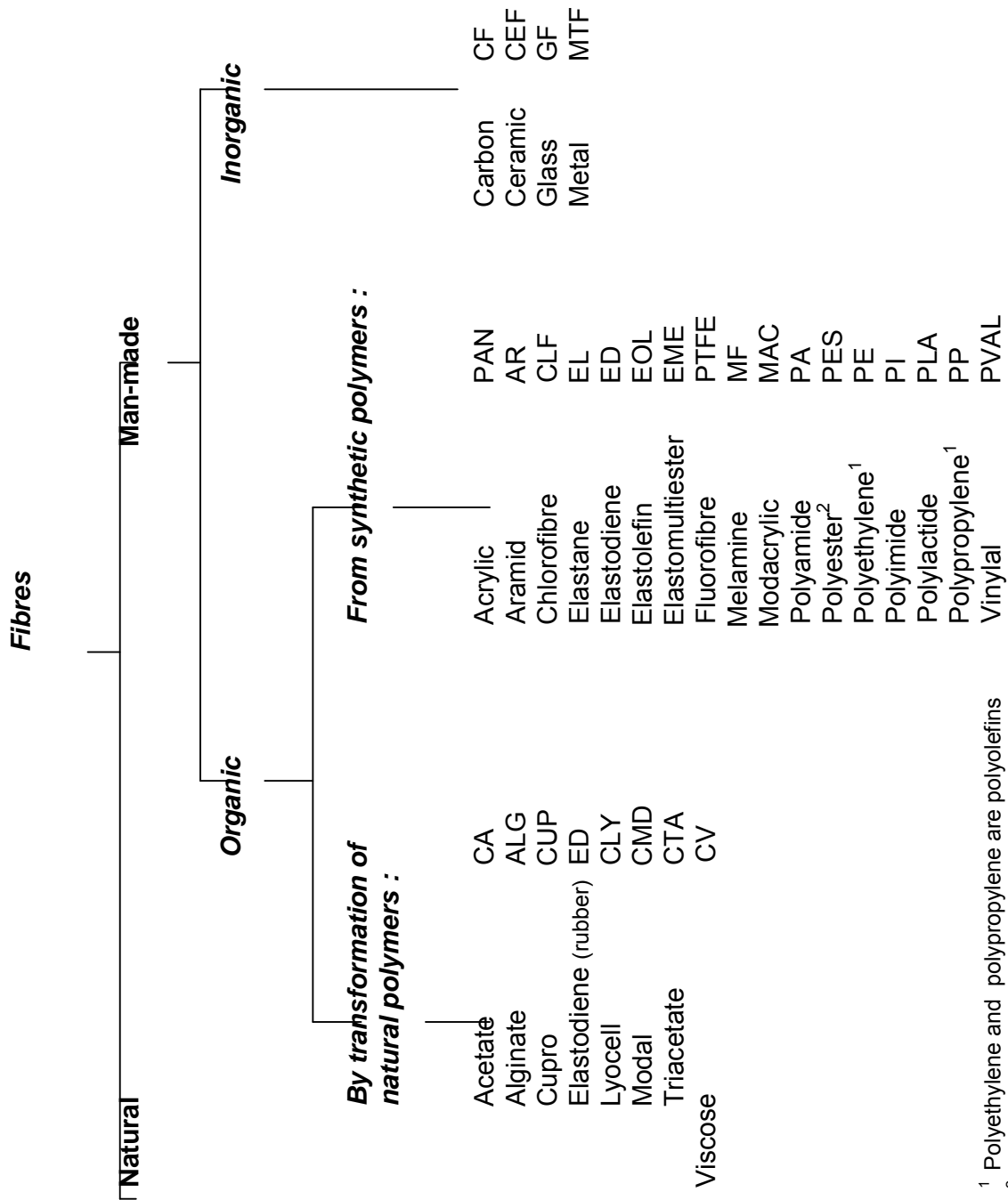
#### Naming mixtures

For naming of fibres containing mixtures of chemically distinct, and not chemically linked polymers or copolymers, the following rules should be applied :

- a) Whereas copolymers may, if necessary, be assigned distinctive generic names, the creation of new generic names for fibres composed of chemically distinct polymers shall be discouraged.
- b) When the proportion of one of the polymers or copolymers reaches 85 % by mass, the fibre takes the generic name corresponding to this component.

- c) When none of the components reaches 85 % by mass, then either a new generic name must be used or the fibre must be identified as a simple mixture e.g. x % poly A, y % poly B. Each such case shall be examined on its merits.

## Generic fibre names with their codes

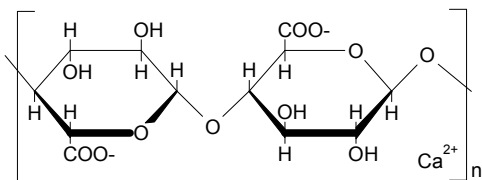
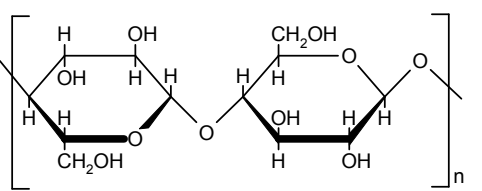


<sup>1</sup> Polyethylene and polypropylene are polyolefins

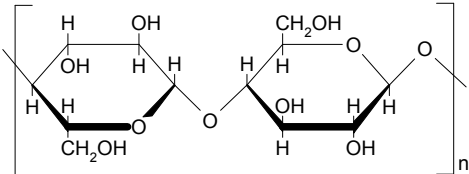
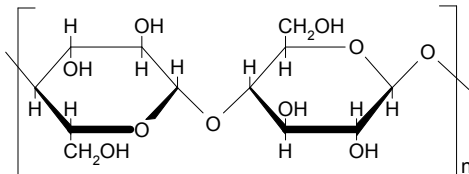
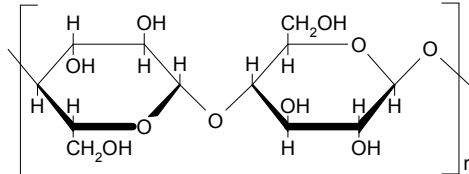
<sup>2</sup> The same code is used in the plastic industry for polyether sulfone (ISO 1043)



## 1.2 Generic classification of cellulosic fibres

Generic name	Distinguishing attribute	Examples of chemical formulae
<b>acetate</b>	Cellulose acetate fibre in which less than 92 %, but at least 74 %, of the hydroxyl groups are acetylated.	<p>Secondary cellulose acetate:</p> $\left[ \text{C}_6\text{H}_7\text{O}_2 - (\text{OX})_3 \right]_n$ <p>Where X = H or CH<sub>3</sub>CO and the degree of esterification is at least 2,22 but less than 2,76</p>
<b>triacetate</b>	Cellulose acetate fibre in which at least 92 % of the hydroxyl groups are acetylated.	<p>Cellulose triacetate</p> $\left[ \text{C}_6\text{H}_7\text{O}_2 - (\text{OX})_3 \right]_n$ <p>Where X = H or CH<sub>3</sub>CO and the degree of esterification is between 2,76 and 3</p>
<b>alginate</b>	Fibre obtained from the metal salts of alginic acid	<p>Calcium alginate:</p> 
<b>cupro</b>	Cellulose fibre obtained by the cuprammonium process	<p>Cellulose:</p> 

## 1.2 Generic classification of cellulosic fibres


Generic name	Distinguishing attribute	Examples of chemical formulae
<b>lyocell</b>	Cellulosic fibre obtained by an organic solvent spinning process. It is understood that: 1) an “organic solvent” means essentially a mixture of organic chemicals and water, and 2) “solvent spinning” means dissolving and spinning without the formation of a derivative.	Cellulose: 
<b>modal</b>	Cellulose fibre having a high breaking force <sup>1</sup> BF and a high wet modulus B <sub>w</sub> .  The breaking force BF <sub>c</sub> in the conditioned state and the wet modulus F <sub>w</sub> required to produce an elongation of 5 % In its wet state are : $BF_c \geq 1.3\sqrt{LD} + 2LD$ $F_w \geq 0,5\sqrt{LD}$ where LD is the mean linear density (mass per unit length) in decitex. BF <sub>c</sub> and F <sub>w</sub> are expressed in centinewtons.	Cellulose: 
<b>viscose</b>	Cellulose fibre obtained by the viscose process	Cellulose: 

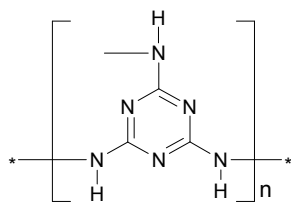
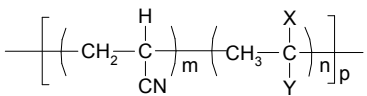
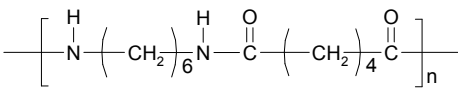
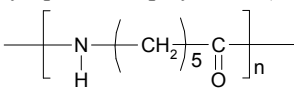
<sup>1</sup> ISO 2076 uses the term "strength"

### 1.3 Generic classification of synthetic fibres

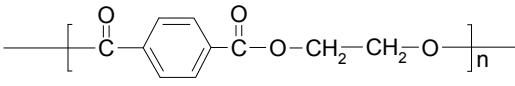
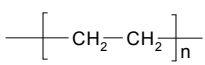
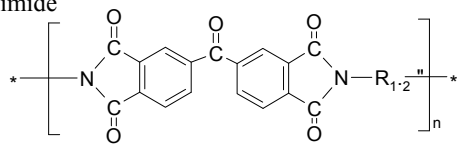
Generic name	Distinguishing attribute	Examples of chemical formulae
<b>acrylic</b>	Fibre composed of linear macromolecules having in the chain at least 85% by mass of acrylonitrile repeating units.	<p>Polyacrylonitrile:</p> $\left[ \text{CH}_2 - \underset{\text{CN}}{\overset{\text{H}}{\text{C}}} \right]_n$ <p>and acrylic copolymers</p> $\left[ \left( \text{CH}_2 - \underset{\text{CN}}{\overset{\text{H}}{\text{C}}} \right)_m \left( \text{CH}_3 - \underset{\text{Y}}{\overset{\text{X}}{\text{C}}} \right)_n \right]_p$
<b>aramid</b>	Fibre composed of linear macromolecules made up of aromatic groups joined by amide or imide linkages, at least 85% of the amide or imide linkages being joined directly to two aromatic rings and the number of imide linkage, if the latter are present, not exceeding the number of aramide linkages.	<p>Example 1:</p> $\left[ \text{C}(=\text{O}) - \text{C}_6\text{H}_4 - \text{C}(=\text{O}) - \text{NH} - \text{C}_6\text{H}_4 - \text{NH} \right]_n$ <p>Example 2:</p> $\left[ \text{O}=\text{C} - \text{C}_6\text{H}_3(\text{C}(=\text{O})\text{N} - \text{C}_6\text{H}_4 - \text{NH}) - \text{C}(=\text{O}) \right]_n$ <p><b>Note:</b> in example 1 the aromatic groups may be the same or different</p>
<b>chlorofibre</b>	Fibre composed of linear macromolecules having in the chain more than 50% by mass of vinyl chloride or vinylidene chloride units (more then 65% in the case in which the rest of the chains is made up of acrylonitrile, the modacrylic fibres being thus excluded.)	<p>Poly(vinyl chloride):</p> $\left[ \text{CH}_2 - \underset{\text{Cl}}{\overset{\text{H}}{\text{C}}} \right]_n$ <p>And</p> <p>Poly(vinylidene chloride):</p> $\left[ \text{CH}_2 - \underset{\text{Cl}}{\overset{\text{Cl}}{\text{C}}} \right]_n$
<b>elastane</b>	Fibre composed of at least 85% by mass of a segmented polyurethane and which, if stretched to three times its unstretched length, rapidly reverts substantially to the unstretched length when the tension is removed.	<p>Macromolecules having alternate elastic and rigid segments with repetition of the group</p> $\text{—O—C(=O)—NH—}$

### 1.3 Generic classification of synthetic fibres

Generic name	Distinguishing attribute	Examples of chemical formulae
<b>elastodiene</b>	Fibre composed of natural or synthetic polyisoprene, or of one or more dienes polymerized with or without one or more vinyl monomers, and which, if stretched to three times its unstretched length, rapidly reverts substantially to the unstretched length when the tension is removed.	Natural polyisoprene extracted from latex <i>Heves brasiliensis</i> , vulcanized  $\begin{array}{c} \text{H} \\   \\ \text{---CH}_2\text{---C---C---CH}_2\text{---} \\   \quad   \\ \text{S}_x \quad \text{CH}_3 \\   \\ \text{CH}_3 \\   \\ \text{---CH}_2\text{---C---C---CH}_2\text{---} \\   \\ \text{H} \end{array}$
<b>elastomultiester</b>	Fibre formed by interaction of two or more chemically distinct linear macromolecules in two or more distinct phases (of which none exceeds 85% by mass) which contains ester groups as dominant functional unit (at least 85%) and which after suitable treatment when stretched to one and half times its original length and released recovers rapidly and substantially to its initial length.	At least 2 ester macromolecules in each filament form an elastomer fibre: e.g.  $\begin{array}{l} \text{O} \quad \text{O} \\    \quad    \\ \text{---C---} \text{---C---O---CH}_2\text{---CH}_2\text{---O---} \text{---} \\   \quad   \\ \text{---C---} \text{---C---O---CH}_2\text{---CH}_2\text{---CH}_2\text{---O---} \text{---} \\   \quad   \\ \text{O} \quad \text{O} \end{array}$ <p>2GT plus</p> <p>3GT</p> Example of physical arrangement:  Parts A and B consist of different macromolecules with ester groups.
<b>elastolefin</b>	Fibre composed of at least 95% (by mass) of macromolecules partially cross-linked, made up from ethylene and at least one other olefin and which, when stretched to one and a half its original length and released, recovers rapidly and substantially to its original length.	Elastolefin  $\begin{array}{c} \text{C}_k\text{H}_{2k+1} \\   \\ \left[ (\text{CH}_2 - \text{CH}_2)_m - (\text{CH}_2 - \text{C})_n \right]_p \\   \\ \text{X} \\   \\ \left[ (\text{CH}_2 - \text{CH}_2)_m - (\text{CH}_2 - \text{C})_n \right]_p \\   \\ \text{C}_k\text{H}_{2k+1} \end{array}$
<b>fluorofibre</b>	Fibre composed of linear macromolecules made from aliphatic fluorocarbon monomers.	Polytetrafluorethylene  $\left[ \begin{array}{c} \text{F} \quad \text{F} \\   \quad   \\ \text{---C---C---} \\   \quad   \\ \text{F} \quad \text{F} \end{array} \right]_n$

<b>melamine</b>	Fibre composed of at least 50 % by mass of cross-linked macromolecules made up of melamine methylol poly-condensate.	 <p>Melamine</p>
<b>modacrylic</b>	Fibre composed of linear macromolecules having in the chain at least 50% and less than 85% by mass of acrylonitrile.	<p>Acrylic copolymers</p>  <p>If X = H and Y = Cl: Poly(acrylonitrile <i>or</i> vinyl chloride)</p> <p>If X = Y = Cl: Poly(acrylonitrile <i>or</i> vinylidene chloride)</p>
<b>polyamide or nylon</b>	Fibre composed of linear macromolecules having in the chain recurring amide linkages, at least 85% of which are joined to aliphatic cycloaliphatic units.	<p>Polyhexamethylene adipamide (polyamide 66)</p>  <p>Polycaproamide (polyamide 6)</p> 

### 1.3 Generic classification of synthetic fibres

Generic name	Distinguishing attribute	Examples of chemical formulae
<b>polyester</b>	Fibre composed of linear macromolecules having in the chain at least 85% by mass of an ester of a diol and terephthalic acid.	<p>Poly(ethylene terephthalate)</p> 
<b>polyethylene<sup>1</sup></b>	Fibre composed of linear macromolecules of unsubstituted saturated aliphatic hydrocarbons.	<p>Polyethylene</p> 
<b>polyimide</b>	Fibre of synthetic linear macromolecules having in the chain recurring imide units.	<p>Polyimide</p>  <p>R1 = Aryl R2 = Alkyl</p>

<b>Poly lactide</b>	Fibre formed of linear macromolecules having in the chain at least 85% (by mass) of lactic acid ester units derived from naturally occurring sugars , and which has a melting temperature of at least 135°C	$\left[ \text{O}-\underset{\text{CH}_3}{\overset{\text{H}}{\text{C}}}-\overset{\text{O}}{\parallel}{\text{C}} \right]_n$
<b>polypropylene<sup>1</sup></b>	Fibre composed of linear macromolecules made up of saturated aliphatic hydrocarbon units in which one carbon atom in two carries a methyl side group, generally in an isotactic configuration and without further substitution.	Polypropylene $\left[ \text{CH}_2-\underset{\text{CH}_3}{\overset{\text{H}}{\text{C}}} \right]_n$
<b>vinylal</b>	Linear macromolecules of poly (vinyl alcohol) with different levels of acetalization	Acetalized poly(vinyl alcohol) $\left[ \left( \text{CH}_2-\underset{\text{OH}}{\overset{\text{H}}{\text{C}}} \right)_m \left( \text{CH}_2-\underset{\text{O}-\text{R}-\text{O}}{\overset{\text{H}}{\text{C}}}-\text{CH}_2-\underset{\text{H}}{\overset{\text{H}}{\text{C}}} \right)_n \right]_p$ Where n > 0

## 1.4 Generic classification of inorganic fibres

Generic name	Distinguishing attribute
<b>Carbon</b>	Fibre containing at least 90% by mass of carbon obtained by thermal carbonization of organic fibre precursors
<b>glass</b>	Fibre, in textile form, obtained by drawing molten glass.
<b>ceramic</b>	Fibre, in textile form, obtained from ceramic materials
<b>metal<sup>2</sup></b>	Fibre obtained from metal

<sup>1</sup> Forms part of the polyolefins class

<sup>2</sup> Fibres can be coated with metals, in which case they are described as "metallized fibres" and not "metal fibres"

## 1.5 Coding system of man-made fibres and relevant Commercial Allowances

Alphabetic order of names		Commercial Allowances	Alphabetic order of codes		Commercial Allowances
acetate	<b>CA</b>	9,00	<b>ALG</b>	alginate*	20,00
acrylic	<b>PAN</b>	2,00	<b>AR</b>	aramid**	STD 7,00/HM 3,5
alginate*	<b>ALG</b>	20,00	<b>CA</b>	acetate	9,00
aramid **	<b>AR</b>	STD 7,00/HM 3,5	<b>CF</b>	carbon	
carbon	<b>CF</b>		<b>CEF</b>	ceramic	
ceramic	<b>CEF</b>		<b>CLF</b>	chlorofibre*	2,00
chlorofibre*	<b>CLF</b>	2,00	<b>CLY</b>	lyocell	13,00
cupro	<b>CUP</b>	13,00	<b>CMD</b>	modal	13,00
elastane***	<b>EL</b>	1,30	<b>CTA</b>	triacetate	7,00
elastodiene*	<b>ED</b>	1,00	<b>CUP</b>	cupro	13,00
elastomultiester*	<b>EME</b>	1,50	<b>CV</b>	viscose	13,00
elastolefin*	<b>EOL</b>	1,50	<b>ED</b>	elastodiene*	1,00
fluorofibre*	<b>PTFE</b>	0,00	<b>EL</b>	elastane	1,3 0
glass	<b>GF</b>	2/3,00	<b>EME</b>	elastomultiester*	1,50
lyocell	<b>CLY</b>	13,00	<b>EOL</b>	elastolefin*	1,50
melamine	<b>MF</b>		<b>GF</b>	glass	2/3,00
metal*	<b>MTF</b>	2,00	<b>MAC</b>	modacrylic*	2,00
modacrylic*	<b>MAC</b>	2,00	<b>MF</b>	melamine	
modal	<b>CMD</b>	13,00	<b>MTF</b>	metal*	2,00
polyamide	<b>PA</b>	FY 5,75 SF 6,25	<b>PA</b>	polyamide	FY 5,75 SF 6,25
polyester	<b>PES<sup>1</sup></b>	1,50	<b>PAN</b>	acrylic	2,00
polyethylene*	<b>PE</b>	1,50	<b>PE</b>	polyethylene*	1,50
polyimide*	<b>PI</b>	3,50	<b>PES<sup>1</sup></b>	polyester	1,50
polylactide*	<b>PLA</b>	1,50	<b>PI</b>	polyimide*	3,00
polypropylene	<b>PP</b>	2,00	<b>PLA</b>	polylactide*	1,50
triacetate	<b>CTA</b>	7,00	<b>PP</b>	polypropylene	2,00
viscose	<b>CV</b>	13,00	<b>PTFE</b>	fluorofibre*	0,00
vinylal*	<b>PVAL</b>	5,00	<b>PVAL</b>	vinylal*	5,00

\* refers to European Union Directives on Textile Labelling

\*\* European Union Directives on Textile Labelling indicate 8,00

\*\*\* European Union Directives on Textile Labelling indicate 1,50

<sup>1</sup> The same code is used in the plastic industry for polyether sulfone in ISO 1043.

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## **CHAPTER 2**

### **Morphological schemes**

---

#### **INTRODUCTION**

This chapter gives an overview on terms directly related to "fibres" and sets out in diagrammatic form the relationship between the various forms into which fibres can be transformed, up to and including the twisting stages. The diagrams cover only the main sequences of commonly used operations, and should not be interpreted as implying that all morphological forms listed exist for a particular generic category. Definitions are given for the main cases of elastane containing yarns.

Each term in these diagrams is defined in chapter 3.

#### **2.1 BISFA definitions of "fibre" related terms**



BISFA definitions of "fibre" related terms

<b>Fibre:</b> a <i>morphological term</i> for substances characterised by their flexibility, fineness and high ratio of length to cross sectional area
<b>Filament:</b> a fibre of <i>very great length, considered as continuous</i>
<b>Yarn:</b> a <i>textile product of substantial length</i> and relatively small cross section, composed of fibres with or without twist. This general term covers all the specific types of yarns, e.g. single yarn, multiplewound yarn, filament yarn, spun yarn

*Man-made fibre spinning process leads to:*



**Tow:** a *large number of filaments*, assembled without substantial twist usually intended to be cut or stretch-broken for use in staple fibre or top form

**Fibril:** a *subdivision of a fibre*  
can be attached to the fibre or loose

⇒ ⇒ ⇒  
**Fibre fly:** *airborne* fibres or parts of fibres (light enough to fly), visible as fibres to the human eye

⇒ increasing unit length ⇒  
**Flock:** *very short fibres*, intentionally produced for other purposes than spinning

⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒  
**Staple fibre:** a textile fibre of *limited but spinnable length*.

⇒ ⇒ ⇒  
**Filament**  
a fibre of very great length, considered as *continuous*

⇓  
*Textile*

(Textile spinning process leads to:)  
**Sliver:** an *indefinitely long assembly of staple fibres*, substantially parallel, without twist, capable of being drafted in preparation for spinning. **Top** = synonym for sliver

⇓  
*spinning*

**Roving:** an indefinitely long assembly of staple fibres, substantially parallel, with *slight twist*, capable of being drafted in the later or final stages of preparation for spinning.

⇓  
*process*

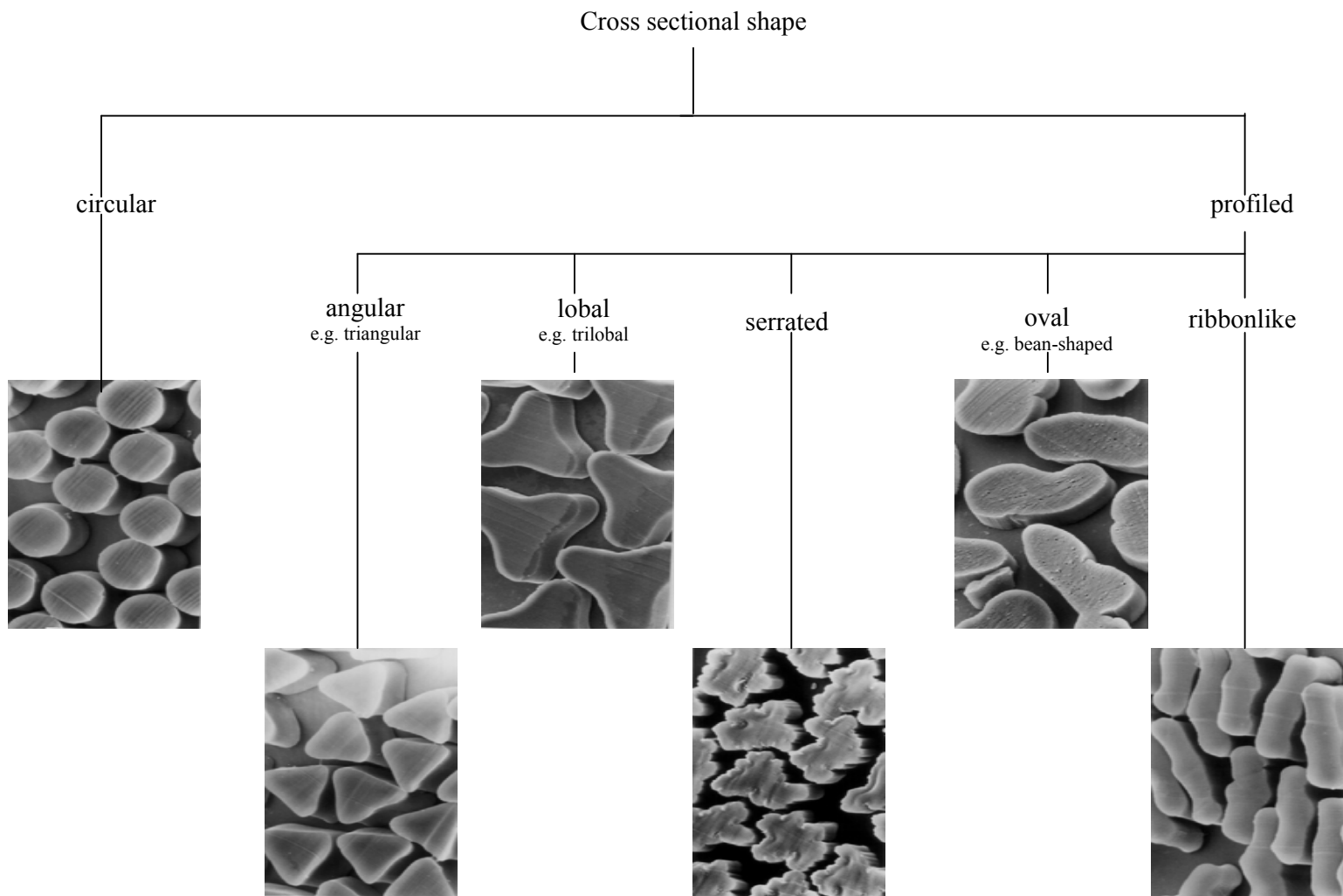
**Spun yarn:** a yarn made of staple fibres usually *bonded together by twist*.

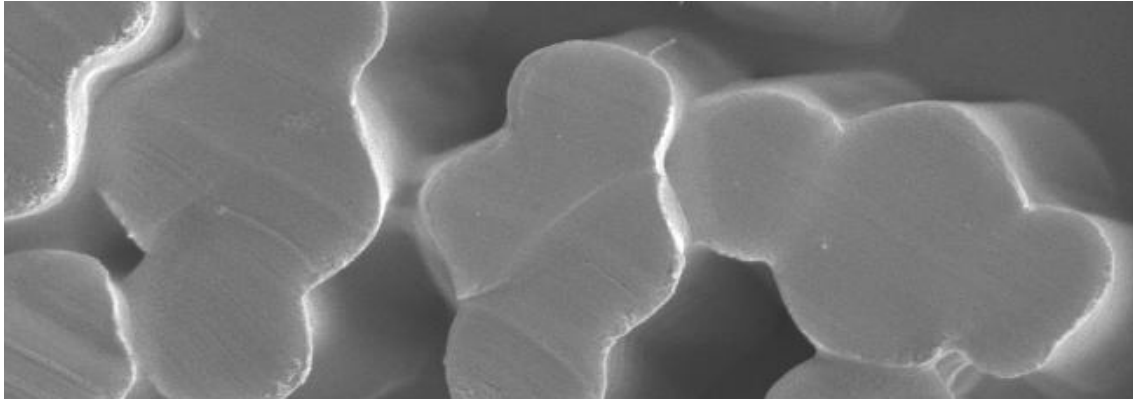
**Filament yarn:** a yarn composed of *one or more filaments*

**Monofil:**  
a filament yarn consisting of a *single filament*

<b>Single yarn:</b> a yarn composed of staple fibres (spun yarn), a single filament (monofilament) or several filaments (multifilament), with or without twist
--

2.2 Characteristics of man-made fibre cross sections



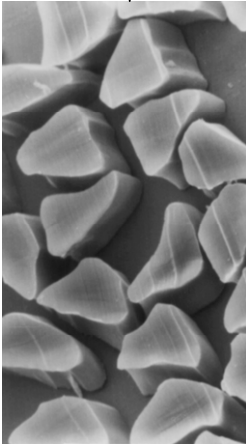


multichannel

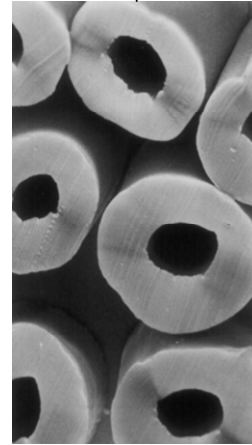
## Cross sectional area

Examples:

solid



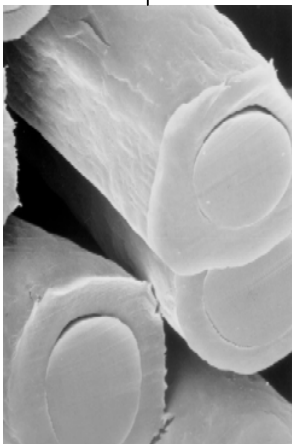
hollow



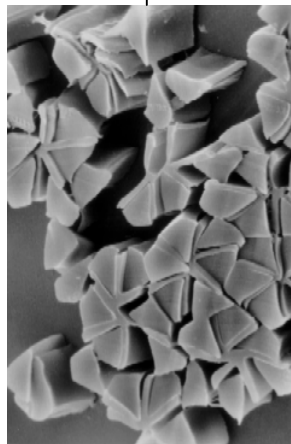
## Multi-component fibres

Examples:

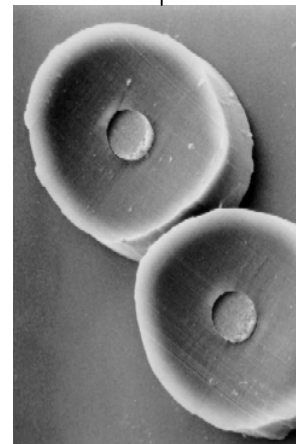
concentric cover-core



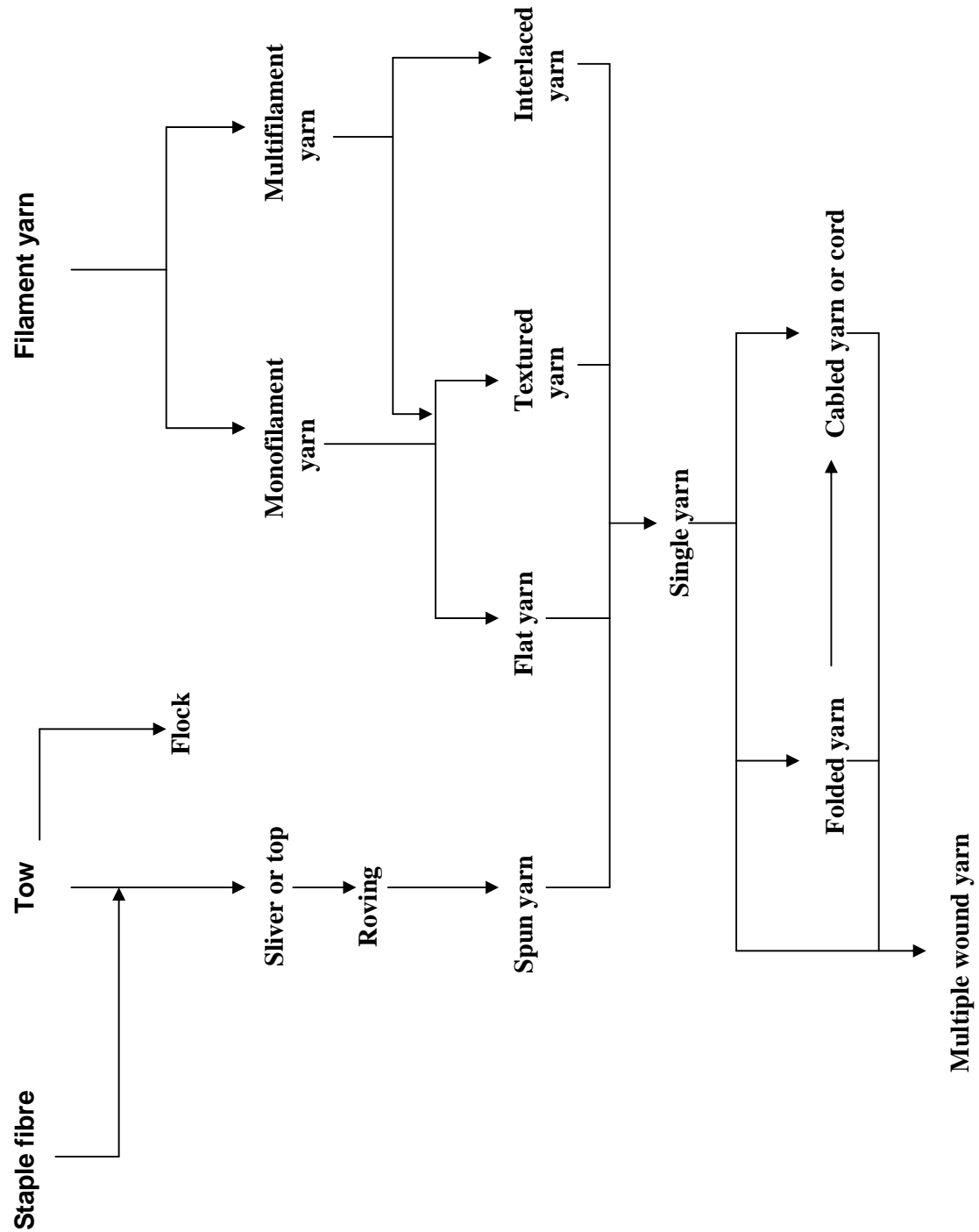
matrix /




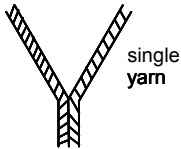
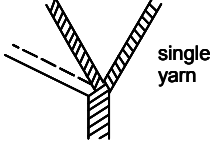
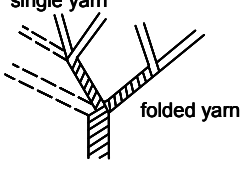
sheath-core



## 2.3 General morphological scheme for man-made fibres

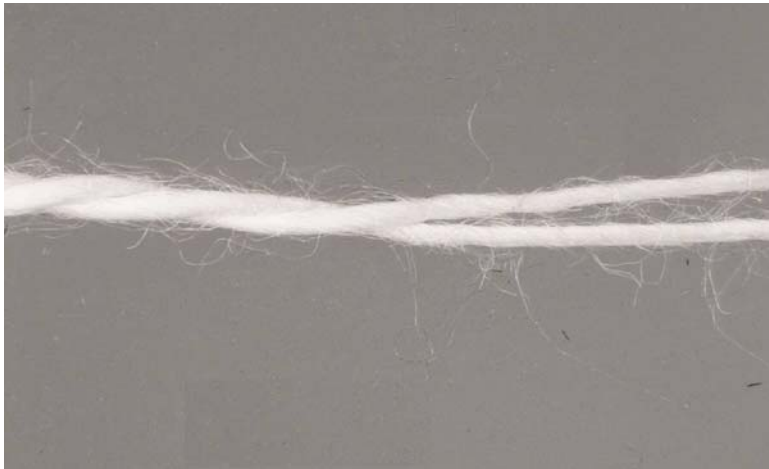


## 2.4 Illustration of yarn constructions

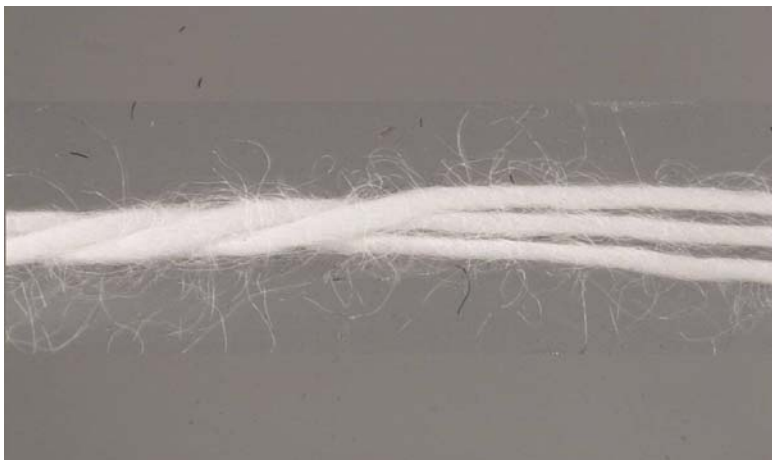
Definition	Explanation
 Single yarn	Spun yarn or Filament yarn
 Multiple wound yarn	Two or more components no twisting operation similar or dissimilar components
 Folded (plied yarn)	Two or more components one twisting operation similar or dissimilar components
 Cabled yarn	Two or more components more than one twisting operation similar or dissimilar components



Single yarn



2 folded (plied) yarn



3 folded (plied) yarn

## 2.5 Morphological scheme for elastane containing yarns

### Elastic covered yarn

General term for elastic yarn with bare elastane core covered by one or more relatively inelastic textile components.

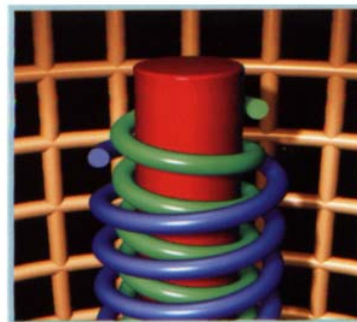
Several processes are in use to combine elastane with other fibres to produce elastic yarns for textile applications. The main yarn constructions of such fibre combinations are :

- **Single or double covered yarn**

Elastic yarn with bare and twistless elastane core and one or more relatively inelastic yarns wrapped around the core with continuous turns in one or opposite directions.



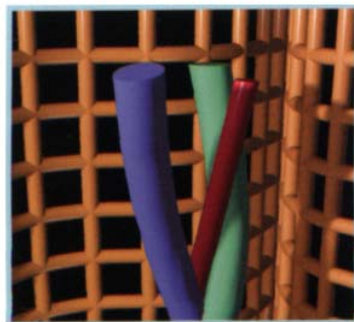
Single-covering



Double-covering

- **Elastic core spun yarns**

Elastic yarn with bare elastane core and relatively inelastic staple fibres from a sliver twisted around the core with continuous turns in one direction.

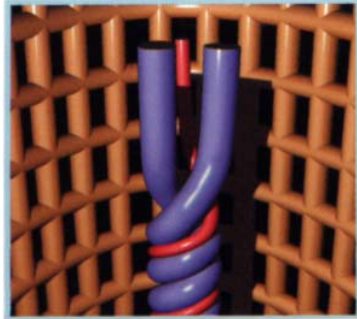


Core-spun



- **Elastic core twisted yarns**

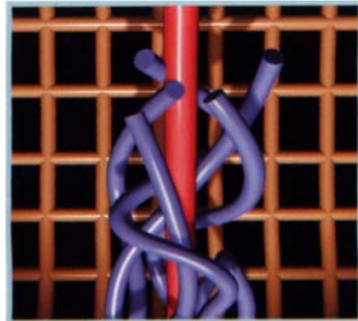
Elastic yarn with bare elastane core and one or more relatively inelastic cover yarns twisted with continuous turns in one direction.



Core-twisting

- **Elastic air covered yarns**

Elastic yarn with bare and twistless elastane core and one or more relatively inelastic cover yarns air-mingled together with the core entwined by the filaments with randomly distributed interlace points.



Air-covering

- **Core textured yarn**

Elastic yarn with bare elastane core covered by one or more relatively inelastic cover yarns continuously textured together with the core entwined by the filaments with false twist turns of randomly changing directions.

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## CHAPTER 3

### Technical terms and definitions

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This chapter lists the technical terms used by BISFA in its various methods booklets together with their definitions. The terms are listed in alphabetical order.

The translation of these terms into languages other than English is set out in Chapter 7.

The definitions of the statistical terms used by BISFA are given in Chapter 4.

Special definitions relevant to tests on steel tyre cord are to be found in the BISFA test methods booklet for steel tyre cord.

#### **Adhesion**

The property denoting the ability of a material to resist delamination or separation into two or more layers.

- **Adhesion, in tyre fabrics**

The force required to separate a textile material or steel cord from rubber or other elastomer by a definite prescribed method.

#### **Adhesion, rubber coverage**

Ratio between the wire surface covered by rubber and total embedded surface after the adhesion pull out test.

#### **Air-covered yarn**

Elastic yarn with bare and twistless elastane (or other elastic) core covered by one or more relatively inelastic cover yarns mingled together by an air stream with the core entwined by the filaments with randomly distributed interlacing points.

#### **Air textured yarn**

Textured filament yarn obtained by overfeeding filament yarn into a turbulent stream of air.

#### **Assembled yarn**

See : Multiple wound yarn

## **Atmosphere**

- **Standard atmosphere :**

Air at local atmospheric pressure with a relative humidity of 65% and a temperature of 20 degree Celsius.

- **Standard atmosphere for testing**

The atmosphere, in which physical testing is carried out, shall be the standard atmosphere maintained with certain limits, to ensure that test results are not significantly influenced by changes in the atmosphere.

Note:

The magnitude of these limits depends on the sorption behaviour of the tested material and is specified in the respective methods booklets.

- **Atmosphere for preconditioning**

The atmosphere used to partially dry the material before further treatment or conditioning. The atmosphere for preconditioning shall be maintained within the following limits :

Humidity :            5 - 25 %  
Temperature :        not exceeding 50 °C

## **BCF (Bulked Continuous Filament)**

Continuous filament fibre containing a degree of crimp or bulk.

## **Beam**

A cylinder usually with flanges on each end on which a defined number of ends are wound substantially parallel with identical length.

- **Back beam**

A beam with a defined number of ends and defined length normally intended for subsequent assembly with other back beams.

- **Warp knitting beam**

A beam with a defined number of ends and length used for subsequent warp knitting operation.

- **Weaver's beam**

A beam carrying the warp which has a defined number of ends of identical length inserted in the loom and used for weaving the fabric.

## **Bicomponent fibre**

See : Multicomponent fibre.

## **Bishrinkage yarn**

Yarn comprising filaments with two different shrinkage properties.

**Boiling water shrinkage**

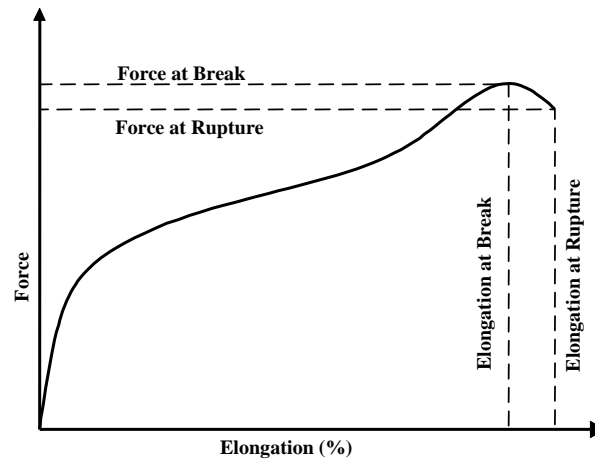
See : Shrinkage.

**Breaking elongation (deprecated term)**

See : Elongation at break.

**Breaking force (Synonym: Force at break)**

The maximum force applied to a test specimen carried to rupture during a tensile test (See diagram).



**Figure 3.1 : Force-Elongation-Diagram**

**Breaking strength (Synonym : Strength at break)**

Term still commonly used, but improperly, for the average of the results of breaking force measurements.

**Breaking tenacity (Synonym : Tenacity at break)**

The breaking force divided by the linear density of the unstrained material.

**Breaking toughness**

The work required to achieve the breaking force of the test specimen expressed per unit length and linear density of the unstrained material.

**Bulked Continuous Filament**

see BCF

**Cabled yarn**

A yarn with two or more components of which at least one is a folded yarn, combined by one or more twisting operations.

Note : For certain industrial uses the word cord is used for folded or cabled yarns.

**Chord modulus**

See : Modulus

**Clamps**

The parts of a testing device which are used to grip the test specimen by means of suitable jaw faces.

**Coating of steel filament**

- **Mass of coating**

The quantity of covering layer applied to the surface of the filament.

- **Thickness of coating**

The average thickness of the coating layer.

- **Composition of coating**

The quantity of each of the components expressed as a percentage of the total mass of the coating

**Coiling**

The process of laying down a sliver, top or tow into successive layers within which circular spirals are regularly arranged.

**Commercial mass**

See : Mass

**Compact cord**

A cord comprising a number of filaments twisted in the same direction and with the same lay length with a minimum cross-sectional area.

**Conditioned state**

A sample is in the "conditioned state" or "conditioned" for testing purposes when it has been kept in the atmosphere for testing until moisture equilibrium has been reached. Equilibrium shall be considered to have been attained when the mass of the well-opened sample shows no progressive change between successive hourly weighings. In the case of certain fibres, preconditioning is necessary to ensure that moisture equilibrium is reached by absorption.

**Conditioning**

The process of bringing a textile material into moisture equilibrium with the standard atmosphere for testing.

**Consignment**

All the products of one defined type and quality, delivered to one customer against one dispatch note.

**Consignment sample**

A selection of containers representative of the whole consignment.

**Constant rate of extension (CRE) dynamometer**

A tensile testing machine, where one clamp is stationery whilst the other is moving with a constant speed throughout the test, and where the entire testing system is virtually free from deflection.

**Container**

The unit of packaging (e.g. carton, case, bag, bale, pallet, etc.).

**Conventional allowance**

The conventional allowance is an agreed percentage to be added to the oven-dry mass of the material for the calculation of commercial mass and certain other properties.

This allowance is normally fixed for each fibre type and includes the moisture regain which approximately corresponds with equilibrium under the standard atmosphere and for some fibres, an allowance for substances removable during normal processing, e.g. the finish normally applied to impart the required properties to the textile material.

See Mass.

**Cord**

See : Cabled yarn, Steel cord.

**Cord of steel**

See : Steel Cord

**Cord thickness**

A conventional way of expressing an average cord diameter.

**Core (in steel tyre cord)**

A filament, filaments or strand that serves as an extended axis about which other elements can be wound.

**Core-spun yarn**

Yarn with filament (elastane, other elastic or inelastic) core and relatively inelastic staple fibres from a sliver twisted around the core with continuous turns in one direction.

**Core-textured yarn**

Yarn with filament (elastane, other elastic or inelastic) core covered by one or more relatively inelastic cover yarns continuously textured together with the core entwined by the filaments with false twist turns of randomly changing directions.

**Core-twisted yarn**

Yarn with filament (elastane, other elastic or inelastic) core and one or more relatively inelastic cover yarns twisted with continuous turns in one direction.

**Covered yarn (single or double)**

Yarn with filament (elastane, other elastic or inelastic) core covered by one or more relatively inelastic cover yarns continuously wrapped around the core in one or opposite directions.

**Crimp**

The waviness of a fibre, yarn or tow.

Note : This characteristic may be expressed numerically by the combination of the crimp frequency either with the crimp contraction or -in the case of textured yarns- with the crimp elongation.

- **Crimp contraction (also : percentage crimp)**

The contraction of a crimped fibre or a textured yarn owing to the development of crimp, expressed as a percentage of its straightened length.

- **Crimp elongation**

The lengthening of a crimped fibre or of a textured yarn after development of crimp when it is straightened under specified tension expressed as a percentage of its initial length.

- **Crimp frequency**

The number of crimps per unit of length of filament yarn, staple fibre or tow.

Note : Different methods are in common use for expressing crimp frequency, based on half or whole waves and on straightened or unstraightened length.  
These bases must therefore be specified in any quantification.

- **Crimp, latent**

Crimp that can be developed by a thermal treatment or by tensioning and subsequent relaxation.

- **Crimp liveliness**

The tendency for a textured yarn to develop its crimp immediately after the reduction of an applied tension.

- **Crimp stability**

The ratio of the crimp of a fibre or textured yarn after a specified treatment to the crimp prior to treatment, expressed as a percentage.

Note : The method for determination of crimp and the treatment must be reported.

### **Cross section**

The shape of a fibre when viewed perpendicular to its axis.

Note : The shape of man-made fibres can be influenced by the spinning process and subsequent processing and treatments, such as texturizing.

### **Delustrant**

A chemical substance added to the polymer in order to reduce the lustre or transparency of a fibre.

### **Dip**

A chemical composition applied to a cord or fabric to improve its adhesion to rubber or elastomers. Direction of lay

See : Twist

### **Durability (Stability)**

The ability of a material to retain its physical or chemical properties after exposure for a specified time under defined conditions such as heat, chemical agents, light or other environmental processes.



## **Dust ; fibre dust**

Non-specific terms. Can cover many types of fibrous and non fibrous species, including contaminants, usually present as mixtures of particulate matter. Recommended specific terms for airborne fibrous material are fibre fly, particulates from fibres, respirable fibre-shaped particulates (RFP).

- **Fibre fly**

Airborne fibres or parts of fibres (light enough to fly), visible as fibres to the human eye.

- **Particulates from fibres**

Airborne particles, not visible as fibres to the naked eye. May or may not be of the polymer material of the fibre or have fibre shape under microscopic view.

- **Fibril**

A subdivision of a fibre. A fibril can be attached to the fibre (fibrillated fibres) or can be loose, independent.

- **Respirable fibre-shaped particulates (RFP)**

Airborne particulates fulfilling the following dimensional conditions: length  $> 5 \mu\text{m}$  and diameter  $< 3 \mu\text{m}$  and length/diameter ratio of  $> 3:1$ .

## **Edge crimped yarn**

A textured filament yarn obtained by drawing heated filament yarn over an edge of small radius of curvature.

## **Elasticity**

That property of a material by virtue of which it tends to recover its original size and shape immediately after removal of a deforming force.

## **Elongation**

The ratio of the extension of a test specimen to its initial length, expressed as a percentage.

- **Elongation at break**

The elongation of a test specimen produced by the breaking force (See Fig. 3.1).

- **Elongation at rupture**

The elongation of a test specimen corresponding to rupture (See Fig. 3.1).

- **Elongation at specified force**

The elongation of a test specimen produced by a specified force.

- **Elongation at specified tenacity**

The elongation of a test specimen produced by a specified tenacity.

- **Elongation between defined forces**

The increase in length of a test specimen which results from subjecting it to two specified forces.

**End**

An individual yarn used in or part of a specific textile assembly such as yarn sheets, warps, yarns on beam.

**Extension**

The increase in length of a test specimen produced by a force, expressed in units of length.

**False twist stretch yarn**

A false twist yarn which has a high crimp elongation or high crimp contraction.

**False twist yarn**

A torsion textured yarn obtained by a continuous process applying high twist, heat setting and untwisting.

**Fibre**

A morphological term for substances characterised by their flexibility, fineness and high ratio of length to cross sectional area.

**Fibre dust**

See: Dust, fibre dust

**Fibre length**

- **Mean length:**

The arithmetic mean of the lengths of staple fibres.

Note : In the case of square cut staple fibres this mean is limited to the "central" section of the frequency distribution.

See Chapter 4: Statistics

- **Nominal length:**

The length quoted on commercial documents.

**Fibril**

See: Dust, Fibre dust

**Filament**

A fibre of very great length, considered as continuous.

See also: Steel Filament.

**Filament yarn**

A yarn composed of one or more filaments.

Note : Filament yarns can have the following morphologies: flat, interlaced, twisted, twistless, textured or combinations of these.

**Finish**

A chemical composition applied to yarns in order to facilitate processing.

**Flame resistance**

The property of a material whereby flaming combustion is slowed, terminated or prevented.

Note : Flame resistance can be an inherent property of the basic material or it may be imparted by specific treatment. The degree of flame resistance exhibited by a material during testing may vary with the test conditions.

**Flare**

The spreading of the filament ends or the strand ends at the cut end of a cord.

**Flock**

Very short fibres, intentionally produced for other purposes than spinning (e.g.: flocking).

**Fly**

See : Dust

**Folded yarn (Synonym: Plied yarn)**

A yarn in which two or more single yarns are combined by a single twisting operation.

**Folding in layers**

The process of placing a sliver, top or tow into successive layers in which each layer is made of regular parallel folds.

**Force**

See : SI units Chapter

- **Force at break**

See: Breaking force

- **Force at rupture**

The final force just before complete rupture of a test specimen (See Fig. 3.1 : Force-Elongation diagram).

- **Force at specified elongation**

The force associated with a specified elongation on the force-elongation curve.

**Gauge length**

The distance between two effective clamping points of a testing device.

**Gear crimped yarn**

Textured filament yarn obtained by passing the yarn between a pair of intermeshed toothed wheels.

**Giant carton**

A container comprising a large number of packages arranged in several layers.

**Gross mass**

See : Mass.

**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 ambient air conditions.

**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.

**High tenacity yarn**

A yarn with a significantly higher breaking tenacity than others of the same generic category, generally used because of that main characteristic.

Note : Currently the following lower limits are used for high tenacity yarns :

**Table 3.1** : Limits for high tenacity filament yarns

<b>Generic category of fibre</b>	<b>Lower limit of tenacity (cN/tex)</b>
Aramid	180
Polyamide/Nylon	53
Polyester	53
Viscose	28

**Hot air shrinkage, after treatment**

See : Shrinkage.

**Hot air shrinkage, during treatment**

See : Shrinkage.

**Industrial fibre**

Fibres intended for use in products other than non-protective clothing, household, furnishing and floor coverings selected principally but not exclusively for their performance and properties as opposed to their aesthetic or decorative characteristics.

**Initial length**

The length of a test specimen under specified pretension at the beginning of a test.

Note : For a tensile test the initial length is measured between the two effective clamping points.

**Interlaced yarn (Synonym: Intermingled yarn)**

A multifilament yarn in which cohesion is imparted to the filaments usually by passing the yarn through a turbulent air-, gas- or steam-jet without overfeed causing entwining of the filaments and the formation of randomly distributed interlacing points.

**Interlacing distance**

The distance between adjacent interlacing points.

**Interlacing frequency**

The number of interlacing points per unit length.

**Intermingled yarn**

See : Interlaced Yarn.

**Invoice mass**

See : Mass.

**Jaw faces**

The elements of a clamp which grip the test specimen without damaging it and which prevent slippage during the test.

**Knit-deknit yarn**

A textured filament yarn obtained by a process in which the filament yarn is knitted, heat set and subsequently unravelled.

**Laboratory sample**

A portion of the contents of the containers in the consignment sample to be taken to the laboratory for testing.

The laboratory samples must be taken in such a way that collectively they represent the whole consignment.

**Latent crimp**

See : Crimp.

**Lay**

Term in common use in cordage and steel cord industry, similar to twist in the textile industry.

- **Direction of lay:**

The helical disposition of the component, of a filament, strand or cord. Direction of lay is in the "S" or left hand lay ("Z" or right hand lay) when the components of a filament, strand or cord held vertically slope in the same direction as the middle part of the letter S (or Z).

See : Twist.

- **Lang's lay**

Cord in which the direction of lay in the stranding is the same as the direction of lay in cabling the cord.

- **Length of lay**

The axial distance required to make a 360 degree revolution of any element in strand or cord.

- **Ordinary or regular lay**

Cord in which the direction of lay in the stranding is opposite to the direction of lay in cabling the cord.

**Linear density**

The mass per unit length of an essentially linear structure, for example of a staple fibre, filament yarn, tow or cord.

See Chapter 6 : SI units.

**Lot**

All the products of one defined type and homogeneous quality delivered to one customer against one dispatch note.

Note : The term lot is sometimes used for the whole consignment and sometimes for a part of a consignment. See : Consignment

**Lubricant**

A chemical composition such as a fatty or waxy substance applied to a yarn in order to reduce friction in subsequent textile operations, such as knitting.

**Mass**

See also Chapter 6 : SI units

- **Commercial mass**

The mass obtained by adding to the oven-dry mass of the material the mass corresponding to the conventional allowance and any additions specified in the BISFA methods.

- **Invoice mass**

The mass indicated on the invoice and used as a commercial basis for charging. In BISFA the invoice mass should not normally differ from the commercial mass by more than the tolerance of the invoice mass.

- **Gross mass**

The total mass of a consignment, or of any part of a consignment, including the fibre and the tare.

- **Net mass**

The difference between the gross mass and the corresponding tare, determined at the same time.

- **Oven-dry mass**

The mass obtained by drying the fibre, usually after removal of added products such as finish or oil and of extractable matters.

- **Tare**

The sum of the masses of all the pallets, wrappers and containers, tie bands, and if appropriate all the yarn supports such as bobbins, tubes, relating to a consignment or to any part of a consignment.

- **Tolerance of invoice mass**

The maximum permitted deviation between the value of the commercial mass as determined according to BISFA methods and the invoice mass as indicated on the documents of sale of the consignment, expressed as a percentage of the invoice mass.

### **Matrix fibre**

Multicomponent fibre in which discrete and discontinuous portions of one or more polymers are embedded in a matrix of another polymer.

### **Matrix fibril fibre**

See : Matrix fibre.

### **Mean length**

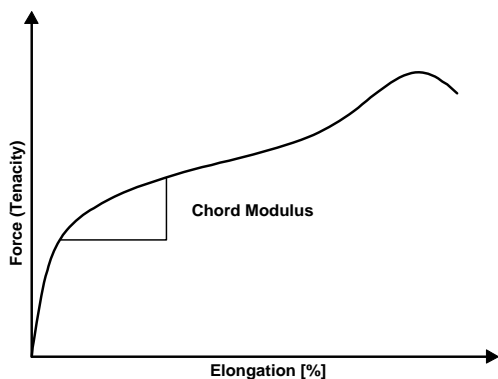
See : Fibre length.

### **Modulus** (see also Fig. 3.1)

The property of a material representative of its resistance to deformation. In tensile testing the modulus is expressed as the ratio of tenacity to strain.

- **Chord modulus**

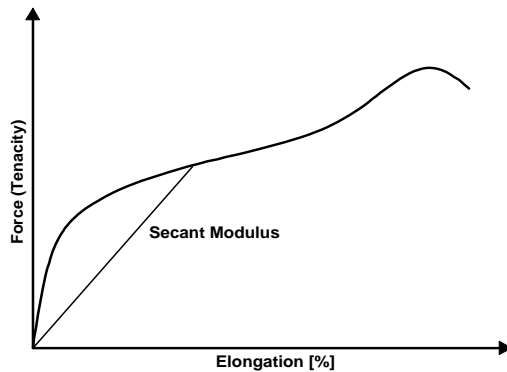
In a tenacity-strain curve, the ratio of the change in tenacity to the change in strain between two specified points on the curve.





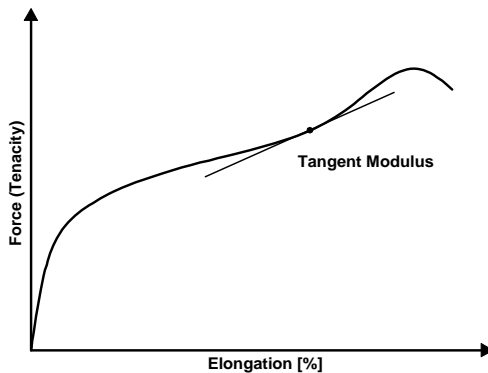
- **Secant modulus**

The secant modulus is a special case of chord modulus : starting at zero.



- **Tangent modulus**

In a tenacity-strain curve, the ratio of the change in tenacity to the change in strain derived from the tangent at any point on the curve.



### **Modulus, wet**

The modulus determined when the material is completely wet.

In the definition of the generic name "modal", the term "wet modulus" is defined as the tenacity required to produce an elongation of 5 % when the specimen is completely immersed in water.

### **Moisture content**

The amount of water contained in a material, expressed as a percentage of its total mass (including moisture and any extractables).

**Moisture regain**

The amount of water contained in the material expressed as a percentage of its oven-dry mass.

**Monofilament yarn (Monofil)**

Filament yarn consisting of a single filament.

**Multicomponent fibre**

Fibre composed of two or more fibre forming polymer components, which are chemically or physically different or both. Components can have arrangements such as side-by-side core-sheath or matrix. Where there are only two components, the fibre is said to be bicomponent.

**Multifilament yarn (Multifil)**

Filament yarn consisting of two or more filaments.

**Multiple wound yarn (Synonym: Assembled yarn)**

A yarn without twist composed of two or more singles, folded or cabled yarns.

**Net mass**

See : Mass

**Nominal length**

See : Fibre length

**Nominal linear density**

The linear density mentioned on the documents of sale (contracts, invoices, etc.).

**Nonwovens**

A manufactured sheet , web or batt of directionally or randomly orientated fibres , bonded by friction , and/or adhesion , excluding paper and products which are woven , knitted , tufted , stitch bonded incorporating binding yarns or filaments , or felted by wet-milling , whether or not additionally needled .

The fibres may be of natural or man-made origin . They may be staple or continuous filaments or be formed in situ .

**Open cord**

A steel cord in which the wires have a periodic loose association which permits "rubber" to penetrate the cross-section.

**Oven dry mass**

See : Mass.

**Package**

A package consists of yarn or cord with its winding support, if used.

Note : Packages may be of various shapes and winding patterns, e.g. bobbins, pirns, cones, cops, hanks, cakes, cheeses, tubes, beams.

**Permanent deformation**

The unrecovered strain of an exercised specimen, measured after a specific recovery period and expressed as percentage of the initial length of the specimen.

**Plied yarn**

See : Folded yarn.

**POY**

Abbreviation for partially oriented yarn, used for filament yarns with a significant degree of residual drawability. Such yarns are designed to be submitted to a further orientation process.

**Preconditioning**

The process of bringing a textile material to approximate equilibrium with the atmosphere for preconditioning.

**Pre-dip**

A chemical composition applied to a cord or fabric to improve the reactivity of the surface.

**Pretension**

The specified tension applied to a test specimen preparatory to making a test.

**Pulp**

Pulp is a generic term for the processed fibrous material manufactured for different end-uses such as fibres, paper, compounds.

**Relative humidity**

The ratio, expressed as a percentage, of the pressure of water vapour actually present in the atmosphere to the saturation pressure at the same temperature and at the same total pressure.

**Residual torsion**

The number of revolutions made by a specific length of steel cord when one end is held in a fixed position and the other allowed to turn freely.

**RFP**

See : Dust

**Roving**

An indefinitely long assembly of staple fibres, substantially parallel, with slight twist, capable of being drafted in the later or final stages of preparation for spinning.

See : Sliver.

**Sample**

A representative portion of a lot of material or of a consignment for testing or for record purposes.

**Shrinkage**

The decrease in length of a test specimen caused by a specified treatment, expressed as a percentage of the length of the untreated test specimen. The lengths are measured before and during or after treatment under specified tensions.

- **Boiling water shrinkage**

The decrease in length of a test specimen caused by a treatment in boiling water for specified time, expressed as a percentage of the length of the untreated test specimen. The lengths are measured before and after treatment under a specified pretension.

- **Hot water shrinkage**

The decrease in length of a test specimen caused by a treatment in hot water under a specified temperature and time, expressed as a percentage of the length of the untreated test specimen. The lengths are measured before and after treatment under a specified pretension. The water temperature to be applied is specified between buyer and seller.

- **Hot air shrinkage, after treatment :**

The decrease in length of a test specimen caused by a treatment in hot air under specified temperature and time, expressed as a percentage of the length of the untreated test specimen. The lengths are measured before and after treatment under a specified pretension.

- **Hot air shrinkage, during treatment :**

The decrease in length of a test specimen caused by a treatment in hot air under specified temperature and time, expressed as a percentage of the length of the untreated test specimen. The lengths are measured before (under a specified pretension) and during treatment (under a specified measuring tension).

**Single yarn**

A yarn composed of staple fibres (spun yarn), a single filament (monofilament) or several filaments (multifilament yarn), with or without twist.

**Size**

A chemical composition in solution or dispersion applied before weaving normally to warp, but sometimes to weft, to facilitate the weaving operations.

**Sliver**

An indefinitely long assembly of staple fibres, substantially parallel, without twist, capable of being drafted in preparation for spinning.

See : Top, Roving.

**Specimen**

See : Test specimen.

**Spun yarn**

A yarn made of staple fibres usually bonded together by twist.

**Square cut staple fibres**

See : Staple fibre.

**Stabilised false twist yarn**

A yarn, having a low crimp elongation and a low crimp contraction, obtained by false twisting, followed by heat-setting in a state where it is only partly relaxed from the straightened condition.

**Standard atmosphere**

See : Atmospheres

**Staple fibre**

A textile fibre of limited but spinnable length. For man-made fibres the three principal categories are:

- **Square cut staple fibres:**

Staple fibres obtained by cutting into bundles of essentially constant length; they are specified by a single nominal length.

- **Stretch-broken fibres:**

Staple fibres obtained by stretch-breaking a tow in a tow-to top process to a range of lengths up to a defined upper limit.

- **Variable length (or bias cut) staple fibres:**

Staple fibres obtained by cutting in such a way as to deliberately introduce several

lengths. Such fibres are specified by two finite nominal lengths corresponding to the limits of the cut length.

**Steel cord**

A formed structure composed of two or more steel filaments when used as an end product or combination of strands or filaments and strands.

**Steel filament**

A steel fibre used as an individual element in a strand or cord.

See : Filament.

**Stiffness**

Resistance to bending, characterised by the bending moment required to produce a bent configuration under specified conditions.

**Straightened length**

The length of a test specimen under a specified tension sufficient to remove crimp.

**Straightness**

The ability of a steel cord to lie flat between two straight parallel lines which are a prescribed distance apart.

**Strain**

The ratio of the extension of a test specimen to its initial length.

See : Elongation.

**Strand**

A general expression for linear textile assemblies, particularly yarns which are components of ropes and cordage.

Note for steel : A group of filaments twisted together to form a unit product to be processed further. A strand may be considered as a cord if it is the end product for tyre reinforcement or if it may be an element in a more complex structure.

**Strength at break**

See : Breaking strength.

**Stress**

The resistance to deformation developed within a material subjected to an external force, expressed as force per cross-sectional area.

Note : Sometimes wrongly used in textile testing for tenacity, which is force per linear density.

**Stretch-broken fibres**

See : Staple fibre.

**Stufferbox crimped yarn**

Textured filament yarn obtained by overfeeding yarn and compressing it into a chamber, which may be heated.

**Tabby**

A plain weave fabric. In the context of tyre cord fabric it refers to sections of closely spaced weft yarns in a special section of fabric woven to provide a sample.

**Tabby sample**

The section of a tyre cord fabric between two tabbies.

**Tangent modulus**

See : Modulus.

**Tangled yarn**

Term sometimes used as alternative for interlaced yarn.  
See : Interlaced yarn.

**Tare**

See : Mass

**Tenacity**

Force divided by linear density.

**Tenacity at break**

See : Breaking tenacity

**Tenacity at specified elongation**

The tenacity associated with a specified elongation on the tenacity-elongation curve.

**Tensile stress**

The force per unit cross-sectional area of the unstrained specimen.

**Tension**

A force tending to cause the extension of a body.

Note : An abbreviation for tensioning force. In fibres and yarns the tension applied is usually based on the linear density of the material.

**Tensioning force**

See : Tension

**Test specimen (Synonym : specimen)**

A portion of a laboratory sample or, in certain cases, the entire laboratory sample to be used for a testing procedure.

**Textured filament yarn**

A filament yarn characterised by actual or latent filament crimps, coils or loops, with or without twist liveliness, by which it has, or can develop by after-treatment, bulk and/or stretch properties.

**Titre (deprecated term)**

See : Linear density.

**Tolerance**

The maximum permissible positive or negative deviation between the value of a quantity as determined according to BISFA methods and the value quoted for the consignment. Normally, the tolerance is a percentage of the quoted value.

**Tolerance of commercial mass**

See : Mass

**Top**

Synonym for sliver.

Also a form of package in which sliver can be delivered, e.g.: ball top or bump top.

**Torsion textured yarn**

A textured filament yarn obtained by heat setting of a twisted filament yarn and subsequently untwisting it.

See : False Twist Yarn.

**Toughness at break**

See : Breaking toughness.



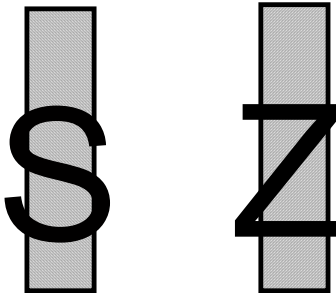
## **Tow**

A large number of filaments, assembled without substantial twist usually intended to be cut or stretch-broken for use in staple fibre or top form.

## **Twist**

The helical disposition of the components of a single, folded or cabled yarn or roving. Twist is in the S (or Z) direction when the spirals of the yarn or roving held vertically slope in the same direction as the middle part of the letter S (or Z).

See : International Standard ISO 2 (1973)



Note : If the S/Z notation cannot be used (for example in numerical fields of databanks) S should be designated as (-) and Z as (+).

In steel cord the twist is called "direction of lay".

## **Twist factor**

The value obtained when the twist is multiplied by the square root of the linear density of the yarn.

Note 1 :

$$TF = t \cdot \sqrt{\frac{LD}{1000}}$$

where : TF = Twist Factor  
t = Twist in turns per metre  
LD = Linear density in tex

Note 2 : In order to be able to make effective comparison of different fibre generic categories in certain applications, e.g. tyre cords, it is necessary to take into account the density of the fibres.

$$TF_c = t \cdot \sqrt{\frac{LD}{\rho}}$$

where :  $TF_C$  = Twist Factor corrected  
t = Twist in turns per meter  
LD = Linear density in tex  
 $\rho$  = Density in kg/m<sup>3</sup>

### **Twist level**

The number of turns per unit length of a twisted yarn.

### **Twist liveliness**

The tendency for a twisted yarn to untwist or for a torsion textured yarn to resume its twisted shape.

### **Type of lay**

See : Lay

### **Tyre cord fabric**

A structure used in tyre manufacture, comprising a sheet of warp cords or yarns bound together by widely spaced weft yarns which are usually of cotton and have a distinctly lower linear density than the warp cords or yarns.

### **Variable length (or bias cut staple fibres)**

Verification factor:

The verification - factor, as numerically defined, can be calculated from the net mass and the oven dry mass plus the conventional allowance.

### **Weight**

Deprecated term still commonly but improperly used for mass.

See : Mass.

### **Wet modulus**

See : Modulus, Wet.

### **Wire**

See : Steel Filament.

### **Work to break**

The total area under the force extension curve up to the breaking force.

**Wrap**

A filament wound helically around a steel cord.

**Yarn**

A textile product of substantial length and relatively small cross section, composed of fibre(s) with or without twist.

This general term covers all the specific types of yarns, e.g. single yarn, multiple wound yarn, filament yarn, spun yarn.

**Yarn length**

The length of yarn wound on a support measured under defined conditions.

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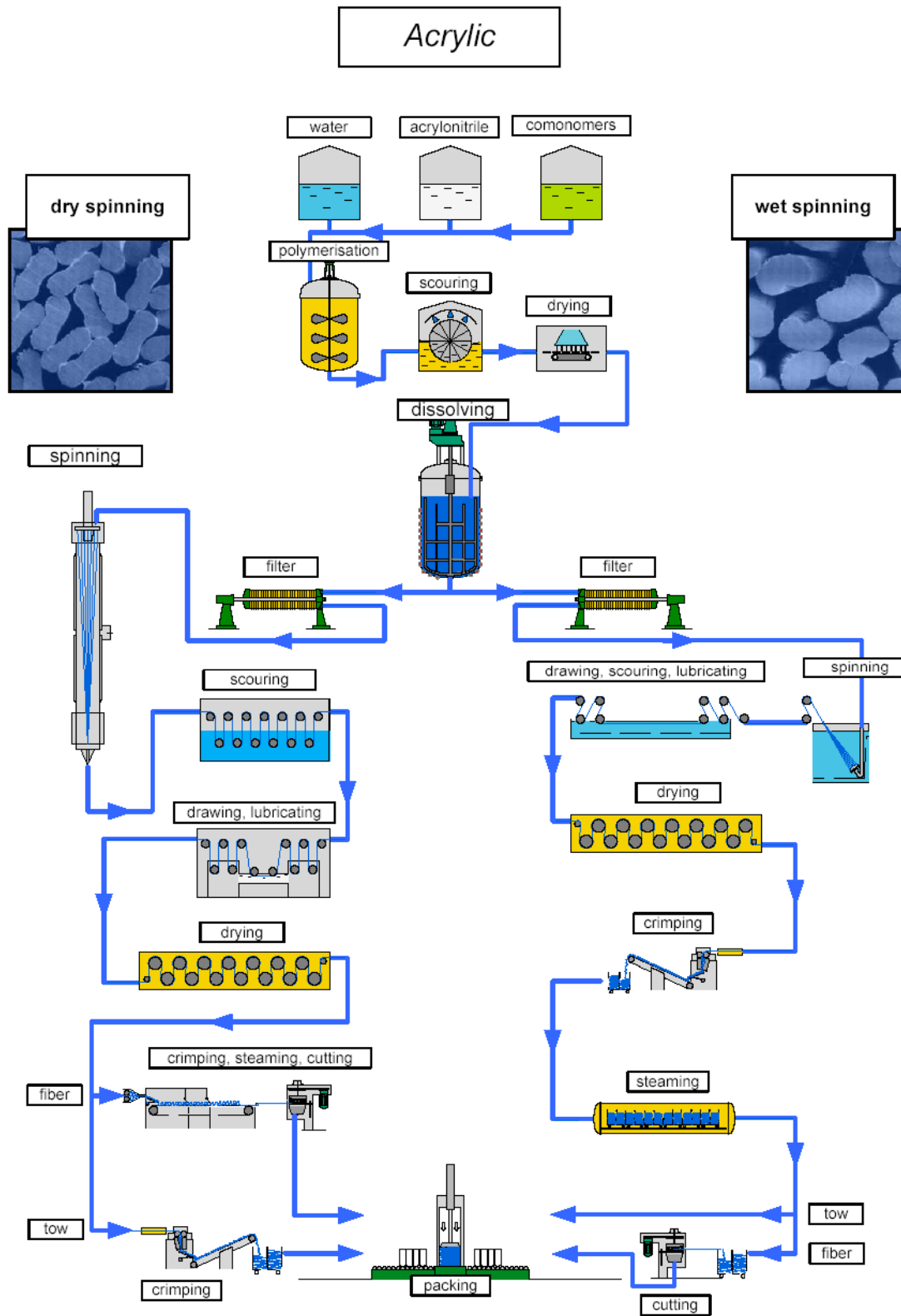
## **CHAPTER 4**

# **Schematic process flow sheets of principal man-made fibres**

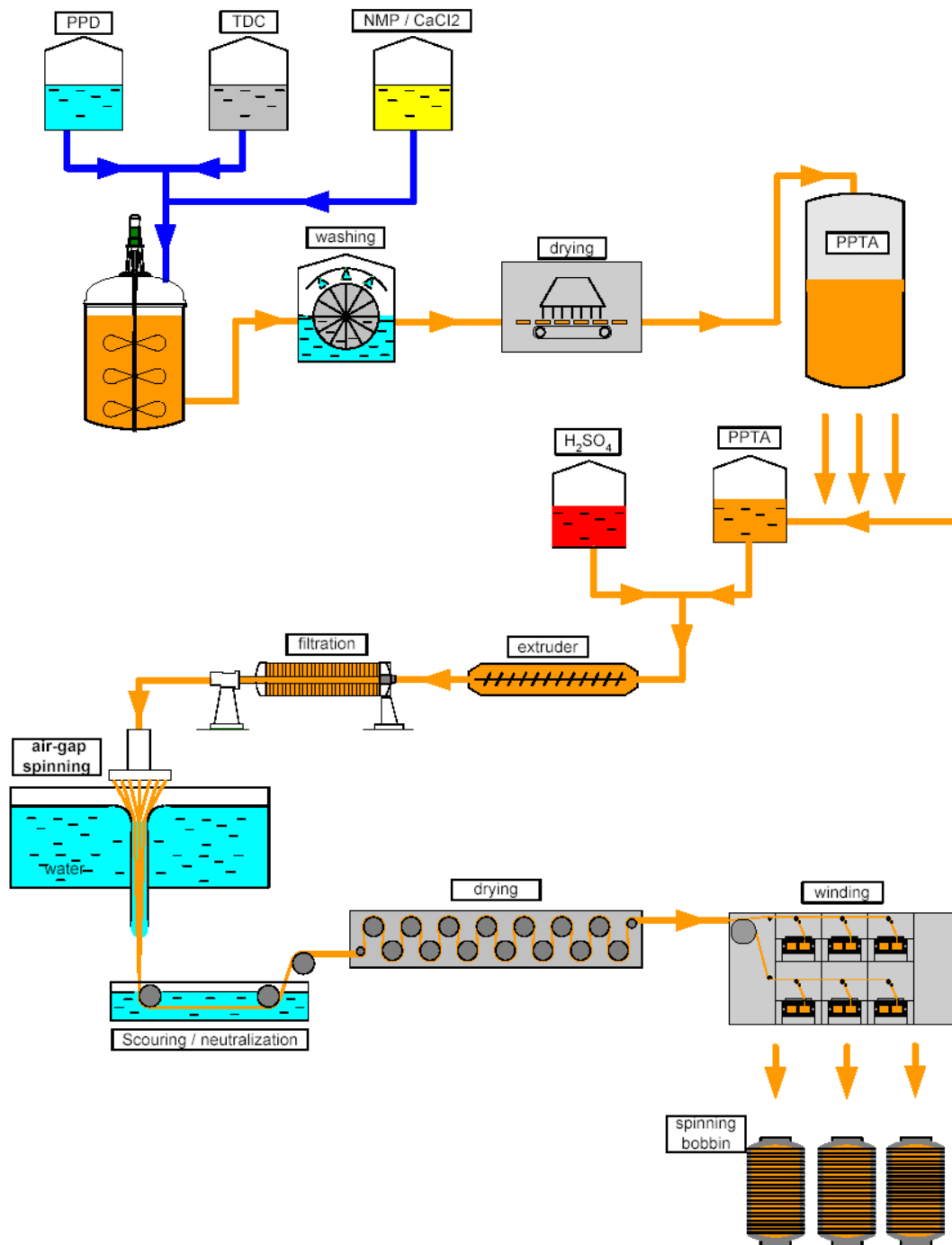
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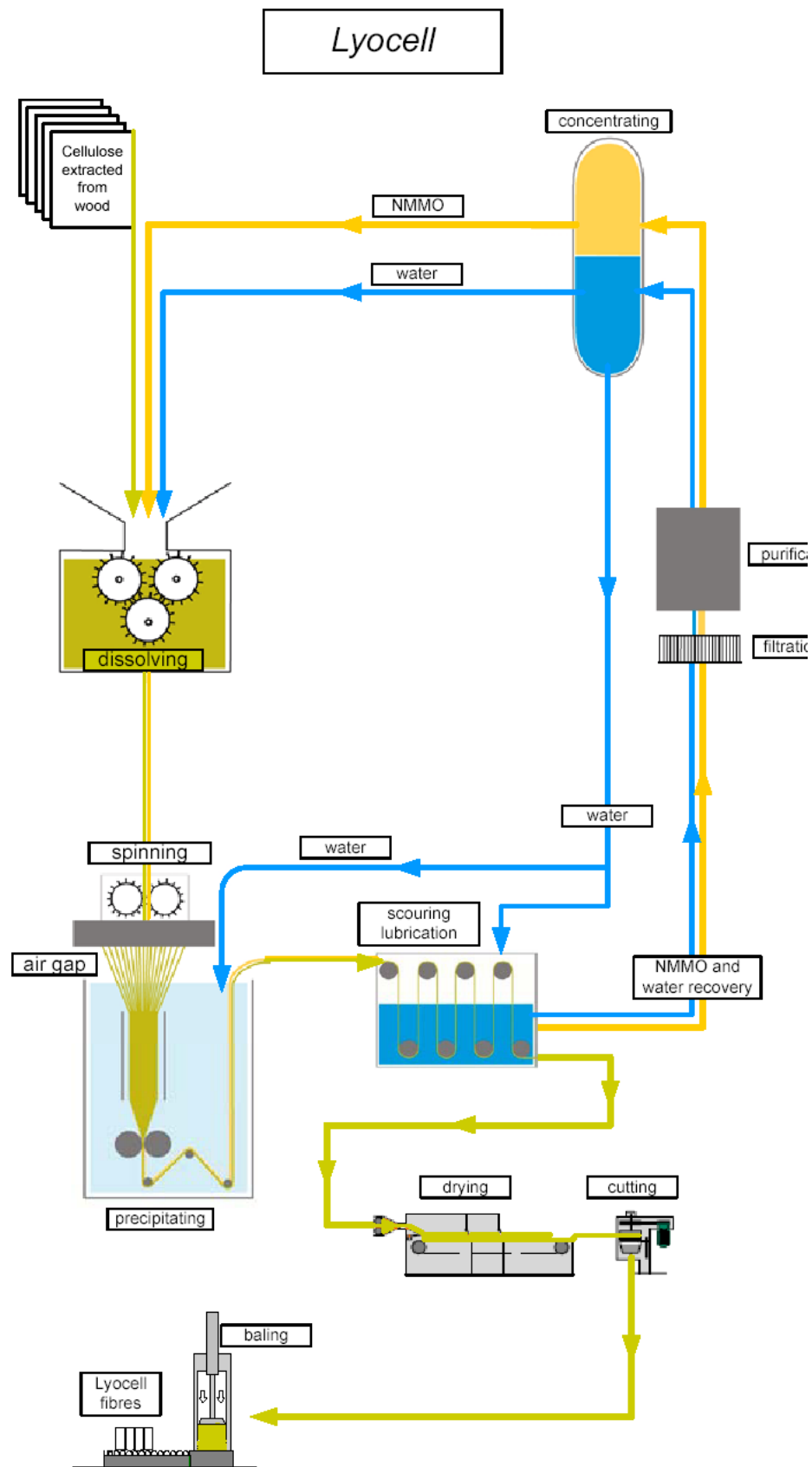
In this chapter only general and schematic process flow sheets of principal man-made fibres are described.

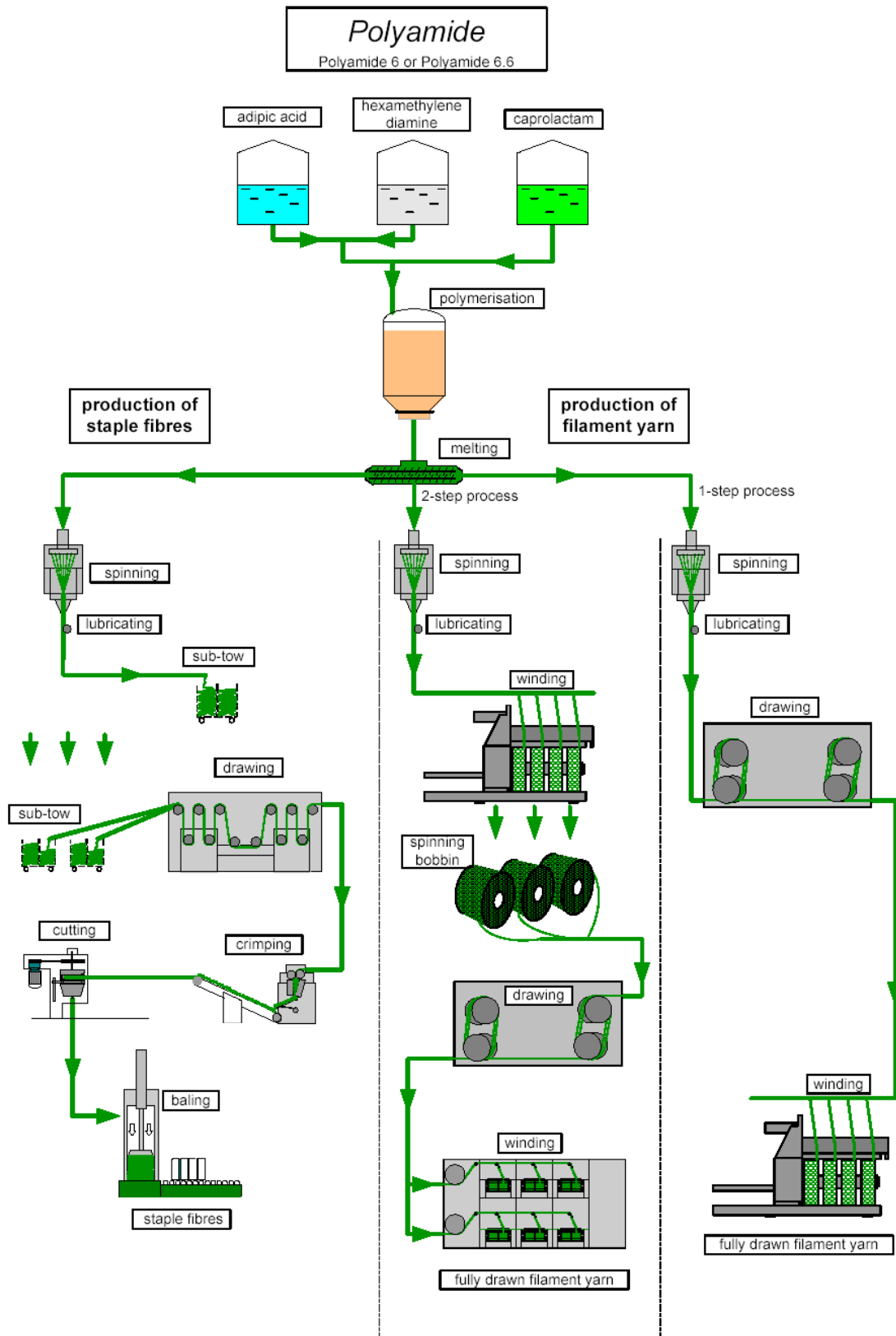
They do not intend to cover all existing technologies.



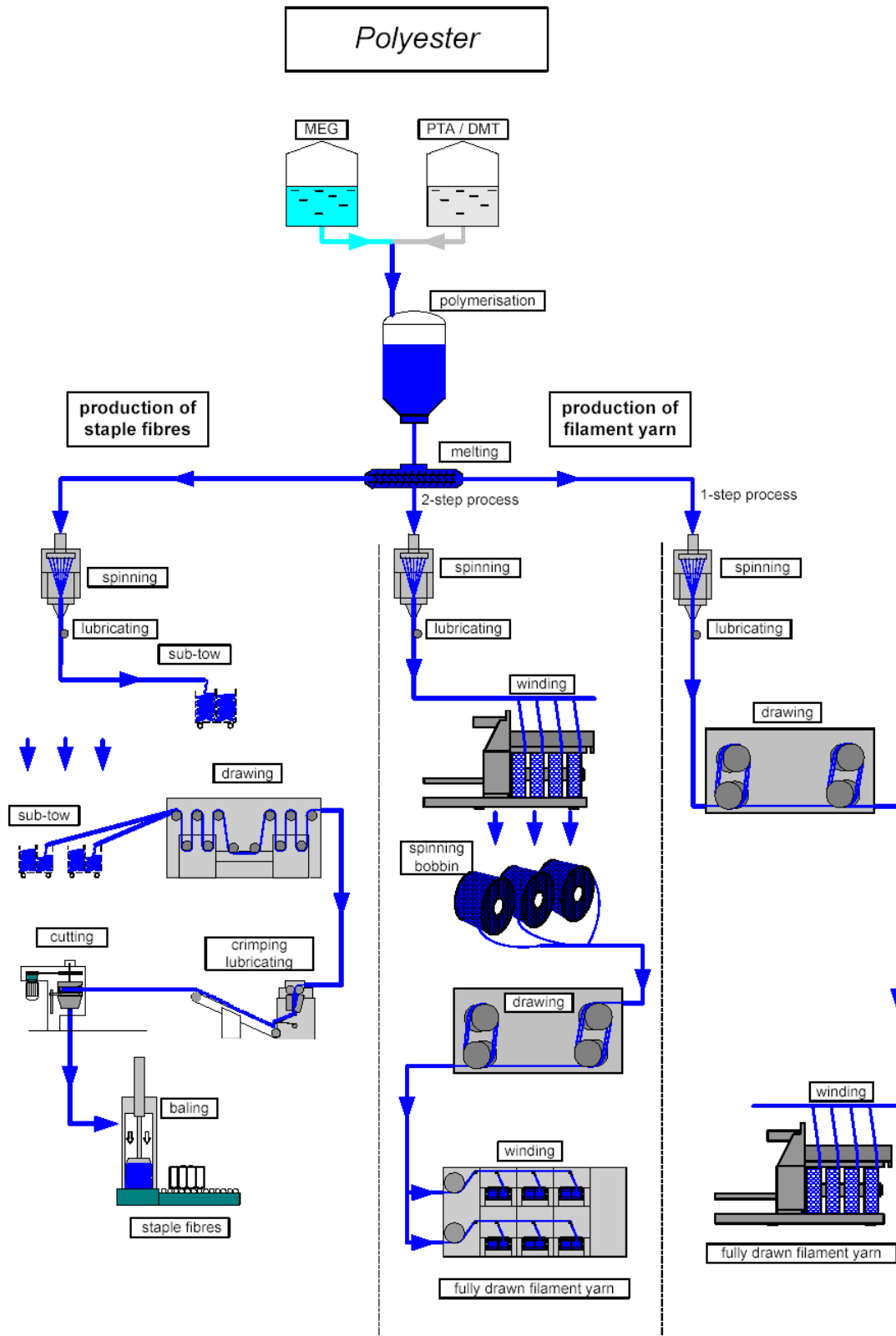
# Aramid

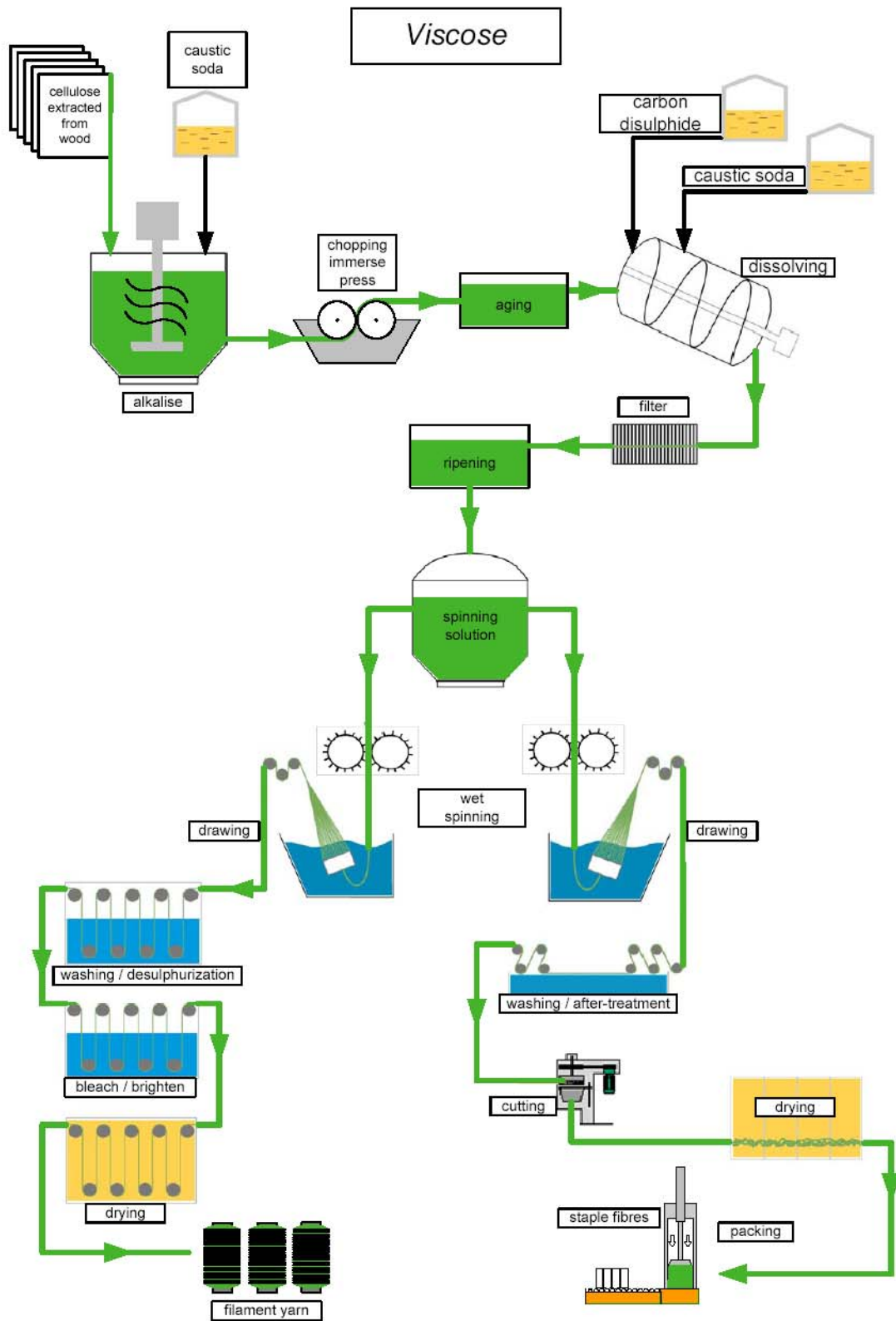












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## **CHAPTER 5**

### **Manufacturing processes of nonwovens and relevant end-uses**

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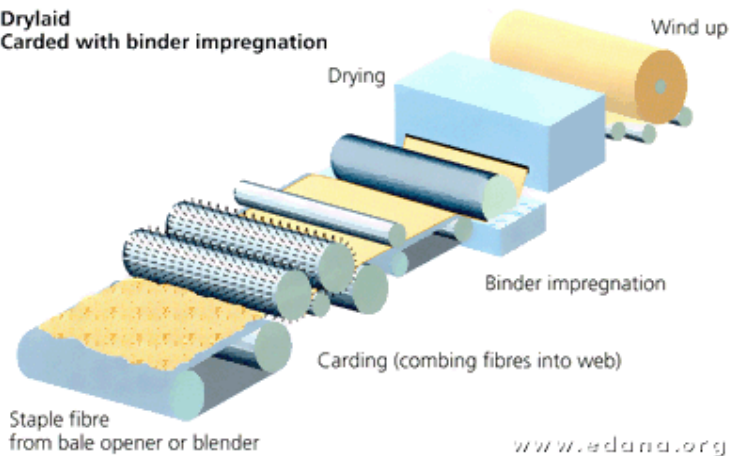
In this chapter , the following schematic process flow sheets of nonwovens manufacturing from principal man-made fibres are described :

- Drylaid
- Spunlaid
- Airlaid
- Wetlaid

Also typical end uses derived from methods of web formation and bonding processes are shown.

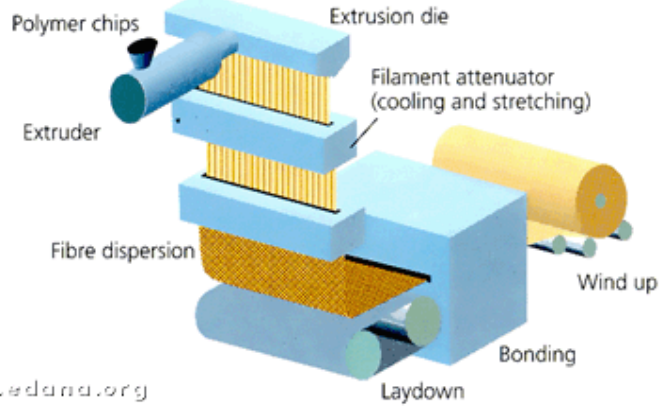
## Drylaid

**Drylaid**  
Carded with binder impregnation



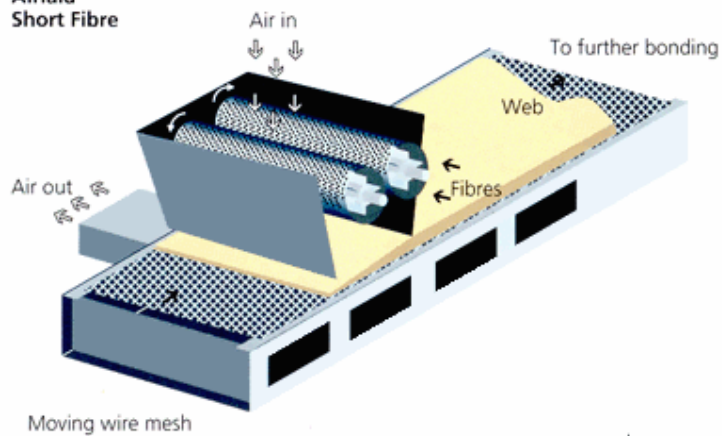
[www.edana.org](http://www.edana.org)

## Spunlaid

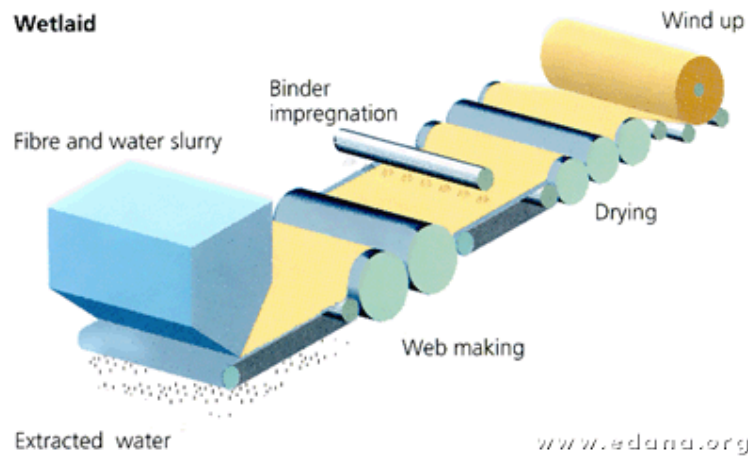


[www.edana.org](http://www.edana.org)

## Airlaid Short Fibre



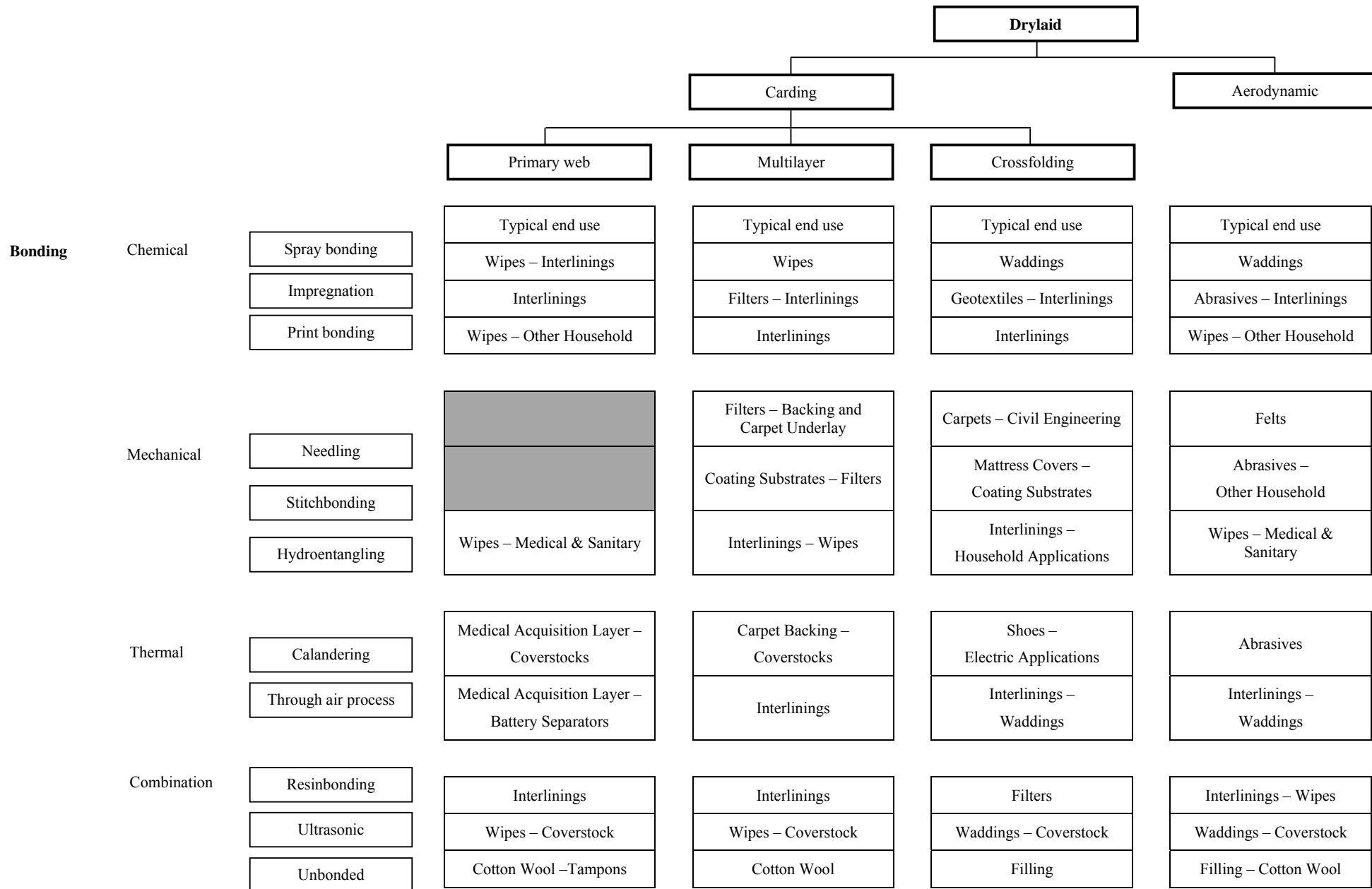
[www.edana.org](http://www.edana.org)



The above schemes are a kind permission from EDANA, Brussels, the international association serving the nonwovens and related industries.

# **TYPICAL END USES FROM METHODS OF WEB FORMATION AND BONDING PROCESSES**

			Spunlaid	Meltblown and other polymer based technology	Wetlaid	Airlaid
<b>Bonding</b>	Chemical	Spray bonding	Typical end use	Typical end use	Typical end use	Typical end use
		Impregnation	Wipes		Interlinings	Wipes – Waddings
		Print bonding	Civil Engineering	Filters – Interlinings	Wipes – Coating Substrates	Wipes – Abrasives
	Mechanical		Table Cloths	Interlinings	Table Cloths	
		Needling	Geotextiles – Carpet Backing			
		Stitchbonding	Furniture Fabrics			Abrasives
		Hydroentangling	Coverstocks		Wipes	Wipes
	Thermal	Calendering	Civil Engineering – Coating Substrates	Filters – Distribution Layers	Filters – Tea-bags – Coverstocks	
		Through air process	Interlinings – Filters	Filters – Surgical Masks		Filters
	Combination	Resinbonding	Wall Coverings			Interlinings
		Ultrasonic				Coverstocks
		Unbonded				Fillings



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## **CHAPTER 6**

### **Morphological scheme of industrial yarns and relevant end-uses**

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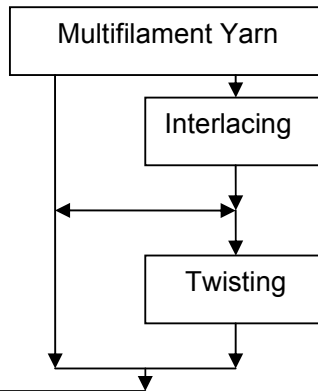
In the following page, the physical yarn transformation and main processing of industrial yarns are described.
















Also the main applications and end uses are shown in a concise way.

It is understood that not all the applications are covered in this interesting and expanding high tech sector.



# Morphological Scheme of Industrial Yarns



	Processing		Application		
	Braiding		Nets Mooring Hoses Ropes		
	Cabling		Belts Tires		
	Composites		Sails Concrete reinforcement		
	Knitting		Cut protective gloves Hoses		
	Pulping		Break pads Packings Paper		
	Weaving broad and narrow fabrics		Sail Airbag Ballistic protection	 	

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## CHAPTER 7

### Statistical terms and definitions

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#### 7.1 Introduction

This chapter of the booklet covers statistical aspects of tests and test methods. However there is no intention, to give a full and broad build up of statistical knowledge, procedures and tools.

The field of statistics is rapidly expanding and has become much more than mere application of basic formulas. Today statistics is essential when it comes to understand and measure uncertainty and accuracy of test methods. Sophisticated statistical procedures for the determination of the accuracy and comparability of test methods have been developed and laid down in a number of standards.

Chapter 7 of the booklet targets to:

- Give an overview of basic statistical terms and definitions, that serve as basis for any kind of advanced statistical engagement.
- Give an overview of statistical terms, that are defined by ISO for the the estimation of the uncertainty of test methods.
- Give a short cross reference to the conduction of interlab trials.
- Give a definition of statistical Process control parameters.

#### 7.2 Basic Statistics

##### Individual value

The result of any one observation (breaking force, linear density, etc.) in a series of tests is called the individual value. The individual value of the  $i^{\text{th}}$  observation in a series of  $n$  observations is denoted by  $x_i$ .

BISFA tests frequently involve the examination of more than one test specimen taken from a laboratory sample or sample. The resultant individual values should first be used to determine the laboratory sample/sample arithmetic mean and it is this mean which should then be used as the individual value in subsequent statistical calculations.

## Normal distribution

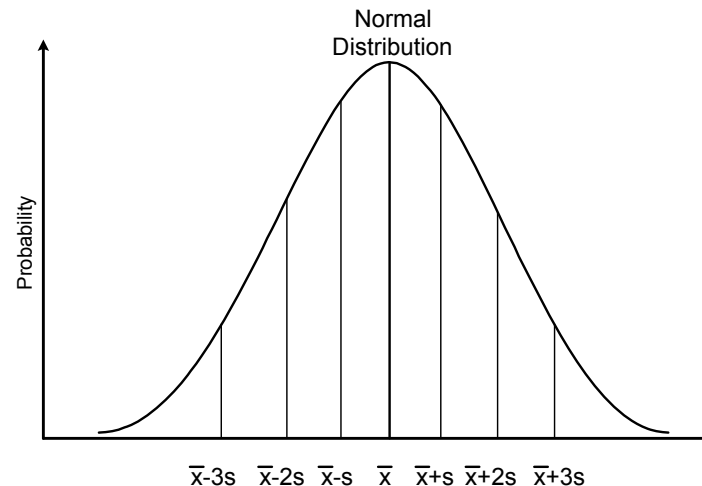
In this booklet it is assumed that individual values follow a normal distribution in which the standard deviation  $s$  is independent from the mean. This distribution

has a bell shape symmetrical around the mean. Characteristics of this distribution are :

$\bar{x} \pm 1s$  contains 68.3 % of data

$\bar{x} \pm 1.96s$  contains 95.0 % of data

$\bar{x} \pm 3s$  contains 99.7 % of data



## Frequency

Frequency is the number of individual values in each class. The number of individual values in the  $j^{\text{th}}$  class is denoted by  $n_j$ ,  $k$  represents the number of classes. It is recalled that :

$$n = \sum_{j=1}^k n_j$$

## Frequency distribution

For a large number of individual values ( $n > 50$ ) it is advantageous to arrange individual values into classes with the same interval; a tabulation or diagram showing the numbers of such values falling into defined class intervals is called a frequency distribution or histogram. It is conventional to include within an interval any observation which falls precisely on its upper boundary.

The central value of a class is defined as the value equidistant between the two class boundaries.

The class containing the greatest number of individual values is called modal class.

**Arithmetic mean**

The arithmetic mean of a series of  $n$  individual values  $x_1, x_2, x_3$ , is the sum of these values divided by their number,  $n$ :

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{\sum_{i=1}^n x_i}{n}$$

In a frequency table made of  $k$  classes, the arithmetic mean is:

$$\bar{y} = \frac{n_1 y_1 + n_2 y_2 + \dots + n_k y_k}{n} = \left( \frac{\sum_{j=1}^k n_j y_j}{n} \right)$$

$Y_j$  = central value of the  $j^{\text{th}}$  class

$n_j$  = frequency of the  $j^{\text{th}}$  class

**Overall arithmetic mean**

It is the arithmetic mean of a set of individual values ignoring any sub-groups (see individual

$$\bar{x} = \frac{\bar{x}_1 + \bar{x}_2 + \dots + \bar{x}_j + \dots + \bar{x}_m}{m} = \frac{\sum_{j=1}^m \bar{x}_j}{m}$$

value) only if the sub-groups contain the same number of individual values.

**Range (R)**

The difference between the largest and the smallest values in a set of observations

$$R = x(\text{max}) - x(\text{min})$$

**Average range ( $\bar{R}$ )**

The average of a set of  $k$  ranges

$$\bar{R} = \frac{R_1 + R_2 + \dots R_e + \dots R_k}{k} = \frac{\sum_{e=1}^k R_e}{k}$$

### Variance and standard deviation

The variance ( $s^2$ ) of a set of  $n$  individual values is the sum of the squares of the differences between each individual value and the arithmetic mean divided by  $(n - 1)$  :

$$s^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}$$

The standard deviation of a set of individual values is the square root of the variance:

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$

These formulae can also be used for mean values when the tests have been done with more than one test specimen from each laboratory sample, but in such cases :

$n$  = the number of samples

$\bar{x}_i$  = the arithmetic mean of the sample

$\bar{x}$  = the overall arithmetic mean of laboratory sample

In the case of a frequency distribution, calculations are made with the following formulae:

$$s^2 = \frac{\sum_{j=1}^k n_j (y_j - \bar{y})^2}{n - 1}, \quad s = \sqrt{\frac{\sum_{j=1}^k n_j (y_j - \bar{y})^2}{n - 1}}$$

### Universe standard deviation

An estimation of a true standard deviation based on a long series of  $k$  groups of measurements and each group of which consists of  $n$  observations.

$$\sigma_e = \frac{\bar{R}}{d_2} \quad \text{or} \quad \sigma_e = \frac{\bar{s}}{c_2}$$

where :

$$\bar{R} = \frac{\sum_{i=1}^k R_i}{k} \quad \text{and} \quad \bar{s} = \frac{\sum_{i=1}^k s_i}{k}$$

Each group contains the same number of observations  $n$  and has a mean not significantly different from the others.  $d_2$  and  $c_2$  are factors used in connection with sampling by variables and they depend on  $n$ . (see Table 6.1).

Table 7.1 : Factors for estimate  $\sigma_e$

n	d <sub>2</sub>	c <sub>2</sub>
2	1.1288	0.5642
3	1.693	0.7236
4	2.059	0.7979
5	2.326	0.8407
6	2.534	0.8686
7	2.704	0.8882
8	2.847	0.9027
9	2.970	0.9139
10	3.078	0.9227

### Coefficient of variation

The ratio of the standard deviation to the arithmetic mean, expressed as a percentage :

$$V(\%) = \frac{s}{\bar{x}} \cdot 100 \quad \text{or} \quad V(\%) = \frac{s}{y} \cdot 100$$

### Confidence limits

In a consignment for which the individual measured values have practically a normal distribution, it is possible to define, symmetrically around the overall arithmetic mean  $\bar{x}$ , an interval which contains in a given percentage of cases BISFA requires 95 %) the true arithmetic mean of the consignment under test. (This percentage is called confidence level)<sup>1</sup> This interval from

$$(\bar{x} - c) \text{ to } (\bar{x} + c)$$

$$(\bar{x} - c) \text{ and } (\bar{x} + c)$$

is called the confidence interval.

are known as the confidence limits.

The half-length, c, of the confidence interval is thus for a given confidence level, the maximum value of the error made in estimating the true arithmetic mean<sup>2</sup> of the consignment from the overall arithmetic mean. The half-length of the confidence interval is given by the expression :

$$c = t \cdot \frac{s}{\sqrt{n}}$$

<sup>1</sup> Sometimes confidence level is expressed as a figure between 0 and 1, but (see ISO 2602) the expression as a percentage is generally used.

<sup>2</sup> BISFA considers that systematic errors are negligible, as the accuracy requirements on instruments are stringent

in which t is a coefficient, given in the following table as a function of n for the required confidence level of 95 %, s is the standard deviation and n is the number of individual values.

BISFA normally prefers to express the half-length c as a percentage C of the overall arithmetic mean :

$$C(\%) = \frac{c}{\bar{x}} \cdot 100 \quad \text{or} \quad C(\%) = t \frac{V(\%)}{\sqrt{n}}$$

where V is the coefficient of variation.

Table 7.2 : Values  $t_{0,975}$  of Student's t-distribution with degree of freedom equals n+1

Number of tests n	t-value	Number of tests n	t-value	Number of tests n	t-value
4	3.18	15	2.14	25	2.06
5	2.78	16	2.13	26	2.06
6	2.57	17	2.12	27	2.06
7	2.45	18	2.11	28	2.05
8	2.36	19	2.10	29	2.05
9	2.31	20	2.09	30	2.04
10	2.26	21	2.09	31 to 40	2.03
11	2.23	22	2.08	41 to 60	2.01
12	2.20	23	2.07	61 to 120	1.99
13	2.18	24	2.07	121 to 230	1.97
14	2.16			> 230	1.96

Note : If a probability other than 95% is desired, those Student's t can be found in statistical books.

Measurements made with single test specimens do not always give values that are normally distributed. Therefore it is necessary to do independent tests on a series of test specimens, all taken from the consignment. For each laboratory sample a number of test specimens is tested and the arithmetic mean of the individual values for that laboratory sample is calculated. The standard deviation of the arithmetic means of each laboratory sample with respect to the overall arithmetic mean is calculated. The confidence limits of the overall arithmetic mean can then be calculated from this standard deviation, using for n the number of laboratory samples that have been tested.

#### Number of tests

For some determinations it may be necessary to increase the number of tests in order to obtain a required confidence interval. If n tests have been made giving a standard deviation s or a coefficient of variation V, the resulting confidence interval may be too large. In order to obtain a required length of confidence interval c\* or C\*, the number of tests must be increased by m additional tests :

$$m = t^2 \frac{s^2}{c} - n \quad \text{or} \quad m = t^2 \frac{V^2}{C^2} - n$$

where  $t$  is the value corresponding to  $n$  in the above Table 4.2. In such cases calculate the mean and its confidence interval from the result of all  $(m + n)$  tests, and verify that the new confidence interval is satisfactory.

### 7.3 Statistical terms used in the estimation of repeatability and reproducibility of test methods

BISFA recommends to apply the ISO 5725 for the conduction of interlab trials. The concept of interlab trials is the basis for the determination of the accuracy of test methods.

#### Accuracy of a measurement

The closeness of agreement between a test result and the accepted reference value.

#### Precision

The closeness of agreement between independent test results obtained under stipulated conditions.

#### Trueness

The closeness of agreement between the average value obtained from a large series of test results and an accepted reference value.

#### Note:

ISO 5725 uses the terms trueness and precision to describe the accuracy of a test method.

While trueness compares to an accepted reference value, precision only refers to the closeness of agreement between test results. Any combination of quality of the precision and trueness of a specific test method is possible.

Figure 4.1 illustrates this issue.

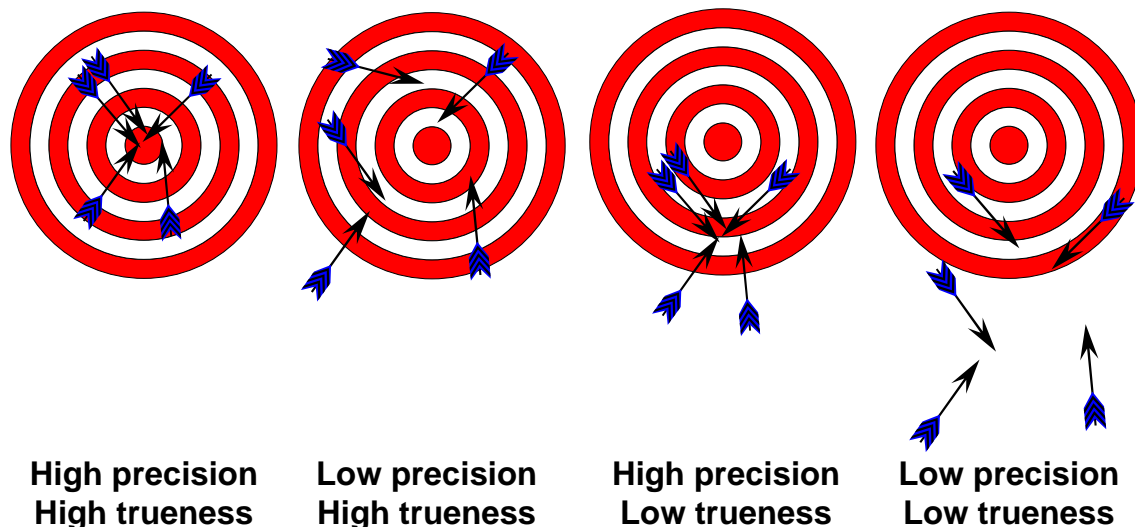


Figure 7.1: Illustration of trueness and precision



### **Uncertainty of measurement**

Parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand.

### **Bias**

The difference between the expectation of the test results and an accepted reference value.

Note:

Bias is the total systematic error as contrasted to random error. There may be one or more systematic error components contributing to the bias.

### **Accepted reference value**

A value that serves as an agreed-upon reference for comparison, and which is derived as:

1. a theoretical or established value, based on scientific principles
2. an assigned or certified value, based on experimental work of some national or international organisation
3. a consensus or certified value, based on collaborative experimental work under the auspices of a scientific or engineering group
4. when 1), 2) or 3) are not available, the expectation of the (measurable) quantity, ie the mean of a specified population of measurements

Note:

In the case of a sample or consignment of fibre or yarn, then only 4) applies.

### **Component of variance**

Is a portion of a total variance caused a particular source.

In this BISFA – terminology booklet three components of variance are considered. They are expressed as standard deviations.

#### Single Operator component ( $S_e$ )

The variance solely caused by the operator(s).

#### Sample component (The variance, solely caused by the sample)

within laboratories component ( $S_t$ )

The variance caused by instruments, environment (test atmosphere) in the laboratory except the variance due to operators. This component is zero, when there is only operator variability.

#### between laboratories component ( $S_L$ )

The variance caused by different laboratories. This component is zero, when there is only one laboratory.

Note:

Single operator component and sample component are difficult to separate and both contribute to the random error.

### **Repeatability**

Precision under repeatability conditions

**Repeatability conditions**

Conditions where independent test results are obtained with the same method on identical test items by the same operator using the same equipment within short intervals of time.

**Variance**

A measure of dispersion, which is the sum of the squared deviations of observations from their average, divided by one less than the number of observations

**Repeatability limit  $r$** 

The values less than or equal to which the absolute difference between two test results obtained under repeatability conditions is expected to be with a probability of 95%.

**Reproducibility limit  $R$** 

The values less than or equal to which the absolute difference between two test results obtained under reproducibility conditions is expected to be with a probability of 95%.

**Reproducibility**

Precision under reproducibility conditions

**Reproducibility conditions**

Conditions where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment.

Note:

In the case of textile fibres/yarns, the test is destructive, therefore the items tested are not actually identical, but these must be sampled so as to make them as nearly identical as possible.

**Repeatability standard deviation**

The standard deviation of test results obtained under repeatability conditions

**Reproducibility standard deviation**

The standard deviation of test results obtained under reproducibility conditions

**Error of result**

The test result minus the accepted reference value.

Note: The test result may be the mean of a number of individual observations.

**Random error of result**

A component of the error, which in the course of a number of test results for the same characteristic varies in an unpredictable way.

**Systematic error of result**

A component of the error, which in the course of a number of test results for the same characteristic remains constant or varies in a predictable way.

## 7.4 Interlab trials

Interlab trials are the basic method for the determination of the repeatability and reproducibility of standardised test methods. BISFA recommends to apply the ISO 5725 / 2 for the conduction of interlab trials.

Note:

In the first place the repeatability and reproducibility of a test method will give a measure for its precision only. The bias is considered to be constant during a test carried out under repeatability conditions. However a possible bias of a specific test method may change in value during tests under reproducibility conditions.

Whenever a representative number of laboratories, that can perform a specific test method conduct an interlab trial on the mentioned test method, the bias will convert to a random property, that means to the between laboratory component of variance, expressed and measured by the concept of reproducibility.

The simplified approach, proposed by BISFA, to consider only the three components of variance, as outlined in paragraph 6.3, implies, that there is no intralab bias of a test method.

The BISFA guideline for interlaboratory tests gives some practical explanations for the conduction of such trials. Please note, that this guide also contains some important aspects of outliers, that should be considered, when the evaluation of the trial is done.

## 7.5 Statistical process control parameters

### Process capability (6 $\sigma$ )

The limits of variability in which a process operates under normal conditions. If this variability is within 6  $\sigma$ , then the process is under statistical control.

### Accuracy index ( $C_A$ )

Index (expressed in percentage) indicating how close the process centering is to the specified target

$$C_A = \frac{\text{Specified target} - \bar{x}}{0.5 (USL - LSL)} \cdot 100$$

where  $\bar{x}$  is the overall arithmetic mean.

USL is the upper specification limit

LSL is the lower specification limit.

### Capability index ( $C_p$ )

Index relating the process capability to the specification tolerance

$$C_p = \frac{USL - LSL}{6 \sigma_e}$$

### Quality index

#### $C_{pk}$

It is the capability index, on a single set of data adjusted for process centering.

$$C_{pk} = \min \left( \frac{USL - \bar{x}}{3 \sigma_e} \right), \left( \frac{\bar{x} - LSL}{3 \sigma_e} \right)$$

Where :  $\sigma_e$  is the estimated standard deviation of the set of data considered.

If both  $C_A$  and  $C_p$  are known, then

$$C_{pk} = C_p \left( 1 - \frac{C_A}{100} \right)$$

#### $P_{pk}$

The performance index measured on different sets of data and adjusted for process centering

$$P_{pk} = \min \left( \frac{USL - \bar{x}}{3 \sigma_s} \right), \left( \frac{\bar{x} - LSL}{3 \sigma_s} \right)$$

where:  $\sigma_s$  is the estimated standard deviation of the data considered.

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## CHAPTER 8

### Designation of yarns in the tex system

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#### 8.1 Textile yarns

A standard notation for yarn construction is set out in the international standard ISO 1139, edition 1973. The notation reflects in a condensed form details of the components of a yarn, including values of the linear densities, direction of twist, twist level, number of folds, etc of these components and/or characteristics such as linear density resulting from this construction.

Two methods for the notation of yarns are available. The "single to fold" notation starts from the linear density of the single yarn ; the "fold to single" notation starts from the linear density of the resultant yarn. The symbols used in both systems are identical ; the differences are in the order of presentation, the use of the multiplication sign (x) in the single to fold notation, and of the solidus (/) in the fold to single notation. Distinction between the two methods does not apply to single spun yarn, monofilament and multifilament yarns without twist, nor to multiple wound yarns.

The following symbols are used :

- R :** symbol for resultant linear density, to be put before its numerical value,
- f :** symbol for filaments, to be put before the number of filaments,
- t0 :** symbol for zero twist ; other twist values are represented by the number of turns per metre of the twisted yarn, preceded by S or Z to indicate twist direction.  
If the S/Z notation cannot be used, for example in numerical fields of data banks, "S" should be designated as (-) and "Z" as (+), (see international standard ISO 2, edition 1973 and Definition "Twist" in chapter 3).

The notation is best illustrated by examples:

The following are taken in part from ISO 1139, edition 1973

**Table 8.1** : Examples of notations of textile yarns in the tex system

Type of yarn	“Single to fold” notation	“Fold to single” notation
<b>Single yarns</b>		
Spun yarn	40 tex Z660	
Monofilament yarn without twist	17 dtex f1	
Monofilament yarn with twist	17 dtex f1 S800 R17.4 dtex	R17.4 dtex f1 S800 ; 17 dtex
Multifilament yarn without twist	133 dtex f40	
Multifilament yarn with twist	133 dtex f40 S1000 ; R136 dtex	R136 dtex f40 S1000 ; 133 dtex

<b>Multiple wound yarns with</b> Similar components  Dissimilar components	40 tex S155 x 2	
	(25 tex S420 + 60 tex Z80)	
<b>Folded yarns with</b> Similar components  Dissimilar components	34 tex S600 x 2 Z400 ; R69.3 tex	R69.3 tex Z4400/2 S600 ; 34 tex
	(25 tex S420 + 60 tex Z80) R89.2 tex	R89.2 tex S360/(S420 + Z80) 25 tex + 60 tex
<b>Cabled yarns with</b> Similar components  Dissimilar components	20 tex Z 700 x 2 S 400 x 3 Z 200 R 132 tex	R 132 tex Z 200/3 S 400/2 Z 700; 20 tex
	(20 tex Z700 x 3 S400 + 34 tex S600) Z200	R96 tex Z200/(S600 + S400/3 Z700) ; 34 tex
<b>Covered yarns</b> Single covered	(56 dtex ; C39 dtex) TS800 (17 dtex f1) : R56 dtex Symbol C : linear density of elastane core (stretched) Symbol TS : direction of twist (here S) Symbol R : resultant linear density of the covered yarn	



Notes :

- Prefixes and multiples shall be written without space.
- A space shall be used to separate the different characteristics of the yarn construction.
- x or / used to mark multiple yarn components shall be separated with spaces.
- Units shall be written with a space in accordance with ISO 1000.

Addition of the resultant linear density in the "single to fold" notation, and of the single yarn linear density in the "fold to single" notation, is not obligatory; such information is separated from the preceding notation by a semi-colon. If not needed, the direction of twist and the twist level may be omitted; however, the description of twistless yarns may include the symbol for zero twist.

Values of linear density and of twist level used in commercial transactions are usually nominal values and are subject to agreed tolerances. Values of these tolerances which apply to the products of BISFA members can be found in the appropriate **BISFA booklets**.

## 8.2 Steel tyre cord

The nomenclature system describes the construction of steel tyre cord.

The description of the construction follows the sequence of manufacture of the cord i.e., starting with the innermost strand or wire and moving outwards.

### 8.2.1 Format

The full description of the cord is given by the following formula:

$$(N \times F) \times D + (N \times F) \times D + (N \times F) \times D + F \times D$$

Where:

N = number of strands

F = number of filaments

D = nominal diameter of filaments expressed in millimetres

**8.2.1.1** Each part shall be separated by a plus (+) sign.

**8.2.1.2** Brackets may be used to differentiate a part that consists of more than one component, i.e.

$$(1 \times 4) \times 0.20 + (6 \times 4) \times 0.20 + 1 \times 0.15$$

**8.2.1.3** When N or F = 1 they should not be included in order to obtain the simplest formula, i.e.

$$4 \times 0.20 + (6 \times 4) \times 0.20 + 0.15$$

- 8.2.1.4** If the diameter is the same for two or more parts in sequence, it needs only be stated at the end of the sequence. The diameter of the spiral wrap shall always be stated separately, i.e.

$$4 + (6 \times 4) \times 0.20 + 0.15$$

- 8.2.1.5** When the innermost strand or wire is identical to the adjacent strands or wires the formula may be simplified by stating only the sum of the identical components and brackets need not be used, i.e.

$$7 \times 4 \times 0.20 + 0.15$$

## **8.2.2 Cord lay length and lay direction**

- 8.2.2.1** The sequence or order in the designation of the lay length and of the lay direction follows the sequence of manufacturing i.e., starting with the innermost strand and moving outwards.

$$7 \times 4 \times 0.20 + 0.15$$

lay length 10/20/3.5

lay direction S/Z/S

10/S is the lay length and direction of strands

20/Z is the lay length and direction of the cord

3.5/S is the lay length and direction of the spiral wrap

### **8.2.2.2 Direction of lay**

The helical disposition of the components of a strand or cord are designated according to the general rules given below

- strand used as an end product : S
- ordinary or regular lay cord : strand S  
cord Z
- Lang's lay cord : strand and cord S
- spiral wrap : opposite to the direction of the cord lay

### **8.2.2.3 Length of lay**

The nominal length of lay for steel cord constructions shall be based on the ISO R 388 - R 20 Series.

### 8.3. Open cord constructions

Open cord constructions are designated by adding OC behind the cord description.

As an illustration, some examples of designation of steel cord construction are given hereunder.

**Table 8.2** : examples of designation of steel cord construction

Type of construction	Lay length (mm)	Lay direction
4 x 0.25 OC	14	S
2 + 7 x 0.22 + 0.15	6.3/12.5/5	SSZ
3 x 0.20 + 6 x 0.35	10/18	SZ
3 + 9 + 15 x 0.175 + 0.15	5/10/116/3.5	SSZS
3 + 9 + 15 x 0.22 + 0.15	6.3/12.5/18/3.5	SSZS

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## CHAPTER 9

### Application of SI units to man-made fibres

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#### Introduction

The International System of units (SI) was adopted as the system of measuring units by the 11th General Conference of Weights and Measures in 1960. The International Standard ISO 1000 gives full details of the recommended units and the ways in which they should be used.

This chapter does not cover all aspects of the system, it is limited to those which are of particular interest to the fibres and textiles industry.

#### 9.1 Base units of the International System (SI)

The International System is founded on the following seven base units

**Table 9.1**

Quantity	Abbreviation or symbol	Base unit	Abbreviation or symbol
Length	<i>L</i>	metre	m
Mass	<i>m</i>	kilogram	kg
Time	<i>t</i>	second	s
Electric current	<i>I</i>	ampere	A
Thermodynamic temperature	<i>T</i>	kelvin	K
Amount of substance	<i>n</i>	mole	mol
Luminous intensity	<i>I</i>	candela	cd

## 9.2 Derived units

The units for the measurement of other physical quantities are exclusively derived from these base units. Distinction is made between :

### a) Derived units which are described in terms of base units

These units are expressed algebraically as a function of base units. Their symbols are obtained using signs of multiplication and division, e.g. unit of speed, metre per second (symbol: m/s).

### b) Derived units having names and special symbols which are subdivided into two groups

#### Units of general application

These units are designated not by expression involving the base units, but by the names and special symbols as set out in Table 6.2.

**Table 9.2**

Quantity	Symbol	Unit		Expression as function	
		Name	Symbol	SI base unit	Derived SI unit
Force	F	newton	N	$\text{kg} \cdot \text{m} \cdot \text{s}^{-2}$	
Pressure, stress	p	pascal	Pa	$\text{kg} \cdot \text{m}^{-1} \cdot \text{s}^{-2}$	$\text{N} \cdot \text{m}^{-2}$
Energy, work, quantity of heat	E	joule	J	$\text{kg} \cdot \text{m}^2 \cdot \text{s}^{-2}$	$\text{N} \cdot \text{m}$
Power	P	watt	W	$\text{kg} \cdot \text{m}^2 \cdot \text{s}^{-3}$	$\text{J} \cdot \text{s}^{-1}$
Frequency	f	hertz	Hz	$\text{s}^{-1}$	

#### Units of specified application

These consist mainly of multiples or sub-multiples of derived SI units and are restricted to special uses ; in particular the unit tex with its multiples and submultiples specifically for the textile industry. See Table 6.3.

**Table 9.3**

Quantity	Name	Symbol	Derived SI unit
Linear density			kg/m
Linear density of fibres and yarns	tex	tex	1 tex = 1 mg/m 1 tex = 1 g/km

### 9.3 Multiples and sub-multiples

The names and symbols of the most commonly used decimal multiples and submultiples of the units are formed by the addition of the following prefixes (Table 6.4)

**Table 9.4**

Multiplication factor of the unit	Prefix	Symbol
$10^9$	Giga	G
$10^6$	mega	M
$10^3$	Kilo	k
$10^2$	hecto	h
10 (or $10^1$ )	deca	da
$10^{-1}$	deci	d
$10^{-2}$	centi	c
$10^{-3}$	milli	m
$10^{-6}$	micro	$\mu$
$10^{-9}$	nano	n

The prefix shall be bound to the name and the symbol of the prefix shall likewise be bound to the symbol of the unit. In certain cases non-decimal multiples and sub-multiples may be used. For example a second of time has as a multiple a minute and a radian has as sub-multiples a degree in minutes and seconds.

## 9.4 Principal SI units in use for textiles

### Mass

The SI System of units replaces the notion of weight by that of mass to describe a quantity of matter.

### Linear Density

The SI unit of linear density is the kilogram per metre (kg/m).

In the man-made fibre industry linear density is expressed in dtex (symbol: dtex). A fibre which has a mass of n grams per 10000 metres of length is said to have a linear density of n dtex.

The recommended multiple and sub-multiples of the tex unit for use are given in Table 6.5.

**Table 9.5**

Name	Symbol	Definition
Millitex	mtex	1 mtex = 1 mg/km = 1 µg/m
Decitex	dtex	1 dtex = 1 dg/km = 0.1 mg/m
Tex	tex	1 tex = 1 g/km = 1 mg/m
Kilotex	ktex	1 ktex = 1 kg/km = 1 g/m

### Force

The unit of force is the newton (N).

One newton is the force which when applied to a body having a mass of one kilogram imparts thereto an acceleration of one metre per second, per second.

The newton, its multiples and sub-multiples are used in the field of textiles for the expression of force, such as tension, breaking force and force at specified elongation.

### Tenacity

The units used are the centinewton per tex (cN/tex) or the millinewton per tex (mN/tex).

This unit is used to quantify all expressions of force per linear density (e.g. breaking tenacity, tenacity at specified elongation).

### Breaking toughness

The units used are J/g.

### Pressure and stress

The unit of pressure and of stress is the pascal (Pa).

One pascal is the force of one newton which is acting on an area of one square metre.

### **Temperature**

The kelvin is the base unit for thermodynamic temperature and has wide scientific application but for practical purposes the degree Celsius is the unit in everyday use.

The kelvin and the degree Celsius represent the same interval of temperature, but zero on the kelvin scale is at  $-273,15^{\circ}\text{C}$ .



**Table 9.6** : Quantities and units used in BISFA methods

Quantity	SI Units	Symbol	Former Unit			Observations
			Name	Symbol	Conversion Factor into SI Units	
<b>Length</b>	metre kilometre centimetre millimetre micrometre	m km cm mm $\mu\text{m}$	yard mile inch inch one thousandth of an inch	yd mile in in mil	0.914 1.609 2.54 25.4 25.4	For other units see ISO standard 2947-1997
<b>Twist</b>	number of turns per metre <sup>(x)</sup>	tpm	number of turns per inch	tpi	39.4	
<b>Mass</b>	kilogram gram	kg g	pound ounce	Lb oz	0.453 28.35	idem
<b>Linear density</b>	tex decitex ktex	tex dtex ktex	denier denier denier	den den den	0.111 1.11 0.00011	idem
<b>Density</b>	kilogram per cubic metre	kg/m <sup>3</sup>	---	---	---	idem
<b>Force</b>	newton centinewton	N cN	pound force kilogram force gram force	lbf kgf gf	4.45 9.81 0.981	idem
<b>Force per linear density</b>	centinewton per tex millinewton per tex	cN/tex mN/tex	gram force per denier	g/den	8.83	idem
<b>Pressure</b>	Pascal	Pa	millimetres of mercury	mm Hg	133.3	idem
<b>Toughness (specific work)</b>	joule per gram	J/g				

<sup>(x)</sup> not an SI unit.

**Note** : To convert from a former unit to an SI unit on the same line, multiply the value expressed in the former unit by the value of this unit given in the column "conversion factor into SI units".

Example : 25 inches = 25 x 25,4 mm = 635,0 mm.

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# CHAPTER 10

## Relative humidity

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### 10.1 Introduction

Following the required limits for the standard atmosphere for testing an appropriate accuracy of the hygrometer used has to be ensured.

BISFA recommends dewpoint measurement for the determination of the humidity of the atmosphere for testing. The dewpoint temperature describes precisely the moisture content of a gas. The optical condensation principle (chilled mirror instrument ) has been established as the most fundamental method of determining the moisture content in a gas with excellent accuracy.

Another measurement technique, the psychrometric method, may also be applied. This method yields less precise results, compared to the dew point method.

### 10.2 Dewpoint temperature

The dewpoint temperature is the temperature, at which the liquid and gaseous phases of the water in the atmosphere are in equilibrium (at a given gas pressure), that means, liquid water evaporates at the same rate, at which vapour condenses.

### 10.3 Dewpoint Principle of moisture content determination

Basis for the determination of the relative humidity is an appropriate approximation formula for the saturation vapour pressure as a function of temperature.

An approximated calculation of saturated vapour density can be made from an empirical fit of the vapour density curve. This curve is shown in figure 7.1.

After measuring the dewpoint temperature and the actual temperature the corresponding saturation pressure values can be calculated from the fit. Finally the relative humidity calculates from the formula:

$$Rh [\%] = 100 \cdot \frac{SP(T_D)}{SP(T_A)}$$

$T_D$  : Dewpoint temperature

$T_A$  : Actual temperature

$SP(T_D)$  : Saturation vapour pressure at dewpoint temperature

$SP(T_A)$  : Saturation vapour pressure at actual temperature

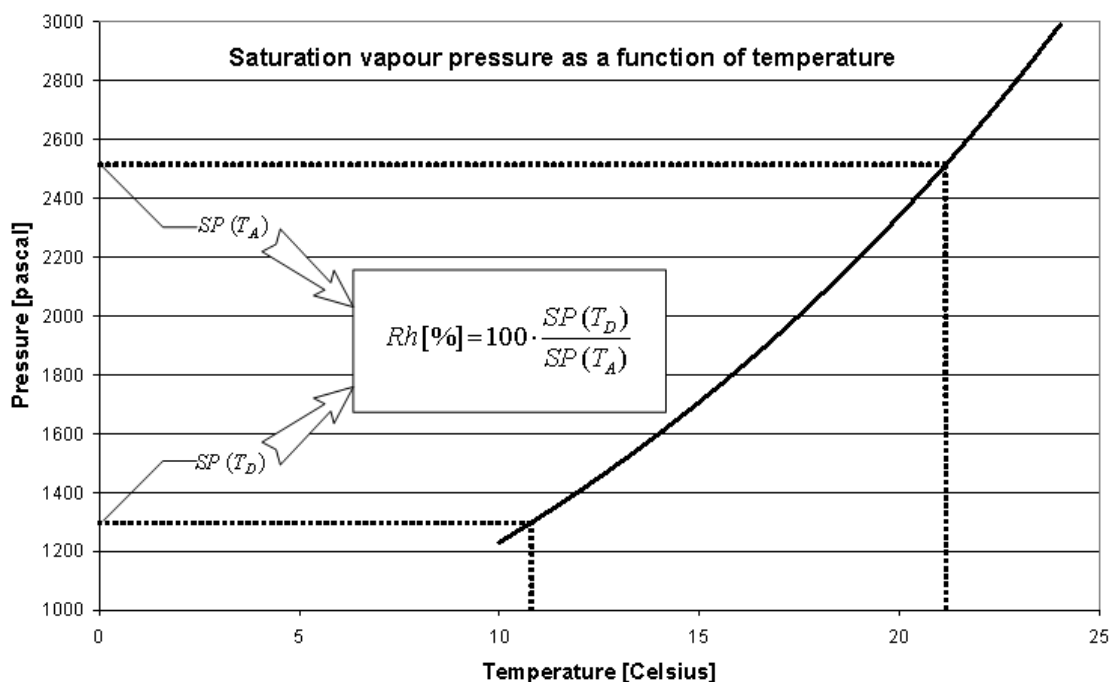


Figure 10.1: Saturation vapour pressure as function of temperature

## 10.4 Accuracy

The accuracy of the temperature measurement shall be  $\pm 0,1$  K or better to be within the demanded limits for the standard atmosphere.

The quality of the calculation of the humidity depends on the accuracy of the empirical fit of the curve in figure 7.1. It is in the responsibility of the supplier of the test equipment to implement an empirical fit of the vapour density curve capable of giving an accuracy as demanded or better.

## 10.5 Calibration of the chilled mirror instrument

The instrument has to be calibrated on a regular basis as recommended by the supplier to keep the demanded accuracy.

## 10.6 Psychrometric method

To be adopted from the test methods booklet viscose filament yarns, 1997 edition – appendix 2, together with annex 1 and annex 2.

## SATURATION VAPOUR PRESSURE OVER WATER

The saturation vapour pressure of the pure phase over plane surface of pure water for temperatures 15 to 25°C was obtained from Wexler's 1976 formulation

$$\ln e_s = \sum_{i=1}^4 g_i \times (T_{68})^{i-2}$$

where:

$$g_1 = -0.63536311 \times 10^4$$

$$g_2 = 0.3404926034 \times 10^2$$

$$g_3 = -0.19509874 \times 10^{-1}$$

$$g_4 = 0.12811805 \times 10^{-4}$$

$$e_s = \text{in Pascal, and}$$

$$T_{68} = 273.15 + t_{68}, \text{ and}$$

$$t_{68} = \text{-degree Celsius (International Practical Temperature Scale of 1968)}$$

# Saturation Vapour Pressure Over Water

Temp	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
°C	Pa	Pa	Pa	Pa	Pa	Pa	Pa	Pa	Pa	Pa
15	1705.32	1716.33	1727.41	1738.54	1749.75	1761.01	1772.34	1783.73	1795.18	1806.70
16	1818.29	1829.94	1841.66	1853.44	1865.29	1877.20	1889.18	1901.23	1913.34	1925.53
17	1937.78	1950.10	1962.48	1974.94	1987.47	2000.06	2012.73	2025.46	2038.27	2051.14
18	2064.09	2077.11	2090.20	2103.37	2116.61	2129.92	2143.30	2156.75	2170.29	2183.89
19	2197.57	2211.32	2225.15	2239.06	2253.04	2267.10	2281.23	2295.44	2309.73	2324.10
20	2338.54	2353.07	2367.67	2382.35	2397.11	2411.95	2426.88	2441.88	2456.94	2472.13
21	2487.37	2502.70	2518.11	2533.61	2549.18	2564.85	2580.59	2596.42	2612.33	2628.33
22	2644.42	2660.59	2676.85	2693.19	2709.62	2726.14	2742.75	2759.45	2776.23	2793.10
23	2810.06	2827.12	2844.26	2861.49	2878.82	2896.23	2913.74	2931.34	2949.04	2966.82
24	2984.70	3002.68	3020.74	3038.91	3057.17	3075.52	3093.97	3112.52	3131.16	3149.90
25	3168.74	3187.68	3206.71	3225.85	3245.08	3264.41	3283.85	3303.38	3323.02	3342.76

## RELATIVE HUMIDITY - PSYCHROMETRIC

Relative humidities rounded to the nearest 1% RH are tabulated by using Ferrel's formulation for the psychrometer coefficient and standard atmosphere pressure (101325 Pa)

$$H_R = \frac{e}{e_s} \times 100 (\%) = \frac{e_w(t_w) - AP(t - t_w)}{e_s} \times 100 (\%)$$

where:

$$A = 6.60 \times 10^{-4}(1 + 0.000115 t_w),$$

$$P = 101325 \text{ Pa}$$

$e_w, e_s$  in Pa, and  $t, t_w$  in °C.

**Table 2**

Air temp. (t)°C	Depression of Wet-Bulb Thermometer (t-t <sub>w</sub> ) °C																			
	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
15	69	68	67	67	66	65	64	63	62	61	60	59	58	57	57	56	55	54	53	52
16	70	69	68	68	67	66	65	64	63	62	61	60	60	59	58	57	56	55	54	54
17	71	70	69	68	68	67	66	65	64	63	62	62	61	60	59	58	57	56	56	55
18	72	71	70	69	68	68	67	66	65	64	63	63	62	61	60	59	58	58	57	56
19	73	72	71	70	69	68	68	67	66	65	64	64	63	62	61	60	60	59	58	57
20	73	72	72	71	70	69	68	68	67	66	65	64	65	64	63	62	62	61	60	59
22	75	74	73	72	71	71	70	69	68	68	67	66	64	63	62	61	61	60	59	58
21	74	73	72	72	71	70	69	68	68	67	66	65	65	65	64	63	63	62	61	60
23	75	74	74	73	72	71	71	70	69	68	68	67	66	66	65	64	63	63	62	61
24	76	75	74	73	73	72	71	71	70	69	68	68	67	66	66	65	64	64	63	62
25	76	75	75	74	73	73	72	71	70	70	69	68	68	67	66	66	65	64	64	63

# CHAPTER 11

## Translation of technical terms

English	French	German	Italian	Spanish	Portuguese	Czech	Turkish
Accuracy of measuring instrument	Précision d'un instrument de mesure	Genauigkeit eines Messinstruments	Precisione di uno strumento di misura	Precisión de un instrumento de medida	Exactidão de um instrumento de medida	Přesnost měřícího zařízení	Ölçüm cihazının hassasiyeti
<b>Accuracy of measurement</b>	Précision de la mesure	Genauigkeit einer Messung	Accuratezza della misura	Precisión de la medida	Exactidão de medida	Přesnost měření	Ölçüm hassasiyeti
<b>Adhesion</b>	Adhésion	Haftung	Adesione	Adhesión	Adesão	Adheze, přilnavost	Yapışma
Adhesion force	Force d'adhésion	Haftkraft	Forza di adesione	Fuerza de adhesión	Força de adesão	Adhezní síla	Yapışma kuvveti
Adhesion, rubber coverage	Adhésion, revêtement de caoutchouc	Haftung einer Gummi-beschichtung	Adesione, rivestimento di gomma	Adhesión, recubrimiento de caucho	Adesão, cobertura de borracha	Adheze pryžového povlaku	Yapışma görünümü
<b>Air textured yarn</b>	Fil texturé par air (Taslan)	Lufttexturiertes Garn	Filo testurizzato ad aria	Hilo texturizado por aire	Fio texturizado por ar	Vzduchem tvarovaná nit	Havalı tekstüre iplik
<b>Atmospheres</b>	Atmosphères	Klima	Atmosfera	Atmósferas	Atmosferas	Ovzduší	Ortam (Klimatik)
Standard atmosphere	Atmosphère standard	Normalklima	Atmosfera normale	Atmósfera normal	Atmosfera normal	Normální ovzduší	Standard (klimatik) ortam
Atmosphere for testing	Atmosphère d'essai	Prüfklima	Atmosfera per l'esame	Atmósfera para ensayo	Atmosfera de ensaio	Ovzduší pro zkoušení	Test ortamı (Klimatik)
Atmosphere for preconditioning	Atmosphère de préconditionnement	Klima für Vorkonditionierung	Atmosfera di pre-ambientamento	Atmósfera para preacondicionamiento	Atmosfera para préacondicionamento	Ovzduší pro předklimatizaci	On sartlandırma ortamı (Klimatik)
<b>Beam</b>	Ensouple	Baum	Subbio	Plegador	Rôlo de urdime	Vál	Levent

Back beam	Chaîne de fond	Zettelbaum	Subbio frazionale	Plegador posterior	Rôlo de urdideira	Snovací vál	Ara levant
Weaver's beam	Ensouple de tissage	Webbaum	Subbio di tessitura	Plegador de Tejedor	Rolo de tecelagem	Osnovní vál	Dokuma levendi
Warp knitting beam	Ensouple pour indémaillable (tricotage chaîne)	Teilkettbaum	Subbio di maglieria in ordito / subbiello per indemagliabile	Plegador para Tejeduría de Punto por Urdimbre	Rôlo de tecelagem de malha por urdime	Pletařský vál	Çözümlü örme (Raşel) levendi
<b>Bicomponent fibre</b>	Fibre à deux composants	Bi-Komponentenfaser	Fibra bicomponente	Fibra bicomponente	Fibra bicomponente	Dvousložkové vlákno	Bikomponent (İkili) elyaf
<b>Bishrinkage yarn</b>	Fil à retrait différentiel	Bi-Schrumpfgarn	Filo biretraibile	Hilo de filamentos con contracción distinta	Fio de filamentos com diferentes encolhimentos	Nit's dvojí sráživosti	İki çekmeli iplik
<b>Breaking elongation</b>	Allongement de rupture	Höchstzugkraft-Dehnung	Allungamento alla forza massima	Alargamiento a la rotura	Alongamento à rotura	Tažnost při max. tahové síle	Kopma uzaması (%) (Max. yükte)
<b>Breaking Strength</b>	Résistance de rupture	Zugfestigkeit	Forza a rottura	Resistencia a la rotura	Resistência à rotura	Pevnost při přetrhu	Kopma yükü (Max. yük)
<b>Breaking tenacity</b>	Ténacité de rupture	Reissfestigkeit <u>or</u> Bruchfestigkeit <u>instead of</u> Feinheitsfestigkeit, Feinheitsbezogene Höchstzugkraft	Tenacità alla rottura	Tenacidad a la rotura	Tenacidade à rotura	Poměrná pevnost při maximální tahové síle	Kopma dayanımı , Mukavemet (Max. yükte)
<b>Breaking toughness</b>	Energie de rupture	Feinheitsbezogene Höchstzugkraft-Arbeit, Bruchzähigkeit	Lavoro a rottura	Tenacidad a la rotura	Trabalho de rotura	Relativní deformační práce	Birim kopma işi (Max. yükte)
<b>Bulked Continuous Filament (BCF)</b>	Fil continu gonflant (fil tapis BCF)	Kontinuierlich gekräuselt Filamentgarn	Filo continuo volumizzato	Filamento Continuo Voluminoso	Filamento contínuo voluminoso	Objemované nekonečné vlákno	BCF
<b>Cabled yarn</b>	Fil câblé	Mehrstufiger Zwirn (Kord)	Ritorto composto	Hilo cableado	Fio com cabos	Káblovaná nit	Katlı bükülmüş iplik , Kord
<b>Clamps</b>	Pinces	Klemmen	Morsetti	Mordazas	Pinças	Svorky	Kıskaçlar
<b>Coating (of steel filament)</b>	Enduction	Beschichtung (Stahlfilament)	Rivestimento (di filo di acciaio)	Recubrimiento de filamento de acero	Revestimento (de filamento metálico)	Povlak (ocelového vlákna)	Kaplama (çelik filamentin)



<b>Coiling</b>	Lover	Bandablage, kreisförmig	Invasatura a spirale	Plegado	Enrolamento em espiral	Navíjení, stáčení	Spiral serme (Şerit , tops , towda)
<b>Commercial mass</b>	Masse commerciale	Handelsmasse	Massa commerciale	Masa comercial	Massa comercial	Obchodní hmotnost	Ticari ağırlık
<b>Compact cord</b>	Câble compact	Kompaktcord	Cord compatto	Cable compacto	Corde compacta	Kompaktní kord	Kompakt kord
<b>Conditioning</b>	Conditionnement	Konditionierung	Ambientamento, condizionamento	Acondicionamiento	Condicionamento	Kondicionování, klimatizace	Kondisyonlama , Şartlandırma , Koşullandırma
<b>Conditioned state</b>	Etat conditionné	Konditionierter Zustand	Ambientamento, condizionamento	Estado acondicionado	Estado de condicionamento	Kondicionovaný stav, klimatizovaný stav	Kondisyonlanmış (şartlandırılmış) hal
<b>Consignment</b>	Lot	Lieferung	Partita	Lote	Partida	Dodávka	Sevkiyat (Partisi / Lotu)
Consignment sample	Echantillon du lot	Probe aus Lieferung	Campione della partita	Muestra escogida	Amostra da partida	Vzorek z dodávky	Sevkiyat / Lot numunesi , örneği
<b>Constant rate of extension (CRE) dynamometer</b>	Dynamomètre à vitesse d'allongement constante	Zugprüfgerät mit konstanter Verformungsgeschwindigkeit	Dinamometro a velocità costante di allungamento	Dinamómetro a velocidad constante de alargamiento	Dinamómetro a velocidade constante de alongamento	Dynamometr (trhací stroj) s konstatní rychlostí protahování	Sabit germe hızlı mukavemet cihazı
<b>Container</b>	Conteneur	Verpackungseinheit	Collo	Caja o recipiente	Recipiente	Jednotka balení	Ambalaj birimi , Koli
<b>Conventional allowance</b>	Tolérance conventionnelle (de conditionnement)	Handelszuschlag	Tasso convenzionale di condizionamento	Tasa convencional de acondicionamiento	Taxa convencional de acondicionamento	Smluvní přírůžka	Ticari ağırlık eklentisi (Nem , avıvaj , vb. için)
<b>Cord</b>	Câble	Kord, mehrstufiger Zwirn	Cord	Cable	Corde	Kord	Kord
Cord of steel	Câble d'acier	Stahlkord	Fune di acciaio	Cable de acero	Corde de aço	Ocelový kord	Çelik kord
Cord thickness	Epaisseur du câble	Korrdicke, <u>oder</u> Korddurchmesser	Spessore della fune	Espesor del cable	Grossura da corda	Tloušťka kordu	Kord kalınlığı
<b>Core</b>	Ame	Kern (-faden)	Anima	Núcleo	Alma, núcleo	Jádro	Kor , Nüve

Core (in steel tyre cord)	Ame ou fil d'âme	Kern (in Stahlkord)	Anima, nucleo (filato con-, -del filato) in tyre cord d'acciaio	Núcleo (cable de acero para neumático)	Alma do fio, núcleo em tyre cord d'aço	Jádro (v ocelovém kordu pro pneumatiky)	Kor (Çelik lastik kordunda)
Core – spun yarn	Filé à âme	Umspinnungsgarn	Filato con anima	Hilado - Núcleo	fio com alma	Jádrová opředená nit	Kor ipliği , Nüveli iplik
Core – textured yarn	Fil texturé à âme	Texturiertes Umwindegarn	Filato con anima testurizzato	Hilo texturado- Núcleo	Fio texturizado com alma	Jádrová texturovaná nit	Kor tekstüre ipliği
Core - twisted yarn	Fil retordu à âme	Umwindegarn	Filato con anima ritorto	Hilo torcido – Núcleo	Fio retorcido com alma	Jádrová obeskaná nit	Kor bükümlü iplik
<b>Covered yarn</b>	Fil guipé	Ummanteltes Garn	Filo ricoperto	Hilo recubierto	Fio revestido	Opředená, obeskaná nit	Kaplanmış iplik
<b>Crimp</b>	Frisure	Kräuselung	Arricciatura, cretto	Rizado	Frisado	Zkadeření	Kıvrıcık
Crimp contraction	Contraction de frisure	Kräuselkontraktion	Contrazione di arricciatura (del cretto)	Contracción por rizado	Contracção de frisado	Kontrakce při zkadeření	Kıvrıcık kısalması(% Kısalma)
Crimp elongation	Elongation de frisure	Kräuseldehnung	Allungamento di arricciatura (del cretto)	Alargamiento por rizado	Alongamento de frisado	Prodloužení zkadeření	Kıvrıcık uzaması (% Uzama)
Crimp frequency	Taux de frisure	Kräuselbogen-frequenz	Frequenza di arricciatura (del cretto)	Frecuencia de rizado	Frequência de frisado	Četnost obloučků při zkadeření	Kıvrıcık sıklığı (Kıv./cm.)
Crimp liveliness	Nervosité de frisure	Kräuselneigung	Nervosità di arricciatura (del cretto)	Vivacidad del rizado	Vivacidade do frisado	Sklon ke kadeření	Tekstürize canlılığı
Crimp stability	Stabilité de frisure	Kräuselbeständig-keit	Stabilità di arricciatura (del cretto)	Estabilidad del rizado	Estabilidade do frisado	Stálost zkadeření	Kıvrıcık kalıcılığı (stabilitesi)
Crimp, latent	Frisure, latente	Kräuselung, latente	Arricciatura (cretto), latente	Rizado latente	frisado, latente	Latentní zkadeření	Potansiyel kıvrıcık
<b>Delustrant</b>	Délustrant	Mattierungsmittel	Opacizzante	Agente deslustrante	Deslustrante	Matovací prostředek	Matlaştırıcı

<b>Dip</b>	Trempage	Dip	Impregnazione	Humectar	Adesão	Úprava namáčením (impregnace)	Banyo
<b>Durability</b>	Duré d'usage	Beständigkeit	Durabilità	Durabilidad	Durabilidade	Stabilita	Dayanıklılık
<b>Dust, fibre dust</b>	Poussière (de fil, fibres)	Faserstaub	Polvere, polvere di fibra	Polvo producido por la fibra	Pó, pó de fibra	Vláknenný prach	Toz , elyaf tozu
Fibre fly	Particule de fibre volante	Faserflug	Pulviscolo di fibre	Fibras flotantes	Fibras flutuantes	Úlet vláken	Uçuntu
Particulates from fibres	Particule de fibres	Faserpartikel	Particolato di fibre	Particularidades de las fibras	Particulas de fibras	Částice z vláken	Lifsi maddeler
Fibril	Fibrille	Fibrille	Fibrilla	Fibrilla	Fibrila	Fibrila	Fibril
Respirable fibre-shaped particulates (RFP)	Particules fibreuses respirables	Lungengängige faserförmige Partikel (LFP) <u>instead of</u> Atembarer Feinstaub von Fasern	Particolato fibroso respirabile	Forma de la fibra transfirable	Particulas de fibra respiráveis	Vláknenné částice, které lze vdechnout	Solunabilir lif şeklinde maddeler
<b>Edge crimped yarn</b>	Fil texturé sur arête	Kantenkräuselgarn	Filo cretato su spigolo	Hilo rizado por el borde	Fio frisado na margem	Nit zkadeřená tažením přes hranu	Kenara sürtme tekstüre ipliği
<b>Elasticity</b>	Elasticité	Elastizität	Elasticità	Elasticidad	Elasticidade	Elasticita, pružnost	Elastikiyet
<b>Elastic yarn</b>	Fil élastique	Elastisches Garn	Filo elasticito	Hilado elastico	Fio elástico	Elastická nit	Elastik iplik
<b>Elongation</b>	Allongement (pourcentage)	Dehnung (in %)	Allungamento relativo percentuale	Alargamiento	Alongamento	Prodloužení	Uzama (%)
Elongation at break	Allongement de rupture (pourcentage)	Höchstzugkraft-Dehnung	Allungamento a rottura	Alargamiento a la rotura	Alongamento de rotura	Tažnost při max. tahové síle	Kopma uzaması (%) (Max. yükte)
Elongation at rupture	Allongement à la rupture (pourcentage)	Bruchdehnung	Allungamento alla rottura	Alargamiento a la ruptura	Alongamento à rotura	Tažnost při přetrhu	Kopma anındaki uzama (%)
Elongation at specified force	Allongement pour une force spécifiée (pourcentage)	Dehnung bei festgelegter Zugkraft	Allungamento a forza specifica	Alargamiento a una fuerza específica	Alongamento a força específica	Tažnost při dané síle	Belirli bir yükte uzama (%)

Elongation at specified tenacity	Allongement pour une ténacité spécifiée (pourcentage)	Dehnung bei festgelegter Festigkeit	Allungamento a tenacità specifica	Alargamiento a la tenacidad especificada	Alongamento a tenacidade específica	Tažnost při dané poměrné pevnosti	Belirli bir mukavemette uzama (%)
Elongation between defined forces (EDF)	Allongement (%) entre deux forces définies	Dehnung zwischen festgelegten Zugkraftgrenzen	Allungamento percento	Alargamiento entre fuerzas definidas	Percentagem de alongamento	Prodloužení mezi danými mezními silami	Belirli iki yük arasında uzama (%)
<b>End</b>	Bout (ou filament)	Faden-Ende	Capo	Cabo	Ponta	Osnovní nit	Uç ; çözgü ipliği / teli
<b>Extension</b>	Allongement absolu (en unité de longueur)	Längung	Allungamento	Alargamiento	Alongamento	Protažení	Uzama (Uzunluk birimi olarak)
<b>False twist stretch yarn</b>	Fil fausse torsion à élasticité conférée (FT)	Falschdrallgarn, hochelastisch (HE-Garn)	Filo elasticizzato a falsa torsione (FT)	Hilo de espuma de falsa torsión	Fio estirado de falsa torção	Elastická nit tvarovaná nepravým zákrutem	Yalancı bükümlü streç ipliği
<b>False twist yarn</b>	Fil fausse torsion	Falschdrallgarn	Filo a falsa torsione	Hilado de falsa torsión	Fio de falsa torção	Nit tvarovaná nepravým zákrutem	Yalancı bükümlü tekstüre iplik
<b>Fibre</b>	Fibre	Faser	Fibra	Fibra	Fibra	Vlákno	Elyaf , Lif
<b>Fibre dust</b>	Poussière de fibre	Faserstaub	Polvere di fibra	Polvo de la fibra	Pó de fibra	Vlákenný prach	Elyaf tozu
<b>Fibre length</b>	Longueur de fibre	Faserlänge	Lunghezza della fibra	Longitud de la fibra	Comprimento de fibra	Délka vlákna	Elyaf boyu
<b>Fibril</b>	Fibrille	Fibrille	Fibrilla	Fibrilla	Fibrila	Fibrila	Fibril
<b>Filament</b>	Filament	Filament	Filamento, bava	Filamento	Filamento	Filament, nekonečné vlákno	Filament , Kesiksiz (sonsuz) lif
<b>Filament yarn</b>	Fil continu	Filamentgarn, Endlosgarn	Filo continuo	Hilo de filamento	Fio de filamento contínuo	Nit z nekonečných vláken	Kontinü / Filament iplik
<b>Finish</b>	Ensimage	Avivage, Schmälze	Ensimaggio	Ensimaje	Ensimagem (acabamento)	Povrchová úprava, aviváž	Terbiye maddesi , Yağ , Finiş , Avivaj
<b>Flame resistance</b>	Anti-feu	Flammhemmend oder: Flammwidrig Flammfestigkeit	Resistenza alla fiamma	Resistencia a la llama	Resistente ao fogo	Odolnost proti hoření	Güç tutuşurluk
<b>Flare</b>	Ouverture à la coupe	Aufspreizen	Apertura	Arder	Abertura	Nálevkovité rozšíření	Açılma , Yayılma , Flare

<b>Flock</b>	Floc	Flock	Flock	Flocado	Floco	Vločka	Flok
<b>Folded yarn</b>	Retors	Einstufiger Zwirn	Ritorto semplice	Hilo Retorcido	Fio retorcido	Skaná nit <sup>~</sup>	Katlı iplik
<b>Folding in layers</b>	Bambaner	Bandablagen parallel	Faldare a strati	Plegado en capas	Dobrar em camadas	Skládání do vrstev	Serme
<b>Force</b>	Force	Kraft, Zugkraft	Forza	Fuerza	Força	Síla	Kuvvet
Force at break	Force de rupture	Höchstzugkraft	Forza (massima) di rottura	Fuerza a la rotura	Força de rotura	Maximální síla při tahovém namáhání, tržná síla	Kopma yükü (Max. yük)
Force at rupture	Force à la rupture	Bruchkraft	Forza alla rottura	Fuerza a la ruptura	Força à rotura	Síla při přetrhu	Kopma anındaki yük
Force at specified elongation	Force sous allongement spécifique	Zugkraft bei festgelegter Dehnung	Forza ad allungamento specifico	Fuerza a alargamiento específico	Força a alongamento específico	Síla při daném prodloužení	Belirli bir uzamada yük
<b>Gauge length</b>	Distance entre pinces	Einspannlänge	Distanza tra morsetti	Distancia entre mordazas	Distância entre pinças (bitola)	Upínací délka	Çene aralığı
<b>Gear crimped yarn</b>	Fil texturé sur engrenage	Zahnrad-kräuselgarn	Filo cretato con rulli scanalati	Hilado rizado con rodillos acanalados	Fio frisado por rolos	Nit <sup>~</sup> tvarovaná ozubenými koly	Dişli tekstüre ipliği
<b>Giant carton</b>	Carton géant	Grossverpackung	Confezione gigante	Carton gigante	Embalagem gigante	Velké balení	Maksi kutu
<b>Gross mass</b>	Masse brute	Bruttomasse	Massa lorda	Masa bruta	Massa bruta	Hmotnost s obalem, brutto	Brüt ağırlık
<b>Heat durability</b>	Durabilité à la chaleur	Hitzebeständigkeit	Durabilità al calore	Durabilidad al calor	Durabilidade ao calor	Tepelná stabilita	Isı dayanıklılığı
<b>Heat resistance</b>	Résistance à la chaleur (Thermo-résistance)	Wärme-beständigkeit	Resistenza al calore	Resistencia al calor	Resistência ao calor	Odolnost proti teplu	Isı direnci
<b>High tenacity yarn</b>	Fil haute ténacité	Hochfestes Garn	Filo ad alta tenacità	Hilado de alta tenacidad	Fio de alta tenacidade	Nit <sup>~</sup> s vysokou poměrnou pevností	Yüksek mukavemetli iplik
<b>Industrial fibre</b>	Fibre à usage industriel	Technische Faser	Fibra industriale	Fibra industrial	Fibra industrial	Průmyslové vlákno	Endüstriyel (sınai) elyaf
<b>Initial length</b>	Longueur initiale	Ausgangslänge	Lunghezza iniziale	Longitud inicial	Comprimento inicial	Počáteční délka	Başlangıç uzunluğu
<b>Interlaced yarn</b>	Fil entrelacé	Verwirbeltes Garn	Filo interlacciato	Hilado entrelazado	Fio entrelaçado	Proplétaná nit <sup>~</sup>	Dolamalı (IMG'li) iplik

<b>Interlacing distance</b>	Distance d'entrelacement	Verwirbelungs-abstand	Distanza di interallacciamento	Distancia de entrelazamiento	Distância de entrelaçamento	Vzdálenost mezi propletenými body	Dolama (IMG) aralığı
<b>Interlacing frequency</b>	Fréquence d'entrelacement	Verwirbelungs-frequenz	Frequenza di interallacciamento	Frecuencia de entrelazamiento	Frequência de entrelaçamento	Počet propletených bodů na jednotku délky	Dolama (IMG) sıklığı
<b>Intermingled yarn (syn : interlaced)</b>	Fil entremêlé	Verwirbeltes Garn	Filo interlacciato	Hilado entremezclado (sinónimo.: entrelazado)	Fio entremeado	Proplétaná nit	Dolamalı (IMG'li) iplik
<b>Invoice mass</b>	Masse facturée	Rechnungsmasse	Massa da fatturare	Masa a facturar	Massa de factura	Fakturovaná hmotnost	Fatura ağırlığı
<b>Jaws</b>	Mâchoires	Klemmbacken	Ganasce	Mordazas	Garra (pinças)	Čelisti	Çeneler
<b>Knit-deknit yarn</b>	Fil texturé par tricotage-détricotage	Strickfixiergarn	Filo immagliato e demagliato (KdK)	Hilo tricotado-destricotado (KdK)	Fio tricotado-desmalhado	Nit tvarovaná postupem pletení-párání	KDK ipliği
<b>Laboratory sample</b>	Echantillon de laboratoire	Laborprobe	Campione di laboratorio	Muestra de laboratorio	Amostra de laboratório	Laboratorní vzorek	Laboratuvar numunesi
<b>Latent crimp</b>	Frisure latente	Latente Kräuselung	Arricciatura (cretto) latente	Rizado latente	Frisado latente	Latentní zkadeření	Potansiyel kıvrırcık
<b>Lay</b>	Pas	Verlegung	Commettitura	Arrollamiento	Enrolamento	Vinutí kordů	Sarım (Kord için)
Direction of lay	Sens du pas	Verlegungsrichtung	Senso di commettitura	Dirección del arrollamiento	Direcção do enrolamento	Směr vinutí	Sarım yönü
Lang's lay	?	Stahlcord-konstruktion Lang	Commettitura parallela (Lang)	Arrollamiento de Lang	Enrolamento de Lang	Stejnoseměrné vinutí	?
Length of lay	Longueur du pas développé	Verlegungslänge	Passo di commettitura	Paso del arrollamiento	Comprimento do enrolamento	Délka vinutí, zákrutu	Sarım uzunluğu
Type of lay	Type de pas	Stahlcord-konstruktion	Tipo di commettitura	Tipo de arrollamiento	Tipo de enrolamento	Typ vinutí	Sarım tipi
<b>Linear density</b>	Masse linéique	Feinheit	Massa per unità di lunghezza	Densidad lineal	Massa por unidade linear	Délková hmotnost, jemnost	Numara (İplik, fitil , elyafta)

Lot	Lot	Lieferung, Los(grösse)	Lotto	Lote	Lote	Partie, (do)dávka	Parti , Lot
<b>Lubricant</b>	Lubrifiant	Schmiermittel, Gleitmittel	Lubrificante	Lubricante	Lubrificante	Lubrikant, mazadlo	Yağlayıcı (Finiş , avivaj) , Lubrikant ,Kaydırıcı
<b>Mass</b>	Masse	Masse	Massa	Masa	Massa	Hmotnost	Kitle , Kütle
Gross mass	Masse brute	Bruttomasse	Massa lorda	Masa bruta	Massa bruta	Brutto, celková hmotnost	Brüt ağırlık
Tare	Tare	Tara	Tara	Tara	Tara	Tára	Dara
Net mass	Masse nette	Nettomasse	Massa netta	Masa neta	Massa liquida	Netto, čistá hmotnost	Net ağırlık
Oven-dry mass	Masse sèche	Ofentrockenmasse	Massa anidra	Masa anhidra	Massa anidra	Suchá hmotnost	Kuru ağırlık
Commercial mass	Masse commerciale	Handelsmasse	Massa commerciale	Masa comercial	Massa comercial	Obchodní hmotnost	Ticari ağırlık
Invoice mass	Masse facturée	Rechnungsmasse	Massa da fatturare	Masa a facturar	Massa da factura	Fakturovaná hmotnost	Fatura ağırlığı
Tolerance of commercial mass	Tolérance sur la masse commerciale	Toleranz der Handelsmasse	Tolleranza della massa commerciale	Tolerancia de la masa comercial	Tolerância da massa comercial	Odchylka, tolerance obchodní hmotnosti	Ticari ağırlık toleransı
<b>Matrix fibre</b>	Fibre à matrice	Matrixfaser	Fibra a matrice	Fibra matriz	Fibra matriz	Matricové vlákno	Matriks yapı lif
<b>Modulus</b>	Module	Modul	Modulo	Módulo	Módulo	Modul	Modül
Chord modulus	Module sécant	Sekantenmodul (Chordmodul)	Modulo della corda	Módulo secante	Módulo de chord	Modul pružnosti (sečna křivky napětí – deformace)	Tanjant modülü
Tangent modulus	Module tangent	Tangentenmodul	Modulo tangente	Módulo tangente	Módulo tangente	Tangentový modul (tečna ke křivce napětí-deformace)	Teğet modülü
Modulus, wet	Module au mouillé	Nassmodul	Modulo a umido	Módulo en húmedo	Módulo em húmido	Modul za mokra	Islak modül
<b>Moisture content</b>	Humidité	Feuchtigkeitsgehalt	Contenuto di umidità	Contenido de humedad	Teor de humidade	Obsah vlhkosti	Nem oranı

<b>Moisture regain</b>	Taux de reprise d'humidité	Feuchtigkeitsaufnahme	Ripresa di umidità	Recuperación de humedad	Retoma de humidade	Vlhkostní přírážka	Nem alma
<b>Monofilament yarn (Monofil)</b>	Fil monofilament	Monofilamentgarn	Monofilamento, monobava	Hilo Monofilamento	Fio de monofilamentos	Nit' z nekonečného vlákna	Tek filamentli (Monofilament) iplik
<b>Multicomponent fibre</b>	Fibre à multicomposants	Multikomponenten Faser	Fibra multicomponente	Fibra multicomponente	Fibra multicomponente	Vícesložkové vlákno	Çok bileşenli (Kompoze) elyaf
<b>Multiconstituent fibre</b>	Fibre à multiconstituants	Multi-konstituenten Faser	Fibra multiconstituente	Fibra multiconstituyente	Fibra multiconstituida	Multikonstituentní vlákno	Çok bileşenli (Kompoze) elyaf
<b>Multifilament yarn (Multifil)</b>	Fil multifilament	Multifilamentgarn	Multifilamento, multibava	Hilo multifilamento	Fio multifilamento	Nit' z nekonečných vláken	Çok filamentli iplik
<b>Multiple wound yarn (syn : Assembled yarn)</b>	Fil assemblé	Gefachtes Garn	Binato o accoppiato	Hilo de arrollado múltiple (sinónimo: hilo ensamblado)	Fio junto	Sdružená nit'	Bükümsüz (katlı) iplik
<b>Nonwovens</b>	Nontissés	Vliesstoff	Nontessuti	Non-tejido	Nao-tecido	Netkany	Dokusuz yusei
<b>Net mass</b>	Masse nette	Nettomasse	Massa netta	Masa neta	Massa líquida	Netto, čistá hmotnost	Net ağırlık
<b>Nominal length</b>	Longueur nominale	Nennlänge	Lunghezza nominale	Longitud nominal	Comprimento nominal	Jmenovitá délka	Nominal (İtibari) elyaf boyu
<b>Nominal linear density</b>	Masse linéique nominale	Nennfeinheit	Densità lineare nominale	Densidad lineal nominal	Densidade linear nominal	Jmenovitá délková hmotnost	Nominal (İtibari) iplik/firil/elyaf numarası
<b>Nominal titre (Nominal count)</b>	Titre nominal	Nenntiter	Titolo nominale	Título nominal	Titulo nominal	Jmenovitý titr	Nominal (İtibari) iplik/firil/elyaf numarası
<b>Open cord</b>	Câble gonflé	Offener Kord	Cord aperto	Cable abierto	Corda aberta	Rozvolněný ocelový kord	Açık kord
<b>Oven-dry mass</b>	Masse sèche	Ofentrockenmasse	Massa anidra	Masa anhidra	Massa anidra	Suchá hmotnost	Kuru ağırlık
<b>Package</b>	Bobine	Aufmachungs-einheit	Confezione	Unidad de arrollamiento	Embalagem	Cívka s návinem	Sarılı iplik bobini/masurası/leven di , vb.



<b>Permanent deformation</b>	Déformation permanente	Permanente Deformation	Deformazione permanente	Deformación permanente	Deformação permanente	Trvalá deformace	Kalıcı deformasyon/şekil bozulması
<b>Plied yarn</b>	Fil retors	Einstufiger Zwirn	Ritorto semplice	Hilo retorcido	Fio retorcido	Skaná nitʹ	Bükümlü-Kath iplik
<b>POY (Partially Oriented Yarn)</b>	Fil continu partiellement orienté	Teilorientiertes Filamentgarn	Filo parzialmente orientato	Hilo orientado parcialmente	Fio parcialmente orientado	Částečně orientovaná nitʹ	POY
<b>Preconditioning</b>	Précondition-nement	Vorklimatisierung	Pre-ambientamento	Preacondicionado	Précondiciona-mento	Předkondice, předklimatizace	Ön kondisyonlama/şartlandırma
<b>Pre-dip</b>	Pré-trempage	Vordip	Pre-impregnazione	Humectación previa	Pré-impregnação	Předběžné namáčení	Ön banyo
<b>Pretension</b>	Prétension	Vorspannkraft	Pretensione	Pretensión	Pré-tensão	Předpětí	Ön germe
<b>Pulp</b>	Pâte à papier	Pulp	Pasta (di legno)	Pulpa	Polpa	Buničina	Selüloz hamuru
<b>Regular cord</b>	Câble ordinaire	Regulärer (normaler) Kord	Cord regolare	Cable regular	Corde regular	Pravidelná (stejnoměrná) kordová nitʹ	?
<b>Relative Humidity</b>	Humidité relative	Relative Luftfeuchtigkeit	Umidità relativa	Humedad relativa	Humidade relativa	Relativní vlhkost	Bağıl (İzafi) hava nemliliği
<b>Relaxation ratio</b>	Taux de relaxation	Relaxations-Verhältnis	Rapporto di rilassamento	Relación de relajamiento	Índice de relaxação	Relaxační poměr	Relaksasyon oranı
<b>Residual torsion</b>	Torsion résiduelle	Resttorsion	Torsione residua	Torsión residual	Torção residual	Zbytková torze (zkrut)	Artık torsiyon / büküm
<b>Roving</b>	Mèche de banc (de fibres discontinues)	Vorgarn	Stoppino	Mecha	Mecha de banco ou acabador	Přást	Fitil
<b>Sample</b>	Echantillon	Probe	Campione	Muestra	Amostra	Vzorek	Numune , Örnek
<b>Shrinkage</b>	Retrait	Schrumpf	Retrazione (rientro)	Encogimiento	Encolhimento	Srážení, sráživost	Çekme
Boiling water shrinkage	Retrait à l'eau bouillante	Kochschrumpf	Retrazione all' ebollizione	Encogimiento por agua hirviendo	Encolhimento em água fervente	Srážení, sráživost za varu	Kaynar suda çekme
Hot water shrinkage	Retrait à l'eau chaude	Heisswasser-schrumpf	Retrazione in acqua calda		Encolhimento em água quente		

Hot air shrinkage, after treatment	Retrait à l'air chaud, après le traitement	Heissluftschumpf (nach der Behandlung)	Retrazione ad aria calda (dopo il trattamento)	Encogimiento por aire caliente, tratamiento posterior	Encolhimento a ar quente (depois de tratamento)	Srážení, sráživost horkým vzduchem (po úpravě)	Sıcak havada çekme (İşlem sonunda)
Hot air shrinkage, during treatment	Retrait à l'air chaud, pendant le traitement	Heissluftschumpf (während der Behandlung)	Retrazione (rientro) ad aria calda (durante il trattamento)	Encogimiento por aire caliente durante el tratamiento	Encolhimento a ar quente (durante o tratamento)	Srážení, sráživost horkým vzduchem (během úpravy)	Sıcak havada çekme (İşlem sırasında)
<b>Single yarn</b>	Fil simple	Einfachgarn	Filo singolo	Hilo sencillo	Fio singelo	Jednoduchá nit	Tek kat iplik
<b>Size</b>	Encollage	Schlichte	Incollaggio	Encolado	Encolado	Šlichta	Haşıl
<b>Sliver</b>	Ruban de fibres	Faserband	Nastro, top	Cinta	Mecha	Pramen	Şerit
<b>Specimen</b>	Eprouvette	Messprobe	Campione	Probeta	Amostra	Zkušební vzorek	Numune , Örnek
<b>Spun yarn</b>	Filé de fibre	Spinnfasergarn	Filato	Hilado	Fiado	Předená nit	Kesik elyaf ipliği , Eğirilmiş iplik
<b>Stabilised false twist yarn</b>	Fil fausse torsion fixée (FTF)	Falschdrallgarn, niederelastisch (Set-Garn)	Filo a falsa torsione fissato (FTF)	Hilo de falsa torsión estabilizada	Fio de falsa torção estabilizada	Stabilizovaná, nepravým zákrutem tvarovaná nit	Çift firınlı , yalancı bükümlü tekstüre iplik
Staple fibre	Fibre discontinue	Spinnfaser	Fibra discontinua	Fibra discontinua	Fibra em rama	Staplové vlákno, stříž	Kesik elyaf
Length of staple	Longueur des fibres	Stapelfaserlänge	Lunghezza di taglio	Longitud de fibra	Comprimento da rama	Délka štáplu	Elyaf boyu , Kesim boyu
Square cut staple fibres	Fibre discontinue à coupe droite	Spinnfaser mit Rechteckschnitt	Fibre a taglio quadrato	Fibras de corte cuadrado	Fibra em rama de corte quadrado	Stříž se čtvercovým řezem	Kesik elyaf , normal kesim
Variable length (or bias cut) staple fibres	Fibre discontinue à coupe en biais	Spinnfaser mit variabler Stapellänge	Fibre a taglio variabile (taglio triangolare)	Fibras cortadas de longitud variable (o corte al sesgo)	Fibra em ramade corte variável	Stříž s proměnlivým staplem získaná řezáním	Değişken (variabl) boyda kesilmiş elyaf
Stretch-broken fibres	Fibre discontinue obtenue par craquage par étirage (Fibre craquée)	Reisspinnband	Fibra discontinua strappata	Fibra craqueada	Fibra convertida	Stříž s proměnlivým staplem získaná trháním	Germe-koparma elyaf
<b>Steel cord</b>	Câble d'acier	Stahlkord	Corde (funo) d'acciaio	Cable de acero	Corde de aço	Ocelový kord	Çelik kord
<b>Steel cord wrap</b>	Câble d'acier guipage	Umwicklung bei Stahlkord	Corde (funo) d'acciaio a filo attorcigliato	Arrollamiento de cable de acero	Corde de aço de fio enrolado	Ovinutí ocelového kordu	Çelik kord spirali

<b>Steel filament</b>	Filament métallique (acier)	Stahlfilament	Filo metallico	Filamento de acero	Filamento de aço	Ocelové vlákno	Çelik filament
<b>Stiffness</b>	Rigidité	Biegesteifigkeit	Rigidità-rigidezza	Rigidez	Rigidez	Tuhost	Bükülme sertliği / direnci
<b>Straightened length</b>	Longueur défrisée (étirée)	Entkräuselte Länge	Lunghezza del disarricciato	Longitud enderezada	Comprimento desfrisado (alisado)	Délka po vyrovnání zkadeření	Kıvırcığı açılmış boy
<b>Straightness</b>	Rigidité	Inflexibilität	Inflessibilità	Escuadria	Inflexibilidade (Rigidez)	Vyrovnnání	Düzgünlük
<b>Strain</b>	Allongement relatif	Dehnung, relative	Allungamento relativo	Deformación	Alongamento relativo	Protažení, relativní	Uzama oranı
<b>Strand</b>	Toron	Litze	Trefolo	Cordón	Cordão	Pramen, provazec	İp , Sicim ; Damar (çelik için)
<b>Strength</b>	Résistance	Festigkeit	Resistenza	Resistencia	Resistência	Pevnost	Dayanım
<b>Stress</b>	Contrainte	Spannung	Sollecitazione	Esfuerzo	Esforço	Namáhání	Gerilim
Stress decay	Chute de contrainte	Spannungsabfall	Caduta di sollecitazione	Deformación debida a la fuerza	Esforço de deterioração	Pokles napětí	Gerilim azalması
<b>Stretch-broken fibres</b>	Fibre discontinuee obtenue par craquage (Fibre craquée)	Reisspinnband	Fibra discontinua strappata	Fibra craqueada	Fibra convertida	Stříž s proměnlivým staplem získaná trháním	Germe-koparma elyaf
<b>Stufferbox crimped yarn</b>	Fil texturé par boîte frissante	Stauchkräuselgarn	Filo arricciato (cretato) con camera di cretto	Hilo rizado con caja de rizado	Fio frisado em caixa frissadora	Nitř zkadeřená v pěchovací komoře	(Kıvırcık kutusunda) Sıkıştırma tekstüre ipliği
<b>Tabby</b>	Tabby	Kordgewebeabschnitt (Tabby)	Tabby	Tabby	Tabby	Hladká tkanina (taft)	Tabby
Tabby sample	Echantillon de tabby	Tabbyprobe	Campione di tabby	Muestra de tabby	Amostra de tabby	Vzorek hladké tkaniny	Tabby numunesi
<b>Tangled yarn</b>	Fil enchevêtré	Verwirbeltes Garn	Filo interlacciato	Hilado entrelazado	Fio emaranhado	Pocuchaná (zapletená) nitř	Dolamalı (IMG'li) iplik
<b>Tare</b>	Tare	Tara	Tara	Tara	Tara	Tára	Dara

<b>Tenacity</b>	Ténacité	Feinheitsbezogene Zugkraft	Tenacità	Tenacidad	Tencidade	Poměrná pevnost	Mukavemet
Tenacity at break	Ténacité de rupture	Feinheits beim Bruch	Tenacità a rottura	Tenacidad a la rotura	Tenacidade à rotura	Poměrná pevnost při maximální tahové síle	Kopma dayanımı , Mukavemet (Max. yükte)
Tenacity at specified elongation	Ténacité sous allongement spécifié	Feinheitsbezogene Zugkraft bei festgelegter Dehnung	Tenacità ad allungamento specifico	Tenacidad a un alargamiento especificado	Tenacidade de alongamento específico	Poměrná pevnost při daném prodloužení	Belirli bir % uzamada mukavemet
<b>Tensile strength</b>	Résistance à la traction	Zugfestigkeit	Resistenza alla trazione	Resistencia a la tracción	Resistência à tracção	Pevnost v tahu	Kopma yükü
<b>Tensile stress</b>	Contrainte de traction	Zugspannung	Sforzo di trazione	Esfuerzo de tracción	Esforço de tracção	Napětí v tahu	Kopma gerilimi (Birim kesit alanına)
<b>Tension</b>	Tension	Zug(kraft)	Tensione	Tensión	Tensão	Napětí	Germe kuvveti
<b>Tensioning force</b>	Force de tension	Zugkraft	Forza di tensionamento	Fuerza de tensionamiento	Força de tensão	Napínací síla	Germe kuvveti
<b>Test specimen (synonym: specimen)</b>	Eprouvette d'essai	Messprobe	Provetta	Probeta	Provete	Zkušební vzorek	Numune , Örnek
<b>Textile fibre</b>	Fibre textile	Textilfaser	Fibra tessile	Fibra textil	Fibra textil	Textilní vlákno	Tekstil elyafı / lifi
<b>Textured filament yarn</b>	Fil continu texturé	Texturiertes Filamentgarn	Filo continuo testurizzato	Hilo continuo texturado	Fio continuo texturizado	Tvarovaná nit z nekonečných vláken	Tekstüre filament iplik
<b>Titre (count)</b>	Titre	Titer	Titolo	Título	Titulo	Titř	Numara (İplik ,fıtil , elyafı)
<b>Tolerance</b>	Tolérance	Toleranz	Tolleranza	Tolerencia	Tolerância	Tolerance, odchylka	Tolerans , Limit
Tolerance of commercial mass	Tolérance sur la masse commerciale	Toleranz der Handelsmasse	Tolleranza della massa commerciale	Tolerancia de la masa comercial	Tolerância da massa comercial	Odchylka, tolerance obchodní hmotnosti	Ticari ağırlık toleransı
<b>Top</b>	Ruban	Faserband	Top	Peinado	Top (Penteado)	Česanec	Şerit , Tops
<b>Torsion textured yarn</b>	Fil texturé par torsion	Torsionstexturiertes Garn	Filo testurizzato a torsione	Hilo texturizado por torsión	Fio texturizado por torção	Nit ˘ tvarovaná kroucením	Yalancı bükümlü tekstüre iplik

<b>Toughness at break</b>	Energie de rupture	Feinheitsbezogene Höchstzugkraft-Arbeit	Lavoro a rottura	Tenacidad a la ruptura	Trabalho de rotura	Relativní deformační práce	Birim kopma işi (Max. yükte)
<b>Toughness at rupture</b>	Energie à la rupture	Feinheitsbezogene Bruchkraft-Arbeit	Lavoro a rottura specifico	Tenacidad a la ruptura	Trabalho à rotura específica	Houževnatost při přetržení	Birim kopma işi (Kopmada)
<b>Tow</b>	Câble de filaments (pour fibres discontinues)	Kabel	Cavo di filatura o tow (per fibra discontinua)	Cable (para fibras discontinuas)	Cabo	Kabel	Elyaf bandı , Tow
<b>Twist</b>	Torsion	Drehung	Torsione	Torsión	Torção	Zákrut	Büküm
Twist factor	Coefficient de torsion	Drehungsbeiwert	Coefficiente di torsione	Coeficiente de torsión	Coeficiente de torção	Zákrutový faktor	Büküm katsayısı
Twist level	Niveau de torsion	Drehungzahl	Numero di torsioni	Nivel de torsión	Nível de torção	Počet zákrutů	Büküm sayısı
Twist liveliness	Effet torque	Kringelneigung	Effetto torque	Vivacidad de la torsión	Efeito torque, efeito de torção	Sklon ke tvorbě zákrutů	Büküm canlılığı
Tyre cord fabric	Tissu pour pneumatiques	Reifenkordgewebe	Tessuto per pneumatici	Tejido de cable para neumáticos	Tecido para pneus	Tkanina z kordového vlákn pro pneumatiky	Kord bezi
<b>Weight</b>	Poids	Gewicht	Peso	Peso	Peso	Hmotnost	Ağırlık
<b>Wet modulus</b>	Module au mouillé	Nassmodul	Modulo ad umido	Módulo en húmedo	Módulo em húmido	Modul za mokra	Islak modül
<b>Wire</b>	Fil tréfilé métallique	Draht	Filamento (metallico)	Alambre	Filamento metálico	Drát	Tel
<b>Yarn</b>	Fil	Garn	Filo	Hilo	Fio	Nit	İplik