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Textile glass — Yarns — Designation

Verre textile — Fils — Désignation

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This sixth edition cancels and replaces the fifth edition (ISO 2078:1993), which has been technically revised. It also incorporates the Amendment ISO 2078:1993/Amd.1:2015. The main changes are as follows:

- three type of glass used in [Table 1](#) have been added;
- one type of yarn in [4.1.2](#) has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Textile glass — Yarns — Designation

1 Scope

This document specifies a system of designating textile glass yarns (including single, multiple-wound, folded (plied), cabled and textured yarns, strands, slivers and rovings) based on their linear density expressed in the tex system.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2, *Textiles — Designation of the direction of twist in yarns and related products*

ISO 472, *Plastics — Vocabulary*

ISO 1139, *Textiles — Designation of yarns*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2 and ISO 472 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Designation of a yarn

4.1 Elements of the designation

4.1.1 General

This document shall be in accordance with the rules of the single-to-fold designation given in ISO 1139 to these textile glass products.

According to the specification given in ISO 1139, the designation of a yarn (single yarn, strand, sliver, roving) is a condensed technical description containing the following elements.

4.1.2 Glass used

One or several letters, to specify the glass used by the manufacturer (see [Table 1](#)).

Table 1 — Type of glass

Type	General indications
E	Composition with electrical properties, strength and durability suitable for most applications
D	Composition with a low dielectric constant
A	High alkali content composition typically with lower electrical resistivity, strength and durability than E-glass
C	Composition resistant to corrosion by most acids
S	Composition in the system $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-MgO}$ with high tensile strength and high elastic modulus
R	Composition in the system $\text{SiO}_2\text{-Al}_2\text{O}_3\text{-MgO-CaO}$ with high elastic modulus
AR	Composition resistant to corrosion by alkali
E-CR	E-glass composition modified for improved resistance to corrosion by most acids
Q	Composition of more than 99,9 % silica content with low dielectric constant, high tensile strength, high temperature resistance and chemical resistance, made from high purity silica or natural quartz crystal
QB	Composition of more than 96 % silica content after removing structured water, prepared by acid leaching and heat treatment of drawn fibre and having high temperature resistance and chemical resistance
BF	Composition made from basalt or volcanic rocks whose main raw material is basalt

4.1.3 Type of yarn

A letter to describe the type of yarn:

- C (continuous) for continuous-filament yarns,
- D (discontinuous) for staple-fibre yarns,
- B (binary) for composite yarns.

NOTE These letters are placed in the first group, as it is of special importance in the case of textile glass to distinguish among continuous-filament yarns, staple fibre yarns and composite yarns; their use makes it unnecessary to indicate the number of filaments, preceded by the symbol *f*, as proposed in ISO 1139.

4.1.4 Nominal diameter of fibre

A number, consisting of one or two figures, giving the nominal diameter, in micrometres, of the filament or staple fibre.

4.1.5 Linear density, direction and amount of twist and number of components

Some, or all, of the following elements, according to ISO 1139:

- a) a number giving the linear density expressed in the tex system. It is strongly recommended that the tex be used as the basic unit, in which case the word “tex” can be omitted from the designation (if multiples or submultiples of the tex are used, these units shall be indicated after the value given for linear density);
- b) the direction(s) of twist;
- c) the amount(s) of twist, expressed in turns per metre, for the twist of the final stage, and (if necessary) in the full designation, for the twist of each intermediate stage;
- d) the number of components in folding (plying) or cabling.

4.1.6 Manufacturer's code

If desired, the designation may also include the manufacturer's code, permitting the incorporation of any complementary information that does not appear among the previous elements, for example the type of size and the overall linear density. If it is included, the manufacturer's code shall be placed either before or after the designation as specified below and never between the elements of the designation (for example in the case of folded (plied) yarns having dissimilar components).

4.2 Designation of different types of textile glass yarn

4.2.1 Strands

- a) the type of glass used;
- b) the letter for the type of yarn (see [4.1.3](#));
- c) the nominal diameter, in micrometres, of the filaments followed by a space;
- d) the linear density, preferably in tex [see [4.1.5 a](#))].

EXAMPLE EC10 40

4.2.2 Slivers

- a) the type of glass used;
- b) the letter for the type of yarn (see [4.1.3](#));
- c) the nominal diameter, in micrometres, of the staple fibres, followed by a space;
- d) the linear density, preferably in tex [see [4.1.5 a](#))].

EXAMPLE ED7 190

4.2.3 Single yarns

4.2.3.1 Single continuous-filament yarns

- a) the type of glass used;
- b) the letter for the type of yarn (see [4.1.3](#));
- c) the nominal diameter, in micrometres, of the filaments, followed by a space;
- d) the linear density, preferably in tex [see [4.1.5 a](#))], followed by a space;
- e) the direction of twist, followed by a space;
- f) the amount of twist, expressed in turns per metre.

EXAMPLE EC9 34 Z 40

When several strands are assembled in parallel and twisted together, only the overall linear density of all the strands before twisting is given.

For example, starting with four strands of EC9 34 and twisting these together, the designation of the resulting yarn is EC9 136 Z 40.

4.2.3.2 Single staple-fibre yarns

- a) the type of glass used;

- b) the letter for the type of yarn (see [4.1.3](#));
- c) the nominal diameter, in micrometres, of the staple fibres, followed by a space;
- d) the linear density, preferably in tex [see [4.1.5 a\)](#)], followed by a space;
- e) the direction of twist, followed by a space;
- f) the amount of twist, expressed in turns per metre.

EXAMPLE ED7 190 Z 160

4.2.3.3 Textured yarns

- a) the type of glass used;
- b) the letter for the designation of the original yarn (see [4.1.3](#));
- c) the nominal diameter, in micrometres, of the filaments, followed by a space;
- d) the linear density, preferably in tex [see [4.1.5 a\)](#)], before texturing, followed by a space;
- e) the linear density, preferably in tex [see [4.1.5 a\)](#)], after texturing, preceded by the letter T.

EXAMPLE EC9 340 T352

4.2.4 Folded (plied) (doubled) yarns

4.2.4.1 Folded (plied) yarns having identical components

- a) Full designation:
 - 1) the designation of the single continuous-filament or staple-fibre yarns used, in accordance with [4.2.3.1](#) or [4.2.3.2](#), followed by a space;
 - 2) a multiplication sign, $\times$, followed by a space;
 - 3) the number of single continuous-filament or staple-fibre yarns, followed by a space;
 - 4) the direction of the folding (plying) twist, followed by a space;
 - 5) the amount of folding (plying) twist, expressed in turns per metre.

EXAMPLES

EC9 34 Z 160 $\times$ 2 S 150

ED7 190 Z 160 $\times$ 2 S 260

- b) Simplified designation:
 - 1) the designation of the single continuous-filament or staple-fibre yarns used, in accordance with [4.2.3.1](#) or [4.2.3.2](#), without indication of the direction or amount of twist (the twist of folded (plied) yarns is generally balanced), followed by a space;
 - 2) a multiplication sign, $\times$, followed by a space;
 - 3) the number of single continuous-filament or staple-fibre yarns, followed by a space;
 - 4) the direction of the folding (plying) twist, followed by a space;
 - 5) the amount of folding (plying) twist, expressed in turns per metre.

EXAMPLES

EC9 34 × 2 S 150

EC9 190 × 2 S 260

4.2.4.2 Folded (plied) yarns having dissimilar components

- a) the designations of the single continuous-filament yarns used, in accordance with [4.2.3.1](#), joined by a plus sign, + , preceded and followed by a space, the whole being placed in parentheses and followed by a space;
- b) the direction of the folding (plying) twist, followed by a space;
- c) the amount of folding (plying) twist, expressed in turns per metre.

EXAMPLE (EC9 34 Z 150 + EC7 22 Z 150) S 100

4.2.5 Cabled yarns

- a) Full designation:

The designation of the yarn used, including the direction and the amount of twist for each stage, the information for each stage being separated by a multiplication sign, × , preceded and followed by a space.

EXAMPLE EC9 34 Z 150 × 2 S 100 × 3 Z 80

- b) Simplified designation:

The twist of cabled yarns is generally balanced, and in most cases it is not necessary to know the direction and the amount of twist of each of the intermediate stages; consequently, the simplified designation for a cabled yarn shall only show the direction and the amount of the final twist.

The simplified designation shall therefore consist of the following elements:

- 1) the designation of the single continuous filament yarns, in accordance with [4.2.3.1](#), omitting the direction and the amount of twist, followed by a space;

for each intermediate stage:

- 2) a multiplication sign, × , followed by a space;
- 3) the number of yarns involved, followed by a space;

for the final stage:

- 4) a multiplication sign, × , followed by a space;
- 5) the number of yarns involved, followed by a space;
- 6) the direction of twist, followed by a space;
- 7) the amount of twist, expressed in turns per metre.

EXAMPLE EC9 34 × 2 × 3 Z 80

4.2.6 Multiple wound yarns**4.2.6.1 Multiple wound yarns having identical components**

- a) the designation of the yarn used, followed by a space;