INTERNATIONAL STANDARD 1139

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Textiles — Designation of yarns

First edition — 1973-09-15

UDC 677.017.272.2

Ref. No. ISO 1139-1973 (E)

Descriptors : textiles, yarns, vocabulary, symbols, designation.

Price based on 5 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, International Standard ISO 1139 replaces ISO Recommendation R 1139-1969 drawn up by Technical Committee ISO/TC 38, *Textiles.*

The Member Bodies of the following countries approved the Recommendation :

Australia	India	Portugal
Belgium	Iran	Romania
Canada	Ireland	South Africa, Rep. of
Chile	Israel	Spain
Czechoslovakia	Japan	Sweden
Denmark	Korea, Rep. of	Switzerland
Egypt, Arab Rep. of	Netherlands	Turkey
France	New Zealand	United Kingdom
Germany	Norway	U.S.A.
Hungary	Poland	U.S.S.R.

The Member Bodies of the following countries expressed disapproval of the Recommendation on technical grounds :

Brazil
Italy

Printed in Switzerland

Textiles — Designation of yarns

0 INTRODUCTION

The general introduction of the Tex System for expressing the linear density of yarns requires standardization of the notation for yarn construction. In designating yarns it has been customary — and it remains desirable — to reflect in a condensed form details of the components of a yarn including values of the linear densities, directions and amounts of twist, number of folds, etc. of these components and/or characteristics of the yarn resulting from this construction, such as its linear density indicated as *resultant linear density.*

The resultant linear density of folded and/or cabled yarns — in some cases with strong twisted filament yarns — will generally differ from the sum of the linear densities of the components and, even when starting from the same component yarns, using the same direction and amount of twist, number of folds, etc., yarns with different resultant linear densities may be produced due to differences in conditions during manufacturing of yarns, such as yarn tensions, types of machine used, moisture content of the yarns, atmospheric conditions, etc.

A yarn notation serves two purposes :

a) it is used as a general indication of a yarn; in this case the values for linear densities, amounts of twist, etc. used in the yarn notation will be referred to as *nominal* values;

b) it may be used for reporting the result of an analysis of a yarn; in this case the values derived from an authorised testing procedure for linear densities and amounts of twist used in the yarn notation will be referred to as *actual* values.

Attention is drawn to the fact that the application of the notation of yarns in the Tex System does not affect existing commercial practices in the trade.

Values of linear density and amount of twist used in commercial transactions are *nominal* unless explicitly stated as being actual.

Nominal linear densities and amounts of twist are subject to tolerances, the numerical values of which are usually agreed in the various branches of the textile industry or directly between seller and buyer.

In this International Standard two methods for the notation of yarns are specified, namely :

a) yarn notation starting from the linear density of the single yarn : it may be referred to as *single-to-fold notation;*

b) yarn notation starting from the linear density of the resultant yarn : it may be referred to as *fold-to-single notation.*

The symbols used in both systems are identical. The differences are in the order of presentation, the use of the multiplication sign (×) in the single-to-fold notation, and of the solidus (/) in the fold-to-single notation.

Distinction between these two methods does not apply to single spun yarns, monofilaments and multifilaments without twist, nor to multiple wound yarns. The notation of these yarns is given under the heading of the first method (see 4.1 and 4.2).

It is hoped that ultimately one method may be used to the exclusion of the other. In fact, ISO 858, dealing with yarns for fishing nets, employs only the single-to-fold method, although giving, in the abbreviations, only those items of information that are appropriate.

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies two methods of indicating the composition of yarns, whether single, folded, cabled or multiple wound. The notation comprises linear density indicated in the Text System, number of filaments in filament yarns, direction and amount of twist, and number of folds.

This International Standard has not yet been extended to some special kinds of yarns, for example to fancy yarns, textured or bulked yarns or yarns produced by wrapping a textile or non-textile material round a core; nor does it deal with other features such as constituent fibres, after-treatment and type of package.

2 REFERENCES

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

ISO 858, *Netting yarns for fishing nets — Designation in the Tex System.*

ISO 1144, *Textiles — Universal system for designating linear density (Tex System).*

ISO 2947, *Textiles — Integrated conversion table for replacing traditional yarn numbers by rounded values in the Tex System.*

3 TERMS, DEFINITIONS AND SYMBOLS

For the purposes of this International Standard the following definitions are applicable :

3.1 yarn : A general term covering all the specific types and structures described below.

3.2 single yarn[1] **:** The simplest continuous strand of textile material composed of one of the following :

a) a number of discontinuous fibres, held together generally by twist. Such yarns are described as *spun yarns*;

b) one or more continuous filament(s). Twist may be absent (zero twist yarn) or present. Such yarns are described as *filament yarns*;

c) only one filament. Such yarns are described as *monofilament yarns*;

d) two or more filaments. Such yarns are described as *multifilament yarns.*

3.3 multiple wound yarn : Yarns formed from two or more yarns wound together but not twisted together.

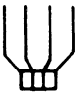
3.4 folded yarn[2] **:** General term designating yarn formed by twisting together two or more single yarns in one folding operation.

3.4.1 twofold yarn : Folded yarn formed from two single yarns twisted together.

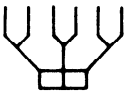
3.4.2 multifold yarn : General term designating folded yarns consisting of more than two single yarns twisted together in one folding operation.

3.4.2.1 threefold yarn : Folded yarn formed from three single yarns twisted together in one single operation.

3.4.2.2 fourfold yarn : Folded yarn formed from four single yarns twisted together in one single operation.



3.5 cabled yarn : Two or more folded yarns (or alternatively folded and single yarns) twisted together in one or more folding operations.



NOTE – In the fishing industry a cabled yarn is generally made of single filaments twisted together, each receiving an additional twist during the twisting operation, which is known as *cabling.*

3.6 yarn notation : Condensed technical description of a yarn, comprising some or all of the following :

- linear density (see 3.7);
- number of filaments;
- direction of twist at each twisting operation;
- amount of twist at each twisting operation;
- number of components in folding;
- number of components in cabling.

3.7 linear density : Mass per unit length of a yarn. It is expressed in tex or multiples or sub-multiples thereof (see ISO 1144).

3.8 resultant linear density : The linear density of the final product resulting from twisting, folding or cabling operations.

NOTES

1 When supplementary chemical or physical treatments have been applied to the final product and their effect has been incorporated in the resultant linear density, this shall be specifically stated.

2 If considered necessary in national standards, attention can be drawn to the fact that the final product may be influenced by various manufacturing operations to such an extent that the use of the resultant linear density may become preferable as a basis for manufacturing calculations.

3.9 Twist

3.9.1 direction of twist : For the definitions of the twist direction and the symbols Z and S, see ISO 2.

3.9.2 amount of twist : The number of turns per metre of the twisted yarn.[3]

3.10 nominal : An adjective indicating a value serving as a name.

NOTES

1 Nominal values serve the purpose of describing characteristics of a yarn in a sufficiently accurate way to be used for calculation in manufacturing. They are subject to the usual commercial tolerances.

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1) For the present this definition does not include polymer tape yarns.

2) *fold* or *ply :* Some sections of the textile industry use *fold, folding, folded,* and some use *ply, plying, plied.* In some sections both words are used interchangeably. In this International Standard *fold* has been used in the English text, but this should not be taken as implying that national standards, based on this International Standard and written in the English language, should use *fold* in preference to *ply.*

3) Pending the universal application of the metric system, the expression of twist in other units of length is allowed, provided that the units are explicitly stated, for example turns per inch, t/i.

2 The nominal linear density of single yarns in the Tex System shall be chosen for the different types of textiles from the special lists agreed by the various sections of the industry (see also ISO 1144 and ISO 2947).

3 Nominal linear density usually refers to the grey yarn; in certain sections of the textile trade, however, the same nominal linear density is used for chemically processed (bleached, dyed, etc.) yarns as for the original unprocessed yarns.

3.11 actual : An adjective indicating a value which results from an authorized testing procedure.

3.12 Symbols

3.12.1 R : symbol for *resultant linear density*, to be put before its numerical value.

3.12.2 f : symbol for *filaments*, to be put before the number of filaments.

3.12.3 t0 : symbol for zero twist.

4 YARN NOTATION BASED ON THE LINEAR DENSITY OF THE SINGLE YARN (SINGLE-TO-FOLD NOTATION)

The following characteristics are stated in the order given below.

In this notation, the resultant linear density may be given as supplementary information. It is separated from the preceding part by a semicolon.

4.1 Single yarns

4.1.1 *Spun yarns*

a) linear density
b) direction of twist
c) amount of twist

EXAMPLE : 40 tex Z 660.

4.1.2 *Monofilaments without twist*

a) linear density
b) symbol f
c) figure 1
d) symbol t0

EXAMPLE : 17 dtex f1 t0.

4.1.3 *Twisted monofilaments*

a) linear density of the monofilament without twist
b) symbol f
c) figure 1
d) direction of twist
e) amount of twist

EXAMPLE : 17 dtex f1 S 800; R 17,4 dtex.

4.1.4 *Multifilaments without twist*

a) linear density
b) symbol f
c) number of filaments laid together
d) symbol t0

EXAMPLE : 133 dtex f 40 t0.

4.1.5 *Twisted multifilaments*

a) linear density
b) symbol f
c) number of filaments twisted together
d) direction of twist
e) amount of twist

EXAMPLE : 133 dtex f 40 S 1000; R 136 dtex.

4.2 Multiple wound yarns

4.2.1 *Multiple wound yarns having similar components*

a) notation, according to 4.1, of the single yarn used
b) multiplication sign, X
c) number of single yarns laid together
d) symbol t0

EXAMPLE : 40 tex S 155 X 2 t0.

4.2.2 *Multiple wound yarns having dissimilar components*

a) notation, according to 4.1, of the single yarns used, connected by the addition sign + and put in brackets
b) symbol t0

EXAMPLE : (25 tex S 420 + 60 tex Z 80) t0.

4.3 Folded yarns

4.3.1 *Folded yarns having similar components*

a) notation, according to 4.1, of the single yarn used
b) multiplication sign, X
c) number of single yarns twisted together
d) direction of folding twist
e) amount of folding twist

EXAMPLE : 34 tex S 600 X 2 Z 400; R 69,3 tex.

4.3.2 *Folded yarns having dissimilar components*

a) notation, according to 4.1, of the single yarns used, connected by the addition sign + and put in brackets
b) direction of folding twist
c) amount of folding twist

EXAMPLE : (25 tex S 420 + 60 tex Z 80) S 360; R 89,2 tex.

4.4 Cabled yarns

4.4.1 *Cabled yarns having similar components*

a) notation, according to 4.3, of the folded yarn used
b) multiplication sign, X
c) number of folded yarns cabled together
d) direction of cabling twist
e) amount of cabling twist

EXAMPLE : 20 tex Z 700 X 2 S 400 X 3 Z 200; R 132 tex.

4.4.2 *Cabled yarns having dissimilar components*[1)]

a) notation, according to 4.1, of the single yarns and, according to clause 4.3, of the folded yarns connected by the addition sign + and put in brackets
b) direction of cabling twist
c) amount of cabling twist

EXAMPLE : (20 tex Z 700 X 3 S 400 + 34 tex S 600) Z 200; R 96 tex.

5 YARN NOTATION BASED ON THE RESULTANT LINEAR DENSITY (FOLD-TO-SINGLE NOTATION)

The following characteristics are stated in the order given below.

In this notation, an indication may be given of the linear density of the single yarn for supplementary information. It is separated from the preceding part by a semicolon.

5.1 Single yarns

5.1.1 *Twisted monofilaments*

a) symbol R
b) resultant linear density
c) symbol f
d) figure 1
e) direction of twist
f) amount of twist

EXAMPLE : R 17,4 dtex f1 S 800; 17 dtex.

5.1.2 *Twisted multifilaments*

a) symbol R
b) resultant linear density
c) symbol f
d) number of filaments twisted together
e) direction of twist
f) amount of twist

EXAMPLE : R 136 dtex f 40 S 1000; 133 dtex.

5.2 Folded yarns

5.2.1 *Folded yarns having similar components*

a) symbol R
b) resultant linear density
c) direction of folding twist
d) amount of folding twist
e) solidus
f) number of single yarns in the folded yarn
g) direction of single yarn twist
h) amount of single yarn twist

EXAMPLE : R 69,3 tex Z 400/2 S 600; 34 tex.

5.2.2 *Folded yarns having dissimilar components*

a) symbol R
b) resultant linear density
c) direction of folding twist
d) amount of folding twist
e) solidus
f) direction and amount of twist in the single yarns used, connected by the addition sign + and put in brackets

EXAMPLE : R 89,2 tex S 360/(S 420 + Z 80); 25 tex + 60 tex.

5.3 Cabled yarns

5.3.1 *Cabled yarns having similar components*

a) symbol R
b) resultant linear density
c) direction of cabling twist
d) amount of cabling twist
e) solidus
f) number of folded yarns in the cabled yarn
g) notation, according to 5.2.1c) to 5.2.1h), of folded yarns having similar components

EXAMPLE : R 132 tex Z 200/3 S 400/2 Z 700; 20 tex.

1) Where the yarns are too complicated to be described with clarity, according to the scheme of 4.4.2, a tabulation arrangement may be used, for example in the single-to-fold notation :

$$\left.\begin{matrix}\text{20 tex Z 700 X 3 S 400}\\ \text{34 tex S 600}\\ \text{40 tex Z 500}\end{matrix}\right\} \text{Z 200} \Big\} \text{S 180; R 150 tex}$$

5.3.2 *Cabled yarns having dissimilar components*[1)]

a) symbol R

b) resultant linear density

c) direction of cabling twist

d) amount of cabling twist

e) solidus

f) directions and amount of twist in the yarns used for the cabling operation, connected by the addition sign +. The notation of the folded yarns, used for the cabling operation, is separated by a solidus from the notation of the direction and amount of twist in the single yarns used, and put in brackets

EXAMPLE : R 96 tex Z 200/(S 600 + S 400/3 Z 700) ; 34 tex + 20 tex X 3.

6 ABBREVIATED NOTATIONS

If not needed, the direction and/or amount of twist and the number of filaments in filament yarns may be omitted. When yarns without twist are being described, the symbol for zero twist shall be used. This is illustrated in 6.1 and 6.2.

6.1 The examples of section 4 may be abbreviated as follows :

Clause reference	
– 4.1.1	Spun yarns : 40 tex
– 4.1.2	Monofilaments without twist : 17 dtex t0
– 4.1.3	Twisted monofilaments : 17 dtex; R 17,4 dtex
– 4.1.4	Multifilaments without twist : 133 dtex t0
– 4.1.5	Twisted multifilaments : 133 dtex; R 136 dtex
– 4.2.1	Multiple wound yarns having similar components : 40 tex X 2 t0
– 4.2.2	Multiple wound yarns having dissimilar components : (25 tex + 60 tex) t0
– 4.3.1	Folded yarns having similar components : 34 tex X 2; R 69,3 tex
– 4.3.2	Folded yarns having dissimilar components : 25 tex + 60 tex; R 89,2 tex
– 4.4.1	Cabled yarns having similar components : 20 tex X 2 X 3; R 132 tex
– 4.4.2	Cabled yarns having dissimilar components : 20 tex X 3 + 34 tex; R 96 tex.

6.2 The examples of section 5 may be abbreviated as follows :

Clause reference	
– 5.1.1	Twisted monofilaments : R 17,4 dtex; 17 dtex
– 5.1.2	Twisted multifilaments : R 136 dtex; 133 dtex
– 5.2.1	Folded yarns having similar components : R 69,3 tex/2; 34 tex
– 5.2.2	Folded yarns having dissimilar components : R 89,2 tex; 25 tex + 60 tex
– 5.3.1	Cabled yarns having similar components : R 132 tex/3/2; 20 tex
– 5.3.2	Cabled yarns having dissimilar components : R 96 tex; 34 tex + 20 tex X 3.

1) Where the yarns are too complicated to be described with clarity, according to the scheme of 5.3.2, a tabulation arrangement may be used, for example in the fold-to-single notation :

$$\text{R 150 tex S 180} \left\{ \begin{array}{l} \text{Z 200} \left\{ \begin{array}{l} \text{S 400/3} \quad \text{20 tex Z 700} \\ \text{34 tex S 600} \end{array} \right. \\ \text{40 tex Z 500} \end{array} \right.$$