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Textiles — Synthetic filament yarns — Determination of dynamic thermal draw-force of partially oriented yarns (POY)

Textiles — Fils de filaments synthétiques — Détermination de la force d'étirage thermique dynamique des fils partiellement orientés (POY)

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Foreword

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This document was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 23, *Fibres and yarn*.

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Textiles — Synthetic filament yarns — Determination of dynamic thermal draw-force of partially oriented yarns (POY)

1 Scope

This document specifies a method for the determination of the dynamic thermal draw-force of partially oriented synthetic filament yarns.

It is applicable to partially oriented polyester (PES), polyamide (PA) and polypropylene (PP) filament yarns, with a linear density less than 800 dtex.

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 139, *Textiles — Standard atmospheres for conditioning and testing*

ISO 2076, *Textiles — Man-made fibres — Generic names*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 2076 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp/ui
— IEC Electropedia: available at https://www.electropedia.org/

3.1
dynamic thermal draw-force
force caused by drawing the running filament yarns to a certain ratio under a certain heater temperature and testing speed

4 Principle

The continuous filament yarn runs into the dynamic thermal draw-force tester at a certain testing speed under constant pretension, then passes a heater and drawing device. It is drawn to a specific ratio while being heated at a specified temperature. The dynamic thermal draw-force is determined.

5 Apparatus

5.1 Dynamic thermal draw-force tester, which meets the following requirements:

a) tensioning device to apply specified pretension on filament yarns and maintain tension to an accuracy of ±10 %;

b) heater to maintain temperature to an accuracy of ±2 °C;

NOTE The results of thermal draw-force being tested in heaters with different length can differ.

c) feeding device to adjust testing speed, with a speed variation less than 2 %;

d) drawing device to adjust draw-ratio within [1,20, 1,90], with a speed variation less than 2 %;

e) force measuring and data collecting device to indicate force values with an error less than 1 % of the nominal value, within [10 %, 90 %] of the full range;

f) yarn aspirator to clear the tested yarns and thereby allow continuous testing.

5.2 Sample holder, to support packages.

6 Testing conditions

6.1 Pretension

Pretension per unit linear density is intended to be (0,050 ± 0,005) cN/dtex.

6.2 Heater temperature

Heater temperatures are variable for different types and nominal linear densities of yarns.

Recommended values of heater temperature are listed in Table 1.

Other heater temperature values may be determined on agreement between the interested parties. Additional information is given in Annex A.

Table 1 — Heater temperature for different types of filament yarns

Type of the yarns	Heater temperature (°C)
poly (ethylene terephthalate) (PET)	170 ± 2
poly (trimethylene terephthalate) (PTT)	145 ± 2
poly (butylene terephthalate) (PBT)	150 ± 2
polypropylene (PP)	140 ± 2
polyamide 6 (PA6)	150 ± 2
polyamide 66 (PA66)	170 ± 2

6.3 Draw-ratio

Draw-ratios are related to the tensile properties of the yarns.

Recommended values of draw-ratio are listed in Table 2.

Other draw-ratio values may be determined on agreement between the interested parties.

Table 2 — Draw-ratios for different types of filament yarns

Type of the yarns	Draw-ratio
poly (ethylene terephthalate) (PET)	1,65 ± 0,01
poly (trimethylene terephthalate) (PTT)	1,75 ± 0,01
poly (butylene terephthalate) (PBT)	1,25 ± 0,01
polypropylene (PP)	1,70 ± 0,01
polyamide 6 (PA6)	1,25 ± 0,01
polyamide 66 (PA66)	1,25 ± 0,01

In order to ensure the comparability of test results, tests shall be carried out under the same draw-ratio.