भारतीय मानक
Indian Standard

IS 17261 : 2022

वस्त्रादि — पालिएस्टर सतत तंतु पूर्ण आह्रत धागे — विशिष्टि

(पहला पुनरीक्षण)

Textiles — Polyester Continuous Filament Fully Drawn Yarns — Specification

(First Revision)

ICS 59.080.20

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April 2022 **Price Group 8**

Man-made Fibres, Cotton and their Products Sectional Committee, TXD 31

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Man-made Fibres, Cotton and their Products Sectional Committee had been approved by the Textiles Division Council.

Fully drawn yarn (FDY) is produced by a process similar to partially oriented yarn (POY) manufacturing except that the yarn is produced at higher spinning speeds coupled with intermediate drawing integrated in the process itself.

This standard was first published in 2019 and has been revised to incorporate the following changes:

a) Scope of the standard has been modified;
b) Requirement and test method for identification of material has been incorporated;
c) All amendments have been incorporated;
d) Table for physical requirements of polyester fully drawn yarn has been modified;
e) Table for chemical requirements of polyester fully drawn yarn has been modified;
f) Freedom from yarn defects has been modified;
g) Marking and packing clause has been modified; and
h) References to Indian Standards have been updated.

The composition of the Committee responsible for the formulation of this standard is given in Annex G.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TEXTILES — POLYESTER CONTINUOUS FILAMENT FULLY DRAWN YARNS — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard specifies requirements for all types of *virgin and recycled* polyester continuous single multifilament or monofilament flat fully drawn yarns (FDY) for various end usages.

1.2 This standard does not specifies requirements for parallel, doubled or plied polyester fully drawn yarns.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMS AND DEFINITIONS

For the purpose of this standard, the following definitions shall apply.

3.1 Cationic Dyeable Polyester — Polyester, modified chemically to make it receptive to cationic dyes.

3.2 Commercial Allowance — A defined percentage to be added to the oven-dry mass of the material for the calculation of commercial mass and certain other properties. This allowance includes the moisture content and the content of the substances which can be removed during analysis, for example, spin finish, oligomers etc.

NOTE — The commercial allowance for polyester FDY shall be 3.0 percent.

3.3 Commercial Mass — The mass obtained by adding to the oven-dry mass, the mass corresponding to the commercial allowance.

3.4 Cross Section — The shape of a yarn when viewed perpendicular to its axis.

NOTE — The shape of man-made yarn can be influenced by the spinning process and subsequent processing and treatments.

3.5 Flat Yarn — Man-made continuous filaments that have not been twisted or textured.

3.6 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 — At present the minimum limit used for high tenacity polyester filament yarns is 7.2 gpd (64 cN/Tex).

3.7 Industrial Filament Yarn — Yarn intended for industrial applications and use in products principally but not exclusively for their performance and properties as opposed to their aesthetic or decorative characteristics.

3.8 Intermingled Yarn (Interlaced Yarn) — A multifilament yarn in which cohesion is imparted to the constituent filaments usually by passing the yarn through a turbulent air without causing entwining of the filaments and the formation of randomly distributed interlacing points (knots).

NOTE — The knots are not actually the knots tied when two threads are broken but they are the tangle knots created by opening up of filaments and mingling under the influence of air pressure. This creates compact sections in the yarn imparting cohesiveness.

3.9 Oven-dry Mass — The mass obtained by drying the filament yarn usually after removal of added products such as finish, oil and extractable matters.

3.10 Mono Yarn — It is continuous strand of twistless single or two filament yarn.

3.11 Mother Yarn — It is a continuous drawn multifilament yarn without entanglement, where its individual filament can be separated continuously at subsequent downstream process.

3.12 BSY (Bi-shrinkage Yarn) — It is continuous strand of filament yarn, comprising of one strand of POY and one strand of FDY, which upon exposure of heat, creates differential shrinkage between the two strands within one yarn.

3.13 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.

3.14 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.

3.15 HSY (High Shrinkage Yarn) — It is continuous strand of filament yarn which upon exposure of heat, creates high shrinkage.

4 CLASSIFICATIONS

The classification of filament yarn shall be declared by the manufacturer as described below:

4.1 Based on Cross Section, For Example

4.1.1 The most common cross-sectional views are as seen in the following figures when seen under a suitably powerful magnifying microscope

4.1.1.1 *Circular*

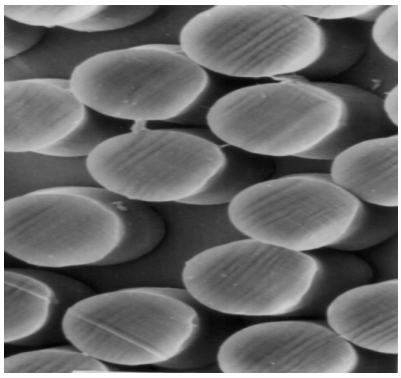

FIG. 1 CIRCULAR

4.1.1.2 *Profiled*

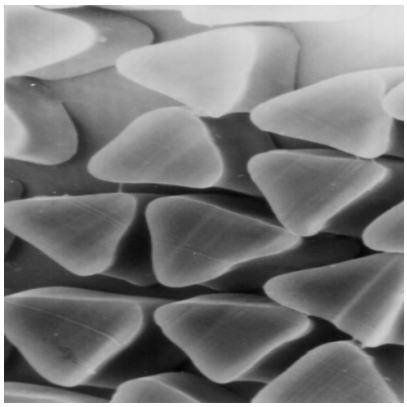

FIG. 2 ANGULAR (TRIANGULAR)

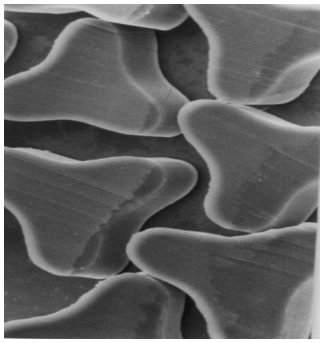

FIG. 3 LOBAL (TRILOBAL)

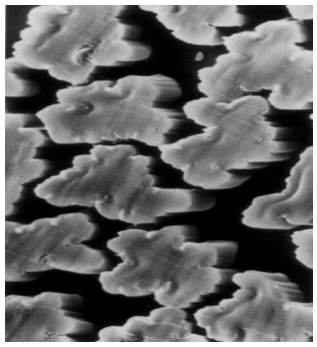

FIG. 4 SERRATED

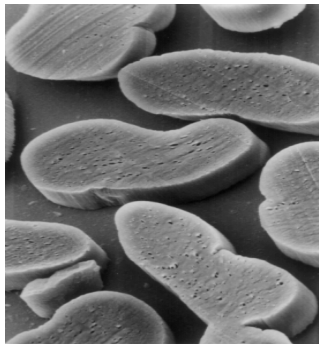

FIG. 5 OVAL (BEAN SHAPED)

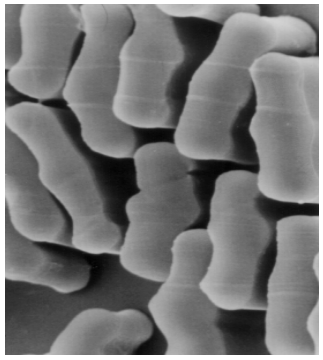

FIG. 6 RIBBONLIKE

4.2 Based on Cross Sectional Area, For Example

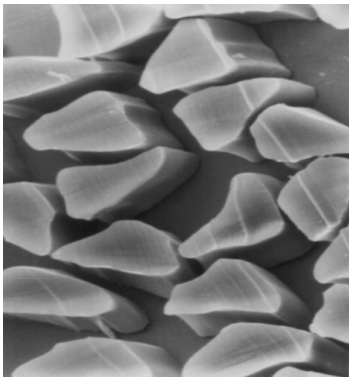

FIG. 7 SOLID

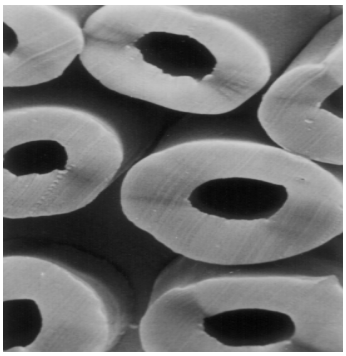

FIG. 8 HOLLOW

4.3 Based on Multi Component Fibres, For Example

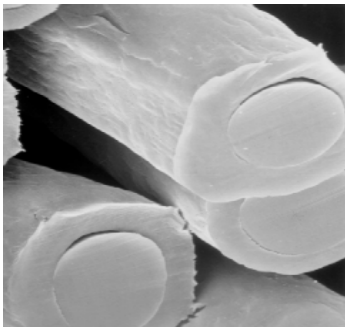

FIG. 9 CONCENTRIC COVER-CORE

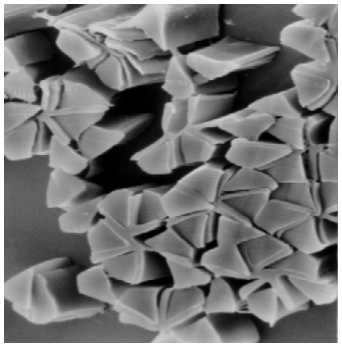

FIG. 10 MATRIX

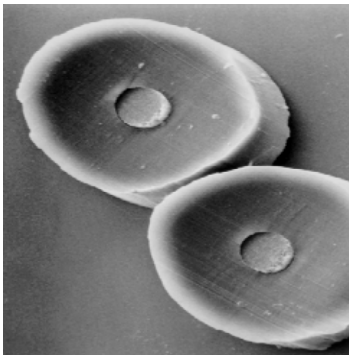

FIG. 11 SHEATH-CORE

4.4 Based on Lustre

4.4.1 *Full Dull (FD)*

4.4.2 *Semi Dull (SD)/Semi Dull Optically Bright (SDOB)*

4.4.3 *Bright (BRT)/Optically Bright (OBRT)*

4.4.4 *Super Bright (SBRT)*

4.5 Based on Dyeing Method

4.5.1 *Disperse Dyeable [Conventional Dyeable (COD)/Stock Dyeable (STD/Easy Dyeable (ED)]*

4.5.2 *Cationic Dyeable (CD)/Easy Dyeable Cationic (EDCD)*

4.5.3 *Dope Dyed (DD)/Optically White (OW)*

NOTE — Undyed yarns may be declared as 'conventional dyeable/stock dyeable (COD/SD)', cationic dyeable (CD)', 'easy dyeable (ED)' or 'easy dyeable cationic (EDCD)' by the manufacturer depending upon its dyeability.

5 DESIGNATION AND DESCRIPTION OF FULLY DRAWN YARN

5.1 Designation of Yarn

A recommended standard notation for yarn designation as per the industry practices based on yarn construction is specified in Table 1. The notation reflects in a condensed form the details of 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 have been specified. 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 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; and

t_0 = 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 (+). The notation is best illustrated by examples given in Table 1.

5.2 Identification and Description

5.2.1 The material of the yarn, that is polyester, shall be identified by confirmatory tests either as per:

a) Microscopic and dissolution test given in IS 667 and melting point of 240 °C, *Min* when tested as per method specified in Annex J of IS 16481; or

b) Staining tests given in IS 667.

5.2.2 The polyester fully drawn yarn shall be described using the classification (*see* **4**), the designation of the yarn (*see* **5.1**) and identification of polyester fully drawn yarn as given in Table 2.

6 REQUIREMENTS

6.1 The linear density, tenacity, elongation and boiling water shrinkage of polyester fully drawn yarn (FDY) shall be declared by the manufacturer within the specified range and shall fall within the tolerances specified in Table 3 in accordance with the description of the yarn.

6.2 The polyester fully drawn yarn (FDY) shall meet the chemical requirements specified in Table 4.

6.2.1 The monofilament and the mother yarn shall comply with the requirements specified in Table 3 and Table 4 in addition to all other requirements.

Table 1 Examples of Notation of Textile Yarns

(*Clause* 5.1)

Sl No.	Type of Yarn	"Single to Fold" Notation	"Fold to Single" Notation
(1)	(2)	(3)	(4)
1	**Single yarns**		
	Single yarn without twist	17 dtex f1	–
	Single yarn with twist	17 dtex f1 S800 R17.4 dtex	R17.4 dtex f1 S800 17 dtex
2	**Multiple wound yarns with**		
	Similar components	40 tex S155 × 2	–
	Dissimilar components	(25 tex S420 + 60 tex Z80)	–
3	**Doubled, folded or plied yarns with**		
	Similar components	34 tex S600 × 2 Z400; R69.3 tex	R89.2 tex S360/(S420 + Z80)
	Dissimilar components	(25 tex S420 + 60 tex Z80) R89.2 tex	25 tex + 60 tex
4	**Cabled yarns with**		
	Similar components	20 tex Z700 × 2 S400 x 3 Z 200; R132 tex	R132 tex; Z 200/3 S400/2 Z700; 20 tex
	Dissimilar components	(20 tex Z700 × 3 S400 + 34 tex S600) Z200	R96 tex Z200/(S600+S400/3 Z700); 34 tex

NOTES

1 Prefixes and multiples shall be written without space.

2 A space shall be used to separate the different characteristics of the yarn construction.

3 '×' or '/' used to mark multiple yarn components shall be separated with spaces.

4 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 twist less yarns may include the symbol for zero twist.

5 Values of linear density and of twist level used in commercial transactions are usually nominal values and are subject to tolerances as per this standard.

Table 2 Identification of Polyester Fully Drawn Yarn

(*Clause* 5.2.2)

Sl No.	Special Characteristics	Examples
(1)	(2)	(3)
i)	Mono or multifilament	100/1, 150/48, 50/24, 70/36, 70/72
ii)	Fibre cross-section	Round, trilobal, serrated, octolobal, triangular, rice shaped, plus shaped etc.
iii)	Filament count	150/48 Number of filaments is 48
iv)	Denier per filament	50/24 DPF = 2.08
v)	Overall denier	840/120 (840)
vi)	Finish level	0.80 to 1.50 percent on weight of yarn
vii)	Lustre	Full dull (FD), Semi dull (SD), Optically bright (OBRT), Bright (BRT), Super bright (SBRT), Semi dull optically bright (SDOB) etc.
viii)	Dyeing method	Dope dyed (DD), Easy dyeable (ED), Easy Dyeable Cationic (EDCD), Cationic dyeable (CD), Disperse dyeable [conventionally dyed (COD)/stock dyed (STD)/easy dyeable (ED)]
ix)	Flame retardant	FR
x)	Anti – microbial	AM
xi)	Ultra violet light resistant	UV
xii)	Optically white	OW
xiii)	High oriented yarn	HOY
xiv)	Special cross section	Profile hollow/mixed cross sections
xv)	Thick and thin yarn	TnT
xvi)	Bi-shrinkage yarn	BSY
xvii)	High shrinkage yarn	HSY
xviii)	Recycled yarn R	FDY
xix)	Mother yarn	MFDY

NOTES

1 Special Characteristic other than above may also be included in the yarns as agreed to between the buyer and seller, provided the finished product meets the requirements of this standard.

2 The description of various special characteristics given in Table 2 is for information and use only to indicate the identification of FDY.

Table 3 Physical Requirements of Polyester Fully Drawn Yarn

(*Clauses* 6.1, 6.2.1 *and* 8.3)

Sl No.	Description	Linear Density, Denier (dtex)		Uneveness U Percent, *Max*	Tenacity, gpd (cN/dtex)		Elongation, Percent		Boiling Water Shrinkage, Percent	
		Range	Tolerance		Range	Tolerance	Range	Tolerance	Range	Tolerance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	FD/SD/BRT/SBRT/OW	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	3.0 – 5.0 (2.65 – 4.42)	± 0.4 (0.35)	18 – 45	± 5	3 – 12	± 1.5
ii)	CD/EDCD	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	5	2.0 – 4.0 (1.59 – 3.98)	± 0.4 (0.35)	30 – 60	± 5	3 – 13	± 1.5
iii)	HOY	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	2.0 – 4.5 (1.77 – 3.98)	± 0.4 (0.35)	60 – 95	± 6	1.5 – 6.0	± 1.5
iv)	Hollow/mixed/special cross section profile yarn/DD	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	2.0 – 5.0 (1.77 – 4.42)	± 0.5 (0.44)	13 – 45	± 7	3 – 12	± 1.5
v)	Thick and thin yarn	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	20	2.0 – 4.5 (1.77 – 3.98)	± 0.8 (0.71)	50 – 95	± 20	10 – 50	± 5
vi)	a) BSY	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	1.5 – 5.0 (1.32 – 4.42)	± 0.5 (0.44)	25 – 55	± 7	20 – 65	± 7
	b) HSY	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	1.5 – 5.0 (1.32 – 4.42)	± 0.5 (0.44)	25 – 55	± 7	25 – 70	± 7
vii)	Recycled yarn	As declared ≤ 65 (72) > 65 (72)	 ± 3.8 percent ± 2.5 percent	2.5	2.6 – 5.0 (2.30 – 4.42)	± 0.4 (0.35)	25 – 55	±5	3 – 12	± 1.5
viii)	Mother yarn (CD/SBRT/SD/DD/BRT/FD/OW)	120 – 450 (133 – 500)	± 3.0 percent	2.5	> 3.8 (3.26)	± 0.4 (0.35)	25 – 35	±5	6.5 – 8.2	± 1.0
ix)	Mono yarn (CD/SBRT/SD/DD/BRT/FD/OW)	10 – 40 (11 – 44.5)	± 2.0	–	> 3.5 (3.1)	± 0.4 (0.35)	24 – 34	±5	7.0 – 9.0	± 1.0
	Method of Test	IS 7703 (Part 1)		IS 7703 (Part 5)	IS 7703 (Part 2)		IS 7703 (Part 2)		IS 17087	

NOTES

1 All FDY yarns types can be combination of any lustre (FD/SD/BRT/SBRT/CD/DD) and any type of cross sections. For specialized polyester FDY given at Sl No. iii) to ix) of Table 3, may have any combination based on lustre, dyeing method and type of cross section. In these cases the requirements as specified against the specialized variety [*see* Sl No. iii) to ix) shall be applicable.

2 Interlace in nips per meter shall be 5-35 with a tolerance of ± 5 subject to a minimum of 5 when tested by the method prescribed in Annex B of IS 17262, Except for mother yarn where interlace can be up to zero.

3 Tolerance on number of filaments in case of multifilament yarns when tested visually shall be ± 0 percent if no. of filaments are ≤ 60 and ± 1 percent if the no. of filaments are > 60.

Table 4 Chemical Requirements of Polyester Fully drawn Yarn

(*Clauses* 6.2 *and* 6.2.1)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Moisture regain, percent, *Max* at equilibrium condition	0.4	Annex B
ii)	Isophthalic acid (IPA) content, percent, *Max*		Annex C of IS 16481
	a) Virgin polyester yarn	Not detected	
	b) Dope dyed/white yarn	0.1	
	c) Recycled polyester yarn	2.2	
iii)	Water soluble matter, percent, *Max*	2.5	IS 3456
iv)	Finish oil pick-up, percent (as declared), with a tolerance of ± 30 percent on declared value	(0.5-2.2)	Annex C
v)	Phosphorus content, percent, *Min* (For fire retardant yarn only)	0.65	Annex D
vi)	Ultraviolet resistance, 500 h Percent retained strength, *Min* (For UV resistant yarn only)	70	IS 13162 (Part 2)
vii)	Anti-microbial activity value, *Min* (For anti-microbial yarn only)	2.0	IS/ISO 20743
viii)	Colour strength with reference to standard yarn, percent (For dope dyed yarns only) (*see* NOTE)	100 ± 4	Annex E
ix)	Colour difference with reference to standard yarn, measured as ΔE, *Max* (for dope dyed yarns only) (*see* NOTE)	1.5	Annex E

NOTE — Either of the requirements indicated at viii) and ix) needs to be complied with.

6.3 Freedom from Yarn Defects

The yarn packages shall be free from the following defects (*see also* **9.3.2**).

6.3.1 *Broken Filaments* — Shall not be more than one per kg.

6.3.2 *Crossed Ends* — Nose end crosses can be allowed, unless they appear matted or too numerous to count. Up to two, 25 mm crosses on the tail end are allowed or crosses < 6 mm from the tube may be allowed.

6.3.3 *Damaged/Bumped* — Only touching impression of up to 5 mm depth may be allowed.

6.3.4 *Dirt/Grease* — No soiling or grease spots shall be allowed. It is acceptable if the spots can be cleaned off. Defect with slight grey/yellow stains shall not be more than 0.5 per kg and more than 5 mm in length.

6.3.5 *Finish Oil Contamination* — Dry or regular oil yarn shall not be contaminated with finish oil when viewed under a packing table UV light, unless very slight (not immediately visible). Strip to clean if possible. Otherwise reject to off-grade.

6.3.6 *Improper Ply* — Count the number of ends if the yarn is three ply or more. Also check the tail. Air strip the yarn to correct if possible. No improper ply with different number of ends and tails shall be allowed.

6.3.7 *Improper Wind* — No patterns or bands, no high or falling off edges and no excessive hard/soft packages shall be allowed.

6.3.8 *Inadequate Tube Clearance* — It shall be 9 mm, *Min* from yarn roll to tail end of tube and 25 mm, *max* (nominal should be 15 mm).

6.3.9 *Indistinct Tail* — Tail end coils to be distinct and minimum tail length shall be one wrap around the tube. Missing, bunch and multiple tails shall not be off graded.

6.3.10 *Latching* — Plies that separate when winding off package shall not be allowed.

6.3.11 *Loops* — Not more than 1.5 loops per kg of yarn each of length less than 10 mm shall be allowed.

6.3.12 *Oversize or Small Packages* — Check suspect packages with appropriate gauge, scale, diameter tape or balance. All equal length bobbins of respective products should be graded and packed separately. Unequal length bobbins are to be graded based on their weights and packed in respective grades. Bobbins with different sizes in terms of length and weight, packed in same package shall not be allowed.

6.3.13 *Ridges/Grooves* — Ridges or grooves < 5 mm high or deep may be allowed.

6.3.14 *Slubs/Kinks* — None shall be allowed.

6.3.15 *Tube Defects* — Crushed, nicked, or cut tubes, especially on the nose end shall not be allowed.

6.3.16 *Uneven Fluorescent Oil* — If applicable, the package(s) having uneven coverage under UV light shall not be allowed.

6.3.17 *Wound in Waste* — May be accepted if it can be corrected by stripping.

6.4 Lustre/Brightness

The yarn shall be classified as full dull, semi dull, bright or super bright on the basis of lustre and shall meet the requirements specified in Table 5 when tested by the method prescribed in Annex F.

Table 5 Requirements of Brightness

(*Clause* 6.4)

Sl No.	Type of FDY	TiO_2 Content, Percent
(1)	(2)	(3)
i)	Full dull (FD)	Above 1.5
ii)	Semi dull (SD)/SDOB	Above 0.16 and up to 1.5
iii)	Bright (BRT)/OBRT	Up to 0.16
iv)	Super bright (SBRT)	Not detected

6.5 Colour Fastness Properties

The dyed yarns shall meet the respective colour fastness requirements as specified in Table 6.

6.6 Commercial Mass

The commercial mass shall be obtained by adding mass corresponding to commercial allowance of 3.0 percent to the oven dry mass of the consignment when tested by the methods prescribed in IS 7703 (Part 3) and it shall not be less than the declared commercial mass of the consignment.

6.7 Additional Requirements for Ecomark (Optional)

For Ecomark, the product shall also comply with the additional requirements as given in Table 7.

7 PACKING

7.1 The polyester fully drawn yarn (FDY) shall be wound over bobbins in any mass up to 11 kg of yarn per bobbin. All such packages shall be to be packed in pallets or cartons, properly strapped using polypropylene/ PET straps. Packing materials should be roadworthy/airworthy/sea worthy as agreed to between the buyer and the seller.

7.2 All wooden pallets used for packing are to be heat treated. All wooden/paper packing should be free from infestation/fungal growth.

NOTE — Container fumigation for domestic supply should be optional.

8 MARKING

8.1 Each carton/pallet of polyester fully drawn yarn (FDY) shall be marked with indelible ink, the following information:

a) Name and description of the material (*see* **5.2**);
b) Designation of the material (*see* **5.1**);
c) Commercial mass of each carton/Pallet;
d) Manufacturer's name, address and trade-mark (if available);
e) Lot/batch/merge number;
f) Month and year of manufacture; and
g) Any other information required by the law in force.

8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

8.3 The declared parameters as per Table 3 shall be provided in the form of a technical data sheet by either pasting on the package or provided separately linking it with lot/batch/merge no. on request for domestic supplies.

8.4 Instructions for transportation and handling of the material shall also be provided by the manufacturer for proper care of the product.

9 SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Lot

The number of packages (*see* **7.1**) in all cartons/pellets of polyester fully drawn yarn (FDY) of the same description and designation delivered to a buyer against one dispatch note shall constitute a lot.

9.2 The number of packages to be selected at random from a lot shall be according to column 3 of Table 8. The packages shall be selected at random from different cartons/pallets to constitute the sample size. To ensure the randomness of selection, IS 4905 may be followed.

9.3 Number of Tests and Criteria for Conformity

9.3.1 The number of packages to be selected for manufacturing defects shall be in accordance with

Table 6 Colour Fastness Properties

(*Clause* 6.5)

Sl No.	Colour Fastness Rating To	Requirement, *Min*			Method of Test
		Dope dyed (DD)/Optically white (OW)	Cationic dyed (CD)/Easily dyeable cationic dyed (EDCD)	Disperse dyed [Conventional dyed (COD)/Easy dyed dyed(ED)/Stock dyed	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Light Change in colour	7	5	5	IS/ISO 105-B01 or IS/ISO 105-B02
ii)	Washing, Test 2				IS/ISO 105-C10
	a) Change in colour	5	4	4	
	b) Staining	4	3	3	
iii)	Rubbing				IS/ISO 105-X12
	a) Dry	5	4	4	
	b) Wet	4	3	3	
iv)	Perspiration (acidic and alkaline)				IS/ISO 105-E04
	a) Change in colour	5	4	4	
	b) Staining	4	4	4	

Table 7 Additional Requirements for ECO-Mark (Optional)

(*Clause* 6.7)

Sl No.	Characteristic	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Free and releasable formaldehyde, mg/kg (ppm), *Max*	20	IS 14563 (Part 1) and IS 14563 (Part 2)
ii)	Extractable heavy metals by artificial Acidic sweat/saliva, ppm, *Max*		Annex A of IS 15651
	a) Mercury	0.1	
	b) Chromium III	0.1	
	c) Chromium VI	Not Detected	
	d) Lead	0.2	
	e) Cadmium	0.1	
	f) Copper	25	
	g) Antimony	30	
	h) Pentachlorophenol, ppm, *Max*	0.5	Annex B of IS 15651
iv)	Pesticides (Sum parameter), ppm, *Max*	1.0	Annex D of IS 15651
v)	Banned Pesticides, ppm, *Max*	Not detected	Annex D of IS 15651
vi)	Banned azo colourants (arylamines), mg/kg (ppm), *Max.* (For dyed yarn only) (Sum parameters)	20	IS 15570

column 3 of Table 8. For all other properties, the number of packages selected shall be in accordance with column 5 of Table 8. These packages may be selected from the packages selected for non-destructive tests.

9.3.2 All the packages selected from the lot shall be visually examined for yarn defects as specified in **6.3**. Four such defects will be considered as one major defect. A package shall be considered defective if it contains any major defect. All the packages selected for destructive tests shall be tested for the requirements as specified in **6.1**, **6.2** and **6.4** to **6.7** as applicable.

9.3.3 The lot shall be declared conforming to the requirements of this standard if the total number of defective packages does not exceed the value given in column 4 of Table 8 for yarn defects or column 6 of Table 8 for other requirements.

Table 8 Number of Packages of Yarn to be Selected

(*Clauses* 9.2, 9.3.1 *and* 9.3.3)

Sl No.	Lot Size	Non-Destructive Testing		Destructive Testing	
		No. of Packages to be Selected	Acceptance Number	No. of Packages to be Selected	Acceptance Number
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 280	13[1]	1	8	0
ii)	281 – 500	20	2	8	0
iii)	501 – 1 200	32	3	13	0
iv)	1 201 – 3 200	50	5	13	0
v)	3 201 – 10 000	80	7	20	1

[1] or lot size when less than 13.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
667 : 1981	Methods for identification of textile fibres (*first revision*) (with supplement)
3456 : 1966	Method for determination of water soluble matter of textile materials
4905 : 2015	Random sampling and randomization procedures (*first revision*)
6359 : 1971	Method for conditioning of textiles
7703	Methods of test for continuous filament polyester and polyamide flat yarn
(Part 1) : 1990	Linear density (*first revision*)
(Part 2) : 1990	Dry and wet tenacity and elongation (*first revision*)
(Part 3) : 1991	Commercial mass (*first revision*)
(Part 5) : 1990	Unevenness percentage
13162 (Part 2) : 1991	Geotextiles — Methods of test: Part 2 Determination of resistance to exposure of ultra-violet light and water (Xenon arc type apparatus)
14563	Textiles — Determination of formaldehyde
(Part 1) : 2021	Free and hydrolysed formaldehyde water extraction method (*first revision*)
(Part 2) : 2021	Released formaldehyde vapour absorption method (*first revision*)
15570 : 2005	Textiles — Method of test — Detection of banned azo colourants in coloured textiles
15651 : 2006	Textiles — Requirements for environmental labelling — Specification
16481 : 2016	Textiles — Synthetic micro-fibres for use in cement based matrix — Specification
17087 : 2019	Textiles — Manmade filament yarns — Determination of shrinkage in boiling water
17262 : 2022	Textiles — Polyester partuially oreiented yarn (POY) — Specification (*first revision*)
IS/ISO 105-B01 : 2014	Textiles — Tests for colour fastness: Part B01 Colour fastness to light: Daylight
IS/ISO 105-B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light: Xenon arc fading lamp test
IS/ISO 105-C10 : 2006	Textiles — Tests for colour fastness: Part C10 Colour fastness to washing with soap or soap and soda
IS/ISO 105-E04 : 2013	Textiles — Tests for colour fastness: Part E04 Colour fastness to perspiration (*first revision*)
IS/ISO 105-X12 : 2016	Textiles — Tests for colour fastness: Part X12 Colour fastness to rubbing (*first revision*)
IS/ISO 20743 : 2013	Textiles — Determination of antibacterial activity of textile product

ANNEX B

(*Table* 4)

METHOD FOR DETERMINATION OF MOISTURE REGAIN

B-1 PRINCIPLE

The specimen is conditioned in the standard atmosphere, weighed, oven dried, weighed again and the moisture content is calculated. From this, the moisture regain is calculated and expressed as a percentage.

B-2 APPARATUS

B-2.1 Precision Balance

B-2.2 Stainless Steel Vessels

B-2.3 Forceps

B-2.4 Hot Air Oven — Capable of maintaining at 110 ± 5 °C.

B-2.5 Wrap Reel

B-3 CONDITIONING OF SAMPLES

The samples shall be allowed to condition at temperature of 27 ± 2 °C and a relative humidity of 65 ± 2 percent before carrying out the tests. All tests shall also be performed under standard conditions (*see* IS 6359).

B-4 PROCEDURE

Weigh the yarn skein before the test (W_1) and dry in the oven at a temperature of 110 ± 5 °C. After thirty minutes weigh the sample and record its mass. Subsequently carry out the weighing every twenty minutes until a constant mass (W_2) is obtained. Calculate the moisture content using the relations:

$$W = W_1 - W_2 \qquad \text{..... (1)}$$

$$\text{Moisture content, percent} = \frac{100 \times W}{W_1}$$

B-5 CALCULATE THE MOISTURE REGAIN BY THE FOLLOWING FORMULA:

$$\frac{\text{Moisture content, percent} \times 100}{100 - \text{Moisture content, percent}}$$

ANNEX C

(*Table* 4)

METHOD FOR DETERMIBATION OF FINISH OIL PICK UP

C-1 PRINCIPLE

The specimen is extracted with petroleum ether in soxhlet apparatus and then distilled. The specimen is then dried, and oil pick up is calculated from the mass of original specimen and the dried specimen.

C-2 APPARATUS

C-2.1 Precision Balance

C-2.2 Stainless Steel Vessel/Conical Flask with Stopper and Plastic Beaker

C-2.3 Forceps, Tongs

C-2.4 Drying Oven

C-2.5 Plastic Tray/Bowls

C-3 PROCEDURE

C-3.1 Take the hank (normally, prepared for denier check of yarn and note down the actual weight of the sample (A).

C-3.2 Take required amount of petroleum ether in the vessel/conical flask and immerse the yarn hank in it with the help of tongs for extraction of oil from yarn samples for 15 min.

C-3.3 After 15 min take out sample from petroleum ether, squeeze it completely and then place the yarn samples in the tray, kept it in open air for 20 min for evaporation of excess petroleum ether.

C-3.4 Then put the hanks in oven at 60 °C temperature. Take out the yarn sample from the oven after drying for 15 min.

C-3.5 Keep the yarns for cooling at room temperature for 10 to 15 min.

C-3.6 Weigh the yarn and note down the weight (*B*).

C-4 CALCULATION

Calculate the percent oil extraction by the formula:

$$\text{Percent oil extraction} = \frac{A-B}{A} \times 100$$

NOTE — For quick and direct comparative estimation of finish oil pick up, Nuclear Magnetic Resonance (NMR) apparatus may be used. Therefore, spin finish can be observed and quantitatively analyzed by routine TD-NMR method.

ANNEX D

(*Table* 4)

DETERMINATION OF PHOSPHORUS CONTENT

D-1 INTRODUCTION

This method is applicable to determine phosphorus content in polymer by colorimetry. Phosphorous present in polymer sample is converted to water soluble orthophosphate form. This solution is then reacted with ammonium molybdate to form molybdo phosphoric acid complex. This complex is reduced to blue colour by sodium sulfite. Intensity of this complex is measured at 710 nm using ultraviolet-visible spectrophotometer.

D-2 PURPOSE

a) Phosphorous additives are added during polymerization to control thermal degradation.

b) Phosphrous is added for flame retardant properties also.

D-3 REAGENTS

D-3.1 10 Percent Sulfuric Acid Solution (2 litres) — Add 100 ml of sulfuric acid in 2 000 ml beaker containing 500 ml demineralized water, cool the beaker to room temp and filter. Transfer the contents to 1 000 ml flasks and make up the volume with demineralized water.

D-3.2 5 Percent Ammonium Molybdate Solution (500 ml) — Weigh 25 g of ammonium molybdate and add to the 500 ml volumetric flask containing of 10 percent sulphuric acid; dissolve the salt then make upto the mark using 10 percent sulphuric acid solution (filter if necessary**).**

D-3.3 0.5 Percent Hydroquinone Solution (500 ml) — Weigh 2.5 g of hydroquinone and to the 500 ml volumetric flask containing 5ml of 1N sulfuric acid; dissolve the salt then make up to the mark using demineralized water (filter if necessary).

D-3.4 20 Percent Sodium Sulphite Solution (500 ml) — Weigh 100 g of sodium sulphite and add to the 500 ml volumetric flask containing 300 ml of demineralized water; dissolve the salt then make up to the mark using demineralized water (filter if necessary).

D-3.5 Zinc Oxide Solution (200 ml) — Dissolve 20 g of zinc oxide in 200 ml of 10 percent sulphuric acid solution (filter if necessary).

D-3.6 Whatman Filter Paper No. 1

D-4 PROCEDURE

D-4.1 Preparation of Standard Solutions

Weigh 5.742 g of di-sodium hydrogen ortho phosphate dihydrate and add to the 1 000 ml volumetric flask containing 150 ml of 10 percent sulphuric acid; dissolve the salt then make up to the mark using demineralized water. From the above flask 25 ml of solution is taken out in 250 ml volumetric flask and make up to the mark using demineralized water, this will give 100 ppm standard solution of phosphorus. From the above flask of 100 ppm solution, 10 ml of solution is taken out in 100 ml volumetric flask and make up to the mark using demineralized water, this will give 10 ppm std. solution of phosphorus. This solution is taken for calibration purpose (liquid phosphorous standard).

D-5 CALIBRATION STANDARD SOLUTION

From the liquid phosphorous standard solution made above, take 2.5, 5, 7.5, 10 and 15 ml solution in 100 ml standard volumetric flasks and add 20 ml zinc oxide solution to each flask. This will correspond to 0.25, 0.5, 0.75, 1, 1.5 ppm of phosphorous solution. Plot the graph for concentration in mg of phosphorous in 100 ml (*X* axis) v/s Abs (*Y* axis). Calculate the slope factor (SF) from graph ($y = mx + c$).

D-6 ANALYTICAL PROCEDURE

D-6.1 Weigh 1 to 1.5 g polyester chips/yarn sample for low content phosphrous expected ~ 10 to 50 ppm. For higher contents expected 6 000 to 7 000 ppm as

phosphorus, sample weight to be taken around 0.1 g in silica crucible. Keep on hot plate at 150 °C for 20 min for shrinking. Remove the crucible and cool it. Add 1.5 g of zinc oxide over the polymer sample to cover it. Keep the crucible on hot plate at 250 to 280 °C for 20-30 min, and then add 0.5 g of zinc oxide again in hot condition. Keep the silica crucible in furnace at 600 °C for 60 min (sample will turn into white-yellowish mass) then remove the silica crucible and cool.

D-6.2 Add 20 ml of 10 percent sulphuric acid to the sample in silica crucible and dissolve the sample. Keep the sample silica crucible on the hot plate at 100 °C for 10 min (till it become clear solution), cool the solution. Filter the sample solution from silica crucible if solution is not clear using Whatman filter paper no.1. Collect the filtrate in 100 ml standard volumetric flask. Add reagents mentioned in **D-6.3**. Dilute up to the mark with demineralized water. If expected phosphorus is 7 000 – 8 000 ppm then dilute the solution to 100 ml with demineralized water and from this solution take 10 ml solution (10 times dilution is done due to high level of phosphorus) and add 18 ml of zinc oxide solution and then add reagents mentioned in **D-6.3** to it.

D-6.3 Add following solution to each 100 ml standard volumetric flask as per the sequence given below:

a) 10 ml ammonium molybdate;
b) 5 ml sodium sulphite; and
c) 5 ml hydroquinone.

D-6.4 Make up to 100 ml with demineralized water. Take two 100 ml volumetric flasks (labeled as A and B). In A, add 5ml of liquid phosphorus standard and B use as a blank. Add 20 ml zinc oxide solution to each flask Add reagents mentioned in **D-6.3** to it. Stopper and shake all the flasks, keep the flask in dark for 60 min. Take the absorbance reading in ultraviolet spectrophotometer at 710 nm using 50 mm cuvette.

D-7 CALCULATION

D 7.1 Phosphorus content, ppm =

$$\frac{\text{Absorbance} \times 1\,000 \times \text{Dilution factor (if any)}}{\text{Sample weight} \left(\text{Slope factor}\right)}$$

D-7.2 Slope factor =

$$\frac{10}{\text{Slope (of of the graph of absorbance v/s concentration (mg/ml)}}$$

D-7.3 Report phosphorous content of the sample, in ppm.

ANNEX E

(*Table* 4)

DETERMINATION OF COLOUR STRENGTH AND COLOUR DIFFERENCE IN DOPE DYED YARNS

E-1 PRINCIPLE

A spectrophotometer is used to comprehend the colour difference that is not generally possible to detect by a human eye. Moreover, it gives quantitative analysis of colour difference in terms of either ΔE or colour strength. It is designed for physical sample analysis *via* full spectrum colour measurement.

E-2 APPARATUS

E-2.1 Card Winding Machine

This is used to prepare card samples from the yarn package. The machine can wind multiple yarns at the same time with a suitable traverse mechanism. It is possible to use one long card sample having multiple samples wound adjacent to each other. Some machines will have one sample per card.

E-2.2 Knitting Machine

Single end knitting machine is used for knit-hose preparation. The continuous knit hose thus prepared can be used for visual inspection of colour difference as well.

E-2.3 Colour Spectrophotometer

A standard colour spectrophotometer with computerized measurement and calculation system shall be used for assessment of colour difference or colour strength. The instrument gives spectral analysis of a sample's reflectance, absorbance or transmittance properties.

E-3 SAMPLE PREPARATION

E-3.1 The sample is wound on a card made of aluminum or cardboard evenly with the layers lying parallel to each other. Care should be taken such that no surface

of the base material is visible. The number of layers is dependent on the denier of the yarn being wound. Typically, about 5-8 layers are wound for getting a densely wound sample.

E-3.2 Apart from the card sample as mentioned in **E-4.1**, it is also possible to test the samples in knit hose form. Single yarn knitting machine is used for sample preparation. As knot hose produced from single end machine may not be dense, it is preferred to fold the knit hose in 4 layers while checking on a spectrophotometer.

E-4 MEASUREMENT OF COLOUR STRENGTH AND COLOUR DIFFERENCE

E-4.1 Calibration of the Instrument

Calibrate the instrument as per the standard operating Procedure given by the supplier. Generally, it is calibrated against the perfectly white tile and a perfectly black tile. This exercise needs to be done every time the spectrophotometer is switched on and/or at intervals suggested by the supplier

E-4.2 Procedure

The assessment of colour strength and/or colour difference shall be done under D-65 light source with a 10º observer mode. Place the sample (either card or folded knit hose) in the specimen section. Start the test and take 2-3 flashes per sample and note down the displayed colour strength and/or colour difference. Repeat the tests for all samples.

E-5 TEST REPORT

Report colour difference or colour strength as required.

ANNEX F

(*Clause* 6.4)

DETERMINATION OF TITANIUM DIOXIDE IN POLYESTER

F-1 GENERAL

Titanium dioxide (TiO_2) is added as a delusturant to minimize the luster of polyester. This method is a routine check to determine the TiO_2 percent in polymer. The polymer is carbonised with concentrated sulphuric acid and ignited at 600 ± 50 °C. The sulphonated ash thus obtained is dissolved in fuming sulphuric acid. The acidic titanium solution produces a yellow colour complex with hydrogen peroxide. The colour species formed is stated to be $[TiO(H_2O_2)]^{+4}$ or an analogous complex. The intensity of colour is measured spectrophotometrically at 410 nm.

F-2 POTENTIAL ENVIORMENT ISSUES

This can lead to pollution near the workplace area and health hazard in case of spillage. Sulphuric acid is corrosive in nature and reacts with many metals to form flammable hydrogen gas, which forms explosive mixture with air. It reacts with water to produce heat and toxic and corrosive fumes. Nitric acid dissolves some of the soil material in particular the carbonate-based materials. The acid will be neutralized to some degree with adsorption of the proton also occurring in clay materials.

F-3 POTENTIAL SAFETY, OCCUPATIONAL HEALTH ISSUES

Proper personal protection equipment (PPE) like safety goggles, nose mask and apron are required to be used while performing this analysis. Glassware is to be handled with care. Inhalation of sulphuric acid vapours from hot concentrated acid may injure lungs. Swallowing may cause injury or death. Wash immediately with water if contact of sulphuric acid is made with skin or eyes and seek medical advice. Inhalation of hydrogen peroxide may cause irritation in the respiratory tract. Skin contact of solution of 35 percent concentration or more causes extreme irritation. If contacted with eye, may cause irritation and may results in irreversible damage. A face shield must be worn while analyzing the sample

F-4 APPARATUS

F-4.1 Analytical Balance — Capable of weighing to 0.1 mg.

F-4.2 Ultraviolet Visible Spectrophotometer

F-4.3 Silica Gel

F-4.4 Flask Volumetric — 100 ml, 500 ml, 1 000 ml.

F-4.5 Muffle Furnace — Capable of maintaining temperature 700 °C to 800 °C and accepting 7 to 8 cm dishes.

F-4.6 Tongs

F-4.7 Hot Plate — Capable of being heated to 250-300 °C.

F-4.8 Measuring Cylinder — 10 to 50 ml capacity.

F-4.9 Glass Beaker — 250 ml capacity.

F-5 REAGENTS

F-5.1 Hydrogen Peroxide (H_2O_2) — 30 percent analytical reagent (AR)/laboratory reagent (LR) grade.

F-5.2 Sulfuric Acid (H_2SO_4) — Concentrated, analytical reagent (AR)/Laboratory reagent (LR) grade.

F-5.3 Nitric Acid — Analytical reagent (AR)/general reagent (GR) grade.

F-5.4 Ammonium Sulphate — Analytical reagent (AR)/general reagent (GR) grade.

F-5.5 TiO_2 — With known purity.

F-6 PROCEDURE

F-6.1 Preparation of Standard Hydrogen Peroxide 3 Percent Solution

Dilute 50 ml of 30 percent H_2O_2 to 500 ml with demineralized water. Prepare a standard file in UV spectrophotometer based on operating range of TiO_2 (concentration vs absorbance).

F-7 ANALYTICAL PROCEDURE

F-7.1 Weigh 1.5 to 2.0 g finish free yarn or polymer nearest to fourth decimal. Transfer to 50 ml silica crucible. Add 2.5 ± 0.5 ml concentrated sulphuric acid and heat the sample on hot plate till it becomes carbonized. Keep the crucible in muffle furnace for 1 h at 600 ± 50 °C. Cool and add 10 ml concentrated sulphuric acid. Heat the content till the ash gets dissolved. Allow the contents to cool to room temperature. Transfer the content quantitatively to a 100 ml volumetric flask containing 20-30 ml demineralized water with washings. Add 10 ml of 3 percent hydrogen peroxide (H_2O_2), and make the final volume with demineralized water. For full dull TiO_2 analysis, prepare solution as follows. Dilute the above solution by taking 10 ml of solution in 100 ml flask and make up with demineralized water. Multiply the results by 10 in final result.

F-7.2 Prepare a reagent blank taking 12 ml H_2SO_4 in about 30-40 ml demineralized water. Add 10 ml of 3 percent hydrogen peroxide (H_2O_2) and make the final volume to 100 ml by demineralized water. Cool to room temperature and find the concentration at 410 nm on lamda 12/35 ultraviolet visible spectrophotometer and 10 mm quartz cells.

F-8 CALCULATIONS

$$TiO_2 \text{ percent} = \frac{\text{Absorbance} \times \text{Slope factor}}{\text{Sample weight in grams}}$$

where

Slope factor = 10/(Slope from graph);

X axis in graph = mg/ml as per Table 9; and

Y axis in graph = Absorbance.

F-9 STANDARD FILE PREPARATION IN UV SPECTROPHOTOMETER FOR TIO_2 MEASUREMENT

F-9.1 Accurately weigh 0.25 ± 0.0002 grams of TiO_2 of known purity into a clean silica dish. Cover with 2 g of ammonium sulphate. Add 10 ml of concentrated sulphuric acid and 3-5 drops concentrated nitric acid. Heat the content to dissolve. This usually takes 10 min to dissolve. The resulting solution must be clear and transparent. Transfer the solution quantitatively into a 1000 ml volumetric flask and make the final volume to 1 litre by demineralized water as "Stock TiO_2 solution (1 ml = 0.25 mg of TiO_2)".

F-9.2 For calibration, prepare different sets of known standards by taking stock solution and reagent solutions as mentioned in Table 9 and make up final volume to 500 ml with demineralized water.

F-9.3 Read the absorbance using 10 mm quartz cell at 410 nm against reagent blank and set the file as described in the operating manual of the spectrophotometer. The calibration data will be stored automatically in the file.

Table 9 Calibration of Stock Solution

(*Clause* F-9.2)

Sample	Stock Soln, ml	Conentrated H_2SO_4, ml	3 percent H_2O_2, ml	Total Volume, ml	Concentration, mg/ml
1	85	25	25	500	0.0425 × Purity
2	75	25	25	500	0.0375 × Purity
3	50	25	25	500	0.0250 × Purity
4	40	25	25	500	0.0200 × Purity
5	20	25	25	500	0.0100 × Purity
6	10	25	25	500	0.0050 × Purity
7	0 (Blank)	25	25	500	0.00

ANNEX G

(*Foreword*)

COMMITTEE COMPOSITION

Man-Made Fibres, Cotton and their Products Sectional Committee, TXD 31

Organization	*Representative(s)*
ICAR-Central Institute for Research on Cotton Technology, Mumbai	Dr P. K. Mandhyan (***Chairman***) Dr A. Arputharaj
Ahmedabad Textile Industry's Research Association, Ahmedabad	Shrimati Deepali Plawat Shri Jigar Dave (*Alternate*)
Association of Synthetic Fibre Industries New Delhi	Shri M. S. Verma
ATM Syntex Dadra and Nagar, Haveli	Shri Arnab Samantha Shri Saugata Das (*Alternate*)
Confederation of Indian Textile Industry, New Delhi	Shri D. K. Nair Shri Shaju Mangalam (*Alternate*)
Consumer Guidance Society of India, Mumbai	Dr Sitaram Dixit Dr M. S. Kamath (*Alternate*)
Cotton Association of India, Mumbai	Secretary
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The Cotton Textile Export Promotion Council Mumbai	Shri Siddartha Rajgopal
The Southern India Mills' Association Coimbatore	Shri D. Suresh Anand Kumar
The Synthetic and Rayon Textile Export Promotion Council, Mumbai	Shri S Balaraju

Organization	*Representative(s)*
The Synthetic and Art Silk Mills Research Association, Mumbai	Dr Manisha Mathur Shrimati Ashwini A. Sudam (*Alternate*)
Veermata Jijabai Technological Institute, Mumbai	Dr (Shrimati) Suranjana Gangopadhyay Shri S. P. Borkar (*Alternate*)
BIS Directorate General	Shri J. K. Gupta, Scientist 'E' and Head (Textiles) [Representing Director General *(Ex-officio)*]

Member Secretary

Shri Mayur Katiyar
Scientist 'B' Textiles, BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: TXD 31 (18289).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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