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भारतीय मानक मसौदा

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(IS 15559 का पहला पुनरीक्षण)

Draft Indian Standard

POLYESTER (PET) STRAPPING — SPECIFICATION

(First Revision of IS 15559)

(ICS 55.040, 83.140.99)

Plastics Sectional Committee,
PCD 12

Last date for Comments:
15 February 2025

FOREWORD

(Formal clauses will be added later)

This standard was first published in 2004. The major changes in this revision (*first*) are as follows:

- Test method for inherent viscosity has been incorporated;
- Title has been modified;
- Type II has been modified with upper width range and simultaneously Table 1 has also been modified;
- The requirements have been modified in clauses **4.2** and **4.4**;
- Requirement of joint strength has been incorporated;
- Cross-referred standards have been updated; and
- Amendment has been incorporated.

Polyester strapping is a product used as an alternative to metal strips [*see IS 1079 : 2017 ‘Hot rolled carbon steel sheet, plate and strip — Specification (seventh revision)’; and IS 5872 : 1990 ‘Cold rolled steel strips (Box strappings) — Specification (second revision)’*], for tying bales, boxes, etc. This product has taken hold in many industrial sectors such as textiles, paper, steel, consumer durables, etc.

The polyester strapping has many advantages over metal strips like it is lighter than steel, reduces freight cost. It has no sharp edges and does not cut or damage loads and is safer than metallic strips. The polyester strapping is weather resistant, impervious to water, UV resistant and does not rust,

does not scratch, indent or cause staining due to corrosion. Elastic memory of polyester strapping enables to maintain its load-holding characteristics. It ensures long-term retained tensions and improved pack security.

Strapping of polyester [poly(ethylene terephthalate)] is safe to use. The polyester strap is fully recyclable and can be recycled with existing recycling technologies for polyester recycling.

This standard contains clauses **4.2, 4.3, 4.6** and **6.1**, which are subject to agreement between the purchaser and the manufacturer.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified values in this standard.

1 SCOPE

This standard covers the requirements for polyester straps intended for use in baling, closing, reinforcing and bundling articles for shipment, unitizing and palletizing.

2 REFERENCES

The standards given below 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 given below:

<i>IS No.</i>	<i>Title</i>
IS 13193 : 1992	Polyalkylene terephthalate (PET and PBT) for moulding and extrusion — Specification
IS 13360 (Part 5/See 1) : 2021/ISO 527-1 : 2019	Plastics — Methods of testing: Part 5 Mechanical properties, Section 1 Determination of tensile properties — General requirements (<i>second revision</i>)
IS 14534 : 2023	Plastics — Recovery and recycling of plastics waste — Guidelines (<i>second revision</i>)
ISO 1628-5 : 1998	Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 5: Thermoplastic polyester (TP) homopolymers and copolymers

3 TYPES

Based on the strength, the polyester strapping shall be of the following two types:

- a) *Type I* — Regular strength (Width 9.0 mm to 12.9 mm); and
- b) *Type II* — High strength (Width 13.0 mm to 32.0 mm).

4 REQUIREMENTS

4.1 Manufacture

The straps shall be made by extruding and orienting the Polyester (Polyethylene-terephthalate — PET) conforming to IS 13193.

4.2 Surface Finish

The strappings shall be of smooth finishing and without any sharp edges and finishing shall be subject to agreement between the purchaser and the manufacturer. In the case of strap required for baling jute, the strappings shall be free of wax coating.

4.3 Colour

The polyester strapping shall be supplied in colour as agreed to between the purchaser and the manufacturer.

4.4 Intrinsic Viscosity

The material used for manufacturing of PET strap shall have intrinsic viscosity (IV), minimum of 0.70 dl/g grade measured as per ISO 1628-5.

4.5 Freedom from Defects

The material shall be free from harmful defects such as kinks, edge curvature, cracks or any other defects, which may deteriorate the functional attributes of the straps.

4.6 Dimensions and Physical Properties

The nominal width and corresponding thickness and breaking strength shall be as given in Table 1. The values outside the purview of Table 1 is to be agreed between the purchaser and the manufacturer. However, the breaking load shall be in correspondence with Table 1.

Table 1 Dimensions and Physical Properties
(Clauses 4.6 and 5.4)

Sl No.	Nominal Width of Strapping mm	Nominal Thickness of Strapping mm	Type	Breaking Strength, <i>Min</i> N
(1)	(2)	(3)	(4)	(5)
i)	9.5	0.51	I	1 760
ii)	10.5	0.51	I	1 950
iii)	10.5	0.61	I	2 350
iv)	11.1	0.51	I	2 055

v)	11.1	0.61	I	2 460
vi)	12.7	0.51	I	2 350
vii)	12.7	0.71	I	3 275
viii)	15.6	0.76	II	4 890
ix)	15.6	0.90	II	5 790
x)	15.6	1.02	II	6 560
xi)	19.05	0.76	II	5 970
xii)	19.05	0.89	II	6 990
xiii)	19.05	1.02	II	8 010
xiv)	19.05	1.27	II	10 005
xv)	25	1.02	II	10 510
xvi)	32	0.82	II	10 010
xvii)	32	1.02	II	12 455
xviii)	32	1.27	II	16 680

4.7 Tolerance on Width and Thickness

Tolerance on thickness and width of the polyester strap shall not exceed the following limits:

<i>Requirement</i>	<i>Tolerance</i>
	mm
Thickness	± 0.06
Width	± 0.76

5 MECHANICAL PROPERTIES

5.1 Tensile Strength and Elongation

The tensile strength and elongation of a test piece, when tested in accordance with IS 13360 (Part 5/See 1) shall meet the requirements as given in Table 2.

Table 2 Tensile Strength and Elongation
(Clause 5.1)

Sl No.	Tensile Strength kg/mm²	Elongation Percent	Type
(1)	(2)	(3)	(4)
i)	38	10 to 20	I
ii)	42	10 to 16	II

NOTE — The cut length of the material shall be in its original condition, that is, original width and thickness shall be used as test piece. Elongation percent on 150 mm gauge length.

5.2 Split Resistance

5.2.1 The test piece when tested in accordance with **5.2.2** shall conform to the split resistance test.

5.2.2 Cut a test piece of (750 ± 5) mm length. Punch the test piece with a sharp pin along the longitudinal axis of the test piece at intervals of 75 mm. Fold the strap along the longitudinal axis at each of the punched area with the help of pliers. Observe the sample for any possible propagation of the split between two holes. The propagation shall not be more than 2.5 mm. The pin shall be of diameter 2.4 mm, and a taper of 4 mm on one end.

5.3 Camber

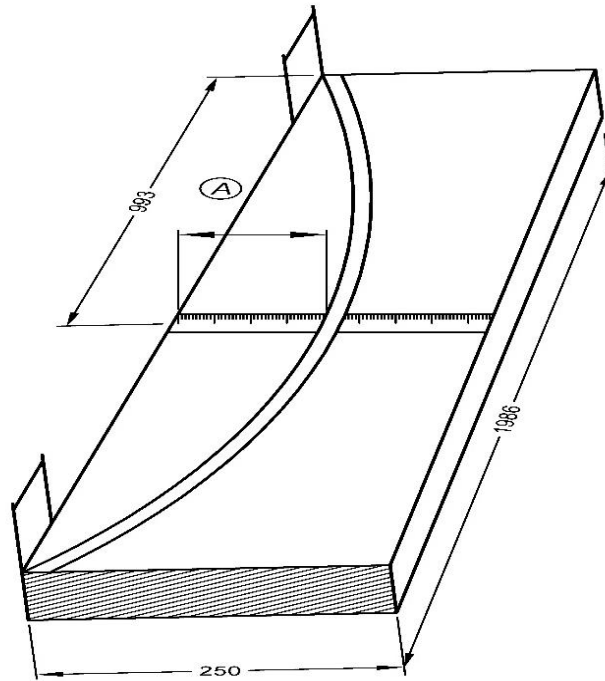
5.3.1 The test piece when tested in accordance with **5.3.2**, shall conform the requirement of camber as given in Table 3.

5.3.2 Take a test piece of 2 000 mm length. Place it on a flat surface for measurement of camber (*see* Fig. 1). Report the distance 'A', in mm, as camber.

NOTE — Camber value shall be determined after 48 h of Production, considering the post extrusion stabilization of shrinkage.

Table 3 Camber
(*Clause 5.3.1*)

Sl No.	Nominal Width mm	Camber, <i>Max</i> mm
(1)	(2)	(3)
i)	9 to 11.5	50
ii)	11.6 to 25	30



All dimensions in millimetres.

FIG. 1 CAMBER CALCULATION

5.4 Joint Strength

Strappings shall have a joint strength not less than 45 percent of the minimum breaking strength corresponding to the dimensions listed in Table 1.

6 PACKING AND MARKING

6.1 Packing

The straps shall be properly wound on 16" core and shall be supplied in coils securely packed in LLDPE stretch film, shrink film, or as agreed to between the purchaser and the manufacturer.

6.2 Marking

Each coil of strap shall be marked with the following:

- a) Identification in code or otherwise to enable the traceability of the lot;
- b) Name of the product;
- c) Width and thickness;
- d) Indication of the source of manufacture, recognized trade-mark, if any;
- e) Net mass/length of the material;

- f) Packing shall be marked with proper recycling symbol as per IS 14534; and
- g) Any other statutory requirement.

6.2.1 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 products may be marked with the Standard Mark.

7 SAMPLING AND RETEST

7.1 One sample for tensile test and two for split tests shall be drawn for every 10 000 m of strap or part thereof of the strap of the same width and thickness. Test samples may be taken from any part of the coil.

7.2 Should the test piece fail to conform any of the tests specified in this standard, two fresh samples shall be drawn from the same lot for retesting for all the requirements. In case these test pieces conform to the tests, the material represented by the test samples shall be deemed to comply with the requirements of the standard. If either of these additional samples fail, the material represented by the test samples shall be deemed to be rejected.