भारतीय मानक
Indian Standard

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ISO 583 : 2023

कपड़ा करकस सहित कन्वेयर बेल्ट — कुल बेल्ट मोटाई और घटक तत्वों की मोटाई — परीक्षण विधियां

(पहला पुनरीक्षण)

Conveyor Belts with a Textile Carcass — Total Belt Thickness and Thickness of Constitutive Elements — Test Methods

(First Revision)

ICS 53.040.20

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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Conveyor Belts Sectional Committee, PGD 40

NATIONAL FOREWORD

This Indian Standard (First Revision) which is identical to ISO 583 : 2023 ‘Conveyor belts with a textile carcass — Total belt thickness and thickness of constitutive elements — Test methods’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Conveyor Belts Sectional Committee and approval of the Production and General Engineering Division Council.

The carcass is the core of a conveyor belt and is the main load bearing component. The combined fabric reinforcement usually found inside of a conveyor belt is normally referred to as the "Carcass".

The most common carcass design is made up of layers or plies of woven fabrics bonded together. This "conventional plied" belt construction, generally employs a plain weave or twill weave carcass which is built up into as many layers as is required to provide the necessary belt strength, usually bound together with rubber.

This standard was first published in 2018. The present revision has been taken up to align it with ISO 583 : 2023.

In this revision a requirement has been regarding the expression of results (*see* **4.5**).

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’; and

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current-practice is to use a point (.) as the decimal marker.

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*)’.

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CONVEYOR BELTS WITH A TEXTILE CARCASS — TOTAL BELT THICKNESS AND THICKNESS OF CONSTITUTIVE ELEMENTS — TEST METHODS

(First Revision)

1 Scope

This document specifies test methods for the determination of total belt thickness and the thickness of constitutive elements of conveyor belts having a textile carcass. The constitutive elements include the covers, the carcass and interlayers, i.e. the material between adjoining plies.

This document does not apply to light conveyor belts as described in ISO 21183-1[1].

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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 Determination of total belt thickness

4.1 Apparatus

The apparatus shall consist of a flat, rigid baseplate, on which the test piece rests, and a gauge having a flat circular foot, 10 mm in diameter, by means of which a specified pressure is applied to the test piece.

The gauge shall be capable of measuring to at least 0,1 mm.

The pressure applied shall be (22 ± 5) kPa for materials with a hardness equal to or greater than 35 IRHD; otherwise, the pressure shall be (10 ± 2) kPa.

NOTE The masses needed to give these specified pressures using a 10 mm diameter foot are 176 g and 80 g, respectively.

4.2 Test piece

Either test piece 1 or test piece 2, according to the following, shall be used.

Test piece 1: cut a rectangular piece of full-width belt, designated as dimension L, with a length of 50 mm, as shown in Figure 1.

Dimensions in millimetres

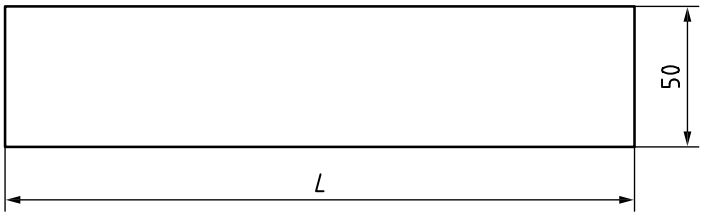


Figure 1 — Test piece 1 (rectangular)

Test piece 2: cut a wedge-shaped piece of full-width belt, designated as dimension *L*, as shown in Figure 2.

Dimensions in millimetres

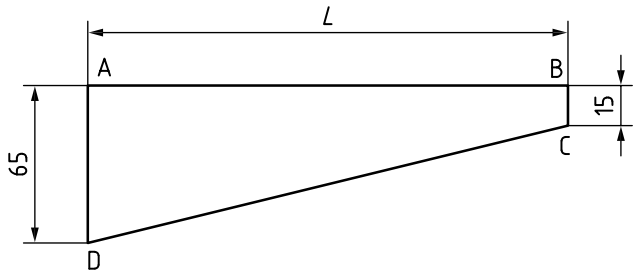


Figure 2 — Test piece 2 (wedge-shaped)

4.3 Measurement points

The measurement points shall be spaced equidistantly along the long axis of the test piece (i.e. the belt width), as shown in Figure 3.

Dimensions in millimetres

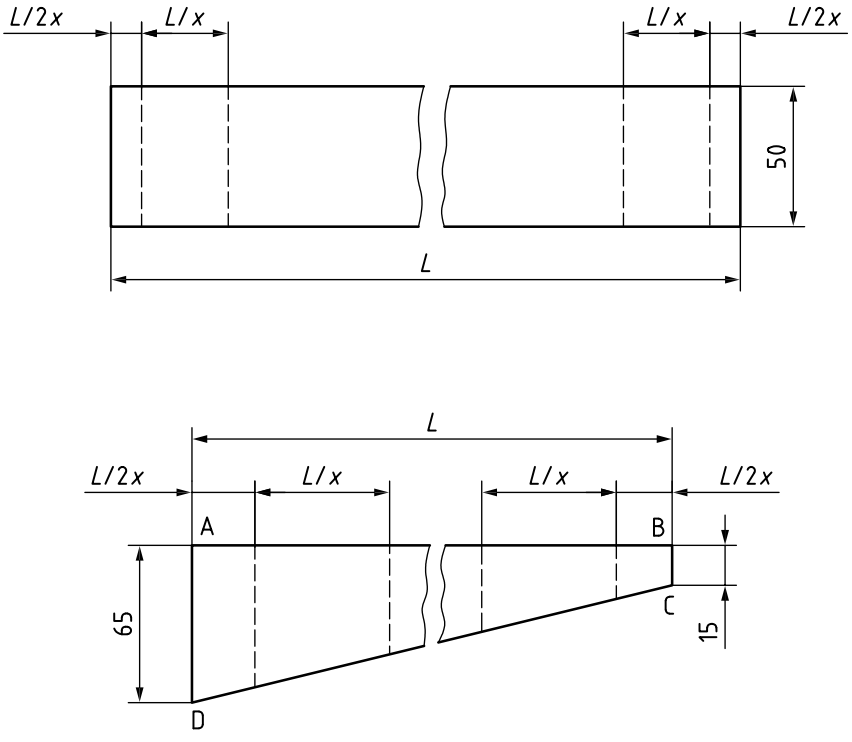


Figure 3 — Measurement points

Determine the minimum number of measurement points, x, according to the width of the belt, L, in accordance with Table 1.

Table 1 — Minimum number of measurement points

Belt width L mm	Minimum number of measurement points x
$L \leq 650$	3
$650 < L \leq 1\,200$	5
$L > 1\,200$	8

4.4 Procedure

Measure the total thickness, d, of the test piece at each of the measurement points specified in 4.3, using the pressure specified in 4.1.

4.5 Expression of results

Calculate the arithmetic mean and the difference between the maximum thickness and the minimum thickness of the individual measurements taken according to 4.4.

Express the arithmetic mean as the total belt thickness in millimetres, to the nearest 0,1 mm.

5 Determination of thickness of covers

5.1 General

The thickness of the covers can be obtained by two methods, the choice of one or the other method depends on whether or not the covers can be removed completely from the carcass.

5.2 Method used when covers can be removed completely from carcass

5.2.1 Principle

The thickness of a test piece is measured at a number of points, according to belt width, both before and after each of the covers has been removed. The cover thickness is calculated by subtraction.

5.2.2 Apparatus

The apparatus shall be in accordance with 4.1.

5.2.3 Test piece

Test piece 1, in accordance with 4.2 and Figure 1, shall be used.

5.2.4 Measurement points

The measurement points shall be in accordance with 4.3.

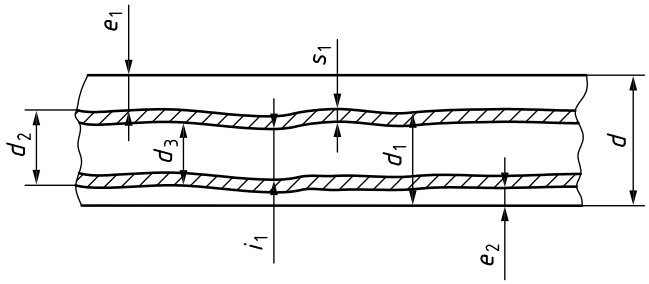
5.2.5 Procedure

Measure the total thickness, d, of the test piece at each of the measurement points, in accordance with 4.4.

Remove the top cover completely, then remeasure the thickness of the test piece, d_1, at the same measurement points.

Then remove the bottom cover completely and measure the thickness of the test piece, d_2, at the same measurement points.

See Figure 4.



Key

d total thickness
d_1 thickness of test piece with top cover removed
d_2 thickness of test piece with top and bottom covers removed
d_3 thickness of test piece with one fabric ply removed [a]
e_1 thickness of top cover
e_2 thickness of bottom cover
i_1 thickness of interlayer [a]
s_1 thickness of fabric [a]
[a] Applicable to belts with two fabric plies (see 7.2.5 and 7.2.6).

Figure 4 — Interlayer thickness (plied fabric belt)

Protective fabrics embedded in the covers, and*d* which do not form an integral part of the textile carcass, shall be regarded as part of the covers and should be removed with them. Other non-load bearing yarns, which are an integral part of the carcass, shall be regarded as part of the carcass, unless otherwise agreed between manufacturer and purchaser. In the latter case, full details shall be included in the test report.

5.2.6 Expression of results

Calculate the thickness, e_1, of the top cover at each of the measurement points as given in Formula (1):

$$e_1 = d - d_1 \quad (1)$$

Calculate the thickness, e_2, of the bottom cover at each of the measurement points as given in Formula (2):

$$e_2 = d_1 - d_2 \quad (2)$$

where

d is the total belt thickness;

d_1 is the thickness of the test piece with the top cover removed;

d_2 is the thickness of the test piece with both top and bottom covers removed.

Calculate the arithmetic mean of the individual measurements and express the cover thicknesses in millimetres, to the nearest 0,1 mm.

5.3 Method used when covers cannot be removed completely from carcass

5.3.1 Principle

The thickness of each cover is measured directly on a cut edge of unstripped belt by means of an optical micrometer or travelling microscope.

5.3.2 Apparatus

Optical micrometer or travelling microscope incorporating a scale graduated in divisions of 0,1 mm shall be used.

5.3.3 Test piece

Cut the test piece in accordance with 4.2 (test piece 1 or test piece 2). If the conveyor belt is of solid woven construction, test piece 2 shall be used.

5.3.4 Measurement points

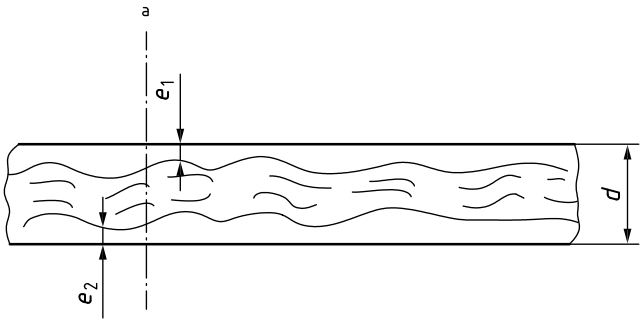
The measurement points shall be in accordance with 4.3. If test piece 2 is used, take measurements along line DC shown in Figure 2.

5.3.5 Procedure

Using the optical micrometer or travelling microscope (5.3.2), measure the distance between the surface of the belting and the top of the nearest fabric knuckle (see Figure 5) at each of the measurement points specified in 4.3. Ensure that the graduated scale of the optical micrometer or travelling microscope is in physical contact with the test piece to avoid errors of parallax.

With certain colours of cover material, difficulty can be experienced in determining the outline of the fabric knuckles. In these cases, the textile fabric may be identified with a colour stain.

Protective fabrics embedded in the covers, and which do not form an integral part of the textile carcass, shall be regarded as part of the covers and excluded from the measurements. Other non-load bearing yarns, which are an integral part of the carcass, shall be regarded as part of the carcass, unless otherwise agreed between manufacturer and purchaser. In the latter case, full details shall be included in the test report.



Key

d total thickness

e_1 thickness of top cover

e_2 thickness of bottom cover

[a] Target measurement point.

Figure 5 — Cover thickness (solid woven belt)

5.3.6 Expression of results

Calculate the arithmetic mean of the individual measurements for each cover and report the result in millimetres, to the nearest 0,1 mm, as e_1, the thickness of the top cover, and e_2, the thickness of the bottom cover.

6 Determination of carcass thickness

6.1 Carcass thickness without covers

For belts where the covers can be removed completely, measure the carcass thickness, d_2, in accordance with 5.2.

6.2 Carcass thickness with covers

For belts where the covers cannot be removed, obtain the carcass thickness by subtracting the thickness of both covers, measured in accordance with 5.3, from the total belt thickness measured in accordance with Clause 4.

6.3 Expression of results

Calculate carcass thickness d_2 at each of the measurement points as given in Formula (3):

$$d_2 = d - (e_1 + e_2) \tag{3}$$

where

d is the total belt thickness;

e_1 is the thickness of the top cover;

e_2 is the thickness of the bottom cover.

Calculate the arithmetic mean of the individual measurements and express carcass thickness d_2 in millimetres, to the nearest 0,1 mm.

7 Determination of thickness of interlayer

7.1 General

The thickness of an interlayer (i.e. the elastomeric material between textile fabric layers in a belt of multiply fabric construction) can be obtained using two methods, the choice of one or the other method depends on whether or not the elastomer can be completely separated from the fabric plies.

7.2 Method used when elastomeric material in interlayer can be removed completely from adjacent fabric ply

7.2.1 Principle

Thickness measurements are taken at a number of points across the belt width, after the covers have been removed, and again after separation of the fabric and elastomeric layers. The thicknesses of the interlayers are obtained by subtraction.

7.2.2 Apparatus

The apparatus shall be in accordance with 4.1.

7.2.3 Test piece

Test piece 1, in accordance with 4.2 and Figure 1, shall be used.

7.2.4 Measurement points

The measurement points shall be in accordance with 4.3.

7.2.5 Procedure

Measure carcass thickness d_2 of the test piece at each of the measurement points specified in 4.3, using the pressure in accordance with 4.1.

For belts with two fabric plies, remove one of these fabric plies and measure the thickness of the remaining test piece, d_3, at the same measurement points (see Figure 4).

For belts with more than two fabric plies, continue removing fabric and elastomer, taking measurements at the specified points after each operation, until only one layer of fabric and elastomer remains.

7.2.6 Expression of results

For belts with two fabric plies, calculate the thickness of the interlayer, i_1, at each of the measurement points as given in Formula (4).

$$i_1 = d_2 - (2 \times s_1) \tag{4}$$

where

d_2 is the carcass thickness;

s_1 is the thickness of the fabric and where

$$s_1 = d_2 - d_3$$

d_3 is the thickness of the test piece with one of two plies removed.

For belts with more than two fabric plies, calculate the thickness of each interlayer (i_2, i_3, ...) in a similar manner.

Calculate the arithmetic mean of the individual measurements and express the interlayer thickness, i, in millimetres, to the nearest 0,1 mm (see Figure 4).

7.3 Method for use when elastomeric material in interlayer cannot be separated completely from adjacent fabric ply

7.3.1 Principle

The thickness of an interlayer is measured directly, on a cut edge of unstripped belt, by means of an optical micrometer or travelling microscope.

7.3.2 Apparatus

An optical micrometer or travelling microscope in accordance with 5.3.2 shall be used.

7.3.3 Test piece

Cut the test piece, either 1 or 2, in accordance with 4.2.

7.3.4 Measurement points

The measurement points shall be in accordance with 4.3.

7.3.5 Procedure

Using the optical micrometer or travelling microscope (5.3.2), measure the thickness of the interlayer material by measuring the distance between each elastomer/fabric interface for that particular layer. Ensure that the graduated scale of the optical magnifier is in physical contact with the test piece in order to avoid errors of parallax.

Small differences in measurement caused by fabric undulations will be minimized by subsequent averaging of results. However, where the crimp of the fabric is sufficient to cause a significant difference, measurement points should be selected in a similar manner to those described in 4.3 to ensure that a minimum interlayer thickness is obtained.

7.3.6 Expression of results

Calculate the arithmetic mean of the individual measurements for a particular interlayer and report the result in millimetres, to the nearest 0,1 mm, as interlayer thickness i_1, i_2, i_3, ..., as appropriate.

8 Test report

The test report shall contain the following information:

a) reference to this document (i.e. ISO 583:2023);

b) the identification of the conveyor belt tested;

c) the number of measurement points;

d) whether test piece 1 or test piece 2 was used;

e) the test pressure value (where applicable);

f) the result expressed in accordance with 4.5, 5.2.6, 5.3.6, 6.3, 7.2.6 or 7.3.6, as appropriate;

g) any deviations from the procedure;

h) any unusual features observed;

i) the date of the test.

Bibliography

[1] ISO 21183-1, *Light conveyor belts — Part 1: Principal characteristics and applications*

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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.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	2821 8093

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