

# Steel cord conveyor belts — Methods for the determination of total thickness and cover thickness (ISO 7590:2009)

ICS 53.040.20

## National foreword

This British Standard is the UK implementation of EN ISO 7590:2009. It supersedes BS EN ISO 7590:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/67, Conveyor belts.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

## Steel cord conveyor belts - Methods for the determination of total thickness and cover thickness (ISO 7590:2009)

Courroies transporteuses à câbles d'acier - Méthodes de détermination de l'épaisseur totale et de l'épaisseur des revêtements (ISO 7590:2009)

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## Foreword

This document (EN ISO 7590:2009) has been prepared by Technical Committee ISO/TC 41 "Pulleys and belts (including veebelts)" in collaboration with Technical Committee CEN/TC 188 "Conveyor belts" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

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### Endorsement notice

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## Foreword

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ISO 7590 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 3, *Conveyor belts*.

This fifth edition cancels and replaces the fourth edition (ISO 7590:2001), which has been technically revised.



# Steel cord conveyor belts — Methods for the determination of total thickness and cover thickness

## 1 Scope

This International Standard specifies three methods for the measurement of total belt thickness and the thickness of covers of steel cord conveyor belts.

Methods A1 and A2 (micrometer methods) can be used for all steel cord conveyor belts for the measurement of both total belt thickness and cover thickness.

Method B (optical method) is recommended for the measurement of cover thickness only. It is not suitable if there is a textile or metal weft, nor if the ends of the steel cords become twisted when cut.

## 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 2.1

#### **breaker**

reinforcement included in the cover

### 2.2

#### **weft**

transverse layer or layers included to reinforce the carcass of the belt and not regarded as part of the cover layer

## 3 Principle

The total thickness is measured using a micrometer at a number of specified points depending on belt width.

The cover thicknesses are measured either

- a) by removing the covers, taking further measurements at the same specified points and calculating each of the cover thicknesses by subtraction, or
- b) by direct measurement using an optical measuring instrument.

## 4 Apparatus

### 4.1 Dial gauge micrometer for methods A1 and A2

The instrument shall be graduated every 0,1 mm with flat feet and a circular foot of 10 mm in diameter that exerts a pressure of  $(22 \pm 5)$  kPa on the test specimen.

## 4.2 Optical measuring instrument for method B

The instrument shall comprise a hand-held magnifying glass with a scale divided in 0,1 mm steps. The magnification shall be at least 8 times.

## 5 Procedure

### 5.1 General

If the adhesion strength between cover and core layer is measured in accordance with ISO 8094, the same test pieces may be used for the determination of cover thickness described in method A1.

If the position of the steel cord is measured in accordance with EN 13827, the same test piece may be used for the determination of cover thickness described in method A2.

If the use of methods A1 and A2 is impractical, the visible belt end or the end of a laboratory sample of the belt may be used for the determination of cover thickness described in method B.

### 5.2 Measurement points

If the belt width,  $B$ , is less than or equal to 1 000 mm, measure the thickness at three points spaced equidistantly over the belt width [see Figure 1 a)].

If the belt width,  $B$ , is greater than 1 000 mm, measure the thickness at five points spaced equidistantly over the belt width [see Figure 1 b)].

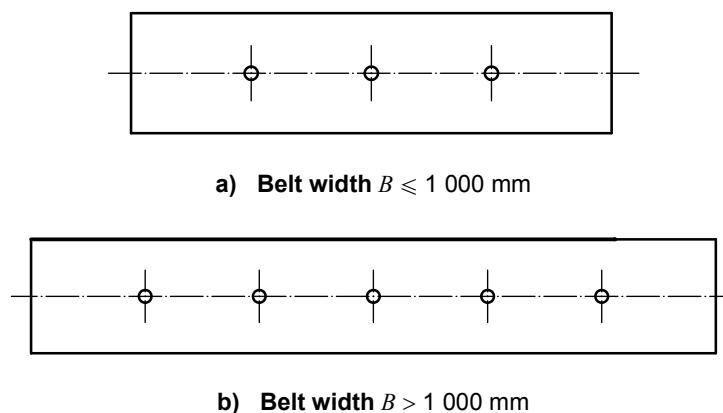


Figure 1 — Location of measurement points

### 5.3 Test pieces and test specimens

#### 5.3.1 General

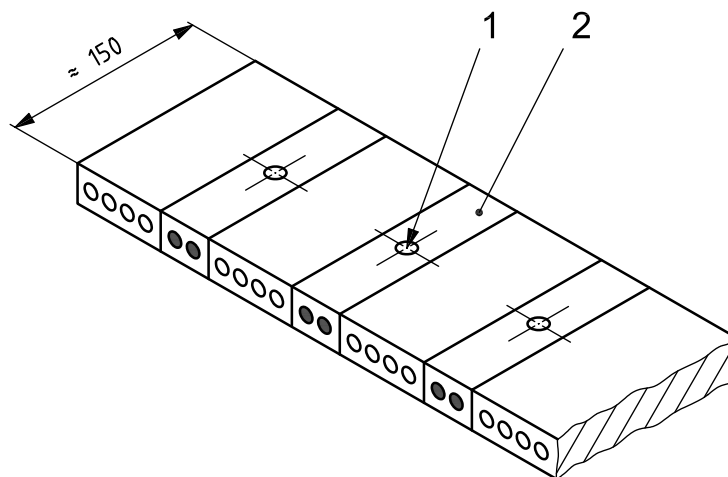
Cut a rectangular test piece across the full belt width, at 90° to the belt edge, with dimensions as specified in 5.3.2 to 5.3.4, as appropriate.

#### 5.3.2 Test pieces and test specimens for method A1

The test piece shall be approximately 150 mm in length. As appropriate, cut three or five test specimens from the test piece at the measurement points specified in 5.2. Each test specimen shall be two cord pitches wide [i.e. of a width equal to the width that comprises two cords (see Figure 2)] and shall have a length of approximately 150 mm.



Dimensions in millimetres



**Key**

- 1 measurement point
- 2 test specimen

**Figure 2 — Test specimens taken at the measurement points and cut from a full-width belt sample**

**5.3.3 Test specimens for method A2**

The test specimen shall be not less than 50 mm in length with a width equal to the total width of the belt. Mark on the test specimen the measurement points specified in 5.2.

**5.3.4 Test specimens for method B**

The test shall be carried out either on the end of the conveyor belt *in situ*, or on a test specimen not less than 50 mm in length. In either case, the cut edge shall be at 90° to the surface of the belt and the cords shall be visible and free from contamination, the cord ends being cleaned, if necessary. Mark on the test specimen the measurement points specified in 5.2.

**5.4 Measurement of thickness**

**5.4.1 Method A1**

**5.4.1.1 Measurement of total thickness**

Measure the total thickness,  $s_1$ , of the test specimen at each of the measurement points specified in 5.2.

**5.4.1.2 Measurement of top cover thickness**

Remove the top cover down to the two cords (see Figure 3). Measure the dimension  $s_7$  at the measurement points shown in Figure 1. Take measurements directly above the cord, ensuring that the micrometer foot is in contact with either the surface of the cord [see Figure 3 a)] or the surface of the weft [see Figure 3 b)].

Calculate the thickness of the top cover,  $s_2$ , at each measurement point, using Equation (1):

$$s_2 = s_1 - s_7 \tag{1}$$

### 5.4.1.3 Measurement of bottom cover thickness

After carrying out the procedure described in 5.4.1.2, remove the bottom cover. Measure the dimension  $s_8$  as described in 5.4.1.2, ensuring that the measurement points are located over the cords.

Calculate the thickness of the bottom cover,  $s_3$ , at each measurement point, using Equation (2):

$$s_3 = s_7 - s_8 \quad (2)$$

### 5.4.1.4 Calculation and expression of results

Calculate the arithmetic mean of three or five thicknesses, as appropriate, for  $s_1$ ,  $s_2$  and  $s_3$ , as determined in 5.4.1.1, 5.4.1.2 and 5.4.1.3. Express the results in millimetres.

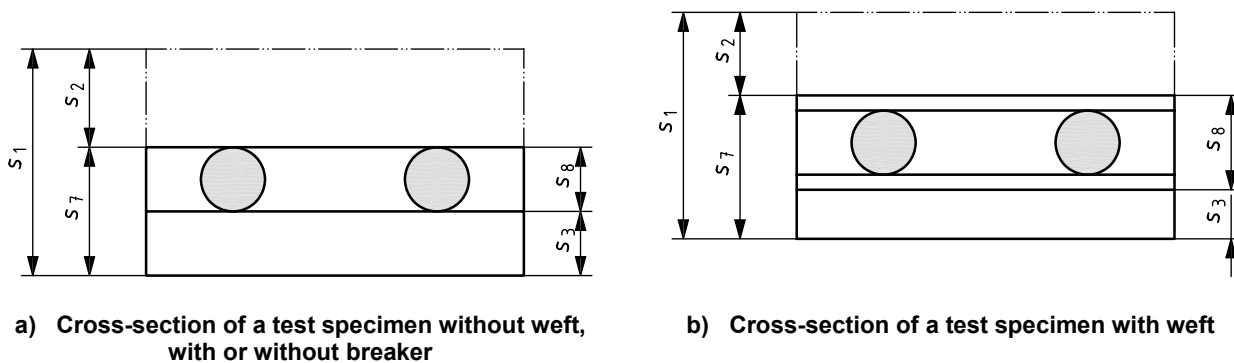


Figure 3 — Test specimens for method A1

## 5.4.2 Method A2

### 5.4.2.1 Measurement of total thickness

Measure the total thickness,  $s_1$ , of the test specimen at each of the measurement points specified in 5.2.

### 5.4.2.2 Measurement of top cover thickness

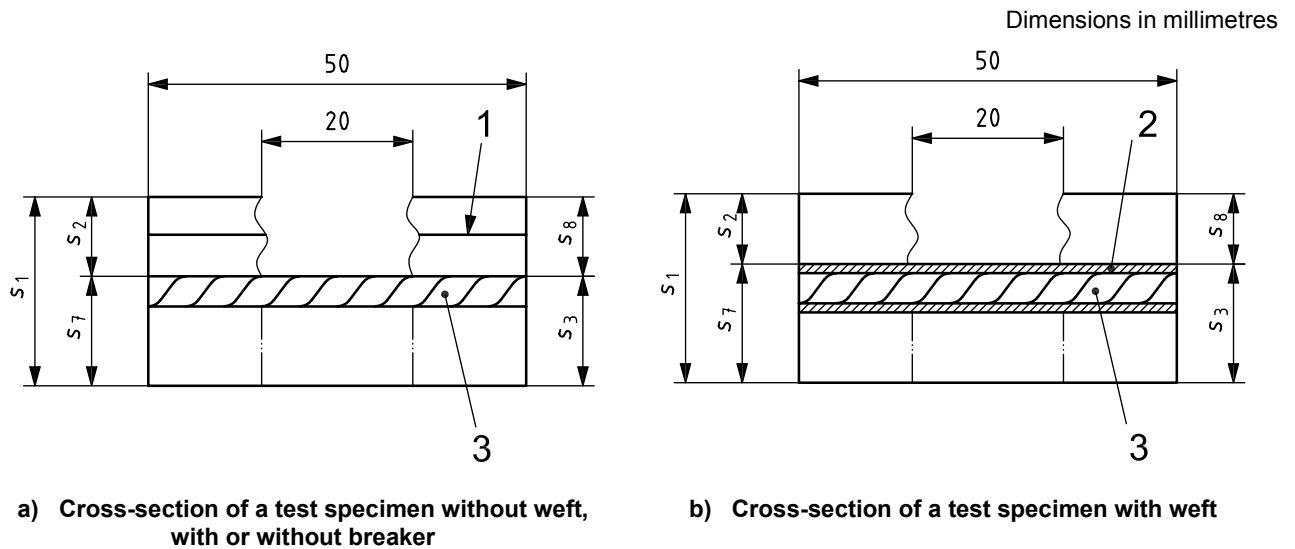
Remove a section of 20 mm in length from the top cover over the entire width of the test specimen (see Figure 4). Measure the thickness,  $s_7$ , at the same points as in 5.4.2.1. Take measurements directly above the cord, ensuring that the micrometer foot is in contact with either the surface of the cord [see Figure 4 a)] or the surface of the weft [see Figure 4 b)].

Calculate the thickness of the top cover,  $s_2$ , at each measurement point, using Equation (1).

### 5.4.2.3 Measurement of bottom cover thickness

After carrying out the procedure described in 5.4.2.2, remove the bottom cover. Measure the dimension  $s_8$  as described in 5.4.2.2, ensuring that the measurement points are located over the cords.

Calculate the thickness of the bottom cover,  $s_3$ , at each measurement point, using Equation (2).



**Key**

- 1 breaker
- 2 weft
- 3 cord

**Figure 4 — Test specimens for method A2**

**5.4.2.4 Calculation and expression of results**

Calculate the arithmetic mean of three or five thicknesses, as appropriate, for  $s_1$ ,  $s_2$  and  $s_3$ , as determined in 5.4.2.1, 5.4.2.2 and 5.4.2.3. Express the results in millimetres.

**5.4.3 Method B**

**5.4.3.1 Measurement of top and bottom cover thicknesses**

Using the optical measuring instrument (see 4.2), measure the distance between the top edge of the cord and the surface of the belt at each of the measurement points specified in 5.2, ensuring that the measuring scale is in physical contact with the belt. Record the thicknesses of the top cover,  $s_2$ , and bottom cover,  $s_3$ , at each measurement point.

**5.4.3.2 Calculation and expression of results**

Calculate the arithmetic mean of three or five thicknesses, as appropriate, for  $s_2$  and  $s_3$ , as determined in 5.4.3.1. Express the results in millimetres.

**6 Test report**

The test report shall contain at least the following information:

- a) reference to this International Standard (ISO 7590:2008);
- b) method used, i.e. A1, A2 or B, as appropriate;
- c) identification of the conveyor belt tested;

- d) number of measurement points;
- e) test results, as given in 5.4.1.4, 5.4.2.4 or 5.4.3.2, as appropriate;
- f) date of the test.

## **Bibliography**

- [1] ISO 8094, *Steel cord conveyor belts — Adhesion strength test of the cover to the core layer*
- [2] EN 13827, *Steel cord conveyor belts — Determination of the lateral and vertical displacement of steel cords*

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