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

*Courroies transporteuses à câbles d'acier — Méthodes de
détermination de l'épaisseur totale et de l'épaisseur des revêtements*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This sixth edition cancels and replaces the fifth edition (ISO 7590:2009), which has been technically revised. The main change compared to the previous edition is as follows:

- [Figure 4](#) has been corrected.

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

1 Scope

This document 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 intended 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 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

breaker

transverse reinforcement in the conveyor belt, typically of a textile material, inserted both above and below or either above or below the steel cords at a distance of at least 1 mm and considered to be part of the cover

Note 1 to entry: It is used to protect the longitudinal cords from impact or trapped material damage.

3.2

weft

transverse component of a protective reinforcement of either steel or textile cords, typically inserted both above and below, or either above or below, the steel cords at a distance of less than 1 mm and considered to be part of the belt carcass

4 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.

5 Apparatus

5.1 Dial gauge micrometer for methods A1 and A2

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

5.2 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.

6 Procedure

6.1 General

If the adhesion strength between cover and core layer is being 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 being 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.

6.2 Measurement points

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

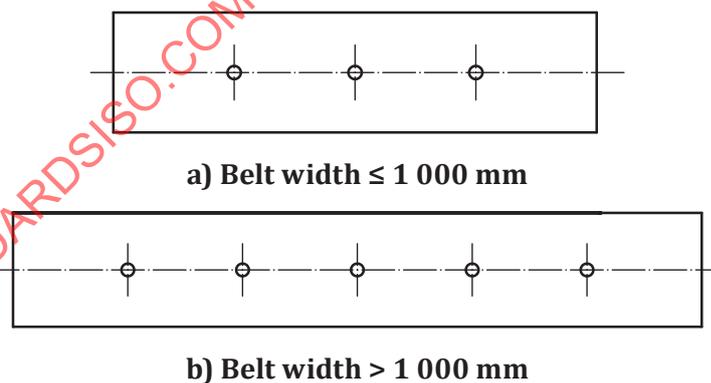


Figure 1 — Location of measurement points

6.3 Test pieces and test specimens

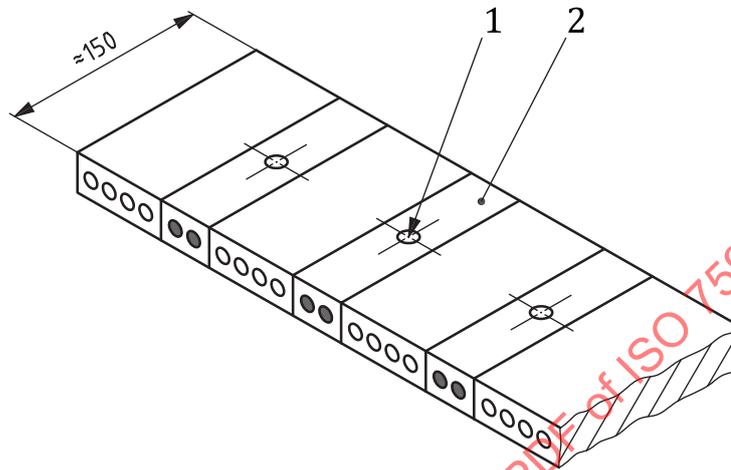
6.3.1 General

Cut a rectangular test piece across the full belt width, at 90° to the belt edge, having dimensions as specified in [6.3.2](#) to [6.3.4](#), as appropriate.

6.3.2 Test pieces and test specimens for method A1

The test piece shall be approximately 150 mm long. Cut three or five, as appropriate, test specimens from the test piece at the measurement points specified in 6.2. Each test specimen shall be two cord pitches wide, i.e. having 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

6.3.3 Test specimens for method A2

The test specimen shall be not less than 50 mm long with a width equal to the total width of the belt. Mark on the test specimen the measurement points specified in 6.2.

6.3.4 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 long. 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 6.2.

6.4 Measurement of thickness

6.4.1 Method A1

6.4.1.1 Measurement of total thickness

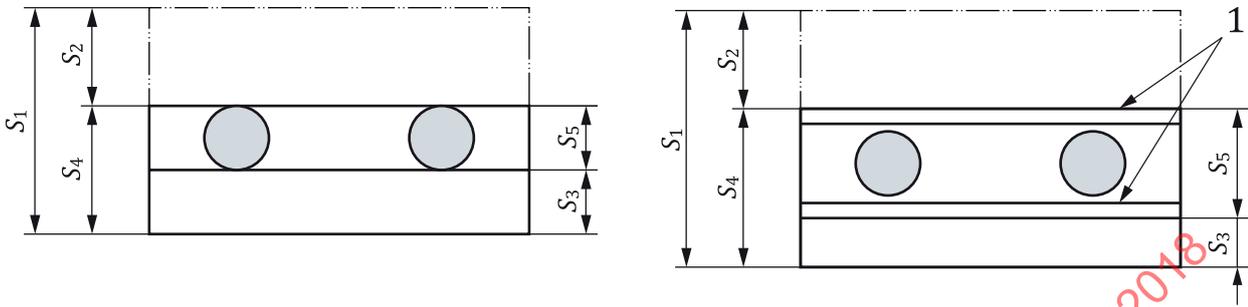
Measure the total thickness, s_1 , of the test specimen at each of the measurement points specified in 6.2.

6.4.1.2 Measurement of top cover thickness

Remove the top cover down to the two cords (see Figure 3). Measure the dimension s_4 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 [Formula \(1\)](#).

$$s_2 = s_1 - s_4 \tag{1}$$



a) Cross-section of a test specimen without weft, with or without breaker

b) Cross-section of a test specimen with weft

Key

1 weft

Figure 3 — Test specimens for method A1

6.4.1.3 Measurement of bottom cover thickness

After carrying out the procedure described in [6.4.1.2](#), remove the bottom cover. Measure the dimension s_5 as described in [6.4.1.2](#), ensuring that the measurement points are located over the cords.

Calculate the thickness of the bottom cover, s_3 , at each measurement point using [Formula \(2\)](#).

$$s_3 = s_4 - s_5 \tag{2}$$

6.4.1.4 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 [6.4.1.1](#), [6.4.1.2](#) and [6.4.1.3](#). Express the results in millimetres.

6.4.2 Method A2

6.4.2.1 Measurement of total thickness

Measure the total thickness, s_1 , of the test specimen at each of the measurement points specified in [6.2](#).

6.4.2.2 Measurement of top cover thickness

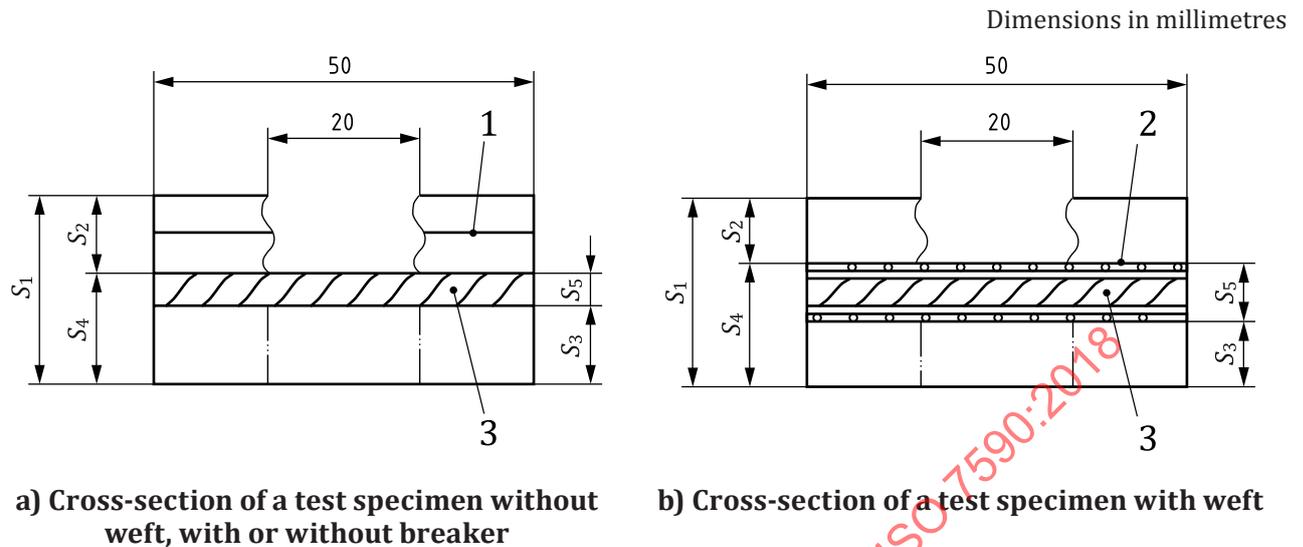
Remove a section of the top cover 20 mm in length over the entire width of the test specimen (see [Figure 4](#)). Measure the thickness, s_4 , at the same points as in [6.4.2.1](#). Take measurements directly above the cord, ensuring that the micrometer foot is in contact with either the surface of the 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 [Formula \(1\)](#).

6.4.2.3 Measurement of bottom cover thickness

After carrying out the procedure described in [6.4.2.2](#), remove the bottom cover. Measure the dimension s_5 as described in [6.4.2.2](#), ensuring that the measurement points are located over the cords.

Calculate the thickness of the bottom cover, s_3 , at each measurement point, using [Formula \(2\)](#).



Key

- 1 breaker
- 2 weft
- 3 cord

Figure 4 — Test specimens for method A2

6.4.2.4 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 [6.4.2.1](#), [6.4.2.2](#) and [6.4.2.3](#). Express the results in millimetres.

6.4.3 Method B

6.4.3.1 Measurement of top and bottom cover thicknesses

Using the optical measuring instrument ([5.2](#)), measure the distance between the top edge of the cord and the surface of the belt at each of the measurement points specified in [6.2](#), 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.

6.4.3.2 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 [6.4.3.1](#). Express the results in millimetres.

7 Test report

The test report shall contain at least the following information:

- a) a reference to this document, i.e. ISO 7590;
- b) the method used, i.e. A1, A2 or B, as appropriate;
- c) identification of the conveyor belt tested;
- d) the number of measurement points;