
Steel cord conveyor belts — Cord-to-coating bond test — Initial test and after thermal treatment

Courroies transporteuses à câbles d'acier — Essai d'adhérence des câbles dans l'enrobage — Essai initial et après traitement thermique

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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 of 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 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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 188, *Conveyor belts*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 7623:2015), which has been technically revised.

The main changes are as follows:

- added cover reduction permission of the grip areas in [Clause 7 c\)](#)

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Steel cord conveyor belts — Cord-to-coating bond test — Initial test and after thermal treatment

1 Scope

This document specifies a method for determining the bond strength of metal cords to their surrounding coating, either in the initial state or after thermal treatment.

It applies exclusively to metal-carcass conveyor belts.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18573, *Conveyor belts — Test atmospheres and conditioning periods*

ISO 7622-2, *Steel cord conveyor belts — Longitudinal traction test — Part 2: Measurement of tensile strength*

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 Principle

Measurement of the force is required to tear one of the steel warp cords out of the carcass by applying tensile stress along the axis of the cord.

5 Apparatus

5.1 Dynamometric tensile testing machine with jaws

In accordance with that described in ISO 7622-2.

5.2 Press

Having two heated platens, temperature controlled to $145\text{ °C} \pm 5\text{ °C}$, and capable of applying a pressure on the specimen (see [Clause 7](#)) of between 1 MPa and 5 MPa.

6 Test conditions

6.1 General

Unless otherwise specified and cited in the test report, the tests shall be carried out at a temperature of $23\text{ °C} \pm 2\text{ °C}$ and at a relative humidity of $(50 \pm 5)\%$, in accordance with ISO 18573, Atmosphere B.

6.2 Test in the initial state

Carry out the test described in [Clause 9](#) at least five days after manufacture of the belt.

6.3 Test after thermal treatment

Carry out the test described in [Clause 9](#) after thermal treatment of a sample of the belt by heating it between the two platens of the press ([5.2](#)) for $150\text{ min} \pm 1\text{ min}$, at a temperature of $145\text{ °C} \pm 5\text{ °C}$ and at a surface pressure of about 1 MPa but not exceeding 5 MPa.

If different temperatures or pressures or the duration of their application are used, details should be specified in the test report.

NOTE An adequate surface pressure can be obtained using spacers of a thickness of the belt test piece minus $1\text{ mm} \pm 0,5\text{ mm}$ between the platens of the press.

7 Specimens

Take from the sample of the belt piece undergoing thermal treatment, or not, three specimens of the following dimensions:

- length in the longitudinal direction of the belt, L is not less than: 350 mm for cords up to 5 mm in diameter, or 450 mm for cords over 5 mm in diameter;
- width: such that the specimen contains five warp cords;
- thickness: thickness of the belt including both covers. If the belt is too thick to be gripped in the jaws, some part of the cover may be cut off in the grip areas.

In the centre of the specimen, trace the limits of the test length L , defined in [Table 1](#).

Table 1 — Test length with tolerance corresponding to the diameter of the warp cords

Dimensions in millimetres

Diameter D	Test length L
≤ 2	25 ± 1
$2 < D \leq 5$	50 ± 2
> 5	100 ± 2

Using a knife, remove the cover and weft, if any, along at least 10 mm on either side of the test length L , so that the five warp cords are laid bare on both sides.

On one side, cut the centre cord as close as possible to the test area (see [Figure 1](#) or [Figure 2](#)).

On the other side, cut the four cords on either side of the centre cord, as close as possible to the test area (see [Figure 1](#) or [Figure 2](#)).

With a knife, detach the coating at the ends of the cut cords.

Take care not to damage the cord to be bond-tested.

8 Conditioning

Condition the test specimens, selected in accordance with [Clause 7](#), for a period of not less than 3 h at $23\text{ °C} \pm 2\text{ °C}$ and $(50 \pm 5)\%$ relative humidity, immediately prior to testing in accordance with [Clause 9](#).

9 Procedure

Set the distance between the jaws of the testing machine ([5.1](#)) at $250\text{ mm} \pm 10\text{ mm}$.

Place the ends of the specimens between the jaws and, for jaws with self-tightening wedges, check that the various parts of these jaws move freely and smoothly.

Apply a continuous tensile stress to the specimen (with no pauses) at a speed of $(100 \pm 10)\text{ mm/min}$.

Maintain the tractive force until the steel cord is completely torn out.

NOTE The complete torn-out force corresponds to the highest tractive force, which is defined as the tear-out force.

Repeat the test on the two other specimens.

10 Expression of results

Calculate the arithmetical mean value of the tear-out force, expressed in newtons, of the three specimens tested in [Formula \(1\)](#).

$$F = \frac{F_1 + F_2 + F_3}{3} \quad (1)$$

The cord-to-coating bond strength, A , is expressed in newtons per millimetre and is calculated using [Formula \(2\)](#).

$$A = \frac{F}{L} \quad (2)$$

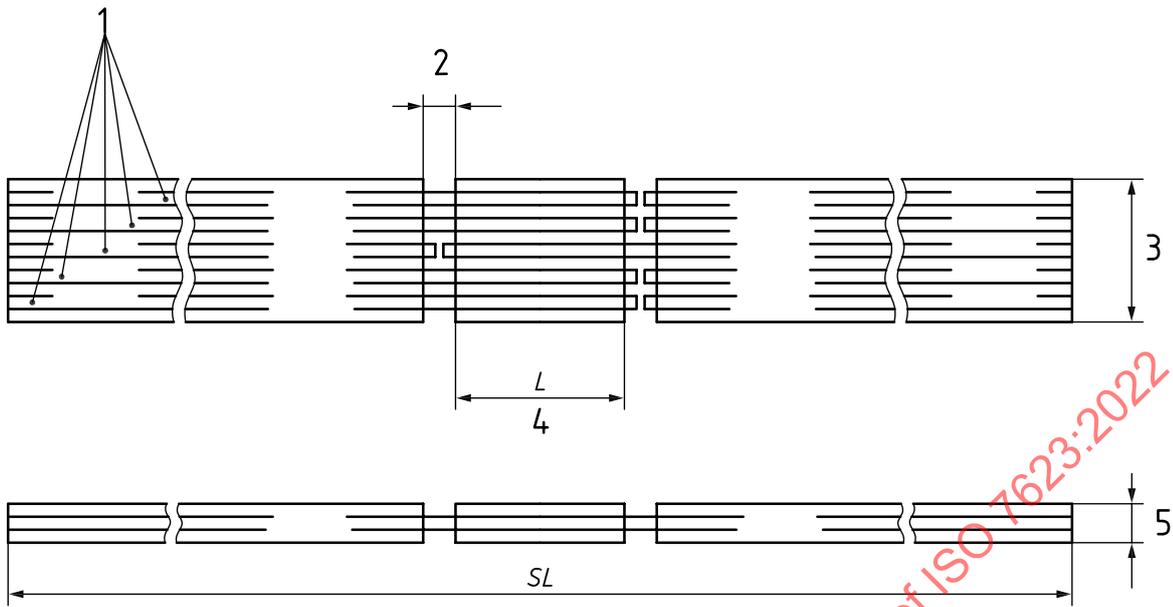
where L is the test length in millimetres.

11 Test report

The test report shall contain the following information:

- a) reference to this document, i.e. ISO 7623:XXXX;
- b) identification of the belt tested and whether it is in the initial state or thermally treated state, or another state [see e)];
- c) cord-to-coating bond strength, expressed as indicated in [Clause 10](#);
- d) the test temperature if other than 23 °C , and the test relative humidity if other than 50% ;
- e) details of any departure from the standard thermal treatment specified in [6.3](#).

Dimensions in millimetres

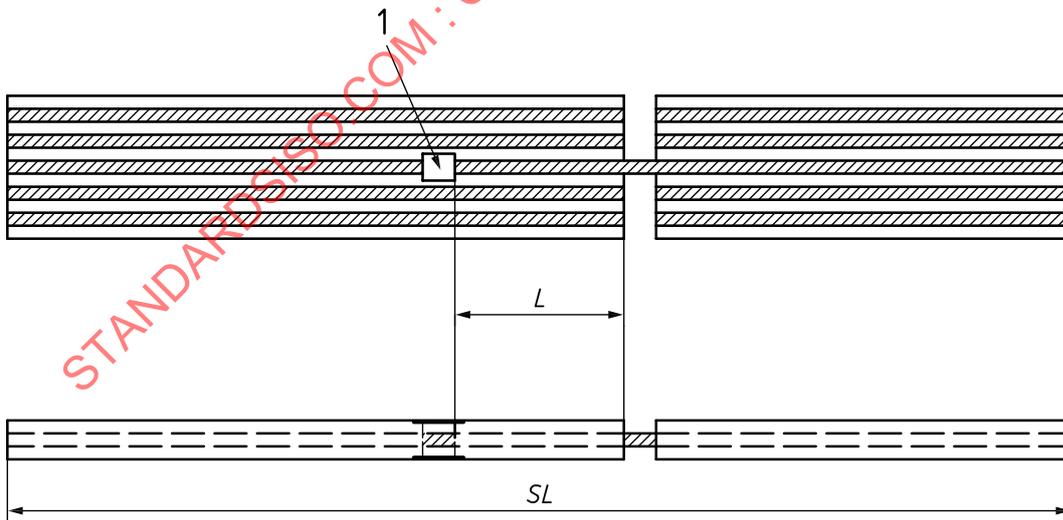


Key

- 1 warp cords
- 2 length of the cover and weft being removed
- 3 test specimen width
- 4 test length
- 5 test specimen thickness

Figure 1 — Specimen for the bond test of the steel cord to its coating

Dimensions in millimetres



Key

- 1 cutting point at the centre cord

Figure 2 — Simple test specimen