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Conveyor belts — Adhesion between constitutive elements — Test methods

Courroies transporteuses — Adhérence entre éléments constitutifs — Méthodes d'essai

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Contents

Page

Foreword

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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).

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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 252:2007), which has been technically revised.

The main changes are as follows:

— former Figure 1 was deleted;

— the requirements regarding autographic record of force have been modified (see 7.1 and 7.2);

— the sentence “Such a separation should be noted, but should not be considered as representative of the adhesion strength.” was deleted (former 6.1 and 6.2).

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.

Conveyor belts — Adhesion between constitutive elements — Test methods

1 Scope

This document specifies two test methods, A and B, for determining the adhesion strength between constitutive elements of a conveyor belt, i.e. between plies and between covers and carcass. Basic test conditions are in conformity with ISO 36.

It is applicable to all types of construction of conveyor belting with the exception of belts containing steel cord reinforcement, and textile-reinforced belts with a full-thickness tensile strength of less than 160 N/mm. It is not suitable or valid for light conveyor belts as described in ISO 21183-1[1].

NOTE Methods A and B are alternative options, but the mean adhesive force values calculated for the two methods can be different. Also, as both methods might not be equally suitable for all belt constructions, it is advisable that the advice of the belt manufacturer be sought.

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 36, *Rubber, vulcanized or thermoplastic — Determination of adhesion to textile fabrics*

ISO 6133, *Rubber and plastics — Analysis of multi-peak traces obtained in determinations of tear strength and adhesion strength*

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

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

The mean force required to strip the covers from the carcass, and also each ply from the next, is determined using a constant rate of traverse machine.

5 Apparatus

A suitable power-driven tensile testing machine, conforming to ISO 36, shall be used.

6 Test pieces

6.1 Time between manufacture and test

The time between completion of production and the commencement of testing shall be not less than 16 h; this period shall include the conditioning periods given in 6.5.

6.2 Shape and dimensions

Each test piece shall consist of a strip of belting of rectangular cross-section with clean-cut edges, (25 ± 0,5) mm wide and 200 mm minimum in length, so as to permit a length of at least 100 mm to be stripped.

6.3 Number

For both methods, A and B, two test pieces in the longitudinal direction shall be used.

The test may also be conducted with two transverse test pieces, if agreed between the manufacturer and purchaser.

6.4 Selection of test pieces from sample

The test pieces shall be taken not less than 100 mm from the edges of the available belt sample and from places as widely spaced as possible.

6.5 Conditioning

Condition the test pieces in accordance with ISO 18573, using either atmosphere D or atmosphere E, and then carry out the tests immediately after completion of the conditioning period.

7 Procedure

7.1 **Method A** (see Figure 1)

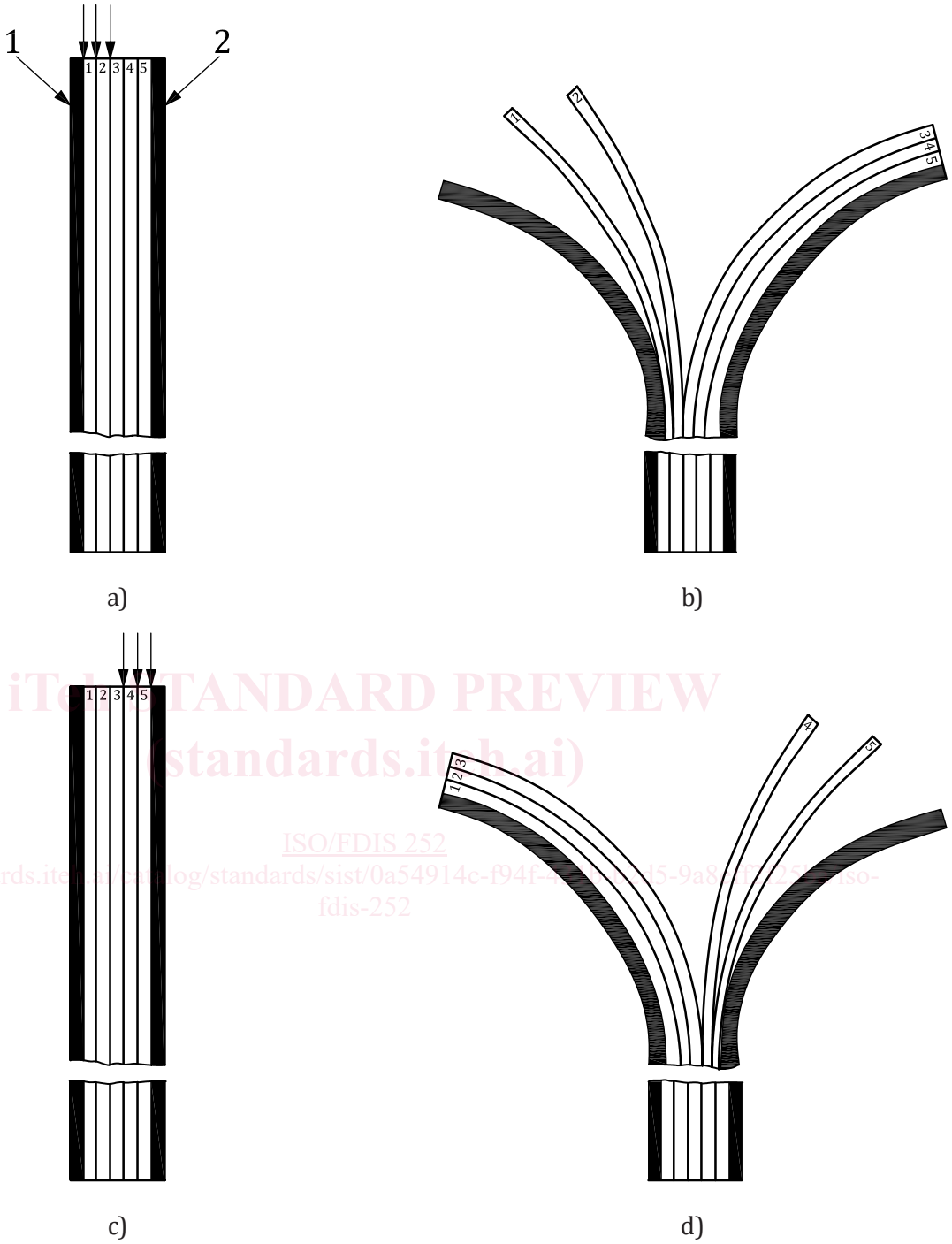
At one end of the longitudinal test piece, separate the top cover from the first ply for a distance appropriate to the test grips to be used. Fix the separated ends in the grips of the tensile testing machine and make an autographic record of the force required to strip enough length to obtain eight or more points of peak force with a rate of traverse of the driven jaw of (100 ± 10) mm/min. The test piece shall be unsupported.

Repeat this procedure using the same test piece for each consecutive ply up to the middle of the test piece [see Figure 1 a) and b)].

Carry out a similar series of tests on a second longitudinal test piece but commencing with the bottom cover [see Figure 1 c) and d)].

If the test is to be carried out on transverse test pieces, conduct the test in the same manner.

Any separation occurring outside the plane of contact between the two components, for example, inside one of the components (such as a cover) subjected to the test, is considered as a rupture of the material which constitutes the component.



Key

1 top cover

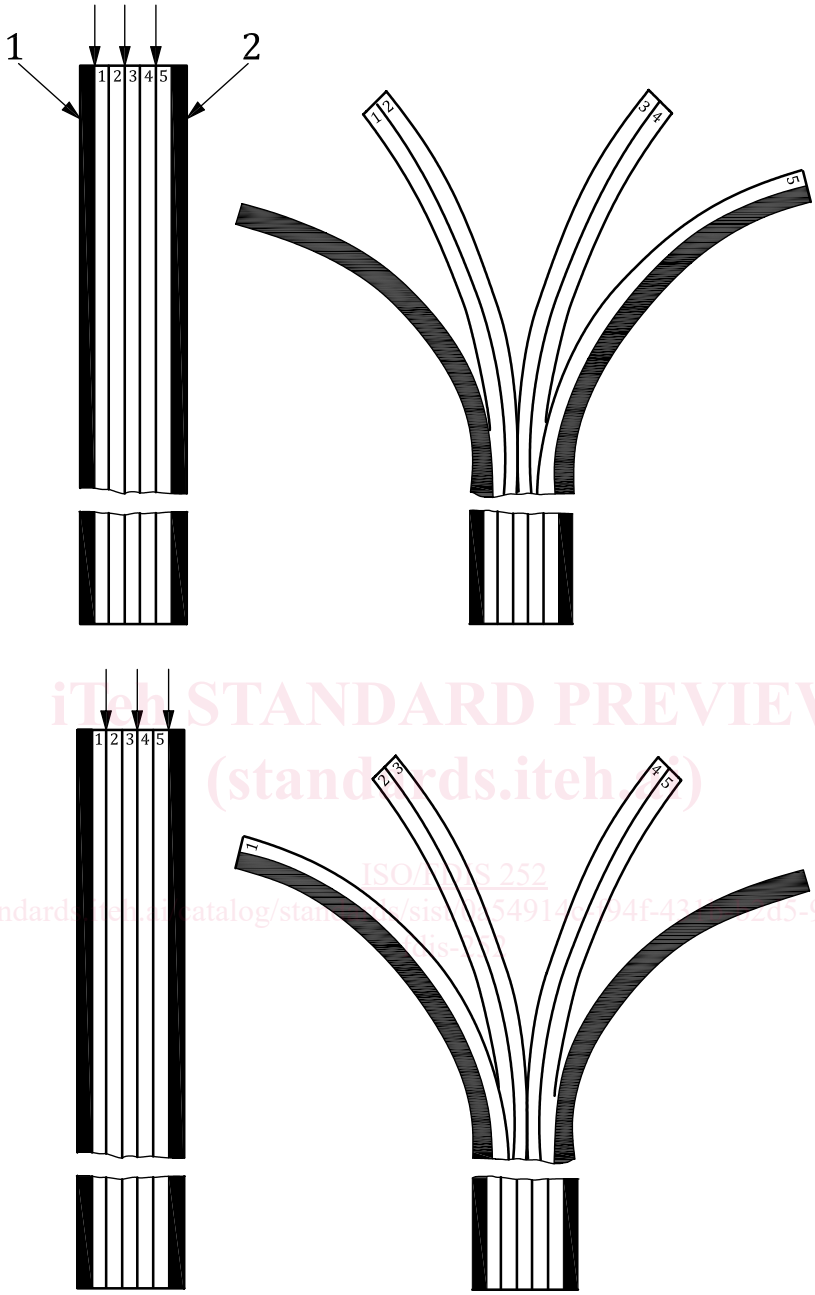
2 bottom cover

Figure 1 — Sequence of separation of components for method A (5-ply belt shown as example)

7.2 Method B (see Figure 2)

At one end of the longitudinal test piece, separate the top cover from the first ply for a suitable distance appropriate to the test grips to be used. Fix the separated ends in the grips of the tensile testing machine and make an autographic record of the force required to strip enough length to obtain eight or more

points of peak force with a rate of traverse of the driven jaw of (100 ± 10) mm/min. The test piece shall be unsupported.



Key

1 top cover

2 bottom cover

Figure 2 — Sequence of separation of components for method B (5-ply belt shown as example)

Repeat this procedure using the same test piece, stripping consecutively two unseparated plies from the remainder of the test piece.

Carry out a similar series of tests on a second longitudinal test piece but commencing by separating the unseparated top cover and first ply from the second ply.

If the test is to be carried out on transverse test pieces, conduct the test in the same manner.

Any separation occurring outside the plane of contact between the two components, for example, inside one of the components (such as a cover) subjected to the test, is considered as a rupture of the material which constitutes the component.

8 Expression of results

8.1 Examination of traces for longitudinal test pieces

Examination and analysis of the multi-peak adhesion strength test traces shall be in accordance with ISO 6133. The median peak force is specified as the mean adhesion force. The lowest graphically recorded peak is defined as the minimum adhesion force.

Calculate the mean adhesion as the quotient of the mean adhesion force, in Newtons, divided by the nominal width, in millimetres, of the test piece to the nearest 0,1 N/mm.

Calculate the minimum adhesion as the quotient of the minimum adhesion force, in Newtons, divided by the nominal width, in millimetres, of the test piece to the nearest 0,1 N/mm.

8.2 Examination of traces for transverse test pieces

Make calculations in accordance with 8.1 for the two test pieces cut transversely, if applicable.

9 Test report

The test report shall contain at least the following information:

a) reference to this document (i.e. ISO 252:####);

b) identification of the conveyor belt tested;

c) time interval between belt manufacture and test piece preparation;

d) temperature and times for conditioning and testing;

e) test method used (A or B);

f) mean adhesion, as calculated in accordance with 8.1, for the top cover to ply or carcass measurement, the bottom cover to ply or carcass measurement and for each ply-to-ply measurement;

g) minimum adhesion, as calculated in accordance with 8.1, for the top cover to ply or carcass measurement, the bottom cover to ply or carcass measurement and for each ply-to-ply measurement;

h) any deviations from the procedure;

i) any unusual features observed;

j) date of the test.

Bibliography

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