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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Conveyor belts — Ply adhesion between constitutive elements — Test methods and requirements

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

Reference number
ISO 252 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 252 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts).*

This second edition cancels and replaces the first edition (ISO 252 : 1975), of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Conveyor belts — Ply adhesion between constitutive elements — Test methods and requirements

1 Scope and field of application

This International Standard specifies the adhesion test methods and their minimum values between plies, and between covers and carcase, of conveyor belts; basic test conditions are in conformity with ISO 36.

It applies to all types of construction of conveyor belting with the exception of belts containing steel cord reinforcement, belts of solid woven construction and textile-reinforced belts with a tensile strength less than 160 N/mm. It does not apply to heat- and oil-resistant conveyor belts.

2 References

ISO 36, *Rubber, vulcanized — 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.*

Section one : Test methods

3 Principle

The test consists in determining the mean force required to strip the covers from the carcase, and also each ply from the next, using a constant rate of traverse machine.

Two test methods are given, since neither individual method is satisfactory with all types of belt construction. The belt manufacturer shall decide on the method to be used for each particular belt of his manufacture.

3.1 Method A ("ply by ply" technique)

After first carrying out a cover adhesion test, this method consists in stripping each ply separately from the remainder of the test piece.

3.2 Method B ("two plies by two plies" technique)

After first carrying out a cover adhesion test, this method of determining the adhesion between plies consists in stripping either the first ply and unseparated cover, or two unseparated plies, from the remainder of the test piece.

4 Apparatus

Suitable power-driven tensile testing machine, complying with the requirements of ISO 36.

5 Test pieces

The test pieces shall be cut at least five days after the belt is manufactured.

5.1 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 300 mm minimum length so as to permit a length of at least 100 mm to be stripped. If necessary and possible, the thickness shall be reduced to a suitable value which will ensure that during the test the line of separation remains as near as possible to the plane through the axes of the components of the test piece held between the grips (see figure 1).

The minimum thickness shall be such that the weakest component can transmit the necessary force for separation without breaking.

5.2 Number

For both methods A and B the following test pieces are required :

a) two pairs of test pieces cut longitudinally, and/or

b) two pairs of test pieces cut transversely.

5.3 Sampling

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.

5.4 Conditioning

The test pieces shall be allowed to stabilize for at least 24 h before the test, at a temperature of 23 ± 2 °C and a relative humidity of (50 ± 5) %. In the case of belts with a textile carcase and after agreement between the parties concerned, a temperature of 20 ± 2 °C and a relative humidity of (65 ± 5) % may be selected.

These values shall be reported in the test report.

6 Procedure

6.1 Method A (see figure 2)

At one end of the longitudinal test piece, separate the face 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 a further 100 mm 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.

Carry out a similar series of tests on a second longitudinal test piece but commencing with the back cover.

Test the other pair of longitudinal test pieces and/or test the two pairs of transverse test pieces similarly.

6.2 Method B (see figure 3)

At one end of the longitudinal test piece, separate the face 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 a further 100 mm 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, 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 face cover and first ply, from the second ply.

Test the other pair of longitudinal test pieces, and/or test the two pairs of transverse test pieces similarly.

NOTE — 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. Such a separation should be noted but should not be considered as representative of the adhesion strength.

7 Expression of results

7.1 Examination of test traces

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

Calculate the average adhesion as the quotient of the mean adhesion force, in newtons, divided by the nominal width, in millimetres, of the test piece.

7.2 Calculation of mean values

7.2.1 Longitudinal samples

Calculate the mean value of

a) all the tests made on the four test pieces cut longitudinally in which the cover is stripped from the carcase;

b) all the tests made on the four test pieces cut longitudinally in which ply is stripped from ply.

7.2.2 Transverse samples

Make a similar calculation for the four test pieces cut transversely.

7.2.3 Mean values of results

Calculate the mean value of all results longitudinally and transversely for

a) all tests in which the cover is stripped from the carcase;

b) all tests in which ply is stripped from ply.

8 Test report

The test report shall include the following particulars:

a) reference to this International Standard;

b) identification of the belt tested;

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

d) temperature, humidity, times for conditioning and testing;

e) test method (A or B);

f) mean value of cover to carcase tests on the longitudinal samples;

g) mean value of ply to ply tests on the longitudinal samples;

h) mean value of cover to carcase tests on the transverse samples;

i) mean value of ply to ply tests on the transverse samples;

j) the mean value of results of all cover to carcase tests;

k) the mean value of results of all ply to ply tests;

l) the lowest graphically recorded value of all cover to carcase tests;

m) the lowest graphically recorded value of all ply to ply tests;

n) the highest graphically recorded peak from all tests;

o) any cases of one of the components failing before the adhesion strength between the two components is reached and the force at which the failure occurred (see note in 6.2);

p) the date of the test.

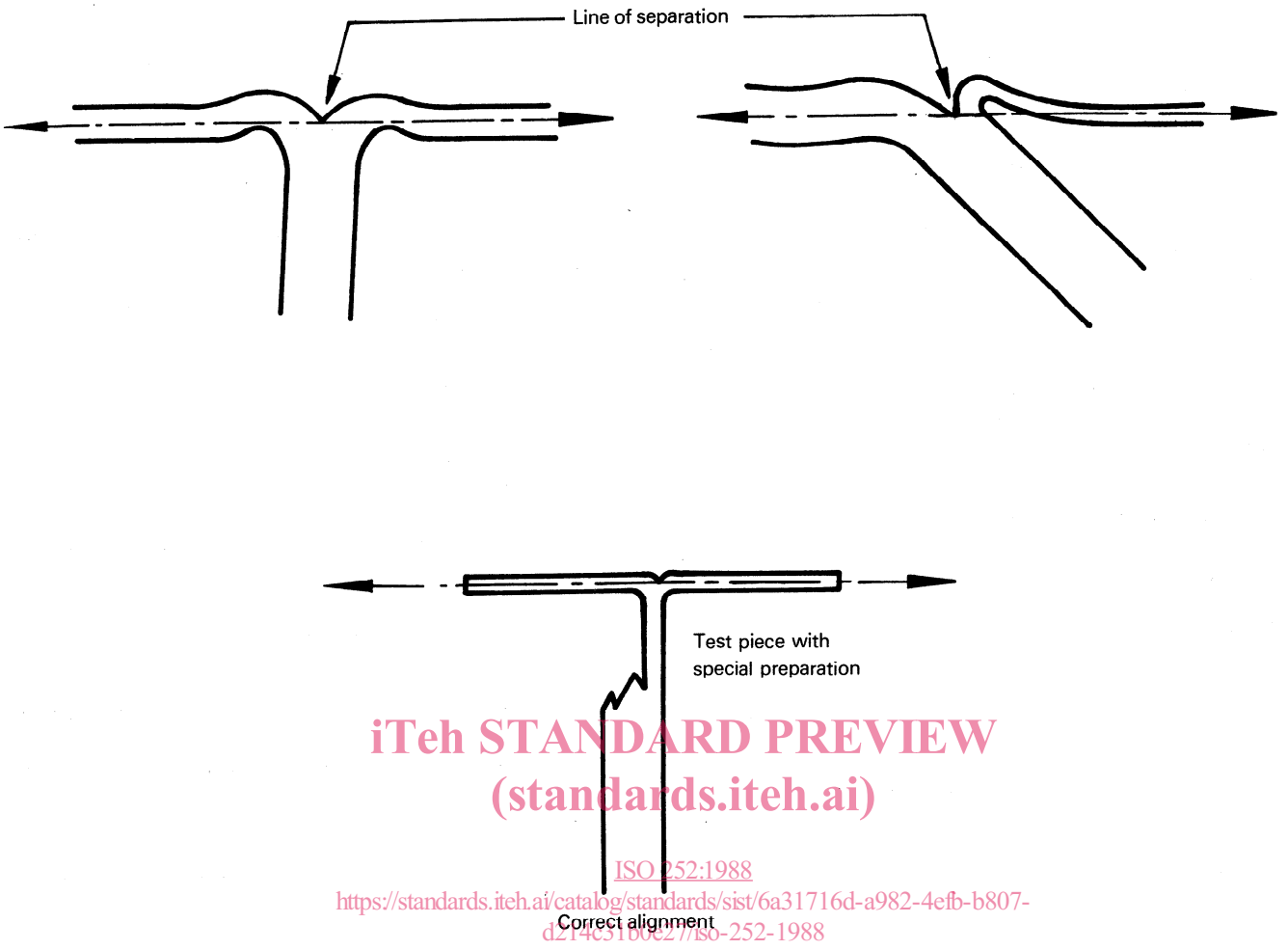

Figure 1 — Position of line of separation of plies

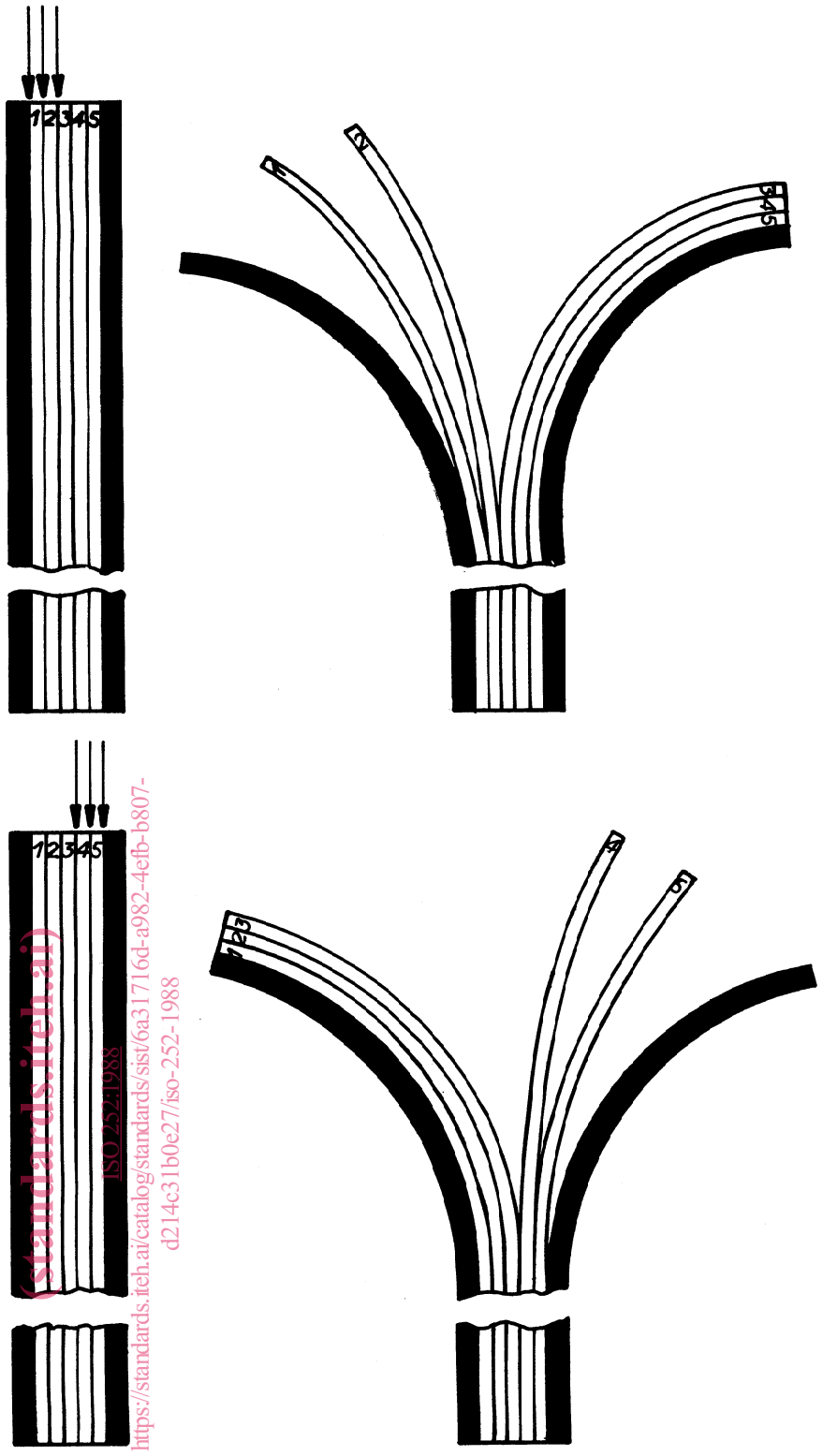

Figure 2 — Sequence of separation of components for method A (5-ply belt shown as example)

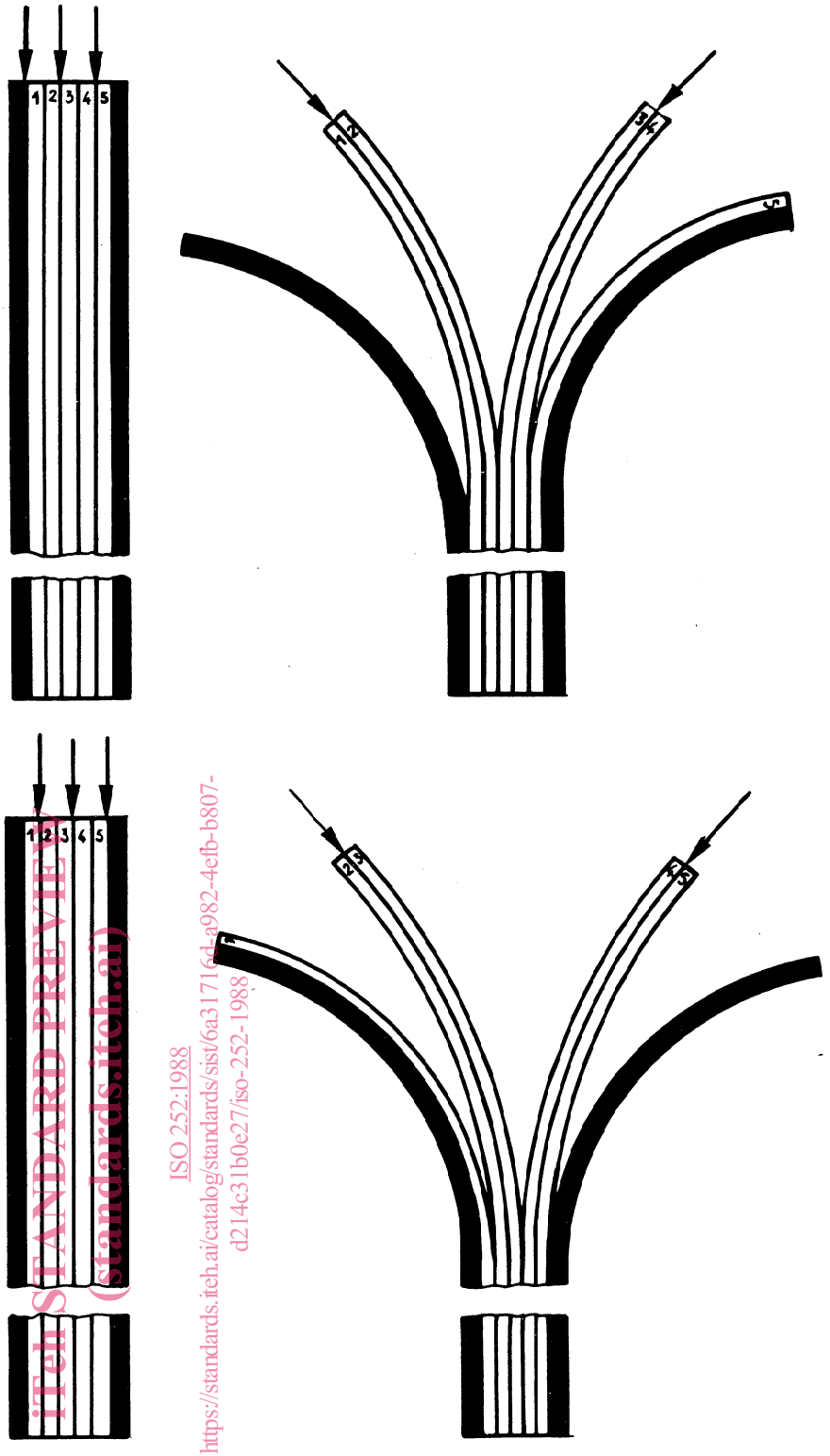

Figure 3 — Sequence of separation of components for method B (5-ply belt shown as example)

Section two : Requirements

9 Adhesion values

The adhesion values shall be as given in tables 1 and 2.

Table 1 — Belts with filament synthetic carcases

Value	Minimum adhesion between adjacent plies	Minimum adhesion between covers and carcase	
		Covers 0,8 to 1,5 mm thick	Covers more than 1,5 mm thick
	N/mm	N/mm	N/mm
Mean value of results longitudinally	4,5	3,2	3,5
Mean value of results transversely	4,5	3,2	3,5
Mean value of all results	5	3,5	3,9
Lowest graphically recorded peak value in all tests	3,9	2,4	2,9

NOTE — In no case shall the highest recorded peak value in all the tests exceed 16 N/mm.

Table 2 — Belts with other textile carcases

Value	Minimum adhesion between adjacent plies	Minimum adhesion between covers and carcase	
		Covers 0,8 to 1,5 mm thick	Covers more than 1,5 mm thick
	N/mm	N/mm	N/mm
Mean value of results longitudinally	3,2	2,1	2,7
Mean value of results transversely	3,2	2,1	2,7
Mean value of all results	3,5	2,4	3
Lowest graphically recorded peak value in all tests	2,7	1,6	2,2

NOTE — In no case shall the highest recorded peak value in all the tests exceed 16 N/mm.