International Standard

ISO 283

Full thickness tensile strength and elongation of conveyor belts — Specifications and method of test

Résistance et allongement par traction des courroies transporteuses en pleine épaisseur — Spécifications et méthode d'essai

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

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.

International Standard ISO 283 was developed by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*.

It results from the combination into one single document of ISO Recommendation R 283-1962 and its Amendment 1-1972, which it cancels and replaces, and was submitted directly to ISO Council for acceptance, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO.

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No member body expressed disapproval of the document.

Full thickness tensile strength and elongation of conveyor belts — Specifications and method of test

0 Introduction

The studies which led to the first edition of ISO/R 283 showed that the highest strength values were obtained from test pieces of a rectangular shape. However, this shape was not adopted because it leads to frequent breakages at the edges of the test piece or in the grips.

It was shown that breakages in the grips were avoided by using a waisted test piece. It was also apparent that the highest values were obtained when the test piece had the greatest possible radius of curvature (for a rectangular test piece the radius of curvature is infinite). The type of test piece which was recommended (hereafter called "type A"), with its 1 000 mm radius of curvature, resulted from these observations.

The same observations are valid in the case of high strength belts, but the gripping force permitted by the 35 mm ends of the type A test piece is generally inadequate to prevent slipping in the grips.

The best shape of test piece is one which :

— provides a large gripping area (test piece with a wide end);

— allows a high ratio of gripping force to tensile strength;

— has the largest possible radius of curvature.

The test pieces described herein for belts having a strength greater than 1 000 N/mm have been agreed as a compromise to meet the above requirements.

1 Scope and field of application

This International Standard lays down the conditions for full thickness tensile strength testing of conveyor belts, and also the corresponding specifications (breaking strength and elongation, elongation under reference load).

It applies to both "surface" and "underground" belts.

2 Specifications

2.1 Breaking strength

The minimum values of full thickness breaking strength in the longitudinal (warp) and the transverse (weft) directions are given in the table below in force units and referred to the unit of the width of the test piece.

Minimum values	
longitudinal direction[1]	transverse direction
N/mm	N/mm
160	63
200	80
250	100
315	125
400	160
500	free
630	free
800	free

[1] The value of the breaking strength of a belt in the longitudinal direction is included in the standard designation for that belt.

NOTES

1 The values shown in the table above belong to the R10 series of preferred numbers, in accordance with ISO 3, *Preferred numbers — Series of preferred numbers*.

2 The table of values for strength in the longitudinal directions may be extended in both directions by using preferred numbers from the R10 series downward or upward :

125, 100, etc.

1 000, 1 250, etc.

3 The table of values for strength in the transverse direction may be extended downward by using preferred numbers of the R10 series in that direction :

50, 40, etc.

On the other hand, transverse strength remains open for belting of 800 N/mm and over (in the longitudinal direction).

2.2 Elongations in the longitudinal direction

The values shown below are given unless otherwise specified (this may occur in particular for single ply belts, metal belts and certain belts of very great length) :

Elongation under reference load[1] 4 % max.

Breaking elongation 10 % min.

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[1] "Reference load" signifies the tensile stress equal to 10 % of the minimum strength specified in the table in 2.1 (longitudinal direction).

3 Method of test

3.1 Principle

A test piece cut from the full thickness of the belt is tensile tested until it breaks.

3.2 Apparatus

The apparatus consists of the following :

3.2.1 Dynamometer, the dynamometer load should be suitable for the strength of the test piece.

3.2.2 Grips, the form of the grips should ensure perfect fixing of the test piece and eliminate any possibility of slip during the tensile test. The use of grips with transverse serrations in accordance with figure 1 is recommended. For very thick belts, the use of double compartment grips of the type shown in figure 2 is permitted.

3.3 Test pieces

3.3.1 Shape and dimensions

The shape and dimensions of the test piece shall be in accordance with either figures 3, 4 or 5 which are alternatives and chosen by the supplier.
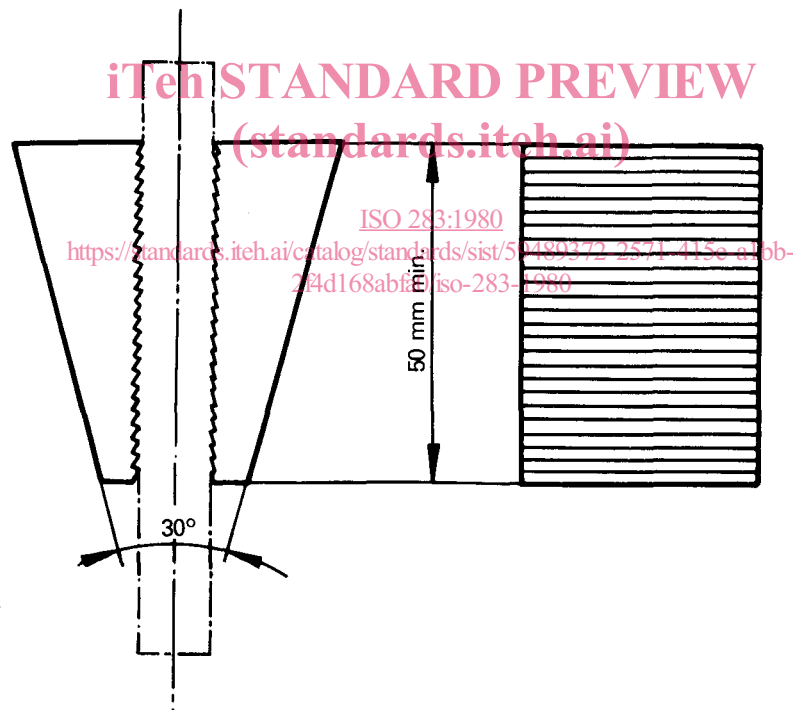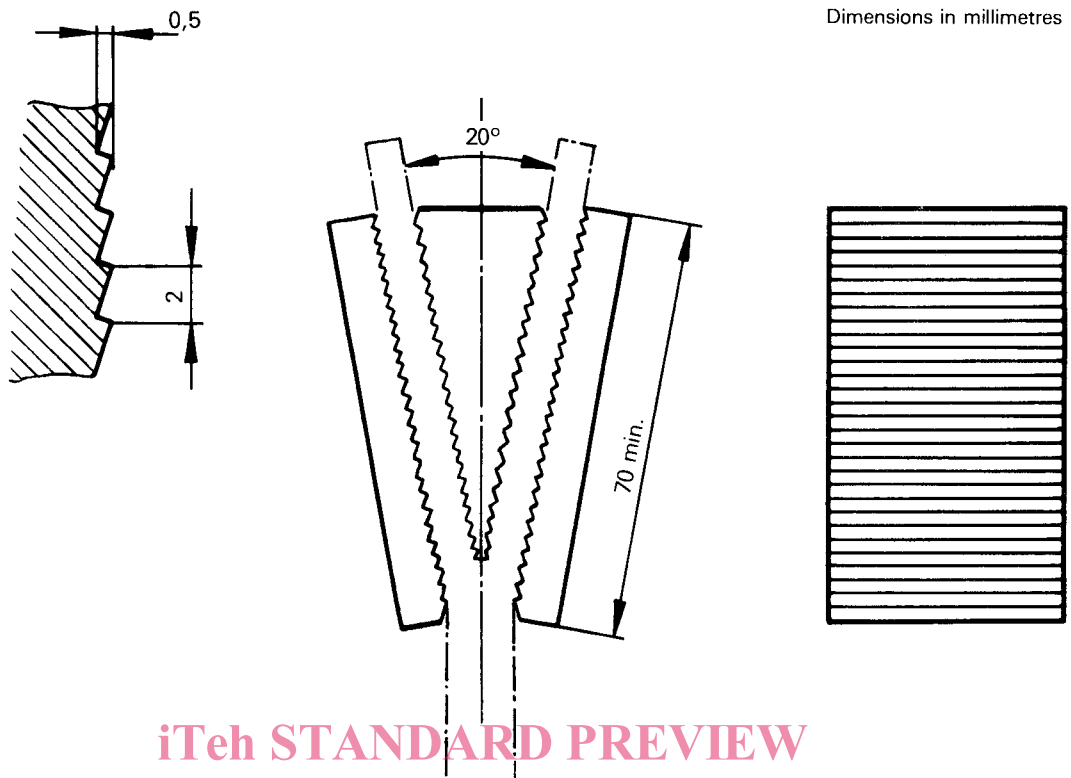

Figure 1

Dimensions in millimetres

Figure 2

Dimensions in millimetres
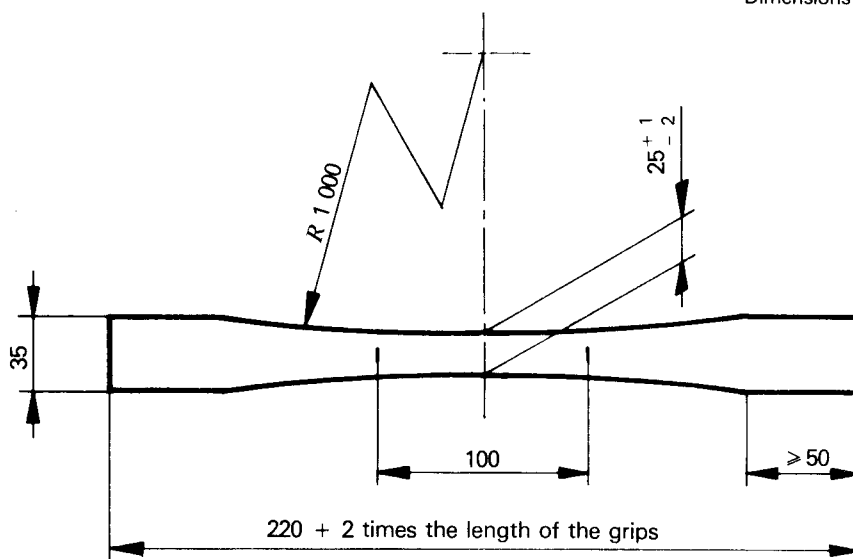
Figure 3 — Type A test piece

Dimensions in millimetres

Cut off corners if necessary

R 560

20 $^{+1}_{-2}$

Clamping zone

140

> 120

> 50

100

≈ 10

500

Figure 4 — Type B test piece

Dimensions in millimetres

R 350

25 $^{+1}_{-2}$

Clamping zone

63

100

≈ 227

380 min.

Figure 5 — Type C test piece
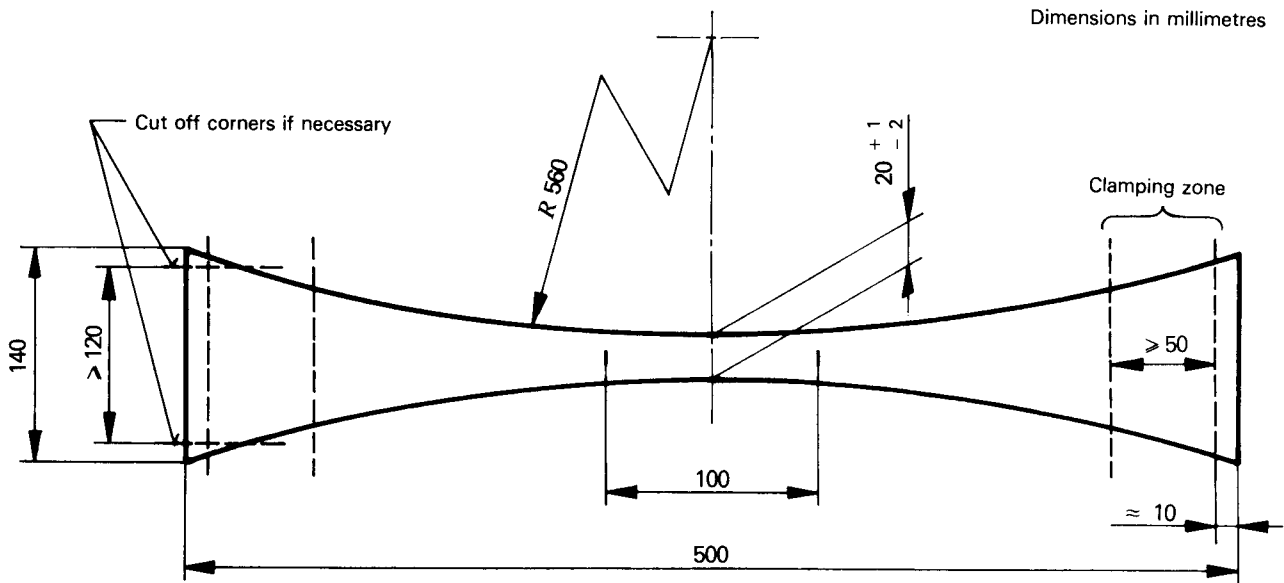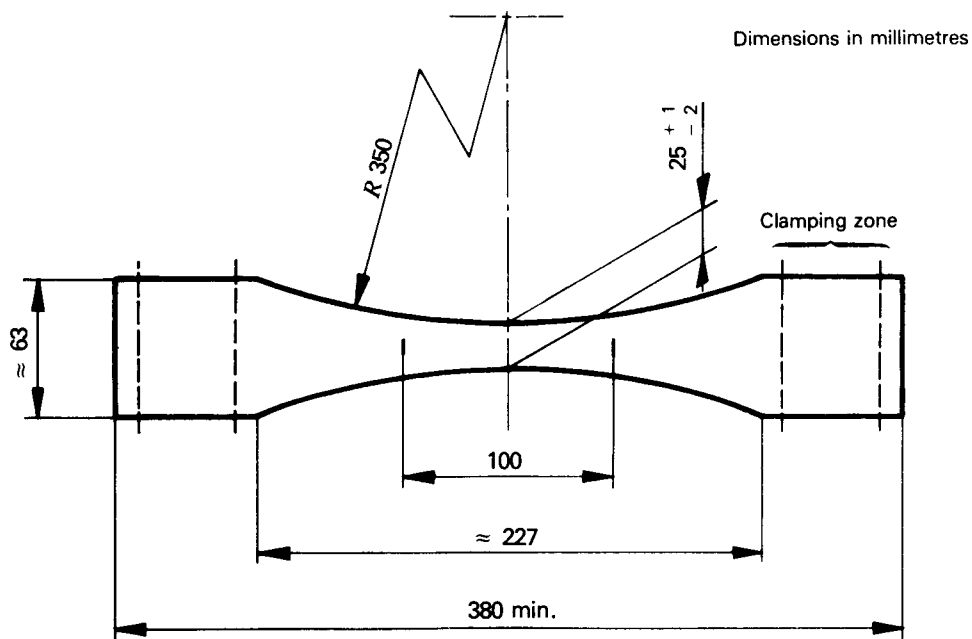
3.3.2 Number

Three longitudinal test pieces.

Three transverse test pieces.

3.3.3 Method of sampling

Sampling should be done parallel or at right angles to the axis of the belt and at least 50 mm from its edge. It should be done at least 5 days after manufacture.

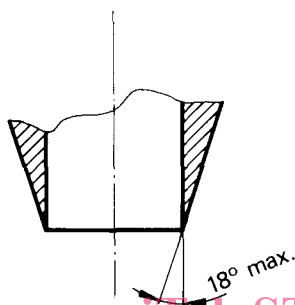The die should be moistened before cutting. The cutter angle should be at most 18° (see figure 6).

18° max.

Figure 6

3.3.4 Preparation

On the axis of the test piece draw two datum marks equidistant from the centre and 100 mm apart.

If the covers of the belt are very thick or of very different thicknesses, the test may be performed without covers, in order to avoid slip of the test piece in the grips.

Measure exactly the width of the middle part of the test piece.

NOTE — For certain types of construction, the proposed shapes produce abnormal distribution of stresses in the different threads and systematic slip in the grips, giving misleading results. The test should then be made on test pieces of a different shape.

3.4 Conditioning of test pieces

The test should be performed on test pieces taken at least 5 days after manufacture.

The test pieces should be conditioned for 3 days at a temperature of 20 ± 2 °C and a relative humidity of (65 ± 5) %.

In the event of dispute, the conditioning period should be increased to at least 14 days (with the same temperature and humidity conditions). The exact value of this period may be specified by agreement between the manufacturer and the user.

3.5 Procedure

The distance between the grips should be fixed at

200 ± 10 mm when a type A test piece is used, or the external edges of the grips should be placed at approximately 10 mm from the extremities of a type B or type C test piece.

Exert a continuous (uninterrupted) tensile stress on the test pieces, at the rate of 100 ± 10 mm/min.

For lengthways test pieces, note the gauge length when the tensile stress reaches 10 % of the nominal strength, this being regarded as the reference load.

Continue to read the gauge length until the first sign of destruction of the fabric. Read the breaking load on the chart or on the dynamometer indicator.

Breakage should occur between the two datum marks on the test piece. (Any test pieces which break outside this central portion or which slip in the grips should not be taken into account when calculating the mean, and the test should be repeated on new test pieces).

3.6 Reporting of results

3.6.1 Breaking strength

Strength should be shown in force units and referred to the unit of the width of the test piece.

Calculate separately the mean of the values obtained for the longitudinal direction and the transverse direction. For each of these two cases, the result should be taken as the nearest whole number to the mean value so found.

3.6.2 Elongations

Elongations should be shown as a percentage of the initial gauge length.

For elongation at break, calculate the mean of the values found (in the longitudinal direction). The result should be taken as the nearest whole number to the mean value so found.

For elongation under reference load, calculate the mean of the values found (in the longitudinal direction). The result should be taken as the number rounded to the first decimal place.

3.7 Test report

The test report should mention, in addition to the results found, the following items :

 a) the mean values;

 b) the type of test piece used;

 c) the width of the middle part of the test piece;

 d) the number of individual values that were used for preparing these means;

 e) the conditioning period;

 f) the temperature and relative humidity during the test.

The test report should indicate if the test has been made with or without cover.

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