INTERNATIONAL STANDARD

ISO 283

Second edition
1990-11-01

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

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

Reference number
ISO 283 : 1990 (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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

This second edition cancels and replaces the first edition (ISO 283 : 1980), of which it constitutes a technical revision. In particular, figure 4 (representing the type B test piece) has been modified.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

The studies which led to publication of ISO/R 283 : 1962 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.

This page intentionally left blank

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

1 Scope

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

It is applicable to both "surface" and "underground" belts.

It does not apply to belts with a metal carcass or with an aramid carcass.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3 : 1973, *Preferred numbers — Series of preferred numbers.*

ISO 471 : 1983, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

3 Specifications

3.1 Breaking strength

The minimum values of full thickness breaking strength in the longitudinal (warp) and the transverse (weft) directions are given in table 1 in force units and referred to the unit of the width of the test piece.

Table 1 — Breaking strength

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 (see ISO 433).

NOTES

1 The values shown belong to the R10 series of preferred numbers, in accordance with ISO 3.

2 This 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 This 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 500 N/mm and over (in the longitudinal direction).

3.2 Elongations in the longitudinal direction

Unless otherwise specified by the purchaser, the following values shall apply:

Elongation under reference load[1)] 4 % max.

Breaking elongation 10 % min.

4 Method of test

4.1 Principle

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

4.2 Apparatus

The apparatus consists of the following :

4.2.1 Dynamometer, capable of applying stress suitable for the strength of the test piece.

4.2.2 Grips, the form of which 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.

4.3 Test pieces

4.3.1 Shape and dimensions

The shape and dimensions of the test piece shall be in accordance with either figures 3, 4 or 5.

Dimensions in millimetres

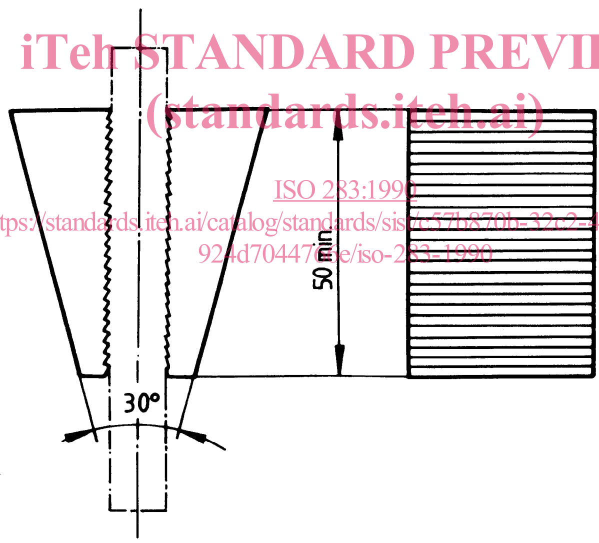

Figure 1 — Grip with transverse serrations

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

Dimensions in millimetres

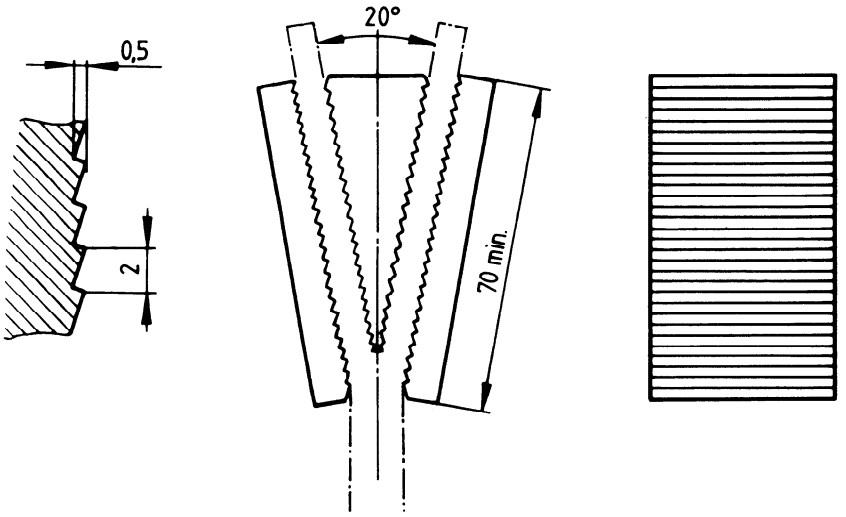

Figure 2 — Double compartment grip

Dimensions in millimetres

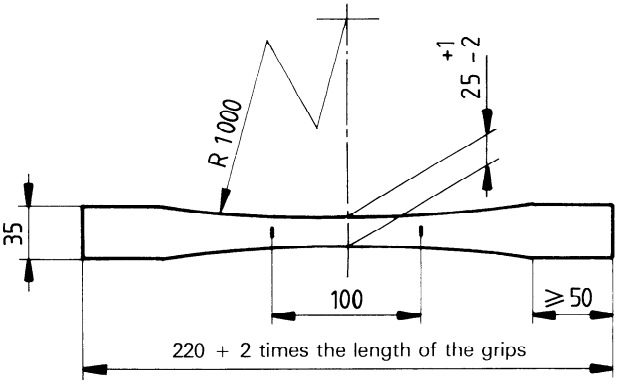

Figure 3 — Type A test piece

Dimensions in millimetres

l_1	l_2
100	500
120	800

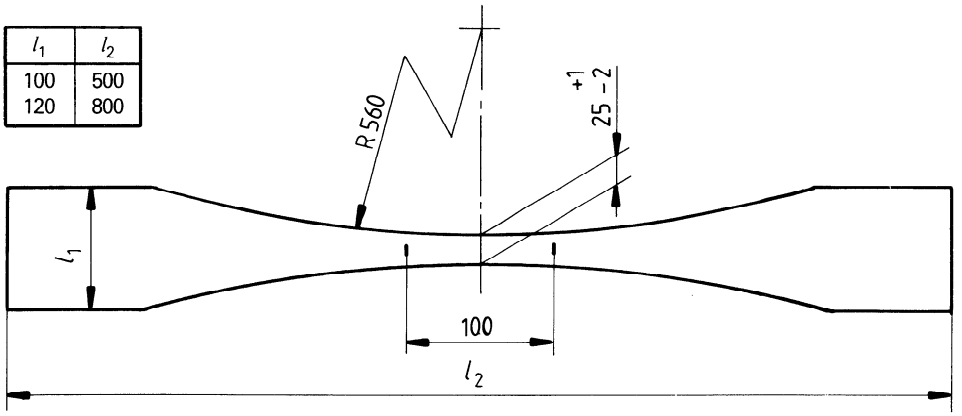

Figure 4 — Type B test piece

Dimensions in millimetres

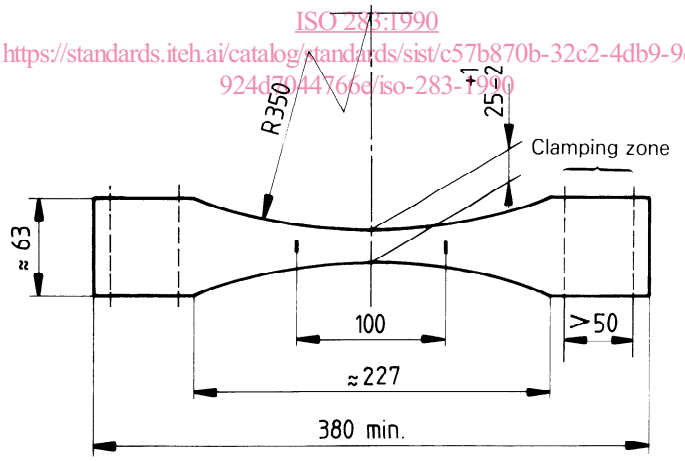

Figure 5 — Type C test piece

4.3.2 Number

Three longitudinal test pieces.

Three transverse test pieces.

4.3.3 Selection of test pieces

The taking of test pieces shall 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.

No test piece shall be cut from the sample with its longitudinal edge less than 12 mm from an edge of the sample.

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

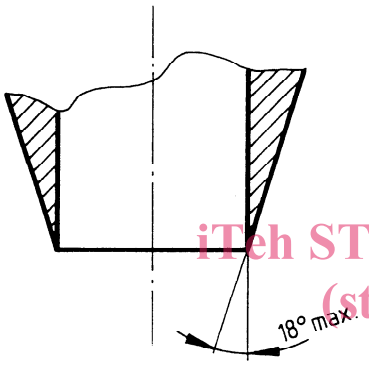

Figure 6 — Die

4.3.4 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 accurately 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 may then be made on test pieces of a different shape.

4.4 Conditioning of test pieces

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

The test pieces shall be conditioned for 3 days at a temperature of 23 °C ± 2 °C and a relative humidity of (50 ± 5) %.

In the event of dispute, the conditioning period shall 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.

NOTE — In the case of belts with a textile carcass, the test results of which can be affected by the humidity, a temperature of 20 °C ± 2 °C and a relative humidity of (65 ± 5 %) may be selected, by agreement between the parties concerned, provided that this is clearly indicated in the test report.

In the special case of tropical conditions, refer to ISO 471 [27 °C ± 2 °C, (65 ± 5 %) %].

4.5 Procedure

The distance between the grips shall be fixed at 200 mm ± 10 mm when a type A test piece is used, or the external edges of the grips shall be placed at a few millimetres from the extremities of a type B or type C test piece.

NOTE — Specimen slippage in the jaws can be minimized by rubbing rosin on the portion of the specimen that will be in the jaws, removing any excess rosin and enclosing both sides of the rosin-coated specimen with coarse emery cloth. Fold the emery cloth over the ends of the specimen with the coarse side of the cloth next to the rosin-coated surfaces.

Exert a continuous (uninterrupted) tensile stress on the test pieces, at the rate of 100 mm/min ± 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 carcass. Read the breaking load on the chart or on the dynamometer indicator.

Breakage shall 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 shall not be taken into account when calculating the mean, and the test should be repeated on new test pieces.)

4.6 Expression of results

4.6.1 Breaking strength

Strength shall 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 shall be taken as the whole number nearest to the mean value so found.

4.6.2 Elongations

Elongations shall 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 shall be taken as the whole number nearest to the mean value so found.

For elongation under reference load, calculate the mean of the values found (in the longitudinal direction). The result shall be taken as the whole number nearest to the mean value so found.