SLOVENSKI STANDARD
SIST ISO 9856:1999

01-december-1999

Naprave za kontinuirni transport - Trakovi traļ nih transporterjev ï Ugotavljanje elastiļ nega modula

Conveyor belts -- Determination of elastic modulus

Courroies transporteuses -- Détermination du module d'élasticité

Ta slovenski standard je istoveten z: ISO 9856:1989

ICS:

53.040.20 Deli za transporterje Components for conveyors

SIST ISO 9856:1999 **en**

INTERNATIONAL STANDARD

ISO 9856

First edition
1989-07-01

Conveyor belts — Determination of elastic modulus

Courroies transporteuses — Détermination du module d'élasticité

Reference number
ISO 9856 : 1989 (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 9856 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*.

Annex A of this International Standard is for information only.

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

Conveyor belts — Determination of elastic modulus

1 Scope

This International Standard specifies a method for determining the elastic modulus of a conveyor belt.

NOTE — The elastic modulus is notably used in the calculation of transition distances in accordance with ISO 5293.

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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 282 : 1975, *Conveyor belts — Sampling.*

ISO 283 : 1980, *Full thickness tensile strength and elongation of conveyor belts — Specifications and method of test.*

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

3 Principle

Application of a sinusoidal stress between 2 % and 10 % of the minimum breaking load on a test piece cut from the full thickness of the belt in the longitudinal direction, then recording of at least 200 load cycles of the graph giving the load as a function of elongation, and, from this graph, determination by calculation of the elastic modulus.

4 Apparatus

4.1 Dynamic tensile testing machine, capable of applying stress of up to 10 % of the minimum breaking load determined in accordance with ISO 283. The machine shall be capable of applying a cyclic load to the test pieces between 2 % and 10 % of the minimum breaking load.

4.2 Extensometer, with a measuring length of at least 100 mm and accurate to at least 0,1 mm.

4.3 Recording device, to record the curve of tensile stress as a function of elongation.

5 Test pieces

5.1 Shape and dimensions

The test piece cut from the full thickness of the belt in the longitudinal direction shall be rectangular. Its width shall be 50 mm and its length at least 300 mm plus twice the necessary clamping zone length.

5.2 Number and conditioning of test pieces

From the same sample obtained in accordance with ISO 282, take the three following test pieces according to the requirements of 5.1:

— two test pieces taken at least 50 mm from the edge of the belt;

— one test piece taken in the middle of the belt.

They shall be taken at least five days after manufacture.

5.3 Preparation and conditioning

Remove the covers from the test piece so that the thickness of the remaining cover is between 0,5 mm and 1 mm (see ISO 283 : 1980, 3.3.4).

Unless specified otherwise (to be noted in the test report), condition the test piece for three days at 23 °C ± 2 °C and a relative humidity of 50 % ± 5 %, in accordance with ISO 471.

6 Procedure

Carry out the test on each test piece defined in 5.2. Place the ends of the test piece between the jaws of the dynamic tensile testing machine (4.1). The free length between the jaws shall be at least 300 mm.

Stress the test piece with an initial tensile stress (dead load) of 0,5 % of the specified minimum breaking strength of the belt in accordance with the method specified in ISO 283.

Position the two grids of the extensometer (4.2) on the axis of the test piece with a separation of at least 100 mm. Then set the recorder (4.3) to zero elongation.

Load the test piece approximately sinusoidally with a force between 2 % and 10 % of the specified minimum breaking strength of the belt and at a frequency of 0,1 Hz.

Record at least the first and the 200th load cycle (see figure 1).

From the graphs obtained (see figure 1), record the value ΔF in newtons per millimetre of test piece width and read the value Δl in millimetres.

7 Expression of results

The elastic modulus, M, of the belt, expressed in newtons per millimetre of test piece width, is given by the formula

$$M = \frac{\Delta F}{\varepsilon}$$

where

ΔF is the variation of the amplitude of the load between 2 % and 10 % of the minimum breaking strength of the test piece, expressed in newtons per millimetre of width;

ε is the relative elongation.

The relative elongation, ε, is given by the formula

$$\varepsilon = \frac{\Delta l}{l_0}$$

where

Δl is the elastic elongation, expressed in millimetres;

l_0 is the initial length, expressed in millimetres, of the test piece.

Calculate the arithmetic mean of the values found and take as the result the number rounded to the first decimal place.

8 Test report

The test report shall contain the following information:

a) identification of the belt tested;

b) reference to this International Standard;

c) results of the test, individual values and mean values;

d) conditioning period;

e) temperature and relative humidity during the test;

f) any deviation from this International Standard or from the International Standards to which reference is made, or regarded as optional.

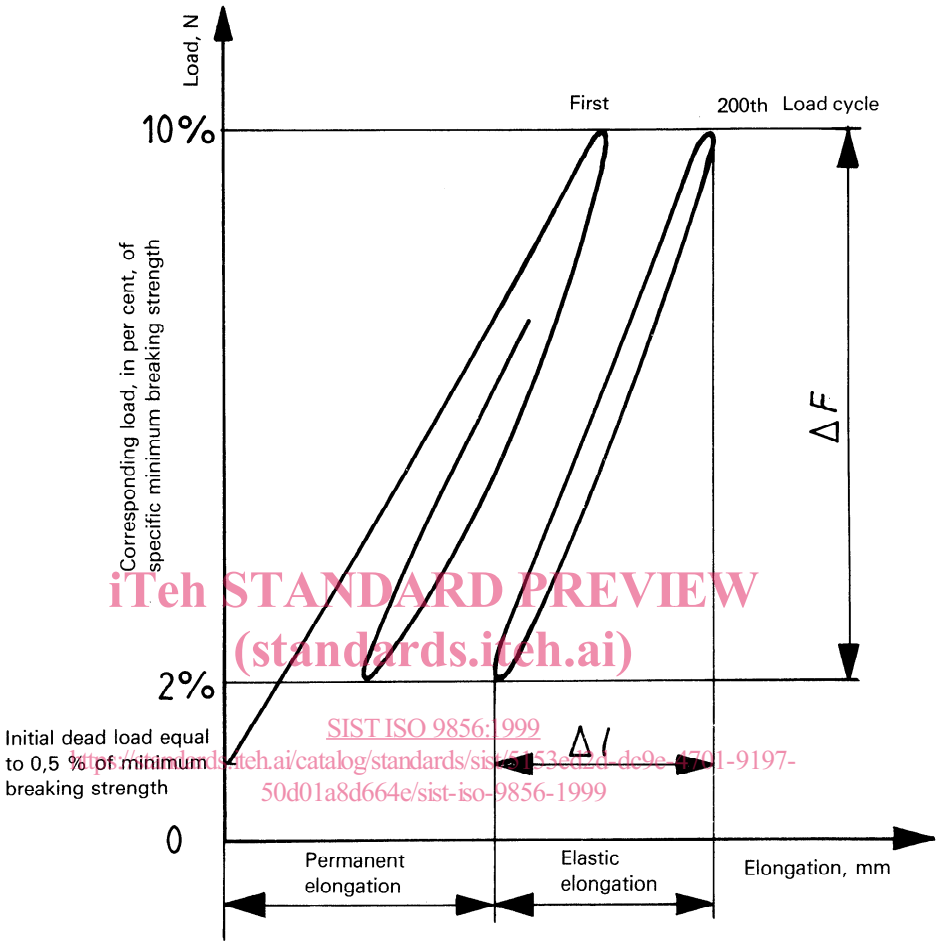

Figure 1 — Graph of the variation of amplitude of the load as a function of elongation

Annex A
(informative)

Bibliography

ISO 5293 : 1981, *Conveyor belts — Formula for transition distance on three equal length idler rolls.*