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# International Standard



# 284

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Conveyor belts — Electrical conductivity — Specification and method of test

*Courroies transporteuses — Conductibilité électrique — Spécification et méthode d'essai*

Second edition — 1982-05-01

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**Descriptors** : belts, conveyor belts, tests, electrical tests, resistivity, specifications.

## 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 284 was developed by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 284-1975), which had been approved by the member bodies of the following countries:

Australia	Germany, F.R.	South Africa, Rep. of
Austria	Greece	Spain
Belgium	India	Sweden
Brazil	Iran	Turkey
Chile	Israel	United Kingdom
Colombia	Italy	USA
Czechoslovakia	Mexico	USSR
Denmark	New Zealand	Yugoslavia
France	Portugal	

No member body had expressed disapproval of the document.

# Conveyor belts — Electrical conductivity — Specification and method of test

## 1 Scope and field of application

This International Standard specifies the maximum electrical resistance of a conveyor belt and the corresponding method of measurement.

The test is intended to ensure that the belt is sufficiently conductive to drain off charges of electricity which may form on it in service.

## 2 Reference

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

## 3 Specification

The electrical resistance shall not exceed  $3 \times 10^8 \Omega$  (300 M $\Omega$ ).

## 4 Method of test

### 4.1 Principle

An electrical current of specified voltage is passed via electrodes through a suitably prepared test piece taken from the belt.

### 4.2 Apparatus

The apparatus shall consist of the following items :

**4.2.1 Sheet of insulating material**, a little larger than the test piece.

**4.2.2 Two cylindrical and coaxial brass electrodes**, the base of one being circular and the other annular. The dimensions and masses are given in figure 2. The bases of these electrodes shall be machined flat and polished. A flexible insulated wire shall be connected to each electrode.

**4.2.3 Resistance-measuring instrument** capable of giving readings between  $10^5$  and  $10^{10} \Omega$  to within  $\pm 5 \%$ .

**4.2.4 Source of direct current**, of voltage between 40 and 1000 V, and not causing an energy dissipation of more than 1 W in the test piece.

### 4.3 Test pieces

#### 4.3.1 Shape and dimensions

The test piece shall be square and shall be cut from the complete thickness of the belt, including covers.

Length of side : 300 mm minimum.

Thickness : the thickness of the belt.

#### 4.3.2 Number

Two test pieces shall be used.

#### 4.3.3 Preparation

The preparation of the test piece consists in the following :

**4.3.3.1** Clean both surfaces of the test piece by rubbing with fuller's earth, for example, using a clean cloth. After cleaning away all traces of the powder, wipe the surface with a clean cloth moistened with distilled water and then dry with a clean cloth.

**4.3.3.2** Paint on one of the surfaces of the test piece using a solution of polyethylene glycol (or other conducting liquid having at least the same electrical conductivity), two areas, as shown in figure 1, which correspond to the dimensions of the bases of the electrodes.

Great care shall be taken to ensure the accuracy of the dimensions of the areas, but the symmetry of the centre is not critical.

**4.3.3.3** Make up the solution as follows :

800 parts, by mass, of anhydrous polyethylene glycol of molecular mass 600;

200 parts, by mass, of water;

one part, by mass, of soft soap.

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**4.3.4 Conditioning**

In the absence of any specification to the contrary clearly given in the test procedure, the test pieces shall be conditioned for at least 2 h, under the conditions of temperature and relative humidity defined in ISO 471.

**NOTES**

1 Select the following conditions by preference :

- temperature :  $23 \pm 2 \text{ }^\circ\text{C}$
- relative humidity :  $(50 \pm 5) \%$

2 In the case of belts with a textile carcass, the test results of which can be affected by the humidity, a temperature of  $20 \pm 2 \text{ }^\circ\text{C}$  and a relative humidity of  $(65 \pm 5) \%$  may be selected, by agreement between the parties concerned, provided that this is clearly indicated in the test report.

3 In the special case of tropical conditions, refer to ISO 471 [ $27 \pm 2 \text{ }^\circ\text{C}$ ,  $(65 \pm 5) \%$ ].

**4.4 Test conditions<sup>1)</sup>**

The test conditions with regard to temperature and humidity shall be those adopted in 4.3.4.

**4.5 Procedure**

Place the test piece on the sheet of insulating material, with the liquid pattern upwards. Clean the lower faces of the brass electrodes and place these on the liquid contact agent pattern on the test piece.<sup>2)</sup>

Connect the outer electrode to the earth or low voltage terminal of the measuring instrument and the inner electrode to the high voltage terminal.

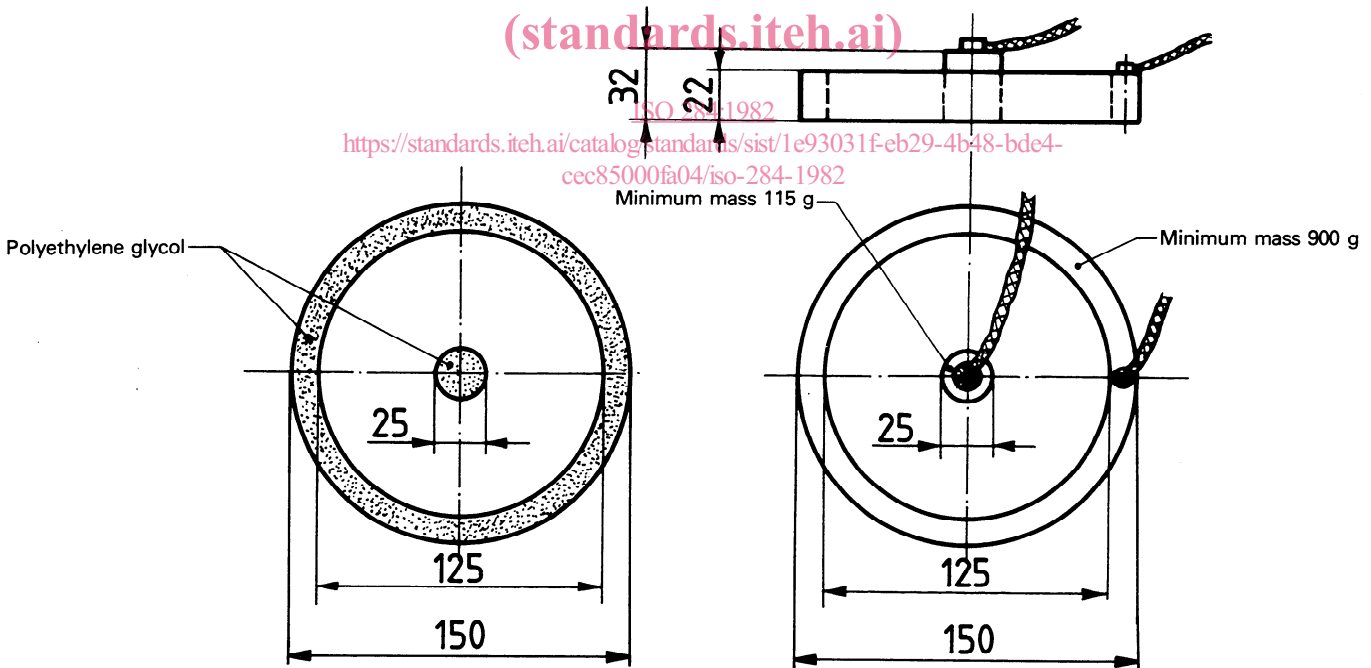
Measure the resistance after applying the voltage for at least 1 min.

Take care not to breathe on the test surface, as any condensation of moisture may falsify the result.

Repeat the test on the other surface of the test piece (and on the two surfaces of the second test piece).

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Dimensions in millimetres



**Figure 1 — Design to be painted on the test piece**

**Figure 2 — Electrodes**

1) The electrical resistance decreases with increase of both temperature and humidity. A successful test therefore proves compliance, but an unsuccessful test does not necessarily prove non-compliance, which can only be established by retesting at the higher specified limit of temperature and humidity.

2) In the case of covers with surface undulations, contact between the electrodes and the test piece can be improved by thin sheets of metal foil of the same dimensions as the bases of the brass electrodes, placed on the liquid contact agent and made to follow the form of the surface by rubbing lightly with the finger.

The brass electrodes are then placed on the foil.

#### 4.6 Expression of results

For each surface of the belt subjected to test, record the electrical resistance, in ohms, as the mean of the values for that surface noted for the two test pieces.

Record the electrical resistance for the two surfaces of the belt separately.

#### 4.7 Test report

The test report shall make reference to this International Standard and shall include :

- a) The identification of the belt tested;
- b) the conditions of temperature and relative humidity adopted for the conditioning of the test pieces and the test;
- c) the results expressed in accordance with 4.6;
- d) an account of any test or operating conditions not specified in this International Standard.

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