INTERNATIONAL STANDARD

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Belt drives — Electrical conductivity of antistatic endless synchronous belts — Characteristics and test method

Transmissions par courroies — Conductibilité électrique des courroies synchrones sans fin, anti-électrostatiques — Spécification et méthode d'essai

Reference number
ISO 9563:1990(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 9563 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*.

Annex A of this International Standard is for information only.

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Belt drives — Electrical conductivity of antistatic endless synchronous belts — Characteristics and test method

1 Scope

This International Standard specifies the maximum electrical resistance of antistatic endless synchronous belts and a corresponding laboratory method of measurement.

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

The application of this International Standard is limited to cases of dispute about new belts intended for use in an explosive atmosphere, in situations where there is a fire risk, or wherever a static discharge cannot be permitted.

The decision is left to national standards or to agreement between interested parties as to whether the test should be carried out on each belt in a batch or on only a percentage of the batch.

2 Electrical resistance — Specification

2.1 General

In general, the resistance of new antistatic belts should not exceed the maximum value as calculated in 2.2, although certain combinations of application and materials may permit higher values.

2.2 Resistance value

The electrical resistance, in ohms, of a belt measured in accordance with clause 4 should not exceed

$$\frac{6 \times 10^5 L}{w}$$

where

L is dry distance (measured in a straight line between the electrodes; see 4.2 and figure 1);

w is the width of the belt.

(L and w are expressed in the same units.)

The resistance value relates to belts when new, i.e. to their initial resistance, and should be determined at a temperature of 23 °C ± 2 °C and a relative humidity of (50 ± 5) %.

2.3 Minimum value of electrical resistance

A minimum value of electrical resistance should be considered to avoid the dangers of excessive conductivity (possible ignition of the belt and transmission of electric current). The manufacturer shall be consulted.

NOTES

1 Compliance with calculated maximum resistance values can be proved at other allowable testing temperatures and humidities. As some materials are sensitive to moisture, great care should be taken to avoid breathing on the samples prior to and during resistance tests.

2 Marking on belts needs to be indelible and clearly visible but of the smallest practicable area to avoid introducing unnecessary insulating materials. The position of the marking should be such that it will not materially affect the electrical resistance of the discharge path across the belt surface.

3 Selection and preparation of belts for test

3.1 A belt shall be selected at least 16 h prior to testing.

3.2 Whenever possible, the time between manufacture and testing should not exceed 3 months. In other cases, tests should be made within 2 months of receipt of the belt by the customer.

3.3 During this time, the belt

a) shall not be mechanically strained in any way; or

b) it shall be strained once and then maintained in the unstrained state at 23 °C ± 2 °C for at least 24 h. The strain shall be approximately equal to the maximum strain to which the belt is likely to be subjected during normal use.

The belt shall be maintained in the unstrained state at a temperature of 23 °C ± 2 °C for not less than 24 h. The surface to be tested shall then be cleaned by rubbing with fuller's earth (magnesium aluminium silicate) and water. It shall be washed with distilled water and allowed to dry. The surfaces shall not be buffed or abraded, or cleaned with organic materials which attach to or swell the materials to be tested.

4 Test method

4.1 Apparatus

4.1.1 Insulation tester

The test should be made preferably with an insulation tester (ohm-meter) having a nominal open circuit voltage of 500 V d.c. or with any suitable instrument known to give comparable results.

The instrument should be sufficiently accurate to determine the resistance to within 10 % and not dissipate more than 3 W in the specimen.

NOTE 3 Insulation testers have an inherent characteristic of limited power output; therefore the voltage which they apply to the test piece is less than their open circuit voltage at low resistance values of the test piece. This is a useful characteristic as it reduces the risk of shock and of overheating the test piece.

Insulation testers of this type may be manually or power-driven generators or battery- or mains-operated multi-range instruments with similar electrical characteristics.

The resistance values obtained vary with the applied voltage and errors may occur when low test voltages are involved; the voltage applied to the test piece should therefore be not less than 40 V.

4.1.2 Electrodes and contacts

Electrodes shall be formed on the surface by means of a conductive silver lacquer, colloidal graphite or a conductive liquid. A suitable conductive liquid, in mass, consists of

— 800 parts of anhydrous polyethylene glycol of relative molar mass 600;

— 200 parts of water;

— 1 part of wetting agent;

— 10 parts of potassium chloride.

When a conductive liquid is used, the electrode contact area shall be completely wetted and shall remain so until the end of the test.

The conductive silver lacquer or colloidal graphite shall be of a type which dries in air at room temperature; the surface resistivity of the dried film should be below 10 Ω·m.

Clean metal contacts should be applied to the electrodes so that the contact area is approximately equal to but no greater than the electrodes, unless otherwise specified. With electrodes other than liquid ones, and if specified for the liquid electrodes, the product specification should state the mass of the electrodes.

The surface of the belt should not be deformed during the application of the contacts or during the test and the belt should be supported on an insulating surface unless otherwise specified.

4.2 Procedure

4.2.1 Immediately after cleaning the belt and without cutting it, lightly clamp by means of insulated clamps a length of the belt having at least 17 teeth, flat, with the teeth uppermost, onto an insulating surface. Apply electrodes (conductive fluid, see 4.1.2) to two areas on the toothed side of the belt extending across the full width of the belt. The electrodes shall each cover the top surface of 3 adjacent teeth and the sides and bottoms of the 2 grooves between them, and shall extend across the width of the belt (see figure 1). The dry distance between the electrodes shall span 7 grooves and 6 teeth.

Place a metal contact that conforms to the shape of the belt teeth on each electrode to cover the top surfaces of 3 adjacent teeth and the sides and bottoms of the 2 grooves and apply a pressure, using weights, of approximately 10 kPa to 40 kPa (see figure 1).

4.2.2 Measure the electrical resistance between the contacts using the insulation tester (see 4.1.1). Take the reading 5 s ± 1 s after the application of the meter voltage.

4.3 Interpretation of results

Verify that the value measured in 4.2.2 is not greater than the resistance value calculated in 2.2.

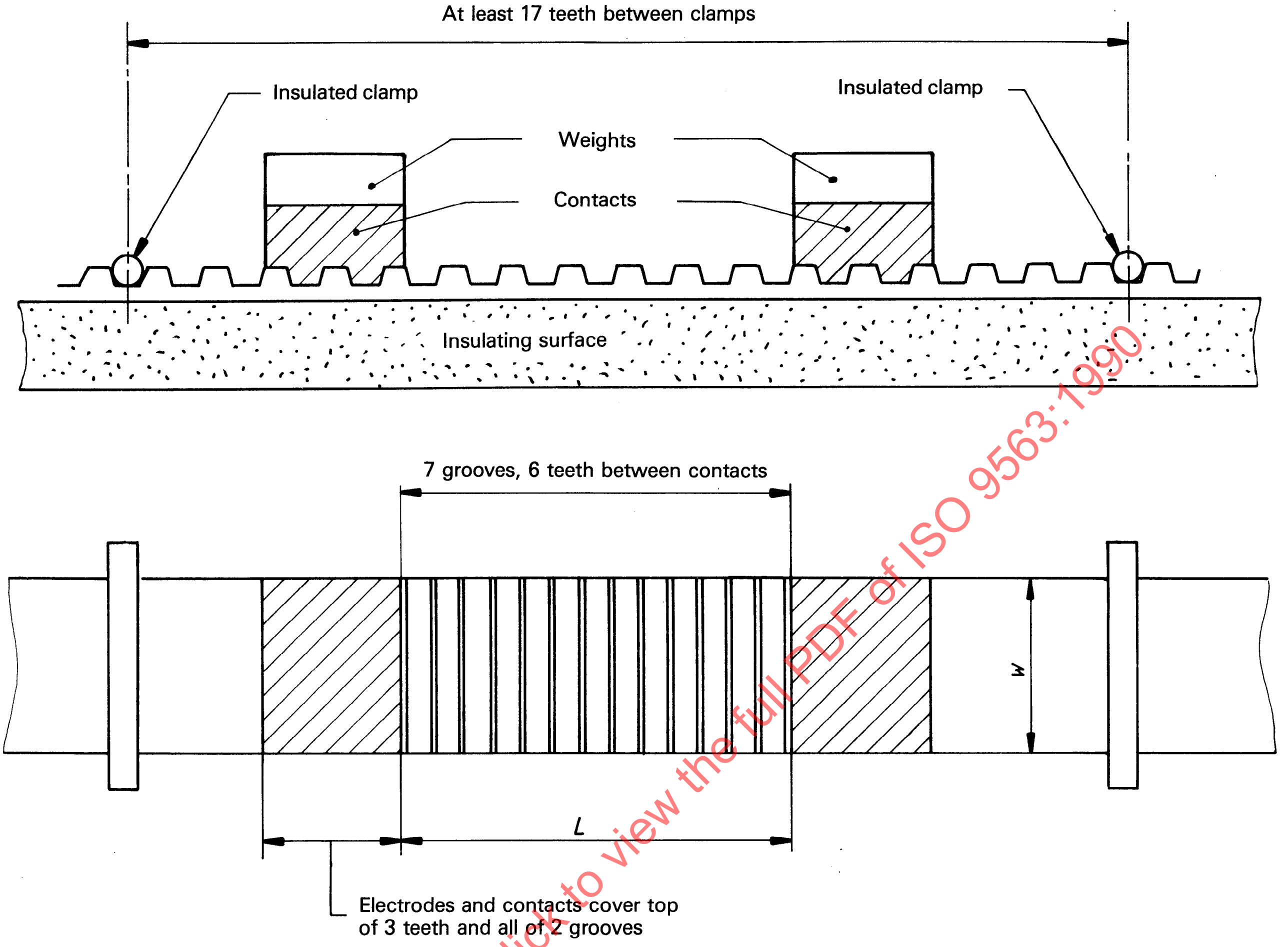
At least 17 teeth between clamps
Insulated clamp
Insulated clamp
Weights
Contacts
Insulating surface
7 grooves, 6 teeth between contacts
w
L
Electrodes and contacts cover top of 3 teeth and all of 2 grooves

Figure 1

Annex A
(informative)

Bibliography

ISO 1813:1979, *Antistatic endless V-belts — Electrical conductivity — Characteristic and method of test*

ISO 5296-1:1989, *Synchronous belt drives — Belts — Part 1: Pitch codes MXL, XL, L, H, XH and XXH — Metric and inch dimensions*

ISO 5296-2:1989, *Synchronous belt drives — Belts — Part 2: Pitch codes MXL and XXL — Metric dimensions*

ISO 9010:1987, *Synchronous belt drives — Automotive belts*