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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

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 4, *Synchronous belt drives*.

This second edition cancels and replaces the first edition (ISO 9563:1990), which has been technically revised.

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

1 Scope

This International Standard specifies the maximum and minimum electrical resistance of antistatic endless and open ended synchronous belts. This International Standard provides guidelines to allow testing of synchronous belts to prove their static conductive (dissipative) properties as well as a corresponding production control test method.

The application of this International Standard is limited to new belts intended to be used in an explosive atmosphere or in situations where there is a fire risk. The test is intended to ensure that the belt is sufficiently conductive to dissipate charges of electricity which may form on it in service.

In the case of a production control test, the decision is left to national standards or agreement between interested parties as to whether the test shall be carried out on each belt in a batch or on only a percentage of belts in a batch.

For each proof test, the belt manufacturer shall determine which type of electrode and conductive coating material shall be used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Electrical resistance — specification

3.1 General

In general, the resistance of new antistatic belts should not exceed the maximum value as calculated in 3.2.

3.2 Resistance value

The electrical resistance in Ohms of a belt measured in accordance with Clause 5 should not exceed R, calculated using the Formula (1):

$$R = \frac{6 \times 10^5 \times L}{W} \quad (1)$$

where

R is the electrical resistance, in ohms (Ω);

L is the dry distance measured in a straight line between the electrodes, see 5.2 and Figure 1;

W is the width of the electrode (or belt if narrower than the electrodes).

NOTE 1 The resistance value relates to the initial resistance of new belts.

NOTE 2 The dimensions L and W are expressed in the same units.

3.3 Minimum value of electrical resistance

Belts with values of resistance below 1 x 10^4 Ω should be classified as conductive. In such cases, it is the end user's responsibility to ensure that values of resistance below this recommended value do not present a hazard in the environment where the belts are being used.

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

4 Selection and preparation of belts for test

4.1 Laboratory test

Belts shall be tested no less than 8 h after production.

Prior to test, the following conditions shall be met.

a) The belt shall be maintained in an unstrained state, for a period of not less than 2 h in a standard atmosphere 23/50, in accordance with ISO 23529 at a temperature of (23 ± 2) °C and (50 ± 5) % relative humidity.

b) Belt surfaces shall not be buffed, abraded or cleaned with organic materials which attack or swell the materials to be tested.

4.2 Production test

Belts can be tested after production with belt temperature between 15 °C and 30 °C.

Prior to test the following conditions shall be met:

Belt surfaces shall not be buffed, abraded or cleaned with organic materials which attack or swell the materials to be tested.

NOTE Where laboratory/production control testing is carried out on numerous belt widths it can be impractical to have electrodes for each belt width. In these cases it is acceptable to test belts and calculate maximum resistance values based on belt width while using narrower or wider electrodes.

5 Test method

5.1 Apparatus — 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 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.

5.2 Electrodes and contacts for laboratory and production tests

Electrodes shall be used that have a profile which fits that of the belt being tested. Electrodes shall be made of a suitable conducting material. Care shall be taken to avoid use of materials which may form a non-conducting layer under exposure to the environment (e.g. oxidation).

Two electrodes shall be applied to the belt so that they each cover the top surface of 3 adjacent teeth and the sides and bottom of two grooves.

The distance between the two electrodes shall span seven grooves and six teeth. Electrodes shall have a minimum width of 20 mm (Figure 1).

The electrodes may be mounted on an insulating handle to allow ease of use and to ensure that the correct distance is used for each test. This necessitates a dedicated set of suitable electrodes for each pitch and tooth profile.

5.3 Test procedures

5.3.1 Laboratory test

A test belt of known width shall be placed teeth uppermost on an insulated surface. The electrodes shall be applied to the toothed surface as per 5.2 and a pressure between 10 kPa to 40 kPa applied.

A conductive solution/gel/powder may be applied to the belt surface to ensure optimum contact between electrode and belt (see Annex A). Care should be taken to ensure that the conductive medium is only applied in the area of contact for the electrodes.

5.3.2 Production test

A test belt of known width shall be placed teeth uppermost on an insulated surface. The electrodes shall be applied to the toothed surface as per 5.2. The pressure applied shall be constant with each type of belt used and such that it does not allow deformation or damage to the belt surface. This procedure is intended for general production testing so hand pressure is sufficient.

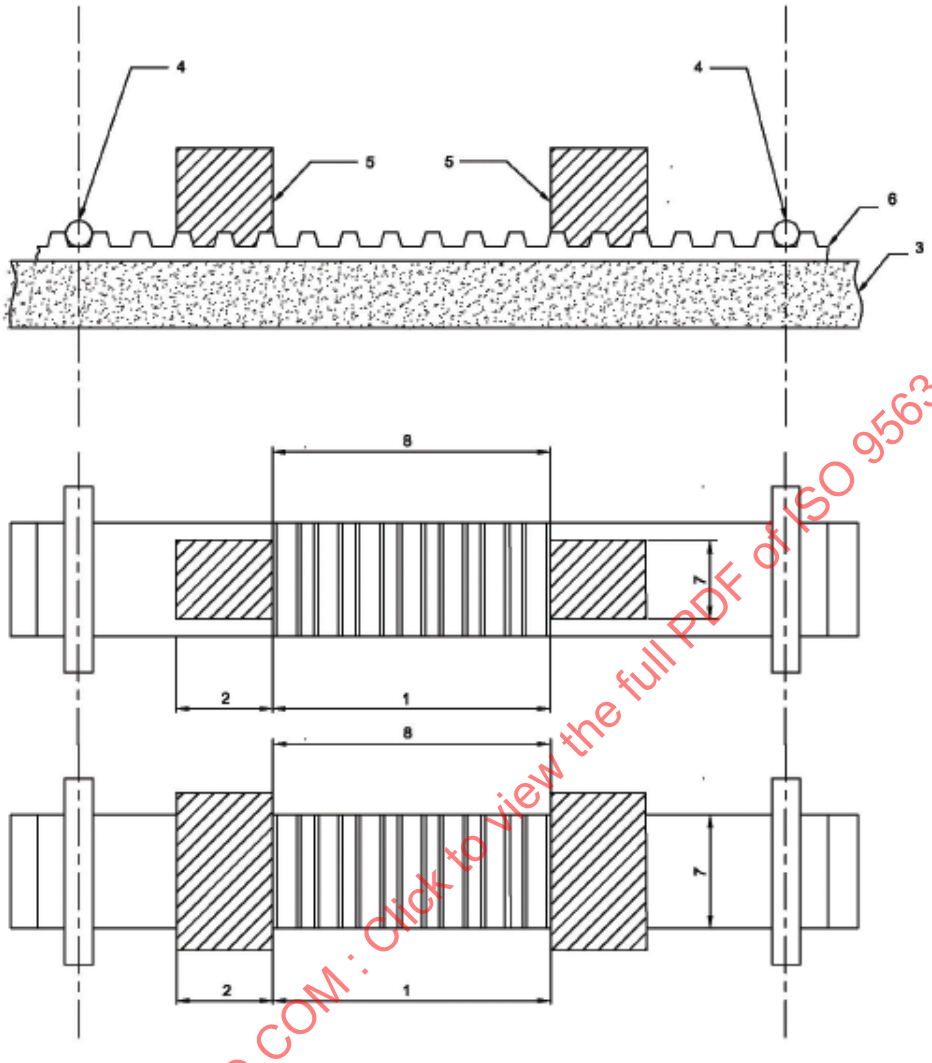
5.3.3 Test timing

Measure the electrical resistance between the contacts using the insulation tester (see 5.1). Take the reading 5 s ± 1 s after the application of the meter voltage.

5.3.4 Interpretation of results

Verify that the value measured in 5.3.1 and 5.3.2 is not greater than the resistance value calculated in 3.2.

If the results of the production test are greater than the resistance value calculated in 3.2, then the belt may be re-tested in line with the laboratory test method.



Key

1 7 grooves, 6 teeth between contacts
2 electrodes and contacts cover top of 3 teeth and all of 2 grooves
3 insulating surface
4 insulated clamp
5 contacts
6 belt
7 *W*
8 *L*

NOTE Dimensions *L* and *W* are expressed in the same units.

Figure 1 — Layout of belt and contacts

Annex A
(informative)

Electrical conductive coating

To ensure minimum electrical resistance between the test metal electrodes and the test belt surfaces, a conductive coating may be provided comprising either

a) a conductive silver lacquer or colloidal graphite which shall be of the type that dries at room temperature with a surface resistivity of the dried film below 10 Ω·m, or

b) a conductive liquid consisting of

   — 800 parts of anhydrous polyethylene glycol of molecular mass 600,

   — 200 parts of water,

   — 1 part of wetting agent, and

   — 10 parts of potassium chloride.

In the latter case, the electrode contact areas shall be completely wetted and remain so until the end of the test.