SLOVENSKI STANDARD
oSIST prEN ISO 8031:2020

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Gumene in polimerne cevi ter cevni priključki - Ugotavljanje električne upornosti in prevodnosti (ISO/FDIS 8031:2020)

Rubber and plastics hoses and hose assemblies - Determination of electrical resistance and conductivity (ISO/FDIS 8031:2020)

Tuyaux et flexibles en caoutchouc et en plastique - Détermination de la résistance et de la conductivité électriques (ISO/FDIS 8031:2020)

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Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity

Tuyaux et flexibles en caoutchouc et en plastique — Détermination de la résistance et de la conductivité électriques

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Contents

Page

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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

This fourth edition cancels and replaces the third edition (ISO 8031:2009), of which it constitutes a minor revision.

The main change compared to the previous edition is that the normative references have been updated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This edition of ISO 8031 addresses the problems encountered in field testing and during product acceptance tests in a production facility in following the test procedures specified in ISO 8031:1993 and a more practical approach is suggested. Also, a test procedure for determining electrical continuity between the end fittings of a hose assembly without actually measuring the resistance has been introduced. This test is frequently carried out in the field and in the factory when the product standard does not require the exact electrical resistance to be measured, but only requires verification of electric conductivity between both metal end fittings.

Special test methods to determine the electrical resistance through the hose wall (now required in some product standards for hoses used in explosive atmospheres) have been added.

Some test methods which have been a standard practice in the hose industry for some time have now been included, as have several new methods to determine the ability of a hose assembly (with metal end fittings) to dissipate static electric charges when the metal end fitting is connected to earth. A total of four new explanatory sketches are included. The hose and hose assembly product standard applicable will have to specify which method is most suitable for the purpose of verification of the required property.

Annex A, an amended version of ISO 8330:2007, Annex A, has been included.

Rubber and plastics hoses and hose assemblies — Determination of electrical resistance and conductivity

1 Scope

This document specifies electrical test methods for rubber and plastics hoses, tubing and hose assemblies to determine the resistance of conductive, antistatic and non-conductive hoses and the electrical continuity or discontinuity between metal end fittings.

All the test methods described for rubber hoses in this document can also be applied to plastics hoses.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2878, *Rubber, vulcanized or thermoplastic — Antistatic and conductive products — Determination of electrical resistance*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8330 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Measurement of resistance of conductive, antistatic and non-conductive hoses

4.1 General

Rubber hoses may have a conducting lining only or a conducting cover only, or may be manufactured from conducting rubber compounds throughout. A method of test is specified for each of the three possible types of construction.

4.2 Apparatus

The following apparatus is required and shall be basically as described in ISO 2878.

4.2.1 Test instruments

4.2.1.1 To determine the resistance of conductive, antistatic and non-conductive hose[1)], the test should preferably be made with an instrument specifically designed for measuring insulation resistance, having a nominal open-circuit voltage of 500 V d.c., or with any other instrument known to give comparable results. The instrument shall be sufficiently accurate to determine the resistance to within ±10 % unless

1) See ISO 8330 and Annex A for details of construction.

specified otherwise. During the test, not more than 3 W shall be dissipated in the specimen, to prevent erroneous results due to effects of temperature. The power dissipated shall be determined by the square of the open-circuit voltage divided by the measured resistance.

The resistance values obtained will vary with the applied voltage, and errors may occur when low test voltages are involved. In cases of dispute, the voltage applied to the test piece shall be not less than 40 V, except where this conflicts with the requirement not to dissipate more than 3 W in the test piece.

4.2.1.2 For tests requiring the measurement of the electrical continuity between end fittings or through continuous internal or external bonded wires, the instrument used shall be an ohmmeter sufficiently accurate to determine the resistance to within ±10 %.

4.2.1.3 For tests where, according to the product standard, determination of the electrical continuity between the end fittings of a hose assembly is required, without measurement of the actual electrical resistance, a 4,5 V battery in combination with a 4 V (0,3 A) test lamp can be used.

4.2.1.4 For determination of the electrical resistance through the hose wall (required by some hose product standards for hoses used in explosive atmospheres), the instrument used shall be an ohmmeter with a capacity of 10^{12} Ω and the measurement shall be made at 500 V d.c. The instrument shall be sufficiently accurate to determine the resistance between the lining and the cover as measured through the hose wall to within ±5 %.

4.2.2 Electrodes and contacts

4.2.2.1 General

For tests conducted in a laboratory, the equipment described below shall be used. For field tests, and for routine tests and product acceptance tests in a manufacturer's plant, this equipment is not practical, and alternatives may be used as described in 4.6.1, 4.7.1.2 and 4.7.2.3.

Electrodes shall be formed on the surface as bands $\left(25^{+2}_{-1}\right)$ mm wide around the circumference by means of a conductive silver lacquer, colloidal graphite or a conductive liquid.

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

— 800 parts by mass of anhydrous poly(ethylene glycol) of relative molecular mass 600;

— 200 parts by mass of water;

— 1 part by mass of wetting agent;

— 10 parts by mass of potassium chloride.

When a conductive silver lacquer or colloidal graphite is used, the surface resistance between any two points on a sample of the dried film shall not exceed 100 Ω.

Clean metal contacts shall be applied to the electrodes so that the contact area is approximately the same size as, but no greater than, the electrodes, except where otherwise stated.

In the case of hoses of less than 50 mm bore, it is difficult to apply the conducting liquid accurately to the hose bore, and it is preferable to use a brass plug of external diameter equal to or greater than the hose internal diameter (ID), coated with conducting liquid and then pushed 25 mm into the hose.