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Rubber and plastics hoses and hose assemblies — Hydrostatic testing

Tuyaux et flexibles en caoutchouc et en plastique — Essais hydrostatiques

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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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 218, *Rubber and plastics hoses and hose assemblies*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 1402:2009), which has been technically revised. The main changes compared to the previous edition are as follows:

— the tolerances of the pressure in Figure 3, 7.2.2, 8.1 and 8.2 have been revised;

— the description of the failure mode in 8.3 has been revised.

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.

Rubber and plastics hoses and hose assemblies — Hydrostatic testing

1 Scope

This document specifies methods for the hydrostatic testing of rubber and plastics hoses and hose assemblies, including methods for the determination of dimensional stability.

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 7751, *Rubber and plastics hoses and hose assemblies — Ratios of proof and burst pressure to maximum working pressure*

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

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

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 General

Unless otherwise specified, all tests shall be carried out at standard temperature in accordance with ISO 23529.

5 Apparatus

5.1 Pressure source, capable of applying pressure at the rate specified in 7.2.2, up to the required test pressure.

5.2 Calibrated pressure gauge or **pressure transducer with digital readout**, chosen for each test so that the test pressure is between 15 % and 85 % of the full-scale reading.

In the interest of accuracy, calibrated pressure gauges or pressure transducers with digital readouts shall be checked at frequent intervals and the fitting of restrictors is recommended to minimize shock damage.

5.3 Dimensional equipment, sliding vernier callipers or micrometre, length measuring tape, circumferential measuring tape (π tape).

6 Test pieces

6.1 Hose assemblies

When hose assemblies are to be tested, the manufactured assembly length shall be used for the test.

6.2 Hoses

The hydrostatic pressure and burst tests shall be carried out on a hose test piece with a minimum free length, excluding end fittings and end reinforcements, of 600 mm when deformation is to be measured and 300 mm when it is not. When a longer test length is required for a particular hose type or size, it must be specified in the individual hose product specification.

6.3 Number of test pieces

At least two test pieces shall be tested.

7 Application of hydrostatic pressure

7.1 General

Water or another liquid suitable for the hose under test shall be used as the test medium.

WARNING — Hoses and hose assemblies pressurized by liquids can fail in a potentially dangerous manner. For this reason, the test shall be performed in a suitable enclosure. Also, the use of air and other gases as test media shall be avoided because of the risk to operators. In special cases, where such media are required for the tests, strict safety measures are imperative. Furthermore, it is stressed that, even when a liquid is used as the test medium, it is essential that all air is expelled from the test piece because of the risk of injury to the operator due to the sudden expansion of trapped air released when the hose bursts.

7.2 Procedure

7.2.1 Fill the test piece with test liquid, expelling all air, and connect to the test equipment. Close the valve and apply the hydrostatic pressure at a uniform rate of increase. Measure the pressure using a calibrated pressure gauge or pressure transducer with a digital readout (5.2).

IMPORTANT — It is important to allow unrestricted movement of the free or plugged end of the test piece during the test.

7.2.2 The rate of pressure increase shall be constant and chosen to reach the final pressure after a period of between 30 s and 60 s for hoses with nominal inside diameters up to 50 mm. For hoses with nominal inside diameters greater than 50 mm and less than or equal to 250 mm, the time needed to reach the final pressure shall be between 60 s and 240 s. For hoses with nominal inside diameters greater than 250 mm, and/or when the test hose is longer than the minimum free length specified in 6.2, the time needed to reach the final pressure shall be decided between the manufacturer and the user.

8 Hydrostatic pressure tests

8.1 Proof pressure hold test

When proof pressure tests are used to determine leakage of hoses or hose assemblies, apply the specified proof pressure in accordance with 7.2.2 and hold it neither for less than 30 s nor for more than 60 s, unless otherwise specified in the product standard, examining the test pieces during this period