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Thermoplastics valves — Fatigue strength — Test method

Robinets en matériaux thermoplastiques — Résistance à la fatigue — Méthode d'essai

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 7, *Valves and auxiliary equipment of plastics materials*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 69, *Industrial valves*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 8659:1989), which has been technically revised.

The main changes compared to the previous edition are as follows:

— updating of the normative references and terms and definitions clauses;

— specification of the type of valve in the test report and explanation note for the opening torque.

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

The aim of this document is to establish certain basic requirements for the endurance testing of plastics valves to ensure that uniform test methods are adopted. This document is intended to be considered in conjunction with any specific requirements, in particular product standards applicable to the individual types of valves.

Thermoplastics valves — Fatigue strength - Test method

1 Scope

This document specifies the endurance test necessary to confirm the ability of hand-operated plastics valves to withstand prolonged use, with repeated opening and closure. It does not specify the ability of valves to withstand adverse conditions, in particular those of chemically aggressive fluid media and/or environments, or excessive fluid velocities and cavitation.

NOTE Concerning the chemical aggression of the materials, a classification table is reported in ISO/TR 10358[1].

This document includes values of the parameters necessary for the proper performance of the endurance test, with the reservation that the parameters are different in particular product standards (see 5.1).

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 161-1, *Thermoplastics pipes for the conveyance of fluids — Nominal outside diameters and nominal pressures — Part 1: Metric series*

ISO 16135, *Industrial valves — Ball valves of thermoplastics materials*

ISO 16136, *Industrial valves — Butterfly valves of thermoplastics materials*

ISO 16138, *Industrial valves — Diaphragm valves of thermoplastics materials*

ISO 16139, *Industrial valves — Gate valves of thermoplastics materials*

ISO 21787, *Industrial valves — Globe valves of thermoplastics materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 161-1 and the following 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/

3.1
nominal pressure
PN
alphanumerical designation of pressure, used for reference purposes, which is related to the mechanical strength of the valve

Note 1 to entry: Usually nominal pressure (PN), measured in bar, corresponds to water pressure at 20 °C water temperature. See also ISO 161-1.

3.2
closing torque
torque exerted over the full closing operation to achieve full tightness of the valve at nominal pressure

3.3
opening torque
torque exerted initially to open the valve from fully closed or over the full opening operation

3.4
fluid velocity
velocity of a fluid in a pipe connected to a valve of nominal size equivalent to the nominal diameter of the pipe

3.5
nominal size
DN
alphanumeric designation of size for components of a pipework system, which is used for reference purposes, comprising the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

[SOURCE: ISO 6708:1995]

3.6
nominal outside diameter
d_n
specified outside diameter, assigned to a nominal size DN

Note 1 to entry: The nominal outside diameter d_n of pipes is given in ISO 161-1 and of flange adapters and loose backing flanges in ISO 9624[3].

4 Apparatus

Test apparatus, capable of testing the whole valve assembly with its obturator mechanism. Furthermore, it shall include appropriate devices to perform each step separately, or continuously and automatically.

The apparatus, when clamping the valve assembly, shall not apply to the valve ends any axial force, nor radial force to the valve stem.

The test apparatus shall include appropriate means to discontinue the test cycle during the pressure period and to maintain the pressure in the closed position.

Pressure gauges shall be accurate to within ±1 % of the full-scale reading.

Temperature sensors shall be accurate to within ±2 °C.

Attention is drawn to the need for adequate safety precautions when using compressed air or gas for this test.

5 Procedure

5.1 Test requirements to be taken from product standards

The following specifications shall be taken from the particular product standard.

a) any tests which shall be performed before the endurance test, and those which shall be repeated after completion of the endurance test;

b) whether tightening of the gland packing (if used) during the endurance test is allowed;

c) acceptance criteria for tests;

d) the number of specimens to be tested;

e) the number of test cycles to be performed;

f) the fluid used for the test, and its temperature, pressure and velocity;

g) the ambient temperature.

5.2 Endurance test

The endurance test, using water, air or gas as the fluid medium, at the temperature, pressure and velocity specified in the particular product standard, shall be carried out, at the ambient temperature specified in the product standard, as follows:

a) Open the valve

- for multiple-turn valves to the fully open position at a hand-wheel speed of 40 r/min ± 10 r/min for valves of nominal size up to DN 50 and 20 r/min ± 10 r/min for valves of nominal size greater than DN 50.
- for quarter-turn valves, the opening time shall be not less than 2 s for valves of nominal size up to DN 50 and not less than 4 s for valves of nominal size greater than DN 50.

The valve shall be left in the open position for at least 5 s, but not longer than 20 s.

During opening and closing, there shall be no visible leakage at any seal.

b) Close the valve

- for multiple-turn valves at a hand-wheel speed of 40 r/min ± 10 r/min.
- for quarter-turn valves, the closing time shall be not less than 1 s.

Closing shall be performed using the torque specified in the particular product standard.

During opening and closing, there shall be no visible leakage at any seal.

c) After the valve has been closed, an internal pressure shall be applied as specified in the particular product standard. The valve shall be left in the closed position for at least 5 s, but no longer than 20 s.

d) The valve shall be opened as described in 5.2 a).

e) The test procedure described in 5.2 a) to d) shall be repeated for as many cycles as required by the particular product standard.

6 Test report

The test report shall include at least the following information:

a) a reference to this document, i.e. ISO 8659, and to the product standard;

b) a complete identification of the valve, giving the following information:

1) the type of valve (ball, butterfly, diaphragm, gate and globe) according to ISO 16135, ISO 16136, ISO 16138, ISO 16139, ISO 21787,

2) the material of the valve body,

3) the nominal size (DN) and the socket diameter or spigot diameter,

4) the nominal pressure (PN) of the valve,

5) the manufacturer's name or trade mark,