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Thermoplastics valves — Torque — Test method

Robinets en matériaux thermoplastiques — Couple de manoeuvre — Méthode d'essai

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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 8233:1988), which has been technically revised.

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

— normative references and terms and definitions clauses have been updated;

— specification of the type of valve in the test report and explanation 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 torque 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 — Torque — Test method

1 Scope

This document specifies a test method for the determination of the opening and closing torque of thermoplastics valves.

This document applies to all types of thermoplastics valves intended to be used for the transport of fluids according to ISO 16135, ISO 16136, ISO 16138, ISO 16139, ISO 21787.

It does not specify the relationship between the torque and its possible increase after valve prolonged use at specific working condition or materials wear/chemical aggression.

NOTE Concerning the chemical aggression of the materials, a collection of data is reported in ISO/TR 10358 concerning the endurance test necessary to confirm the ability of hand-operated plastics valves to withstand prolonged use, with repeated opening and closure. Further information is provided in ISO 8659.

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 10931, *Plastics piping systems for industrial applications — Poly(vinylidene fluoride) (PVDF) — Specifications for components and the system*

ISO 15493, *Plastics piping systems for industrial applications — Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) — Specifications for components and the system — Metric series*

ISO 15494, *Plastics piping systems for industrial applications — Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP) — Metric series for specifications for components and the system*

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.

Note 2 to entry: 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa= 1 N/mm^2.

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

3.3
opening torque
torque exerted initially to open the valve from fully closed position

Note 1 to entry: Opening torque shall be evaluated at the PN for ball, butterfly, gate valves; at the PN and at the minimum pressure difference between upstream and downstream sides for diaphragm and globe valves.

3.4
running torque
torque required to achieve full opening or closing of the valve at nominal pressure

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, 2.1, modified — NOTES removed]

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 that of flange adapters and loose backing flanges is given in ISO 9624.

4 Test specimen

The test specimen shall be an unused valve, unless otherwise specified in the specific product standard.

5 Test condition

Water or air at the nominal pressure of the valve (0,6 MPa max. when using air), connected in accordance with ISO 10931 or ISO 15493 or ISO 15494, with a temperature of 23 ± 2 °C, shall be applied to the test specimen as indicated in Clause 7.

If air is used as test medium, it is necessary to take appropriate safety precautions for its use.

The measurement shall not be made less than 24 h after manufacture.

Other test conditions, including the use of other fluids and/or other temperatures, may also be prescribed by specifications for valves for particular applications, such as those for the transport of gaseous fuels.

6 Apparatus

The apparatus shall include at least the following:

6.1 Pump, capable of delivering a pressure at least equivalent to the nominal pressure of the valve under test.

6.2 **Device**, capable of supplying the required torque with an accuracy of 2 %.

6.3 **Measuring instrument**, between the torque device and the valve, that shall permit the continuous reading of the torque with the required accuracy of 2 %, and the recording of its maximum value.

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

7 Procedure for torque test

At least 12 h before carrying out this test, open and close the valve ten times to ensure smooth operation.

With the valves closed, raise the pressure gradually over 60 s to the nominal pressure of the valve and maintain it for 5 min.

In case of different conditioning time, required by specific product standards or specifications, with the valve in closed position at the nominal pressure, the torque values can be different and shall be recorded in the test report.

For diaphragm and globe valves, the upstream pressure, acting on obturator, can reduce the effort exerted to operate them. For this reason, repeat the torque test also without applying a pressure difference between upstream and downstream side on these valve types.

Connect the valve stem to the torque device and measuring instrument and apply a torque, increasing it gradually until the opening torque is reached. Complete the opening of the valve in accordance with the requirements specified in Table 1.

Table 1 — Torque test operation requirements

Type	Nominal size (DN) mm	Operating time s	Operating speed r/min
Quarter-turn valves	DN ≤ 50	2	-
	DN > 50	DN/30 [a]	-
Multiple-turn valves	DN ≤ 50	-	≧20
	DN > 50	-	≧10

[a] Rounded up to the next whole second.

Record the opening and running torque of the valve, if possible during the whole operation.

Close the valve to the full tightness at nominal pressure and record the running and closing torque, if possible during the whole operation.

The measured test results shall meet the test requirements in the relevant product standard.

Bidirectional valves shall be tested according to this procedure in both directions.

Additional torque tests are foreseen by the manufacturer during the production, to test the valve torques.

8 Test report

A test report shall be provided for each valve tested that shall contain the following information:

a) a reference to this document (ISO 8233:2021), to the test designation (Clause 7) and to the product standard;

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

- the type of valve (ball, butterfly, diaphragm, gate and globe) according to ISO 16135, ISO 16136, ISO 16138, ISO 16139, ISO 21787;
- material of the valve body and seals;
- nominal valve diameter (DN) or nominal outside diameter (d_n);
- nominal pressure (PN) of the valve;
- manufacturer name or trademark;
- if necessary, flow direction.

c) date of test;

d) recorded values of the opening, running and closing torque, before and after conditioning, if necessary;

e) any deviations from procedure;

f) any unusual features observed.