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Thermoplastics valves — Torque — Test method

Robinets en matériaux thermoplastiques — Couple de manoeuvre — 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 document 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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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 are as follows:

— the normative references clause (Clause 2) and the terms and definitions clause (Clause 3) have been updated;

— the type of valve has been specified in the test report and the opening torque has been explained.

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, closing and running torque of thermoplastics valves.

This document is applicable to all types of manually operable thermoplastics valves, with or without actuator, intended to be used for the transport of fluids.

NOTE 1 Examples of valve types tested with this method are in ISO 4437-4, ISO 16135, ISO 16136, ISO 16138, ISO 16139, ISO 16486-4, ISO 21787, EN 1555-4[13] and EN 12201-4 [14].

This document does not specify the relationship between the torque and its possible increase after prolonged use of the valve under a specific working condition or wear/chemical aggression of the materials.

NOTE 2 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 closing operations. 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*

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 terminology databases for use in standardization at the following addresses:

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

— IEC Electropedia: available at https://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: Nominal pressure (PN), measured in bar, usually 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 complete the *obturator* (3.7) stroke to obtain full tightness of the valve at *nominal pressure (PN)* (3.1)

3.3
opening torque
torque exerted initially to open the valve from fully closed position at *nominal pressure (PN)* (3.1)

3.4
running torque
torque required to open or close the *obturator* (3.7) during its stroke at *nominal pressure (PN)* (3.1)

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 — Preferred term "nominal size" has been added. Notes to entry have been removed.]

3.6
nominal outside diameter
d_n
specified outside diameter, assigned to a *nominal size (DN)* (3.5)

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.

3.7
obturator
movable component of the valve whose position in the fluid flow path permits, restricts or obstructs the fluid flow

[SOURCE: EN 736-2:2016, 3.2.1, modified — Note 1 to entry has been removed [12].]

4 Test specimen

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

5 Test condition

5.1 General

The test is performed at a temperature of (23 ± 2) °C with water, air or nitrogen at the PN of the valve, with the valve assembled within appropriate piping components to permit pressurization.

For the purpose of this document the PN is a value equal to the maximum working pressure as defined by the manufacturer.

The user of this document is informed that when testing with air or nitrogen, safety precautions shall be considered. For testing with air or nitrogen, a pressure of a maximum of 6 bar shall be used. For PN > 4 bar, testing with water shall be considered. The test conditions shall be agreed between the manufacturer and end user.

NOTE Testing facilities are informed that in some countries legal regulations are in force, regulating the applicable maximum pressure for dangerous fluids.

Other test conditions, including the use of other fluids or other temperatures, or both, may also be prescribed by specifications for valves for particular applications.

5.2 Conditioning time

The torque measurement shall not be made less than 24 h after manufacture. At least 12 h before carrying out the test, open and close the valve ten times to ensure smooth operation.

5.3 Test pressure

The opening torque for ball valves, butterfly valves and gate valves shall be evaluated at the PN upstream and no pressure downstream. For diaphragm and globe valves, the opening torque shall be evaluated at no pressure on the upstream and downstream sides.

The closing torque for diaphragm valves and globe valves shall be evaluated at the PN upstream and downstream.

The closing torque for ball valves, butterfly valves and gate valves shall be evaluated by feeding the required flow and pressure upstream in such a way that when the specimen is closed, the pressure reaches the maximum differential value (i.e. 0 to PN).

NOTE In working conditions, the value of the closing torque is influenced by the fluid speed.

6 Apparatus

The apparatus shall include at least the following:

6.1 Pump, capable of delivering the required fluid and a pressure at least equivalent to the PN of the valve under test.

6.2 Device, capable of supplying the required torque.

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.

NOTE The device and the measuring instrument can be a single combined tool (e.g. torque wrench).

6.4 Clamping system, that shall not apply any axial force to the valve ends, nor radial force to the valve stem.

7 Procedure for torque test

The torque test starts after the due conditioning time according to 5.2 and after positioning the valve in the apparatus.

With the valve in closed position, according to 5.3, raise the pressure gradually over 60 s to the PN of the valve and maintain it for 5 min. 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 [a]
Quarter-turn valves	DN ≤ 50 DN > 50	2 DN/30 [b]	— —
Multiple-turn valves	DN ≤ 50 DN > 50	— —	≦20 ≦10

[a] r/min = revolutions per minute.

[b] Rounded up to the next whole second.