

Valves — Test of flow resistance using water as a test fluid

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National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 22, an inside back cover and a back cover.

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Armaturen – Messung des Strömungswiderstandes mit Wasser als Prüfmedium

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 69 "Industrial valves", the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by March 2000.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies a method for determining the pressure loss and fluid flow rate through valves in piping systems using water as a test fluid. This method is suitable:

- for valves with low ζ values but higher than 0,1 by determining pressure loss, with respect to fluid flow rate and density;
- and to valves with equal inlet and outlet nominal sizes.

Industrial-process control valves are out of the scope.

NOTE 1 If using air as a test fluid, other standards e.g. EN 60534-2-3 and ISO 6358 should be referred to.

NOTE 2 For valves with flow resistance coefficient ζ values lower than 0,1, the pressure loss through the valve is very low with respect to the pressure loss in the test tubes, and ζ values cannot be determined with an acceptable measurement accuracy.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 736-1, *Valves - Terminology - Part 1: Definition of types of valves.*

EN 736-3, *Valves - Terminology - Part 3: Definition of terms.*

EN 1057, *Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications.*

EN 60534-2-1, *Industrial-process control valves - Part 2: Flow capacity – Section 1 : Sizing equations for incompressible fluid flow under installed conditions (IEC 60534-2 :1978).*

EN 60534-2-3, *Industrial-process control valves – Part 2 : Flow capacity – Section 3 : Test procedures (IEC 60534-2-3 :1997).*

EN ISO 6708, *Pipework components – Definition and selection of DN (nominal size) (ISO 6708 :1995).*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation.*

ISO 65, *Carbon steel tubes suitable for screwing in accordance with ISO 7-1.*

ISO 1127, *Stainless steel tubes - Dimensions, tolerances and conventional masses per unit length.*

ISO 4006, *Measurement of fluid flow in closed conduits - Vocabulary and symbols.*

ISO 4200, *Plain end steel tubes, welded and seamless - General tables of dimensions and masses per unit length.*

ISO 6358, *Pneumatic fluid power - Components using compressible fluids - Determination of flow-rate characteristics.*

ISO 7194:1983, *Measurement of fluid-flow in closed conduits - Velocity-area methods of flow measurement in swirling or asymmetric flow conditions in circular ducts by means of current-meters or Pitot static tubes.*

ISO 7598, *Stainless steel tubes suitable for screwing in accordance with ISO 7-1.*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

3.1

valve types

see EN 736-1

3.2

flow coefficient (K_v or C_v)

see EN 736-3

3.3

flow resistance coefficient ζ

see EN 736-3

3.4

DN (nominal size)

see EN ISO 6708

3.5

uncertainties

see ISO 4006

4 Test installation

4.1 General

The test installation(s) shall be in accordance with figure 1. The position of the components outside the frame shall be chosen by the laboratory.

For angle valves (1b) the valve under test and test length L_3 may be arranged to lie in a horizontal or vertical plane. For multi end port valves, additional test tubes of the same type shall be used in the same manner.

4.2 Test tubes

The lengths of the test tubes and the position of the pressure tapping points shall be in accordance with figure 1. The lengths are measured from the ends of the test tubes.

If the test installation has upstream, two elbows in series and in different planes, it is necessary to make L_1 longer than $10 D$ unless a flow straightener is installed before the upstream test tube. If a flow straightener is used, the length L_1 may be shorter than $10 D$ provided the conditions in 5.1 are satisfied.

Further details of flow straighteners shall be found in clause 6 of ISO 7194:1983.

The test tubes shall be straight, the ends shall be cut square and deburred, and the internal surfaces shall be clean and without obstructions when inspected visually. The internal diameters are chosen by the valve manufacturer if not stated in relevant valve, product or performance standard. For valves with low ζ -value, the results obtained will be affected by the internal diameter of the test tube. Therefore, it is necessary to record the actual internal diameter of the test tube (see 7.2).

Note When new test tubes are made, it is recommended to make them in accordance with annex A.

The number of holes for the pressure tappings shall be chosen by the laboratory. At each pressure point, there may be one, two or four holes, or a slit provided excentricity is avoided. Four tapping holes are recommended for $DN > 300$.

The diameters of the pressure tapping holes shall be in accordance with table 1 and the length shall be at least twice the diameter. The edge of the pressure tapping hole at the internal surface of the test tube shall be sharp and free from burrs. The axis of the pressure tapping hole shall intersect the axis of the test tube and be at right angle to it, with a maximum deviation of 5 °. Connecting tubes between the pressure tappings and pressure measuring devices shall have an internal diameter of at least twice the diameter of the tapping holes. In order to avoid dirt accumulation, no tapping hole shall be located at the bottom of the cross section.

Table 1 - Diameter of pressure tapping holes in millimetres

DN	Min	Max
< 20	1,5	2
20 to 50	2	3
> 50	3	5