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Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 5: Control valves

Robinetterie pour l'alimentation en eau — Prescriptions d'aptitude à l'emploi et vérifications s'y rapportant — Partie 5: Robinets de régulation

Armaturen für die Wasserversorgung — Anforderungen an die Gebrauchstauglichkeit und deren Prüfung — Teil 5: Regelarmaturen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

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

EN 1074 consists of six parts:

— *Part 1: General requirements;*

— *Part 2: Isolating valves;*

— *Part 3: Check valves;*

— *Part: Air valves;*

— *Part 5: Control valves;*

— *Part 6: Hydrants.*

Part 1, in conjunction with the subsequent parts, lays down the general requirements and test procedures to be carried out in production and during the assessment of conformity of these valves (type tests). The detailed requirements, which depend on the types of valves, are defined in parts 2 to 6 of this standard.

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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

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.

Introduction

In respect of potential adverse effects on the quality of water intended for human consumption caused by the product covered by this standard:

a) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;

b) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

1 Scope

This European Standard defines the minimum fitness for purpose requirements for automatic control valves providing a regulation function to be used in, or connected to, water supply pipe systems, above or below ground (see EN 805), carrying water intended for human consumption.

This standard specifies the design requirements, the performance requirements and the conformity assessment method for control valves, whatever their type and materials.

This standard applies in priority to any other product or test standard: the requirements from other standards apply only when this standard refers to them.

This part of EN 1074 deals with the requirements applicable to control valves up to DN 2000 and PFA 6 bar to PFA 25 bar.

This part of EN 1074 does not deal with the specific performances of the controlling system accessories, whether they be integrated or not, nor with the other components of such control systems e.g. pressure sensors, flow meters, level detectors, regulating devices, powered actuators, etc.

Control valves manufactured in accordance with this standard are not intended for buried service.

2 Normative references

This European Standard incorporates, by dated or undated references, 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 (including amendments).

EN 805, *Water supply — Requirements for systems and components outside buildings*

EN 1074-1:2000, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 1: General requirements*

EN 1074-2:2000, *Valves for water supply — Fitness for purpose requirements and appropriate verification tests — Part 2: Isolating valves*

EN 1267, *Valves — Test of flow resistance using water as test fluid*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in EN 1074-1:2000 apply, together with the following terms and definitions.

3.1
control valve
device intended to regulate, within specified limits, one of the following functions:

— flow rate;

— level;

— pressure (upstream or downstream).

Control valves are divided into two types:

3.1.1
autonomous control valve
these valves have integral capability to control the function using energy from the conveyed water by adjusting the position of the obturator

they can be directly operated i.e. the force is applied (via a spring or diaphragm) directly to the obturator

they can be pilot operated i.e. the force is applied through an adjustable pilot valve

3.1.2
non-autonomous control valve
these valves require an externally powered control system in order to regulate the specified function

4 Design requirements

Control valves shall be designed in accordance with the design requirements given in clause 4 of EN 1074-1:2000.

Control valves with pressure control or level control function shall be seat tight when closed.

The manufacturer shall indicate in the relevant technical documentation the working limits of the valve and any special conditions for installation and commissioning.

5 Performance requirements

5.1 Mechanical strength

5.1.1 Resistance to internal pressure of the shell and of all pressure containing components

Requirement and test shall be in accordance with 5.1.1 of EN 1074-1:2000. If the manufacturer indicates that any feature of the control valve is not designed to withstand a high pressure, he shall indicate in his technical documentation the appropriate means to be used (e.g. isolating valves of the control system), in order to protect them during the test.

The features protected by these means shall be tested to the pressure given in 5.1.2 of EN 1074-1:2000.

5.1.2 Resistance to differential pressure

The valve shall comply with the requirement and test of 5.1.2 of EN 1074-1:2000.

If a control valve is designed without seat tightness, the requirement and test for the obturator shall be modified as follows:

— the differential pressure which the obturator shall withstand, shall be the lower of (1,5 x ΔPM) bar and (ΔPM + 5) bar; where ΔPM is the maximum differential pressure of the control valve in operation (value to be given by the manufacturer).

After the test, the valve shall comply with the control performances of this standard (see 5.3).

5.1.3 Resistance of valves to bending

Bending resistance is an optional requirement for control valves; if bending resistance is claimed by the manufacturer, the requirement and test shall be in accordance with 5.1.3 of EN 1074-1:2000, for sizes DN 50 to DN 500.

The bending moments M to be applied during the test shall be as given in Table 1 as a function of DN.

Table 1 — Bending moments

DN	*M* Nm
DN 50	525
DN 65	700
DN 80	750
DN 100	1 100
DN 125	1 600
DN 150	2 400
DN 200	3 600
DN 250	5 500
DN 300	7 500
DN 350	9 500
DN 400	12 000
DN 450	14 000
DN 500	16 500

5.1.4 Resistance of valves to operating loads

This requirement is applicable only to control valves whose main obturator can be operated manually to over-ride the control function.

Requirement shall be in accordance with 5.1.4 of EN 1074-1:2000. Test shall be in accordance with 5.1.4 of EN 1074-2:2000.

5.2 Leak-tightness

5.2.1 Leak-tightness of the shell and of all pressure containing components

5.2.1.1 Leak-tightness to internal pressure

Requirement and test shall be in accordance with 5.2.1.1 of EN 1074-1:2000.

5.2.1.2 Leak-tightness to external pressure

Requirement and test shall be in accordance with 5.2.1.2 of EN 1074-1:2000.

5.2.2 Seat tightness

This subclause is only applicable to control valves where seat tightness is a requirement or is claimed by the manufacturer (see clause 4).

For level control and pressure control valves, the leakage rate shall be the rate A, under the conditions defined in the manufacturer's documentation. For other valves, the leakage rate shall be in accordance with the manufacturer's documentation.

Seat tightness shall be checked at the highest and lowest values of the differential pressure, as follows:

— 1,1 x PFA;

— the lowest differential pressure allowed by the manufacturer in his documentation.

In both cases, the requirement and test shall be in accordance with 5.2.2.1 of EN 1074-1:2000, with the values of the differential pressure as given in this subclause.

5.2.3 Maximum operating torque (MOT) for operation and leak-tightness

This requirement is applicable only to control valves whose main obturator can be operated manually to over-ride the control function.

Requirement shall be in accordance with 5.2.3 of EN 1074-1:2000. Test shall be in accordance with 5.2.3 of EN 1074-2:2000.

5.2.4 Leak-tightness of gearboxes to external pressure

If applicable, requirement and test shall be in accordance with 5.2.4 of EN 1074-1:2000.

5.3 Hydraulic characteristics

Testing is not required for control valves greater than DN 300.

5.3.1 Flow coefficient, K_v

Requirement shall be in accordance with 5.3 of EN 1074-1:2000; the characteristic given by the manufacturer shall be the flow coefficient K_v.

For autonomous control valves, it shall be given in the fully open position. In the case of non-autonomous control valves, the manufacturer shall give it as a function of the opening position of the obturator.

When measured in accordance with the test method defined in EN 1267, the flow coefficient shall be within a range of ±10 % of the value given by the manufacturer.

5.3.2 Regulation hydraulic characteristics

This requirement is applicable firstly to autonomous control valves, and secondly to non-autonomous control valves where the manufacturer claims specific hydraulic characteristics linked to a designated control system.

5.3.2.1 Control valves providing flow regulation function

When tested as defined in annex A, the values obtained shall be within the tolerances given in the manufacturer's documentation.

5.3.2.2 Control valves providing pressure regulation function

When tested as defined in annex B, the values obtained shall be within the tolerances given in the manufacturer's documentation.

5.3.2.3 Control valves providing level regulation function

When tested as defined in annex C, the values obtained shall be within the tolerances given in the manufacturer's documentation.

5.4 Resistance to disinfection products

Requirement and test shall be in accordance with 5.4 of EN 1074-1:2000.

5.5 Endurance

After the endurance test defined in annex D, the valve shall pass:

— the hydraulic tests in accordance with 5.3 with values within the range of ±5 % of the values measured before the endurance test;

and

— the tests in accordance with 5.2.1 and 5.2.2 with the same leakage rate, if the valve is claimed to be seat tight.

6 Conformity assessment

6.1 General

Requirement shall be in accordance with 6.1 of EN 1074-1:2000.

6.2 Type tests

Requirement shall be in accordance with 6.2 of EN 1074-1:2000; the type tests to be performed shall be those given in Table 2.

6.3 Control of production and quality system

Requirement shall be in accordance with 6.3 of EN 1074-1:2000; the production tests in Table 2 are informative.

7 Marking

Requirement shall be in accordance with clause 7 of EN 1074-1:2000.

8 Packaging

Requirement shall be in accordance with clause 8 of EN 1074-1:2000.

Table 2 — Requirements and tests

Subclause	Requirement	Type tests	Production tests (informative)
4.1[a]	Materials	see drawings and part lists	-
4.2[a]	DN	see drawings	-
4.3[a]	Pressures	see technical documentation	-
4.4[a]	Temperatures	see materials	-
4.5[a]	Design of the shell and obturator	see test report or calculation report	-
4.6[a]	End types and interchangeability	see drawings and marking	-
4.7[a]	Operating direction	see drawings	-
4.8[a]	Maximum water velocity	see clause 4	-
4.9[a]	All materials, including lubricants, in contact with water intended for human consumption	see test report in accordance with national regulations	-
4.10[a]	Internal corrosion and ageing resistance	see drawings, part lists and technical documentation	visual inspection of coatings
4.11[a]	External corrosion and ageing resistance	see drawings, part lists and technical documentation	visual inspection of coatings
5.1.1[a]	Resistance to internal pressure of the shell and of all pressure containing components	see 5.1.1	see 5.1.1
5.1.2[a]	Resistance of the obturator to differential pressure	see 5.1.2	-
5.1.3[a]	Resistance of valves to bending	see 5.1.3	-
5.1.4[a]	Resistance of valves to operating loads	see 5.1.4	-
5.2.1.1[a]	Leak-tightness to internal pressure	see 5.2.1.1	see 5.2.1.1
5.2.1.2[a]	Leak-tightness to external pressure	see 5.2.1.2	-
5.2.2[a]	Seat tightness	see 5.2.2	see 5.2.2
5.2.3[a]	Maximum operating torque (MOT) for operation and leak-tightness	see 5.2.2 and 5.2.3	see 5.2.3
5.2.4[a]	Leak-tightness of gearboxes to external pressure	see 5.2.4	
5.3.1	Flow coefficient K_v	see 5.3.1	-
5.3.2	Regulation hydraulic characteristics	see 5.3.2	-
5.4[a]	Resistance to disinfection products	see 5.4	-
5.5[a]	Endurance	see 5.5	-

a The subclauses and requirements shown above are those given in EN 1074-1:2000.

Annex A
(normative)

Test method for the hydraulic characteristics of control valves providing flow regulation function

A.1 General

The test shall be performed at ambient temperature on a valve in its delivery state.

Cavitation shall be avoided.

A.2 Test procedure (see Figure A.1)

At a set point of the flow, Q, equal to the minimum allowed value of the flow as given by the manufacturer, the differential pressure applied to the valve shall be given different values (Δpmin, Δpmax and two intermediate values), while measuring the controlled flow.

The resulting curve [$Q = f(\Delta p)$] shall be inside the area limited by the tolerance (ΔQ) given in the manufacturer's documentation.

Repeat the same procedure, choosing a second set point of the flow, equal to the maximum allowed value of the flow as given by the manufacturer.

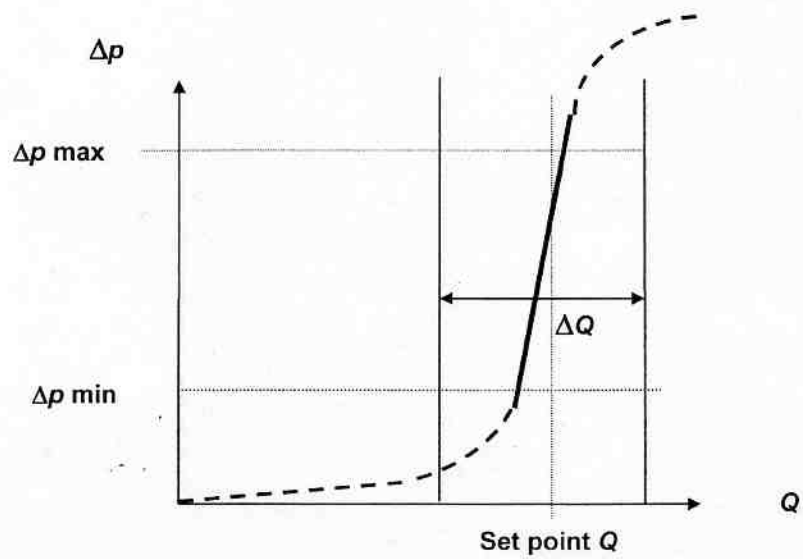

Figure A.1 — Hydraulic characteristics

Annex B
(normative)

Test method for the hydraulic characteristics of control valves providing pressure regulation function

B.1 General

The test shall be performed at ambient temperature on a valve in its delivery state.

Cavitation shall be avoided.

B.2 Test procedure (see Figures B.1 and B.2)

At a set point of the controlled pressure, p, equal to the minimum allowed value of the pressure as given by the manufacturer, provide a flow at different values (Qmin, Qmax and two intermediate values), while measuring the controlled pressure.

Maintain the differential pressure at the minimum value allowed by the manufacturer's documentation.

The resulting curve [p = f (Q)] shall be inside the area limited by the tolerances (Δp, Qmin, Qmax) indicated in the manufacturer's documentation.

Repeat the same procedure, choosing a second set point of the pressure, equal to the maximum allowed value of the pressure as given by the manufacturer.

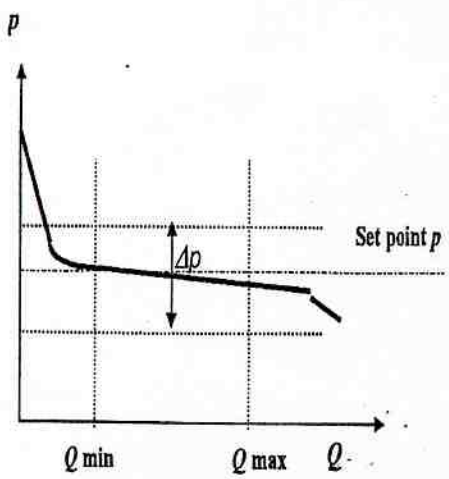

Figure B.1 — Pressure reducing valve valve

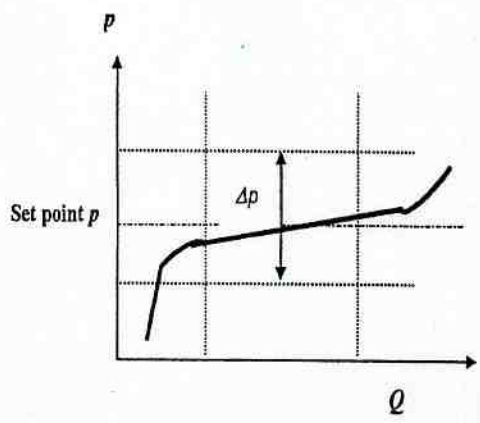

Figure B.2 — Pressure sustaining

Annex C
(normative)

Test method for the hydraulic characteristics of control valves providing level regulation function

C.1 General

The test shall be performed at ambient temperature on a valve in its delivery state.

Cavitation shall be avoided

C.2 Test procedure (see Figure C.1)

Open the valve to increase the level in the tank up to the level of closing, *H*max.

Increase the pressure up to 1,1 x PFA, checking that the flow has stopped and that the height in the tank is not higher than *H*max.

Decrease the upstream pressure of the valve down to zero, and then decrease the level in tank of the value ΔH, as given in the manufacturer's documentation.

Increase the upstream pressure until the flow starts again, and note the value of the pressure.

Allow the tank to fill to *H*max.

Increase the pressure to 1,1 x PFA and check that the height in the tank is not higher than *H*max when flow stops.

If the manufacturer claims an adjustable value of *H*max, the test shall be performed at both limits of the range.

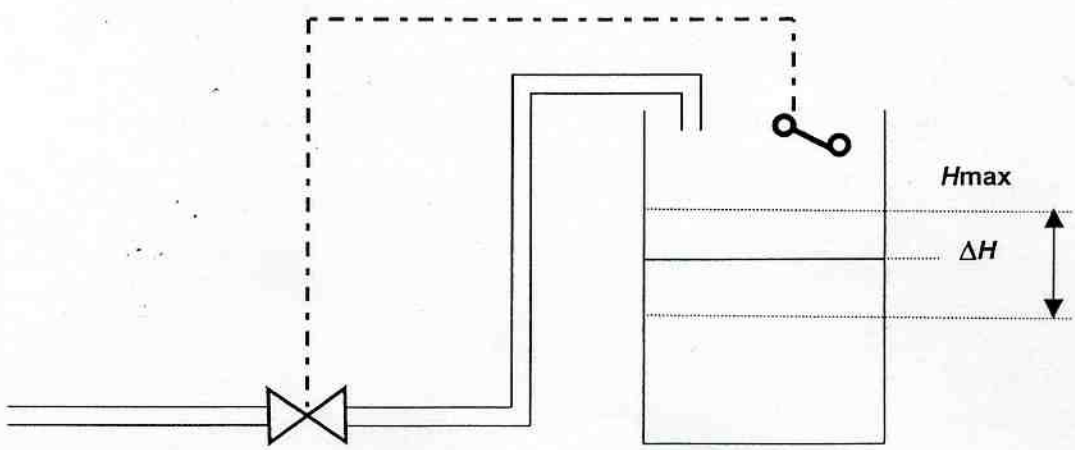

Figure C.1 — Test installation

Annex D
(normative)

Test method for the endurance of control valves

D.1 General

The test shall be performed at ambient temperature on a valve, which has passed the tests in accordance with either annex A, B or C.

For valves equipped with a pilot, the pilot and the main valve may be tested separately.

D.2 Endurance testing procedure

Set the control valve to its open position, as given in the manufacturer's technical documentation and maintain in this position for a minimum of 15 s, with a pressure equal to PMA ±10 %.

Set the control valve to its maximum closed position, as given in the manufacturer's technical documentation and increase the differential pressure up to PMA ±10 %.

Maintain in this position for a minimum of 15 s.

Repeat the procedure for 2 500 cycles.

D.3 Final tests and control

On completion of the test, the valve shall be subjected to a re-test in accordance with annex A, B or C, at one test setting point .

The result of the re-test shall be within ±5 % of the original test result.