BRITISH STANDARD

BS EN
14453:2005

Devices to prevent pollution by backflow of potable water — Pipe interrupter with permanent atmospheric vent DN 10 to DN 20 — Family D, type C

The European Standard EN 14453:2005 has the status of a British Standard

ICS 13.060.20; 23.060.50

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 14453:2005. It supersedes BS 6281-3:1982 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee B/504, Water supply, to Subcommittee B/504/14, Backflow prevention, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

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English version

Devices to prevent pollution by backflow of potable water - Pipe interrupter with permanent atmospheric vent DN 10 to DN 20 - Family D, type C

Dispositifs de protection contre la pollution de l'eau potable par retour - Rupteur à évent atmosphérique permanent DN 10 à DN 20 - Famille D, type C

Sicherungseinrichtungen zum Schutz des Trinkwassers gegen Verschmutzung durch Rückfließen - Rohrunterbrecher mit ständig geöffneten Lufteintrittsöffnungen, DN 10 bis DN 20 - Familie D, Typ C

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Foreword

This document (EN 14453:2005) has been prepared by Technical Committee CEN/TC 164 “Water supply”, 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

This document has been developed with reference to EN°1717 "Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 document:

a) this document 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 document specifies:

a) field of application;

b) requirements for pipe interrupters with permanent atmospheric vent;

c) dimensional, the physico-chemical properties and the properties of general hydraulic, mechanical and acoustic design of pipe interrupters with permanent atmospheric vent, DN 10 to DN 20;

d) test method and requirements for verifying these properties;

e) marking and presentation;

f) acoustics.

This document specifies the characteristics of pipe interrupters with permanent atmospheric vent, DN 10 to DN 20 that are suitable for use in drinking water systems at pressures up to 1 MPa (10 bar) and temperatures up to 65 °C and for 1 h 90 °C.

Backflow protection devices integrated in flushing valves are similar to DC and are not covered under this document. The requirements are stated in EN 12541.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 806-1:2000, *Specifications for installations inside buildings conveying water for human consumption — Part 1: General*

EN 1717:2000, *Protection against pollution of potable water in drinking water installations and general requirements of devices to prevent pollution by backflow*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 3822-1, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 1: Method of measurement (ISO 3822-1:1999)*

EN ISO 3822-3, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 3: Mounting and operating conditions for in-line valves and appliances (ISO 3822-3:1997)*

EN ISO 3822-4, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 4: Mounting and operating conditions for special appliances (ISO 3822-4:1997)*

EN ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices — Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full (ISO 5167-1:1991)*

EN ISO 6509, *Corrosion of metals and alloys — Determination of dezincification resistance of brass (ISO 6509:1981)*

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

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1717:2000, EN 806-1:2000 and the following apply.

pipe interrupter with permanent atmospheric vent
pipe interrupter fitted with air inlet port(s) which is (are) totally unrestricted and permanent. Water flows vertically downwards. The device prevents back flow by venting to atmosphere all the downstream and upstream elements.

For the purpose of this document "pipe interrupter with permanent atmospheric vent DC" is hereafter referred to as "device(s)"

4 Nominal size

The nominal size of device (DN designated) shall correspond to the denomination of the thread according to Table 1.

For specifications of threads refer to 8.2.

Table 1 — Nominal size vs thread size

DN	10	15	20
Thread size	⅜	½	¾

5 Designation

The devices are designated by:

a) name;

b) reference to this document (EN 14453);

c) family, type;

d) DN;

e) body material;

f) acoustic group.

Example for a designation:

Pipe interrupter, EN 14453, family D, type C, DN 20, gun metal, I

6 Marking and technical documents

6.1 General

In countries where the use of products made of dezincification resistant materials is not required, the dezincification resistant products according to EN ISO 6509, as well as the products which do not contain zinc, may be marked "DR".

In countries where the use of dezincification resistant materials is required, the dezincification resistant products, as well as the products which do not contain zinc, shall be marked "DR".

6.2 Marking

The devices shall be marked permanently and visibly on the casing or on a fixed data plate.

This information shall be on the upper side or on each lateral side of the device. The indications shall be indelible and obtained by moulding, engraving or similar procedures.

The marking shall indicate:

a) name, manufacturer's brand or logo;

b) arrow indicating normal direction of flow;

c) nominal size (DN);

d) acoustic group;

e) letters indicating family and type of device;

Marking a), b), c), and e) are obligatory. In case there is no marking for d), the device shall be considered as not classified acoustically.

6.3 Technical documents

Each package and/or each batch and/or each catalogue of the supplier/manufacturer shall contain technical product information which shall be written in a commonly spoken language of the country in which the product is sold.

It shall provide the following information:

a) designation and purpose of the product;

b) installation instructions;

c) minimum installation height;

d) (brand) name and address of supplier/manufacturer;

e) instructions for maintenance, if any;

f) spare part list, if any.

7 Symbolization

The graphic representation of the device is as follows (see Figure 1):

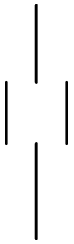
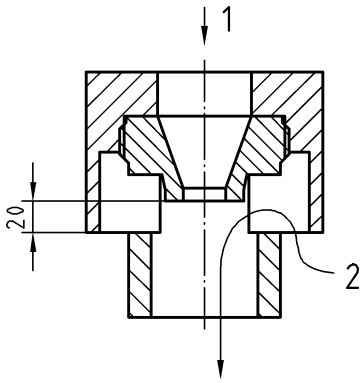


Figure 1 — Graphic symbol

8 General design characteristics

8.1 Design principle

A typical design principle of the device is given in Figure 2.



Key
1 Direction of water flow
2 Air

Figure 2 — Design principle

8.2 Connections

Connections shall comply with EN ISO 228-1 or ISO 7-1.

8.3 Air inlets

Air inlets shall be shrouded and designed to ensure that they cannot easily be blocked by deposits.

Dimensions of external air inlets shall be as shown in Figure 2 and shall be verified as given in 10.3.2.

9 Physico-chemical characteristics

9.1 Materials

The materials and the coatings used, liable to come normally or accidentally in contact with potable water, shall satisfy the EU regulations concerning water quality.

The materials and the coatings shall be:

a) corrosion resistant in accordance with ISO 9227;

b) prone to the least scaling possible;

c) in conformity with the associated standards and regulations;

d) compatible among themselves and with:

- water distributed;
- fluids or matter liable to come into contact with them;
- products normally used for disinfection operations of the network: potassium permanganate and sodium hypochlorite.

9.2 Nature of materials

The choice of materials is left to the discretion of the manufacturer

a) Copper-zinc alloys containing more than 10 % zinc are subject to denzincification when submitted to water capable of dezincification. In the countries where the use of products made of dezincification resistant materials is required, the products shall guarantee a dezincification depth less than 200 um in any direction, they shall be tested in accordance with EN ISO 6509 and shall be marked in compliance with the indication in Clause 6;

b) Neither the materials nor coatings used shall, by normal or accidental contact with drinking water, cause any risk of affecting or modifying the water up to a temperature of 90 °C. The suitability of the water for human consumption is defined by national regulations;

c) The manufacturer shall state in his technical and sales literature the nature of the materials and the coatings selected;

d) The materials, and in particular copper alloys, for which recommendations or standards exist shall comply with the relevant recommendations or standards.

10 Characteristics and tests

10.1 General

Examples shown in the figures are for guidance only. Laboratory equipment shall be designed to ensure that the devices can be tested in accordance with the requirements.

The accuracy of measurements and accuracy of measuring instruments shall not exceed the following:

a) Accuracy of measurements

In the absence of any particular specifications:

— flow rate and pressure: ± 2 % of the value indicated;
— temperature: cold water ± 5 °C of the value indicated; hot water ± 2 °C of the value indicated;
— time: $^{+10}_{0}$ % of the value indicated;

b) Accuracy of measuring instruments

Measuring instruments shall have a precision of ± 2 % of the measured value. Temperature measurements shall be accurate to 1 K.

10.2 Test sequence

The device for type testing shall be tested in accordance with the following sequence. Minimum three (3) samples shall be submitted. The test sequence is specified in Annex A.

Stage 1: Visual verification. See 10.3.

Stage 2: Bending moment. See 10.4.

Stage 3: Vacuum test. See 10.5.

Stage 4: Flow rate/pressure loss — leak tightness. See 10.6.

For combined devices[1)] only the anti-pollution test stage 3 are to be performed.

10.3 Visual verification (Stage 1)

10.3.1 Procedure

Check by visual verification that the devices comply with the description and the appropriate drawings.

10.3.2 Verification of dimensional requirements of air inlets

Dimensions of external air inlets shall be minimum 4 mm.

The lower edge of the disconnection of the water pipe and/or air inlet has to be at least 20 mm away from the upper edge, in opposite direction of the flow (see Figure 2).

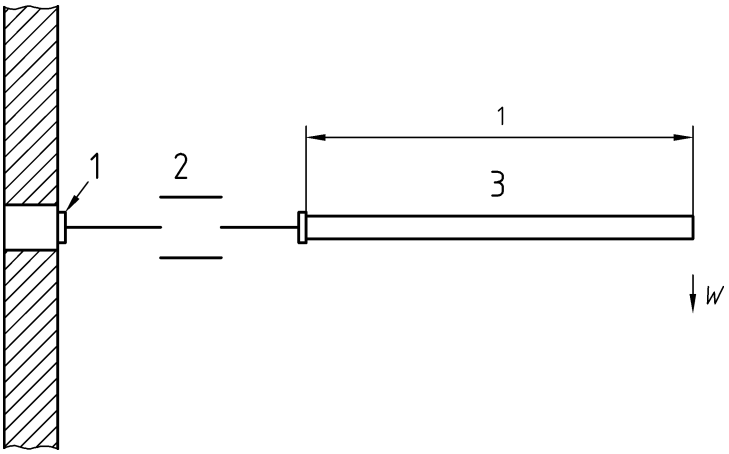
1) Valve combinations should also comply with a recognised standard.

10.4 Bending moment (Stage 2)

10.4.1 General

The bending moment test shall be applied to each and every size and end design.

10.4.2 Test equipment



Key
1 Mounting fixture for test device
2 Test device
3 Steel pipe, threaded at one end to be connected to the outlet of the test device without any intermediate parts

W Applied load

Figure 3 — Bending moment test equipment

10.4.3. Procedure

Install the test device in the test rig.

Apply a load W as shown in Figure 3 to produce the bending moment given in Table 2 at ambient temperature. Hold for 10 min (see Figure 3).

The bending moment is measured at the connection to the pipe. In calculating the bending moment, make due allowances for the mass of the pipework, and any loads imposed by the test equipment.

10.4.4 Requirement

The test requirements shall be satisfied with the appropriate bending moment applied to the device, as given in Table 2.

There shall be no breakage or permanent deformation of the body of the device.

Table 2 — Nominal size *vs* bending moment

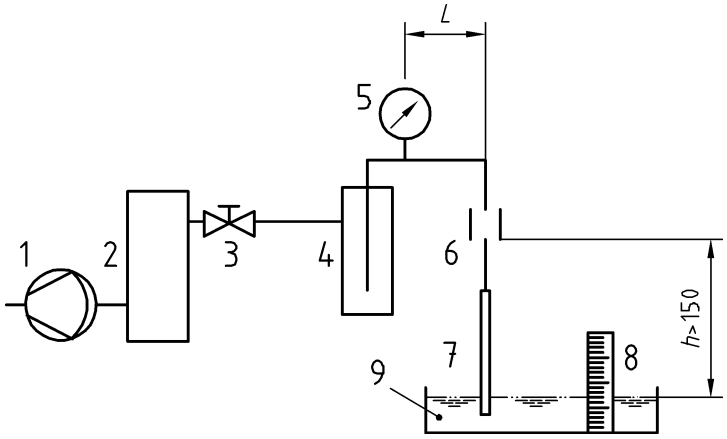
DN	10	15	20
Bending moment, Nm	30	50	70

10.5 Vacuum test (Stage 3)

10.5.1 Test equipment

The test apparatus shall be arranged and constructed as shown in Figure 4 so that the absolute pressure measured near the device under test on its supply side remains less than 0,05 MPa (0,5 bar) for at least 5 s.

Dimensions in millimetres



$100 \leq L \leq 150$

Key
1 Vacuum pump
2 Vacuum vessel
3 Full-way valve
4 Water trap
5 Vacuum gauge
6 Test device
7 Transparent tube
8 Ruler
9 Water reservoir
h Vertical distance between the edge at the inlet of the device and water level

Figure 4 — Test equipment for vacuum test

10.5.2 Procedure

Test equipment is shown in Figure 4.

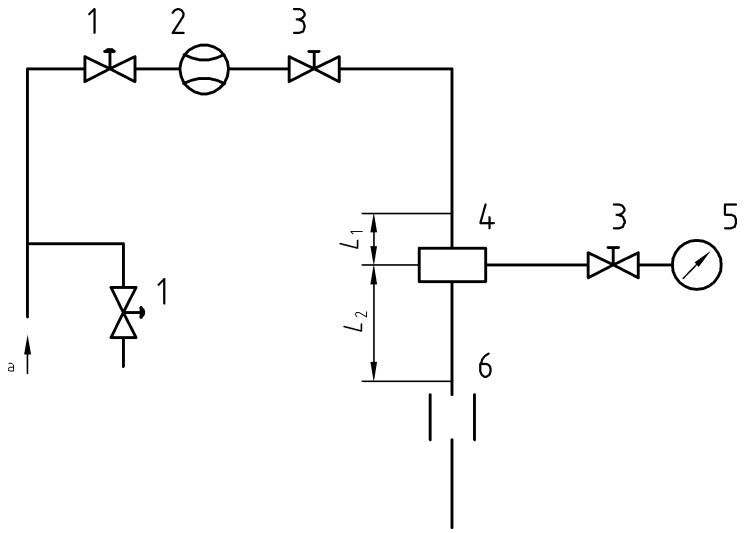
By opening of the full-way valve (3) within 1 s apply a vacuum to the device so that the absolute pressure as indicated by the vacuum gauge (5) remains below 0,05 MPa (0,5 bar) for at least 5 s.

10.5.3 Requirement

The water column in the transparent tube (7) shall not exceed 5 cm [0,0005 MPa (0,005 bar)].

10.6 Flow rate/pressure loss test (Stage 4)

10.6.1 Testing equipment



$L_1 \geq 5\ D$ and $L_2 \geq 10\ D$

Key
1 Needle type valves
2 Flow meter
3 Stop valves
4 Standarized pressure take off, to EN ISO 5167-1
5 Pressure gauge
6 Test device

a Water supply

Figure 5 — Flow rate/pressure loss test equipment

10.6.2 Procedure

The flow rate is measured at a pressure difference of 0,01 MPa (0,1 bar);

Increase the flow pressure in steps of 0,1 MPa (1 bar) up to 0,6 MPa (6 bar). Keep the flow for 1 min at each step;

Check the leak tightness during the whole test.

10.6.3 Requirement

The flow rate at a flow pressure of 0,01 MPa (0,1 bar) shall not be less than the values given in Table 3.

No splashing water shall be observed at the outside of the external air inlets.

Table 3 — Nominal size *vs* minimum rate of flow

DN	10	15	20
Minimum flow rate, l/s	0,08	0,15	0,30

11 Acoustic characteristics

11.1 General

This Clause specifies the test method for classifying device by acoustic group.

11.2 Procedure

11.2.1 Mounting and operating conditions

This shall be carried out in accordance with the requirements of EN ISO 3822-3 or EN ISO 3822-4 as appropriate.

11.2.2 Test methods

The test shall be carried out in accordance with the requirements of EN ISO 3822-1 and EN ISO 3822-4.

The flow pressure shall be adjusted at 0,3 MPa (3 bar). The resulting flow rate and the noise level is measured and documented.

11.3 Test criteria

11.3.1 Expression of the results

The results of the measurements carried out in accordance with EN ISO 3822-1 shall be expressed as appliance sound level pressures L_{AP} in dB(A).

11.3.2 Noise classification

Device shall be classified in accordance with Table 4.

Table 4 — Acoustic groups

Acoustic group	L_{AP} dB (A) at 0,3 MPa
I	< 20
II	$20 \leq L_{AP} \leq 30$
Not classified	> 30

Annex A
(normative)

Sampling and test sequence

Table A.1 — Test sequence on the samples submitted

Number of test devices/Test			
Test	**Device 1**	**Device 2**	**Device 3**
Visual verification 10.3	X	X	X
Bending moment 10.4	X		
Vacuum test 10.5		X	X
Flow rate/pressure loss 10.6		X	

Bibliography

[1] EN 12541, *Sanitary tapware — Pressure flushing valves and automatic closing urinal valves PN 10*

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