BS EN 12729:2023

BSI Standards Publication

Devices to prevent pollution by backflow of potable water — Controllable backflow preventer with reduced pressure zone — Family B — Type A

bsi.

National foreword

This British Standard is the UK implementation of EN 12729:2023. It supersedes BS EN 12729:2002, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/504, Water supply.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2023

ISBN 978 0 539 13420 9

ICS 13.060.20; 91.140.60

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 March 2023.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12729

March 2023

ICS 13.060.20; 91.140.60

Supersedes EN 12729:2002

English Version

Devices to prevent pollution by backflow of potable water - Controllable backflow preventer with reduced pressure zone - Family B - Type A

Dispositifs de protection contre la pollution de l'eau potable - Disconnecteur à zone de pression réduite contrôlable - Famille B - Type A

Sicherungseinrichtungen zum Schutz des Trinkwassers gegen Verschmutzung durch Rückfließen - Systemtrenner mit kontrollierbarer druckreduzierter Zone - Familie B - Typ A

This European Standard was approved by CEN on 30 January 2023.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN 12729:2023 E

Contents

Page

European foreword ... 4
Introduction ... 5
1 Scope ... 6
2 Normative references ... 6
3 Terms and definitions ... 8
4 Denomination ... 9
5 Designation ... 9
6 Symbolization ... 10
7 Physico-chemical characteristics ... 10
7.1 General ... 10
7.2 Materials ... 10
7.2.1 General ... 10
7.2.2 Dezincification resistant copper alloy ... 10
7.3 Surface coating ... 11
7.3.1 General ... 11
7.3.2 Epoxy coating ... 11
7.3.3 Polyamide powder based coating ... 11
8 Design ... 11
8.1 General ... 11
8.2 Relief valve ... 12
9 Characteristics and tests ... 13
9.1 General ... 13
9.2 General tolerances ... 13
9.2.1 Tolerance of set parameters ... 13
9.2.2 Accuracy of measuring instruments ... 13
9.3 Dimensional characteristics ... 13
9.3.1 Connections ... 13
9.3.2 Pressure taps ... 13
9.4 Mechanical characteristics ... 14
9.4.1 General ... 14
9.4.2 Mechanical resistance of the body under pressure ... 14
9.4.3 Endurance ... 14
9.4.4 Torque test of captive rotating nuts and bending strength – tightness of the body ... 16
9.4.5 Reliability of stop valves fitted to test ports ... 17
9.5 Tightness characteristics ... 18
9.5.1 Verification of the tightness of the downstream check valve (in the closing direction) ... 18
9.5.2 Verification of the closing pressure of the downstream check valve and its tightness (opening direction) ... 18
9.5.3 Verification of the tightness of the upstream check valve at low pressure ... 19
9.5.4 Verification of the tightness of the upstream check-valve under vacuum ... 20
9.6 Hydraulic characteristics ... 21
9.6.1 Test rig – General circuit ... 21
9.6.2 Verification of the pressure loss as a function of the flow rate ... 22

9.6.3 Verification of the pressure difference between the upstream and the intermediate zones 22
9.6.4 Verification of venting to atmospheric pressure of the intermediate zone when the upstream pressure drops 23
9.6.5 Verification of opening start of the relief valve and of its closing 23
9.6.6 Verification of the relief valve tightness in case of fluctuation of the upstream pressure 24
9.6.7 Verification of the intermediate zone pressure for a given relief flow rate under inverse feed 24
9.7 Compatibility with the products used for shock disinfection of the networks 25
9.7.1 Requirement 25
9.7.2 Test method 25
9.8 Acoustic tests 25
9.8.1 General 25
9.8.2 Procedure 26
10 Marking and technical documents 26
10.1 Marking 26
10.2 Technical documents 27
11 Presentation at delivery 27
Annex A (normative) General information for coating definition 28
A.1 Organic coating (paint) 28
A.2 Pre-treatment before coating 28
A.3 Application techniques 28
Annex B (normative) Evaluation of the degree of polymerization 30
B.1 Solvent resistance test 30
Bibliography 32

European foreword

This document (EN 12729:2023) 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 September 2023, and conflicting national standards shall be withdrawn at the latest by September 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12729:2001.

The main changes compared to the previous edition are listed below:

— hydraulic and mechanical requirements have been revised;

— the Scope has been updated;

— all tests have been described in more detail and optimized;

— acoustics have been updated;

— endurance tests have been revised;

— section coatings have been added;

— solvent resistance test section has been added.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye 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 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 the field of application, the dimensional, the physico-chemical, the design, the hydraulic, the mechanical, and the acoustic characteristics of controllable backflow preventers with reduced pressure zone, Family B, Type A.

This document covers controllable backflow preventers of Family B, Type A, with reduced pressure zones, intended to prevent pollution of potable water by backflow, caused by backsiphonage or by backpressure.

It is applicable to controllable backflow preventers in denominations DN 6 up to DN 250.

It covers controllable backflow preventers of PN 10 that are capable of working without modification or adjustment:

— at any pressure, up to 1 MPa (10 bar);

— with any pressure variation, up to 1 MPa (10 bar);

— in permanent duty at a limited temperature of 65 °C and for maximum 1 h at 90 °C.

It specifies also the test methods and requirements for verifying their characteristics, the marking and the presentation at delivery.

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.

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

EN 1267, *Industrial valves - Test of flow resistance using water as test fluid*

EN 1329-1, *Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes, fittings and the system*

EN 1453-1, *Plastics piping systems with structured-wall pipes for soil and waste discharge (low and high temperature) inside buildings - Unplasticized poly(vinyl chloride) (PVC-U) - Part 1: Specifications for pipes and the system*

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

EN 10310:2003, *Steel tubes and fittings for onshore and offshore pipelines - Internal and external polyamide powder based coatings*

EN 13959, *Anti-pollution check valves - DN 6 to DN 250 inclusive family E, type A, B, C and D*

EN 13828, *Building valves - Manually operated copper alloy and stainless steel ball valves for potable water supply in buildings - Tests and requirements*

EN 14901-1, *Ductile iron pipes, fittings and accessories - Requirements and test methods for organic coatings of ductile iron fittings and accessories - Part 1: Epoxy coating (heavy duty)*

EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

EN ISO 2409, *Paints and varnishes - Cross-cut test (ISO 2409)*

EN ISO 2808, *Paints and varnishes - Determination of film thickness (ISO 2808)*

EN ISO 2812-2, *Paints and varnishes - Determination of resistance to liquids - Part 2: Water immersion method (ISO 2812-2)*

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)*

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)*

EN ISO 21920-2, *Geometrical product specifications (GPS) - Surface texture: Profile - Part 2: Terms, definitions and surface texture parameters (ISO 21920-2)*

EN ISO 4624, *Paints and varnishes - Pull-off test for adhesion (ISO 4624)*

EN ISO 4628-2, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering (ISO 4628-2)*

EN ISO 4628-3, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting (ISO 4628-3)*

EN ISO 6272-1, *Paints and varnishes - Rapid-deformation (impact resistance) tests - Part 1: Falling-weight test, large-area indenter (ISO 6272-1)*

EN ISO 8501-1, *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings (ISO 8501-1)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227)*

EN ISO 11357-1, *Plastics - Differential scanning calorimetry (DSC) - Part 1: General principles (ISO 11357-1)*

EN ISO 6509-1, *Corrosion of metals and alloys - Determination of dezincification resistance of copper alloys with zinc - Part 1: Test method (ISO 6509-1)*

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

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

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

3.1
controllable backflow preventer with reduced pressure zone, Family B, Type A
device, called "BA", with following specific characteristics:

— 3 pressure zones such that upstream p_1 > intermediate p_i > downstream p_2 (static no flow and under water flow conditions);

— $p_1 - p_i > 14$ kPa (140 mbar);

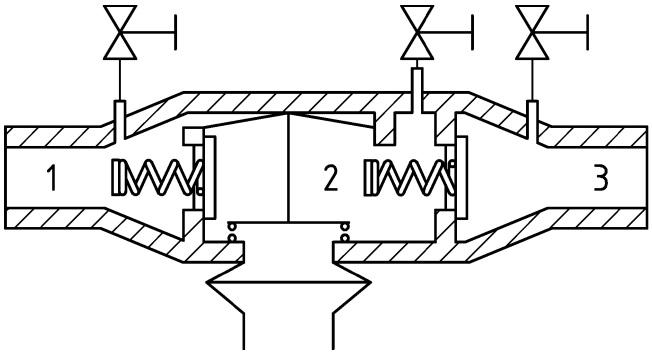
— connection from the intermediate pressure zone (p_i) to the atmosphere when $p_1 - p_i \leq 14$ kPa (140 mbar);

— disconnection by venting the intermediate pressure zone (p_i) to the atmosphere when $p_1 < 14$ kPa (140 mbar);

— a minimum set discharge flow (backflow rate);

— devices that allow verification in every zone of the disconnection and of the sealing of the protection devices (check valves, discharge valve)

Note 1 to entry: See Figure 1.



Key
1 upstream zone p_1
2 intermediate zone p_i
3 downstream zone p_2

Figure 1 — Design principle

Note 2 to entry: For the purposes of this document, "controllable backflow preventer BA" is hereafter referred to as "device".

3.2
in line device
device installed within the pipework where the downstream flow of water supplies one or more points of use

3.3
incorporated device
device integrated in appliances

EXAMPLES Cleaning apparatus, heating boilers, etc.

3.4
end of line device
device installed at the end of the pipework at the point of use for a specific purpose

EXAMPLES Temporary filling heating system, jetwasher machine, feeding points for events, etc.

4 Denomination

For the purposes of this document, for the devices the nominal size DN is a function of the minimum flow rate given in Table 6.

5 Designation

A controllable backflow preventer with reduced pressure zone, Family B, Type A is designated by:

— its name;

— its family and its type;

— type of installation (in line, end of line or incorporated device);

— its denomination;

— its size of end connection;

— the material of its body;

— its surface finish (possible coating);

— the acoustic group I, II or nc (for DN ≤ 32);

— the reference to this document.

Examples for a designation:

— Controllable backflow preventer with reduced pressure zone — Family B — Type A, in line, DN 32, R 11/4 × R 11/4, bronze, I, EN 12729.

— Controllable backflow preventer with reduced pressure zone — Family B — Type A, in line DN 100, flanged, cast iron, epoxy coated, EN 12729.

6 Symbolization

The graphic representation of the controllable backflow preventer with reduced pressure zone, Family B, Type A is as follows (see Figure 2).

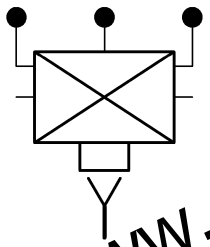


Figure 2 — Graphic symbol

7 Physico-chemical characteristics

7.1 General

The selection of materials is the responsibility of the manufacturer, provided they satisfy the following requirements:

a) materials and coatings shall not contaminate the potable water;

b) in a technical document, the manufacturer shall state the nature of the materials and coatings used;

c) materials with inadequate corrosion resistance shall have additional protection;

d) the materials used shall be suitable for the temperatures specified in the tests in this document;

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

7.2 Materials

7.2.1 General

All materials coming into contact with water intended for human consumption shall present no health risk nor cause any change to the water in terms of quality, appearance, smell or taste.

NOTE While awaiting the adoption of verifiable European criteria for testing materials in contact with water intended for human consumption, existing national regulations concerning the use and/or the characteristics of these products remain in force.

7.2.2 Dezincification resistant copper alloy

Copper-zinc alloys containing more than 15 % zinc are subject to dezincification when submitted to water capable of dezincification. In the countries where the use of products made of dezincification resistant materials is required, the materials used shall guarantee a dezincification depth less than 200 µm in any direction. For this purpose, materials shall be tested in accordance with EN ISO 6509-1 and the product shall be marked in compliance with the indications according to Clause 11.

7.3 Surface coating

7.3.1 General

The outside and inside surfaces of the device may contain a coating. Such coating shall not impair the functional characteristics of the device.

The coating for protection of the basic material against corrosion can be either realized by epoxy coating or by polyamide powder-based coating. See also Table A.1.

7.3.2 Epoxy coating

Epoxy coating shall fulfil the requirements as described in Annex A based on EN 14901-1.

7.3.3 Polyamide powder based coating

Polyamide powder coating shall fulfil the requirements as described in Annex A based on EN 10310:2003.

8 Design

8.1 General

a) The internal components of the device shall be accessible for inspection, repair or replacement. These operations shall be possible on the installed device. Mandatory maintenance can also be done by removing the device from the pipework for sizes DN ≤ 20. By design, the components shall be able to be refitted at their initial place, without ambiguity (impossibility of reversal, interchange of obturators, diaphragms, springs …). A visible mark is not sufficient;

b) the settings of the springs shall be fixed and not adjustable;

c) in line devices and incorporated devices shall comprise three pressure tapings, upstream, intermediate, downstream, permitting periodic verification of the function of the device;

d) end of line devices shall comprise at least two pressure tapings, upstream and intermediate permitting periodic verification of the function of the device.

   They are placed:

   — upstream of the first check valve;

   — in the intermediate zone;

e) It shall be possible to vent the air which can accumulate inside the device;

f) the internal components of the device can only be controlled by the pressure of the water of the supply network;

g) possible additional control devices (electric, pneumatic, …) shall not adversely affect the backflow protection function;

h) normally the device shall be installed horizontally. Devices DN ≤ 50 may be installed in the downward vertical orientation in accordance with the design of the valve and the manufacturers' instructions while satisfying all the criteria in this document. If this orientation influences the function of the devices the tests shall be carried out in all possible orientations.

8.2 Relief valve

The design of the relief valve operation shall be such that when the differential pressure over the upstream check valve is less than 14 kPa (140 mbar) the relief valve shall be open to ensure safety.

An internal vertical distance *h*, as shown in the Figure 3 (in disconnected position) shall be provided between the upstream check valve seat and the seat of relief valve:

— $h \geq 5$ mm for DN ≤ 15;

— $h \geq 10$ mm for 15 < DN ≤ 50;

— $h \geq 20$ mm for DN > 50.

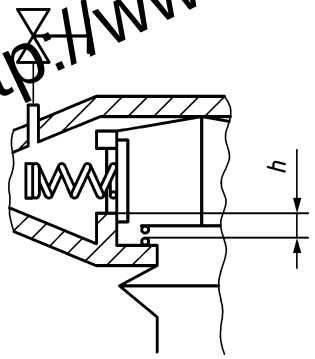


Figure 3 — Relief orifice

In none of the installation positions indicated by the manufacturer, any water retention with the intermediate zone shall be possible.

The cross sections of the passage orifices and of the pilot tube for operation of the relief device shall be greater than or equal to 45 mm^2 with DN ≥ 15, or 12,5 mm^2 with DN < 15. No dimension for the calculation of the cross section shall be less than 4 mm. The outside pilot tube shall be made so as not to be subject to any permanent deformation or rupture under outside stresses.

An air break to drain shall exist between any waste drain and any means of collecting the discharged water (floor, tundish, curb, sink).

The air break to drain shall meet the dimensional requirements as specified in EN 1717. This air break to drain shall be either:

1) directly incorporated into the device; or

2) factory fitted; or

3) supplied with the device; or

4) guaranteed by the installation (accepted in case of outside applications).

In the cases 3 and 4, the relief orifice of the device shall permit neither the fitting of a standardized threaded pipe, nor the connection of a standardized pipe or shape, neither by adhesive, welding nor interlocking.

The dimension ‘‘G” of the outlet of the air break to drain (see in EN 1717) shall be possible to connect a standardized drain pipe (EN 1329-1 PVC compact or EN 1453-1 PVC with structured walls).

9 Characteristics and tests

9.1 General

Performance tests shall be carried out on the device as installed in accordance with the manufacturer's technical documents, subject to dimension *h* being complied with.

If not specified, all tests shall be performed with water at ambient temperature.

9.2 General tolerances

9.2.1 Tolerance of set parameters

In the absence of any particular specifications:

— flow rate and pressure: ±2 % of the value specified;

— temperature: cold water: ±5 °C of the value specified;

  — hot water: ±2 °C of the value specified;

  — other values: ±2 °C of the value specified;

— time $^{10\ \%}_{0}$ of the value specified.

9.2.2 Accuracy of measuring instruments

All the measuring instruments shall have an error limit of ±2 % of the measured value.

9.3 Dimensional characteristics

9.3.1 Connections

The connection shall be in accordance with the relevant European Standards.

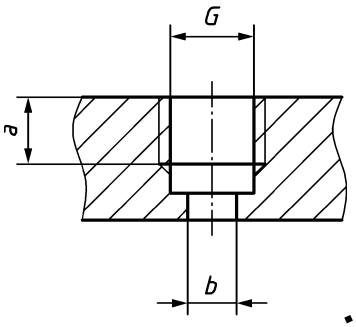
9.3.2 Pressure taps

The devices shall have one test port orifice per zone according to the indications as shown in Figure 4 and Table 1.

The bores for pressure taps shall have over their full length a minimum cross-section of 12,56 mm^2. Their smallest dimension shall be not less than 4 mm.

Table 1 — Dimension of thread and test parts

DN	**Thread** (designation in accordance with ISO 228-1)	**a** mm
≤ 15	G 1/8 or G 1/4	> 6,5
20 ≤ DN ≤ 50	G 1/4	> 6,5
> 50	G 1/2	> 13



Key

G thread

a thread length

b bore hole

Figure 4 — Pressure tap orifice

These test ports shall be fitted with stop valves (other technical means for verification such as fast couplings or removable plugs, etc. are allowed).

If stop valves are fitted, the outlet connections shall be in accordance with Figure 4 and Table 1 (except Dimension a).

9.4 Mechanical characteristics

9.4.1 General

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

9.4.2 Mechanical resistance of the body under pressure

9.4.2.1 Requirement

There shall be no visual permanent deformation or rupture of the body or the internal parts of the device.

9.4.2.2 Test method

Apply at the inlet of the device in increments of 0,1 MPa (1 bar) per 5 s an increase of the static water pressure up to 2,5 times the PN, the value that equals 2,5 MPa (25 bar); hold this pressure for 5 min. Observe the device and note any observations.

Verify that the device satisfies the requirement of 9.4.2.1.

9.4.3 Endurance

9.4.3.1 Requirement

a) The endurance test shall be done with the same sample that has been tested according to 9.5.1, 9.5.2, 9.5.3, 9.6.4 and 9.7. After performing the test according to 9.4.3.2 the sample shall fulfil the requirements according to 9.5.1, 9.5.2, 9.5.3, 9.5.4 and 9.6.4;

b) There shall be no visible damages or deformation of the coating, and of components.

9.4.3.2 Tests

Test 1 — Behaviour at temperature.

Place the complete device for 72 h in an environment at a temperature of 65 °C and at a relative humidity of (50 ± 10) %.

Test 2 — Thermal shock.

Following the preceding test, put the complete device at the flow rate as given in the Table 4 supplying it with water at 90 °C.

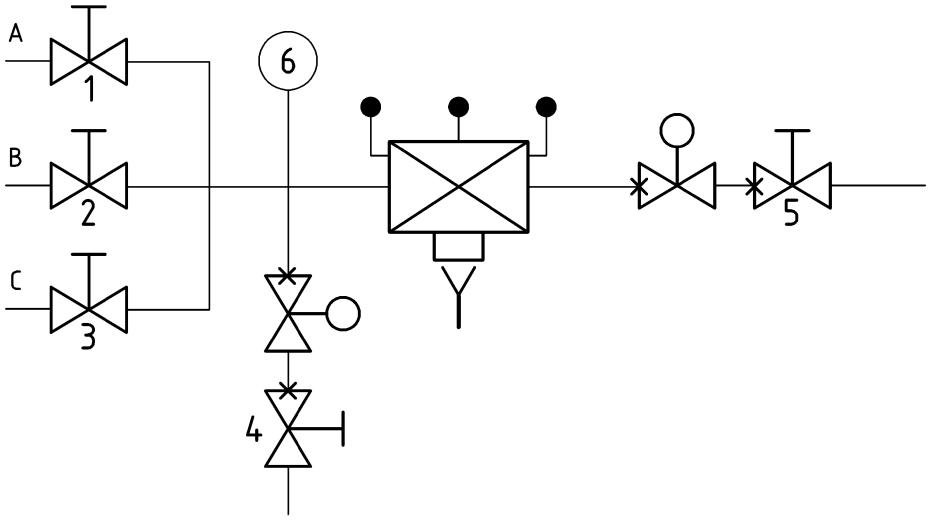
Once temperature reaches 85 °C at the outlet of the device hold the flow rate for 60 min and then supply for 10 min with water at 15 °C.

Test 3 — Mechanical endurance.

A Supply flow; maximum pressure of 0,3 MPa (3 bar) at zero flow

B Supply pressure: (1 ± 0,05) MPa (10 ± 0,5) bar

C Supply pressure: (0,3 ± 0,03) MPa (3 ± 0,3) bar



Key

valve with time control of opening and closing

adjusting valve

6 pressure gauge

Figure 5 — Endurance testing equipment

Following the preceding tests 1 and 2 submit the device placed in the testing equipment (see Figure 5) to 5 000 $^{+50}_{0}$ cycles at a temperature of 65 °C, each cycle comprising:

— Stage 1: Open valve 5 then valve 1, circulation at a flow rate as given in Table 2 at the value ±5 % for (6 ± 2) s;

— Stage 2: Close valve 5 then valve 1;

— Stage 3: Open valve 3, static pressure at 0,3 MPa (3 bar) for (6 ± 2) s;

— Stage 4: Close valve 3, open valve 4. Upstream drain for (6 ± 2) s (opening of the relief valve);

— Stage 5: Close valve 4;

— Stage 6: Open valve 5 then valve 1, circulation at a flow rate as given in Table 2 at the value ± 5 % for (6 ± 2) s;

— Stage 7: Close valve 5 then valve 1;

— Stage 8: Open valve 2. Static pressure at 1 MPa (10 bar) for (6 ± 2) s;

— Stage 9: Close valve 2, open valve 4. Upstream drain (opening of the relief valve) for (6 ± 2) s;

— Stage 10: Close valve 4.

The 5 000 cycles are broken down into seven periods as follows:

— 1 250 cycles;

— the device is at rest for 14 h at ambient temperature;

— 1 250 cycles;

— the device is maintained under load at a static pressure of 1 MPa (10 bar) for 14 h at ambient temperature;

— 1 250 cycles;

— the device is submitted for 14 h to an upstream pressure of 0,3 MPa (3 bar) and to a downstream pressure of 1 MPa (10 bar) at ambient temperature;

— 1 250 cycles.

Table 2 — Flow rate for the endurance test depending on the nominal size DN

DN	6	8	10	15	20	25	32	40
Flow rate m^3/h	0,25	0,4	0,6	1,3	2,2	3,5	5,8	9
DN	50	65	80	100	125	150	200	250
Flow rate m^3/h	14	24	36	56	56	56	56	56

9.4.4 Torque test of captive rotating nuts and bending strength – tightness of the body

9.4.4.1 Requirement

a) After unscrewing, no visual damage of the nut shall be detected.

b) There shall be no rupture nor permanent deformation or leakage on the body of the device.

9.4.4.2 Test method

The device shall be fixed to the test rig, into operating orientation, as shown in Figure 6, swivel nut connection shall be tightened with the torque specified in Table 3. Gradually apply torque to the captive rotating nut/backnut until the tightening torque is reached and maintain it for a period of at least 1 min.

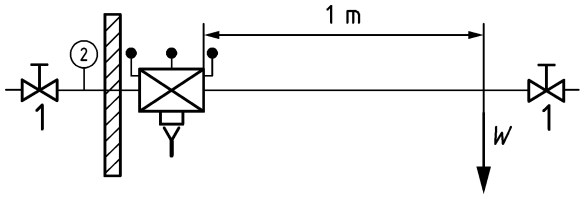
Once in water under pressure and without bending stress, the fitting shall be leaktight. In case it is not leaktight, the tightening torque can be increased.

Apply a load *W* as shown in Figure 6 corresponding to the bending moment shown in Table 4 according to the type of product (see 3.2, 3.3 and 3.4). Apply pressure up to 1,6 MPa (16 bar) with increments of 0,1 MPa (1 bar) per 5 s.

Maintain bending moment and pressure for 10 min. When calculating load *W* corresponding to the bending moment, loads introduced by the piping and taps and any loads arising from the test apparatus shall be accounted for.

Table 3 — Torsional strength

Nominal size DN	10	15	20	25	32	40	50
Tightening torque (Nm)	30	60	75	100	125	150	150



Key

W load
1 isolating valve
2 pressure gauge

Figure 6 — Bending moment testing equipment

Table 4 — Bending moment for the endurance test depending on the nominal size DN

DN		**6**	**8**	**10**	**15**	**20**	**25**	**32**	**40**
Bending moment Nm	In line device	20	30	40	70	110	150	250	300
	End of line device			30	50	70	120	190	220
	Incorporated device	Not applicable							
DN		**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
Bending moment Nm	In line device	500	750	950	1 300	1 800	2 400	3 800	5 500
	End of line device	300							
	Incorporated device	Not applicable							

Verify that the device satisfies the requirements of 9.4.4.1.

9.4.5 Reliability of stop valves fitted to test ports

9.4.5.1 General

The following test shall only be performed if the isolating valves are not in accordance with the requirements of EN 13828.

The stop valves fitted to the pressure taps shall be easily manoeuvrable.

The stop valves of flanged devices shall be operable by hand without additional tools.

The opening and closing positions shall be defined by mechanical stops.

9.4.5.2 Operating torque

9.4.5.2.1 General

Before starting the test, one preliminary cycle shall be carried out. The valve shall then be left for 24 h at ambient temperature.

The operating torque of the valve is measured continuously from the fully open position to the fully closed position and then back to the open position while it is subjected to the static PN 10. During the test the speed of the rotation shall be 5 ± 1 cycle per minute.

Table 5 — Operating torque

DN	8	10	15
Torque (Nm)	4	5	6

9.4.5.2.2 Requirement

The operating torque shall not exceed the values given in Table 5.

9.4.5.2.3 Test

Measure the maximum torque to go from the complete closure position to the full opening position and to return to the complete closure position.

The cycle “Closed → Open → Closed” shall be repeated three times.

9.5 Tightness characteristics

9.5.1 Verification of the tightness of the downstream check valve (in the closing direction)

9.5.1.1 Requirement

There shall be no leakage nor permanent deformation or deterioration of the downstream check valve.

9.5.1.2 Test

Downstream of the device, apply a pressure of 1,6 MPa (16 bar), the upstream zone being at atmospheric pressure. The pressure build-up from 0 to 1,6 MPa (16 bar) must be gradual over a period of one minute minimal.

Hold the pressure for 2 min.

Isolate the device from the supply system for 10 min.

Verify that the device satisfies the requirements of 9.5.1.1.

9.5.2 Verification of the closing pressure of the downstream check valve and its tightness (opening direction)

9.5.2.1 Requirement

The closing pressure of the check valve shall be greater than 7 kPa (70 mbar) or if a check valve EB conforming to EN 13959 is used, the closing pressure shall be greater than 0,5 kPa (5 mbar).

The closing pressure shall reach a stable value above the indicated limits.

9.5.2.2 Test

The verification is made by measuring the difference in height between two levels (Figure 7).

The inside diameter of the level tubes shall be $10\ ^{0}_{-2}$ mm.

a) **b)**

Key

1 isolating valve

2 isolating valve

Figure 7 — Closing pressure testing equipment

Admit water to the device, so that the height h of the water column in tube C is obtained and sufficient to carry out the two tests.

Isolate the device for 5 min ± 30 s.

Record height Δh_1 [Figure 7 a)].

Drain slightly downstream.

Isolate for 5 min ± 30 s.

Record height Δh_2 [Figure 7 b)].

Verify that the device satisfies the requirement of 9.5.2.1. The results can be expressed as a curve. The closed system is observed and the values Δh_1 and Δh_2 are greater than 7 kPa (70 mbar) or 0,5 kPa (5 mbar) within 5 min.

9.5.3 Verification of the tightness of the upstream check valve at low pressure

9.5.3.1 Requirement

The upstream check valve shall be leaktight at each test stage.

No sagging of the water level in the tube shall be stated at each of the stages.

9.5.3.2 Test

Fill the device with water so that the water column has a height of 200 mm ± 50 mm in the tube (diameter inside $10\ ^{0}_{-2}$ mm), as shown on Figure 8.

Isolate for 5 min ± 30 s.

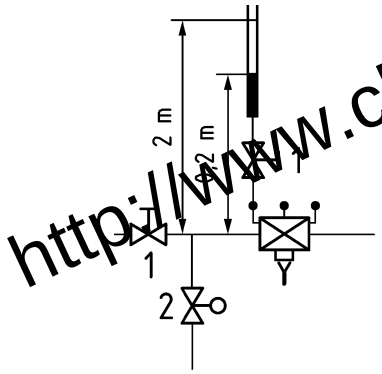
Raise the level in the tube to 1 000 mm ± 50 mm.

Isolate for 5 min ± 30 s.

Raise the level in the tube to 2 000 mm ± 50 mm.

Isolate for 5 min ± 30 s.

Verify that the device satisfies the requirement of 9.5.3.1.



Key

1 isolating valve

2 adjusting valve

Figure 8 — Tightness testing equipment (low pressure)

9.5.4 Verification of the tightness of the upstream check-valve under vacuum

9.5.4.1 Requirement

The upstream check valve shall be leaktight.

9.5.4.2 Test

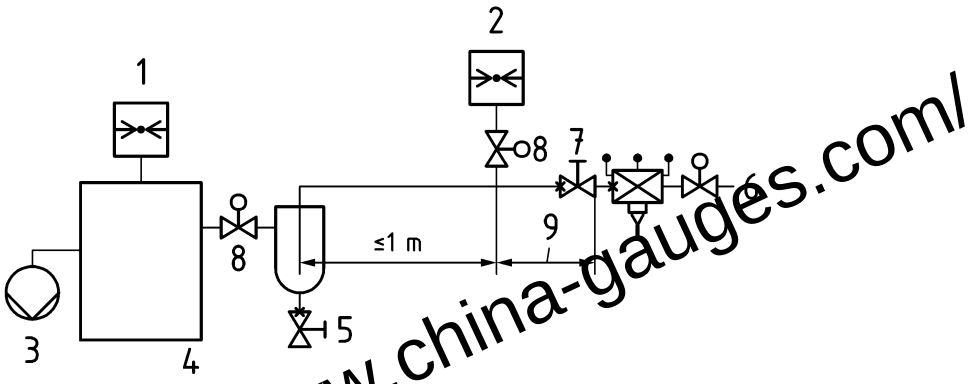
Remove or block the downstream check valve in the open position.

Place the device in the testing equipment (see Figure 9).

Adjust the relief flow rate for a pressure in the intermediate zone of 14 kPa (140 mbar).

Apply rapidly upstream of the device a vacuum 0,05 MPa (0,5 bar) and hold the vacuum for 5 min.

Verify that the device satisfies the requirement of 9.5.4.1.



Key

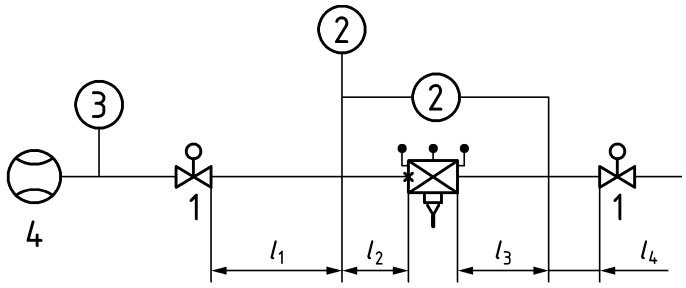
1 vacuum gauge A
2 vacuum gauge B
3 vacuum pump
4 vacuum vessel
5 water trap
6 water supply
7 isolating valve
8 adjusting valve
9 5 DN to 10 DN

Figure 9 — Tightness testing equipment (vacuum)

9.6 Hydraulic characteristics

9.6.1 Test rig – General circuit

The setup of the test equipment shown in Figure 10 shall be based upon horizontal installation in accordance with EN 1267. For other orientations, the test rig shall be adjusted.



Key

1 adjusting valve
2 pressure gauge
3 thermometer
4 flow meter

l_1 and $l_3 \geq 10D$, l_2 and $l_4 \geq 2D$

Figure 10 — Flow rate/pressure loss testing equipment

9.6.2 Verification of the pressure loss as a function of the flow rate

9.6.2.1 Requirement

For in line devices, the flow rate values measured from 0 to the flow rate given in Table 6, the reference pressure loss shall not be exceeded.

For the incorporated devices and the end of line devices, the flow rate values shall be defined by manufacturer and verified during this test.

Table 6 — Flow rate for the hydraulic test depending on the nominal size DN

DN	Flow rate (m^3/h) Pressure loss (0,1 MPa)	Flow rate (m^3/h) Pressure loss (0,15 MPa)	DN	Flow rate (m^3/h) Pressure loss (0,1 MPa)	Flow rate (m^3/h) Pressure loss (0,15 MPa)
6	0,32	0,48	**50**	21	32
8	0,54	0,81	**65**	36	48
10	0,86	1,27	**80**	54	72
15	1,9	2,9	**100**	85	113
20	3,4	5,1	**125**	133	177
25	5,3	7,9	**150**	191	255
32	8,7	13	**200**	339	396
40	13,6	20,3	**250**	530	619

9.6.2.2 Test

Record the flow rate over pressure loss of the device for the full range from 0 to the required flow rate given in 9.6.2.1.

Verify that the device satisfies the requirement.

The pressure loss in the piping lengths between the device and the pressure taps should be accounted for.

During the test for flow rate over pressure loss, verify the tightness of the relief valve during the whole test.

9.6.3 Verification of the pressure difference between the upstream and the intermediate zones

9.6.3.1 Requirement

During the two tests mentioned below, the pressure difference between the upstream zone and the intermediate zone shall be greater than 14 kPa (140 mbar).

9.6.3.2 Tests

9.6.3.2.1 Dynamic test

Record the pressure difference between upstream and intermediate zone over the flow rate varying from 0 to the maximum required flow rate given in 9.6.2.1.

Verify the device satisfies the requirement of 9.6.3.1.

9.6.3.2.2 Static test

Record the pressure difference between upstream and intermediate zone over the upstream pressure from 0,1 MPa to 1 MPa (1 bar to 10 bar).

Verify that the device satisfies the requirement of 9.6.3.1.

9.6.4 Verification of venting to atmospheric pressure of the intermediate zone when the upstream pressure drops

9.6.4.1 Requirement

The discharge system shall open to contact the intermediate zone to atmospheric pressure before the pressure differential between upstream and intermediate zone is 14 kPa (140 mbar).

9.6.4.2 Test

Record the pressure difference between upstream and intermediate zone over an upstream pressure from 0,175 MPa to 0 MPa (1, 75 bar to 0 bar).

Verify that the device satisfies the requirement of 9.6.4.1.

9.6.5 Verification of opening start of the relief valve and of its closing

9.6.5.1 Requirement

The relief valve shall:

a) start opening at a pressure difference between the upstream and intermediate zone greater than 14 kPa (140 mbar);

b) then close again in a tight manner.

9.6.5.2 Test

9.6.5.2.1 General

Record the pressure difference between the upstream and the intermediate zone for each of the following upstream pressures: 0,175 MPa − 0,3 MPa − 0,6 MPa and 1 MPa (1,75 bar − 3 bar − 6 bar and 10 bar).

9.6.5.2.2 Start of opening of the relief valve

Apply the given static pressure upstream of the device.

Reduce this upstream pressure slowly.

Record the value of the pressure difference between upstream and intermediate zone when the relief valve opens (appearance of the first drop).

Verify that the device satisfies the requirement “a” of 9.6.5.1.

9.6.5.2.3 Closing

Bring the pressure back to its initial value.

Verify that the device satisfies the requirement “b” of 9.6.5.1.

9.6.6 Verification of the relief valve tightness in case of fluctuation of the upstream pressure

9.6.6.1 Requirement

For an upstream pressure increasing and decreasing in a range of ± 10 kPa (100 mbar), no discharge at the relief valve shall occur.

9.6.6.2 Test

For each of the following upstream pressures: 0,175 MPa – 0,3 MPa – 0,6 MPa and 1 MPa (1,75 bar – 3 bar – 6 bar and 10 bar):

— apply the given static pressure upstream of the device;

— in a time period of 10 s, increase this pressure by 10 kPa (100 mbar);

— within 10 s, reduce to the given static pressure upstream of the device;

— in a time period of 10 s, reduce this pressure by 10 kPa (100 mbar);

— within 10 s, return to the static pressure settings and repeat the test 10 times;

— verify that the device satisfies the requirement of 9.6.6.1.

9.6.7 Verification of the intermediate zone pressure for a given relief flow rate under inverse feed

9.6.7.1 General

This verification is performed, the downstream check valve being removed at the relief flow rate given in Table 7 below.

Table 7 — Relief flow rate corresponding to nominal size

DN	6	8	10	15	20	25	32	40
Relief flow rate m^3/h	0,32	0,54	0,54	0,72	1,08	1,08	2,34	2,34
DN	50	65	80	100	125	150	200	250
Relief flow rate m^3/h	4,5	4,5	6,8	8,6	8,6	8,6	13,5	13,5

9.6.7.2 Requirement

For an upstream pressure having a maximum of 14 kPa (140 mbar), the pressure in the intermediate zone shall be less than 10,5 kPa (105 mbar) at the flow rate given in Table 7.

For an upstream pressure greater than 14 kPa (140 mbar), the differential pressure between the upstream and the intermediate zone shall be greater than 3,5 kPa (35 mbar) at the flow rate given in Table 7.

The air break to drain shall evacuate the full relief flow rate.

9.6.7.3 Test

Record the variation of the intermediate pressure for a constant downstream flow rate (relief flow) as given in Table 7 with a static upstream pressure maintained at 0,014 MPa, 0,1 MPa, 0,5 MPa and 0,8 MPa (0,14 bar, 1 bar, 5 bar and 8 bar).

Record the variation of the intermediate pressure for an upstream pressure.

9.7 Compatibility with the products used for shock disinfection of the networks

9.7.1 Requirement

All the constituent parts of the device, and in particular those made of elastomer, shall be compatible with the treated water used for the shock disinfection of the networks using sodium hypochlorite, hydrogen peroxide or chlorine dioxide.

9.7.2 Test method

The compatibility is checked by exposing the internal parts of the device to the chemicals as defined in Table 8.

Table 8 — Test chemicals

Chemical formula	Chemical solution	Contact time	Concentration	Temperature
NaOCl	sodium hypochlorite	24 h	100 mg in 1 l demineralized water	20 ± 5 °C
H_2O_2	hydrogenperoxide	24 h	1 g in 1 l demineralized water	20 ± 5 °C
ClO_2	chlorine dioxide	12 h	6 mg in 1 l demineralized water	20 ± 5 °C

Each of the contacts being carried out under a static pressure of (0,3 ± 0,1) MPa (3 ± 1) bar measured upstream.

The test has shall carried out with at least one of the given chemicals as defined in Table 8.

Verify that the device satisfies the requirement of 9.7.1.

9.8 Acoustic tests

9.8.1 General

This subclause specifies the test method used to measure the acoustic characteristics of the devices and to classify the devices by acoustic group.

The acoustic tests shall be performed on devices with DN lower or equal to 32.

9.8.2 Procedure

9.8.2.1 Assembly of the devices

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

9.8.2.2 Test method

The tests shall be carried out in accordance with the specifications of EN ISO 3822-1 and EN ISO 3822-3.

9.8.2.3 Determination of the group

The device can be classified into the following groups (see Table 9) in accordance with the *L* values obtained.

Table 9 — Noise classification of in line check valve

Group	L_{ap} in dB(A)	Marking on the product
I	$L_{ap} \leq 20$	I
II	$20 < L_{ap} \leq 30$	II
U (unclassified)	$L_{ap} > 30$/not tested	

10 Marking and technical documents

10.1 Marking

Devices shall be marked permanently and visibly on the housing, or on a fixed identification plate.

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

Marking shall indicate:

a) name, manufacturer's brand or logo;

b) arrow indicating normal direction of flow;

c) letter indicating family and type of device;

d) acoustic group according to Table 9;

e) nominal diameter (DN) only for in line devices;

f) nominal pressure (PN);

g) the unique serial number;

h) maximum operating temperature in degrees Celsius, C;

i) reference to this document;

j) in the countries where the use of products made of dezincification resistant materials is:

1) not required, the dezinification resistant products according to EN ISO 6509-1 as well as the products which do not contain zinc are allowed to be marked “DR”.

2) required the dezinification resistant products as well as the products which do not contain zinc shall be marked “DR”.

10.2 Technical documents

The technical documentation shall be delivered with the product and/or available electronically, shall be written at least in the language commonly spoken of the country in which the products are distributed giving all the necessary information for their installation and use.

This shall include:

a) the designation of the product;

b) the reference to this document (EN 12729);

c) maximum operating temperature in degrees Celsius, °C and maximum pressure, MPa (bar);

d) the device’s purpose;

e) its area(s) of use; installation and maintenance instructions;

f) an indication if the downstream check valve is a check valve EB conforming to EN 13959;

g) specific applicable rules for installation as protection unit in accordance with the EN 1717;

h) specific applicable rules for installation including the protection unit with the air break to drain in accordance with the specifications EN 1717;

i) flow rates and pressure drops (curve);

j) a list of spare parts for its constituent subassemblies;

k) the nature of materials.

11 Presentation at delivery

The devices shall be protected from the time of manufacture to the time of installation against:

— damage to threaded ends;

— external contamination:

— of inlet and outlet orifices;

— of orifices for the purpose of sanitary safety (discharge valve, air inlets, …).

These points are fulfilled if the product is protected by a cardboard box (for example).

The test orifices shall be fitted with a means of protection when not in use, i.e. attached to the device.

Annex A
(normative)

General information for coating definition

A.1 Organic coating (paint)

Liquid paint or powder paint coatings applied on a base material.

A.2 Pre-treatment before coating

The pre-treatment may be mechanical and/or chemical. It is designed to remove surface impurities (grease, dirtying, corrosion by-products) and to improve the coating systems adhesion.

A.3 Application techniques

The choice of the technique depends on the type of piece and on the coating.

Coating by dipping in fluid bath

Before coating, the piece is heated to a sufficiently high temperature to enable the formation of a melted film, adhering to the surface of the piece, by dipping in an air fluidised resin powder bath.

Coating by electrostatic precipitation

The resin powder, sprayed through a nozzle at a high potential, becomes electrically charged and deposits itself on the heated piece. After depositing the necessary thickness, the polymerization is carried out by passing through an oven.

Coating by spray gun

The resin in liquid form is applied by spray gun on the piece.

Coating by electrophoresis

The piece is immersed in a bath in epoxy resin in suspension in the water. By electric field effect, created between the pieces to be coated (connected to the cathode) and the anodes, the resin is deposited uniformly over the whole surface of the immersed piece. The piece is then placed in an oven to polymerize the resin.

Table A.1 — Requirements function of the type of coating

Criteria	EN 14901-1 Epoxy coating		EN 10310 Polyamide powder coating	
	Requirement	Standard used	Requirement	Standard used
Preparation of surface	Sa 2 1/2	EN ISO 8501-1	Sa 2 1/2 Rz 55 to 65 µm	EN ISO 8501-1 EN ISO 21920-2
Ground coat	not applicable	not applicable	primer system fixed in agreements for drinking water.	
Appearance of coating	uniformity of whole surface		uniformity of whole surface	
Covering thickness	not lower than defined by manufacturer	EN ISO 2808	≥ 200 µm edges < r 3 mm: ≥ 200 µm	EN ISO 2808
Impact strength	no cracking or detachment or any other visible defect at the location of the impact allowed	EN ISO 6272-1	no cracking or detachment or any other visible defect at the location of the impact allowed	EN ISO 6272-1
Adhesion of the film	≤ 250 µ > 250 µ	EN ISO 2409 EN ISO 4624	Dry coating Adhesion ≥ 8MPa	EN ISO 4624
Degree of polymerization	Level 1 or 2	See Annex B EN ISO 11357-1	not applicable	
Water immersion test	Degree of rusting < Ri 2 degree of blistering < S2 after 480 h	EN ISO 2812-2	Degree of rusting < Ri 2 degree of blistering < S2 after 480 h	EN ISO 2812-2
Salt spray test	Degree of rusting < Ri 2 degree of blistering < S2 after 480 h	EN ISO 9227 after make EN ISO 4628-2 EN ISO 4628-3 EN ISO 2409 EN ISO 4624	Degree of rusting < Ri 2 degree of blistering < S2 after 480 h	EN ISO 9227 after make EN ISO 4628-2 EN ISO 4628-3 EN ISO 4624
Indentation resistance	not applicable		Shore D: 70 - 75	EN ISO 868

Annex B
(normative)

Evaluation of the degree of polymerization

B.1 Solvent resistance test

B.1.1 General

This test involves rubbing part of the coated surface with a white cotton cloth.

The specified solvent can either be a ketone solvent (MIBK, MEK, etc.) or the solvent specified by the coating manufacturer. It can be applied directly or indirectly to the coated surface.

B.1.2 Operating procedure

a) Direct method

- On a coated, horizontal surface, deposit 5 drops of solvent;
- Cover the drops with a watch glass and leave it to work for about 30 s;
- Wipe by rubbing the surface with a white cotton cloth, completing at least 5 full back-and-forth cycles;
- Note the appearance as well as the colour of the cloth and the surface of the coating.

b) Indirect method

- Take a piece of white cotton cloth soaked with solvent;
- Wipe by rubbing the surface, completing at least 5 full back-and-forth cycles;
- Note the appearance as well as the colour of the cloth and the surface of the coating.

B.1.3 Required characteristics

The required characteristics for an assessment are those defined in Table B.1.

Table B.1 — Polymerization quality assessment scale

Scale	Comment	Evaluation
Level 1	No loss of the coating's gloss. No transfer of colour onto the cloth.	Good polymerization
Level 2	Slight loss of the coating's gloss. Colour transfer slightly perceptible.	
Level 3	Mat film. Colour transfer very clearly perceptible on the cloth.	Poor polymerization; requires additional tests.
Level 4	Very mat and considerably softened film. Very definite transfer of colour on the cloth.	
In the case of colour transfer onto the cotton cloth (for levels 3 and 4), a complementary test of polymerization should be carried out by measuring the temperature of the glass transition (ΔTg) of the coating in the uncertain zone and comparing it to the one given by the manufacturer (EN ISO 11357-1).		

Bibliography

[1] EN 1092-1, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges*

[2] EN 1092-2, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges*

[3] EN 1254-1, *Copper and copper alloys - Plumbing fittings - Part 1: Capillary fittings for soldering or brazing to copper tubes*

[4] EN 1254-2, *Copper and copper alloys - Plumbing fittings - Part 2: Compression fittings for use with copper tubes*

[5] EN 1254-3, *Copper and copper alloys - Plumbing fittings - Part 3: Compression fittings for use with plastics and multilayer pipes*

[6] EN 1254-4, *Copper and copper alloys - Plumbing fittings - Part 4: Threaded fittings*

[7] EN 10226-1, *Pipe threads where pressure tight joints are made on the threads - Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

[8] EN ISO 4628-1, *Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 1: General introduction and designation system (ISO 4628-1)*

[9] NF A 49-706:1998, *Steel tubes. Epoxy resin powder external coating. Application. Inspection and test*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than one device provided that it is accessible by the sole named user only and that only one copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than one copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright and Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member.**

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email cservices@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services
Tel: +44 345 086 9001
Email: cservices@bsigroup.com

Subscriptions
Tel: +44 345 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.