BS EN 331:2015

BSI Standards Publication

Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings

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National foreword

This British Standard is the UK implementation of EN 331:2015. It supersedes BS EN 331:1998+A1:2010 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/42, Gas fittings and connections including metal hose and hose assemblies.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 331

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Supersedes EN 331:1998

English Version

Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings

Robinets à tournant sphérique et robinets à tournant conique à fond plat destinés à être manoeuvrés manuellement et à être utilisés pour les installations de gaz dans les bâtiments

Handbetätigte Kugelhähne und Kegelhähne mit geschlossenem Boden für die Gas-Hausinstallation

This European Standard was approved by CEN on 24 October 2015.

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.

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

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European foreword

This document (EN 331:2015) has been prepared by Technical Committee CEN/TC 236 “Non industrial manually operated shut-off valves for gas and particular combinations valves-other products”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by September 2017.

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

This document supersedes EN 331:1998.

The revised version:

— includes in one document the previous publications of 1998 and 2010 to allow an easier reading of the text;

— allocates the clauses and the annexes in line with the framework of the standards which support CPR;

— enlarges the field of application to the nominal sizes DN 65, 80 and 100;

— updates the technical content in line with the current edition of the referenced standards;

— considers the proposals coming from the experience of the application of the previous edition of EN 331;

— adds Annex ZA for the relationship between this European Standard and the Essential Requirements of EN Construction Products Regulation.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

1.1 This European Standard specifies the characteristics for the construction, performance and safety of ball valves and closed bottom taper plug valves. It also details the test methods and marking provisions.

It applies to metallic valves not directly buried for domestic and commercial installations inside or outside of buildings, using gases of the first, second and third family (specified in EN 437) and working up to 0,2 × 10^5 Pa, 0,5 × 10^5 Pa, 1 × 10^5Pa, 5 × 10^5 Pa and 20 × 10^5Pa and with temperature limits from –5 °C or −20 °C to + 60 °C.

NOTE "Not directly buried" within the context of this standard means that valves below ground are not in direct contact with earth or other materials e.g. that they are in a protected encasement.

1.2 Valve nominal sizes (*DN*) covered by this European Standard are as follows: 6, 8, 10, 12, 15, 20, 25, 32, 40, 50, 65, 80, 100.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 377, *Lubricants for applications in appliances and associated controls using combustible gases except those designed for use in industrial processes*

EN 437:2003+A1:2009, *Test gases - Test pressures - Appliance categories*

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

EN 682, *Elastomeric Seals - Materials requirements for seals used in pipes and fittings carrying gas and hydrocarbon fluids*

EN 751-1, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 1: Anaerobic jointing compounds*

EN 751-2, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 2: Non-hardening jointing compounds*

EN 751-3, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water - Part 3: Unsintered PTFE tapes*

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

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

EN 1092-3, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges*

EN 1254-1, *Copper and copper alloys - Plumbing fittings - Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes*

EN 1254-2, *Copper and copper alloys - Plumbing fittings - Part 2: Fittings with compression ends for use with copper tubes*

EN 1254-8, *Copper and copper alloys - Plumbing fittings - Part 8: Fittings with press ends for use with plastics and multilayer pipes*

EN 1412, *Copper and copper alloys - European numbering system*

EN 1503-1, *Valves — Materials for bodies, bonnets and covers — Part 1: Steels specified in European Standards*

EN 1503-3, *Valves — Materials for bodies, bonnets and covers — Part 3: Cast irons specified in European Standards*

EN 1555-3, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

EN 1593:1999, *Non-destructive testing - Leak testing - Bubble emission techniques*

EN 1982 *Copper and copper alloys - Ingots and castings*

EN 10226 (all parts), *Pipe threads where pressure tight joints are made on the threads*

EN 10255, *Non-Alloy steel tubes suitable for welding and threading — Technical delivery conditions*

EN 12163 *Copper and copper alloys - Rod for general purposes*

EN 12164 *Copper and copper alloys - Rod for free machining purposes*

EN 12165 *Copper and copper alloys - Wrought and unwrought forging stock*

EN 12167 *Copper and copper alloys - Profiles and bars for general purposes*

EN 12168 *Copper and copper alloys - Hollow rod for free machining purposes*

EN 12420 *Copper and copper alloys - Forgings*

EN 12627, *Industrial valves - Butt welding ends for steel valves*

EN 60730-1:2000, *Automatic electrical controls for household and similar use - Part 1: General requirements (IEC 60730-1:1999, modified)*

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)*

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

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

ISO 261, *ISO general purpose metric screw threads — General plan*

ISO 17885, *Plastics piping systems -- Mechanical fittings for pressure piping systems -- Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
standard reference conditions
conditions to which all measured values are corrected (temperature 15 °C; pressure 1013,25 × 10^2 Pa absolute; dry air)

3.2
shut off valve
device which admits or closes the gas flow by movement of the closure member. A valve is manually operated if operation can be performed by the user

3.3
components
3.3.1
obturator
movable part of the valve which shuts off the gas flow

3.3.2
actuating mechanism
part of the valve which actuates the obturator

3.3.3
manual actuator
manually operated actuating mechanism

3.3.4
gas way
passage in the valve through which the gas flows

3.3.5
joint
means of connecting elements of a gas installation

[SOURCE: EN 1775:2007]

3.3.6
flexible appliance connector
element of flexible pipework to be fitted between the end of fixed pipework and the appliance inlet connection

[SOURCE: EN 1775:2007]

3.4
leak-tightness
3.4.1
external leak-tightness
leak-tightness of a gas-carrying compartment with respect to atmosphere

3.4.2
internal leak-tightness
leak-tightness between the inlet and outlet of the valve with the obturator in the closed position

3.5
pressures
pressures measured under static conditions. All pressures quoted are relative to atmospheric pressure

3.5.1
inlet pressure
pressure at the inlet of the valve

3.5.2
outlet pressure
pressure at the outlet of the valve

3.5.3
maximum operating pressure (MOP)
maximum pressure at which a valve can be operated continuously under normal operating conditions

3.5.4
test pressure
pressure to be applied during the test

3.5.5
pressure difference
difference between inlet and outlet pressures

3.6
rated flow rate
flow rate of air, under standard reference conditions, at a given pressure drop

3.7
temperatures
3.7.1
ambient temperature
temperature of the medium surrounding the gas valve

3.7.2
maximum operating temperature (MOT)
maximum temperature at which a valve can be operated continuously under normal conditions

3.7.3
minimum operating temperature
lowest temperature (−5 °C; −20 °C) declared by the manufacturer at which the valve can be operated

Note 1 to entry: Temperatures lower than −20 °C can be declared by the manufacturers.

3.8
operating torque
3.8.1
opening torque
torque to be applied to the manual actuator to move the obturator from the closed to the open position

3.8.2
closing torque
torque to be applied to the manual actuator to move the obturator from the open to the closed position

3.9
cycling frequency
number of working cycles, i.e. from the closed position to the openposition and back to the closed position, in unit time

3.10
DN (nominal size)
alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections

[SOURCE: EN ISO 6708:1995]

4 Product characteristics

4.1 Reaction to fire

Manually operated ball valves and closed bottom taper plug valves in compliance with this standard are classified as belonging to Class A1 “No contribution to fire”.

4.2 Dimensions and tolerance

4.2.1 Materials

4.2.1.1 The shell, obturator and stem shall be made in one of the following materials:

a) copper alloy excluding aluminium-bronze in accordance with Table 1;

b) ductile cast iron excluding laminar cast iron in accordance with EN 1503-3;

c) forged steel and cast steel in accordance with EN 1503-1.

Any part in contact with the gas or the surrounding atmosphere, shall be manufactured from corrosion-resistant materials or shall comply with salt spray test (see 5.6.3). See Table 1 for a list of suitable copper-alloy materials.

Table 1 — Type of suitable copper-alloy materials

Material		Reference standards Choice of the standard following the material processing		
Symbol	**Number (According to** EN 1412**)**	**Turning**	**Stamping Forging**	**Casting**
CuZn37	CW508L	EN 12167 EN 12163	EN 12420 EN 12165	
CuZn40	CW509L	EN 12167 EN 12163	EN 12420 EN 12165	
CuZn36Pb3	CW603N	EN 12167 EN 12164 EN 12168		
CuZn37Pb1	CW605N	EN 12168		
CuZn37Pb2	CW606N	EN 12167 EN 12164 EN 12168		
CuZn39Pb0,5	CW610N	EN 12164 EN 12167	EN 12165 EN 12420	
CuZn39Pb1	CW611N	EN 12164 EN 12167 EN 12168	EN 12165 EN 12420	
CuZn39Pb2	CW612N	EN 12164 EN 12167 EN 12168	EN 12165 EN 12420	
CuZn39Pb3	CW614N	EN 12164 EN 12167 EN 12168	EN 12165 EN 12420	
CuZn40Pb2	CW617N	EN 12164 EN 12167 EN 12168	EN 12165 EN 12420	
CuZn39Pb1AlB-C	CC755S			EN 1982
CuZn38Al-C	CC767S			EN 1982
CuSn10-C	CC480K			EN 1982
CuSn5Zn5Pb5-C	CC491K			EN 1982
CuSn3Zn8Pb5-C	CC490K			EN 1982
NOTE Materials of equal or better chemical and mechanical characteristics can be accepted.				

The corrosion protection for springs and other moving parts shall not be impaired by any movement.

4.2.1.2 Material indicated in 4.2.1.1 b) and c), excluding a), shall be tested in accordance with 5.6.3 (salt spray resistance).

Once the test has been run, no corrosion which could impair the device's operation shall be revealed by visual examination (disregarding possible salt deposits), and the external tightness of the device (connected and disconnected) remains in conformity with the requirement defined in 4.4 (leak-tightness).

4.2.1.3 Springs and other moving parts manufactured from non-corrosion-resistant materials shall be protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve. After the test of 5.6.1 these parts shall withstand the test of 5.6.3.

4.2.1.4 Elastomeric sealing materials shall comply with EN 549 or EN 682. Additionally the temperature range of the materials specified in technical data sheet shall cover the valve temperature classes of Table 3 of this standard.

4.2.1.5 Lubricants shall comply with EN 377. Additionally the temperature range of the lubricant specified in technical data sheet shall cover the valve temperature classes of Table 3 of this standard.

4.2.1.6 Anaerobic jointing compounds shall comply with EN 751-1.

4.2.2 Construction

Valves shall be designed such that, once installed, it is impossible to remove the obturator or a seal without damaging the valve or leaving clear signs of tampering on it.

4.2.3 Product appearance

All valve components, when viewed with the naked eye corrected for normal vision, shall be free from sharp edges and corners which could cause damage, injury or incorrect operation.

4.2.4 Valve maintenance

All valves shall be designed to be maintenance free.

4.2.5 Springs

If a spring is used, the two end-faces of the spring shall be parallel and perpendicular to the axis of the spring. The end coils of a spring shall not damage their mating faces.

4.2.6 Wall thickness

The wall thickness from any gas way to atmosphere or to holes connected to the atmosphere, shall not be less than 1 mm. Holes for screws, pins, etc., which are used for the assembly of parts and for mounting, shall not provide any leak path between gas ways and the atmosphere.

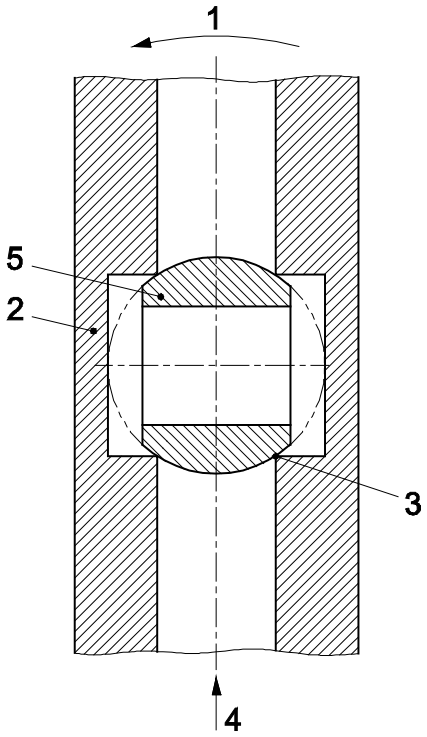
4.2.7 Plug valves

4.2.7.1 The plug shall be designed and mounted in the housing in such a way that the top edge of the sealing surface protrudes into the corresponding sealing surface of the housing taper.

4.2.7.2 A minimum spacing of 1 mm shall be provided to ensure that the plug is able to advance in the event of wear. The top of the sealing surface of the plug shall be lower than the sealing surface in relation to the body.

4.2.8 Angular seal

With the valve in the fully closed position, the angular distance between the gas port in the obturator and both the inlet port and outlet port in the valve body, shall be at least 8° for DN up to 50 and 6° for DN from 65 to 100 with a measurement uncertainty of 1°, when measured according to 5.7 (see Figure 1).



Key

1 opening direction

2 valve body

3 seat

4 flow

5 obturator

Figure 1 — Angular seal

4.2.9 Seals

Sealing on the obturator shall be constructed so that tightness is achieved by mechanical means. This shall exclude the use for this purpose of all sealing materials such as liquids, pastes, and tapes.

The tightness between the different parts of the body shall be ensured by mechanical means.

Additional products can be used in order to maintain the mechanical tightness.

If glues, pastes, tapes are used, they shall comply with EN 751-1, EN 751-2 and EN 751-3.

4.2.10 Operation

4.2.10.1 Valves shall be constructed so that they can be operated by means of a manual actuator such as a handle, key or similar device.

4.2.10.2 Valves operated by turning shall close in a clockwise direction.

The rotation from open to closed shall be a quarter turn. If the manual actuator is detachable then the end of the operating shaft shall be marked so that the open and closed positions are clearly indicated.

4.2.11 Stops

On valves the end positions “open” and “closed” shall be limited by fixed, non-adjustable stops.

The manual actuator shall be designed so that it is:

— at right angles to the direction of the flow for the closed position;

— parallel with the direction of the flow for the open position.

Each part of the operating mechanism that can rotate shall indicate the open or close position of the obturator. The valve can include a locking system which allows the valve to be blocked and sealed in the shut-off position.

If the manual actuator is marked with a mark meaning “not removable”, it shall not be possible to dismount the manual actuator.

It shall not be possible to dismount the manual actuator, unless it is granted that it is reassembled in the position assuring the correct operation.

4.2.12 Joints

4.2.12.1 Threads

4.2.12.1.1 Threaded pressure-tight joints at the inlet and outlet connections for valves shall comply with the EN 10226 series.

4.2.12.1.2 Non pressure-tight joints shall comply with ISO 261 or EN ISO 228-1.

4.2.12.1.3 Valves with threaded connections shall have flats on the body which, when used for fitting shall accommodate commercially available tools.

4.2.12.2 Bolted flange joint

For valves with flanged connections the dimensions of the connections shall be in accordance with EN 1092-1, EN 1092-2 and EN 1092-3.

NOTE Raised face flanges are recommended.

4.2.12.3 Capillary joints

The dimensions of connections for capillary soldered and capillary brazed joints shall comply with EN 1254-1.

4.2.12.4 Union connections

If a union (nut with liner) with a non-metallic gasket is used for the outlet connection, any gasket shall be at least 2 mm thick and shall be attached to the liner in such a way that it cannot be accidentally detached.

4.2.12.5 Compression joints

The dimensions of the construction of the compression joints shall comply with EN 1254-2.

4.2.12.6 Weld ends

Butt welded ends for steel valves shall comply with EN 12627.

4.2.12.7 Polyethylene pipe joints

Pipe polyethylene joints shall be in accordance with EN 1555-3. Mechanical joints for polyethylene pipes shall be in accordance with ISO 17885-1.

4.2.12.8 Press ends

EN 1254-8 shall be applied for copper alloys press ends for plastic and multilayers piping.

4.2.12.9 Other connections

Other connections are possible if they comply with the requirements of the countries where they are used.

4.3 Classification of relevant characteristics

4.3.1 Pressure classes

The valves are divided into classes, corresponding to the maximum working pressure as follows (see Table 2):

Table 2 — Valve pressure classes

Class		Pressure range	Remark
MOP	0,2	0 to 0,2 × 10^5 Pa	MOP = 0,2 × 10^5Pa
MOP	0,5	0 to 0,5 × 10^5 Pa	MOP = 0,5 × 10^5Pa
MOP	1	0 to 1 × 10^5 Pa	MOP = 1 × 10^5 Pa
MOP	5	0 to 5x 10^5 Pa	MOP = 5 × 10^5Pa
MOP	20	0 to 20 × 10^5Pa	MOP = 20 × 10^5 Pa

4.3.2 Temperature classes

The valves are divided into two temperature classes as follows:

Table 3 — Valve temperature classes

Class	Temperature range
–5 °C	–5 °C to 60 °C
–20 °C	–20 °C to 60 °C

NOTE Temperatures lower than - 20 °C can be declared by the manufacturers.

4.3.3 High temperature resistance classes

The valves are divided in three classes, as per Table 4.

Table 4 — High temperature resistance classes

Class	Characteristics
A	No requirements for high temperature resistance
B	High temperature resistance (external leak tightness only)
C	High temperature resistance (internal and external leak tightness)

4.4 Tightness (gas): leak tightness

A valve is leak-tight when the measured leakage rate does not exceed the values of Table 5, when tested as indicated in 5.2. It includes the equipment accuracy, measurement errors and apparent leakages mainly due to temperature variations.

Table 5 — Maximum leakage rates

DN	Maximum leakage rates cm^3/h of air	
	Internal	External
≤ 50	20	20
50 < DN ≤ 100	40	40

4.5 Effectiveness: rated flow rate

The rated flow rate shall not be less than the value specified in Table 6 when tested in accordance with 5.3.

Table 6 — Rated flow rate

DN	Rated flow rate	
	Straight (m^3/h)	Angle (m^3/h)
6	1	-
8	2	-
10	3	2
12	3,5	2,5
15	5	3,5
20	10	6
25	16	10
32	27	18
40	40	28
50	65	36
65	100	Not applicable
80	170	Not applicable
100	230	Not applicable

4.6 Resistance to high temperature

The manually operated ball valves and closed bottom taper plug valves of classes B and C shall comply with the high temperature resistance requirements of Annex A.

NOTE Valves with PE or multilayers pipes connections are only class A.

4.7 Mechanical strength for gas networks

4.7.1 Operating torque

The torque required for the preliminary cycle shall not be greater than three times the value given in Table 7 at the ambient temperature for the size of the valve.

The maximum operating torque according to Table 7 shall not be exceeded after preliminary cycle.

Table 7 — Operating torque

DN	Torque (Nm)	
	ambient temperature max.	low temperature max.
< 15	4	6
15	7	11
20		
25		
32	14	21
40		
50		
65	35	52
80	45	68
100	65	98

The position of the obturator and that of the manual actuator shall not alter of its own accord.

NOTE Table 1 of EN 1005–3:2002+A1:2008 gives the maximal isometric force capacity limits for some common activity for machinery operation, related to the human physical performance and could be considered to define the length of the lever.

4.7.2 Torque and bending mechanical strength

The valves shall resist the stresses resulting from their installation and during service. They shall also meet the requirements for internal and external leak-tightness (see 5.2).

The stresses MT_1 (torque) and MF_1 (bending moment) represent the installation stresses. The stresses MT_2 and MF_2 represent the stresses to which the valve may be submitted during service. For valves which have end fittings that use flexible appliance connectors, only the stress of torque MT_1 and bending moment MF_1 are applied.

Dependent upon connection size, the valve shall resist the stresses of torque and bending specified in Table 8, with the test conditions given in 5.5.

Table 8a — Torque and bending resistance MOP 1, MOP 5, MOP 20

DN	MF_1 N·m	MF_2 N·m	MT_1 N·m	MT_2 N·m
6	25	13	15	12
8	30	15	20	16
10	70	35	35	28
12	85	43	55	34
15	105	53	75	40
20	225	113	100	68
25	340	170	125	100
32	475	238	160	128
40	610	305	200	160
50	1100	550	250	200
65	1550	775	300	250
80	1900	950	370	290
100	2500	1250	465	370

Table 8b — Torque and bending resistance MOP 0,2 - MOP 0,5

DN	MF_1 N·m	MF_2 N·m	MT_1 N·m	MT_2 N·m
6	25	12	15	12
8	30	15	20	15
10	50	20	35	20
12	65	25	55	25
15	85	30	75	30
20	125	40	100	40
25	200	50	125	50
32	250	64	160	64
40	300	80	200	80
50	450	100	250	100

4.8 Safeguard against overloading of the handle – Stop resistance

When tested in accordance with 5.8, the stops in the open or closed position shall withstand minimum 1,5 times the value of the torque of Table 7 at ambient temperature.

4.9 Release of dangerous substances

Materials used in valves shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

4.10 Performance requirements

4.10.1 General

For valves with an inlet size different to the outlet size, the test value shall correspond to that for the smaller size.

The maximum operating temperature shall be at least 60 °C and the minimum operating temperature not higher than −5 °C or −20 °C, as declared by the manufacturer.

4.10.2 Durability

4.10.2.1 Endurance

The manual actuator of the valve shall withstand, at ambient temperature, a series of operating cycles (see Table 9).

After the endurance test the valve shall conform to the requirements for external and internal leaktightness at ambient temperature and at (60 ± 5) °C in accordance with 4.4. It shall comply with the requirements for operating torque in accordance with 4.7.1.

Table 9 — Endurance

Nominal size (*DN*)	Number of operations
≤ 15	5 000
20 – 25	2 500
32 – 40 – 50	1 000
65 – 80 – 100	500

4.10.2.2 Resistance to low temperature

The valve shall conform to the requirements given in 4.4 and 4.7.1, when tested in accordance with 5.6.2.

5 Testing, assessment and sampling methods

5.1 General

5.1.1 Test conditions

The tests are normally carried out at ambient temperature (20 ± 5) °C and with air. The measured values are corrected to 15 °C, and 1013,25 × 10^2 Pa absolute. The tests are carried out in the mounting position declared by the manufacturer. When there are several declared mounting positions, the least favourable position shall be selected.

5.1.2 Test sequence

Three samples of each size of valve shall be tested according to Table 10 in Clause 6 (AVCP).

5.2 Internal pressure and leak-tightness

5.2.1 General

The test shall be carried out in accordance with EN 1593:1999, applying the immersion technique with direct pressurization of the object (see EN 1593:1999, 8.1, 8.2.1 and 8.3) and making measurements according to EN 1593:1999, Annex A. Test time is 10 min.

Other detection methods can be used for checking the leakage (for example, electronic devices can be used). For such methods, the equivalence with the above requirements shall be proved.

The uncertainty of measurement shall not be greater than 5 cm^3/h and the resolution shall be 1 cm^3/h.

5.2.2 Pressure test values

Leak-tightness for all the leak-tightness and strength tests (bending and torque) shall be determined at the following test pressures:

600 Pa and 1,5 x MOP, max. 20×10^5 Pa.

5.2.3 Closure parts, external leak-tightness

The inlet and outlet of the half open valve are pressurized to the test pressure and the leakage rate measured. The valve shall conform to 4.4.

5.2.4 Internal leak-tightness

The test is carried out in the flow direction of the valve. The valve, with the obturator in the closed position, is mounted on the test equipment.

The inlet of the valve is then pressurized to the test pressure. For valves without a specified direction of gas flow, the test is repeated with the test pressure on the other connection.

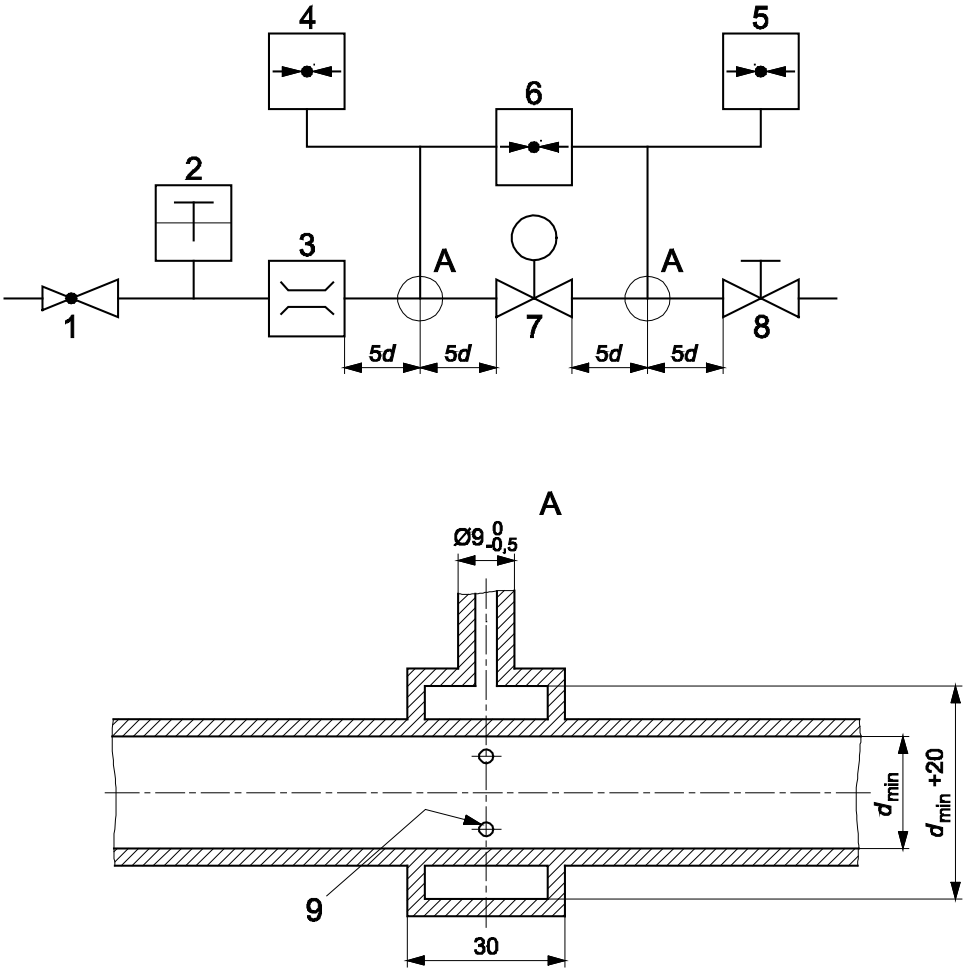
The valve shall conform to 4.4.

5.3 Rated flow rate

5.3.1 Apparatus

The test shall be carried out using the apparatus, as shown in Figure 2. The limit of error in measurement of flow and pressure shall not exceed 2,0 %. The air temperature is measured to ± 0,5 °C.

Dimensions in millimetres



Key

1 adjustable governor for inlet pressure
2 thermometer
3 flow meter
4 inlet pressure gauge
5 outlet pressure gauge
6 differential pressure gauge
7 test sample
8 manual control tap
9 4 holes d = 1,5

Nominal size *DN*	Diameter, d_{min} mm
6	6
8	9
10	13
15	16
20	22
25	28
32	35
40	41
50	52
65	67
80	80
100	106

Figure 2 — Apparatus for the rated flow rate test

5.3.2 Procedure

The sample is installed with its obturator in the fully open position and the inlet pressure adjusted to 2500 Pa. The flow rate is adjusted to give 100 Pa pressure difference across the valve.

5.4 Operating torque

Before starting the test, one preliminary cycle is carried out. The valve is then left for 24 h to 36 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 fully open position while it is subjected to the declared maximum operating pressure, with a pressure limiting device fitted at the outlet of the valve.

During the test the speed of rotation shall be approximately five cycles per minute.

5.5 Torque and bending mechanical strength

5.5.1 General

a) All tests shall be carried out with connections to the valves (whatever their end fitting configurations) which are capable of withstanding the required torque values and bending moments (according to Table 8).

b) If the inlet and outlet connections are not on a common axis, the torque tests shall be repeated with the connections reversed.

c) Ensure that the bending and torsional moments can be attained with an accuracy of 5,0 % of the specified values.

d) If the valve has different connections, the larger connection shall be used for pipe 1 (see Figure 3 and Figure 4).

e) The pipes for the testing of connections shall conform to EN 10255, medium series.

f) For valves with end fittings which are intended for use with removable appliance connectors, only tests on torque MT_1 and bending moment MF_1, are carried out.

5.5.2 Sequence of torsion and bending moment tests for valves

5.5.2.1 Torque (see Figure 3)

5.5.2.1.1 Torque MT_1

a) Assemble pipe 1 with a torque, not exceeding the required torque indicated in Table 7, into the valve. Clamp pipe 1 at a distance ≥ 2 *DN* from the valve.

b) Assemble pipe 2 with a torque, not exceeding the required torque indicated in Table 7, into the valve. Ensure that the joints are leak-tight.

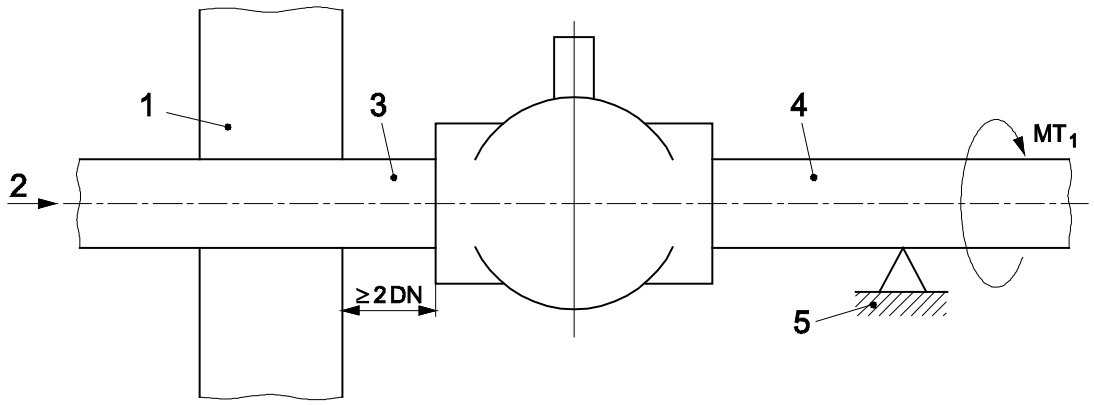
c) Support pipe 2 such that no bending moment is applied to the valve.

d) Apply the required torque (MT_1) to pipe 2 for 10 s.

e) The torque shall be applied progressively and smoothly without undue delay. The torque given in Table 7 shall not be exceeded.

f) With the stress removed, check the valve for external and internal leak-tightness (see 4.4) and visually for any deformation.

g) Check the operating torque as in 4.7.1.



Key

1 pipe clamp
2 test pressure
3 pipe 1
4 pipe 2
5 pipe support

Figure 3 — Arrangement for torsion test

5.5.2.1.2 Torque MT_2

a) Apply MT_2 for 15 min maximum permitting the realization the internal leak-tightness test, external leak-tightness test and torque test for the same valve submitted to torque MT_1.

b) During this time the internal and external leak-tightness and operating torque are measured.

5.5.2.2 Bending (see Figure 4)

5.5.2.2.1 Bending moment MF_1 at the axis of the obturator

a) Use the same valve and the same arrangement as for the torque test.

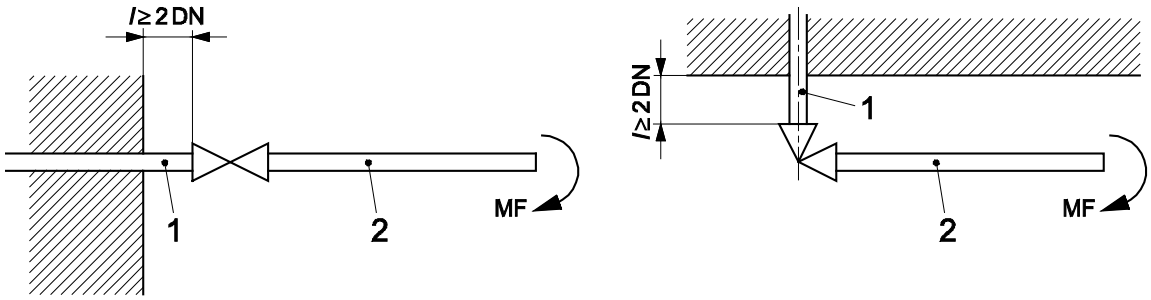
b) Apply a force for 10 s as per Figure 4 to the axis of the obturator for generating on the valve the bending moment MF_1.

c) With the stress removed, measure the external and internal leak-tightness according to 4.4 and check the operating torque according to 4.7.1 and visually for any deformation.

5.5.2.2.2 Bending moment MF_2 at axis of the obturator

a) Apply MT_2 for 15 min maximum permitting the realization the internal leak-tightness test, external leak-tightness test and torque test for the same valve submitted to torque MT_1.

b) During this time the internal and external leak-tightness and operating torque are measured.



Key

1 pipe 1

2 pipe 2

Figure 4 — Arrangement for bending moment test

5.6 Durability

5.6.1 Endurance test

The test equipment shall be designed so that the valve can be tested without inducing any torsion or bending stress. The manual actuator shall be cycled from the fully closed stop position to the fully open stop position and back. The applied operating torque, at ambient temperature, shall not exceed the torque specified in 4.7.1, Table 7. The operating speed shall be (5 ± 1) cycles per minute. The test is carried out at ambient temperature using air as a medium, at nominal pressure and with a flow rate (5 ± 2) % of the rated flow rate specified in Table 6.

After the endurance test the sample is checked for external and internal leak-tightness at ambient temperature and at (60 ± 5) °C according to 5.2. After cooling to ambient temperature, the operating torque is measured according to 5.4.

5.6.2 Resistance to low temperature

Prior to the endurance test in 5.6.1, the sample is maintained at a temperature of either –5 °C or –20 °C (depending on class) for 9 h ± 3 h.

The sample is then subjected to a test pressure as specified in 5.2.1 and 5.2.2.

The operating torque is measured immediately after removal from the low temperature chamber in accordance with 5.4.

5.6.3 Salt spray resistance

This test shall be carried out on device N° 3 according to Table 10 following the requirements of EN ISO 9227, for a neutral salt spray (NSS).

The device shall not be under pressure and shall be disconnected.

If it was designed by the manufacturer, the protection shall be positioned at the outlet of the device. The inlet of the device shall be closed by a cap.

The test chamber shall spray a saline solution having a mass concentration of (5 ± 0,5) % sodium chloride in distilled water.

The intensity of the spray shall be such that, for each 80 cm^2 of horizontal collecting surface, (2 ± 1) ml of solution are collected per hour.

The test chamber shall be maintained at a temperature of (35 ± 1) °C.

The test lasts (96 ± 1) h.

After the salt spray resistance test, the sample is checked according to 4.2.1.2.

5.7 Angular seal

Mount the complete valve on a test rig which is capable of measuring the angle of rotation of the actuator (e.g. a 360° graduated scale and pointer mounted on the handle or control lever).

Connect the inlet of the valve to a compressed air supply of 1,5 x MOP for MOP < 20, and 1 x MOP for MOP = 20, through a bubble indicator (or similar flow measuring device). The air flow through the valve is limited to a value between 1 l/h and 5 l/h by means of a pressure limiting device connected to the outlet of the valve.

Slowly open the valve until the flow measuring device indicates flow, then slowly close the valve until the flow measuring device indicates no flow. Measure the angle between the closed position and the "no flow" position. The measured value shall be in accordance with 4.2.8.

5.8 Safeguard against overloading of the handle – Stop resistance

Apply the chosen operating torque x 1,5 times (±1 N.m) among the values of Table 7 at ambient temperature. Check the valve, after the torque is removed, visually for any deformation, cracking or failure of the mechanism.

6 Assessment and verification of constancy of performance - AVCP

6.1 General

The compliance of manually operated ball valves and closed bottom taper plug valves for gas installations for buildings with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE 1 Same AVCP system means testing by an independent third party under the responsibility of a notified product certification body.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristic for all products within that same family

NOTE 2 Products may be grouped in different families for different characteristics.

NOTE 3 It is advised to make reference to the assessment method standards to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified manually operated ball valves and closed bottom taper plug valves for gas installations for buildings (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings manufacturer to ensure that the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of manually operated ball valves and closed bottom taper plug valves for gas installations for buildings to be tested/assessed shall be in accordance with Table 10.

Table 10 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Dimensional tolerances	4.2.12		3 (samples n. 1, n. 2, and n. 3)	
Internal pressure and leak-tightness	4.4	5.2	3 (samples n. 1, n. 2, and n. 3)	5.2
Angular seal	4.2.8	5.7	1 (sample n. 2)	5.7
Rated flow rate	4.5	5.3	1 (sample n. 2)	5.3
Resistance to high temperature (if required by national legislations)	4.6	Annex A	1 (supplementary sample 4)	Annex A
Mechanical strength (for gas networks): - torque and bending resistance	4.7.2	5.5	1 (sample n. 2)	5.5
operating torque	4.7.1	5.4	3 (samples n. 1, n. 2, and n. 3)	5.4
Safeguard against overloading of handle (for gas networks): stop resistance	4.8	5.8	1 (sample n. 1)	5.8
- endurance	4.10.2.1	5.6.1	1 (sample n. 3)	5.6.1
- resistance to low temperature	4.10.2.2	5.6.2	1 (sample n. 3)	5.6.2
- salt spray resistance	4.2.1.2	5.6.3	1 (sample n. 3)	5.6.3

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfill his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Personnel

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product conformity, shall be defined. This applies in particular to personnel that needs to initiate actions preventing product non-conformities from occurring, actions in case of non-conformities and to identify and register product conformity problems. Personnel performing work affecting product conformity shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

6.3.2.3 Equipment

6.3.2.3.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.3.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.4 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.5 Traceability and marking

Individual product batches shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.6 Controls during design process

The factory production control system shall document the various stages in the design of the valve, identify the checking procedure and those individuals responsible for all stages of design.

During the design process itself a record shall be kept of all checks, their results and any corrective actions taken. This record shall be sufficiently detailed and accurate to demonstrate that all stages of the design stage, and all checks have been carried out satisfactorily.

6.3.2.7 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.8 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are:

— Dimensional tolerances: shall be in compliance with the requirements indicated in 4.2.12. Every batch of components (with statistical system) shall be tested;

— Internal pressure and leak tightness: shall be subject to the tests indicated in 5.2.1. Every valve shall be tested at a pressure between 600 Pa and 20×10^5 Pa and respect the values given in Table 5 for internal and external leakage.

6.3.2.9 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.10 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.11 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Initial inspection of factory and FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented,

and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice,

and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the

manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

7 Marking, labelling, instructions and packaging

7.1 Marking and labelling

The manufacturer shall provide the following information which permits to identify the performance of the manually operated ball valves and closed bottom taper plug valves:

a) manufacturer's name or identification mark or trade mark;

b) nominal size DN;

c) pressure class (MOP): 0,2 or 0,5 or 1 or 5 or 20;

d) the temperature class shall be indicated if it is different from −20 °C;

e) high temperature resistance class B or C, with related pressure class of high temperature resistance;

NOTE 1 e.g. “MOP5 B0,5 C0,2”, “MOP5 B0,5”. It is not necessary to mark class A;

f) direction of flow (if necessary);

g) date of manufacture (at least the year), may be in code.

h) if applicable (see 4.2.11), the manual actuator shall be marked indicating that it is not removable.

All above markings shall be on the non-removable parts of the valve, clearly legible, durable and resistant to atmospheric conditions. Labels and their markings shall neither deteriorate nor lift nor become unreadable by humidity and temperature. Self-adhesive labels shall be tested according to Annex A of EN 60730-1:2000.

When the marking is on a label or by ink, the durability of marking is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

After all the tests of this standard, the marking shall be easily legible, it shall not be easily possible to remove marking plates and they shall show no curling.

Specifically after the salt spray test, the marking is verified and it shall neither deteriorate nor lift nor become unreadable.

NOTE 2 Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met.

7.2 Instructions for installation and operation

For all manually operated ball valves and closed bottom taper plug valves the installation and servicing operating instructions shall be available and written in the official language(s) acceptable to the country into which the manually operated ball valve and closed bottom taper plug valve will be delivered, giving

all the necessary information regarding its appropriate installation and operation together with details of the effectiveness test that is to be used upon installation and during its lifetime.

The instruction shall include all marking details described in 7.1.

The instructions shall detail the method and procedure of how to install and operate a manually operated ball valve and closed bottom taper plug valve and how to verify its correct installation and operation.

The valve shall be operated only by means of the operating mechanism provided with the original valve by the manufacturer.

Warnings:

— any deterioration or destruction of any part of the manually operated ball valve and closed bottom taper plug valve shall result in the need to replace the complete valve: alterations to any part of the complete valve shall result in the valve no longer being in compliance with the performance requirements of this document;

— ensure that the manually operated ball valve and closed bottom taper plug valve allows an adequate flow rate for its intended use;

— all installations should be performed in accordance with existing local installation regulations and codes of practice where they exist;

— it is imperative to follow the installation instructions of the manually operated ball valve and closed bottom taper plug valve manufacturer and of the appliance manufacturer, including those for the correct position of the connection point for the valve.

These instructions and warnings may be supplemented as required by drawings.

7.3 Packaging

The packaging shall be selected by the manufacturer and shall provide adequate protection against damage to the valve. The package shall contain the installation and operating instructions.

Annex A
(normative)

Resistance to high temperatures for valves classes B and C

A.1 General

This annex describes a procedure for tests on manually operated ball valves and closed bottom taper plug valves.

A manually operated ball valve or closed bottom taper plug valve is considered to be resistant to high temperatures when it retains its leak-tightness up to a temperature at which there is no longer any danger of a gas explosion.

For first, second and third family gases (see Table 1 of EN 437:2003+A1:2009) the permissible temperature is 650 °C.

NOTE This is the self-ignition temperature of a natural gas / air mixture which is a secured value for all gas families.

It is accepted that for manually operated ball valves and closed bottom taper plug valves for buildings this leak-tightness relates to the atmosphere (external leak-tightness). These components may be considered to be resistant to high temperatures if they have passed the following test.

A.2 Procedure

A.2.1 Test criteria

This test is deemed to be passed if the leakage rate of the manually operated ball valve or closed bottom taper plug valve, measured under the test conditions described in A.2.2, does not exceed 150 dm^3/h under the following test conditions:

— Temperature in the middle of the furnace compartment has to be maintained constant at 650 °C (±10 °C) during the whole test.

— Duration of the high temperature test is 30 min.

— Constant test pressure equal to the maximum operating pressure with a value of at least 10^4 Pa (100 mbar) (higher values up to MOP may be specified by the manufacturer).

— Test fluid is nitrogen.

A.2.2 Test method

A.2.2.1 Apparatus

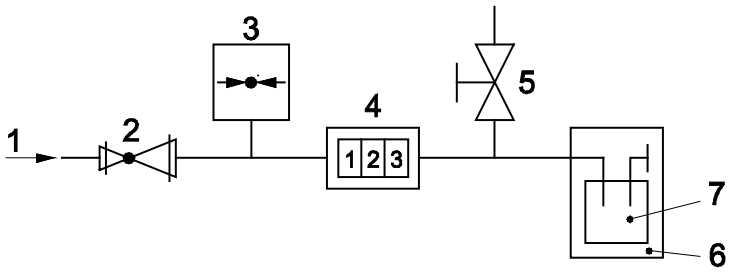
The dimensions of the furnace are such that the manually operated ball valve or closed bottom taper plug valve and its connections can be installed in positions which are similar to those observed in practice.

Arrangements are made to maintain a constant pressure in the manually operated ball valve or closed bottom taper plug valve throughout the test.

A.2.2.2 Test procedure

The furnace is heated up until the temperature in the middle of the compartment has reached 650 °C; this temperature is maintained constant (±10 °C) during the whole test.

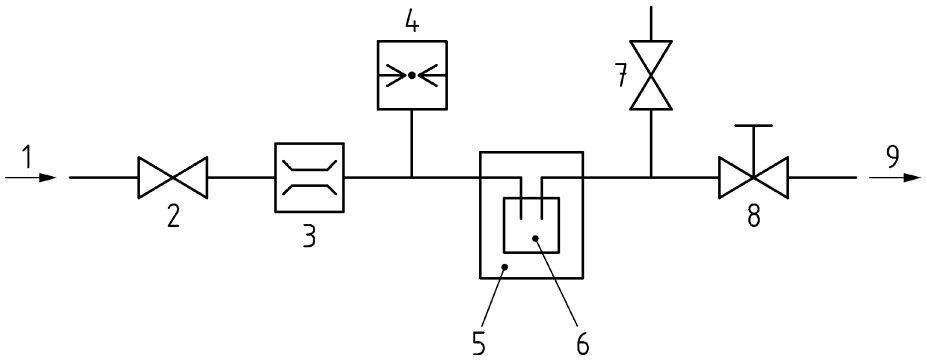
The manually operated ball valve or closed bottom taper plug valve is connected to inlet joints and fitted with a suitable thermocouple for measuring its surface temperature. The complete assembly is installed in the centre of the pre-heated furnace using supports if necessary (see Figure A.1and A.2).



Key

1 test gas inlet
2 pressure regulator
3 pressure gauge
4 measuring meter
5 discharge valve
6 furnace
7 valve to be tested in partially open position

Figure A.1 — Equipment for high temperatures resistance test (external leakage)



Key

1 test gas inlet
2 cock
3 flow meter
4 pressure gauge (up to 100 mbar)
5 furnace
6 valve to be tested, in closed position
7 purge valve
8 discharge valve
9 outlet

Figure A.2 — Equipment for high temperatures resistance test (internal and external leakage)

With the discharge valve closed, the valve to be tested is subjected to the test pressure specified by the manufacturer (at least 10^4 Pa) (100 mbar).

With valve to be tested subjected to nitrogen pressure, the high temperature test starts when the temperature of the external surface of the valve to be tested has reached 650 °C. Throughout the high temperature test the pressure is maintained at a constant level in the valve to be tested by means of the discharge valve. During 30 min the leakage rate recorded on a flow meter is checked.

The leakage rate is the ratio of the volume of nitrogen measured within the measuring time.

Reference shall also be made to the relevant national legislation and/or technical rules for domestic gas installations.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/131 "Pipes, tanks and ancillaries not in contact with water intended for human consumption" given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for manually operated ball valves and closed bottom taper plug valves for gas installations for buildings using gases of first, second and third families

Product: Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings as components in domestic and commercial not directly buried installations inside or outside buildings **Intended use:** using gases of first, second and third families (specified in EN 437)			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Dimensional tolerances	4.2.12	-	pass/fail
Internal Pressure and leak-tightness	4.4	-	- test method in 5.2; cm^3/h pass/fail
Effectiveness: - rated flow rate	4.5	-	- test method in 5.3 m^3/h pass/fail
Resistance to high temperature if required by national regulations	4.6	-	- test method in Annex A; dm^3/h pass/fail
Mechanical strength (for gas networks): - torque and bending - operating torque	4.7 2 4.7.1	-	- test method in 5.5; pass/fail - test method in 5.4; pass/fail
Safeguard against overloading of handle (for gas networks): - stop resistance	4.8	-	- test method in 5.8; pass/fail
Durability - endurance; - resistance to low temperature; - salt spray resistance	4.10.2.1 4.10.2.2 4.2.1.2	-	test method in 5.6: 5.6.1 pass/fail 5.6.2 pass/fail 5.6.3 pass/fail

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of manually operated ball valves and closed bottom taper plug valves for gas installations for buildings

The AVCP system(s) of manually operated ball valves and closed bottom taper plug valves for gas installations for buildings indicated in Table ZA.1, established by EC Decision(s) 1999/472/EC (OJEC L 184 of 17.7.1999) as amended by EC Decision 2001/596/EC (OJEC L209 of 2.8.2001) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Product(s)	Intended use	Level(s) or class(es) of performance	AVCP system(s)
Valves and taps	In installations for the transport/distribution/storage of gas/fuel intended for the supply of building heating/cooling systems, from the external storage reservoir or the last pressure reduction unit of the network to the inlet of the boiler/heater/cooler system(s) of the building(s).	-	3
Valves and taps	In installations in areas subject to reaction to fire regulations used for the transport/distribution/storage of gas/fuel intended for the supply of building heating/cooling systems, from the external storage reservoir or the last pressure reduction unit of the network to the inlet of the heating/cooling systems of the building	Any	1
System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2, as amended by Regulation (EN) No 568/2014. System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4, as amended by Regulation (EN) No 568/2014.			

The AVCP of the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings in Table ZA.1 shall be according to the AVCP procedures indicated in Table ZA.3.1 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of evaluation of conformity tasks for manually operated ball valves and closed bottom taper plug valves under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristic of Table ZA.1 relevant for the intended use which are declared, namely: - dimensional tolerances; - internal pressure and leak tightness.	6.3
	Further testing of samples taken at the manufacturing plant by the manufacturer in accordance with the prescribed test plan	Essential characteristic of Table ZA.1 relevant for the intended use which are declared	6.2
Tasks for the notified product certification body	An assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product	Essential characteristic of Table ZA.1 relevant for the intended use indicated in Annex III of the mandate	6.2
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: - dimensional tolerances; - internal pressure and leak tightness. Documentation of the FPC.	6.3
	Continuous surveillance, assessment and approval of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely: - dimensional tolerances; - internal pressure and leak tightness. Documentation of FPC	6.3

Table ZA.3.2 — Assignment of evaluation of conformity tasks for manually operated ball valves and closed bottom taper plug valves under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared, namely: - dimensional tolerances; - internal pressure and leak tightness.	6.3
Tasks for a notified laboratory	The notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product	Essential characteristics of Table ZA.1	6.2

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the manually operated ball valves and closed bottom taper plug valves for gas installations for buildings

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed,

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,

— the unique identification code of the product-type

— the reference number of the declaration of performance

— the level or class of the performance declared

— the dated reference to the harmonized technical specification applied

— the identification number of the notified body,

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 and ZA.2 give examples of the information related to products subject to AVCP under each of the different systems to be given in Tables ZA.1 and ZA.2.

CE 0123	*CE marking, consisting of the "CE"-symbol* *Identification number of the product certification body*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **15** 00001-CPR-2013/05/12	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 331:2015 Product: Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings intended to be used in gases of first, second and third families Pressure Class: MOP 5 Nominal size: DN 25 Temperature Class: −20 °C to 60 °C **High temperature resistance class and related pressure class:** B1 Dimension tolerance: pass Internal pressure: - Pressure:$5x10^5$ Pa Tightness (gas): - Leak-tightness (internal): ≤ 20 cm^3/h - Leak-tightness (external): ≤ 20 cm^3/h Effectiveness: - Rated flow rate: 16 m^3/h Mechanical strength (for gas networks): - Torque and bending: pass - Operating torque: pass Safeguard against overloading of handle (for gas network): - Stop resistance: pass Durability: - Endurance: pass - Resistance to low temperature: pass Salt spray resistance: pass	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP system 1

CE 8910	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified test laboratory*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **15** 00001-CPR-2013/05/12	*name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 331:2015 Product: Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings intended to be used in gases of first, second and third families Pressure Class: MOP 5 Nominal size: DN 25 Temperature Class: −20 °C to 60 °C Dimension tolerance: pass Internal pressure: - Pressure: $5x10^5$ Pa Tightness (gas): - Leak-tightness (internal): ≤ 20 cm^3/h - Leak-tightness (external): ≤ 20 cm^3/h Effectiveness: - Rated flow rate: 16 m^3/h Mechanical strength (for gas networks): - Torque and bending: pass - Operating torque: pass Safeguard against overloading of handle (for gas network): - Stop resistance: pass Durability: - Endurance: pass - Resistance to low temperature: pass Salt spray resistance: pass	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.2 — Example CE marking information of products under AVCP system 3

Environmental Checklist

Document number (if available):	Title of standard: EN 331 — Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings	TC/SC/WG number: TC 236/WG1
Work item number (if available):	Version of the environmental checklist: 2	Date of last modification of the environmental checklist: 22/12/2014

Environmental Issue	Stages of the life cycle										All stages
	Acquisition		Production		Use			End-of-Life			
	Raw materials and energy	Pre-manu-factured materials and components	Production	Packaging	Use	Maintenance and repair	Use of additional products	Reuse/ Material and Energy Recovery	Incineration without energy recovery	Final disposal	Transportation
Inputs											
Materials	Y*** (1)	Y*** (1)	Y*** (1)	Y*** (1)				Y*** (2)			
Water	Y	Y	Y					Y			
Energy	Y	Y	Y	Y				Y	Y		Y
Land											
Outputs											
Emissions to air	Y		Y					Y	Y	Y	Y
Discharges to water	Y										
Discharges to soil	Y										
Waste	Y	Y	Y	Y				Y	Y	Y	
Noise, vibration, radiation, heat	Y	Y	Y								Y
Other relevant aspects											
Risk to the environ-ment from accidents or unintended use					Y 4.8						
Customer information					Y 7.2			Y*** (2)			

Comments:
(1) A link could be made to preferred suppliers with an environmental policy
(2) Materials stated in 4.2.1 are recyclable. A recommendation to avoid landfill could be added in installation instructions

NOTE 1 The stage of packaging refers to the primary packaging of the manufactured product. Secondary or tertiary packaging for transportation, occurring at some or all stages of the life cycle, is included in the stage of transportation.
NOTE 2 Transportation can be dealt with as being a part of all stages (see checklist) or as separate sub-stage. To accommodate specific issues relating to product transportation and packaging, new columns can be included and/or comments can be added.

Bibliography

[1] EN 1005-3:2002+A1:2008, *Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation*

[2] EN 1775:2007, *Gas supply - Gas pipework for buildings - Maximum operating pressure less than or equal to 5 bar - Functional recommendations*

[3] EN ISO 6708:1995, *Pipework components - Definition and selection of DN (nominal size) (ISO 6708:1995)*

[4] EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

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