ISBN 978-0-626-32383-7

SANS 50331:2010
Edition 1

EN 331:1998
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

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

This national standard is the identical implementation of EN 331:1998, and is adopted with the permission of CEN, Avenue Marnix 17, B-1000 Brussels.

Published by SABS Standards Division
1 Dr Lategan Road Groenkloof ✉ Private Bag X191 Pretoria 0001
Tel: +27 12 428 7911 Fax: +27 12 344 1568
www.sabs.co.za

SANS 50331:2010
Edition 1
EN 331:1998
Edition 1

Table of changes

Change No.	Date	Scope

National foreword

This South African standard was approved by National Committee SABS/TC 1019, *Gas supply, handling and control (fuel and industrial gases)*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This SANS document was published in November 2010.

Reaffirmed and reprinted in September 2015.
This document will be reviewed every five years
and be reaffirmed, amended, revised or withdrawn.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 331

January 1998

ICS 23.060.10

Descriptors: gas valves, stopcocks, metal products, manual controls, residential buildings, definitions, classifications, specifications, equipment specifications, performance evaluation, tests, marking

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 des bâtiments

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

This European Standard was approved by CEN on 11 December 1997.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 236 "Non industrial manually operated shut-off valves for gas", 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 July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

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

1 Scope

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

It applies to valves for domestic and commercial not directly buried installations inside or outside of buildings, using gases of the first, second and third family (specified in EN 437).

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

2 Normative references

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

EN 377	Lubricants for applications in appliances and associated controls using combustible gases except those designed for use in industrial processes
EN 437	Test gases - Test pressures - Appliance categories
EN 549	Rubber materials for seals and diaphragms for gas appliances and gas equipment
prEN 1254	Copper and copper alloys - Plumbing fittings
ISO 7	Pipe threads where pressure-tight joints are made on the threads
ISO 65	Carbon steel tubes suitable for screwing in accordance with ISO 7-1
ISO 228	Pipe threads where pressure-tight joints are not made on the threads
ISO 261	ISO general purpose metric screw threads - General plan
ISO 7005	Metallic flanges

3 Definitions

For the purposes of this European standard, the following definitions apply:

3.1 standard reference conditions: Conditions to which all measured values are corrected (temperature 15°C; pressure 1013,25 x 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 closure member: Movable part of the valve which shuts off the gas flow.

3.3.2 actuating mechanism: Part of the valve which actuates the closure member.

3.3.3 manual actuator: Manually operated actuating mechanism.

3.3.4 compression joint: Assembly of all the components necessary to make the joint except the pipe.

3.3.5 gas way: Passage in the valve through which the gas flows.

3.3.6 union connection: Assembly of all the components necessary to make the joint with a pipe.

3.3.7 flexible connection: An element of flexible pipework to be fitted between the end of the valve and the appliance inlet connection.

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 closure member 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 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; -40 °C) declared by the manufacturer at which the valve can be operated.

3.8 Operating torque

3.8.1 opening torque: Torque to be applied to the manual actuator to move the closure member from the closed to the open position.

3.8.2 closing torque: Torque to be applied to the manual actuator to move the closure member from the open to the closed position.

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

4 Classification

4.1 Pressure classes

The valves are divided into three classes, corresponding to the maximum working pressure as follows:

Table 1 : Valve pressure classes

Class	Pressure range
0,2 MOP	0 to 0,2 x 10^5 Pa
0,5 MOP	0 to 0,5 x 10^5 Pa
5 MOP*	0 to 5 x 10^5 Pa
*In some countries, national regulations require a special pressure (20 bar) for valves used with third family gas. For those valves, "20" will be added to the class reference (for example MOP 5-20).	

4.2 Temperature classes

The valves are divided into three temperature classes as follows:

Table 2 : Valve temperature classes

Class	Temperature range
-5 °C	-5 °C to 60 °C
-20 °C	-20 °C to 60 °C
-40 °C	-40 °C to 60 °C

5 Construction requirements

5.1 General

5.1.1 Materials

5.1.1.1 Any part in contact with the gas or the surrounding atmosphere, shall be manufactured from corrosion-resistant materials or shall be suitably protected and shall withstand the humidity test in 7.6.5 and the paint scratch test in 7.6.4.
The corrosion protection for springs and other moving parts shall not be impaired by any movement.

5.1.1.2 For welded valves the tests in 7.6.5 and 7.6.4 shall apply only to moving parts in contact with the gas and to any part in contact to the surrounding atmosphere.

5.1.1.3 Surfaces which are protected by a coating, shall withstand the test of 7.6.4 before and after the humidity test of 7.6.5, without the ball penetrating the protective coating to expose bare metal.

5.1.1.4 Springs and other moving parts which shall be suitably protected against corrosion and shall retain their protective coating despite any movement resulting from the operation of the valve. After the test of 6.6 these parts shall withstand the test of 7.6.5.

5.1.1.5 All markings shall be durable and resistant to atmospheric conditions. Labels and their markings shall neither deteriorate nor lift nor become unreadable by humidity and temperature.

5.1.1.6 Rubber materials shall conform to EN 549.
Until a specific European standard becomes available, other non-metallic materials for seals (e.g. synthetic fibers, graphite) shall conform to the requirements of those countries in which the valve will be used.

5.1.1.7 Lubricants shall conform to EN 377.

5.1.1.8 The valve shall be made in one of the following materials:

- copper alloy excluding Aluminium-bronze[1)]
- ductile cast iron excluding laminar cast iron[2)]
- forged steel and cast steel[3)]

5.1.2 Construction

5.1.2.1 General

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

5.1.2.2 Product appearance

All valve components shall be free from burrs and clean (e.g. free from swarf and core-sand), and shall be of sound manufacture. All valve components shall be free from sharp edges and corners which could cause damage, injury or incorrect operation, when viewed with the naked eye.

5.1.2.3 Valve maintenance

Valves designed to be maintained shall be such that it is difficult to remove parts serving to seal against gas without specialist knowledge and that any tampering is evident and incorrect reassembly is impossible.

Seals for moving parts which separate gas ways from the atmosphere, shall maintain their original leak- tightness without any manual adjustment.

5.1.2.4 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.

5.1.2.5 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.

5.1.2.6 Plug valves

5.1.2.6.1 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.

5.1.2.6.2 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.

---

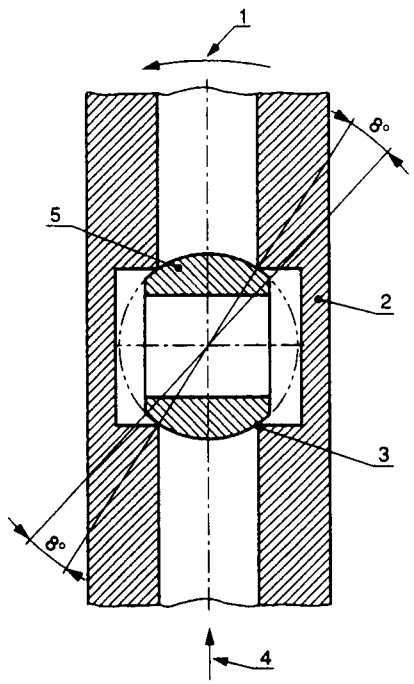
1) On this subject CEN/TC 69 is preparing the draft European standard prEN 1503-4 "Valves - Shell materials - Part 4: Copper alloys" (W.I. 00069060)

2) On this subject CEN/TC 69 is preparing the draft European standard prEN 1503-3 "Valves - Shell materials - Part 3: Cast irons" (W.I. 00069059)

3) On this subject EN 10028 and EN 10213 are available and ECISS/TC 28 is preparing the draft European standard prEN 10222.

5.1.2.7 Angular seal

With the valve in the fully closed position, the angular distance between the gas port in the closure member and both the inlet port and outlet port in the valve body, shall be at least 8° with a measurement uncertainty of 1°, when measured according to 7.7 (see fig. 1).



1 Opening direction
2 Valve body
3 Seat
4 Flow
5 Closure member

Figure 1: Angular seal

5.1.3 Connections

5.1.3.1 Threads

5.1.3.1.1 Threaded inlet and outlet connections for valves with pressure-tight joints made on the threads, shall conform to ISO 7.

5.1.3.1.2 Where threads for non pressure-tight joints are required, they shall conform to ISO 228 or ISO 261.

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

5.1.3.2 Flanges

For valves with flanged connections the dimensions of the connections shall be in accordance with ISO 7005.

NOTE: Raised face flanges are recommended.

5.1.3.3 Capillary joints

The dimensions of connections for capillary joints shall conform to prEN 1254.

5.1.3.4 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.

5.1.3.5 Compression joints

While waiting for a European or International Standard specifying the dimensions of the construction of the compression joints, those joints shall conform to the current requirements of the country where the valve is used.

5.1.3.6 Weld ends

While waiting for a European or International Standard specifying the dimensions of the construction of the weld ends, those weld ends shall conform to the current requirements of the country where the valve is used.

5.1.4 Seals

Sealing on the closure member shall be constructed so that tightness is achieved by mechanical means. This excludes all sealing materials such as liquids, pastes, and tapes.

Sealing between split part bodies shall be constructed so that tightness is achieved by mechanical means. Sealants used for such connections shall withstand all torque and bending moment values.
For valves intended to be serviced, the tightness of the serviceable part shall be maintained after dismantling and reassembly.

5.2 Operation

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

5.2.2 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.

5.3 Stops

On valves the end positions "open" and "closed" shall be clearly identified and 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.

If the stop mechanism is part of the handle, the handle and the shaft shall be all of one piece; the fastening of the handle shall be sealed.

5.4 High temperature resistance

See Annex C.

6 Performance requirements

6.1 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 or -40°C, as declared by the manufacturer.

6.2 Leak-tightness

The valve shall be leak-tight. Valves which may be serviced shall be leak- tight after dismantling and reassembling of the closure parts.
Leak-tightness for all strength tests (bending and torque) shall be according to the following Maximum Operating Pressures:

MOP (in Pa) $\leq 5 \times 10^5$
Test pressure $\geq$ 1,5 MOP.

The valve shall be considered leak-tight if it meets the tests as detailed in 7.2.

6.3 Rated flow rate

The rated flow rate shall not be less than the value specified in Table 3 when tested in accordance with 7.3.

Table 3 : 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

6.4 Operating torque

The torque required for the preliminary cycle shall not be greater than three times the maximum value at the ambient temperature given for the size of the valve. The operating torque shall not exceed the values given in Table 4, when tested in accordance with 7.4.

Table 4 : Operating torque

DN	Torque (N · m)	
	ambient temperature max.	low temperature max.
< 15	4	5
15 20 25	7	15
32 40 50	14	40

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

6.5 Torque and bending resistance

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 and ease of operation.
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 connections, 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 5, with the test conditions given in 7.5.

Table 5 : Torque and bending resistance

MOP 5

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

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

6.6 Durability

6.6.1 Endurance

The manual actuator of the valve shall withstand, at ambient temperature, a series of operating cycles (see table 6).
After the endurance test the valve shall conform to the requirements for external and internal leak-tightness at ambient temperature and at (60 ± 5)°C in accordance with 6.2. After cooling to ambient temperature it shall conform to the requirements for operating torque in accordance with 6.4.

Table 6 : Endurance

Nominal size (*DN*)	Number of operations
≤ 15	5000
20 - 25	2500
32 - 40 - 50	1000

6.6.2 Resistance to low temperature

The valve shall conform to the requirements given in 6.2. and 6.4, when tested in accordance with 7.6.2.

6.7 Stop resistance

When tested in accordance with 7.8, the force required to overcome the stops in the open or closed position shall exceed, at a minimum 1,5 times the maximum operation torque, at ambient temperature (see table 4).

7 Test methods

7.1 General

7.1.1 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 x 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 testing laboratory shall select the least favourable position.

7.1.2 Test sequence

Three samples of each size of valve are required for the tests to be carried out according to table 7.

Table 7 : Test sequence

Valve N° Test	1	2	3
Ease of operation	X	X	X
Stop test	X		
Leak-tightness	X	X	X
Rated flow rate		X	
Torque resistance		X	
Bending resistance		X	
Endurance			X
Resistance to low temperature			X
Resistance to humidity			X
Protection of external surfaces			X

7.2 Leak-tightness

7.2.1 General

This test may be carried out by those methods used in national laboratories, providing these methods give reproducible results.

The uncertainty of measurement shall not be greater then 5 cm^3/h and the resolution shall be 1 cm^3.
A valve is leak-tight when the measured leakage rate does not exceed 20 cm^3/h. It includes the equipment accuracy, measurement errors and apparent leakages mainly due to temperature variations.
In case of dispute, a reference method shall be used, for example:

- the method in annex A (volumetric method) for test pressures not exceeding 150 x 10^2 Pa;

- the method in annex B (pressure loss method) for test pressures above 150 x 10^2 Pa.

The test shall be carried out over a period of 10 min with the test pressures of:
- 600 Pa for all classes;
- 0,3 x 10^5 Pa for class MOP 0,2;
- 0,75 x 10^5 Pa for class MOP 0,5;
- 7,5 x 10^5 Pa for class MOP 5;
- 20 x 10^5 Pa for class MOP 5 (20), where applicable.

Where applicable, closure members are dismantled and reassembled five times according to the manufacturer's instructions, using tools which are readily available commercially. The sample is then tested in accordance with 7.2.2 and 7.2.3.

7.2.2 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 6.2.

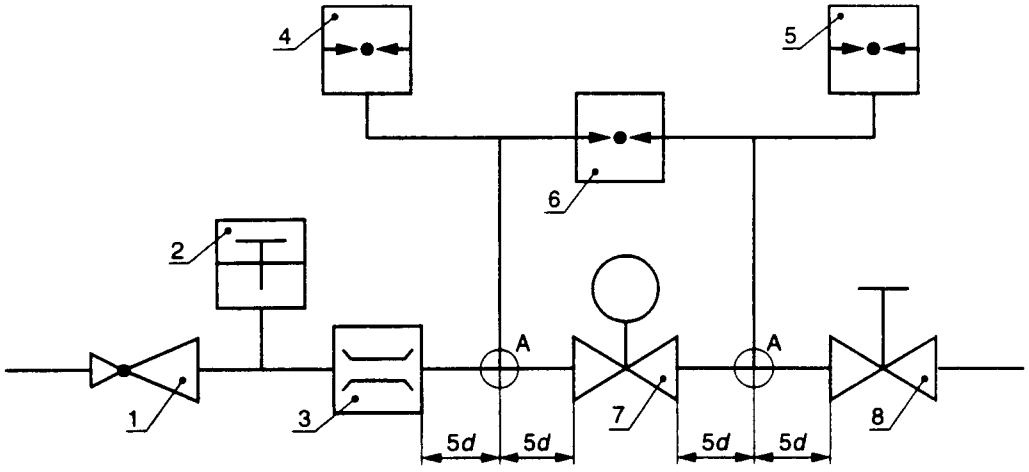
7.2.3 Internal leak-tightness

The test is carried out in the flow direction of the valve. The valve, with the closure member 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 6.2.

7.3 Rated flow rate

7.3.1 Apparatus

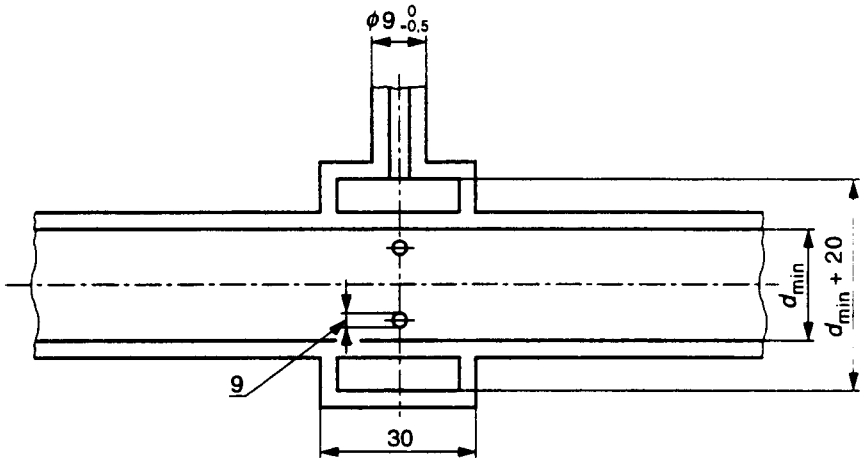
The test is carried out with the apparatus shown in fig. 2. The limit of error in measurement of flow and pressure shall not exceed 2,0 %. The air temperature is measured to ± 0,5 °C.



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

Detail of A

Dimensions in millimetres



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

Figure 2: Apparatus for the rated flow rate test

7.3.2 Procedure

The sample is installed with its closure member 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.

7.4 Operating torque

Before commencing the test, one preliminary cycle is carried out. The valve is then 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 fully open position while it is subjected to the declared maximum operating pressure, with a flow restrictor fitted at the outlet of the valve.

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

7.5 Torque and bending resistance

7.5.1 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 5).

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, figure 4 and figure 5).

e) The pipes for the testing of connections shall conform to ISO 65, medium series, and have a length of 1 m.

f) Valves which have fittings on both ends which are intended for use with flexible connections shall be attached to a test-bench by their mounting bracket (see figure 5).

g) For valves with end fittings which are intended for use with flexible connections, only tests on torque MT_1 and bending moment MF_1, are carried out.

7.5.2 Sequence of torsion and bending moment tests for valves

7.5.2.1 Torque (see figure 3)

7.5.2.1.1 Torque MT_1

a) Screw pipe 1 with a torque, not exceeding the required torque indicated in table 5, into the valve. Clamp pipe 1 at a distance equal to or greater than 2 *DN* from the valve.

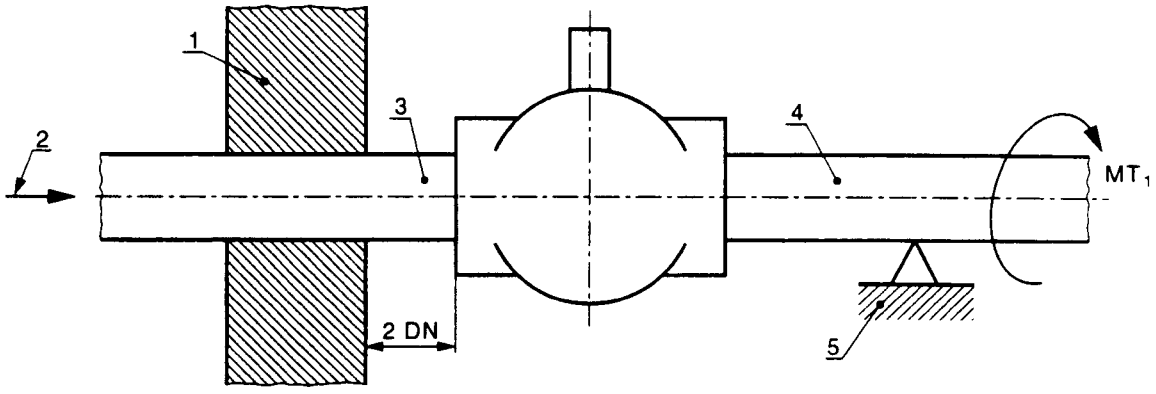
b) Screw pipe 2 with a torque, not exceeding the required torque indicated in table 5, into the valve. Ensure that the joint is leak-tight.

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.
The torque shall be applied progressively and smoothly without undue delay. The torque given in table 5 shall not be exceeded.

e) With the stress removed, check the valve for external and internal leak-tightness (see 6.2) and visually for any deformation.

f) Check the operating torque as in 6.4.



1 Pipe clamp
2 Test pressure
3 Pipe 1
4 Pipe 2
5 Pipe support

Figure 3: Arrangement for torsion test

7.5.2.1.2 Torque MT_2

a) Apply MT_2 for 900 s to the same valve as for the torsion test MT_1.

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

7.5.2.2 Bending (see figure 4)

7.5.2.2.1 Bending moment MF_1 at the axis of the closure member

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

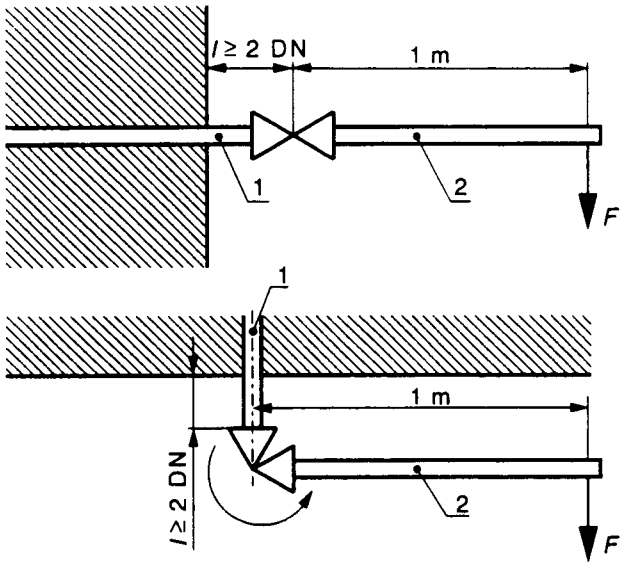
b) Apply force F, for 10 s at 1 m from the axis of the closure member so that the bending moment MF_1 is produced.

c) With the stress removed, measure the external and internal leak-tightness according to 6.2 and the operating torque according to 6.4.

7.5.2.2.2 Bending moment MF_2 at axis of the closure member

a) Apply MF_2 for 900 s to the same valve as for the bending moment test MF_1.

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



1 Pipe 1
2 Pipe 2

Figure 4: Arrangement for bending moment test

7.5.3 Procedure for valves for flexible connection (see figure 5)

a) Secure the valve to a test bench, by using its appropriate fixing systems.

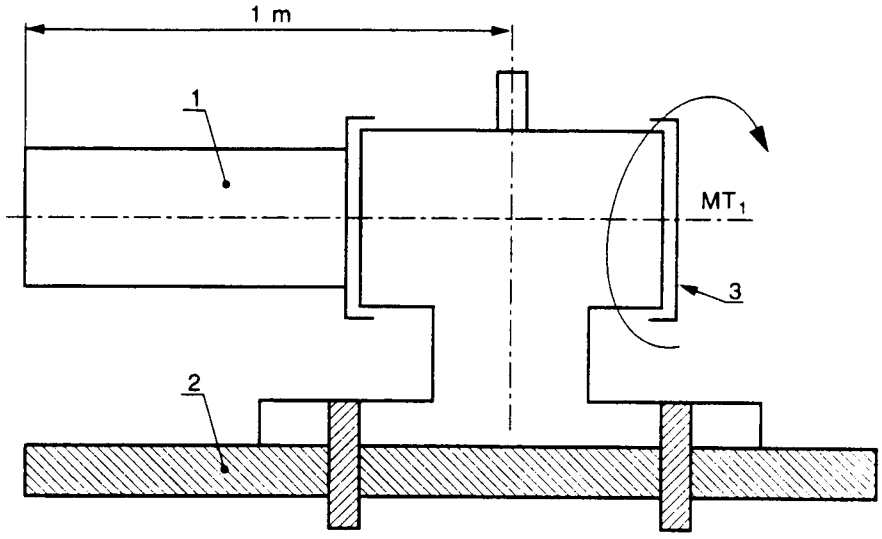
b) Insert the pipe of required diameter and material for this type of fitting with an appropriate liner. The pipe is tightened to torque MT_1 and held constant for 10 s.
If the fitting requires a flat elastomeric liner, the valve is to be tightened to the torque indicated by the manufacturer.

c) The end sealing cup required for the type of fitting is fixed on the outlet of the valve and tightened to the torque specified in b).

d) Apply a gradually increasing bending moment to the inlet pipe. The moment MF_1 shall be held constant for 10 s.

e) With the stress removed, check the valve for the external and internal leak-tightness (see 6.2) and visually for any deformation.

f) Check the operating torque as in 6.4.



1 Pipe
2 Test bench
3 End sealing cap

Figure 5 : Valves for flexible connection - Arrangement for torsion and bending moment test

7.6 Durability

7.6.1 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 6.4, table 4. 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 ± 1)% of the rated flow rate specified in table 3.

After the endurance test the sample is checked for external and internal leak-tightness at ambient temperature and at (60 ± 5)°C according to 7.2. After cooling to ambient temperature the operating torque is measured according to 7.4.

7.6.2 Resistance to low temperature

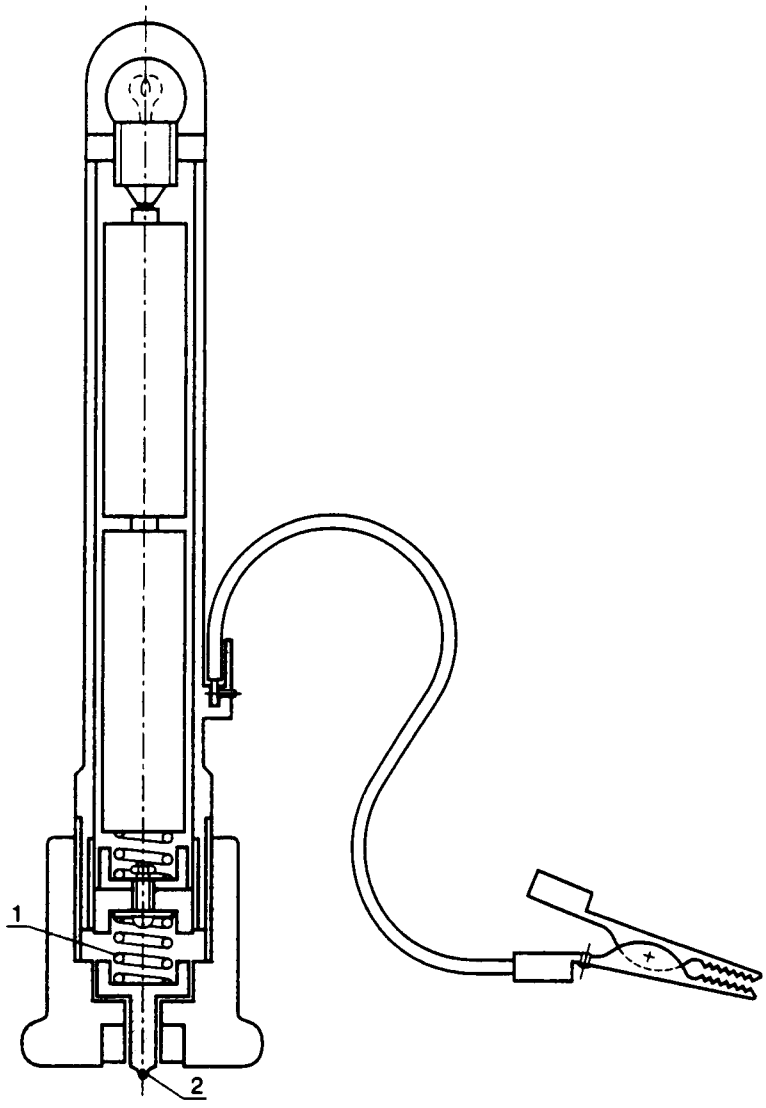
After the endurance test in 7.6.1 the sample is subjected to a test pressure as specified in 7.2.1 whilst the temperature is maintained at either - 5 °C or - 20 °C or - 40 °C (depending on class) for 23 h.
External and internal leak-tightness are then checked for conformity to 7.2 at the lowest temperature range.
The operating torque is measured immediately after removal from the low temperature chamber in accordance with 7.4.

7.6.3 Durability of sealing materials

Sealing materials shall conform to EN 751-1, EN 751-2 and EN 751-3.

7.6.4 Protection of external surfaces

A 1 mm diameter fixed steel ball shall be drawn across the surface at a speed of 30 mm/s to 40 mm/s and with a contact force of 10 N (see figure 6). This test is repeated after the humidity test for surfaces which are exclusively protected by paint (see 7.6.5).



1 Spring loading : 10 N
2 Scratching point (d = 1 mm steel ball)

Figure 6: Paint scratch test apparatus

7.6.5 Resistance to humidity

The valve is placed in a chamber at a temperature of 40 °C ± 3 °C and with a relative humidity at least 95% for 48 h. The valve is then removed from the chamber and examined visually for signs of corrosion, lifting or blistering of the coated surface. The valve is then left for 23 h at room temperature and examined again.

7.7 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 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 flow restrictor 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 5.1.2.7.

7.8 Stop resistance

Apply the operating torque to the ends of the actuator. Check the valve, after the torque is removed, visually for any deformation, cracking or failure of the mechanism.

8 Marking, installation and operating instructions and packaging

8.1 Marking of the valve

The following information, at least, shall be durably marked on the valve in a clearly visible position:

a) manufacturer's name or identification mark or trade mark;
b) nominal size *DN*;
c) pressure class (MOP): 0,2 or 0,5 or 5 or 5-20 where applicable;
d) direction of flow (if necessary);
e) date of manufacture (at least the year), may be in code.

8.2 Installation and servicing operating instructions

For all valves the installation and servicing operating instructions shall be available and written in the official language of the country into which the valve will be delivered. They shall include all relevant information, in particular:

a) installation;
b) operation and servicing;
c) mounting position (if necessary);
d) the maximum and minimum operating temperatures;
e) maximum operating pressure.

8.3 Packaging

The type of packaging is selected by the manufacturer and shall provide adequate protection against damage to the valve.

The packaging shall contain the installation and operating instructions (see 8.2).

ANNEX A
(informative)

Leak-tightness test - Volumetric method

A.1 Apparatus

The apparatus used is of the form shown in figure A.1, with the dimensions indicated.

The apparatus is made of glass. Taps 1 to 5 are also made of glass, and are spring loaded. The liquid used is water.

The distance, *l*, between the water level in the constant level bottle and the end of tube G is adjusted so that this height of water corresponds to the test pressure.

The apparatus is installed in an air-conditioned room.

A.2 Test method

The pressure of the compressed air, at the inlet to tap 1, is adjusted to the test pressure by means of pressure regulator F.

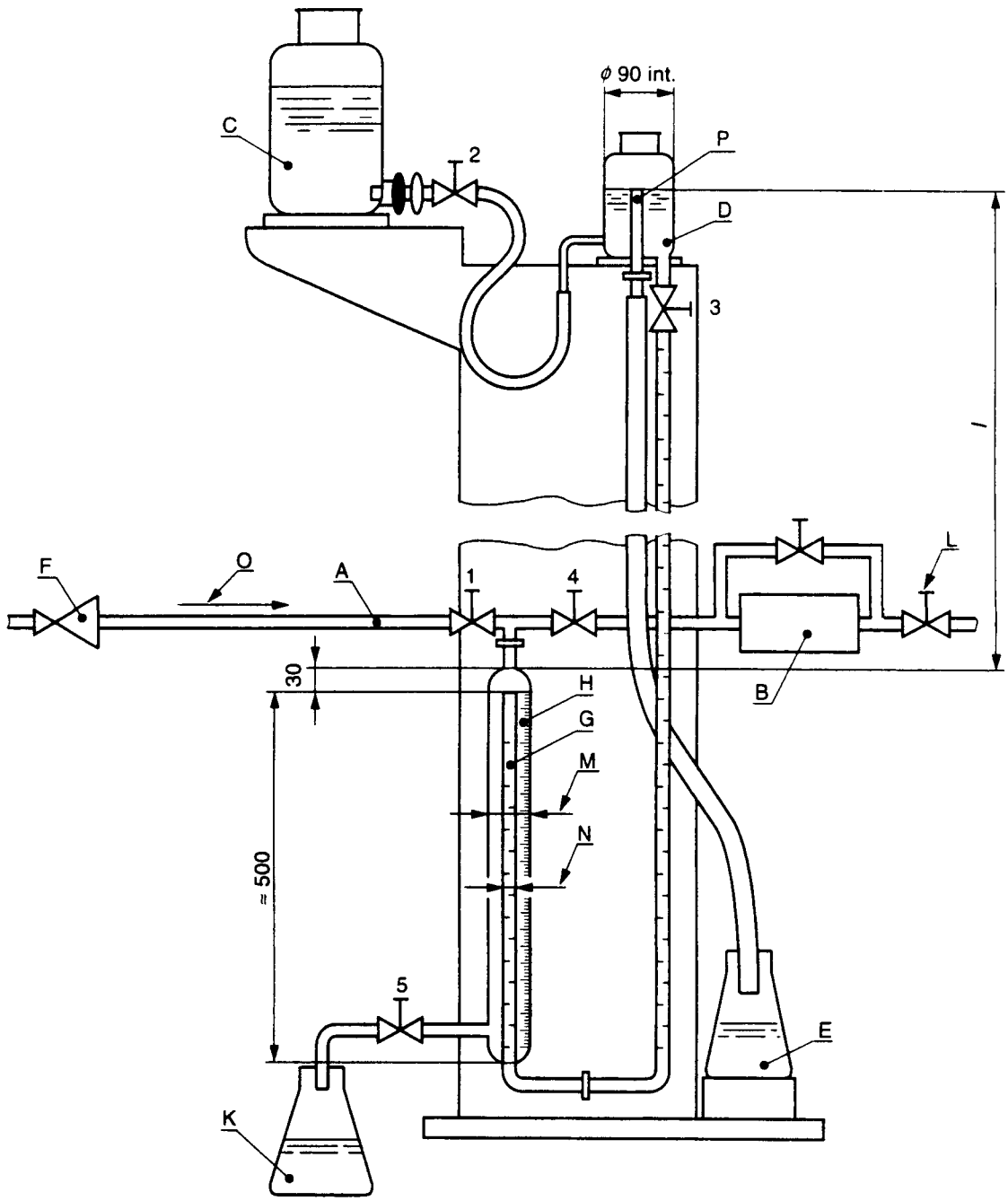
Taps 1 to 5 are all closed. The test sample B is connected to the tube. Outlet valve L is closed.

Tap 2 is opened; it is closed when the water in the constant level bottle D overflows into the overflow bottle E.

Taps 1 and 4 are opened. Through inlet A, the pressure is established in the measuring burette H and in the device. Tap 1 is then closed.

Tap 3 is opened. A time of about 15 min is allowed for the air in the test apparatus (and sample) to reach thermal equilibrium.

Any leak is shown by water overflowing from tube G into the measuring burette H.



A	Inlet	H	Measuring burette
B	Test sample	K	Overflow bottle
C	Water tank	L	Outlet valve
D	Constant level bottle	M	d = 20 mm to d = 24 mm
E	Overflow bottle	N	d = 6 mm to d = 8 mm
F	Regulator	O	Compressed air
G	Pipe	P	Tube 10 mm to 12 mm

1 to 5 Manual taps

Figure A.1 : Apparatus for testing leak-tightness (volumetric method)

ANNEX B
(informative)

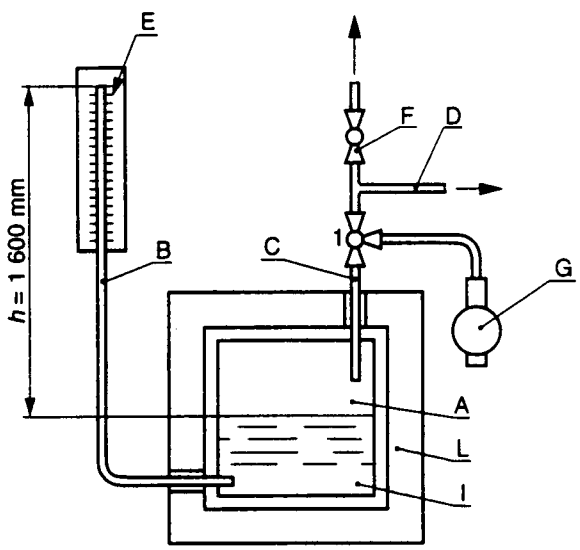
Leak-tightness test - Pressure loss method

B.1 Apparatus

The apparatus is shown schematically in figure B.1.

The apparatus consists of a thermally insulated pressure vessel A, which is filled with water such that the volume of air above the water is 1 dm^3. A glass tube B of internal diameter 5 mm, is open at the top and has its lower end in the water in A. This tube serves to measure the pressure loss.

The test pressure is applied to a second tube C, which enters the air chamber of the pressure vessel, to which the test sample is connected by means of a flexible tube of length 1 m and internal diameter 5 mm attached to connection D.



1 Three-way tap
A Thermally insulated pressure vessel 1 dm^3 air volume
B Measuring tube
C Pressure tube
D Joining pipe for the test sample
E Scale divided into millimetres
F Vent
G Air pump
I Water
L Thermal insulation

Figure B.1: Apparatus for testing leak-tightness (pressure loss method)

B.2 Test method

By means of a governor the air pressure through the three-way tap 1 is adjusted to the test pressure.The rise in water level in the measuring tube B corresponds to the test pressure.

The test sample, which is connected to D, is introduced into A by opening the three-way tap 1.

10 min are allowed for thermal equilibrium to be established, after which the test period of 5 min begins. At the end of this period the pressure loss is read from the measuring tube B.

The following formula is used to calculate the leakage rate (e.g. in cm^3/h) from the pressure loss.

$$q_L = 11{,}85 \times 10^{-3} [V_g (P_{abs}' - P_{abs}'')]$$

where:

q_L is the leakage rate (in cubic centimetres per hour);

V_g is the total volume of test sample and test equipment (in cubic centimetres);

P_{abs}' is the absolute pressure at beginning of test (in Pascal);

P_{abs}'' is the absolute pressure at the end of test (in Pascal).

The pressure loss is measured over a period of 5 min and the leakage rate is based on 1 h.

ANNEX C
(informative)

High temperature resistance

Awaiting the existence of a suitable directive, this European standard does not include the requirements specifying the high temperature resistance of the valves. When national legislation requires particular valves to be high temperature proof then these valves will be tested in accordance with the standards in force in the countries where the valves are used.
In this case in the absence of a national standard the procedure given in EN 1775 should be used.

ANNEX D
(informative)

A-Deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard does not fall under any Directive of the EC. In the relevant CEN/CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Spain:
In deviation of the requirements of clause 5, the valves should have a mechanical block system in closed position which stops the turn of the closure member, and the valve should be easily sealed in blocked position, in relation to 5.4 of Decreto 2913/1973 and Annex VI.5 and 6.4, 10.1 and 11.4 of the Real Decreto 1853/1993.

ANNEX E
(informative)

Bibliography

EN 1775 General safety requirements for gas pipework in buildings

SABS – Standards Division

The objective of the SABS Standards Division is to develop, promote and maintain South African National Standards. This objective is incorporated in the Standards Act, 2008 (Act No. 8 of 2008).

Amendments and Revisions

South African National Standards are updated by amendment or revision. Users of South African National Standards should ensure that they possess the latest amendments or editions.

The SABS continuously strives to improve the quality of its products and services and would therefore be grateful if anyone finding an inaccuracy or ambiguity while using this standard would inform the secretary of the technical committee responsible, the identity of which can be found in the foreword.
Tel: +27 (0) 12 428 6666 Fax: +27 (0) 12 428 6928

The SABS offers an individual notification service, which ensures that subscribers automatically receive notification regarding amendments and revisions to South African National Standards.
Tel: +27 (0) 12 428 6883 Fax: +27 (0) 12 428 6928 E-mail: sales@sabs.co.za

Buying Standards

Contact the Sales Office for South African and international standards, which are available in both electronic and hardcopy format.
Tel: +27 (0) 12 428 6883 Fax: +27 (0) 12 428 6928 E-mail: sales@sabs.co.za
South African National Standards are also available online from the SABS website http://www.sabs.co.za

Information on Standards

The Standards Information Centre provides a wide range of standards-related information on both national and international standards, and is the official WTO/TBT enquiry point for South Africa. The Centre also offers an individual updating service called INFOPLUS, which ensures that subscribers automatically receive notification regarding amendments to, and revisions of, international standards.
Tel: +27 (0) 12 428 6666 Fax: +27 (0) 12 428 6928 E-mail: info@sabs.co.za

Copyright

Details and advice can be obtained from the Senior Manager.
Tel: +27 (0) 12 428 6666 Fax: +27 (0) 12 428 6928 E-mail: info@sabs.co.za