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WC and urinal flushing cisterns

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National foreword

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WC and urinal flushing cisterns

Réservoirs de chasse d'eau pour WC et urinoirs

Spülkästen für WC-Becken und Urinale

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Foreword

This document (EN 14055:2010) has been prepared by Technical Committee CEN/TC 163 “Sanitary appliances”, 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of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by August 2012.

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

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1 Scope

This European Standard specifies design, performance requirements and the test methods for WC and urinal flushing cisterns with flushing mechanism, inlet valve and overflow.

This document covers flushing cisterns designed to be connected to drinking water installations inside buildings.

This standard does not cover automatic valveless siphon flushing cisterns for flushing urinals.

NOTE Flushing cisterns for one-piece WCs and close-coupled suites are covered by EN 997.

2 Normative references

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

EN 997:2003, *WC pans and WC suites with integral trap*

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

EN 13407:2006, *Wall-hung urinals — Functional requirements and test methods*

EN 14124, *Inlet valves for flushing cisterns with internal overflow*

BS 1212-2:1990, *Float operated valves — Specification for diaphragm type float operated valves (copper alloy body) (excluding floats)*

BS 1212-3:1990, *Float operated valves — Specification for diaphragm type float operated valves (plastics bodied) for cold water services only (excluding floats)*

BS 1212-4:1991, *Float operated valves — Specification for compact type float operated valves for WC flushing cisterns (including floats)*

3 Terms and definitions

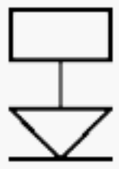
For the purposes of this document, the following terms and definitions apply.

3.1
valve-type flushing cistern
cistern with integral valve outlet device, for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan

3.2
valveless-type flushing cistern
cistern with integral syphonic actuated outlet device, for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan

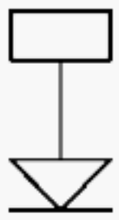
NOTE Both types of flushing cisterns are available, as detailed below:

Wall-hung independent low-level



Built-in independent

Wall-hung independent mid-level



Wall-hung independent high-level

One-piece integral (with WC pan)

Close-coupled

3.3
close-coupled multiple use flushing cistern
close-coupled flushing cistern for use with different WC pans

3.4
independent flushing cistern
flushing cistern mounted separately from a WC pan or urinal

3.5
outlet valve
mechanism for opening and closing the outlet orifice of the flushing cistern

3.6
operating mechanism
mechanism to open, and if applicable, close the outlet valve

3.7
flush pipe
connecting pipe between a flushing cistern’s outlet and a WC’s or urinal's inlet

3.8
overflow
device enabling release of excess water from a flushing cistern when water reaches a pre-determined level

3.9
inlet valve
valve that controls and shuts off the flow of water into a flushing cistern

3.10
overflow level
water level corresponding to the upper edge of the overflow or to the lower edge of the overflow notch

3.11
maximum water level
highest water level reached after flow stabilisation, in the event of continuous supply, as a result of malfunction of the inlet valve

3.12
critical water level
highest water level in any part of the appliance, 2 s after the supply is cut off

3.13
residual water level
water level after a full flush is completed

3.14
adjustable residual water level
water level in a cistern, after (uninterrupted) flushing, when an outlet mechanism can be adjusted to the elevated residual water level

3.15
meniscus level
level resulting from surface tension of water during overflowing

3.16
nominal water level
water level when a flushing cistern is filled to the nominal flush volume

3.17
nominal flush volume
volume of water indicated, when a flushing cistern is filled to the nominal water level

3.18
flush volume
volume of water discharged from the flushing cistern during a flush cycle

3.19
safety margin
c
distance between the nominal water level determined by the manufacturer and the overflow level

3.20
flush rate
volume of water flowing out of a flushing cistern as a function of time

3.21
test height
distance between the seat of the outlet valve and the horizontal axis of the flush pipe

3.22
impact force
force of the flushing water at the outlet of the flush pipe

3.23
flushing device
device fitted to a cistern to provide controlled measured volume(s) of water to a WC pan or suite for flushing

3.24
water-saving device
flushing device that permits a part of the total flush volume to be delivered, e.g. acting as double-action mechanisms (interruptible) or double-control mechanisms (dual control or dual flush)

3.25
warning level
level of spill over of a vertically mounted warning pipe connection or the invert of a horizontally mounted warning pipe connection, or the level at which an equally effective (warning) device would operate

3.26
short-term leak test
leak test consisting of a 15 min wait after flushing then positioning paper designed to change colour when wet, under the flushing device for 10 min

NOTE A leak is defined as being visible discharge of water amounting to more than three separate drops.

3.27
long-term leak test
leak test consisting of a 2 h wait after flushing then positioning paper designed to change colour when wet, under the outlet for 15 min

NOTE A leak is defined as being visible discharge of water amounting to more than three separate drops.

4 Classification

Flushing cisterns are classified as described below:

— **Class 1:** Flushing cisterns tested in accordance with the requirements of Clauses 5 and 8 using a nominal flush volume of either 4 l, 5 l, 6 l, 7 l or 9 l.

— **Class 2:** Flushing cisterns tested in accordance with the requirements of Clauses 6 and 8 using a maximum flushing volume of 6 l, or a dual-flush which combines a maximum flush of 6 l and a reduced flush no greater than two-thirds of the maximum flush.

— **Class 3:** Class 1 flushing cistern intended to be used in connection with urinals.

5 Requirements and test methods for class 1 products

5.1 Design

5.1.1 Flushing cistern equipment

An equipped flushing cistern comprises:

— a shell, provided with a removable lid or an access flap allowing access to components;

— an inlet valve complying with EN 14124;

— a flushing device;

— an overflow device;

— an operating mechanism;

— a flush pipe, when the cistern is for use with an independent WC pan.

In special cases, a combined fitting providing the functions of filling, overflowing and evacuation is permissible. In this case, the fitting shall be designed to comply with the hygiene, physico-chemical, leaktightness, hydraulic, pressure resistance, acoustic and mechanical characteristics specified in EN 14124. The tests shall be performed on the flushing cistern as supplied.

5.1.2 Water supply connection

The inlet valve can be connected to the cistern through:

— the side;

— the back;

— the underside;

— the top.

5.1.3 Supply piping

All materials of the supply piping which could be in contact with drinking water shall not be a danger to health. They shall not change the taste, aroma or visual appearance of the drinking water.

5.1.4 Removable parts

It shall be possible to dismantle removable parts, without having to remove the flushing cistern.

5.1.5 Connecting dimensions

The connecting dimensions shall comply with Table 1.

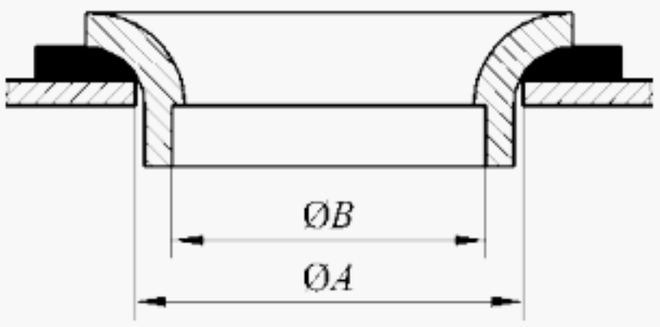
Table 1 — Connecting dimensions (Figures 1 and 2)

Designation	Symbol	Dimensions mm	Remarks
Hole for inlet valve	—	19 ± 2 [c]	For inlet valves size 3/8"
		23 ± 2 [c]	For inlet valves size ½"
Hole for outlet valve	*A*	$63\ ^{+2}_{-3}$ [c]	For ceramic flushing cisterns
		$61\ ^{+2}_{0}$ [c]	For thin-walled flushing cisterns (e.g. plastic)
		$45\ ^{+2}_{-3}$ [c]	For high level flushing cisterns
Inside diameter of outlet connection	*B*	$32{,}5\ ^{+1}_{0}$ [c]	For flush pipes of design A
		$51\ ^{+0,5}_{0}$ [c]	For flush pipes of design B
Outside diameter of outlet connection	*C* [a]	$49{,}5\ ^{+0,4}_{0}$ [b]	For flush pipes of design C
Hole in the cover for operating device	—	$40\ ^{+2}_{-1}$ [c]	Recommended dimension

[a] Not applicable to flushing cisterns built into wall frames.

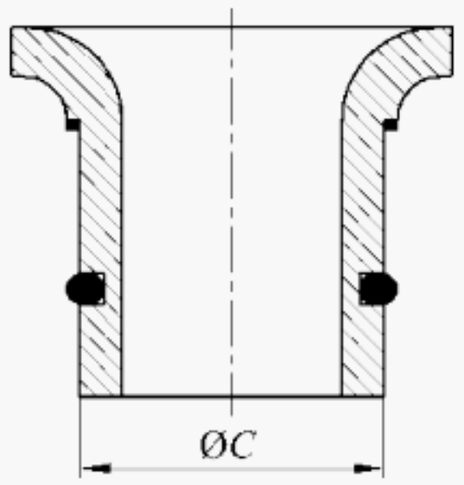
[b] Where the exterior diameter of the flush pipe is conical or has several stepped diameters, the maximum diameter is to be verified and recorded.

[c] Other dimensions are permissible if the performance of the cistern is assured.



Key
See Table 1

Figure 1 — Outlet connection for flush pipes of designs A and B



Key
See Table 1

Figure 2 — Outlet connection for flush pipes of design C

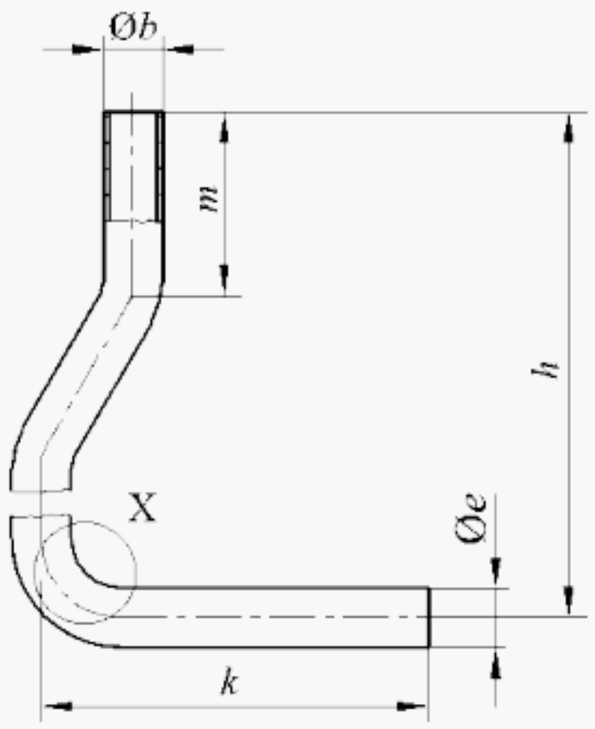
5.1.6 Flush pipes

The dimensions of flush pipes designed to equip WC pans for independent supply shall comply with Table 2. The flush pipe shall be provided by the manufacturer of the flushing cistern.

Table 2 — Dimensions of flush pipes (Figures 3 to 6)

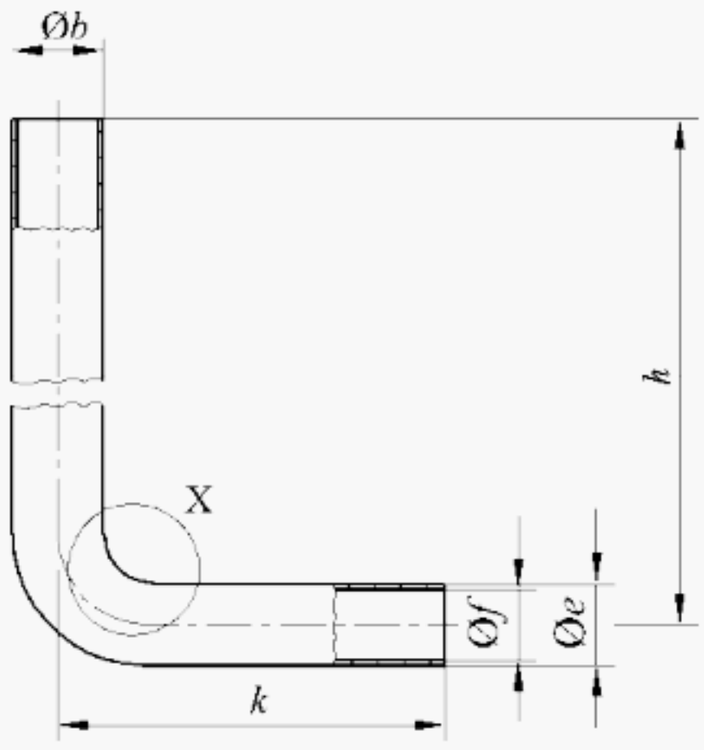
Designation	Symbol	Dimension mm	Remarks
Outside diameter at inlet	*b*	$32\ ^{+0,5}_{0}$	For flush pipes of design A
		$50\ ^{+0,5}_{0}$	For flush pipes of design B
Inside diameter	*c*	$50\ ^{+1}_{0}$	For flush pipes of design C
Outside diameter at outlet to WC	*e*	$32\ ^{+0,5}_{0}$	For flush pipes of design A
		$44\ ^{+0,5}_{0}$	For flush pipes of design B
		$45\ ^{+0,5}_{0}$	For flush pipes of design C
Inside diameter at outlet to WC	*f*	≥ 39	For flush pipes of designs B and C
Height of flush pipe	*h*	≥ 1 500	For flush pipes of design A
		≥ 165	For flush pipes of design B
		≥ 600	
		≥ 165	For flush pipes of design C
Length	*k*	≥ 210	For flush pipes of designs A and B
		≥ 180	For flush pipes of design C
Length of vertical inlet portion	*m*	≥ 100	For flush pipes of design A
Radius of bend	*r*	50 to 80	For flush pipes of design A
		≥ 15	For flush pipes of design B
		≥ 5	For flush pipes of design C

Apart from dimension *e* other dimensions are permissible, provided the performance requirements in 5.2 are satisfied.



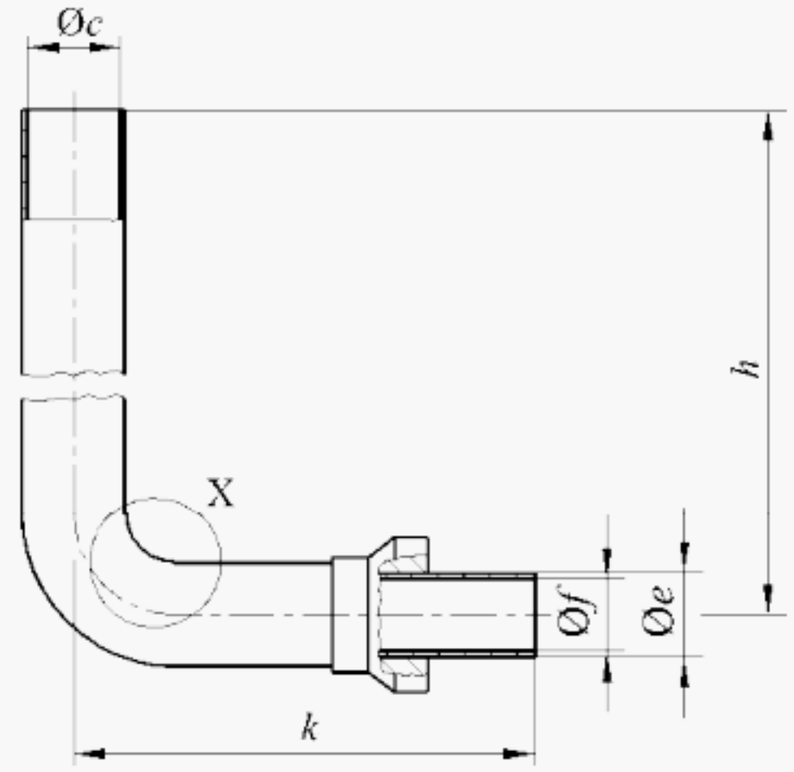
Key
See Table 2

Figure 3 — Design A flush pipe for wall-hung high-level cisterns, fabricated in one or two parts



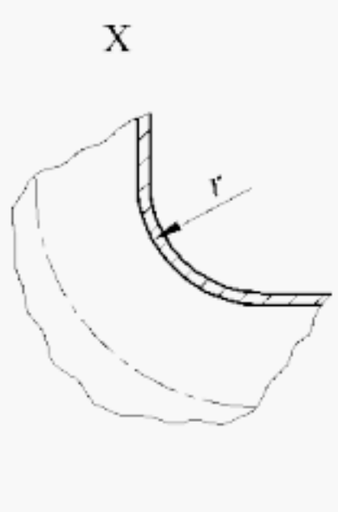
Key
See Table 2

Figure 4 — Design B flush pipe for wall-hung low-level or mid-level cisterns



Key
See Table 2

Figure 5 — Design C flush pipe for built-in cisterns



Key
r Radius of bend

Figure 6 — Detail X

5.2 Hydraulic and mechanical characteristics

5.2.1 Flush volume

Flush volume(s) shall correspond with those specified in Table 3, when measured as described in 5.3.2.

Table 3 — Flush volumes

Nominal flush volumes l	Flush volumes l			
	For complete flushing		For water-saving (dual) flushing	
	Minimum	Maximum	Minimum	Maximum
9,0	8,5	9,0	3,0	4,5 [a]
7,0	7,0	7,5	3,0	4,0 [a]
6,0	6,0	6,5	3,0	4,0 [a]
5,0	4,5	5,5	3,0	4,0 [a]
4,0	4,0	4,5	2,0	3,0 [a]
[a] Only for double-control water-saving (dual) flushing devices.				

Flushing cisterns or their components shall be marked to allow the correct volume(s) of flush to be achieved.

Flushing cisterns with a nominal volume of 9 l, 7 l, 6 l, 5 l or 4 l can be used to deliver the different volumes shown in Table 3. Adjustment can be effected at the inlet valve and/or the outlet mechanism. The manufacturer's instructions shall describe the procedure and the consequences (e.g. increase in the residual water level or decrease in the filling level).

5.2.2 Water-saving devices

Water-saving mechanisms shall be designed so that, when selected, only part of the total flush volume is delivered.

Water-saving mechanisms shall comply with the requirements specified below:

a) Double-action mechanisms (interruptible):

   1) one action initiates flushing; and

   2) a second action stops the flush.

Devices with immediate and automatic closing are not permitted.

b) Double-control mechanisms (dual control):

   1) one control releases the full flush volume; and

   2) another control releases a reduced flush volume.

Both devices shall deliver flush volumes and flush rates in accordance with Tables 3 and 4.

5.2.3 Flush rate and impact force

When tested as described in 5.3.3 and 5.3.11, the flush rate and the impact force shall comply with the values specified in Table 4.

Table 4 — Flush rates and impact force

Type of flushing cistern	Test height mm	Impact force N	Flush rate for complete flush l/s
Independent wall-hung low-level	200 ± 5	—	2,4 ± 0,2
Independent built-in	≥ 195 [a]	—	2,2 ± 0,2
Independent built-in	< 195 [a]	> 3,9 (defined by the maximum method) or > 3,7 (defined by the fixed time frame method)	2,2 ± 0,2
Independent wall-hung mid-level	565 ± 5	—	$1{,}8\ ^{+0,4}_{-0,1}$
Independent wall-hung high-level	1 365 ± 5	—	$1{,}8\ ^{+0,4}_{-0,1}$
One-piece and close-coupled	—	—	n.a. [b]
Multiple use close-coupled	—	—	min. 2,0 [c]

[a] Flushing cisterns with integral flush pipes and flushing cisterns built into wall frames shall be tested as supplied by the manufacturer, regardless of the test height.

[b] One-piece and close-coupled type will be tested in accordance with EN 997.

[c] Independent from this value, the flushing cistern shall be tested in accordance with EN 997 with dedicated WC pans specified by the manufacturer of multiple use close-coupled flushing cistern.

5.2.4 Overflow

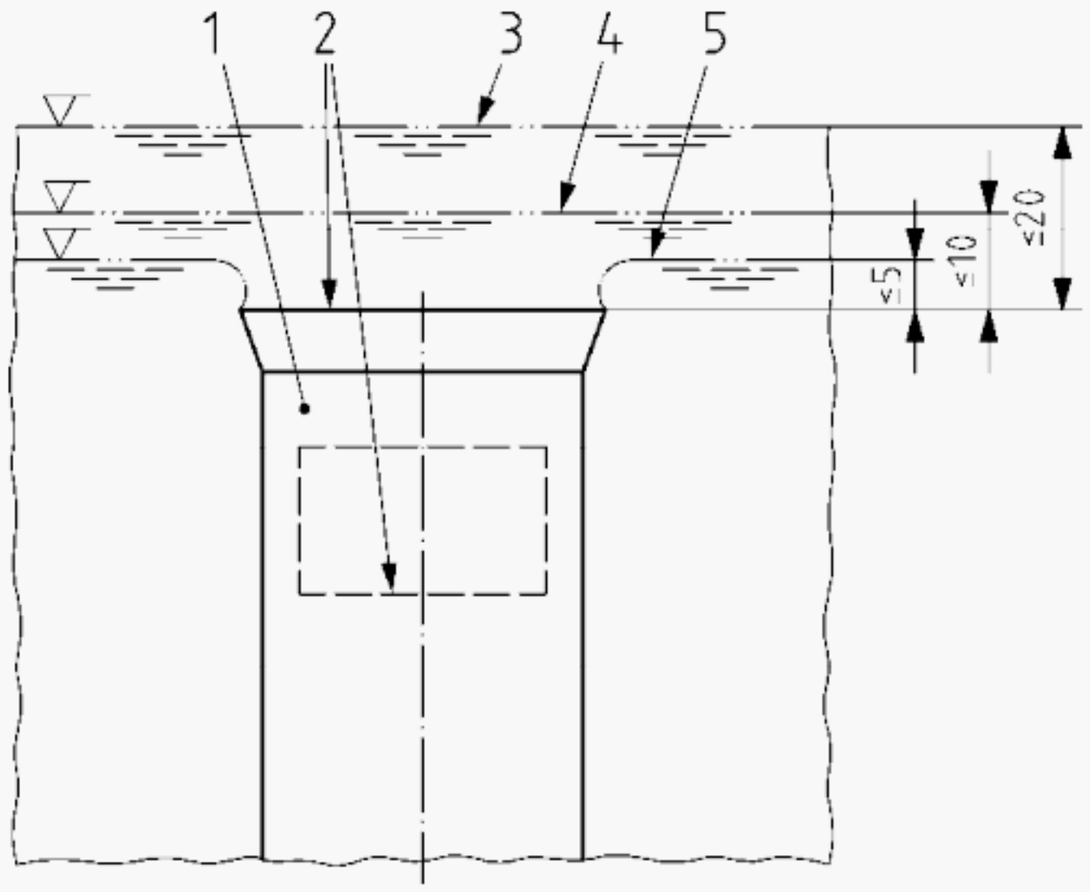
When tested as described in 5.3.4, the overflow shall be designed in accordance with the requirements specified below (see Figure 7):

a) the distance between the maximum water level and the level of overflow shall be ≤ 20 mm;

b) the distance between the critical water level and the level of overflow shall be ≤ 10 mm;

c) the distance between the meniscus level and the level of overflow shall be ≤ 5 mm.

Dimensions in millimetres



Key

1 Overflow pipe
2 Overflow level
3 Maximum water level
4 Critical water level
5 Meniscus level

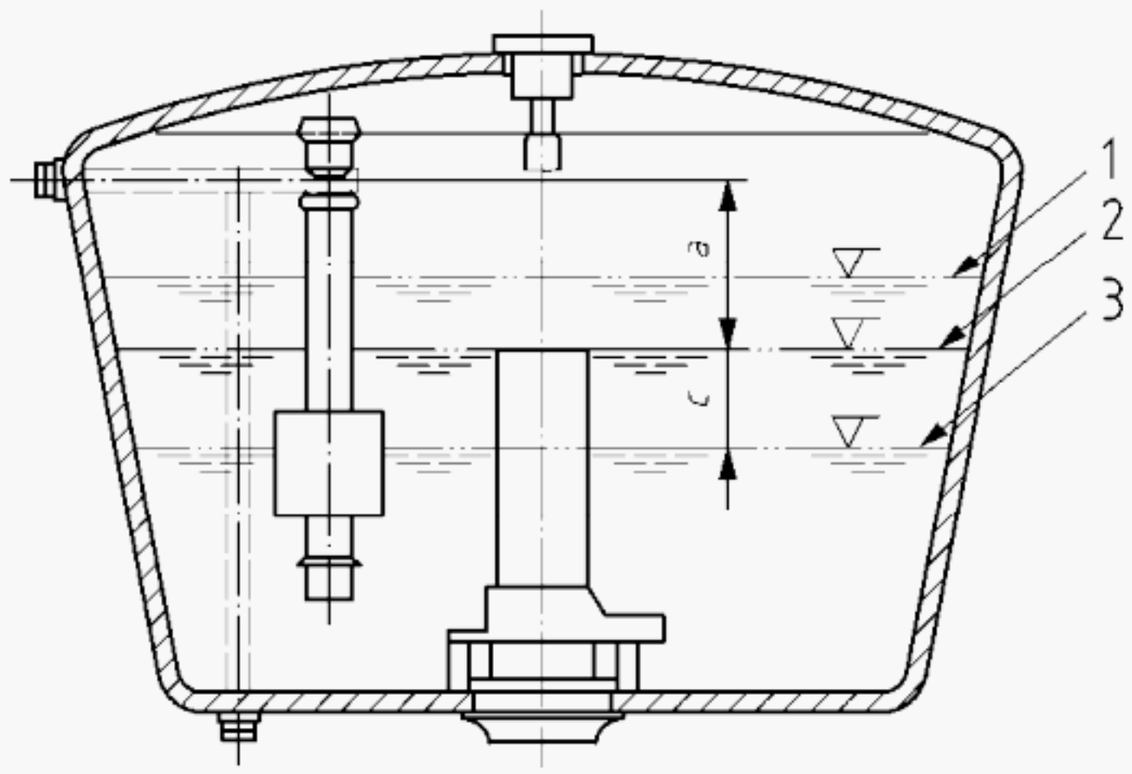
Figure 7 — Maximum, critical and overflow level

5.2.5 Inlet valve opening characteristics for water saving flushing

When tested as described in 5.3.5, inlet valves used with flushing cisterns equipped with a water-saving device shall re-open during or after the short flush has been completed.

5.2.6 Safety margin – Dimension "*c*"

When tested as described in 5.3.6, dimension "*c*" (see Figure 8) corresponding to the distance between the overflow level and the maximum nominal water level indicated by the manufacturer shall be at least 20 mm.



Key

1 Maximum water level
2 Overflow level
3 Maximum nominal water level
a Distance between overflow level and the point of the air inlet orifice of the inlet valve
c Safety margin

Figure 8 — Safety margin dimensions

5.2.7 Backflow prevention, air gap, safety margin – Dimension "a"

When tested as described in 5.3.7, the dimension "a" (see Figure 8) between the overflow level and the lowest point of the air inlet orifice of the inlet valve shall be 20 mm minimum as required by EN 1717 to prevent backflow.

In the case of adjustable overflow, the adjustment shall provide a dimension "a" of 20 mm minimum.

5.2.8 Outlet valve leaktightness

When tested in accordance with 5.3.8, there shall be no leakage greater than three drops within 15 min.

5.2.9 Outlet valve reliability

When tested in accordance with 5.3.9, the outlet mechanism functions shall be ensured.

The flushing device shall not show any failure or permanent distortion of any components including linkages that prevents normal operation of the mechanism.

The outlet of the flushing device shall not show leakage greater than three drops within 15 min.

5.2.10 Operating force

When tested as described in 5.3.10, it shall be possible for the outlet mechanism to be actuated with a maximum force of 25 N.

5.2.11 Durability

Class 1 products conforming with 5.2.1, 5.2.3 to 5.2.9 and Clause 8 are deemed to be durable.

5.3 Test methods

5.3.1 General

The tests described are type tests (laboratory tests) and not quality control tests carried out during manufacture.

5.3.2 Flush volume

5.3.2.1 General

The flush volume(s) shall be as specified in Table 3.

The flush volume(s) for one-piece and close-coupled cisterns supplied with a WC pan shall conform with the value(s) specified by the manufacturer.

5.3.2.2 Determination of the full flush volume

— Install the cistern on a firm flat horizontal or vertical surface as appropriate.

— Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.

— Shut off the supply.

— Operate the flushing mechanism control and collect the water delivered.

— Measure the volume using a calibrated container.

— Perform the test three times.

— If there are differences in the volumes delivered, calculate the arithmetic mean for the three volumes.

— In the case of flushing cisterns that provide a choice of flush volumes, the test shall be repeated for each of these flush volumes.

5.3.2.3 Determination of the flush volume for water-saving devices

5.3.2.3.1 Double-action water-saving devices

— Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.

— Shut off the supply.

— Operate the flushing mechanism control and stop the flush after 1,5 s whilst collecting the water delivered.

— Measure the volume using a calibrated container.

— Perform the test three times.

— If there are differences in the volumes delivered calculate the arithmetic mean for the three volumes.

— In the case of flushing cisterns that provide different flush volumes, the test shall be repeated for each of these volumes.

5.3.2.3.2 Double-control water-saving devices

— Fill the flushing cistern via an inlet valve to the level indicated by the manufacturer.

— Shut off the supply.

— Operate the control for the reduced flush volume and collect the water delivered.

— Measure the volume using a calibrated container.

— Perform the test three times.

— If there are differences in the volumes delivered, calculate the arithmetic mean for the three volumes.

— In the case of flushing cisterns that provide different flush volumes, the test shall be repeated for each of these volumes.

5.3.3 Flush rate

5.3.3.1 Test apparatus

a) For flushing cisterns equipped with a flush pipe, the test shall be carried out with the flush pipe using the height specified in Table 4.

For multiple-use close-coupled flushing cisterns, the test shall be carried out without a flush pipe.

b) A pressure sensor with the following characteristics shall be used:

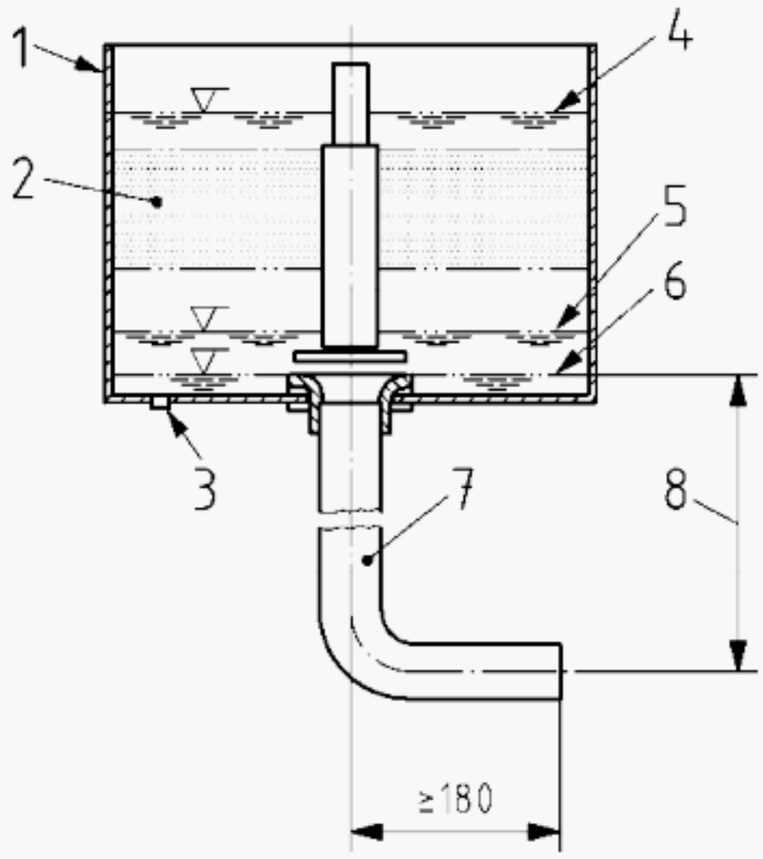
1) measuring range from 0 MPa to 0,005 MPa (from 0 bar to 0,05 bar);

2) accuracy > class 1;

3) response time ≤ 10 ms;

4) acquisition rate ≥ 40 acquisitions per second.

Dimensions in millimetres



Key

1 Flushing cistern
2 Measured volume
3 Pressure sensor
4 Nominal water level
5 Residual water level
6 Seat level
7 Flush pipe
8 Test height (see Table 4)

Figure 9 — Test arrangement for testing low-level, mid-level and built-in flushing cisterns

5.3.3.2 Determination of the residual water level

— Fill the flushing cistern via an inlet valve to the water level indicated by the manufacturer.

— Shut off the supply.

— Operate the flushing mechanism.

— Record the residual water level, when flushing is completed.

— Perform the test three times.

— If there are differences in the levels obtained, record the highest residual water level.

— In the case of flushing cisterns with alternative flush volumes indicated, the residual water level shall be established for each volume.

— In the case of flushing cisterns having an adjustment of flushing volumes via the outlet valve, the increased residual water level shall be established and marked for each of the adjustable flushing water volumes.

5.3.3.3 Establishing the measuring points to measure the flush rate

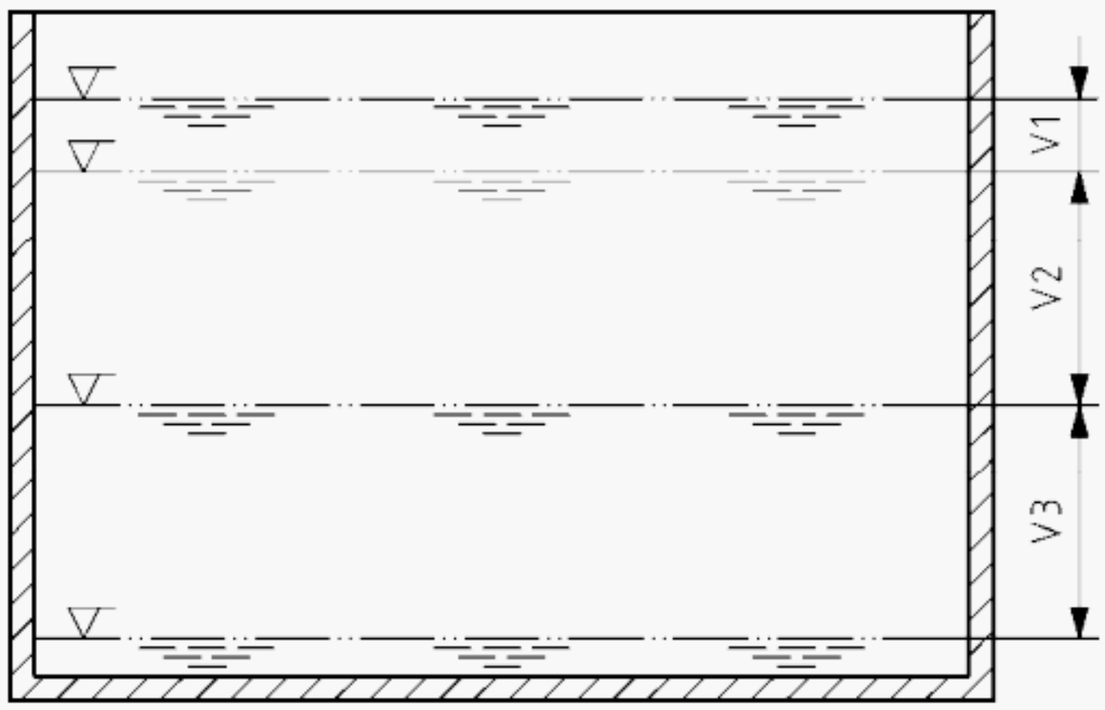
5.3.3.3.1 General

In order to measure the flush rate, it is necessary to establish the measuring points indicated in Figures 10, 11 and 12.

5.3.3.3.2 Flushing cisterns with an outlet valve adjustment for flushing volumes of 6 l, 7 l or 9 l respectively

The determination of the measuring points and the adjustment of the water level are illustrated in Figure 10.

The choice of measuring points is significant for measuring the flush rate.



Key

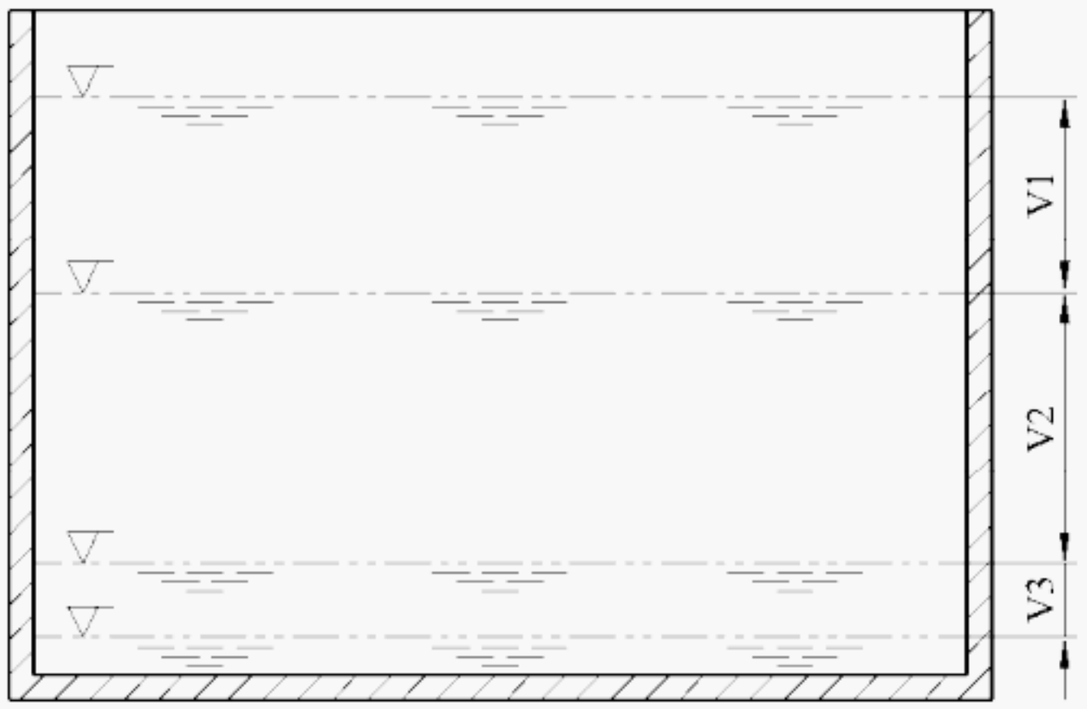
V1 Starting volume (full flush 1,0 l)
V2 Measuring volume (full flush 3,0 l)
V3 Finishing volume (full flush 2,0 l, 3,0 l, 5,0 l)

Figure 10 — Flushing cisterns with an outlet valve adjustment for flushing volumes of 6 l, 7 l or 9 l respectively

5.3.3.3.3 Flushing cisterns with an inlet valve adjustment for flushing volumes of 6 l, 7 l or 9 l respectively

The determination of the measuring points and the adjustment of the water level are illustrated in Figure 11.

The choice of measuring points is significant for measuring the flush rate.



Key

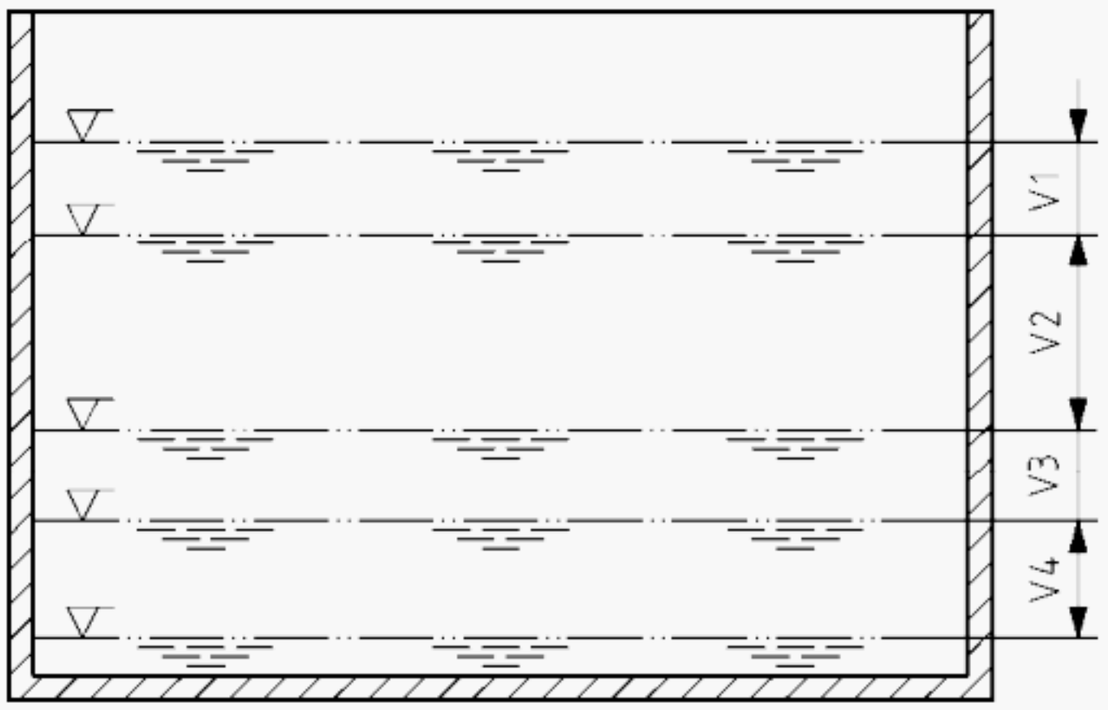
V1 Starting volume (full flush 1,0 l, 2,0 l, 4,0 l)
V2 Measuring volume (full flush 3,0 l)
V3 Finishing volume (full flush 2,0 l)

Figure 11 — Flushing cisterns with an inlet valve adjustment for flushing volumes of 6 l, 7 l or 9 l respectively

5.3.3.3.4 Flushing cisterns with a combined outlet/inlet valve adjustment flushing volume of 4,0 l or 5,0 l respectively

Flushing cisterns with a combined outlet/inlet valve adjustment flushing volume of 4,0 l or 5,0 l and the determination of the measuring points and the adjustment of the water level are illustrated in Figure 12.

The choice of measuring points is significant for measuring the flush rate.



Key

V1 Starting volume (full flush 1,0 l)
V2 Measuring volume (full flush ≥ 2,0 l)
V3 Finishing volume (full flush 1,0 l)
V4 Residual volume (full flush individual)

Figure 12 — Flushing cisterns with a combined outlet/inlet valve adjustment flushing volume of 4,0 l or 5,0 l respectively

EXAMPLE For a flush with 4 l in a 7 l flushing cistern:

Maximum adjustable flushing volume	7,0 l

Adjustment via the inlet valve to 5,5 l

Giving for full flush:

— V1 = 1,0 l;

— V2 = 2,0 l;

— V3 = 1,0 l;

— V4 = 1,5 l.

V4 being the volume remaining in the flushing cistern, controlled by the outlet valve.

5.3.3.3.5 Flushing cisterns having no flushing volume adjustment

For flushing cistern having no flushing volume adjustment, i.e. where the volume is permanently set to 4 l, 5 l, 6 l, 7 l or 9 l, the measuring points and the setting of the water level shall be established or obtained by analogy with the description in 5.3.3.3.2 to 5.3.3.3.4.

5.3.3.4 Determination of flush rate

5.3.3.4.1 General

For flushing cisterns providing the possibility of adjustment to different flushing volumes, the flush rate is to be measured at the adjustment corresponding to the lowest measuring points as 5.3.3.3.2 to 5.3.3.3.4.

5.3.3.4.2 Flush rate for complete flushing

— Fill the flushing cistern via an inlet valve to the level determined as described in 5.3.3.3.

— Shut off the water supply.

— Operate the flushing mechanism.

— Using the sensor established in the cistern as described in 5.3.3.1, record the pressure/time curve.

— Extrapolate from the recording the flush rate between the measuring points established as described in 5.3.3.3.

— The test shall be performed three times.

— The arithmetic mean of the three separate operations shall be taken as the flush rate.

5.3.4 Determination of the overflow capacity

— Record the overflow level.

— Supply the flushing cistern with a flush rate of 0,28 l/s for at least 60 s.

  In the case of a combined mechanism (inlet valve + flushing mechanism), supply the mechanism at a pressure of 0,6 MPa (6 bar) and force the inlet valve to be open for at least 60 s.

— Record the maximum water level when the level has stabilised.

— Shut off the water supply.

— Determine the water level 2 s after the water supply is shut-off (critical water level).

— Record the meniscus level after stabilisation.

5.3.5 Inlet valve opening characteristics

— Fill the flushing cistern using an inlet valve with a supply pressure of 0,3 MPa (3 bar) to the level(s) indicated by the manufacturer.

— In the case of a double-action flushing cistern, stop the flush after (1,5 ± 0,2) s or in the case of a double-control cistern, operate the reduced flush control.

— Verify opening of the inlet valve and re-filling of the cistern to the level(s) indicated by the manufacturer.

5.3.6 Determination of dimension "*c*"

Fill the flushing cistern using an inlet valve to the highest water level indicated by the manufacturer.

Measure dimension "*c*" representing the safety margin (see Figure 8) between the maximum nominal water level and the overflow level.

5.3.7 Determination of dimension "*a*"

Determine dimension "*a*" (see Figure 8) representing the distance between the lowest point of the inlet valve's air inlet orifice and the overflow level using the inlet valve manufacturer's marking as specified in EN 14124.

5.3.8 Outlet valve leak tightness

— A flush pipe is not fitted for this test.

— Fill the flushing cistern to the water level indicated by the manufacturer. In the case of flushing cisterns with adjustable levels, the minimum level shall be used.

— Actuate the flushing mechanism and allow the flushing cistern to fill again.

— Leave the flushing cistern for a period of 2 h.

— Wipe the outlet orifice dry.

— Place a piece of paper under the flushing cistern.

— Leave for 15 min. Observe and record any watermarks on the paper.

In the case of double-control mechanisms, the test is to be repeated using the reduced flush volume.

5.3.9 Outlet valve reliability test

5.3.9.1 Test apparatus

The test apparatus comprises:

— a flushing cistern which shall be filled through an inlet valve or an alternative filling device to accelerate the test;

— an automatic system allowing the flushing mechanism to be activated with a controlled force in the range of 25 N to 30 N and with a velocity of 5 cm/s in a period of 0,5 s to 1 s for the duration of the test. The system shall ensure that the outlet valve is fully closed before the flushing cistern is refilled;

— a water supply with a temperature of 7 °C to 25 °C.

A flush pipe is not fitted for this test.

5.3.9.2 Procedure

The test shall be performed using the highest water level in the flushing cistern when several alternative water levels are indicated.

One cycle consists of:

a) Fill the flushing cistern to the highest indicated water level indicated by the manufacturer.

b) Actuate the flush operating control by means of the automatic system.

c) Allow the mechanism to close again.

d) Re-fill the flushing cistern.

e) In the case of single-flush devices, submit the cistern to 50 000 of these cycles (category I) or 200 000 of these cycles (category II).

f) In the case of double-control devices the test is carried out:

1) either: with three reduced flushes followed by a full flush for a total of 50 000 flushes (category I) or 200 000 flushes (category II);

2) or: with 37 500 reduced flushes followed by 12 500 full flushes (category I) or 150 000 reduced flushes followed by 50 000 full flushes (category II).

g) Record any failure or permanent distortion of the outlet valve during and at the end of the test.

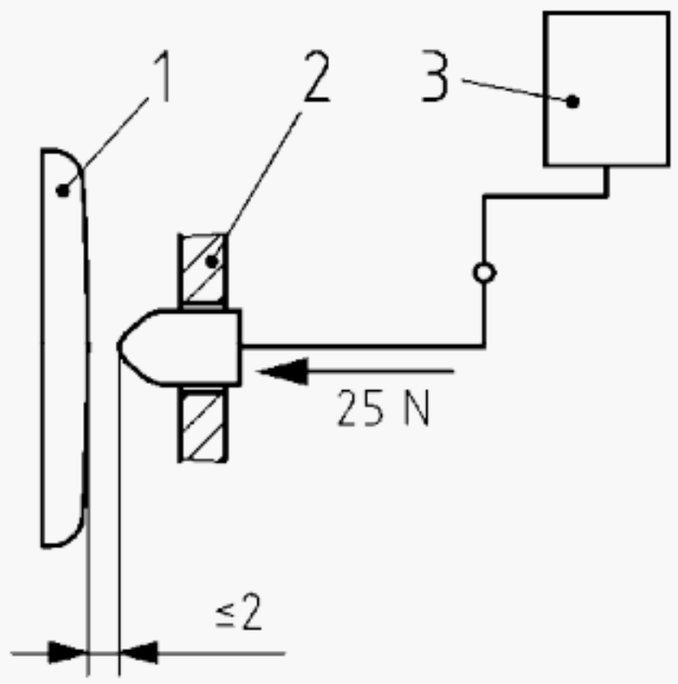
h) 2 h after completing the cycles, verify the leaktightness in accordance with 5.2.8.

5.3.10 Operating force

5.3.10.1 Test apparatus

Examples of typical test arrangements are shown in Figures 13 and 14.

Dimensions in millimetres

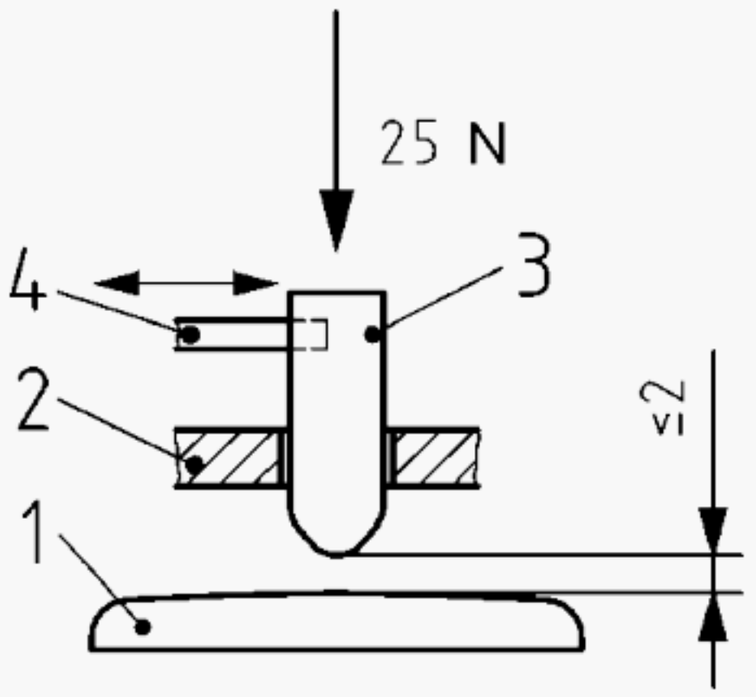


Key

1 Push button or cistern operating mechanism
2 Guide
3 Test force

Figure 13 — Test apparatus for vertical operation

Dimensions in millimetres



Key

1 Push button or cistern operating mechanism
2 Guide
3 Test force
4 Release

Figure 14 — Test apparatus for horizontal operation

5.3.10.2 Procedure

— Fill the flushing cistern to the maximum water level indicated by the manufacturer.

— Place the testing device 2 mm from the push button or cistern operating mechanism.

— Apply a maximum force of 25 N to the push button or cistern operating mechanism.

— Verify that the push button or cistern operating mechanism is activated within 0,5 s to 1 s.

5.3.11 Impact force

5.3.11.1 General

The impact force of the flushing cistern complete with the flush pipe according to Table 4 shall be measured with the test device shown in Figure 15. The flushing water from the flush pipe shall be directed against the sensor plate (90 mm diameter) to create an impact force. This impact force shall be measured with a load cell and expressed in newtons.

The test procedure consists of the measurement procedure and the calculation procedure using calibrated test equipment.

5.3.11.2 Test device

The test device shall meet the following requirements:

— The test device shall be in accordance with Figures 15 and 16.

— The load cell [1] shall have an accuracy of 0,2 g (C3 (OIML)) and a load capacity of 3 kg regardless of the mounting position.

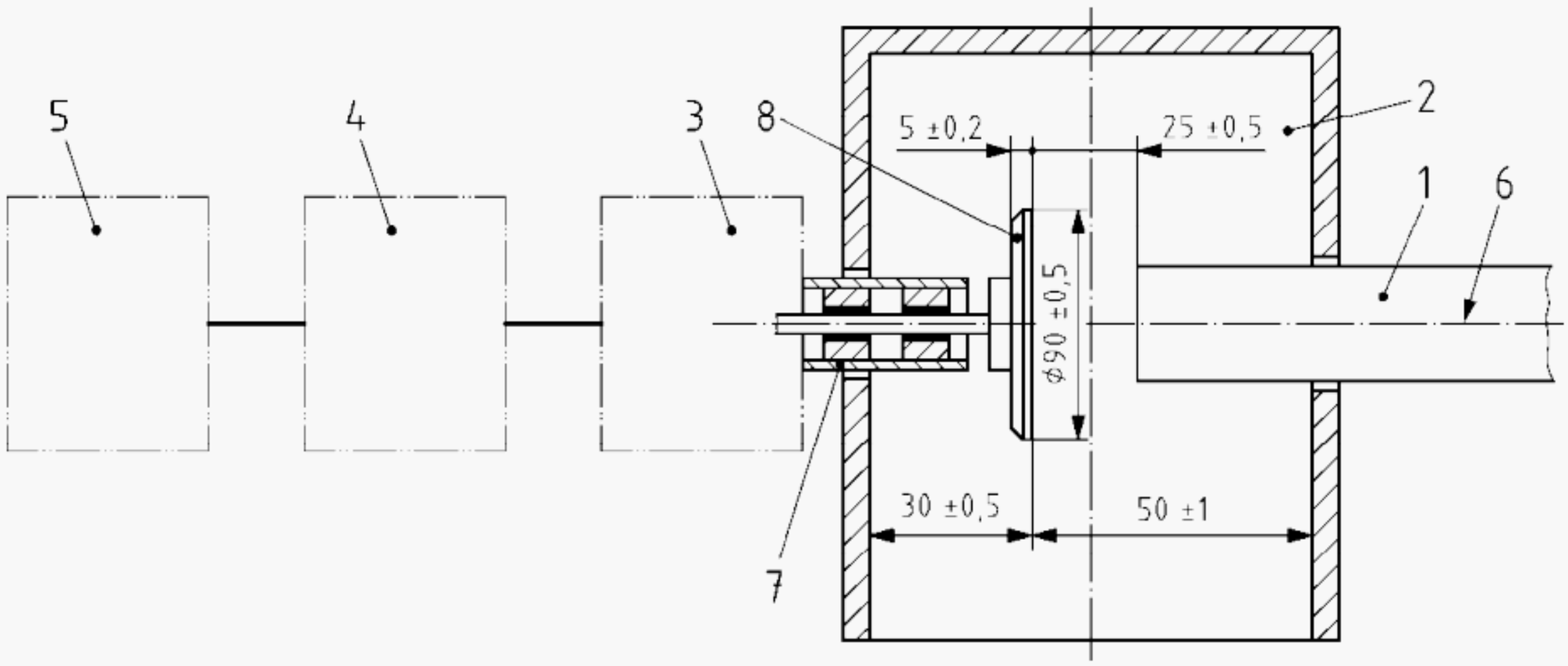
— Measurement amplifier [2] and load cell shall form one system.

— The measurement amplifier shall work with a sampling frequency of 600 Hz and a 100 Hz Bessel filter.

— The system (consisting of the measurement amplifier and load cell) shall have a tare function.

— The water used for the test shall have a temperature between 7 °C and 25 °C.

Dimensions in millimetres



Key

1 Flush pipe of the flushing cistern
2 Splash guard (for details see Figure 16)
3 Load cell unit
4 Measurement amplifier for data acquisition
5 Computer for recording and evaluating the measurement data (with suitable software [3])
6 The centre axis of the flush pipe shall be in line with the centre axis of the sensor plate.
7 The mechanical connection between the sensor plate and the load cell shall be suitable for the correct function of the load cell. It is recommended to have short distances to the load cell and sufficient adequate bearings.
8 Sensor plate

Figure 15 — Test device [4] to measure the impact force

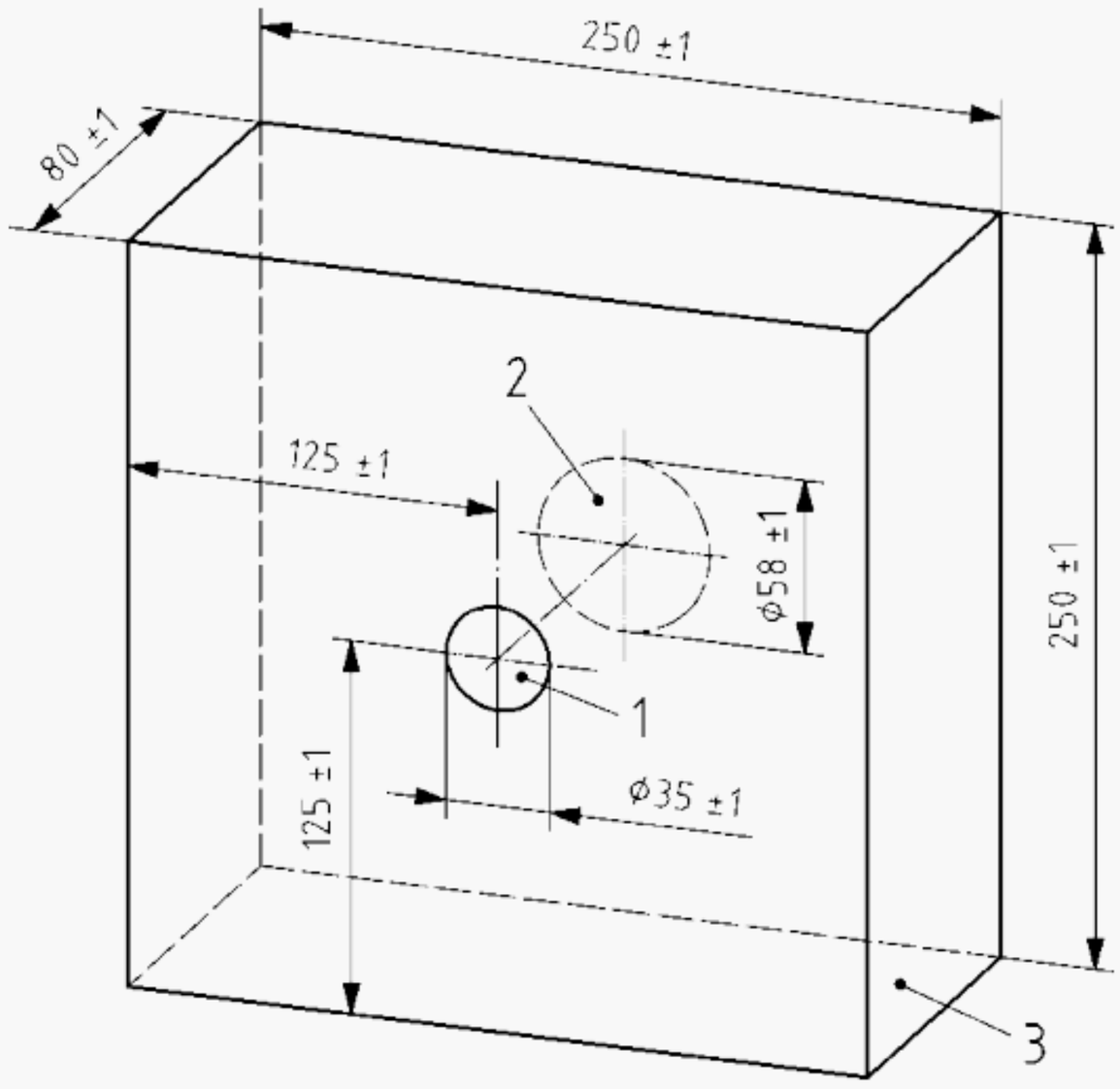
[1] Suitable test device (i.e. PW6DC3MR 3 kg) is available from Fa. Hottinger Baldwin Messtechnik GmbH, PO-Box 10 01 51, 64201 Darmstadt, GERMANY. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of these products.

[2] Suitable test device (i.e. MX840) is available from Fa. Hottinger Baldwin Messtechnik GmbH, PO-Box 10 01 51, 64201 Darmstadt, GERMANY. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of these products.

[3] Suitable software (i.e. Catman easy) is available from Fa. Hottinger Baldwin Messtechnik GmbH, PO-Box 10 01 51, 64201 Darmstadt, GERMANY. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of these products.

[4] Suitable test device is available from Fa. LGA QualiTest GmbH, Dreikronenstr. 31, 97082 Würzburg, GERMANY. This information is given for the convenience of users of this European Standard and does not constitute an endorsement by CEN of these products.

Dimensions in millimetres



Key

1 Hole diameter: (35 ± 1) mm for fixing the sensor plate including the mechanical connection to the load cell to the front of the splash guard
2 Hole diameter: (58 ± 1) mm for fixing the flush pipe (position 1 of Figure 15) to the back of the splash guard
3 Wall thickness minimum 5 mm

NOTE Dimensions shown are internal dimensions.

Figure 16 — Splash guard

It is not permissible to use other test equipment than the one shown in Figure 15.

5.3.11.3 Procedure for calibrating the load cell unit and the measurement amplifier

The test device (see Figure 15 except position 1) with all its components assembled shall be calibrated in its testing position with a force of 4 N.

5.3.11.4 Measurement procedure

1) Check and record the correct horizontal alignment of the flush pipe and the vertical alignment of the flushing cistern (see position 6 of Figure 15).

2) Record the water temperature.

3) Set the load cell unit and the measurement amplifier to zero by using the tare function of the system.

4) Start the recording of the impact force measurement values with a resolution of 600 Hz.

5) Activate the flushing device for full flush with an activating speed of 14 cm/s. In the case of non-manually (e.g. electronic) activated outlet valve, the activating speed is not applicable.

6) Stop the recording of the measurement data after the complete flush.

7) Export the measurement data (time and force) into a table calculation file and store the data.

8) Repeat the procedure (3) to 6)) a further nine times (ten measurements).

5.3.11.5 Calculation procedure for fixed time frame 0,35 s to 0,5 s

1) Open the recorded measurement data.

2) Set the time point zero of the flush where the force signal exceeds 0,5 N for the first time and number this point with 1.

3) Number the datasets to point 299 beginning with the time point zero.

4) Calculate the average of the 90 force values from point 210 (0,35 s) to point 299 (0,5 s).

5) Record average of the 90 force values as the impact force of this measurement.

6) Evaluate the impact force for each measurement by repeating the procedure (1) to 5)) a further nine times.

7) Calculate the average of the ten tests (of 6)) to two decimal places the result of which is the impact force of the flushing cistern.

8) Record the impact force of the flushing cistern.

5.3.11.6 Calculation procedure for maximum impact force

1) Open the recorded measurement data.

2) Set the time point zero of the flush were the force signal exceeds 0,5 N for the first time and number this point with 1.

3) Determine the arithmetic average value of each possible 60 consecutive measuring values.

Example:

$$\overline{F_1} = \frac{1}{60}\sum_{i=1}^{60} F_i \qquad \overline{F_2} = \frac{1}{60}\sum_{i=2}^{61} F_i \qquad \overline{F_3} = \frac{1}{60}\sum_{i=3}^{62} F_i \qquad \ldots.$$

where

$\overline{F_1}$ is the arithmetic mean of the impact force calculated out of the measurement point 1 to 60, in newtons;

$\overline{F_2}$ is the arithmetic mean of the impact force calculated out of the measurement point 2 to 61, in newtons;

$\overline{F_3}$ is the arithmetic mean of the impact force calculated out of the measurement point 3 to 62, in newtons;

$\overline{F_i}$ is the specific impact force of a measuring point, in newtons.

4) The impact force of this measurement is the maximum of all the average values.

5) Record the impact force of this measurement.

6) Evaluate the impact force for each measurement by repeating the procedure (1) to 5)) a further nine times.

7) Calculate the average of the ten tests (of 6)) to two decimal places, the result of which is the maximum impact force of the flushing cistern.

8) Record the impact force of the flushing cistern.

6 Functional requirements and test methods for class 2 products

6.1 Inlet valve

Either the first inlet valve or, in the event of this failing, all four of the remaining inlet valves shall comply with BS 1212-2, -3 or -4 subject to the amendments listed below:

— The water hardness during tests shall not exceed the range of (230 ± 20) ppm of calcium carbonate ($CaCO_3$) during the course of the test.

— The supply pressure for the endurance test described in Parts 3 and 4 shall be (0,15 ± 0,01) MPa ((1,5 ± 0,1) bar).

— Part 2 valves shall be subject to an endurance test as described in Parts 3 and 4 using a supply pressure of (0,15 ± 0,01) MPa ((1,5 ± 0,1) bar).

— The endurance test shall be undertaken for 200 000 cycles and, if the first inlet valve fails the test, the four valves subsequently tested shall all satisfy the requirements.

6.2 Backflow prevention

When tested in accordance with the backflow prevention requirements of Clauses 15 or 17 of BS 1212-3:1990 or BS 1212-4:1991 respectively there shall be no evidence of backflow.

6.3 Marking of flushing cistern

Every flushing cistern, other than a pressure flushing cistern, shall be clearly marked internally with an indelible line to show the intended volume of flush, together with an indication of that volume. Discharge volume(s) shall be based on measurement from the water level in the cistern using the manufacturer's original equipment to the residual water level in the cistern on completion of a flush.

6.4 Warning pipe and overflow provision

When tested as described in 6.10.2, every flushing cistern, not being a pressure flushing cistern, shall be fitted with a warning pipe connection arranged with the discharge level between 25 mm to 32 mm above the marked water level, or a no less effective device shall be provided. The top edge of any internal overflow shall be not less than 10 mm above the warning level.

6.5 Flush volume

6.5.1 Full flush

When tested as described in 6.10.3 with any adjustable flushing device set to deliver the maximum flush volume, the measured discharge shall on no occasion exceed 6 l.

6.5.2 Reduced flush

When tested as described in 6.10.3 with any adjustable flushing device set to deliver a reduced flush volume, the measured discharge shall on no occasion exceed two-thirds of the full-flush volume.

6.6 Flush rate

When tested as described in 6.10.4, the mean flush rate of discharge per flush shall be ≥ 1,85 l/s for the full flush and ≥ 1,6 l/s for the reduced flush, if provided.

6.7 Physical endurance and leakage of flushing device

When tested as described in 6.10.5, the flushing device shall not undergo any failure or permanent distortion of any components including linkages that prevents normal operation of the mechanism.

No more than two instances of leakage are permitted. A leak is defined as being visible discharge of water amounting to more than three separate drops. If the first flushing device fails the test, the four devices subsequently tested shall all satisfy the requirements.

6.8 Chemical endurance of flushing device

When tested as described in 6.10.6, there shall be:

— no dimensional alteration of any component greater than 1 mm or 5 % whichever is the lesser;

— no weight loss of any component greater than 1 g or 5 % whichever is the lesser;

— no visible sign of physical change such that performance is impaired;

— no deterioration in performance.

The flushing device shall not leak after undergoing a 3 000 cycle physical endurance test and the long-term leakage test.

6.9 Durability

Class 2 products conforming with 6.1, 6.5, 6.6, 6.7, 6.8 and Clause 8 are deemed to be durable.

6.10 Test methods

6.10.1 Inlet valve tests

6.10.1.1 Test apparatus

6.10.1.1.1 Apparatus as specified in BS 1212-2, -3 or -4, subject to the additional requirements specified in 6.1.

Supply pressure requirements for pressurised cisterns shall conform with the manufacturer's recommendations.

6.10.1.2 Procedure

Subject the inlet valve to the tests as specified in BS 1212-2, -3, or -4 as appropriate. In testing against Clause 17 of BS 1212-2:1990, BS 1212-3:1990 or BS 1212-4:1991 (modified in 6.1) if the first inlet valve fails, four further valves shall be tested.

6.10.1.3 Expression of results

Record whether the inlet valve complied with the requirements of BS 1212-2, -3 or -4 as modified by 6.1. For the test under Clause 17 of BS 1212-2:1990, BS 1212-3:1990 or BS 1212-4:1991 (as modified in 6.1), record whether the first inlet valves, or all four of the subsequent inlet valves, met the requirements.

6.10.2 Warning pipe and overflow provisions

6.10.2.1 Test apparatus

6.10.2.1.1 Flushing cistern with warning pipe connection or a device deemed to be no less effective and internal overflow, if provided, installed in accordance with the manufacturer's instructions.

6.10.2.1.2 Measuring device with an accuracy of ± 0,1 mm.

6.10.2.1.3 Water supply controlled by a stop valve.

6.10.2.2 Procedure

Set the flushing cistern level. Fill with water to the nominal static water level marked by the manufacturer. Measure the distance from the water level to the warning level, i.e. the invert of a side connection warning pipe connection or the top of a bottom connection warning pipe connection. If appropriate, measure the distance from the warning level to the top of any internal overflow.

6.10.2.3 Expression of results

Record compliance or any failure to comply with the requirements of 6.4.

6.10.3 Flush volume test

6.10.3.1 Apparatus

6.10.3.1.1 Flushing cistern, complete with fitments including flush pipe and cover, installed in accordance with the manufacturer’s instructions, on a firm, flat, vertical surface.

6.10.3.1.2 Measuring vessel capable of collecting the flush volume.

6.10.3.1.3 Water supply controlled by a stop valve.

6.10.3.2 Procedure

Set the dual-flush control or setting if provided, to the full-flush volume in accordance with the manufacturer’s instructions. Connect the water supply to the flushing cistern and fill to the marked water line. Operate the flushing mechanism three times, completing three flushing cycles. Fill the flushing cistern to the water line. Shut off the water supply, unless essential for the normal operation of the flushing device.

NOTE Where a water supply is essential for the normal operation of the device, it is recommended to maintain the supply at a hydraulic pressure of (0,15 ± 0,01) MPa ((1,5 ± 0,1) bar) or the minimum required to operate the device, whichever is the greater.

Operate the flushing device and collect the water in the measuring vessel. Record the volume of water collected. Repeat the procedure a further four times.

Reset the dual-flush control or setting, if provided, to the reduced-flush volume and repeat the procedure five times.

6.10.3.3 Expression of results

Measure the volume of water collected in the measuring vessel after each flush cycle, and record compliance or any failure to comply with the requirements of 6.5.

6.10.4 Flush rate test

6.10.4.1 Apparatus

6.10.4.1.1 Flushing cistern, complete with fitments including flush pipe and cover, installed in accordance with the manufacturer's instructions on a firm, flat, vertical surface.

6.10.4.1.2 Calibrated measuring container.

6.10.4.1.3 Fluid level sensing devices.

6.10.4.1.4 Electronic timer.

6.10.4.1.5 Water supply controlled by a stop valve.

6.10.4.1.6 Power supply.

6.10.4.2 Procedure

Set the dual-flush controller or setting, if provided, to the full-flush volume in accordance with the manufacturer's instructions. Connect the water supply to the flushing cistern and fill to the marked water line. Shut off the water supply, unless essential for the normal operation of the flushing device.

NOTE Where a water supply is essential for the normal operation of the device, it is recommended to maintain the supply at a hydraulic pressure of $(0,15 \pm 0,01)$ MPa $((1,5 \pm 0,1)$ bar) or the minimum required to operate the device, whichever is the greater.

Operate the flushing device completing one flushing cycle. On completion of the flush, using the calibrated measuring container, add 0,5 l of water to the flushing cistern. Locate and position a fluid sensing device at the water level in the flushing cistern. Using the calibrated measuring container, add further water to the flushing cistern equivalent to the volume of full-flush recorded in 6.10.3.3 less 1,0 l. Locate and position a second fluid sensing device at the water level in the flushing cistern. Add further water to the cistern up to the marked water level for the full-flush volume. Connect the two fluid level sensing devices to the electronic timer and connect to the power supply. Operate the flushing device and, on completion of the flush, record the time taken to discharge the volume of water between the fluid level sensing devices as displayed on the timer. Repeat the procedure a further four times.

If the flushing device is provided with a reduced flush facility, shut off the water and power supplies, and operate the flushing mechanism. Using the calibrated container, add to the flushing cistern a volume of water equivalent to the difference between the full-flush volume and reduced-flush volume as recorded in 6.10.3.3. Add a further 0,5 l. Locate and position a fluid level sensing device at the water level in the flushing cistern. Using the calibrated measuring container add further water to the flushing cistern until it is filled to a volume equivalent to the volume of full flush recorded in 6.10.3.3 less 1,0 l. Locate and position a second fluid sensing device at this water level in the flushing cistern. Add further water to the flushing cistern, up to the marked water level for the full-flush volume recorded in 6.10.3.3. Turn on the power supply. Set the dual-flush controller or setting to the reduced-flush volume in accordance with the manufacturer's instructions. Operate the flushing device and, on completion of the flush, record the time taken to discharge the volume of water between the fluid level sensing devices as displayed on the timer. Repeat the procedure a further four times.

6.10.4.3 Expression of results

From the five recorded times, at each flush volume, determine the average time and, using the following formula, calculate the mean rate of discharge using the following methods.

For the full flush

$$\frac{\textit{Volume of discharge per full flush in litres (recorded in 6.10.3.3)} - 1,0\ \text{l}}{\textit{Average time in seconds (recorded in 6.10.4.3)}}$$

For the reduced flush

$$\frac{\textit{Volume of discharge per reduced flush in litres (recorded in 6.10.3.3)} - 1{,}5\ l}{\textit{Average time in seconds (recorded in 6.10.4.3)}}$$

6.10.5 Physical endurance and leakage test of flushing device

6.10.5.1 Test apparatus

6.10.5.1.1 Flushing cistern, complete with fitments including flushing device, flush pipe and cover, installed in accordance with the manufacturer's instructions.

6.10.5.1.2 Means of operating the flushing limiter activator automatically in accordance with the manufacturer's instructions.

6.10.5.1.3 Water supply maintained at a hydraulic pressure of (0,15 ± 0,01) MPa ((1,5 ± 0,1) bar), or the minimum pressure required to operate the flushing device whichever is the greater; having maintained water hardness not greater than the range (230 ± 20) ppm as calcium carbonate ($CaCO_3$) during the course of the test.

6.10.5.1.4 Paper of a type which changes colour when wet.

6.10.5.2 Procedure

Connect the water supply. For a single flush flushing device, operate the flushing device and, if appropriate, allow the flushing cistern to re-fill. Carry out the long-term leak test. Three drops or more observed on the paper shall be considered a leak. Initiate automatic operation of the flushing device. Carry out the short-term leakage test and inspect the flushing device after a further 2, 5, 10, 50, 100, 500, 1 000, 10 000 and every subsequent 10 000 cycles. If a leak is detected, the leak test interval, but not the test itself, shall re-start (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10, etc. cycles). Continue until 200 000 test cycles have been completed, and then subject the flushing device to the long-term leak test. If, at any point during the test, three leaks have been detected, the test terminates and four further flushing devices shall be subjected to the same test, which again terminates if three leaks have been detected for any one of the flushing devices.

For flushing devices with reduced flush option operate the flushing device for a full flush and, if appropriate, allow the cistern to re-fill. Carry out the long-term leak test. Three drops or more observed on the paper shall be considered a leak. The test then continues with the sequence three reduced flushes activated followed by a maximum flush. The flushing device shall be subject to the short-term leak test after 2, 5, 10, 50, 100, 500, 1 000, 10 000 and every subsequent 10 000 flushes (maximum and reduced flushes each counting as one flush). If a leak is detected, the leak test interval, but not the test itself, shall re-start (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10, etc. cycles). Continue until 200 000 test cycles have been completed, and then subject the flushing device to the long-term leak test. If at any point during the test, three leaks have been detected, the test terminates and four further flushing devices shall be subjected to the same test, which again terminates if three leaks have been detected for any one of the flushing devices.

The flushing device shall be inspected for wear at the same frequency as the short-term leak test. If the flushing device or any of its operating linkages suffers structural failure that affects operation, the test terminates.

6.10.5.3 Expression of results

Record compliance, or any failure to comply, with the requirements of 6.7.

6.10.6 Chemical endurance test of flushing device

6.10.6.1 Test apparatus

6.10.6.1.1 Weighing scales having a resolution of 0,1 g and an accuracy of ± 0,05 g.

6.10.6.1.2 Micrometer having a resolution of 0,1 mm and an accuracy of ± 0,05 mm.

6.10.6.1.3 Test solution (100 ml of domestic chlorine-based bleaching agent, consisting of up to 5 % sodium hypochlorite (NaClO) and anionic surfectants to every 900 ml of water).

6.10.6.1.4 Container.

6.10.6.2 Procedure

Dismantle the flushing device and weigh all seals, plungers, pistons or other components that initiate and stop water discharge and measure and record the principle dimensions, e.g. external diameter and thickness. Re-assemble the components and place the complete assembly in the container filled with test solution. Ensure that the assembly is covered by at least 100 mm depth of test solution. Leave for a period of (90 ± 2) days. Remove from the test solution and rinse under clean water.

WARNING — Appropriate precautions should be taken when using chlorine based agents. Do not touch raw crystals or the stock solution, or allow these to come into contact with clothing or easily combustible materials.

Subject the flushing limiter to a 3 000 cycle endurance test using the long-term leak test after the first and last cycles, and check for leaks.

6.10.6.3 Expression of results

Record compliance, or any failure to comply with the requirements of 6.8.

6.10.7 Requirements for compatibility testing of class 2 products

This subclause provides background notes on the testing and compatibility of elements of WC suites. Class 2 flushing cisterns are intended for use in class 2 WC suites as specified in EN 997.

NOTE Reference should be made to EN 997:2003, 6.17.11, extracts from which are reproduced below.

Inlet valves shall satisfy BS 1212-2, -3 or -4 as modified in 6.1.

Flushing devices shall satisfy the requirements with regard to physical and chemical endurance. They shall also be capable of satisfying the flush volume test at full and, if appropriate, reduced flush volumes. They should also be capable of contributing towards the other requirements when tested in combination.

Flushing cisterns shall consist of compliant components and so satisfy warning pipe and overflow provisions and the flush volume test. They should also be capable of contributing towards the other requirements when tested in combination.

It should be noted that, when undertaking tests involving more than one component of a WC suite, components which could adversely affect the results of the whole test should not be changed without re-starting that test.

7 Requirements and test methods for class 3 products

7.1 Requirements and test methods

Urinal flushing cisterns shall fulfil and be tested in accordance with the test methods and requirements of Clauses 5 and 8.

7.2 Adjustment

To assure that the functional unit, e.g. urinal and flushing cistern, meets the functional requirements of EN 13407, the manufacturer of the flushing cistern shall provide the installer with an instruction manual showing adjustments of the flush rate and the flush volume in accordance with the requirements of a particular urinal in the following ranges measured in accordance with EN 13407:2006, Annex B:

a) the flush volume: < 5 l;

b) the flush rate: 0,4 l/s to 0,6 l/s.

8 Acoustic characteristics

The acoustic class corresponds to that applicable to the inlet valve.

The values declared for the cistern shall comply with the requirements for group I or II as specified in EN 14124.

9 Dangerous substances

See ZA.1 and ZA.3.

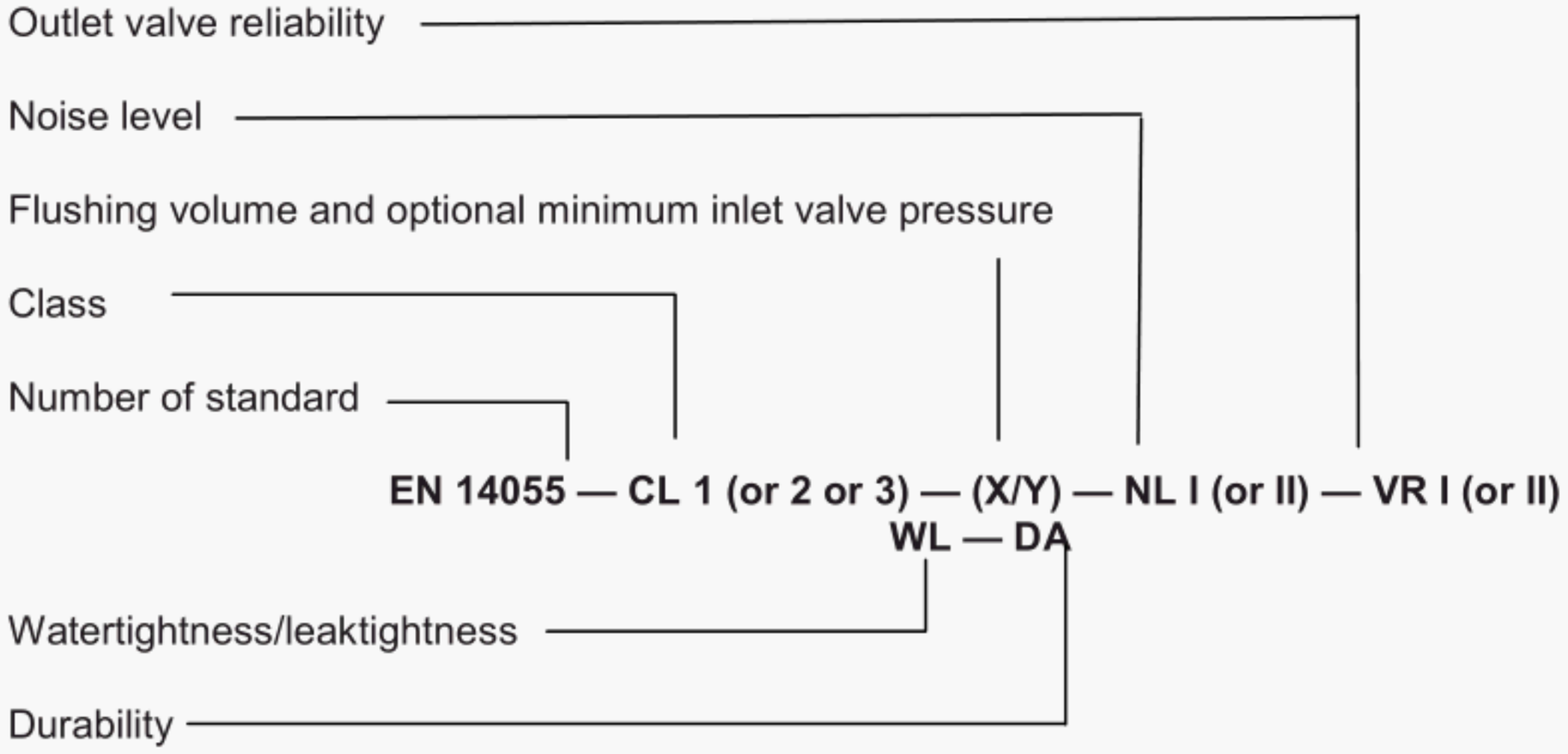
10 Marking and product designation

The relevant product characteristics for WC and urinal flushing cisterns including their abbreviations are given in Table 5.

Table 5 — Characteristics and abbreviations

Abbreviations	Characteristics
EN 14055	Number of European Standard for WC and urinal flushing cisterns
CL 1	Class 1: WC flushing cisterns for specified flush volumes
CL 2	Class 2: WC flushing cisterns intended for WC suites with flush volume ≤ 6 l
CL 3	Class 3: Class 1 flushing cistern intended for urinals for flush volume < 5 l and flush rate from 0,4 l/s to 0,6 l/s
(X/Y)	Specified flush volume 9 l, 7 l, 6 l, 5 l or 4 l for class 1 and class 3 flushing cisterns and optional minimum inlet valve pressure
VR	Outlet valve reliability (category I or II)
NL	Noise level (group I or II)
WL	Watertightness/leaktightness
DA	Durability

All WC and urinal flushing cisterns shall be designated in accordance with the following system:



The second line of the designation code can be omitted when those characteristics are fulfilled.

EXAMPLE 1 Class 1 WC flushing cistern providing a flush volume of 6 l with a classified inlet valve having a noise level of group I and with an outlet valve providing reliability of category I.

EN 14055 — CL 1 — 6 — NL I — VR I

EXAMPLE 2 Class 2 WC flushing cistern for use with a WC pan(s) specified by the manufacturer to form a WC suite for which the manufacturer has exercised the NPD option for noise level.

EN 14055 — CL 2 — NL/NPD

EXAMPLE 3 Class 3 urinal flushing cistern providing a flush volume of 5 l at an inlet valve pressure of minimum 0,05 MPa (0,5 bar) with a classified inlet valve having a noise level of group I and with an outlet valve providing reliability of category I.

EN 14055 — CL 3 — 5/0,5 — NL I — VR I

NOTE For CE marking and NPD declaration, see Annex ZA.

11 Evaluation of conformity

11.1 General

The compliance of a WC or urinal flushing cistern with this European Standard shall be demonstrated by:

— initial type testing (see 11.2);

— factory production control by the manufacturer (FPC), including product assessment (see 11.3).

11.2 Type testing

11.2.1 Initial type testing

Initial type testing shall be performed before the product is put on the market for the first time and each time when its characteristics are changed.

Where characteristics are determined on the basis of conformity with other product standards, the manufacturer shall ensure that the products themselves have undergone appropriate initial and when necessary routine type testing to ensure the adequacy of the stated performance. Products CE marked in accordance with appropriate harmonised European Specifications may be presumed to have the performances stated of them, although this does not replace the responsibility of the flushing cistern manufacturer to ensure that the flushing cistern as a whole is correctly manufactured and its component products have the necessary performance values.

11.2.2 Further type testing

WC and urinals flushing cisterns are considered to be of the same type, when they have the same design, construction and performance characteristics and when they are of the same material, however they may have different features.

Whenever a change occurs in the flushing cistern, the raw material or supplier of the components, or the production process would change significantly one or more of the stated characteristics, the type tests shall be repeated for the appropriate characteristics.

11.2.3 Sample, testing and compliance criteria

The WC and urinals flushing cistern shall be subjected to and pass the relevant tests in Tables 6 or 7 and acoustic characteristic in accordance with Clause 8.

Table 6 — Type testing for class 1 and class 3 products

Characteristic to be tested	Assessment method according to clauses of this European Standard	Number of samples	Compliance criteria
Flushing cistern equipment	5.1.1	1	5.1.1
Water supply connection	5.1.2	1	5.1.2
Flexible hoses	5.1.3	1	5.1.3
Mechanical components	5.1.4	1	5.1.4
Connecting dimensions	5.1.5	1	5.1.5
Flush pipes	5.1.6	1	5.1.6
Flush volume	5.3.2	1	5.2.1
Water saving devices	5.2.1, 5.2.3	1	5.2.2
Flush rate	5.3.3	1	5.2.3
Overflow	5.3.4	1	5.2.4
Inlet valve opening	5.3.5	1	5.2.5
Safety margin − dimensions “c”	5.3.6	1	5.2.6
Backflow prevention	5.3.7	1	5.2.7
Leaktightness	5.3.8	1	5.2.8
Endurance	5.3.9	1	5.2.9
Operating force	5.3.10	1	5.2.10
Impact force	5.3.11	1	5.2.3

Table 7 — Type testing for class 2 products

Characteristic to be tested	Assessment method according to clauses of this European Standard	Number of samples	Compliance criteria
Inlet valve	6.1, 6.10.1	1	6.1
Backflow prevention	6.2	1	6.2
Marking	6.3	1	6.3
Warning pipe and overflow provision	6.10.2	1	6.4
Flush volume(s)	6.10.3	1	6.5
Flush rate	6.10.4	1	6.6
Flushing device: physical endurance and leakage	6.10.5	1	6.7
Flushing device: chemical endurance	6.10.6	1	6.8

11.3 Factory production control

11.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that products placed on the market conform with the stated performance characteristics. The FPC system shall consist of documented procedures, regular inspections and tests and/or assessments and the use of the results obtained to control raw and other incoming materials or components, equipment, the production process and the product.

NOTE An FPC system conforming with the requirements of the relevant part(s) of EN ISO 9001:2008 [1] or equivalent, and made specific to the requirements of this European Standard, can/may be considered to satisfy the above requirements.

The results of inspections, tests or assessments requiring action shall be documented. The action to be taken when control values or criteria are not met shall be recorded.

11.3.2 Testing equipment

All weighing, measuring and testing equipment shall be calibrated and regularly inspected in accordance with documented procedures and frequencies of checks.

11.3.3 Raw materials and components

The specification of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their conformity.

11.3.4 Product testing and assessment

The manufacturer shall establish and document procedures to ensure that the stated values of all of the characteristics are maintained.

11.3.5 Non-conforming products

If during the factory production control non-conforming products are detected, there shall be immediately implemented suitable measures for correction of failure(s) and handling defective products.

Annex ZA
(informative)

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

ZA.1 Scope and relevant characteristic

This European Standard has been prepared under Mandate M/110 [5)] given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the WC and urinals flushing cisterns covered by this annex for their intended use; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended use, can be applicable to the product(s) falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/internal/dangsub/dangmain_en.htm).

This annex establishes the condition for the CE marking of the WC and urinals flushing cisterns intended for use indicated in Tables ZA.1, ZA.2 and ZA.3 and shows the relevant clauses applicable. This Annex has the same scope as Clause 1 of this standard and is defined by Tables ZA.1, ZA.2 and ZA.3.

Table ZA.1 — Scope and relevant clauses for class 1 WC flushing cisterns

Product:	**WC flushing cistern of class 1**		
Intended use:	**Personal hygiene**		
Essential Characteristics	**Requirement clauses in this European Standard**	**Mandated levels and/or classes**	**Notes**
Watertightness/leaktightness	5.2.8	None	Pass/fail
Outlet valve reliability	5.2.9	None	Declared group
Noise level	8	None	Declared group
Flushing volume	5.2.1	None	Pass/fail
Durability	5.2.11	None	Pass/fail

5) As amended by M/139.

Table ZA.2 — Scope and relevant clauses for class 2 WC flushing cisterns

Product: WC flushing cistern of class 2 **Intended use:** Personal hygiene			
Essential Characteristics	**Requirement clauses in this European Standard**	**Mandated levels and/or classes**	**Notes**
Watertightness/leaktightness	6.7	None	Pass/fail
Outlet valve reliability	6.7	None	Pass/fail
Noise level	8	None	Declared group
Flushing volume	6.5	None	Pass/fail
Durability	6.9	None	Pass/fail

Table ZA.3 — Scope and relevant clauses for class 3 urinals flushing cisterns

Product: Urinal flushing cistern of class 3 **Intended use:** Personal hygiene			
Essential Characteristics	**Requirement clauses in this European Standard**	**Mandated levels and/or classes**	**Notes**
Watertightness/leaktightness	5.2.8	None	Pass/fail
Outlet valve reliability	5.2.9	None	Declared group
Noise level	8	None	Declared group
Flushing volume	5.2.1, 7.2	None	Pass/fail
Durability	5.2.11	None	Pass/fail

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used where the characteristic is subject to a threshold level.

ZA.2 Procedure for attestation of conformity of WC and urinal flushing cisterns

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of the WC and urinal flushing cisterns indicated in Tables ZA.1, ZA.2 and ZA.3, in accordance with the Decision of the Commission 96/578/EC of 1996-06-24 as amended by the Commission Decision 01/596/EC as given in Annex III of the Mandate for “Sanitary Appliances” is shown in Table ZA.4 for the indicated intended use and relevant level(s) or class(es):

Table ZA.4 — System of attestation of conformity

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
WC and urinal flushing cistern	Personal hygiene	—	4
System 4: See Directive 89/106/EEC Annex III.2.(ii), third possibility.			

The attestation of conformity of the WC and urinal flushing cisterns in Tables ZA.1, ZA.2 and ZA.3 shall be based on the evaluation of conformity procedures indicated in Table ZA.5 resulting from application of the clauses of this European Standard indicated therein.

Table ZA.5 — Assignation of evaluation of conformity tasks

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Initial type testing	All relevant characteristics of Tables ZA.1, ZA.2 and/or ZA.3	11.2.1
	Factory production control	Parameters related to all relevant characteristics of Tables ZA.1, ZA.2 and/or ZA.3	11.3

ZA.2.2 Declaration of conformity

When compliance with this annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

— description of the product (e.g. type, identification, use, etc.), and a copy of the information accompanying the CE marking;

— provisions to which the product conforms (e.g. Annex ZA of this European Standard);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

The above mentioned declaration shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EEC and shall be shown on a label attached to the WC and urinal flushing cistern or on the accompanying label, the packaging or on the accompanying commercial documents, e.g. a delivery note. The following information shall accompany the CE marking symbol:

— name or identifying mark and registered address of the manufacturer;

— the last two digits of the year in which the CE marking is affixed;

— reference to this European Standard, i.e. EN 14055;

— information on those relevant Essential Characteristics listed in Tables ZA.1, ZA.2 and ZA.3 which are to be presented in a form of standard designation as defined in Clause 10 of this standard.

The NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination

NOTE 1 When NPD option is used for a characteristic, the durability corresponding to this required characteristic is considered as NPD.

NOTE 2 When the designation code is used with a NPD option for a characteristic, it should be presented as, e.g. NL/NPD.

Figure ZA.1 gives an example of the information to be given on the product label, packaging and/or commercial documents.

CE	CE marking, consisting of the "CE" symbol given in Directive 93/68/EEC
AnyCo Ltd, PO Box 21, B-1050	Name or identifying mark and registered address of the manufacturer
11	Last two digits of the year in which the marking is affixed
EN 14055 — CL 1 — 6 — NL I — VR I	Number of European Standard, class, flushing volume and information on noise level group and valve reliability category

Figure ZA.1 — CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 3 European legislation without national derogations need not be mentioned.

NOTE 4 Affixing the CE marking means, if a product is subjected to more than one directive, that it complies with all applicable directives.

Bibliography

[1] EN ISO 9001:2008, *Quality management systems — Requirements (ISO 9001:2008)*

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Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
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