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EN 997

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English Version

WC pans and WC suites with integral trap

Cuvettes de WC et cuvettes à réservoir attenant à siphon intégré

WC-Becken und WC-Anlagen mit angeformtem Geruchverschluss

This European Standard was approved by CEN on 14 April 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 997:2018) 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of an identical text or by endorsement, at the latest by April 2019 and conflicting national standards shall be withdrawn at the latest by July 2020.

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

This document supersedes EN 997:2012+A1:2015.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

For relationship with EU Construction Products Regulation, see informative Annex ZA, which is an integral part of this document.

This standard is one of a series of standards for sanitary appliances. Supporting standards are those for flushing devices and connecting dimensions.

The main changes introduced in EN 997:2012+A1:2015 were the following:

a) introduction of a new Annex ZA in accordance with the latest template (in the format of TF N 687 rev1 of 2015-06-02);

b) modification of the marking of products;

c) editorial modifications as agreed between representatives of EU/DG Growth, CEN/TC 163 and FECS on 2016-07-07 in Brussels for citation of standard in OJEU.

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

1 Scope

This European Standard specifies constructional and performance characteristics together with test methods for close-coupled suites, one-piece and independent WC pans with integral trap used for personal hygiene manufactured from glazed ceramics or stainless steel.

This European Standard does not apply to squatting toilets, WC pans without integral trap or flushing cisterns as separate appliances.

In the case of independent WC pans, the associated flushing cisterns and pressure valves are covered by other standards and the reference to cisterns in this standard is related only to the definition and requirements of flushing volume.

In the case of close-coupled suites and one-piece WCs, this standard also specifies design, performance characteristics and the test methods for designated flushing cisterns with flushing mechanisms, inlet valves and overflows. For these products, this standard covers flushing cisterns designed to be connected to drinking water installations inside buildings.

Before installation of WCs, EN 12056-2 and national requirements need to be taken into consideration.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 12056-2, *Gravity drainage systems inside buildings - Part 2: Sanitary pipework, layout and calculation*

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

AS 1172-1, *Water closets (WC) - Pans*

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 1212-4:2016, *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.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

Note 1 to entry: Drawings are diagrammatic only.

3.1
glazed ceramic
ceramic material for sanitary appliances with all visible surfaces glazed when installed

3.2
WC pan
bowl-shaped appliance for reception and flushing away of human solid and liquid excrement

3.3
pedestal WC pan
floor-mounted WC pan that has an integral foot

3.4
wall-hung WC pan
WC pan cantilevered clear of the floor

3.5
back-to-wall WC pan
pedestal WC pan whose back is in contact with the wall

3.6
wash-out WC pan
WC pan in which excrement falls first into a shallow water filled bowl, before being removed by the flushing water

3.7
wash-down WC pan
WC pan in which excrement falls directly into the trap before being removed by the flushing water

3.8
siphonic WC pan
WC pan in which excrement is removed by siphonage induced by the flushing water

3.9
close-coupled suite
combination of a WC pan and flushing cistern directly coupled into a functional unit

3.10
one-piece WC pan
WC pan manufactured with an integral flushing cistern

3.11
independent WC pan
WC pan suitable for the connection with a flushing cistern or a pressure flush valve

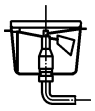
3.12
WC suite
WC pan combined with either a flushing cistern with integral warning pipe connection – or a device deemed to be a no less effective device – and inlet/outlet devices, or a pressure flush valve, with WC and flushing device installed as a functioning unit

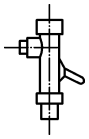
3.13
children WC pan
WC pan with a front edge between 300 mm and 380 mm high

3.14
baby WC pan
WC pan with a front edge below 260 mm high

3.15
flushing device
device fitted to a cistern to provide controlled measured volume(s) of water to a WC pan or suite for flushing

Note 1 to entry: A flushing device can be a siphon, drop valve, flap valve or pressurized cistern, etc. For the purposes of this standard, the flushing device includes the activator (e.g. handle, button, linkages etc.) and all seals, pistons, or other integral components.

3.16
valve-type flushing cistern

cistern with integral valve outlet device for the storage and discharge of a defined volume(s) of flushing water for the removal of excrement from a WC pan

3.17
pressure flush valve

valve directly connected to the water supply which delivers a pre-determined volume of flushing water for the removal of excrement from a WC pan

3.18
water trap
water seal that prevents backflow of foul odour from a drain

3.19
inlet valve
valve that controls and shuts off the flow of water into a flushing cistern, usually by an arm connected to a float

3.20
outlet valve
mechanism for opening and closing the outlet orifice of the flushing cistern

3.21
flush pipe
connecting pipe between a flushing cistern's outlet and a WC's inlet

3.22
overflow
device enabling release of excess water from a flushing cistern when water reaches a pre-determined level

3.23
overflow level
water level corresponding to the upper edge of the overflow or to the lower edge of the overflow notch

3.24
flush volume
volume of water discharged from the flushing device during a flush cycle

3.25
after-flush volume
volume of flush water remaining after the last test specimen has left the outlet of the bowl

3.26
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

3.27
meniscus level
level resulting from surface tension of water during overflowing

3.28
nominal water level
water level when a cistern is filled to the nominal flush volume, e.g. 4 l, 5 l, 6 l, 7 l or 9 l

3.29
nominal flush volume
volume of water indicated, when a flushing cistern is filled to the nominal water level

3.30
maximum water level
highest water level reached after flow stabilization, in the event of continuous supply, as a result of malfunction of the inlet valve

3.31
critical water level
highest water level in any part of the appliance, 2 s after the supply is cut-off

3.32
residual water level
water level, after a full flush is completed

3.33

adjustable residual water level

residual water level in a cistern, after (uninterrupted) flushing, which can be altered by adjusting the outlet mechanism

3.34

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

3.35

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

3.36

safety margin — dimension *c*

distance between the nominal water level determined by the manufacturer, and the overflow level

3.37

impact force

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

3.38

test height

distance between the seat of the flushing device and the horizontal axis of the flush pipe

3.39

flush rate

volume of water flowing out of a flushing cistern as a function of time

3.40

product type

set of representative performance levels or classes of a construction product, in relation to its essential characteristics, produced using a given combination of raw materials or other elements in a specific production process

Note 1 to entry: The definition is taken from Regulation (EU) No. 305/2011.

4 Classification

WC pans and suites are classified as described below:

Type 1: WC pans and suites designed for use with and tested using a nominal full flush volume of either 4 l, 5 l, 6 l, 7 l or 9 l and in case of a reduced flush not less than those in accordance with Table 2 and Table 3. The requirements of type 1 are given in Clause 5.

Type 2: WC suites designed for use with a pressure flushing valve or a flushing cistern incorporating some other flushing device, and tested as described in Clause 6, using a maximum flushing volume of 6 l, or a dual-flush combining a maximum flush of 6 l and a reduced flush not greater than two-thirds of the maximum flush volume. The requirements of type 2 are given in Clause 6.

5 Functional characteristics and test methods for type 1 products

5.1 Depth of water seal

When tested in accordance with 5.7.1, the depth of the water seal shall be not less than 50 mm.

5.2 Flushing characteristics

5.2.1 General

Table 1 correlates the flushing characteristics to the WC pan sub-type and flushing volume.

Table 1 — Flushing characteristics

Sub-type of WC pan in accordance with Table 2 and Table 3	Wash of bowl (5.2.2)	Flushing of toilet paper (5.2.3)	Flushing of 50 plastic balls (5.2.4)	Oversplashing (5.2.5)	After-flush volume (5.2.6)
9	X	X	X	X	
7	X	X	X	X	
6	X	X		X	X
5	X	X		X	X
4	X	X	X	X	

The efficiency of flushing is demonstrated by the following characteristics.

5.2.2 Wash of bowl

When tested in accordance with 5.7.2.3, the arithmetic average of any unflushed area below the rim and above the surface of the water in the trap shall not be more than 50 cm^2 after five flushing operations.

In case of rimless WCs, the surface to be tested is the area between the water surface and a horizontal line 85 mm below the top edge of the bowl.

5.2.3 Flushing of toilet paper

When tested in accordance with 5.7.2.4, 12 sheets of toilet paper shall be flushed out of the WC pan a minimum of 4 times out of five tests.

For baby WC pans, 6 sheets of toilet paper shall be flushed out of the WC pan a minimum of 4 times out of five tests.

5.2.4 Flushing of fifty small plastic balls

When tested in accordance with 5.7.2.5 after five tests, each with 50 balls, a minimum of 85 % of the balls shall be flushed out of the WC pan.

5.2.5 Oversplashing

When tested in accordance with 5.7.2.6, flushing water shall not splash beyond the rim of the bowl and wet the floor. Only a few small drops are permissible.

5.2.6 After-flush volume

When tested in accordance with 5.7.2.7, an after-flush volume of 2,5 l or 2,8 l as appropriate is required.

5.3 Water absorption

When tested in accordance with 5.7.3, the arithmetic average for water absorption of glazed ceramic WC pans shall not exceed 0,5 % by mass.

5.4 Static load

When tested in accordance with 5.7.4, wall-hung and non-ceramic WC pans and WC suites shall withstand a force of (4,00 ± 0,05) kN without showing any evidence of cracking or permanent deformation.

Experience has shown that pedestal ceramic WC pans and WC suites comply with this characteristic.

5.5 Additional characteristics of flushing cisterns for close-coupled suites and one-piece WCs

5.5.1 General

If close-coupled suites and one-piece WCs comprising a flushing cistern and a WC pan supplied or specified by the manufacturer as a unit, the following characteristics shall be fulfilled.

5.5.2 Inlet valve of the flushing cistern

Flushing cisterns shall have an inlet valve complying with EN 14124.

5.5.3 Supply piping

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

The use of elastomeric flexible supply hoses complying with EN 13618 is permissible inside the assembly.

5.5.4 Flush volume(s) of the flushing cistern

The flush volume(s) for one-piece and close-coupled flushing cisterns supplied with a WC pan shall conform to the value(s) specified by the manufacturer according to Table 3, when measured as described in 5.7.5.1.

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

5.5.5 Leak-tightness between flushing cistern and bowl

When tested in accordance with 5.7.5.2, there shall be no leakage between the WC pan and the flushing cistern.

5.5.6 Outlet valve leak-tightness

When tested in accordance with 5.7.5.3, the outlet shall not show any leakage greater than three drops within 15 min.

5.5.7 Outlet valve reliability

When tested in accordance with 5.7.5.4, the outlet mechanism functions shall be ensured.

The flushing device shall not show any failure or permanent distortion of any component 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.

5.5.8 Overflow

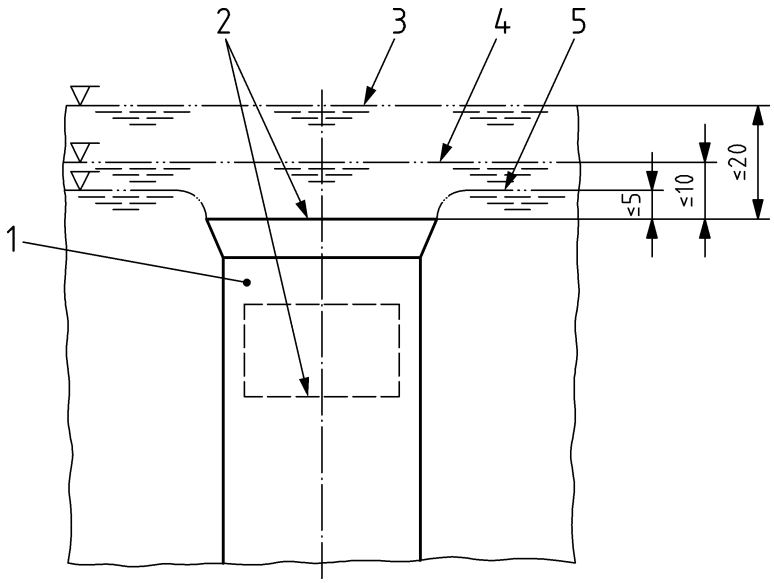
When tested as described in 5.7.5.5, the overflow shall meet the requirements specified below (see Figure 1):

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

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

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

Dimensions in millimetres



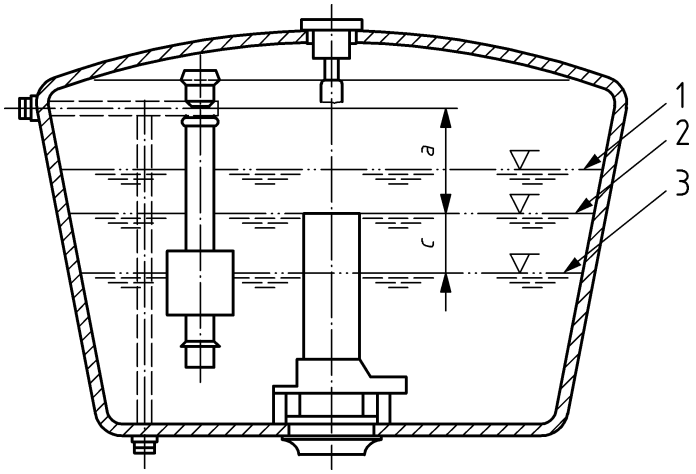
Key

1 overflow pipe
2 overflow level
3 maximum water level
4 critical water level
5 meniscus level

Figure 1 — Maximum, critical and overflow level

5.5.9 Safety margin – dimension "*c*"

When tested as described in 5.7.5.6, dimension "*c*" (see Figure 2) corresponding to the distance between the overflowing level and the maximum nominal water level indicated by the manufacturer shall be ≥ 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 2 — Safety margin dimensions

5.5.10 Safety margin – dimension "*a*"

When tested as described in 5.7.5.7, the dimension "*a*" (see Figure 2) between the overflow level and the lowest point of the air inlet orifice of the inlet valve shall be 20 mm minimum as required in EN 1717, to prevent backflow.

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

5.6 Durability

Type 1 products conforming to the requirements of 5.2 to 5.4 and 5.5.5 to 5.5.10 are deemed to be durable.

5.7 Test methods

5.7.1 Depth of water seal

Install the WC pan in accordance with 5.7.2.2. Flush the WC pan and measure the height from the invert of the trappage back plate to the surface of the water.

5.7.2 Flushing tests

5.7.2.1 Apparatus

Independent WC pans are to be tested with one or both of the following separate flushing devices:

Valve-type flushing cistern	Type A (see Annex A, Figures A.1, A.2, A.4 and A.5, Tables A.1 and A.2)
Pressure flush valve	Type C (see Annex B, Figures B.1, B.2 and B.3, Table B.1)

Close-coupled suites and one-piece WC pans shall be tested with flushing cisterns provided or specified by the manufacturer.

5.7.2.2 Preparation to test

Independent WC pans

Use the flushing volumes in accordance with Table 2 with the full flush as indicated by the manufacturer:

Install the pedestal or wall-hung WC pan to be tested on a firm flat horizontal or vertical surface as appropriate. Connect a flushing device in accordance with Annex A or Annex B.

Close-coupled suites and one-piece WC pans

Use the flushing volumes in accordance with Table 3 with the full flush as indicated by the manufacturer:

Install the close-coupled suite or the one-piece WC pan on a firm flat horizontal or vertical surface as appropriate using the flushing device provided or specified by the manufacturer.

5.7.2.3 Sawdust test

5.7.2.3.1 Test material

20 g of fine dry wood sawdust.

5.7.2.3.2 Procedure

Moisten the complete inner surface of the WC pan below the flushing rim and above the surface of the water in the trap. Immediately afterwards, sprinkle the sawdust as evenly as possible over the moistened surface. Flush the WC pan and measure any unwashed area. Repeat this procedure 5 times.

In the case of rimless WCs, the surface to be tested is the area between the water surface in the trap and a horizontal line 85 mm below the top edge of the bowl.

5.7.2.4 Toilet paper test

5.7.2.4.1 Test material

Single layer toilet paper with a saturation time of 15^{+15}_{-10} s verified by the basket method in accordance with Annex D (see Figures D.1 and D.2). Individual sheets shall have a size of (130 ± 10) mm × (100 ± 10) mm. The mass per unit surface of the toilet paper shall be (30 ± 10) g/m^2.

5.7.2.4.2 Procedure

Individually loosely crumple 12 sheets of toilet paper or 6 sheets in case of baby WCs and drop them separately one after the other into the WC pan within a time of 14 s to 18 s. Activate the full flush within 2 s of the last sheet being dropped into the WC pan. Record and remove any paper not flushed out of the bowl and the trap. Repeat this test 5 times.

5.7.2.5 Fifty plastic balls test

5.7.2.5.1 Test material

50 balls of non-absorbent material, each having a mass of (3,7 ± 0,1) g and a diameter of (20 ± 0,1) mm.

5.7.2.5.2 Procedure

For each flushing operation place the 50 balls into the WC pan and flush the WC pan with a full flush. Record and remove any balls left in the WC pan. Repeat this test 5 times.

5.7.2.6 Oversplashing test

5.7.2.6.1 Test material

Paper of a type which shows surface change when wet.

5.7.2.6.2 Procedure

Lay the paper around the WC pan to be tested projecting 200 mm beyond the plan of the bowl projected onto the floor. Flush the WC pan and record evidence of water on the paper. The test shall be made with the flushing volume for which the WC pan will be approved.

5.7.2.7 After-flush volume test

5.7.2.7.1 Test rig

A test rig in accordance with Annex C (see Figures C.1 and C.2).

Other test rigs may be used, if the tolerance for after flush volume, related to 6 l, does not exceed ± 0,1 l when the same WC pan is used.

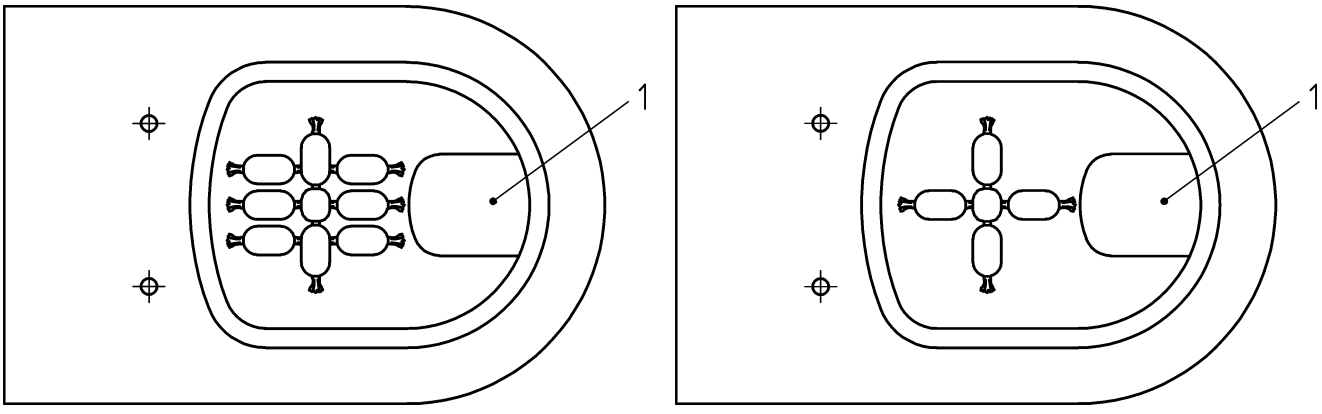
5.7.2.7.2 Test material

Test specimens prepared in accordance with Annex E (see Figures E.1, E.2, E.3, E.4, E.5 and E.6).

5.7.2.7.3 Procedure

Place four test specimens, or in case of baby WC pans two test specimens, one after the other into the WC pan and flush the WC pan. In case of wash out WC, place the four specimen as shown in Figure 3.

To obtain 10 measures, repeat the test 9 times.



a) **b)**

Key

1 water trap

a placement of the four specimen in adults' wash-out WC

b placement of the two specimen in baby wash-out WC

Figure 3 — Placement of specimen in case of wash-out WC

The result of flushing operations when not all test specimens have been evacuated shall count as 0 l.

The test is positive, if:

a) in 8 out of 10 flushes all test specimens are evacuated and the after-flush volume is on each occasion ≥ 2,5 l, or

b) the arithmetic average of the after-flush volume of the 10 flushing operations is ≥ 2,8 l.

If the WC pan does not provide results according to a) or b), repeat the procedure again for an additional 20 flushing operations.

The test is then positive, if:

c) in 16 out of 20 flushes all test specimens are evacuated and the after-flush volume is on each occasion ≥ 2,5 l, or

d) the arithmetic average of the after-flush volume of the 20 flushing operations is ≥ 2,8 l.

5.7.3 Determination of water absorption

5.7.3.1 Test material and apparatus

— A balance accurate to 0,05 g;

— an oven controlled at a test temperature of (110 ± 5) °C;

— a desiccator with fresh prepared silica gel;

— a chamois leather;

— a heated bath with temperature control;

— demineralised water;

— a pair of fine tweezers;

— a fine brush.

5.7.3.2 Procedure

— Break three samples glazed on one face from a WC pan. The unglazed surface area of the samples shall be approximately 30 cm^2 and the thickness including the glaze shall be approximately 12 mm.

— Dry the samples at a temperature of 110 °C for (180 ± 5) min.

— Allow the samples to cool in a desiccator.

— Weigh each sample to an accuracy of 0,05 g; the mass is m_0.

— Using the fine tweezers place the samples in the bath and fill with demineralised water. Ensure they do not touch the sides or the bottom of the bath.

— Heat the water to boiling point for (120 ± 5) min. Afterwards stop the heating process and leave the samples immersed for a further (20 ± 1) h.

— Using the fine tweezers take the samples immediately from the water and dry them with slightly damp chamois leather.

— Any cavities or holes shall be dried using a fine brush.

— Weigh each sample immediately; this mass is m_1.

— The coefficient of water absorption in percentage shall be calculated for each sample using Formula (1):

$$WA = \frac{m_1 - m_0}{m_0} \cdot 100 \quad (1)$$

where

WA is the coefficient of water absorption, in %;

m_0 is the mass of the dry sample, in g;

m_1 is the mass of the sample after immersion in water, in g.

Calculate the arithmetic average of the water absorption coefficient for the three samples. Report each individual value and the calculated arithmetic average.

5.7.4 Load test

Wall-hung WC pans shall be fixed in accordance with the manufacturer's instructions onto a smooth surface with a layer of mortar or other facing material used for pointing between the back of the WC pan and the smooth surface.

Pedestal WC pans of non-ceramic materials shall be fixed onto a solid smooth horizontal surface in accordance with the manufacturer's instructions.

A force of (4,00 ± 0,05) kN shall be applied for a period of 1 h by means of a beam with a cross section of 100 mm × 100 mm positioned across the centre of aperture of the bowl (see Figure 4).

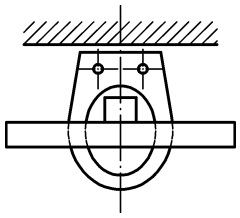


Figure 4 — Load test

5.7.5 Tests for flushing cisterns of close-coupled suites and one-piece WCs

5.7.5.1 Flush volume(s) for flushing cisterns of close-coupled suites and one-piece WCs

5.7.5.1.1 Determination of the full-flush volume

— Install the close-coupled suite or one-piece WC on a firm flat horizontal or vertical surface as appropriate.

— In case of a close-coupled suite, fit the flushing cistern to the WC pan.

— Fill the flushing cistern via an inlet valve.

— Fill the water trap of the WC by activating the flushing mechanism.

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

— Shut-off the supply.

— Operate the full 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.

— Repeat for all full-flush volumes.

5.7.5.1.2 Determination of the reduced flush volume

— Install the close-coupled suite or one-piece WC on a firm flat horizontal or vertical surface as appropriate.

— In case of a close-coupled suite, fit the flushing cistern to the WC pan.

— Fill the flushing cistern via an inlet valve.

— Fill the water trap of the WC by activating the flushing mechanism.

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

— Shut off the supply.

— Operate the double-control flushing mechanism for the reduced flush volume and collect the water delivered or in case of double-action flushing mechanism 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.

— Repeat for all reduced flush volumes.

5.7.5.2 Leaktightness test of close-coupled suites

— Install the flushing cistern on the WC pan.

— Install the close-coupled suite on a firm flat horizontal or vertical surface as appropriate.

— Fill the flushing cistern to the maximum nominal water level.

— Flush the close-coupled suite and observe the connection between the WC pan and flushing cistern for any leakage during the complete flush.

5.7.5.3 Outlet valve leaktightness test

— This test is done with the flushing cistern only. In the case of a one-piece WC, the flushing cistern shall be cut from the bowl for the verification.

— Fill the flushing cistern to the water level corresponding to the nominal flush volume 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. Not more than three drops are permitted.

5.7.5.4 Outlet valve reliability test

5.7.5.4.1 Test apparatus

The test apparatus comprises:

— a flushing cistern into which the outlet valve is mounted and 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.

5.7.5.4.2 Procedure

One cycle is carried out as follows:

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

— Actuate the flush operating mechanism by means of the automatic system.

— Allow the mechanism to close again.

— Refill the flushing cistern.

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

— In the case of double-control mechanisms the test is carried out:

  — 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);

  — 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).

— Record any failure or permanent distortions of the outlet valve during and at the end of the test.

— 2 h after finishing of the cycles, verify the leak-tightness in accordance with 5.7.5.3.

5.7.5.5 Determination of the overflow capacity

— Measure the overflow level in accordance with Figure 2.

— Supply the flushing cistern with a flow rate of 0,28 l/s for 60 s. In the case of a combined mechanism (filling valve + flushing mechanism), supply the combined mechanism at a pressure of 0,6 MPa (6 bar) and force the inlet valve to be open for 60 s.

— Measure the maximum water level in accordance with Figure 2.

— Shut off the water supply.

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

— Measure the meniscus level after stabilisation in accordance with Figure 1.

5.7.5.6 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 2) between the maximum nominal water level and the overflow level.

5.7.5.7 Determination of dimension *a*

Determine dimension *a* (see Figure 2) 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.

5.8 Sub-types of independent WC pans, close-coupled suites and one-piece WCs

5.8.1 Nominal flush volume

Sub-type and test volume for a full flush shall be defined by the manufacturer.

Baby WC pans belong to sub-type 5 or sub-type 4.

The nominal flush volume of independent WC pans shall correspond to one of the sub-types given in Table 2.

Table 2 — Sub-types of independent WC pans

Sub-type	Nominal flush volume l	Test flush volume l
9	9	$9^{\ 0}_{-0,1}$
7	7	$7^{\ 0}_{-0,1}$
6	6	$6^{\ 0}_{-0,1}$
5	5	$5^{\ 0}_{-0,5}$
4	4	$4^{\ 0}_{-0,1}$

The nominal flush volume of close-coupled suites and one-piece WC pans shall correspond to one of the sub-types given in Table 3.

Table 3 — Sub-types of close-coupled suites and one-piece WC pans

Sub-type	Nominal flush volume l	Test flush volume l	Reduced flush volume l
9	9	$9^{\ 0}_{-1,4}$	Maximum 2/3 of the nominal flush volume as specified by the manufacturer
7	7	7 ± 0,5	
6	6	$6^{+0,4}_{-0,5}$	
5	5	$5^{+0,4}_{-0,5}$	
4	4	$4^{+1,0}_{-0,5}$	

5.8.2 Flushing devices

Independent WC pans shall be designed to be flushed by one or both of the following separate flushing devices:

Valve-type cistern Type A (for calibration see Annex A)

Pressure flush valve Type C (for calibration see Annex B)

5.8.3 Verification of sub-types

1) Connect the flushing cistern to a water supply of (0,2 ± 0,1) MPa and adjust the flush volume in accordance with the manufacturer's instructions.

2) Flush the flushing cistern 3 times and measure the flush volume to an accuracy of ± 0,1 l. The water supply shall be closed during the flushing operation.

3) The WC pan shall be classified on the arithmetic average resulting from three flushing operations referring to Table 2 or Table 3.

4) The flushing tests in accordance with this standard shall be carried out on the basis of the WC pan sub-type (see Table 1).

6 Functional characteristics and test methods for type 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, BS 1212-3, or BS 1212-4 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.

— 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.

— 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 BS 1212-3:1990 or BS 1212-4:2016, Clauses 15 or 17 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 6.17.2, 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 6.17.3 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 6.17.3 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 6.17.4, 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 6.17.5, 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 6.17.6, 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 Solids discharge and after-flush volume for maximum flush

When tested as described in 6.17.7, for the first six flush cycles, or for a minimum of eight out of ten flush cycles, each of the four test specimens shall be completely evacuated from the WC bowl and pan's outlet. The recorded after-flush volume in each flush cycle shall be no less than 40 % of the full-flush volume.

6.10 Paper discharge for reduced-flush volume

When tested as described in 6.17.8, for the first six flush cycles, or for a minimum of eight out of ten flush cycles, all six sheets of toilet paper shall be flushed out of the WC pan and outlet.

6.11 Liquid contaminant dye retention

When tested as described in 6.17.9, for the first five flush cycles, or for a minimum of nine out of ten flush cycles at full-flush volume, the contaminate level shall be ≤ 1 %. For the first five flush cycles, or for a minimum of nine out of ten flush cycles at reduced-flush volume, when provided, the contaminate level shall be ≤ 6 %.

6.12 Wash of bowl

When tested as described in 6.17.10, the arithmetic average of any unflushed area below the rim and above the surface of the trap shall be no greater than 50 cm^2 after five flushing operations.

6.13 Depth of water seal

When tested twice at random as described in 6.17.3, the depth of water seal shall be no less than 50 mm on either occasion. If any alternative trap seal device is utilised, a no less effective comparable seal shall be in operation.

6.14 Static load of type 2 products

When tested in accordance with 5.7.4, type 2 products shall meet the requirements of 5.4.

6.15 Water absorption

When tested in accordance with 5.7.3, type 2 products shall meet the requirements of 5.3.

6.16 Durability of type 2 products

Type 2 products conforming to 6.1 to 6.15 are deemed to be durable.

6.17 Test methods

6.17.1 Inlet valve tests

6.17.1.1 Apparatus

Apparatus as specified in BS 1212-2, BS 1212-3 or BS 1212-4, subject to the additional requirements specified in 6.1. Supply pressure requirements for pressurised cisterns shall conform to the manufacturer's recommendations.

6.17.1.2 Procedure

Subject the inlet valve to the tests as specified in BS 1212-2, BS 1212-3 or BS 1212-4 as appropriate. In testing against Clause 17 of BS 1212-2:1990, BS 1212-3:1990 or BS 1212-4:2016 (modified in 6.1) if the first inlet valve fails, four further valves shall be tested.

6.17.1.3 Expression of results

Record whether the inlet valve complied with the requirements of BS 1212-2, BS 1212-3 or BS 1212-4 as modified by 6.1. For the test under Clause 17 of BS 1212-2:1990, BS 1212-3:1990 or BS 1212-4:2016 (as modified in 6.1), record whether the first inlet valves, or all four of the subsequent inlet valves, met the requirements.

6.17.2 Warning pipe and overflow provisions

6.17.2.1 Apparatus

a) Flushing system 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;

b) measuring device with an accuracy of ± 0,1 mm;

c) water supply controlled by a stop valve.

6.17.2.2 Procedure

Set the flushing system 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.

6.17.2.3 Expression of results

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

6.17.3 Flush volume and water trap seal tests

6.17.3.1 Apparatus

a) Flushing cistern, complete with fitments including flushpipe and cover, installed in accordance with the manufacturer's instructions, on a firm, flat, vertical surface;

b) measuring vessel capable of collecting the flush volume;

c) water supply controlled by a stop valve;

d) water seal depth measuring device.

6.17.3.2 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 cistern to the water line. Shut off the water supply, unless essential for the normal operation of the flushing device.

Where a water supply is essential for the normal operation of the device, the supply should be maintained at a hydraulic pressure of (0,15 ± 0,01) MPa 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.

Record the water trap seal depth on two occasions at random by measuring the height from the invert of the trappage back plate to the surface of the water.

Reset the dual-flush control or setting, if provided, to the reduced-flush volume and repeat the procedure 5 times.

6.17.3.3 Expression of results

Measure the volume of water collected in the measuring vessel after each flush cycle and record any compliance or failure so as to comply with the requirements of 6.5. Also, record any failure of the trap seal depth to conform to the requirements of 6.13.

6.17.4 Flush rate test

6.17.4.1 Apparatus

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

b) calibrated measuring container;

c) fluid level sensing devices;

d) electronic timer;

e) water supply controlled by a stop valve;

f) power supply.

6.17.4.2 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.

Where a water supply is essential for the normal operation of the device, the supply should be maintained at a hydraulic pressure of (0,15 ± 0,01) MPa 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 cistern. Locate and position a fluid sensing device at the water level in the cistern. Using the calibrated measuring container add further water to the cistern equivalent to the volume of full-flush recorded in 6.17.3.3 less 1,0 l. Locate and position a second fluid sensing device at the water level in the 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 cistern a volume of water equivalent to the difference between the full-flush volume and reduced-flush volume as recorded in 6.17.3.3. Add a further 0,5 l. Locate and position a fluid level sensing device at the water level in the cistern. Using the calibrated measuring container add further water to the cistern until it is filled to a volume equivalent to the volume of full-flush recorded in 6.17.3 less 1,0 l. Locate and position a second fluid sensing device at this water level in the cistern. Add further water to the cistern, up to the marked water level for the full flush volume recorded in 6.17.3. 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.

6.17.4.3 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

$$\frac{\text{Volume of discharge per full flush in litres (recorded in 6.17.3)} - 1{,}0\ \text{l}}{\text{Average time in seconds (recorded in 6.17.4)}}$$

For the reduced-flush

$$\frac{\text{Volume of discharge per reduced flush in litres (recorded in 6.17.3)} - 1{,}5\ \text{l}}{\text{Average time in seconds (recorded in 6.17.4)}}$$

6.17.5 Physical endurance and leakage test of flushing device

6.17.5.1 Apparatus

a) Cistern, complete with fitments including flushing device, flushpipe and cover, installed in accordance with the manufacturer's instructions;

b) means of operating the flushing limiter activator automatically in accordance with the manufacturer's instructions;

c) a water supply maintained at a hydraulic pressure of (0,15 ± 0,01) MPa, 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 during the course of the test;

d) paper of a type which changes colour when wet.

6.17.5.2 Procedure

Connect the water supply. For a single flush flushing device operate the flushing device and, if appropriate, allow the flushing cistern to refill. 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 leak 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 restart (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10…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 refill. 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 restart (e.g. the short-term leak test shall be undertaken after a further 1, 2, 5, 10…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.

6.17.5.3 Expression of results

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

NOTE 200 000 cycles = category II flush limiter.

6.17.6 Chemical endurance test of flushing device

6.17.6.1 Apparatus

a) Weighing scales with a resolution of 0,1 g and an accuracy of ± 0,05 g;

b) micrometer with a resolution of 0,1 mm and an accuracy of ± 0,05 mm;

c) test solution (100 ml of domestic chlorine-based bleaching agent, consisting of up to 5 % sodium hypochlorite (NaClO) and anionic surfactants to every 900 ml of water);

d) container.

6.17.6.2 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. Reassemble 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) d. 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.

6.17.6.3 Expression of results

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

6.17.7 Solids discharge and after-flush volume for maximum flush volume test

6.17.7.1 Apparatus

a) WC pan with associated flushing cistern and/or flushing device, or a close-coupled/one-piece suite, installed in accordance with the manufacturer's instructions on a firm, flat horizontal/vertical surface, as appropriate. The flushing device shall satisfy the requirements of this specification;

b) four test specimens prepared in accordance with Annex E;

c) measuring vessel;

d) electronic test rig with sensor for measuring the volume of water discharged after the last test specimen (b) has been discharged from the WC (a suitable test rig is described in AS 1172-1);

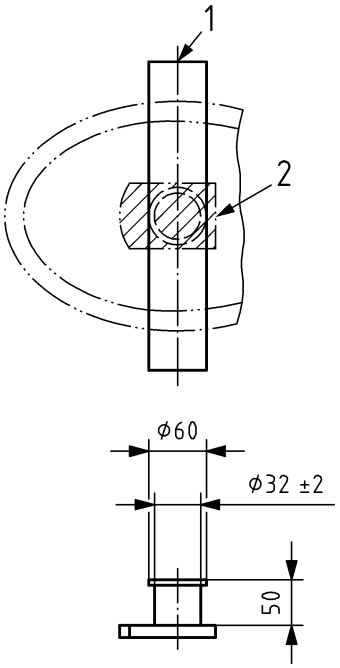
e) container capable of collecting test specimens and discharge volume;

f) timing device having an accuracy of ± 0,05 s;

g) directing device (see Figure 5);

h) water supply.

Dimensions in millimetres



Key

1 position directional device over normal outlet bore of water seal

2 surface of water seal

Figure 5 — Directing device

6.17.7.2 Procedure

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

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

Operate the flushing device and measure the total flush volume. Using the direction device in Figure 5, drop the four test specimens into the WC pan. Operate the flushing device to evacuate the test specimens and record the after flush volume. Repeat the procedure a further 5 times or 9 times as appropriate (see 6.9).

6.17.7.3 Expression of results

Record compliance or any failure to comply with the requirements of 6.9.

6.17.8 Paper discharge for reduced-flush volume test

6.17.8.1 Apparatus

a) WC pan with associated flushing cistern or flush valve, or a close-coupled/one-piece suite, installed in accordance with the manufacturer's instructions on a firm, flat horizontal/vertical surface as appropriate. The flushing device and cistern shall satisfy the requirements of this specification.

b) Sheets of toilet tissue with a saturation time of (15 ± 10) s as verified by Annex D, having an approximate size of 140 mm × 100 mm, and a mass per unit surface of (30 ± 10) g/m^2.

c) Water supply maintained at a hydraulic pressure of (0,15 ± 0,01) MPa or the minimum required to operate the flushing device, whichever is the greater.

6.17.8.2 Procedure

Fill any flushing cistern in accordance with the manufacturer's instructions. Operate the flushing mechanism twice, completing two flush cycles. Set the dual-flush control or setting to the reduced-flush volume in accordance with the manufacturer's instruction. Loosely crumple six individual sheets of toilet tissue and drop them separately into the WC pan within a period of 14 s to 18 s. Operate the flushing mechanism within 2 s of the last sheet being dropped into the WC pan. Check for any paper not flushed out of the bowl and the trap, and remove, if necessary. Repeat the procedure a further 5 (9) times as appropriate (see 6.10).

6.17.8.3 Expression of results

Record compliance or failure to comply with the requirements of 6.10.

6.17.9 Liquid contaminant dye retention test

6.17.9.1 Apparatus

a) WC pan with associated flushing cistern and/or flushing device, or a close-coupled/one-piece suite, all meeting the appropriate requirements of this standard, installed in accordance with the manufacturer's instructions on a firm, flat horizontal/vertical surface as appropriate. The flushing device and cistern shall satisfy the requirements of this specification;

b) liquid contaminant dye (5 g/l potassium permanganate ($KMnO_4$));

WARNING — Potassium permanganate is an oxidant and appropriate precautions should be taken when preparing the solution.

c) calibrated spectrophotometer with prepared glass cuvettes;

d) fluid suction device;

e) water supply.

6.17.9.2 Procedure

Set the dual-flush control or setting, if provided, to the full-flush volume in accordance with the manufacturer's instruction. Fill any cistern to the marked water level suitable for the WC pan. Shut off the water supply, unless essential for the normal operation of the flushing device.

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

Using the fluid suction device, remove any water from the WC's trap. Fill the WC's trap with liquid contaminant dye to the trap seal depth. Operate the flushing device. On completion of the flush, place a sample of the liquid remaining in the trap in the spectrophotometer cuvette. Measure and record the concentration of potassium permanganate in the sample. Repeat the procedure a further 4 (9) times as appropriate (see 6.11).

Reset the dual-flush control or setting, if provided, to reduced-flush volume and repeat the procedure 5 (10) times as appropriate (6.11).

6.17.9.3 Expression of results

Record compliance or failure to comply with the requirements of 6.11.

6.17.10 Wash of bowl

6.17.10.1 Apparatus

a) WC pan with associated flushing cistern and/or flushing device, or a close-coupled/one-piece suite, all meeting the appropriate requirements of this standard, installed in accordance with the manufacturer's instructions on a firm, flat horizontal/vertical surface as appropriate. The flushing device shall satisfy the requirements of this specification;

b) supply of fine dry wooden sawdust;

c) 2 mm sieve;

d) water supply.

6.17.10.2 Procedure

Set the dual-flush control or setting, if provided, to full-flush volume in accordance with the manufacturer's instruction. Fill any cistern to the marked water level. Shut off the water supply, unless essential for the normal operation of the flushing device.

Where a water supply is essential for the normal operation of the flushing device, the supply should be maintained at a hydraulic pressure of (0,15 ± 0,01) MPa or the minimum required to operate the device, whichever is the greater.

Moisten the complete inner surface of the WC pan below the flushing rim and above the water in the trap. Immediately afterwards, sprinkle 20 g of sieved sawdust as completely and evenly as possible over the moistened surface. Operate the flushing device and record any area of unflushed surface.

Repeat the procedure a further four times.

6.17.10.3 Expression of results

On completion of the five test procedures calculate the arithmetic average of the unflushed area between the water level in the trap and the underside of the rim. Record compliance or any failure to comply with the requirements of 6.12.

6.17.11 Summary of requirements for compatibility testing of type 2 products

This clause provides further background notes on the testing and compatibility of elements of the WC suite for the purposes of this standard.

The expectation of 6.1 to 6.17 is that any element of a WC suite offered for sale independently should enable other associated elements to meet the performance characteristics of type 2 of this specification when combined to form a WC suite. Nonetheless, it is clearly unreasonable for the manufacturer of an independent component of a suite to ensure that the product would satisfy the requirements, if installed with every other available part that could make up a WC suite. Therefore, manufacturers need to complete those tests relevant to their product and ensure that when installed as part of a whole WC suite their product would be capable of fulfilling the complete set of tests. Whoever selects the components to form a WC suite should ensure that they form a compliant suite which satisfies the all the tests in this specification.

Inlet valves shall satisfy BS 1212 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.

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.

WC pans shall, for their intended flush volume, satisfy the requirements regarding solid and paper discharge, after-flush volume, liquid dye contaminant retention, wash of bowl and trap seal depth.

The whole WC suite shall comprise of fully compliant components which, when installed together, satisfy all the tests. This shall include a cistern suitably marked for the intended full and, if appropriate, reduced flush volume of the WC pan.

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 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through: https://ec.europa.eu/growth/tools-databases/cp-ds_en.

8 Marking

The intended use of close-coupled suites, one-piece and independent WC pans with integral trap is personal hygiene in accordance with the scope of this standard.

A schematic drawing of the product may optionally follow the abbreviation for personal hygiene.

EXAMPLE 1 Use of full text: Personal hygiene

EXAMPLE 2 Use of abbreviation: PH

EXAMPLE 3 Use of the abbreviation and the optional schematic drawing: PH 

Close-coupled suites, one-piece and independent WC pans with integral trap belong always to one type and sub-type at least. For each type and sub-type a set of characteristics to be tested (see 9.2.2) is defined. Due to this a close-coupled suite, one-piece and independent WC pan with integral trap can be described with a designation code which includes all fulfilled essential characteristics.

The relevant product characteristics and the Essential Characteristics for close-coupled suites, one-piece and independent WC pans with integral trap including their abbreviations are given in Tables 4 and 5.

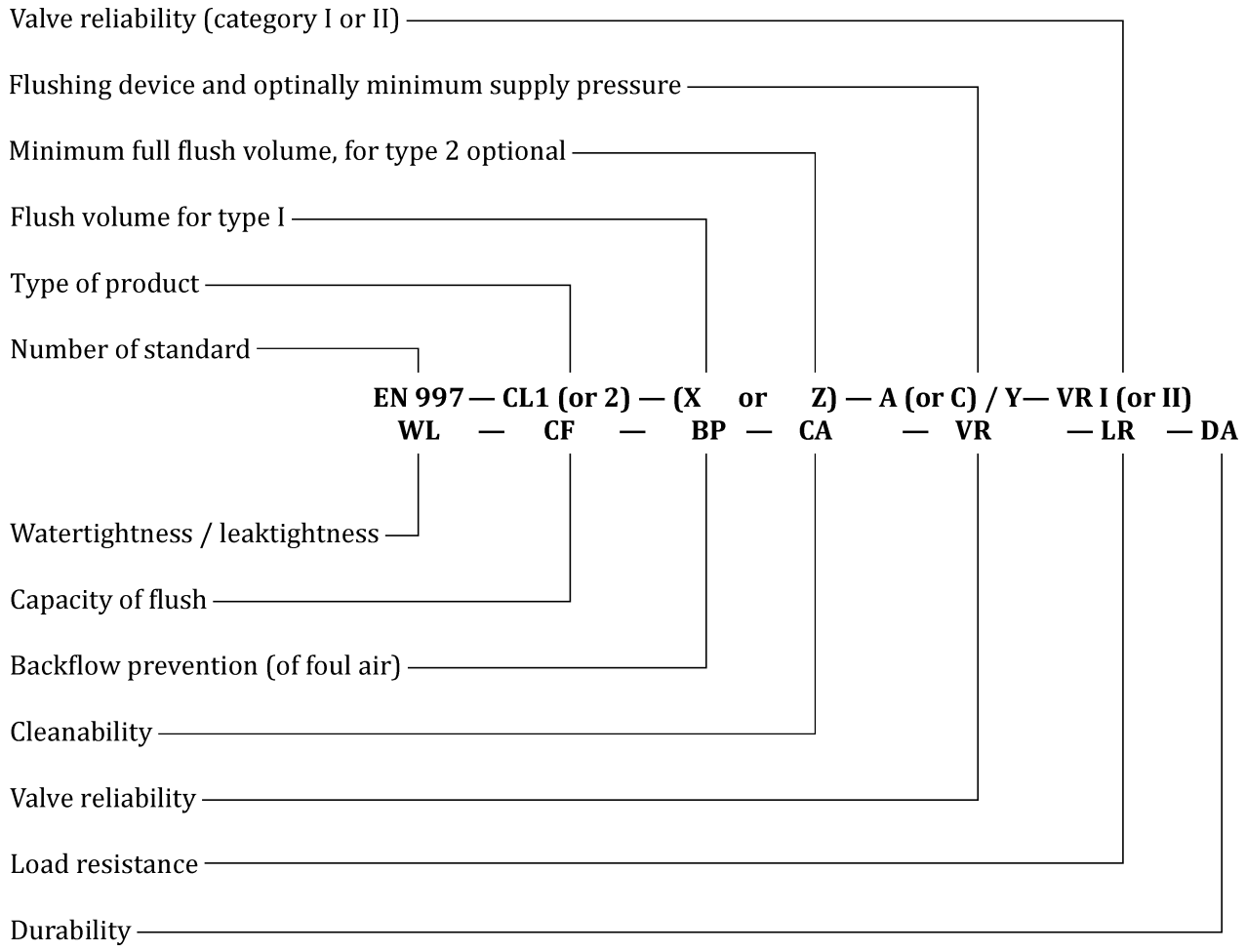
Table 4 — Characteristics and abbreviations for type 1 products

Abbreviation	Characteristics
EN 997	Number of European Standard for WCs and WC suites for product description
CL 1 - X	Type 1 product with fixed flush volumes (9 l, 7 l, 6 l, 5 l or 4 l)
(Y)	Minimum supply pressure (optionally)
A	Flushing cistern
C	Pressure flush valve
WL	Water tightness / leak tightness
CF	Capacity of flush
BP	Backflow prevention (foul air)
CA	Cleanability
VR(x)	Valve reliability (type 1 close-coupled suites and one-piece WC pans only – category I or II)
LR	Load resistance
DA	Durability

Table 5 — Characteristics and abbreviations for type 2 products

Abbreviation	Characteristics
EN 997	Number of European Standard for WCs and WC suites for product description
CL 2 - Z	Type 2 product with flush volume ≤ 6 l and optionally minimum full flush volume (as Z)
WL	Water tightness / leak tightness
CF	Capacity of flush
BP	Backflow prevention (foul air)
VR	Valve reliability
CA	Cleanability
LR	Load resistance
DA	Durability

All close-coupled suites, one-piece and independent WC pans with integral trap shall be designated in accordance with the following system:



EXAMPLE 4 Type 1 independent WC pan for a flush volume of 5 l and 4 l when flushed by a flushing cistern, and for a flush volume of 6 l when flushed with a pressure flush valve. All Essential Characteristics specified for type 1 products are satisfied:

EN 997 — CL 1 — 5/4 A — 6 C

EXAMPLE 5 Type 1 close coupled suite or one-piece WC pan with a flush volume of 6 l when flushed with a flushing cistern equipped with a valve of reliability category II. The requirements for type 2 products are also satisfied:

EN 997 — CL 1 — 6 — VR II + CL 2

If type 1 close-coupled suites components (WC pan and flushing cistern) are delivered separately, both components should be CE marked.

EXAMPLE 6 Type 2 WC suite for use with designated flushing cistern(s). All Essential Characteristics specified for type 2 products are satisfied:

EN 997 — CL 2

EXAMPLE 7 Type 1 close coupled suite for a flush volume of 6 l when flushed with a flushing cistern equipped with a valve of reliability category II. The minimum supply pressure is specified by the manufacturer with 0,05 MPa (0,5 bar) optional. All Essential Characteristics specified for type 1 products are satisfied. The requirements for type 2 products are also satisfied:

EN 997 — CL 1 — 6 / 0,5 — VR II + CL 2

EXAMPLE 8 Type 2 WC suite for use with designated flushing cistern(s). Minimum full flush volume 5,2 l is shown in the designation code as an option. All Essential Characteristics specified for type 2 products are satisfied:

EN 997 — CL 2 — 5,2

9 Assessment and verification of constancy of performance – AVCP

9.1 General

The compliance of close-coupled suites, one-piece and independent WC pans with integral trap with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type (see 9.2);

— factory production control by the manufacturer (FPC), including product assessment (see 9.3).

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

9.2 Type testing

9.2.1 General

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

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

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

Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

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

— at the beginning of the production of a new or modified close-coupled suites, one-piece and independent WC pans with integral trap (unless a member of the same product range), or

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

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the modified close-coupled suites, one-piece and independent WC pans with integral trap design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

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

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the close-coupled suites, one-piece and independent WC pans with integral trap manufacturer to ensure that the close-coupled suites, one-piece and independent WC pans with integral trap as a whole is correctly manufactured and its component products have the declared performance values.

9.2.2 Test samples, testing and compliance criteria

The number of samples of close-coupled suites, one-piece and independent WC pans with integral trap to be tested/assessed shall be in accordance with Table 6 and/or Table 7.

Table 6 — Type testing for type 1 products

Characteristic to be tested	Assessment method according to clauses of this standard	Number of samples	Requirement and Compliance criteria
Depth of water seal	5.7.1	1	5.1
Wash of bowl	5.7.2.3	1	5.2.2
Flushing toilet paper	5.7.2.4	1	5.2.3
Flushing of 50 plastic balls	5.7.2.5	1	5.2.4
Oversplashing	5.7.2.6	1	5.2.5
After-flush volume	5.7.2.7	1	5.2.6
Water absorption	5.7.3	1	5.3
Static load	5.7.4	1	5.4
Flush volume(s) for flushing cisterns of suites	5.7.5.1	1	5.5.4
Leaktightness between cistern and bowl	5.7.5.2	1	5.5.5
Outlet valve leak tightness	5.7.5.3		5.5.6 [a]
Outlet valve reliability	5.7.5.4		5.5.7 [a]
Overflow	5.7.5.5	1	5.5.8
Safety margin – dimension *c*	5.7.5.6	1	5.5.9
Safety margin – dimension *a*	5.7.5.7	1	5.5.10
Dangerous substances	Clause 7	—	—

[a] Where an outlet valve is used in several cisterns, the outlet valve need only be tested once unless there are design changes.

Table 7 — Type testing for type 2 products

Characteristic to be tested	Assessment method According to clauses of this standard	Number of samples	Compliance criteria
Inlet valve	6.17.1	1	6.1
Backflow prevention	6.2 [a] 6.17.3	1	6.2 6.13
Flushing cistern marking	6.3	1	6.3
Warning pipe and overflow provision	6.17.2	1	6.4
Flush volume	6.17.3	1	6.5
Flush rate	6.17.4	1	6.6
Flushing device: Physical endurance and leakage	6.17.5	1	6.7
Flushing device: Chemical endurance	6.17.6	1	6.8
Solids discharge and after flush volume for maximum flush	6.17.7	1	6.9
Paper discharge for reduced flush volume	6.17.8	1	6.10
Liquid contaminant dye retention	6.17.9	1	6.11
Wash of bowl	6.17.10	1	6.12
Water seal depth	6.17.3	1	6.13
Static load	5.7.4	1	6.14
Water absorption	5.7.3	1	6.15
Dangerous substances	Clause 7	—	—

[a] Foul air and water.

9.3 Factory production control (FPC)

9.3.1 General

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

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

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

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

9.3.2 Equipment

9.3.2.1 Testing

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

9.3.2.2 Manufacturing

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

9.3.3 Raw materials and components

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

9.3.4 Product testing and assessment

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

9.3.5 Non-complying products

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

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

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

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

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

9.3.6 Corrective action

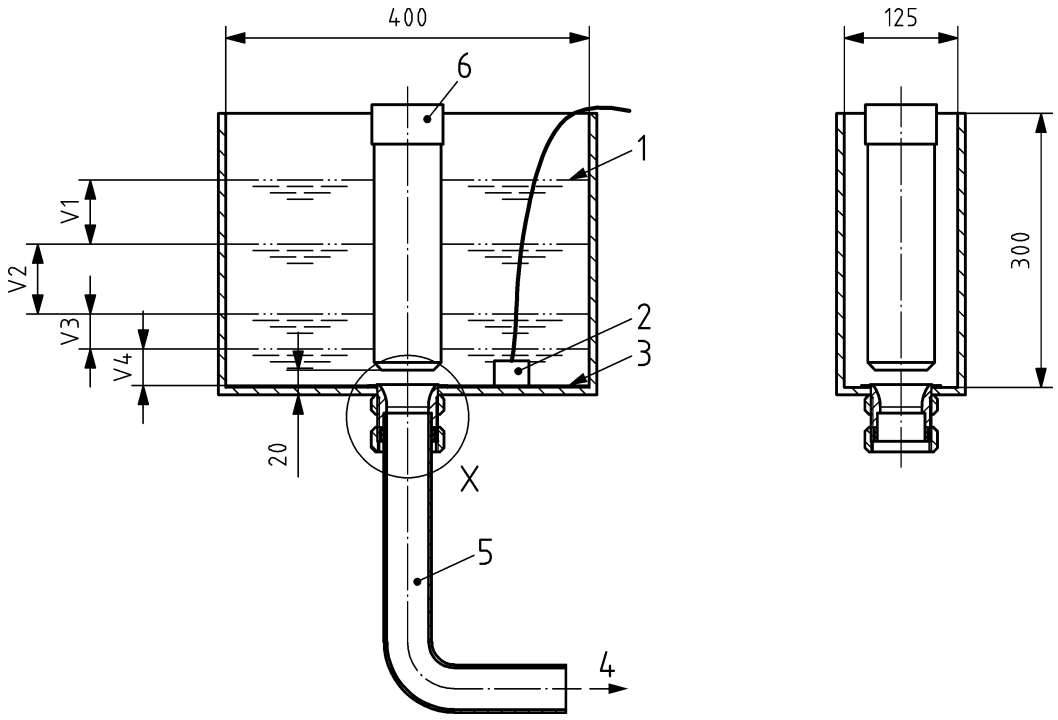
The manufacturer shall have document procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

Annex A
(normative)

Valve-type test flushing cistern

A.1 Valve-type test flushing cistern (Figures A.1 to A.3)

Dimensions in millimetres

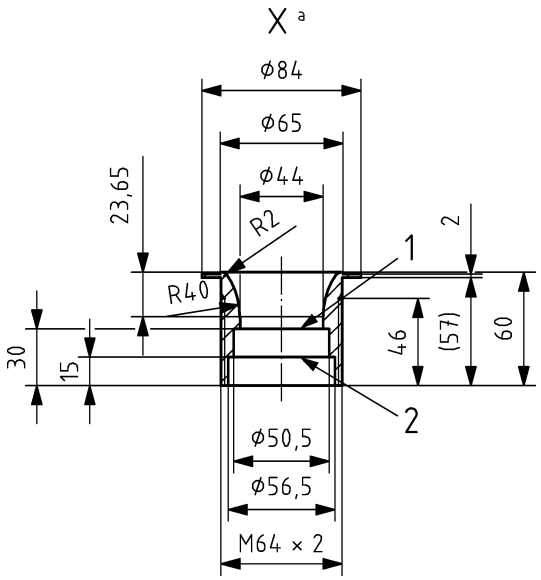


Key

1 water level for the total test volume
2 pressure sensor (pick-off), see NOTE 1
3 residual water
4 flow rate and impact force in accordance with Table A.1, related to the nominal flushing volume 6 l
5 flush pipe in accordance with Figure A.3
6 outlet valve of the test flushing cistern, for examples see Annex F (Figures F.1, F.2, F.3 and F.4)
V1 starting volume (see Table A.2)
V2 measuring volume (see Table A.2)
V3 finishing volume (see Table A.2)
V4 residual volume (see Table A.2)
Test flush volume V1 + V2 + V3
Total test flush volume V1 + V2 + V3 + V4

Figure A.1 — Valve-type test flushing cistern

Dimensions in millimetres



Key

1 bedstop for flush pipe with 50 mm diameter

2 bedstop for flush pipe with 56 mm diameter

Figure A.2 — Detail X

The flush pipe shall be mounted at the bedstop fixed by the screw connection.

NOTE 1 The measurement with an upper and lower water level sensor connected to a level control unit and an electronic timer instead of the pressure sensor (2) is possible.

Dimensions in millimetres

Key

1 flush pipe “type B” for floor standing WC’s, for examples see Annex F, (Figures F.1, F.2, F.3 and F.4)

2 flush pipe “type C” for wall mounted WC’s, for examples see Annex F, (Figures F.1, F.2, F.3 and F.4)

Figure A.3 — Flush pipes for valve-type test flushing cistern

A.2 Calibration of the valve-type test flushing cistern

Use the procedure to test the flush rate, detailed in A.3, with a total test flush volume of 6 l to calibrate the test flushing cistern and the procedure to measure the impact force, detailed in A.5, to verify the impact force. Adjust the flush pipe(s) to achieve the flush rate(s) in accordance with Table A.1. This is usually achieved by cutting the flush pipe.

Table A.1 — Correlation between independent WC sub-type and flush pipe to be used

WC pan sub-type	Intended to be equipped with type of flushing cistern	Description of the flush pipe	Flush rate	Impact force from	
				0,35 s to 0,5 s after start of the signal	maximum method
			l/s	N	N
Pedestal	Wall-hung low-level	Flush pipe “type B”	2,3 ± 0,1	—	—
Back-to-wall	Built-in	Flush pipe “type C”	2,1 ± 0,1	3,8 ± 0,1	4,0 ± 0,1
Wall-hung	Built-in	Flush pipe “type C”	2,1 ± 0,1	3,8 ± 0,1	4,0 ± 0,1

Table A.2 — Test volumes of the test flushing cistern

Nominal flush volume	Total test flush volume	Starting volume V1	Measuring volume V2	Finishing volume V3	Residual volume V4
l	l	l	l	l	l
9	9	—	—	—	0
7	7	—	—	—	0
6 [a]	6	1	3	2	0

[a] For nominal flushing volumes less than 6 l, use the total test flush volume of 6 l, decrease the finishing volume (V3) and increase the residual volume (V4) accordingly. In this case the test flushing cistern can be equipped with a closing unit at the outlet valve. Other equipment, e.g. limitation ring, is permissible.

A.3 Procedure to test the flush rate of the test flushing cistern

Use a calibrated container for all water to be added.

1) Fix the applicable flush pipe to the bedstop of the test flushing cistern (see Table A.1).

2) Fix the pressure sensor at the bottom of the test flushing cistern.

3) Connect the pressure sensor to a measuring device (e.g. an oscilloscope).

4) Fill the test flushing cistern to the total test flush volume in accordance with Table A.2 and mark this.

5) Flush the test flushing cistern.

6) Add V3 l water to the residual water and document the voltage of the pressure sensor for this water level.

7) Add V2 l water and document the voltage of the pressure sensor for this water level.

8) Add V1 l water to reach the total test volume.

9) Flush the test flushing cistern and use the oscilloscope to record the pressure decline during the flush.

10) Determine the time *t* between the voltages of point 6 and 7 of the procedure.

11) Calculate the flow rate by V2/*t*.

12) The required flush rate according to Table A.1 is verified by the arithmetic average of five flushing operations.

13) The outlet valve shall be closed in such a way, that the relevant nominal flush volume is submitted.

A.4 Procedure to test the flushing requirements of the WC

a) Fix the applicable flush pipe to the bedstop of a calibrated test flushing cistern and connect the WC to be tested with a flush pipe according Table A.1.

b) Fill the flushing cistern to the total test volume in accordance with Table A.2. In case of nominal flushing volumes less than 6 l, use the total test flush volume of 6 l and increase the residual volume (V4) accordingly.

c) Flush the flushing cistern for executing the flush test.

A.5 Procedure to measure the impact force of the test flushing cistern

A.5.1 General

The impact force of the test flushing cistern complete with the flush pipe in accordance with Table A.1 shall be measured with the test device shown in Figure A.4. 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 Newton.

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

A.5.2 Test device

The test device shall meet the following requirements:

— The test device shall be in accordance with Figures A.4 and A.5.

— The centre axis of the flush pipe shall be in line with the centre axis of the sensor plate.

— 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.

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

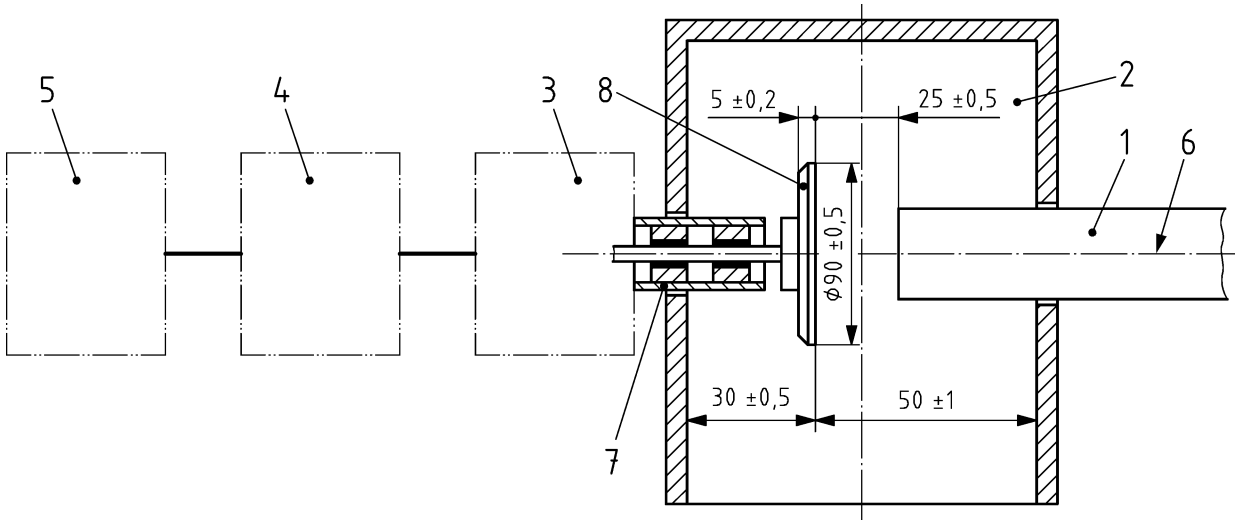
— Measurement amplifier and load cell shall form one system.

— 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

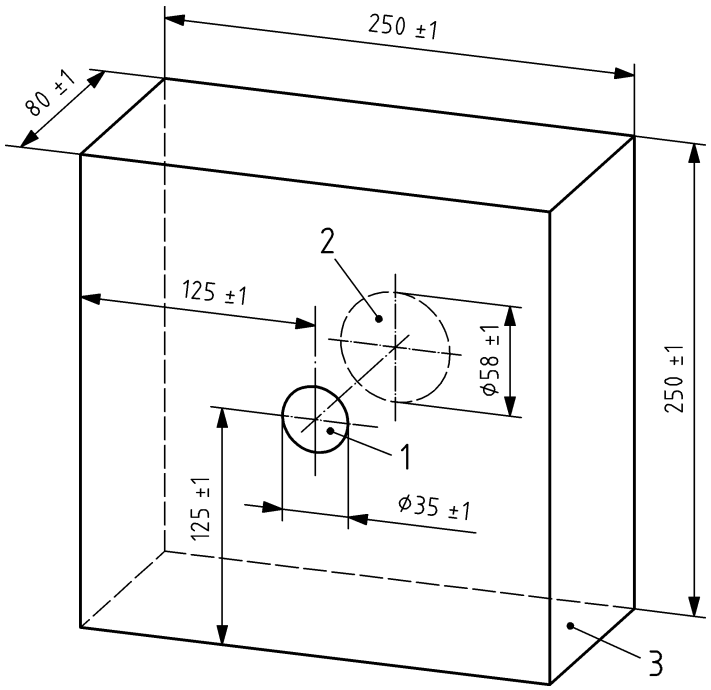


Key

1 flush pipe of the flushing cistern
2 splash guard (for details see Figure A.5)
3 load cell unit
4 measurement amplifier for data acquisition
5 computer for recording and evaluating the measurement data (with suitable software)
6 the centre axis of the flush pipe
7 the mechanical connection between the sensor plate and the load cell
8 sensor plate

Figure A.4 — Test device to measure the impact force

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 A.4) to the back of the splash guard

3 wall thickness minimum 5 mm

Dimensions shown are internal dimensions

Figure A.5 — Splash guard

It is not permissible to use other test equipment than the one shown in Figure A.4.

A.5.3 Procedure for calibrating the load cell unit and the measurement amplifier

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

A.5.4 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 A.4).

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 9 times (10 measurements).

A.5.5 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 data sets 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 test by repeating the procedure 1) to 5) a further 9 times.
7) Calculate the average of the 10 measurements 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.

A.5.6 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 of the possible 60 consecutive measuring values.

EXAMPLE

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

where

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

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

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

F_i is the specific impact force of a measuring point, in N.

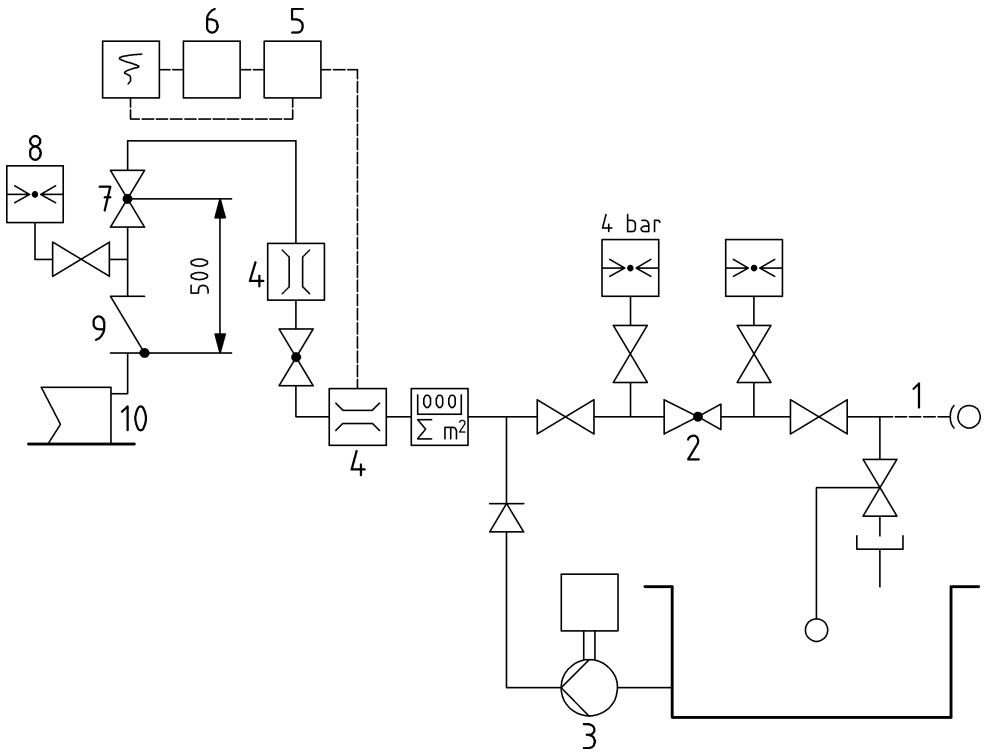
4) The impact force of this measurement is the maximum of all the average values.
5) Record the impact force of this measurement.
6) Evaluate the impact force for each measurement by repeating the procedure 1) to 5) a further 9 times.
7) Calculate the average of the 10 measurements of 6) to two decimal places the result of which is the maximum impact force of the flushing cistern.
8) Record the impact force of the flushing cistern.

Annex B
(normative)

Test rig for test pressure flush valve

B.1 Test rig (Figure B.1)

Dimensions in millimetres



Key

1	main water supply	6	integrating/differentiating instrument
2	pressure regulator	7	control valve
3	centrifugal-pump with frequency meter	8	pressure gauge
4	flow meter	9	test pressure flushing valve (Figure B.2)
5	amplifier	10	flush pipe

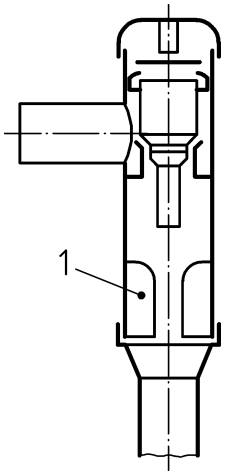
Main supply (1) or tank with pump (3) are alternatives.

Figure B.1 — Test rig

The test pressure flush valve shall deliver the hydraulic values specified in Table B.1.

Table B.1 — Test pressure flush valve

Flush volume l	Flush rate l/s	Impact force measured at the end of the flush pipe N
$5^{\ 0}_{-0,1}$	$1^{+0,05}_{\ 0}$	5,0 ± 0,2
$6^{\ 0}_{-0,1}$	$1^{+0,05}_{\ 0}$	5,0 ± 0,2
$7^{\ 0}_{-0,1}$	$1,15^{+0,05}_{\ 0}$	6,5 ± 0,2
$9^{\ 0}_{-0,1}$	$1,15^{+0,05}_{\ 0}$	6,5 ± 0,2



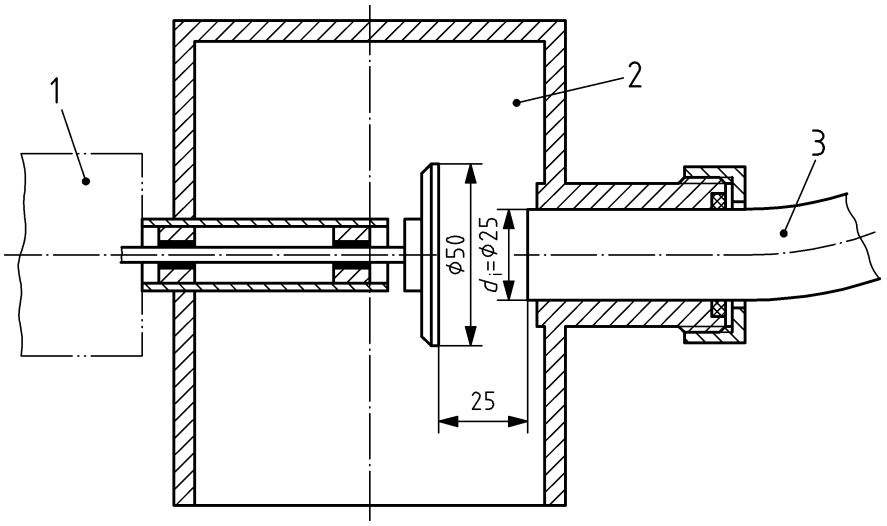
Key
1 air inlets

Figure B.2 — Test pressure flush valve

B.2 Procedure to measure the impact force

The impact force in newtons (N) of a pressure flush valve complete with the flush pipe shall be measured with the test device shown in Figure B.3. The flushing water from the flush pipe shall be directed against the disc (50 mm diameter) to create an impact force. This impact force shall be measured with a load cell and expressed in newtons (N).

Dimensions in millimetres



Key

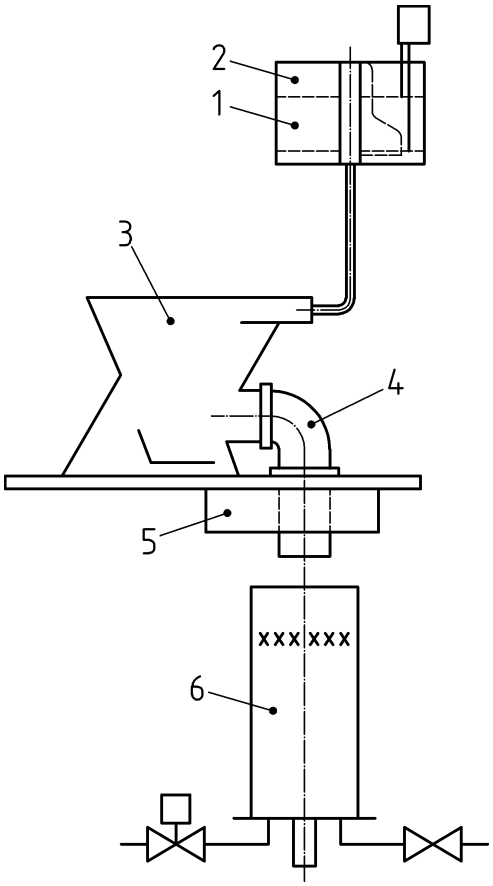
1 load cell
2 measuring box
3 flush pipe

Figure B.3 — Test device to measure the impact force

Annex C
(normative)

Test rig for after-flush volume test

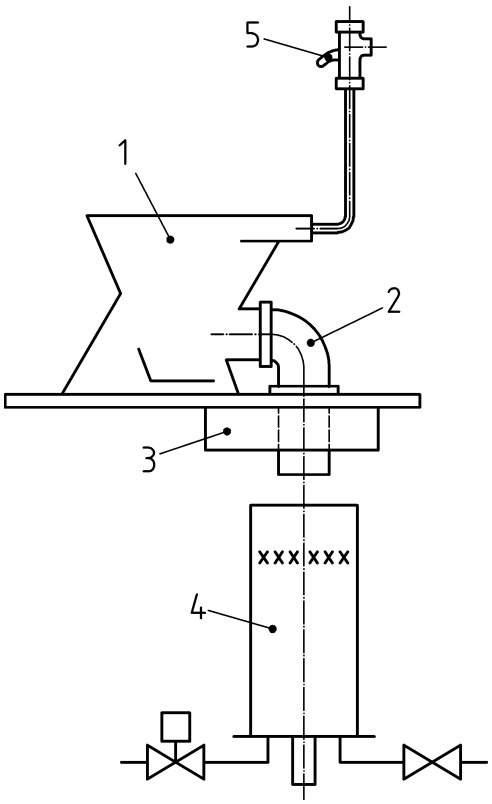
C.1 Test rig for after-flush volume test for independent WC pans (Figures C.1 and C.2)



Key

1 test flushing cistern in accordance with Annex A
2 outlet device of test flushing cistern
3 WC pan to be tested
4 discharge bend (if needed)
5 sensor
6 measuring vessel

Figure C.1 — Test rig for independent WC pan and flushing cistern

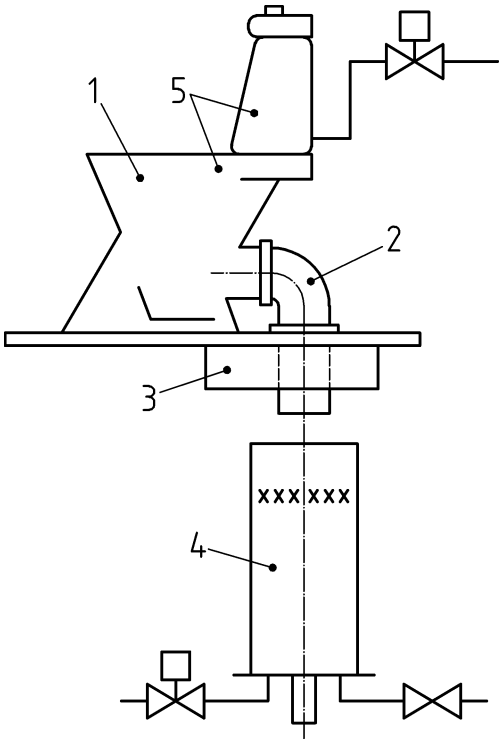


Key

1 WC pan to be tested
2 discharge bend (if needed)
3 sensor
4 measuring vessel
5 test pressure flush valve in accordance with Annex B

Figure C.2 — Test rig for independent WC pan and pressure flush valve

C.2 Test rig for after-flush volume test for one-piece WC pans, close-coupled suites and WC suites (Figure C.3)



Key

1 WC pan to be tested
2 discharge bend (if needed)
3 sensor
4 measuring vessel
5 one-piece WC pan, close-coupled suite or WC suite

Figure C.3 — Test rig for one-piece WC pans, close-coupled suites and WC suites

Annex D
(normative)

Basket method

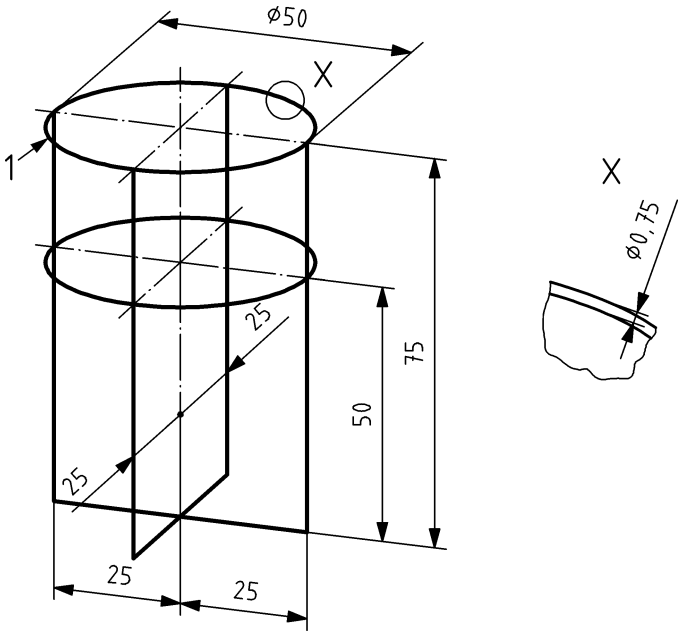
The saturation time of single-layer paper is measured using the basket method.

A sufficient number of sheets of paper are stacked and cut to a size of 75 mm × 250 mm. Approximately 5 g are weighed out, rolled up and put into the basket in accordance with Figure D.1.

Place the inverted basket containing the paper into a cylindrical glass vessel in accordance with Figure D.2 containing water that does not deviate more than ± 3 °C of the temperature of the water used for flushing. Measure the time in seconds from placing the basket into the water until it is completely immersed. Repeat the test 3 times and record the arithmetical average time taken.

The test shall be carried out under the same conditions of relative humidity and temperature of air as for the flushing test.

Dimensions in millimetres



Diameter of wire 0,75 mm

Mass 3 g

Figure D.1 — Basket

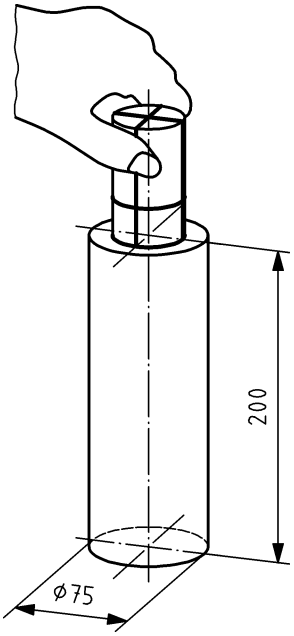


Figure D.2 — Placing the basket

Annex E
(normative)

Preparation of test specimens

1) Moisten the artificial sausage skin and cut it to length in accordance with Figure E.1. Tie the bottom end with string of 1 mm diameter in accordance with Figure E.2.

2) Insert the metal detector ring with a 14 mm internal diameter (diameter of the wire 1,6 mm, mass 1,53 g) out of stainless steel or a ring with a 10 mm internal diameter (diameter of the wire 2,0 mm) out of silver, fill in 37 ml of water and tie the upper end with string. Position the O-rings diameter 10/14 in accordance with Figure E.2.

3) Verify whether the specimen is completely filled with water in accordance with Figure E.3.

4) For protection the test specimen shall be covered with a tubular bandage and tied with strings in accordance with Figures E.4 and E.5.

5) Check finally the test specimens with a template in accordance with Figure E.6.

Dimensions in millimetres

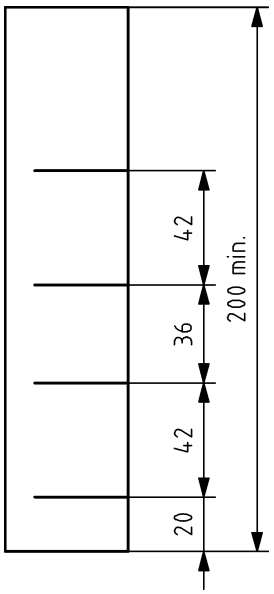
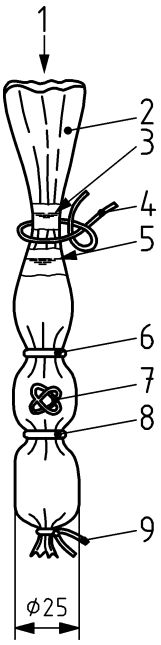


Figure E.1 — Measuring template



Key

1	37 ml water	6	O-ring
2	artificial skin	7	metal detector ring
3	water level after tying	8	O-ring
4	string	9	string
5	water level before tying		

Figure E.2 — Tie position of test specimen

Dimensions in millimetres

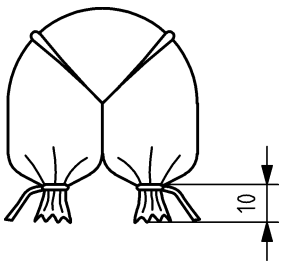


Figure E.3 — Verifying position of test specimen

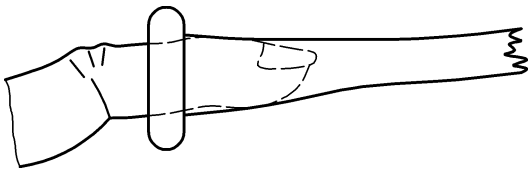


Figure E.4 — How to roll the tubular bandage over the test specimen

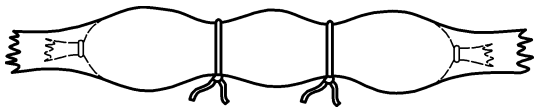
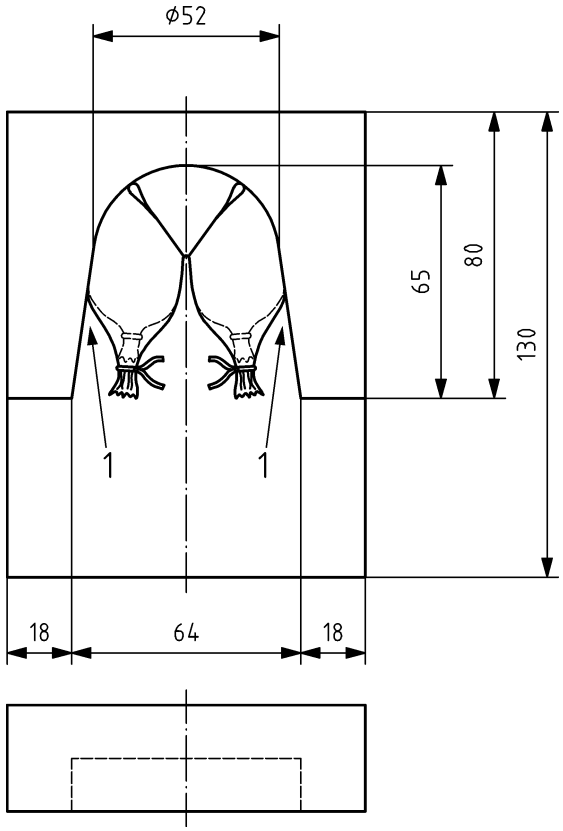


Figure E.5 — Protected test specimen with tubular bandage

Dimensions in millimetres



Key

1 position of test specimen in the gauge without any tension

Figure E.6 — Template to check the final configuration of the test specimen

Annex F
(normative)

Examples of flush pipes and outlet valves for test flushing cisterns

Dimensions in millimetres

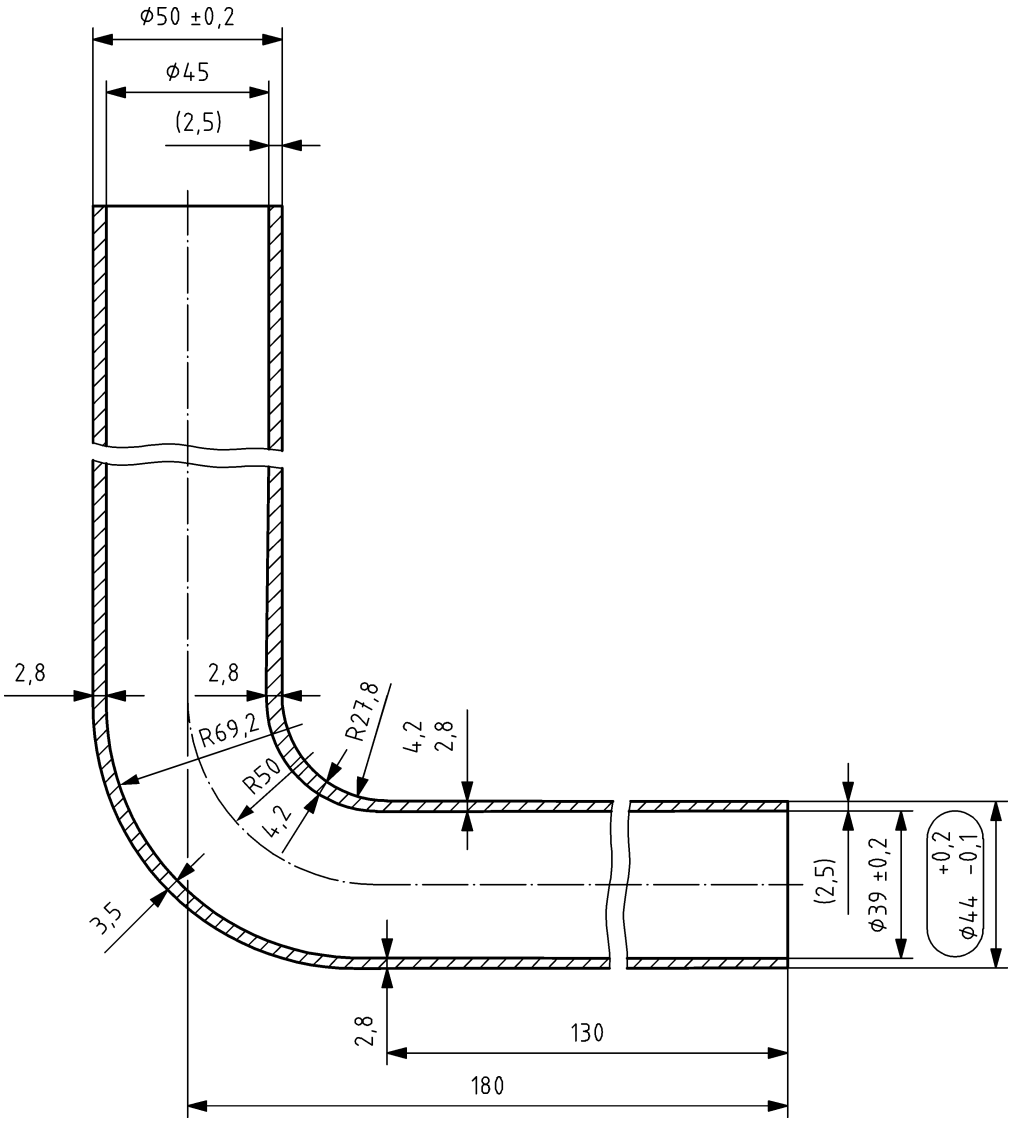


Figure F.1 — Drawing of the flush pipe type B

Dimensions in millimetres

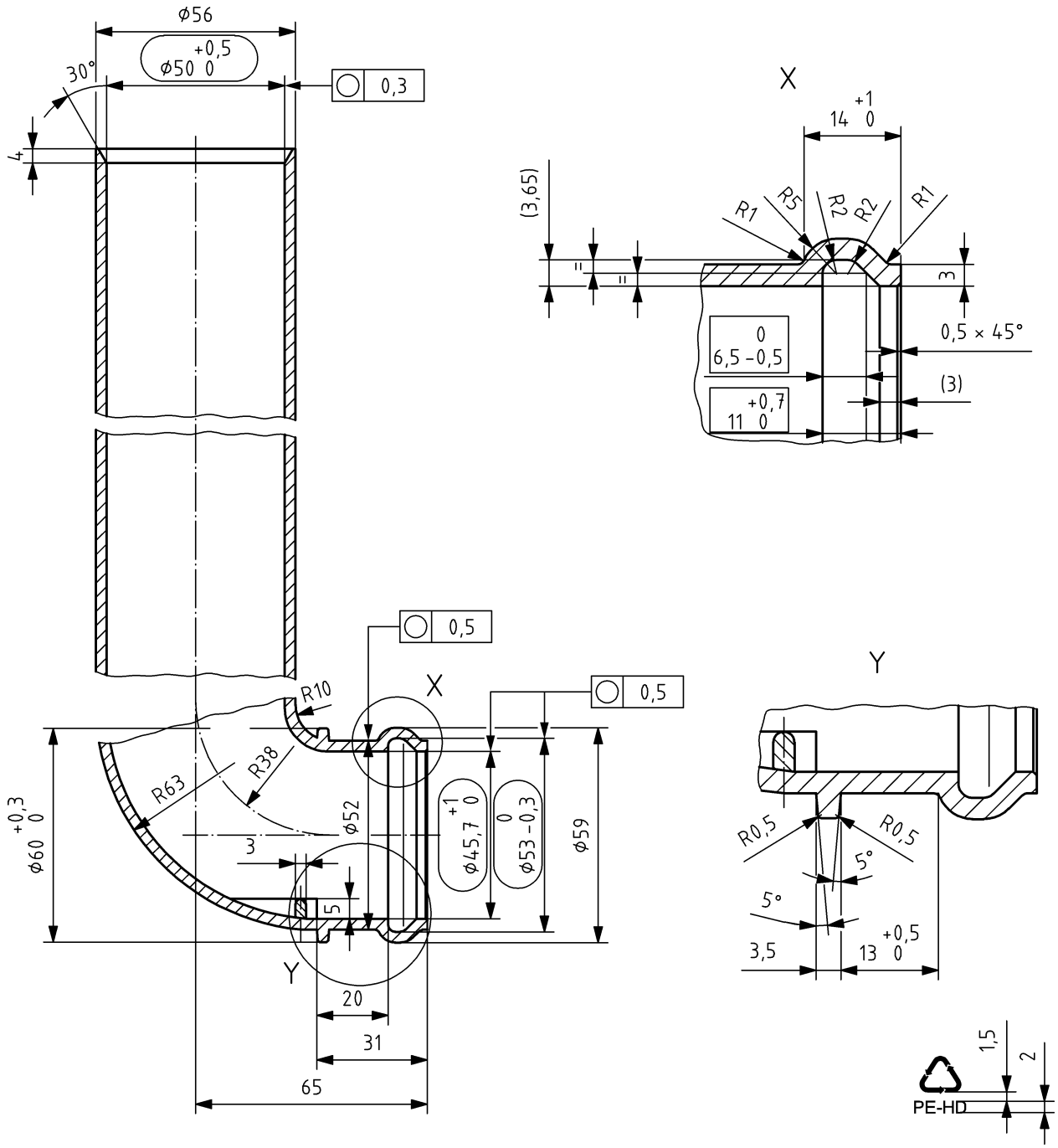
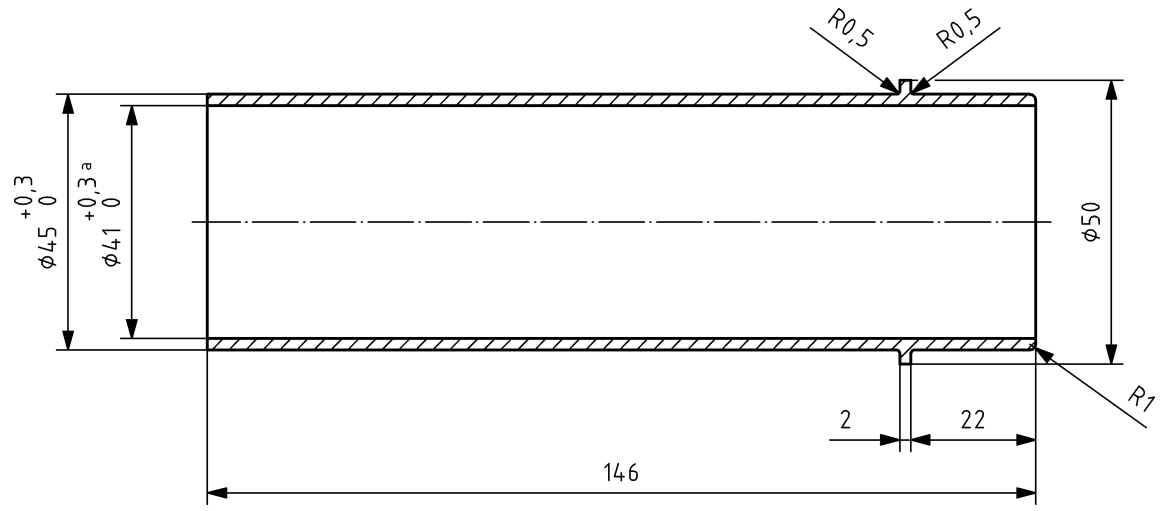


Figure F.2 — Drawing of the flush pipe type C

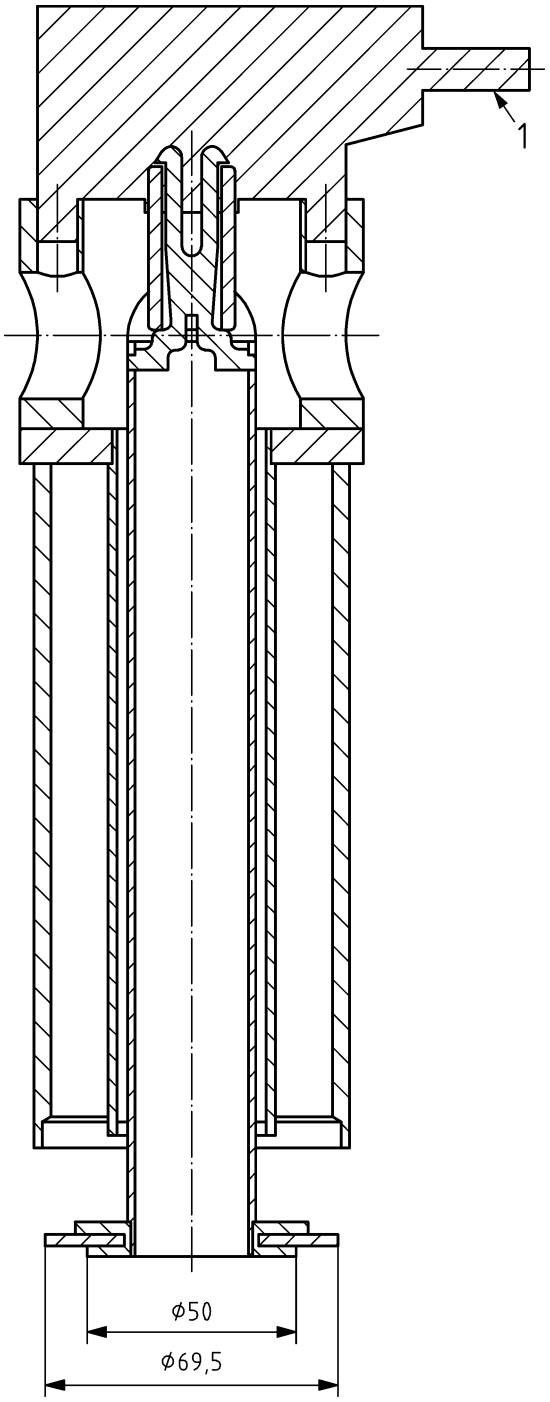
Dimensions in millimetres



The calibration shall be made without the collar.

Figure F.3 — Drawing of horizontal pipe of the flush pipe type C

Dimensions in millimetres



Key

1 connection to the automatic actuator/closing unit

Figure F.4 — Drawing of the outlet valve

Annex ZA
(informative)

Relationship of this European Standard with Regulation (EU) No.305/2011

(When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M/110 "Sanitary Appliances" as amended by M/139 given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1.1 — Relevant clauses for close-coupled suites, one-piece and independent WC pans with integral trap of type 1 for personal hygiene

Construction Product:	**Close-coupled suites, one-piece and independent WC pans with integral trap of type 1**		
Intended use:	**Personal hygiene**		
Essential Characteristics	**Clauses in this European Standard related to Essential Characteristics**	**Classes and/or threshold levels**	**Notes**
Capacity of flushing water	5.2.1 5.5.4	—	Confirmed
Backflow prevention (of foul air)	5.1	—	Confirmed
Cleanability	5.2.2 5.2.3 5.2.4 5.2.5 5.2.6 5.3	—	Confirmed
Load resistance	5.4	—	Confirmed
Water/leak tightness	5.5.5	—	Confirmed

Construction Product:	Close-coupled suites, one-piece and independent WC pans with integral trap of type 1		
Intended use:	Personal hygiene		
Essential Characteristics	**Clauses in this European Standard related to Essential Characteristics**	**Classes and/or threshold levels**	**Notes**
Valve reliability	5.5.6 5.5.7	—	Confirmed
Durability	5.6	—	Confirmed

Table ZA.1.2 — Relevant clauses for close-coupled suite of type 2 for personal hygiene

Construction Product:	Close-coupled suites of type 2		
Intended use:	Personal hygiene		
Essential Characteristics	**Clauses in this European Standard related to Essential Characteristics**	**Classes and/or threshold levels**	**Notes**
Capacity of flushing water	6.3 6.4 6.5 6.8	—	Confirmed
Backflow prevention (of foul air)	6.2 6.13	—	Confirmed
Cleanability	6.9 6.10 6.11 6.12	—	Confirmed
Load resistance	6.14	—	Confirmed
Water/leak tightness	6.7 6.8	—	Confirmed
Valve reliability	6.7	—	Confirmed
Durability	6.16	—	Confirmed

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP system of close-coupled suites, one-piece and independent WC pans with integral trap indicated in Tables ZA.1.1 and ZA.1.2 can be found in the EC legal act(s) adopted by the EC: Decisions 96/578/EC (OJ L 254 of 8.10.1996 p 49) amended by EC Decisions 2001/596/EC (OJ L 209 p 33 of 2.8.2010) and 2002/592/EC (OJ L 192 p 57 of 20.7.2002).

ZA.3 Assignment of AVCP tasks

The AVCP system(s) of close-coupled suites, one-piece and independent WC pans with integral trap in Tables ZA.1.1 and ZA.1.2 is defined in Table ZA.2 resulting from application of the clauses of this or other European Standards indicated therein. The content of tasks of the notified body shall be limited to those Essential Characteristics, if any, as provided for in Annex III of the relevant standardisation request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses, the following tasks are to be undertaken by manufacturer for the assessment and verification of the constancy of performance of the product.

Table ZA.2 — Assignment of AVCP tasks for close-coupled suites, one-piece and independent WC pans with integral trap under system 4

Tasks		Content of task	AVCP clauses to apply
Task for the manufacturer	An assessment of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product	Essential Characteristics of Table ZA.1.1 or Table ZA.1.2 relevant for the intended use which are declared	9.2
	Factory production control (FPC)	Parameters related to Essential Characteristics of Table ZA.1.1 or Table ZA.1.2 relevant for the intended use	9.3

Bibliography

[1] EN 13618, *Flexible hose assemblies in drinking water installations - Functional requirements and test methods*

[2] EN ISO 9001, *Quality management systems - Requirements (ISO 9001)*