



SLOVENSKI STANDARD
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WC pans with integral trap

Klosettbecken mit angeformtem Geruchverschluß

Cuvettes de WC a siphon intégré

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 997

July 1999

ICS 91.140.70

English version

WC pans with integral trap

Cuvettes de WC à siphon intégré

Klosettbecken mit angeformtem Geruchverschluss

This European Standard was approved by CEN on 24 February 1999.

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

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

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

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by January 2000, and conflicting national standards shall be withdrawn at the latest by January 2000.

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

This standard includes annexes, seven normative and one informative, covering the current interchangeability of independent WC pans by flushing volume class and flushing device acceptable in the different Member States of the European Union and European Free Trade Association.

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

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
1 Scope

This standard specifies constructional and performance requirements together with test methods for WC pans with integral trap used for domestic purposes made from vitreous china or stainless steel which are flushed by a nominal volume of 6 l, 7 l or 9 l.

This standard is not applicable to WC pans flushed with other volumes, squatting WC's and WC pans without integral trap.

2 Definitions

For the purpose of this standard, the following definitions apply:

2.1 pedestal WC pan:	Floor mounted WC pan that has an integral base.	
2.2 wall-hung WC pan:	WC pan cantilevered clear of the floor.	
2.3 wash-out WC pan:	WC pan in which excrement falls first into a shallow water filled bowl, before being removed by the flushing water.	
2.4 wash-down WC pan:	WC pan in which excrement falls directly into the trap before being removed by the flushing water.	
2.5 siphonic WC pan	WC pan in which excrement is removed by siphonage induced by the flushing water.	
2.6 close-coupled suite:	Combination of a WC pan and flushing cistern directly coupled into a functional unit.	
2.7 one-piece WC pan:	WC pan manufactured with an integral flushing cistern.	
2.8 independent WC pan:	WC pan suitable for the connection with a flushing cistern or a pressure flush valve.	
2.9 valve-type flushing cistern:	Cistern with integral valve outlet device for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan.	

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2.10 valveless-type flushing cistern:

Cistern with integral siphonic outlet device for storage and discharge of a defined volume of flushing water for removal of excrement from a WC pan.

**2.11 pressure flush valve:**

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



NOTE: Drawings are diagrammatic only

3 Functional requirements

Table 1 correlates the functional requirements of this standard to the Essential Requirements of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (89/106/EEC).

Table 1

Functional requirements	Essential Requirements		
	Hygiene Health Environment	Safety in use	Energy economy
Depth of water seal	X		
Flushing tests	X		
Flushing volume	X		X
Water absorption	X		
Static load		X	

3.1 Depth of water seal

When tested in accordance with 4.1 the depth of the water seal shall be not less than 50 mm.

3.2 Flushing requirements**3.2.1 General**

Table 2 correlates the flushing requirements to the WC pan type, flushing volume and flushing device type.

Table 2

WC pan	Nominal flushing volume (litres)	Flushing device	Wash of bowl (3.2.2)	Flushing of toilet paper (3.2.3)	Flushing of single ball (3.2.4)	Flushing of 50 balls (3.2.5)	Over-splashing (3.2.6)	After-flush volume (3.2.7)
Close-coupled suites and one-piece WC pans	9	Valve-type flushing cistern	X	X		X	X	
	7	Valve-type flushing cistern	X	X		X	X	
		Valveless-type flushing	X	X	X		X	
	6	Valve-type flushing cistern	X	X			X	X
		Valveless-type flushing cistern	X	X	X		X	X
Independent WC pans	9	Valve-type flushing cistern	X	X		X	X	
		Pressure flush valve	X	X		X	X	
	7	Valve-type flushing cistern	X	X		X	X	
		Valveless-type flushing cistern	X	X	X		X	
		Pressure flush valve	X	X		X	X	
	6	Valve-type flushing cistern	X	X			X	X
		Valveless-type flushing cistern	X	X	X		X	X
		Pressure flush valve	X	X			X	X

The efficiency of flushing excrement is simulated by the following requirements.

3.2.2 Wash of bowl

When tested in accordance with 4.2.3, 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 cm² after 5 flushing operations.

3.2.3 Flushing of toilet paper

When tested in accordance with 4.2.4, 12 sheets of toilet paper shall be flushed out of the WC pan a minimum of 4 times out of 5 tests.

3.2.4 Flushing of single plastic ball

When tested in accordance with 4.2.5, the plastic ball shall be flushed out of the WC pan a minimum of 4 times out of 5 tests.

3.2.5 Flushing of fifty small plastic balls

When tested in accordance with 4.2.6, after 5 tests, each with 50 balls, a minimum of 85% of the balls shall be flushed out of the WC pan.

3.2.6 Over-splashing

When tested in accordance with 4.2.7, flushing water shall not splash beyond the rim of the bowl and wet the floor. Only a few small drops are permissible.

3.2.7 After-flush volume

When tested in accordance with 4.2.8, an after-flush volume of 2.5 l or 2.8 l as appropriate is required.

3.3 Water absorption

When tested in accordance with 4.3, the arithmetic average for water absorption of glazed ceramic WC pans shall not exceed 0,5 % by mass.

3.4 Static load

When tested in accordance with 4.4, wall-hung and non-ceramic pedestal WC pans shall withstand a loading of (400 ± 5) kg without showing any evidence of cracking or permanent deformation.

4 Test methods

4.1 Depth of water seal

Install the WC pan in accordance with 4.2.2. Flush the WC pan and measure the height from the invert of the trappage back plate to the surface of the water.

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4.2 Flushing tests

4.2.1 Apparatus

Independent WC pans are to be tested with one or any combination of the following separate flushing devices as indicated by the manufacturer:

Valve-type flushing cistern	Type A (see annex A)
Valveless-type flushing cistern	Type B (see annex B)
Pressure flush valve	Type C (see annex C)

For interchangeability of independent WC pans and flushing devices the test requirements shall be fulfilled for any combination (see tables 3 and 5 and annex H).

For close-coupled suites and one-piece WC pans see table 4 and annex D.

4.2.2 Preparation to test

Independent WC pans: 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, B or C.

Close-coupled suites and one-piece WC pans: Install the suite or the one-piece WC pan on a firm flat horizontal or vertical surface as appropriate using the flushing device provided and specified by the manufacturer. The flushing volume shall be verified for the class of the WC pan (see table 4 and annex D).

4.2.3 Sawdust test

4.2.3.1 Test material

20 g of fine dry wooden sawdust.

4.2.3.2 Test method

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 completely and evenly as possible over the moistened surface. Flush the WC pan and measure any unwashed area. Repeat this procedure 5 times.

4.2.4 Toilet paper test

4.2.4.1 Test material

Toilet paper with a saturation time of (15 ± 10) s verified by the basket method (see annex E). Individual sheets shall have a size approximately 140 mm x 100 mm. The mass per unit surface of the toilet paper shall be (30 ± 10) g/m².

4.2.4.2 Test method

Individually loosely crumple 12 sheets of toilet paper and drop them separately one after the other into the WC pan within a time 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. Repeat this test 5 times.

4.2.5 Single plastic ball test

4.2.5.1 Test material

A ball of non-absorbent material, having a relative density of between 1,075 g/cm³ and 1,08 g/cm³ and a diameter of $(43 \pm 0,5)$ mm.

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4.2.5.2 Test method

For each flushing operation place the ball into the WC pan and flush the WC pan. Check if the ball is flushed out of the WC pan. Repeat this test 5 times.

4.2.6 Fifty plastic balls test

4.2.6.1 Test material

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

4.2.6.2 Test method

For each flushing operation place the 50 balls into the WC pan and flush the WC pan. Check for and remove any balls left in the WC pan. Repeat this test 5 times.

4.2.7 Over-splashing test

4.2.7.1 Test material

Paper of a type which shows surface change when wet.

4.2.7.2 Test method

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 which the WC pan will be approved for.

4.2.8 After-flush volume test

4.2.8.1 Test rig

A test rig in accordance with annex D.

NOTE: Other test rigs can be used if the deviation of the after-flush volume related to 6 l is not more than $\pm 0,1$ l using a reference WC pan.

4.2.8.2 Test material

4 test specimens prepared in accordance with annex F.

4.2.8.3 Test method

Place the 4 test specimens one after the other into the WC pan and flush the WC pan. Repeat this test 10 times.

The test is positive, if:

- a) in 8 out of 10 flushes all 4 test specimens are evacuated and the after-flush volume is on each occasion $\geq 2,5$ l or
- b) the arithmetical average of after-flush volume of the 10 flushing operations is $\geq 2,8$ l.

The result of flushing operations without all 4 test specimens being evacuated shall count as 0 l.

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

The test then is positive, if:

- c) in 16 out of 20 flushes all 4 test specimens are evacuated and the after-flush volume is on each occasion $\geq 2,5$ l or
- d) the arithmetical average of after-flush volume of the 20 flushing operations is $\geq 2,8$ l.

4.3 Determination of water absorption**4.3.1 Test material and apparatus**

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- a balance accurate to 0,05 g;
- an oven controlled at a test temperature of (105 ± 2) °C;
- a desiccator with fresh prepared silica gel;
- a chamois leather;
- a heated bath with controller;
- demineralized water;
- a pair of fine tweezers.

4.3.2 Test method

- Break three samples glazed on one face from the rim of the same product. The unglazed surface area of the samples shall be approximately 30 cm² and the maximum thickness shall be approximately 12 mm including the glaze.
- Dry the samples at a temperature of 105 °C for (180 ± 5) min.
- Allow the samples to cool in a desiccator.
- Weigh each sample to an accuracy of 0,05 g; this mass is m_0 .
- Using the fine tweezers place the samples in the bath and fill with demineralized 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 a slightly damp chamois leather.
- Any cavities or holes shall be dried using a fine brush.