

**Translation from Finnish**

**Legally binding only in Finnish and Swedish**

**8/19**

## **Decree of the Ministry of the Environment**

### **on the Type Approval of Check Valves Intended for Water Supply Systems of Buildings**

By decision of the Ministry of the Environment, the following is enacted pursuant to section 6, subsection 3; section 9, subsection 2; and section 10, subsection 3 of the Act on the Type Approval of Certain Construction Products (954/2012):

#### Section 1

##### *Scope of application*

This Decree applies to the requirements of type approval of check valves of water supply systems intended for conducting household water and domestic hot water in a building and on property.

This Decree covers check valves with a nominal diameter of DN 8 - DN50 used in the cold and hot water supply system or solely in the cold water supply system of a building. This Decree covers the check valve types presented in Table 1.

Table 1. Check valve types covered by type approval.

Type of a check valve (E)	Description
EA	One closure member, test plug inlet side
EB	One closure member, no test plug
EC	Two single closure members
ED	Two single closure members, test plugs inlet side

#### Section 2

##### *Establishment of conformity*

Type approval can be used to demonstrate that the check valves comply with the essential technical requirements laid down in section 117 c of the Land Use and Building Act (132/1999), as amended by Act (958/2012), and thereunder.

### Section 3

#### *Suitability for conducting household water*

An accredited testing laboratory shall inspect the information on the material of a check valve.  
An accredited testing laboratory shall test the concentration of lead dissolved into test water from the manufacturing material of the check valve with a 26-week long dissolution test, or the dissolution of lead and cadmium from the test valve with a 10-day test in accordance with Appendix 1.

In case there are different sizes of check valves of the same material and structure, a check valve with a nominal diameter of DN 25 or the valve size closest to it shall be tested.

### Section 4

#### *Chemical composition and corrosion resistance of metal parts*

An accredited testing laboratory shall analyse the chemical composition of the metal parts that come into contact with water. The composition shall conform to the composition stated by the manufacturer.

An accredited testing laboratory shall measure the dezincification resistance of a check valve if the zinc content of the composition of the check valve exceeds 15 per cent.

An accredited testing laboratory shall test the occurrence of internal stress in the brass fitting parts of a check valve with a stress corrosion resistance test. In the test, no cracks that are visible with a ten-fold magnification may appear in the parts.

### Section 5

#### *Structure and surfaces*

An accredited testing laboratory shall examine the structure and surfaces of the check valve visually without magnification. The replaceability of the closure member of the check valve shall be examined.

### Section 6

#### *Dimensions*

An accredited testing laboratory shall inspect the dimensions of the check valve. The dimensions shall conform to the information notified by the manufacturer.

### Section 7

#### *Flow resistance*

An accredited testing laboratory shall determine the flow resistance of a check valve using flow resistance test apparatus with at least four water flows which cover the flow range of the check valve. The measured values shall be presented in tabulated form and in graphs.

In connection with the measurements, the operation of a check valve shall be checked at a high flow rate so that the flow rate in the connection pipes of the check valve is four meters per second for five minutes. In the test, no parts may be detached from the check valve and it may not sustain damage.

## Section 8

### *Mechanical strength*

An accredited testing laboratory shall test the mechanical strength of a check valve at a test pressure of  $2.5 \pm 0.1$  MPa. The test shall be performed with cold water at  $25 \pm 5$  degrees Celsius. In the test, the pressure shall be applied on both sides of the closure member. The test period is five minutes. In the test, the check valve may not sustain permanent deformations or other damage.

## Section 9

### *Resistance to bending*

An accredited testing laboratory shall test the strength of the body of a check valve equipped with threaded fittings in bending. In the test, the connection ends of the check valve shall be subjected to a bending moment with steel tubes in accordance with Table 2 for five minutes. In the test, the check valve may not sustain permanent deformations or other damage. After the test, the check valve shall be tight.

Table 2. Bending moment of the body of a check valve.

Nominal size	DN 8	DN10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Bending moment Nm	30	40	80	150	300	400	500	600

## Section 10

### *Tightness*

An accredited testing laboratory shall test the tightness of the closure member of the check valve and the check valve entity in a check-valve tightness test apparatus in accordance with Table 3. The test shall be performed with cold water at  $25 \pm 5$  degrees Celsius. In the tests, the check valve shall be tight and it may not lock.

Table 3. Tightness tests and test parameters.

Test	Pressure kPa	Test period min
Tightness with small back pressure	0.3	5
Tightness with high back pressure	1,600	10
Locking (opening pressure)	$\leq 15$	-
Close-off pressure difference	$\leq 0.5$	-

## Section 11

### *Durability*

An accredited testing laboratory shall test the durability of a check valve. The test shall be carried out in a test apparatus where the closure member of a check valve has to operate repeatedly with the test values in accordance with Table 4. After the test, the check valve shall meet the requirements of tightness testing.

Table 4. Test parameters of the durability test.

Nominal size	DN 8	DN10	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
Flow l/s during the flow phase	0.1	0.15	0.35	0.65	1	1.6	2.5	4
Water temperature	At the beginning of the test at 90 °C for 1 hour, whereafter 65 °C <sup>a)</sup>							
Pressure phase, no flow	Pressure at the outlet of the check valve (1 000±50) kPa, inlet non-pressurised							
Operating cycle	Flow (6±1) s, switch (1±0,5) s, pressure (6±1) s switch (1±0,5) s							
Number of operating cycles	80,000							
<sup>a)</sup>	Cold and hot water valves, cold water valves: (20–30) °C							

## Section 12

### *Marking*

An accredited testing laboratory shall inspect the markings of the check valve.

## Section 13

### *Type testing*

For type approval, an accredited testing laboratory shall type test the check valves in accordance with the extent of testing given in Table 2.1 of Appendix 2. For type approval, the manufacturer shall, in addition to samples, submit product designs, material information and certificates as well as installation instructions.

## Section 14

### *Quality control relating to type approval*

The certifying body for quality control shall verify that the check valves comply with the requirements of type approval and also meet the conditions set in the decision on type approval.

The certifying body for quality control shall carry out an initial inspection of the production, an on-going control of the internal production quality control as well as the selection of random samples of products and their testing once annually or more frequently if the products do not meet the type-approval requirements. The extent of testing of random samples is presented in Table 2.2 of Appendix 2.

The manufacturer's internal production quality control shall cover at least the inspections and tests presented in Appendix 3.

Section 15

*Entry into force*

This Decree enters into force on 1 January 2020.

Helsinki, 9 April 2019

Minister of the Environment, Energy and Housing Kimmo Tiilikainen

Senior Specialist Tomi Marjamäki

### **Dissolution of heavy metals– test method**

Dissolution of heavy metals (cadmium, lead) shall be tested from the brass parts of a check valve that come into contact with water. The testing shall be carried out on an unused check valve with a ten-day test.

#### Test solution

The test solution (synthetic potable household water) shall be prepared by weighing 50 milligrams of NaCl, 50 milligrams of Na<sub>2</sub>SO<sub>4</sub> and 50 milligrams of CaCO<sub>3</sub> (all p.a. quality) per litre of distilled and /or deionized water. The solution shall be stirred and CO<sub>2</sub> shall be bubbled therein until all CaCO<sub>3</sub> has dissolved. After that air shall be bubbled into the solution while stirring it until the pH value has reached 7.0± 0.1. Since CaCO<sub>3</sub> dissolves very slowly, it must be ensured that all CaCO<sub>3</sub> has dissolved before air is bubbled; if not, the solution will not stabilize.

The test solution may also be prepared by weighing 50 milligrams of NaCl, 50 milligrams of Na<sub>2</sub>SO<sub>4</sub> and 37 milligrams of Ca(OH)<sub>2</sub> (all p.a. quality) per litre of distilled and /or deionized water. The solution shall be stirred until Ca(OH)<sub>2</sub> is almost dissolved and CO<sub>2</sub> shall be bubbled therein until the pH value is below five. After that air shall be bubbled into the solution while stirring it until the pH value has reached 7.0± 0.1. This preparation method will make the dissolution of the salts easier.

The synthetic potable household water shall be prepared either immediately before each water replacement or it shall be ensured that the solution is clear and that its pH value is 7.0 ± 0.1 at least in connection with the water replacements on days four, eight and nine. A blank sample shall be taken in connection with the water replacements on days 8 and 9.

#### Analysis apparatus

An atomic absorption spectrometer equipped with a graphite furnace or another sufficiently sensitive measuring instrument. The limit of determination shall be at least 0.1 micrograms per litre for lead (Pb) and 0.02 micrograms per litre for cadmium (Cd).

#### Test method

The sample shall be degreased with pure ethanol for those parts that come into contact with potable household water. After that, tap water shall be run through the sample for one hour at the flow rate corresponding to the flow rate of 1-2 meters per second in the connection pipes of the valve.

Stoppers made of colourless polyethylene or covered with a polyethylene coating shall be used in the flow orifices of the sample. The stoppers may also be made of other material as long as no cadmium or lead is dissolved therefrom. The sample shall be immediately rinsed with synthetic potable household water by filling it halfway and shaking it for approximately 30 seconds, after which the water is poured off. Immediately after that the sample shall be filled with synthetic potable household water so that no air remains inside it and its flow orifices are equipped with stoppers.

The synthetic potable household water shall be let stand in the sample for 24 hours, after which it is emptied, the amount of water is measured and the sample is refilled. The synthetic potable household water in the sample shall be replaced after days 1, 2, 3, 4, 7, 8 and 9. It shall be checked that the amount of water emptied from the sample remains constant ( $\pm 10$  per cent).

The water samples replaced after days 8 and 9 (test period of 9 and 10 days) shall be analysed for cadmium and lead. The measured concentrations deducted with the equivalent concentrations in the blank samples shall be indicated in the results (micrograms per litre). In addition, the total amounts of cadmium and lead (in micrograms) derived from the concentrations and the water volume of the sample as well as the water volume of the sample in litres shall be indicated.

**Type testing of a check valve and the tests used in the verification of quality control**

Table 2.1. The properties to be tested in the type testing of check valves and the extent of testing for valves of identical structure and material when there are several valve sizes.

Property to be tested	Samples to be tested
Suitability for conducting household water	Testing of heavy metals, 1–2 pcs, ≤ DN 25
Composition of material	1 pc
Dezincification resistance	1 pc
Structure, surfaces and dimensions	1 pc, all sizes
Flow rate and flow resistance	1 pc, all sizes
Mechanical strength of the body (pressure test)	1 pc, all sizes
Resistance to bending	1 pc, all sizes
Tightness with small back pressure	3 pc/ DN 15 or smallest size > DN 15, others 1 pc/size, all sizes
Tightness with high back pressure	
Close-off pressure difference	
Durability	1 pc, DN 25 or largest < DN 25

Table 2.2. The properties to be tested in the verification of quality control of check valves and the testing frequency when the valves are of identical structure and material.

Property to be tested	Testing frequency
Composition of material	1 pc/ in 1–2 years
Structure, surfaces and dimensions	2 pcs/size, 3 sizes/year. The sizes to be tested shall be alternated annually
Mechanical strength of the body	
Tightness	
Markings	All samples

**Testing by the manufacturer's internal quality control**

Table 3.1. Inspections and tests on check valves by the manufacturer's internal quality control and their minimum frequency.

Property to be tested	Extent of inspections
Material acceptance inspection	Each accepted batch, all material certificates, inspections and any non-conformities observed shall be recorded
Manufacturing process	The extent of inspections at the different stages of the manufacturing process shall be sufficiently comprehensive to ensure a constant quality of the products.
Tightness tests and end-product inspection	All products in accordance with the quality plan of the manufacturer.