

**Translation from Finnish**

**Legally binding only in Finnish and Swedish**

**5/19**

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

### **on the Type Approval of Fittings for PEX Pipes 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 the fittings for cross-linked polyethylene pipes (hereinafter *PEX pipes*) of water supply systems intended for conducting household water and domestic hot water in a building and on property.

This Decree covers fittings for PEX pipes with a nominal diameter of DN 10–DN 110.

#### Section 2

##### *Definition*

*The nominal diameter of a PEX pipe fitting* means the nominal outside diameter of the PEX pipe to be connected.

#### Section 3

##### *Establishment of conformity*

Type approval can be used to demonstrate that the PEX pipe fittings 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 4

### *Suitability for conducting household water*

An accredited testing laboratory shall inspect the information on the material of the PEX pipe fittings.

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

## Section 5

### *Material*

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

An accredited testing laboratory shall test the long-term strength, heat resistance and pressure resistance of plastic PEX pipe fittings. Section 10 of the Decree on the Ministry of the Environment on the Type Approval of PEX Pipes Intended for Water Supply Systems of Buildings (1/2018) shall be applied to the testing.

## Section 6

### *Corrosion resistance of metal parts*

An accredited testing laboratory shall measure the dezincification resistance of the PEX pipe fitting if the zinc content of the composition of the fitting exceeds 15 per cent.

An accredited testing laboratory shall test the occurrence of internal stress in the brass parts of the PEX pipe fitting 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 7

### *Surface properties*

An accredited testing laboratory shall examine the outer appearance of the PEX pipe fittings visually without magnification.

An accredited testing laboratory shall test the light transmittance of a plastic PEX pipe fitting if the fitting transmits light.

## Section 8

### *Structure and dimensions*

An accredited testing laboratory shall examine the structure and dimensions of the PEX pipe fittings.

## Section 9

### *Suitability for a PEX piping system*

An accredited testing laboratory shall test the suitability of PEX pipe fittings for a PEX piping system with the tests presented in Table 1. The connections may not leak in the tightness tests. The connections may not become detached in the tensile test.

Table 1. Piping system tests.

Test	Temperature °C	Test pressure bar	Test period or number of cycles
Tightness			
in excess pressure	95±2	12.5	1,000 h
in bending	23±2	33.9	1 h
in temperature variation	90/20 <sup>a)</sup>	10	5,000/2,500 cycles <sup>b)</sup>
in pressure cycling	23±2	0.5/15.0 <sup>c)</sup>	10 000 cycles
in underpressure	23±2	-0.8	1 h
Tensile test <sup>d)</sup>	23±2 95±2	- -	1 h 1 h
<p>a) 90/20 °C, duration 15/15 min, (30 min/cycle)</p> <p>b) <math>d_n \leq 63</math> mm: 5,000 cycles, <math>d_n &gt; 63</math> mm: 2,500 cycles</p> <p>c) (30±5) cycles/minute</p> <p>d) Force <math>F = \pi \times d_n^2 \times p_D / 4</math></p> <p>where  F is force (N),  <math>d_n</math> is the nominal outside diameter (mm)  <math>p_D</math> is the dimensioning pressure 1.0 MPa (10 bar)  Force of the tensile test at 23 °C 1,5×F and at 95 °C F.</p>			

## Section 10

### *Marking*

An accredited testing laboratory shall inspect the markings of the fittings.

## Section 11

### *Type testing*

For type approval, an accredited testing laboratory shall type test PEX pipe fittings in accordance with the extent of testing presented in Tables 2.1-2.3 of Appendix 2. For type testing, the manufacturer shall, in addition to the samples, submit product and raw-material information.

## Section 12

### *Quality control relating to type approval*

The certifying body for quality control shall verify that PEX pipe fittings 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 the testing of random samples is presented in Table 2.4 of Appendix 2.

The manufacturer's internal production quality control shall cover at least the inspections and tests presented in Tables 3.1 and 3.2 of Appendix 3.

## Section 13

### *Entry into force*

This Decree enters into force on 1 January 2020.

Helsinki, 11 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 (lead and cadmium) shall be tested on an unused PEX pipe fitting 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 fitting.

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 PEX pipe fittings**

Table 2.1. Size grouping of pipes and fittings.

Size group	1	2
Nominal outside diameter, $d_n$ , mm	$10 < d_n < 75$	$75 \leq d_n \leq 110$

Table 2.2. Fitting groups.

Fitting group	Fitting type
1	Bends, T-branches
2	Adapters, reducers, plugs
3	Manifolds
4	Other fittings

Table 2.3. The properties and samples to be tested in the type testing of PEX pipe fittings when the fittings of different sizes are of identical material and structure.

Property	Minimum number of samples to be tested
Outer appearance	All samples
Nominal size and dimensions	1 pc/size, all sizes
Metal fittings	
Composition of material	1 pc, 1 size
Dissolution of heavy metals	1–2 pcs / $d_n$ 28 mm or the size closest to it
Dezincification resistance	1 pc, 1 size
Stress corrosion	3 pcs/size, 1 size
Plastic fittings	
Suitability for conducting household water	Assessment on the basis of composition data
Long-term strength	1 assessment/material
Heat resistance	1 sample/material
Transparency	1 sample / smallest wall thickness
Pressure resistance	3 samples/ size/ fitting group
Physical and chemical properties	2 samples / size group, 1 assessment / seal material
Piping system	
Tightness in excess pressure	3 samples/size, 2 sizes/size group
in bending	3 samples/size, 2 sizes/size group
in temperature variation	2 samples/size
in pressure cycling	3 samples/size
in underpressure	3 samples/size, 2 sizes/size group
Tensile stress resistance	3 samples/size

Table 2.4. The properties to be tested in the verification of quality control of PEX pipe fittings and their minimum testing frequency when the fittings of different sizes are of identical material and structure.

<b>Property</b>	<b>Testing frequency</b>
Composition of material	1 pc/in 1-2 years
Dezincification resistance	Need for testing to be assessed on the basis of material composition
Outer appearance	3 samples/size group/year
Dimensions	3 samples/size group/year
Plastic fittings, pressure resistance, 95 °C ≥ 1,000 h	3 samples/size group/fitting group/year
Markings	All samples
<b>Piping system</b> Test values	Each test: 3 pcs/ size, 2 sizes/year. The sizes to be tested shall be alternated annually.
Tightness in excess pressure	
Tightness in tensile stress	
Markings	All samples
Sizes to be tested shall be alternated annually	



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

Table 3.1. Internal quality control inspections of the manufacture of PEX pipe fittings and their minimum extent.

<b>Inspection</b>	<b>Extent of inspection</b>
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.
Plastic fittings Pressure resistance, 95 °C ≥ 1,000 h	3 samples/size group/ fitting group / year