

Translation from Finnish
Legally binding only in Finnish and Swedish

2/20

Decree of the Ministry of the Environment

on the type approval of fittings for PE pipes intended for water supply and sewerage 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 fittings for polyethylene pipes (hereinafter *PE pipes*) of water supply and sewerage systems intended for conducting pressurised household water and sewage in a building and on property. This Decree covers mechanical and fusion fittings for PE pipes with a nominal size of DN/OD 16-DN/OD 225.

Section 2

Establishment of conformity

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

Section 3

Suitability for conducting household water

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

An accredited testing laboratory shall test the concentration of lead dissolved into test water from the manufacturing material of the PE 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 4

Directive 2015/1535/EC of the European Parliament and the Council (32015L1535), Official Journal No L 241, 17.9.2015, p. 1

Material

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

If the mechanical PE pipe fittings are made of plastic, their long-term strength, heat resistance and pressure resistance shall be tested. The same tests as for PE pipes shall be applied in the testing. Based on the test results, it shall be possible to reliably estimate the design life of plastic PE pipe fittings under design conditions as at least equal to the design life of PE pipes.

Section 5

Corrosion resistance

An accredited testing laboratory shall measure the dezincification resistance of the PE 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 PE 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 6

Surface properties

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

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

Section 7

Structure and dimensions

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

Section 8

Piping system

An accredited test laboratory shall test the suitability of PE pipe fittings for connecting PE pipes with the tests presented in Table 1 and Table 2. The connections may not leak during the tightness tests. The connections may not become detached in the tensile tests.

Table 1. PE piping system tests for mechanical fittings.

Property	Test pressure bar	Test temperature Test period
Tightness in overpressure	1.5 x PN	(23±2) °C 1 h
in bending	1.5 x PN	
in external overpressure	0.1 and 0.8	
in underpressure	-0.8	
Tensile stress resistance	- ¹⁾	
1) Axial force of the fitting $F (N) = 1.5 \pi \sigma e_n (d_n - e_n)$ where σ is computational stress, PE 80: 5.7 MPa, PE 100: 7.2 MPa e_n nominal wall thickness of the pipe (mm) d_n nominal outside diameter of the pipe (mm) PN = nominal pressure		

Table 2. PE piping system tests for fusion fittings.

Property	Limit values	Test parameters
Tightness in overpressure	Must be tight	Hoop stress 4.5 MPa (PE80) and 5.4 MPa (PE100) Temperature 80 °C 165 h
Cohesive force for electrofusion sleeve fitting	Brittle fracture: Rupture length $\leq L_2/3$	23 °C Sample size 0.1 x d_n
Cohesive force for electrofusion saddle fitting	$L_d \leq 50 \%$ $A_d \leq 25 \%$, brittle fracture	23 °C
L_2 = length of the tubular part of the spigot end in fusion connection L_d = section of the cohesion area in cross connection A_d = section of cohesion area in the theoretical total area		

Section 9

Seals

The manufacturer shall submit to the accredited testing laboratory test reports on the resistance of the seals of the fittings. The accredited laboratory shall verify the equivalence of the seal material specified by the manufacturer with the seals used in the products. The test method applied may be either an IR analysis or a thermogravimetric analysis. In type testing, the suitability of the seal as an element of the system is tested as part of the systems tests of the PE pipe fittings.

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 the PE pipe fittings in accordance with the extent of testing presented in Tables 2.1-2.2 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 the PE 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 and 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 3.1 of Appendix 3.

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

Section 13

Entry into force

This Decree enters into force on 1 March 2021.

Helsinki, 22 December 2020

Minister of the Environment and Climate Change Krista Mikkonen

Senior Specialist Tomi Marjamäki

Dissolution of heavy metals - test method

Dissolution of heavy metals (lead and cadmium) shall be tested on an unused PE 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 Na₂SO₄ and 50 milligrams of CaCO₃ (all p.a. quality) per litre of distilled and/or deionized water. The solution shall be stirred, and CO₂ shall be bubbled therein until all CaCO₃ 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 CaCO₃ dissolves very slowly, it must be ensured that all CaCO₃ 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 Na₂SO₄ and 37 milligrams of Ca(OH)₂ (all p.a. quality) per litre of distilled and/or deionized water. The solution shall be stirred until Ca(OH)₂ is almost dissolved and CO₂ shall be bubbled therein until the pH value is below five. After that air is 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 a flow rate corresponding to the flow rate of 1-2 meters per second in the PE pipe 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 (± 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 PE pipe fittings

Table 2.1. The properties and the samples to be tested in the type testing of PE pipe fittings when the PE pipe fittings of different sizes are identical with regard to material and the structure of the PE pipe end connection.

Property	Minimum number of samples to be tested
Outer appearance	All samples
Structure and dimensions	1 pc / size, all sizes
Metal fittings	
Dezincification resistance	1 pc, 1 size
Material composition	1 pc, 1 size
Suitability for conducting household water	1–2 pc / d_n 28 mm or size closest to that
Stress corrosion	3 pcs / size, 1 size
Plastic fittings	
Suitability for conducting household water	Assessment based on composition data
Long-term strength	1 estimation / material
Heat resistance	1 sample / material
Transparency	1 sample / smallest wall thickness
Pressure resistance	3 samples / size / size group
Physical and chemical properties	2 samples / size group, 1 assessment / sealing material
PE piping system	
Tightness in overpressure	3 samples / size, 2 sizes / size group
in bending	3 samples / size, 2 sizes / size group
in underpressure	3 samples / size, 2 sizes / size group
Tensile stress resistance	3 samples / size
Cohesive force for electrofusion sleeve fitting	3 samples
Cohesive force for electrofusion saddle fitting	2 samples when $DN/OD < 110$ 4 samples when $110 \leq DN/OD$

Table 2.2. Size grouping of PE pipe fittings.

Size group	1	2
Nominal outside diameter, d_n , mm	$16 \leq DN/OD \leq 63$	$75 \leq DN/OD \leq 225$

Tests to be applied in the verification of quality control of PE pipe fittings

Table 3.1. Properties to be tested and minimum sampling frequency for external quality control of PE pipe fittings.

Property	Testing frequency
Outer appearance	1 sample / size group / year
Structure and dimensions	1 sample / size group / year
Markings	All samples
Metal PE pipe fittings; material composition	1 pc / 1-2 years
Plastic PE pipe fittings, pressure resistance, 80 °C ≥ 1000 h	1 sample / size group / fitting group / year
PE piping system Test values	Each test: 3 pcs / size, 2 sizes / year. The sizes to be tested shall be alternated annually
Tightness in overpressure	
Tightness under tensile stress ²⁾	

Testing by the manufacturer's internal quality control

Table 3.2. Internal quality control inspections of production of PE pipe fittings and their minimum extent.

Inspection	Extent of inspection
Material acceptance inspection	Each accepted batch, all material certificates, inspections, and any non-conformities observed shall be recorded.
Production process	The extent of inspection at different stages of the production process shall be sufficiently comprehensive to ensure the constant quality of the products.
Plastic PE pipe fittings Pressure resistance, 80 °C ≥ 1000 h	3 samples / size group / fitting group / year