



**SLOVENSKI STANDARD**  
**oSIST prEN 10358:2012**  
**01-maj-2012**

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**Sanitarna armatura iz nelegiranih jekel - Sanitarna armatura s stiskalnimi končniki za cevi iz nelegiranih jekel**

Unalloyed steel plumbing fittings - Fittings with press ends for unalloyed steel tubes

Fittings aus unlegierten Stählen - Pressfittings für Rohre aus unlegierten Stählen

Raccords de plomberie en acier non allié - Raccords à sertir pour tubes en acier non allié

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| 77.140.75 | Jeklene cevi in cevni profili za posebne namene | Steel pipes and tubes for specific use |

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EUROPEAN STANDARD  
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English Version

## Unalloyed steel plumbing fittings - Fittings with press ends for unalloyed steel tubes

Raccords de plomberie en acier non allié - Raccords à sertir pour tubes en acier non allié

Fittings aus unlegierten Stählen - Pressfittings für Rohre aus unlegierten Stählen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ECISS/TC 110.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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## Foreword

This document (prEN 10358:2012) has been prepared by Technical Committee ECISS/TC 110 “Steel tubes, and iron and steel fittings”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

## 1 Scope

This European Standard specifies materials and test requirements for tube connections with press fittings made of unalloyed steel.

This European Standard specifies press fittings in the size range 12 mm to 108 mm for the purpose of joining unalloyed steel tubes intended for use in heating and cooling systems, wet sprinkler systems, oil transporting and compressed air.

Permissible operating temperatures and maximum operating pressures are also established.

Fittings may comprise a combination of end types, specified in this standard or other standards, providing they are suitable for the fluid /air being conveyed.

The standard establishes a designation tube system with press end joints made with the components fitting and tube, pressed with a pressing tool.

This standard is applicable to press fittings for joining unalloyed steel tubes to EN 10305-3, EN ISO 2081, EN 10346.

Fittings may be suitable for joining other metallic tubes provided the press fitting joint with the specified tube meets the requirements of this standard.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 437:2003+A1:2009, *Test gases — Test pressures — Appliance categories.*

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment.*

EN 681-1, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber.*

EN 10305-3, *Steel tubes for precision applications - Technical delivery conditions - Part 3: Welded cold sized tubes.*

EN 10346, *Continuously hot-dip coated steel flat products - Technical delivery conditions.*

EN ISO 2081, *Metallic and other inorganic coatings - Electroplated coatings of zinc with supplementary treatments on iron or steel.*

EN ISO 9001, *Quality management systems – Requirements.*

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ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation.*

ISO 9924-1, *Rubber and rubber products — Determination of the composition of vulcanizates and uncured compounds by thermogravimetry — Part 1: Butadiene, ethylene-propylene copolymer and terpolymer, isobutene-isoprene, isoprene and styrene-butadiene rubbers.*

**3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply:

- 3.1  
adaptor fitting**  
fitting combining more than one connector type
- 3.2  
factory production control (FPC)**  
means by which a manufacturer ensures that the performances declared by the manufacturer continue to be valid for all subsequent products
- 3.3  
initial type test (ITT)**  
verification of the product's performances described in the technical specification before starting serial production
- 3.4  
maximum operating pressure  
MOP**  
maximum internal pressure at which pipe work can be operated under regular operating conditions
- 3.5  
nominal diameter**  
outside diameter of the connecting tube
- 3.6  
permanently marked**  
marked in such a way that the marking will remain readable up to the end of the life of the installation, e.g. by stamping, etching or engraving
- 3.7  
PN**  
reference figure to characterize components of a pipe work system, It comprises the letters "PN" (Pressure Nominal) followed by an integer which indicates the design pressure in bar at room temperature.
- Note 1 to entry: The allowable pressure of a pipe work component depends on the PN number, the material and design of the component, its allowable temperature, etc.
- 3.8  
press contour**  
appropriate design of the pressing tool to crimp press fittings
- 3.9  
press fitting**  
component with at least one sealing element for connecting pipe components by pressing

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**3.10****pressing machine**

motor for the pressing tool

**3.11****pressing tool**

device to crimp press fittings

**3.12****temporarily (removable) marked**

marked in such a way that the marking will remain readable at least up to the time of commissioning the installation, e.g. ink marking

**4 Classification**

There are two types of press fittings depending on the aggregate state of the medium with which they are suitable for use, as shown in table 1.

**Table 1 — Classification of press fittings**

| Type | aggregate state of medium |
|------|---------------------------|
| 1    | liquiform / liquid        |
| 2    | gasiform / gaseous        |

**5 Operating temperatures and pressures**

Operating temperatures and pressures for pressed joints shall not exceed the values in tables 2 or 3 according to classification.

**Table 2 — Operating temperatures and pressures for type 1 press fitting**

| Operating temperature   | Maximum operating pressure (MOP) for nominal diameters from 12 mm up to and including 108 mm |
|---|--|
| °C  | bar  |
| 30  | 16   |
| 95  | 10   |
| NOTE 1 Intermediate pressure ratings shall be determined by linear interpolation.   |  |
| NOTE 2 Certain designs of press fitting are suitable for use at temperature/pressure ratings outside those given in this table. For such applications, the advice of the manufacturer should be sought. |  |

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To allow for system malfunctions, fittings shall be capable of temporary excursions up to a temperature of 110 °C at a pressure of 10 bar.

**Table 3 — Operating temperatures and pressures for type 2 press fitting**

| Operating temperature<br>°C | Maximum operating pressure for nominal diameters from<br>12 mm up to and including 108 mm<br>bar |       |
|-----------------------------|--|-------|
|                             | MOP 5  | MOP 1 |
| - 20 to + 70                | 5  | 1     |

## 6 Requirements

### 6.1 General

Fittings, including reducers, shall conform to the requirements of 6.2 to 6.3.

### 6.2 Materials

#### 6.2.1 Metals

Fitting bodies and tubes shall be made from unalloyed steel grades shown in the list below or selected from materials specified in EN 10305-3.

NOTE Some of the standardized unalloyed steel grades commonly used for the manufacture of fittings are shown in table 4.

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**Table 4 — Examples of commonly used materials**

| Material designation |              | Standard   |
|----------------------|--------------|------------|
| Steel Name           | Steel Number |            |
| E195                 | 1.0034       | EN 10305-3 |
| E220                 | 1.0215       | EN 10305-3 |
| E235                 | 1.0308       | EN 10305-3 |

Other components can be made from metallic or non-metallic materials, provided that they do not prevent the fitting meeting the functional requirements of this standard and do not cause degradation of the connected tube, fitting or sealing element.

#### 6.2.2 Elastomers

Sealing elements for type 1 fittings shall conform to the requirements for elastomeric materials in EN 681-1:2006-11 and table 5 of this standard.

Sealing elements for type 2 fittings shall conform to the requirements for elastomeric materials in EN 549:1995-04 and table 6 of this standard.

Additional requirements are necessary considering that press fitting design does not allow maintenance and/or substitution of sealing rings after installation. The original sealing ring shall consequently insure a relevant lifetime expectancy

**Table 5 — Sealing elements for type 1 fittings - additional requirements and tests**

|   |                 |
|---|-----------------|
| Test procedures   |                 |
| Tear strength also for butyl rubber in accordance with EN 681-1:2006-11, table 3.<br>Minimum tear strength: $\geq 20$ N   |                 |
| Identity testing of elastomeric materials<br><br>For identification testing of elastomers the following procedures will be applied:<br>- thermogravimetric analysis (TGA)<br>- determination of extractable components<br>- infrared spectrum of the extract<br><br>The TGA is carried out in accordance with ISO 9924-1.<br><br>Frequency of test — All types of identification tests will be applied during initial type testing and during requalification after 5 years. For yearly test in between the TGA-test is sufficient. If the yearly TGA shows differences to the ITT results in a way that lets assume that the formulation of the elastomer has been changed, then all types of identification test must be applied. |                 |
| Compression set test in water, in accordance with EN 681-1 appendix B, and ISO 815<br><small><a href="https://standards.iteh.ai/catalog/standards/sist/ab0fd5c9-77b0-4117-8d18-134054615b2e/ksist-fpren-10358-2014">https://standards.iteh.ai/catalog/standards/sist/ab0fd5c9-77b0-4117-8d18-134054615b2e/ksist-fpren-10358-2014</a></small>  |                 |
| Test duration:  | 10 000 h        |
| Test temperature:   | 110 °C          |
| Test medium:  | Distilled water |
| Compression set after 3 000 h:  | $\leq 30$ %     |
| Compression set after 10 000 h:   | $\leq 40$ %     |
| Compression set shall be measured after 500, 1 000, 1 500, 2 000, 2 500, 3 000, 4 000, 5 000, 6 000, 8 000, 10 000 h. The significant compression set values for 3 000 h and 10 000 h will be calculated by a regression line. For a graphical visualisation of the regression line a logarithmical time scale shall be used.   |                 |
| Volume change / swelling (differing to EN 681-1:2006-11 the following requirement is applicable for IIR only):  |                 |
| Test duration   | 7 d             |
| Temperature   | 95 °C           |
| Test medium   | Distilled water |

|   |       |
|---|-------|
| Volume change   | ≤15 % |
| Cold compression set acc. to EN 681-1:2006-11, clause 4.2.5.3         |       |
| All tests shall be performed with rings of approximately 28 mm x 3 mm |       |

**Table 6 — Sealing elements for type 2 fittings - additional requirements and tests**

|  |
|--|
| Test procedures  |
| Ozone resistance testing and requirements in accordance with EN 549:1995-04, 7.8 and 6.2, table 3  |
| Requirement — no cracks  |
| Material identity by TGA   |
| Frequency of test – the test shall be carried out at the initial type testing stage to produce the master graph. Further analysis will be made to compare the production to the master graph at a frequency of once per year thereafter. |

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### 6.3 Design and manufacture

Press fittings and seals shall be designed to meet the expected lifetime of a building or to the first expected renovation period of the building.

The tightness of the joint, based on actual technical knowledge, is presumed to be capable of maintaining required performance over a period of at least 50 years under the influence of foreseeable actions and normal maintenance to fulfil the essential requirements, if the joint itself is in conformity with the requirements of this standard.

#### 6.3.1 Pressing machine and pressing tools

It is important to use appropriate pressing machine and appropriate pressing tools to ensure that the connection has been made correctly.

#### 6.3.2 Tube abutment

Fittings are usually manufactured with an abutment to limit tube insertion and to retain a loose supporting sleeve, if used. Fittings may be produced for special purposes, particularly useful for repairs, where the fittings do not incorporate abutments, allowing for the fitting to slide along the tube.

#### 6.3.3 Tolerance for the alignment of the fitting ends

The alignment of the ends of the fitting shall be within 2° of the specified axis.

#### 6.3.4 Tube specification

Press fittings produced to this standard are suitable for joining unalloyed steel tubes to EN 10305-3 with wall thicknesses as specified by the manufacturer.

## 7 Evaluation of conformity

### 7.1 General

The conformity of press fittings to the requirements of this standard and with the stated values shall be demonstrated by:

- initial type testing, ITT, controlled by a certification body;
- factory production control, FPC, by the manufacturer, including product assessment.

For the purposes of testing, press fittings may be grouped into families, where it is considered that the selected property/properties is/are common to all the fittings within that family.

### 7.2 Type testing

#### 7.2.1 Initial Type Testing, ITT

##### 7.2.1.1 General

Initial type testing shall be performed to show conformity with this standard.

##### 7.2.1.2 Requirements

All requirements in clause 6 and sub-clause 8.1 shall be subject to initial type testing. The material characteristics in sub-clauses 6.2.1 do not need testing because:

- reaction to fire — stainless steel is class A.1 according to Commission Decision;
- properties at high temperature – mechanical properties are not reduced significantly at temperatures concerned.

##### 7.2.1.3 Use of historical data

Tests previously performed on press fittings of the same design and dimensions in accordance with the provisions of this standard (same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account.

##### 7.2.1.4 Further type testing

Whenever a change occurs in the fitting design, the raw material or supplier of the joint components, or the production process (subject to the definition of a family), which would change significantly one or more of the characteristics, the type tests shall be repeated for the appropriate characteristic(s).

##### 7.2.1.5 Transferability of test results, obtained with a specific press contour

Test results, obtained with a specific press contour, can only be transferred from one manufacturer of pressing tools to another manufacturer with the same nominal press contour under the following conditions:

- identical geometry
- identical material properties
- identical drive

The type testing shall be performed with every allocated construction of joint assembly and pressing tools.

**prEN 10358:2012 (E)****7.2.2 Sampling, testing and conformity criteria****7.2.2.1 Sampling**

Initial type testing shall be performed on representative samples of press fittings' production to be placed on the market.

**7.2.2.2 Testing and conformity criteria**

The connection made with press fitting, tube and appropriate pressing tool shall be tested for conformity to the requirements and characteristics listed in clauses 6 and 8 in accordance with the relevant methods given in annexes A to M.

The results of all type tests shall be recorded and held by the manufacturer for at least 5 years.

**7.3 Factory production control (FPC)****7.3.1 General**

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market conform to the declared performance characteristics. The FPC system shall consist of written procedures (works' manual), regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required component characteristics and checking the effective operation of the production control system.

Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the conformity of the component with its technical specifications. Its implementation may be achieved by controls and tests on measuring equipment, raw materials and constituents, processes, machines and manufacturing equipment and finished components, including material properties in components, and by making use of the results thus obtained.

**7.3.2 General FPC requirements**

The FPC system shall fulfil the requirements as described in the following clauses of EN ISO 9001:2008, where applicable:

- Documentation requirements acc. to clause 4.2 except 4.2.1 a)
- Management commitment acc. to clauses 5.1 e), 5.5.1, 5.5.2
- Resource management acc. to clause 6
- Planning of product realization acc. to clauses 7.1 except 7.1 a), 7.2.3 c), 7.4, 7.5, 7.6
- Monitoring and measurement acc. to clauses 8.2.3, 8.2.4, 8.3, 8.5.2

The FPC system may be part of a quality management system, e.g. in accordance with EN ISO 9001:2008.

The manufacturer shall establish procedures to ensure that the production tolerances allow for the press fittings' performances to be in conformity with the declared values derived from initial type testing.

The requirements, and the means of verification, are given in clause 6 and clause 8 and annexes A to M and the minimum frequency of testing is given by the manufacturer's quality system.

The manufacturer shall record the results of the tests specified above. These records shall at least include the following information:

- identification of the press fittings tested;
- the date of testing;
- the test results.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken.

The action to be taken when control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer's FPC procedures.

### 7.3.3 Personnel

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product conformity, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-conformities from occurring, actions in case of non-conformities and to identify and register product conformity problems.

### 7.3.4 Equipment

All weighing, measuring and testing equipment necessary to achieve, or produce evidence of, conformity shall be calibrated or verified and regularly inspected according to documented procedures, frequencies and criteria. Control of monitoring and measuring devices shall conform to the appropriate clause of EN ISO 9001:2008.

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 manufacturers written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

### 7.3.5 Raw materials and connection components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their conformity. The verification of conformity of the raw material with the specification shall be in accordance with EN ISO 9001:2008, 7.4.3.

### 7.3.6 In-process control

The manufacturer shall plan and carry out production under controlled conditions. Compliance with EN ISO 9001:2008, 7.5.1 and 7.5.2 shall be deemed to satisfy the requirements of this clause.

### 7.3.7 Traceability and marking

Batches or packages of press fittings shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings (see clause 10) are inspected regularly. Compliance with EN ISO 9001:2008, 7.5.3 shall be deemed to satisfy the requirements of this clause.

### 7.3.8 Non-conforming products

The manufacturer shall have written procedures, which specify how non-conforming 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.