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**Fitingi iz temprane litine z navoji po ISO 7-1**

Malleable cast iron fittings threaded to ISO 7-1

Raccords en fonte malléable filetés conformément à l'ISO 7-1

**Ta slovenski standard je istoveten z: ISO 49:1994**

SIST ISO 49:2001

<https://standards.iteh.ai/catalog/standards/sist/666a3698-21f5-451c-adf4-6470d75b8eed/sist-iso-49-2001>

**ICS:**

23.040.40

Kovinski fittingi

Metal fittings

**SIST ISO 49:2001**

**en**

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# INTERNATIONAL STANDARD

**ISO  
49**

Second edition  
1994-12-15

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## Malleable cast iron fittings threaded to ISO 7-1

**iTeh STANDARD PREVIEW**

*Raccords en fonte malléable filetés conformément à l'ISO 7-1*  
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Reference number  
ISO 49:1994(E)

## ISO 49:1994(E)

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 49 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 5, *Threaded or plain end butt-welding fittings, threads, gauging of threads*.

This second edition cancels and replaces the first edition (ISO 49:1983), which has been technically revised.

Annex A of this International Standard is for information only.

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International Organization for Standardization  
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# Malleable cast iron fittings threaded to ISO 7-1

## 1 Scope

This International Standard specifies requirements for the design and performance of malleable cast iron threaded pipe fittings.

These fittings are for general purposes for the transmission of fluids and gases up to the limits of pressure and temperature specified in this International Standard. They are intended for the connection of elements threaded in accordance with ISO 7-1, sizes 1/8 to 6.

For use in conditions outside the pressure and temperature limits specified, consult the fitting manufacturer.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*.

ISO 228-1:1994, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*.

ISO 2859-0:—<sup>1)</sup>, *Sampling procedures for inspection by attributes — Part 0: Introduction to the ISO 2859 attribute sampling system*.

ISO 2859-1:1989, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection*.

ISO 2859-2:1985, *Sampling procedures for inspection by attributes — Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*.

ISO 2859-3:1991, *Sampling procedures for inspection by attributes — Part 3: Skip-lot sampling procedures*.

ISO 5922:1981, *Malleable cast iron*.

ISO 6708:—<sup>2)</sup>, *Pipe components — Definition of nominal size (DN)*.

1) To be published. (Revision of ISO 2859:1974)

2) To be published. (Revision of ISO 6708:1980)

### 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 fitting:** Connecting piece, of one or more parts.

**3.2 jointing thread:** Thread complying with ISO 7-1.

**3.3 fastening thread:** Thread complying with ISO 228-1.

**3.4 fitting size; designation of thread size:** Size designation of the threads of the threaded outlets as derived from ISO 7-1 (see also clause 13).

**3.5 nominal size; DN:** For definition see ISO 6708.

#### NOTES

1 Nominal size is designated by the letters DN followed by the appropriate number.

2 The relationship between fitting size and nominal size (DN) is given in clause 15 for guidance only.

3 Nominal size (DN) should not be used for the designation of fitting size.

**3.6 reinforcement:** Additional material on the outside diameter of an internally threaded fitting in the form of a band or bead (see figure 1).



**Figure 1 — Forms of reinforcements**

**3.7 rib:** Local and axially aligned additional material on the outside or inside of a fitting for assistance in assembly or manufacturing.

**3.8 outlet:** Internally or externally threaded end of a fitting, which connects with a tube, fitting or other component threaded in accordance with ISO 7-1.

**3.9 run:** Two principal axially aligned outlets of a tee or cross.

**3.10 branch(es):** Side outlet(s) of a tee or cross.

**3.11 chamfer:** Conical portion at the entrance of a thread removed to assist assembly and prevent damage to the start of the thread.

**3.12 face-to-face dimension:** Distance between the two parallel faces of axially aligned outlets of a fitting.

**3.13 face-to-centre dimension:** Distance between the face of an outlet and the central axis of an angularly disposed outlet.

**3.14 laying length:** Average distance from the assembled pipe end to the axis of the fitting, or between the ends of two assembled pipes (see also 7.2).

## 4 Types of fitting

Table 1 provides an index to fitting types, patterns and symbols. The symbols relate to the identification of fittings and may be used for designation (see 13.1).

**Table 1 — Index of fitting types and symbols, with corresponding clauses and patterns**

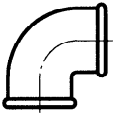
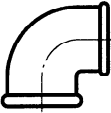
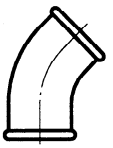
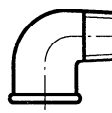
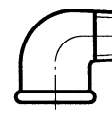
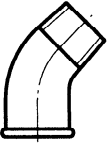
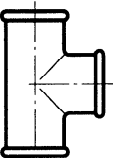



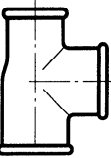
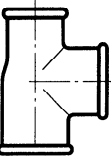
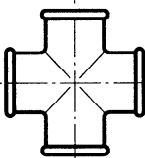
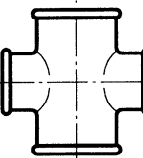
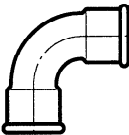
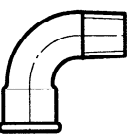
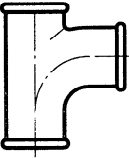
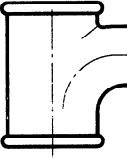
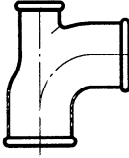
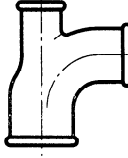
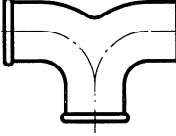
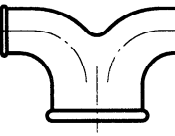
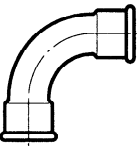
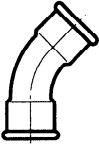
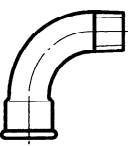
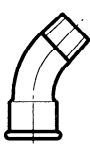
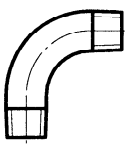
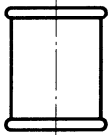
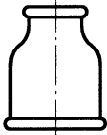
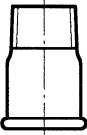

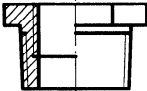
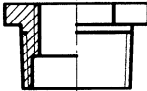
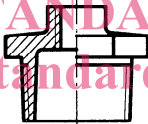
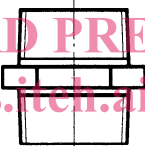
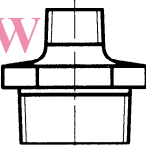
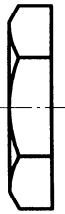


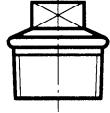

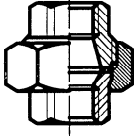
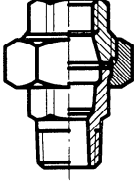
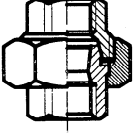
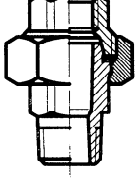
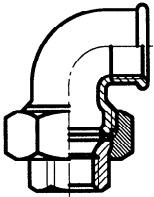
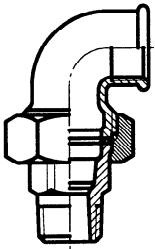
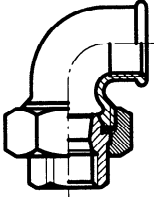
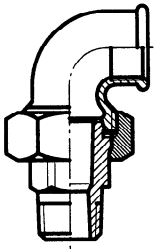
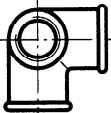
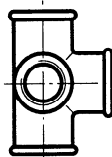
Type	Symbol					
<b>A</b> Elbows	<b>A1</b>		<b>A1/45°</b>	<b>A4</b>		<b>A4/45°</b>
						
	Clause 17	Clause 18	Clause 19	Clause 17	Clause 18	Clause 19
<b>B</b> Tees	<b>B1</b>					
						
	Clause 17	Clause 20	Clause 20	Clause 21	Clause 21	Clause 21
<b>C</b> Crosses	<b>C1</b>					
						
	Clause 17	Clause 22				
<b>D</b> Short bends	<b>D1</b>	<b>D4</b>				
						
	Clause 23	Clause 23				
<b>E</b> Pitcher tees Twin elbows	<b>E1</b>				<b>E2</b>	
						
	Clause 23	Clause 24	Clause 24	Clause 24	Clause 23	Clause 25

Table 1 — Index of fitting types and symbols, with corresponding clauses and patterns (continued)

Type	Symbol					
<b>G</b> Long sweep bends	<b>G1</b>  Clause 26	<b>G1/45°</b>  Clause 27	<b>G4</b>  Clause 26	<b>G4/45°</b>  Clause 27	<b>G8</b>  Clause 26	
<b>M</b> Sockets	<b>M2</b> <b>M2 R-L</b>  Clause 28	<b>M2</b>  Clause 28	<b>M4</b>  Clause 29		 Clause 29	
<b>N</b> Bushings Hexagon nipples	<b>N4</b>  Clause 30	 Clause 30	 Clause 30	<b>N8</b> <b>N8 R-L</b>  Clause 31	<b>N8</b>  Clause 31	
<b>P</b> Backnuts	<b>P4</b>  Clause 32					
<b>T</b> Caps Plugs	<b>T1</b>  Clause 33	<b>T8</b>  Clause 33	<b>T9</b>  Clause 33	<b>T11</b>  Clause 33		
<b>U</b> Unions	<b>U1</b>  Clause 34	<b>U2</b>  Clause 34	<b>U11</b>  Clause 34	<b>U12</b>  Clause 34		



**Table 1 — Index of fitting types and symbols, with corresponding clauses and patterns** (*concluded*)

Type	Symbol				
<b>UA</b> Union elbows	<b>UA1</b>  Clause 35	<b>UA2</b>  Clause 35	<b>UA11</b>  Clause 35	<b>UA12</b>  Clause 35	
<b>Za</b> Side outlet elbows and tees	<b>Za1</b>  Clause 17	<b>Za2</b>  Clause 17			

## 5 Materials

## iTeh STANDARD PREVIEW (standards.iteh.ai)

### 5.1 Fitting material

#### 5.1.1 Malleable cast iron

SIST ISO 49:2001

The material used shall be malleable cast iron (except see 5.1.2) meeting the requirements of ISO 5922. The grade of material used shall be selected from the following grades depending on the design chosen (see 6.1):

Grade W400-05 or W350-04 for whiteheart fittings;  
Grade W350-10 or B300-06 for blackheart fittings.

#### 5.1.2 Other ferrous materials

Any other ferrous materials which give mechanical properties at least equivalent to those grades of malleable cast iron specified in 5.1.1 are allowed for fittings not larger than size 3/8 of the straight type, but excluding unions.

### 5.2 Hot-dip zinc coating

Where a protection by zinc coating is required, the zinc coating shall be applied by the hot-dip process and shall meet the following requirements.

NOTE 4 For fittings supplied in other ferrous materials (see 5.1.2), an alternative to zinc coating may be provided by agreement with the purchaser.

#### 5.2.1 Chemical composition of the zinc coating

The percentage by mass of the trace elements in the finished zinc coating shall not exceed the following maximum values:

aluminium	(Al)	0,1 %
antimony	(Sb)	0,01 %
arsenic	(As)	0,02 %
bismuth	(Bi)	0,01 %
cadmium	(Cd)	0,01 %
copper	(Cu)	0,1 %
lead	(Pb)	1,6 %; in certain cases 1,8 %
tin	(Sn)	0,1 %

### 5.2.2 Coating mass per unit surface area

The areic mass of the zinc coating shall be not less than 500 g/m<sup>2</sup>, as an average of five fittings. This corresponds to an average layer thickness of 70 µm. The areic mass shall be not less than 450 g/m<sup>2</sup> (63 µm) on each individual sample.

The average layer thickness  $\bar{s}$ , in micrometres, of the zinc coating may be calculated by using the approximation:

$$\bar{s} = \frac{m_A}{7,2}$$

where  $m_A$  is the areic mass of the zinc coating, in grams per square metre.

### 5.2.3 Surface condition of the zinc coating

The zinc coating on the internal surface of the fitting shall be continuous, with the exception of machined black surfaces. In the special case of larger material cross-sections, the iron–zinc alloy phases may grow through. The internal zinc coating shall be free from zinc blisters, zinc burrs and nonmetallic remainders.

## 5.3 Despatch conditions of finished fittings

The surfaces of the finished fittings shall be free of aromatic hydrocarbons.

## 6 Design

# iTeh STANDARD PREVIEW (standards.iteh.ai)

**6.1** Fittings shall be identified by design symbols according to the material selected (see 5.1.1) and the choice of thread (see 8.1.1) as given in table 2.

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**Table 2 — Design symbols**

Design symbol	Thread type		Material grade
	external	internal	
A	R	Rp	W400-05 or B350-10
B	R	Rp	W350-04 or B300-06
C	R	Rc	W400-05 or B350-10
D	R	Rc	W350-04 or B300-06
NOTE — For fittings having only external threads, the design symbol shall be the same as that specified for fittings manufactured with internal thread and in the same material grade.			

**6.2** The types and sizes dimensionally standardized are given in clauses 17 to 35. The drawings are diagrammatic, without prejudice to the manufactured form.

**6.3** Fittings shall be reinforced at the internally-threaded ends by a band or bead, except where they are polygonal in shape to allow for spanner flats, or where fittings have side outlets (types Za1 and Za2).

**6.4** Ribs may be incorporated at the manufacturer's discretion. Ribs should not project higher than the reinforcing bead or band.

**6.5** Backnuts may be plain or recessed and one face may be machined.

**6.6** Clauses 34 and 35 show two typical types of seats of unions and their designations. Other types of seat design and seat material shall be considered as complying with this International Standard provided the dimensions in clauses 34 and 35 and other requirements of this International Standard are observed. Such unions do not have a formal designation.

## 7 Dimensions and tolerances

**7.1** Fittings shall have the appropriate dimensions (see clauses 17 to 35). Where maximum or minimum dimensions are not specified, the tolerances for face-to-face and face-to-centre dimensions shall be as given in table 3.

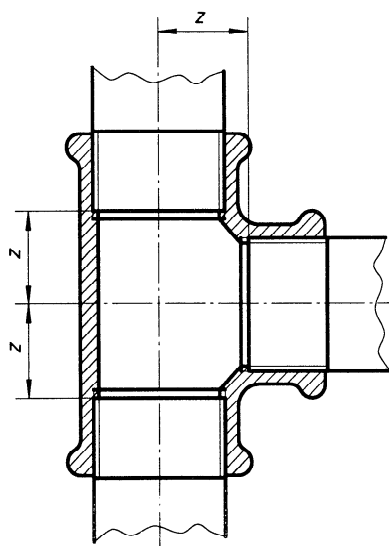
NOTE 5 The face-to-face and face-to-centre dimensions of unions may not always comply with the tolerances given, due to the compound effect of piece tolerances and design upon the final assembly.

**Table 3 — Tolerance on length**

Values in millimetres	
Dimension	Tolerance
$\leq 30$	$\pm 1,5$
$> 30 \leq 50$	$\pm 2$
$> 50 \leq 75$	$\pm 2,5$
$> 75 \leq 100$	$\pm 3$
$> 100 \leq 150$	$\pm 3,5$
$> 150 \leq 200$	$\pm 4$
$> 200$	$\pm 5$

**7.2** Laying lengths are given in clauses 17 to 35 for assistance and guidance during installation. Their accuracy is dependent upon the tolerances given in 7.1 and on the tolerance of the threads specified in ISO 7-1. The dimensions ( $z_1$ ,  $z_2$  and  $z_3$ ) given in clauses 17 to 35 are the average distance from the pipe end to the axis of the fitting (see figure 2) or the distance from pipe end to pipe end (see figure 3).

These assembly dimensions are calculated by deducting average lengths of engagement from the face-to-face or face-to-centre dimensions given in the appropriate table. The average lengths of engagement are rounded from the dimensions given in ISO 7-1 and are given in table 4.



**Figure 2 — Laying lengths  $z$  in the case of an angularly disposed fitting**

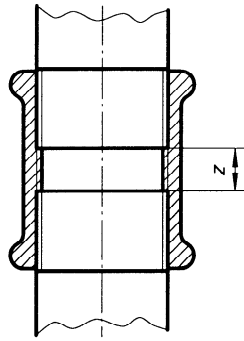


Figure 3 — Laying length  $z$  in the case of an axially aligned fitting

Table 4 — Lengths of engagement

Designation of thread size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Length of engagement, mm	7	10	10	13	15	17	19	19	24	27	30	36	40	40

**7.3** The dimensions of widths across flats,  $s$ , depend on the design of the fittings and are left to the discretion of the manufacturer.

**7.3.1** Flats on plugs shall be square. Flats on other fittings up to and including size 3/4 should be hexagonal. Flats on other fittings above size 3/4 may be hexagonal or octagonal. Flats on union parts, excluding the union nut, may be hexagonal, octagonal or decagonal.

**7.3.2** The minimum depth of the spanner flats measured at the corners shall be as given in table 5. For backnuts, any chamfering shall not reduce the depth of spanner flats below the minimum dimensions given in table 5.

Table 5 — Minimum depth of spanner flats

Designation of thread size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Minimum depth of spanner flats, mm	4	4	5	5	5,5	6	6,5	6,5	7	7	7,5	8

## 8 Threads

### 8.1 Choice of thread

#### 8.1.1 Jointing thread

Fittings shall be threaded in accordance with ISO 7-1. External threads are taper (R); internal threads may be parallel (Rp) or taper (Rc).

#### 8.1.2 Fastening threads

The threads of union nuts and their mating threads shall be in accordance with ISO 228-1. Backnuts shall be in accordance with ISO 228-1.

### 8.2 Alignment of threads

The axes of the screw threads shall be accurate to within  $\pm 0,5^\circ$  of the specified angle.

### 8.3 Chamfering

The outlets of the fittings shall have a chamfer.

On internal threads, the chamfer should have a minimum included angle of 90°, and the diameter at the face should exceed the major diameter of the thread.

On external threads, the chamfer should have a minimum included angle of 60° and the diameter at the face should not exceed the minor diameter of the thread at that face.

## 9 Manufactured aspect

Fittings shall not contain material detrimental to their application. They should be smooth, free from sand, blow holes, cracks and other injurious defects. They shall not be impregnated to cover such defects.

## 10 Required characteristics

### 10.1 Permissible working pressure and temperature

The fittings of all sizes shall be suitable for the maximum permissible working pressures within the temperature ranges given in table 6 (see also figure 4). Intermediate pressure ratings at temperatures between 120 °C and 300 °C shall be obtained by linear interpolation. For normal applications the lowest service temperature appropriate for fittings is – 20 °C. For special applications at temperatures below – 20 °C, the manufacturer shall be consulted.

SIST ISO 49:2001  
Table 6 — Pressure/temperature ratings  
<https://standards.icharcat.org/standards/sist/666a5676-21b-451c-adf4-6470d75b8ced/sist-iso-49-2001>

Service temperature °C	Maximum permissible working pressure bar <sup>1)</sup>
– 20 to 120	25
between 120 and 300	interpolated values
300	20
1) 1 bar = 10 <sup>5</sup> N/m <sup>2</sup> = 100 kPa	

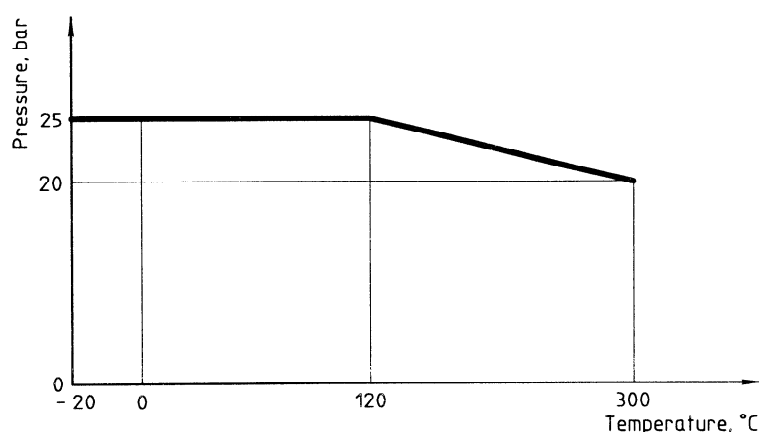


Figure 4 — Pressure/temperature ratings