# INTERNATIONAL STANDARD

ISO 7-1

1994-05-15

# Pipe threads where pressure-tight joints are made on the threads —

# Part 1: iTeh Dimensions, tolerances and designation (standards.iteh.ai)

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1.71.7



Reference number ISO 7-1:1994(E)

# Foreword

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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 7-1 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 third edition cancels and replaces the second edition ( $S_1^{-1}$ ) ( $S_2^{-1}$ 

ISO 7 consists of the following parts, under the general title *Pipe threads* where pressure-tight joints are made on the threads:

- Part 1: Dimensions, tolerances and designation

- Part 2: Verification by means of limit gauges

Annex A of this part of ISO 7 is for information only.

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International Organization for Standardization

# Pipe threads where pressure-tight joints are made on the threads —

# Part 1:

Dimensions, tolerances and designation

## 1 Scope

This part of ISO 7 specifies the requirements for thread form, dimensions, tolerances and designation RDSD 72:1982, Pipe threads where pressure-tight for jointing pipe threads, sizes 1/16 to 6 inclusive, for *joints are made on the threads — Part 2: Verification* joints made pressure-tight by the mating of the **CS**. by means of limit gauges. threads. These threads are taper external, parallel internal or taper internal and are intended for use with -1:1994 pipes suitable for threading and for valves;/fittings.orlards/sis314(**Definitions** 8-a48eother pipeline equipment interconnected by threaded 6/iso-7-1-1994

An appropriate jointing medium should be used on the thread to ensure pressure-tight joints.

NOTES

joints.

1 Parallel external pipe threads are not suitable as jointing threads.

2 For pipe threads where pressure-tight joints are not made on the threads, see ISO 228-1.

3 ISO 7-2 gives details of methods of verification of jointing thread dimensions and form and recommended gauging systems.

## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 7. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

For the purposes of this part of ISO 7, the following definitions apply (see also figures 3 and 5).

**3.1 gauge diameter:** Major diameter of the thread, whether external or internal.

**3.2 major cone:** Imaginary cone which just touches the crests of a taper external thread or the roots of a taper internal thread.

**3.3 gauge plane:** Plane, perpendicular to the axis of the taper thread, at which the major cone has the gauge diameter.

NOTE 4 For external threads the gauge plane is located at a distance equal to the nominal gauge length from the small end of the thread. For internal threads the gauge plane is located at a distance of half-pitch behind the face of the threaded part. This is in order to give consideration to the start of the thread that has been removed by chamfering.

**3.4 gauge length:** On an external thread, the distance from the gauge plane to the small end of the thread.

**3.5 reference plane:** Visible surface of each of the internally and externally threaded parts, which facili-

For internal threads it is the face of the internally threaded part, for external threads it is the small end of the externally threaded part.

3.6 complete thread: That part of the thread which is fully formed at both crest and root.

NOTE 5 When there is a chamfer at the start of the thread not exceeding one pitch in length, this is included in the length of complete thread.

3.7 incomplete thread: That part of the thread which is fully formed at the root, but truncated at the crest by its intersection with the cylindrical surface of the product.

3.8 washout thread; vanish thread: That part of the thread which is not fully formed at the root.

NOTE 6 The washout thread is produced by the bevel at the start of the threading tool.

**3.9 useful thread:** Complete thread plus incomplete  $\Lambda$   $\mathbb{R}d_{2}$ thread, excluding the washout thread.

standar 3.10 fitting allowance: Length of useful thread bethread yond the gauge plane of an external thread required, to provide for assembly with an internal thread at the standards sist/d4folerance for the position of the gauge plane on

Internally threaded parts will have a sufficient NOTE 7 length to accommodate the fitting allowance, except when they have a free run-out. See 7.2.2.

3.11 wrenching allowance: Length of useful thread which is provided to accommodate the relative movement between the end of the externally threaded part and the internally threaded part required for wrenching beyond the position of handtight engagement.

#### Symbols 4

- Rp Parallel internal pipe thread where pressure-tight joints are made on the threads
- Rc Taper internal pipe thread where pressure-tight joints are made on the threads
- R Taper external pipe thread where pressure-tight joints are made on the threads

- Pitch Р
- Η Height of the triangle of the thread profile perpendicular to the thread axis
- = 0,640 327 P; height of the thread profile beh tween rounded crests and roots perpendicular to the thread axis
- Radius of rounded crests and roots
- Major diameter of the internal thread at the D gauge plane (gauge diameter - see 3.1)
- D 1,280 654 P; minor diameter of the internal  $D_1$ thread at the gauge plane
- D 0,640 327 P; pitch diameter of the internal  $D_2$ thread at the gauge plane
- Major diameter of the external thread at the d gauge plane (gauge diameter - see 3.1)
- = d 1,280 654 P; minor diameter of the ex $d_1$ ternal thread at the gauge plane
- = d 0.640 327 P/ pitch diameter of the external thread at the gauge plane

it Tolerance on the gauge length of an external

8c85f0e7eb46/iso-7-1-1an4nternal thread

# 5 Dimensions

Pipe thread dimensions, in millimetres, are given in table 1.

#### Designation 6

The designation of threads according to this part of ISO 7 shall consist of the following elements in the sequence given:

**6.1** The description block shall be:

Pipe thread

6.2 The International Standard number block shall be:

**ISO 7** 

Table 1 — Inread dimensions	Table	1		Thread	dimensions
-----------------------------	-------	---	--	--------	------------

								Dir	nensions	in mil	limetres
20	Diametral tolerance <sup>1)</sup> on parallel internal threads		± 0,071 ± 0,071 ± 0,10 <b>4</b>	± 0,104 ± 0,142 ± 0,142	± 0,180 ± 0,180 ± 0,180	± 0,180 ± 0,216 ± 0,216	± 0,216 ± 0,216 ± 0,216	la <i>h</i> (the height from the major	tting allowance	nount of taper. ,1 mm.	
19		ing ance	Turns of thread	23/4 23/4 23/4	23/4 23/4 23/4	23/4 23/4 23/4	31/4 4 4	41/2 5 5	the formu f thread <i>h</i>	ances or fi	16, the an nearest 0
18		Fitt allow	2)	2,5 2,5 3,7	3,7 5,0	6,4 6,4 6,4	7,5 9,2 9,2	10,4 11,5 11,5	e pitch <i>P</i> , e height o	the tolera	nd with 1/ ing to the
17	seful id not	muminim 107 dtpnel epuse		5,6 8,4 8,4	8,8 11,4 12,7	14,5 16,8 16,8	21,1 23,2 26,3	32,3 36,6 36,6	ines the tively the	r adding	ımı 3 aı Id round
16	th of us al threa ess thar	For maximum gauge length		7,4 7,4 11	11,4 15 16,3	19,1 21,4 21,4	25,7 30,2 33,3	39,3 43,6 43,6	respecting or	acting c	th in colu mn 3 ar
15	Leng extern	For nominal dauge length		6,5 6,5 9,7	10,1 13,2 14,5	16,8 19,1 19,1	23, <b>4</b> 26,7 29,8	35,8 40,1 40,1	th, which or twice	by subti	ding pitc in colu
14	nce on on of lane on thread	ance 2/2	Turns of thread	11/4 11/4 11/4	11/4 11/4 11/4	11/4 11/4 11/4	11/4 11/2 11/2	11/2 11/2 11/2	ads per inc cting once	e obtained ead.	correspon anding pitcl
13	Tolerar positi gauge p internal	Tolera ± 7,	2)	1,1 1,1 7,1	1,7 2,3 2,3	0,0,0 0,0,0	3,5 3,5	ດ ດີດີ ດີດີ	lber of thre d by subtra	table 1 wer urns of thr	ig with the
12		u. M		3,1 3,1 4,7	5,1 6,4 7,7	8,1 10,4 10,4	13,6 14,0 17,1	21,9 25,1 25,1	the num compile	given in nber of t	nultiplyir g with th
11	/ thread)	Amax.		4,9 4,9 7,3	7,7 10,0 11,3	12,7 15,0 15,0	18,2 21,0 <b>24</b> ,1	28,9 32,1 32,1	ng with ere then	lengths id in nur	14 by r ultiplyin
10	(external	anced38-6	Turns of thread				1 11/2 11/2	11/2 11/2 11/2	ım, beginn liameter w	remaining limetres ar	s in columi hread by π
9	REV uge length al)	592b <del>r</del> 6led 4 ± <sup>1</sup>	2)	0,9 0,9 1,3	1,3 1,8 1,8	2,3 2,3 2,3	2,3 3,5 <b>3,5</b>	ດ,ດ ດີດ ດີດ	h = 25,4 m nd minor d	puted. The ssed in mil	e tolerance turns of t
8	D Pl a	<u>994</u> / <mark>Nióthilla</mark> Dd 7-1-199		440	6,4 9,5	10, <b>4</b> 12,7 12,7	15,9 17,5 20,6	25,4 28,6 28,6	asis of 1 inc n diameter a	lirectly com e are expre	red from the
7	DAR plane ards	ISO 7-1:1 /s <b>tnind</b> ards e7eb46/iso	ď	6,561 8,566 11,445	14,950 18,631 24,117	30,291 38,952 44,845	56,656 72,226 84,926	110,072 135,472 160,872	es on the ba plane. Pitch	ance were c	the mandato
9	s at gauge tand	ai <b>préh</b> log 8c85f0	$q_2$	7,142 9,147 12,301	15,806 19,793 25,279	31,770 40,431 46,324	58,135 73,705 86,405	111,551 136,951 162,351	t the gauge	itting allow es and fitti	tral tolerand
5	eh ST <sup>Diameter</sup>	Major Ind(gadigeeh diameter)	q	7,723 9,728 13,157	16,662 20,955 26,441	33,249 41,910 47,803	59,614 75,184 87,884	113,030 138,430 163,830	converted in or diameter a	ices and the ligth. Tolerand	rts the diarne tres, are obta
4		Height http://sta thread	Ч	0,581 0,581 0,856	0,856 1,162 1,162	1,479 1,479 1,479	1,479 1,479 1,479	1,479 1,479 1,479	sions were nd the maj	the tolerar I gauge len	rreaded par , in millime
3		Pitch	ď	0,907 0,907 1,337	1,337 1,814 1,814	2,309 2,309 2,309	2,309 2,309 2,309	2,309 2,309 2,309	n dimen: 327 <i>P</i> a	e length, > nomina	ternally th
2		Number of threads in mm 4,82		28 28 19	19 14 14	111	11 11	223	— The mai ad) = 0,640 ter.	minal gaug tively to the	r parallel int formative to
-		Designation of thread size		1/16 1/8 1/4	3/8 1/2 3/4	1 11/4 11/2	2 21/2 3	400	NOTE of thre diamet	The nc respec	1) Fo 2) Inf

- 6.3 The individual item block shall be composed of:
- a) letter symbol(s) for type of pipe thread
  - the letter R followed by the letter p for parallel internal threads;
  - the letter R followed by the letter c for taper (conical) internal threads;
  - the letter R for external threads:
- b) the thread size, from column 1 of table 1.

## EXAMPLES

The complete designation for a right-hand thread size 1 1/2:

Internal thread	( parallel	Pipe thread ISO 7 - Rp 1 1/2 $H =$	0,960 491 <i>P</i>
	taper	Pipe thread ISO 7 - Rc 1 1/2 $r =$	0,640 327 <i>P</i> 0,137 329 <i>P</i>
External thread	always taper	Figure 1 - Pipe thread ISO7TRA1/2DARD PREVIEV	— Parallel thread

# (standards.iteh.ai)

6.4 For left-hand threads, the letters LH shall be added to the designation. Right-hand threads require 7-1:1994 https://standards.iteh.ai/catalog/standards/sist/d40d592b-6bf7-4d38-a48eno special designation. 8c85f0e7eb46/iso-7-1-1994

#### **Thread design** 7

#### Thread forms 7.1

### 7.1.1 Parallel thread

The basic form of the parallel pipe thread shall be as shown in figure 1. The angle between the flanks, measured in an axial plane section, is 55°. The thread profiles are rounded equally at crests and roots by circular arcs blending tangentially with the flanks.

### 7.1.2 Taper thread

The basic form of the taper pipe thread shall be as shown in figure 2. The taper is 1 to 16, measured on the diameter. The angle between the flanks, measured in an axial plane section, is 55°, the flanks making equal angles with the axis.

The thread profiles are rounded off equally at crests and roots by circular arcs blending tangentially with



h = 0,640 327 Pr = 0,137 278 P





the flanks in such a manner as to give the same

thread height h as for parallel threads.

### d

### 7.1.3 Direction of thread helix

Unless otherwise specified, the ISO 7-1 thread shall be a right-hand thread. (See also 6.4.)

# 7.2 Thread lengths

### 7.2.1 External thread

The terms relating to the external taper pipe thread are given in figure 3.

The length of the useful thread, allowable in practice, is the sum of the lengths of the complete and incomplete threads, excluding the washout thread. The minimum length of the useful thread must be not less than the minimum gauge length plus the fitting allowance.

### 7.2.2 Internal thread

The design of internally threaded parts shall be such standards, where externat that they can receive external threads up to the lengths given in column 16 of table 1. The minimum Such a combination of t lengths  $L_{min}$  of useful thread in the case of internal R Dachieve a leak-tight joint.

threads with free run-out shall be not less than 80 % of the values given in column 17 of table 1. (See figure 4.)

# 8 Gauging

For the verification of pipe threads, the plug and ring gauges used shall conform to ISO 7-2. The gauging always relates to a reference plane of the threaded part to be verified (see figure 5).

# 9 Combination with fastening thread

The combination of an external parallel thread G, tolerance class A or B in accordance with ISO 228-1, with an internal parallel thread Rp in accordance with ISO 7-1 needs special consideration.

When it is necessary to have this combination, the positive or negative tolerance of the internal thread to ISO 7-1 shall be considered in the relevant product standards, where external parallel threads G are used.

Such a combination of threads may not necessarily achieve a leak-tight joint.



# (standards.iteh.ai)

Figure 3 — Terms relating to external threads



Figure 4 — Internal threads with free run-out



Figure 5 — Illustration of internal and external pipe threads (position of gauge plane, reference plane useful thread)

# **Annex A** (informative)

# Bibliography

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

# iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 7-1:1994 https://standards.iteh.ai/catalog/standards/sist/d40d592b-6bf7-4d38-a48e-8c85f0e7eb46/iso-7-1-1994