

TC 5

INTERNATIONAL STANDARD



7/1

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**Pipe threads where pressure-tight joints are made on
the threads —
Part I : Designation, dimensions and tolerances**

Filetages de tuyauterie pour raccordement avec étanchéité dans le filet — Partie I : Désignation, dimensions et tolérances

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7/1 was developed by Technical Committee ISO/TC 5, *Metal pipes and fittings*, and was circulated to the member bodies in June 1977.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Romania
Belgium	India	South Africa, Rep. of
Brazil	Israel	Spain
Bulgaria	Italy	Sweden
Canada	Japan	Switzerland
Chile	Korea, Dem. P. Rep. of	Turkey
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Denmark	Mexico	U.S.A.
Egypt, Arab Rep of	Netherlands	U.S.S.R.
Finland	New Zealand	Yugoslavia
France	Norway	
Germany	Poland	

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 7-1955, of which it constitutes a technical revision.

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

Part I : Designation, dimensions and tolerances

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the designation, the dimensions and the tolerances of pipe threads where pressure-tight joints are made on the threads.

These threads are intended for tubes suitable for screwing, and for cocks, valves and any fittings to be connected to screwed tubes. If considered necessary, an appropriate jointing medium may be used on the thread to ensure pressure-tight joints.

The 1/16 size is given solely for connector threads (see ISO 1179); it is not intended that there should be a 1/16 nominal size tube.

ISO 7/II will deal with inspection of these threads.

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

2 REFERENCES

ISO 228/1, *Pipe threads where pressure-tight joints are not made on the threads — Part I : Designation, dimensions and tolerances.*

ISO 1179, *Pipe connections for plain end steel and other metal tubes in industrial applications.*

3 DEFINITIONS

The following terms relate to pipe threads.

3.1 gauge diameter : The basic major diameter of the thread, whether external or internal.

3.2 gauge plane : The plane, perpendicular to the axis, at which the major cone has the gauge diameter.

NOTE — The gauge plane is theoretically located for internal threads at the face of the thread, and for external threads at a distance equal to the basic gauge length from the small end of the thread.

3.3 gauge length : On an external thread, the distance, parallel to the axis, from the gauge plane to the small end of the thread.

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

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

3.5 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.

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

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

3.7 major cone : An imaginary cone which just touches the crests of a taper external thread or the roots of a taper internal thread.

3.8 useful thread : The complete thread and the incomplete thread, excluding the washout thread.

3.9 fitting allowance : The length of useful thread beyond the gauge plane of an external thread required to provide for assembly with an internal thread at the upper limit of the tolerances.

3.10 wrenching allowance : The length of useful thread which is provided to accommodate the relative movement between the external thread and the internally threaded part required for wrenching beyond the position of hand-tight engagement.

4 SYMBOLS AND EXPLANATIONS

R_p Parallel internal pipe thread where pressure-tight joints are made on the threads

R_c 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

H Height of the triangle of the thread profile

- h Height of the thread profile with rounded crests and roots
- r Radius of rounded crests and roots
- P Pitch
- d Basic major diameter of the thread
- $d_1 = d - 1,280\ 654\ P$; basic minor diameter of the thread
- $d_2 = d - 0,640\ 327\ P$; basic pitch diameter of the thread
- T_1 Tolerance for the distance of the gauge plane from pipe end
- T_2 Tolerance for the position of the gauge plane of a 1 in 16 plug gauge on internal plugs

5 DIMENSIONS*

Dimensions in millimetres are given in table 1.

Dimensions in inches are given in table 2, in an annex which will be deleted in the next revision.

6 DESIGNATION

Pipe threads complying with this International Standard shall be designated by :

- 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 (always taper).

These symbols are followed by the designation of the thread (see table 1, column 1).

Examples of the complete designation for thread 1 1/2 are :

Internal thread		External thread
Parallel	Taper	(always taper)
Rp 1 1/2	Rc 1 1/2	R 1 1/2

* The dimensions shown in table 1 for size 1/16 were accepted by ISO/TC 5/SC 5 on the basis of a French proposal. The dimensions for size 1/8 to 6 were taken by ISO/TC 5 from British Standard BS 21 : 1938.

The basic dimensions were converted into millimetres on the basis of 1 in = 25,4 mm, beginning with the number of threads per inch, which determines the pitch P , the formula $h = 0,640\ 327\ P$ (the depth of thread) and the basic major diameter at the gauge plane. Pitch diameter and minor diameter were then compiled by subtracting once or twice respectively the depth of thread h from the basic major diameter.

The basic gauge length, the tolerances and the fitting allowance were directly computed. The remaining lengths in table 1 were obtained by subtracting or adding the tolerances or fitting allowance respectively to the basic gauge length. Tolerances and fitting allowance are expressed in millimetres and in number of turns of thread.

Basic thread forms and terminology

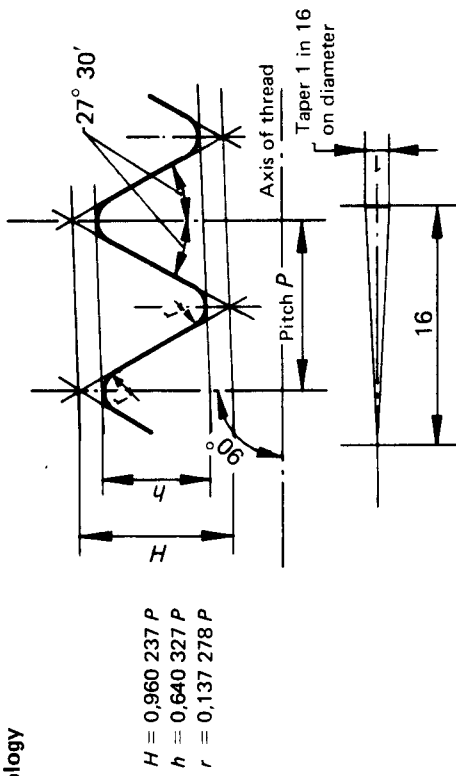


FIGURE 1 - Parallel thread

FIGURE 2 - Taper thread

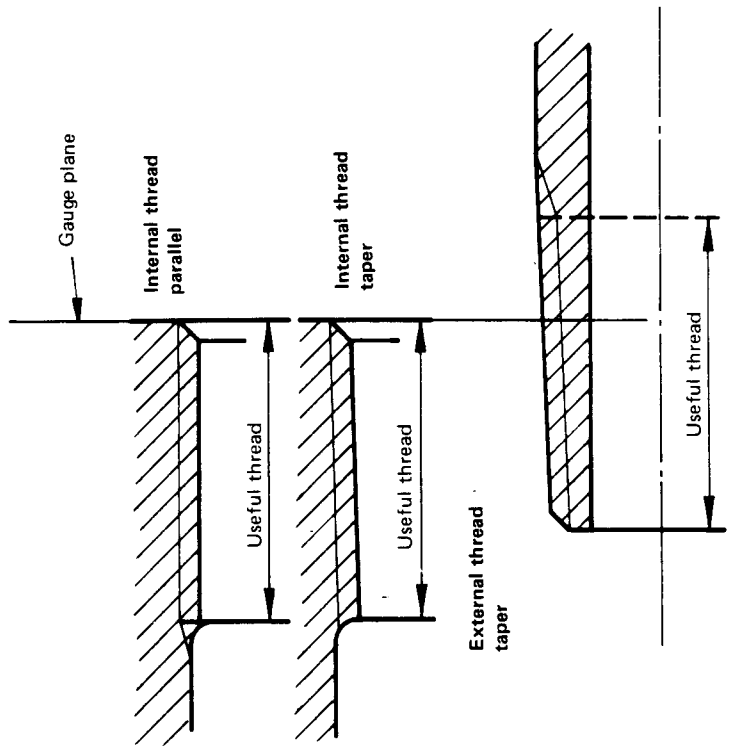


FIGURE 4 - Position of gauge plane, useful thread

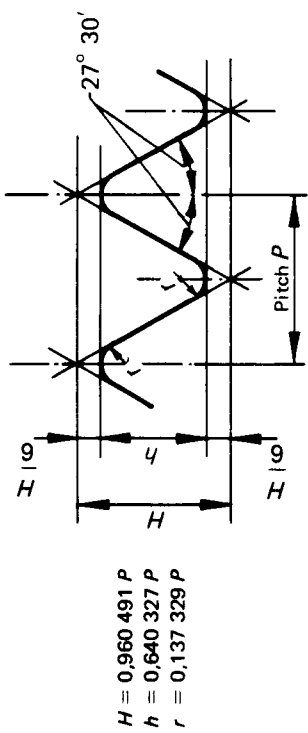


FIGURE 3 - Terms relating to pipe threads

TABLE 1 - Thread dimensions (in millimetres)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Designation of thread	Number of threads in 25,4 mm	Pitch P mm	Depth of thread h mm	Diameters at gauge plane (basic)			Gauge length (distance of gauge plane from pipe end)				Position of gauge plane on internal threads		Length of useful thread on pipe end ²⁾ not less than:			Fitting allowance mm	Turns of thread	
				Major (gauge diameter) d mm	Pitch d_2 mm	Minor d_1 mm	Basic mm	Tolerance + and - $T_1/2$ mm	max. mm	min. mm	Tolerance + and - $T_2/2$ mm	Turns of thread	For basic gauge length mm	For maximum gauge length mm	For minimum gauge length mm			
1/16	28	0,907	0,581	7,723	7,142	6,561	4,0	0,9	1	4,9	3,1	1,1	1 1/4	6,5	7,4	5,6	2,5	2 3/4
1/8	28	0,907	0,581	9,728	9,147	8,566	4,0	0,9	1	4,9	3,1	1,1	1 1/4	6,5	7,4	5,6	2,5	2 3/4
1/4	19	1,337	0,856	13,157	12,301	11,445	6,0	1,3	1	7,3	4,7	1,7	1 1/4	9,7	11,0	8,4	3,7	2 3/4
3/8	19	1,337	0,856	16,662	15,806	14,950	6,4	1,3	1	7,7	5,1	1,7	1 1/4	10,1	11,4	8,8	3,7	2 3/4
1/2	14	1,814	1,162	20,955	19,793	18,631	8,2	1,8	1	10,0	6,4	2,3	1 1/4	13,2	15,0	11,4	5,0	2 3/4
3/4	14	1,814	1,162	26,441	25,279	24,117	9,5	1,8	1	11,3	7,7	2,3	1 1/4	14,5	16,3	12,7	5,0	2 3/4
1	11	2,309	1,479	33,249	31,770	30,291	10,4	2,3	1	12,7	8,1	2,9	1 1/4	16,8	19,1	14,5	6,4	2 3/4
1 1/4	11	2,309	1,479	41,910	40,431	38,952	12,7	2,3	1	15,0	10,4	2,9	1 1/4	19,1	21,4	16,8	6,4	2 3/4
1 1/2	11	2,309	1,479	47,803	46,324	44,845	12,7	2,3	1	15,0	10,4	2,9	1 1/4	19,1	21,4	16,8	6,4	2 3/4
2	11	2,309	1,479	59,614	58,135	56,656	15,9	2,3	1	18,2	13,6	2,9	1 1/4	23,4	25,7	21,1	7,5	3 1/4
2 1/2	11	2,309	1,479	75,184	73,705	72,226	17,5	3,5	1 1/2	21,0	14,0	3,5	1 1/2	26,7	30,2	23,2	9,2	4
3	11	2,309	1,479	87,884	86,405	84,926	20,6	3,5	1 1/2	24,1	17,1	3,5	1 1/2	29,8	33,3	26,3	9,2	4
4	11	2,309	1,479	113,030	111,551	110,072	25,4	3,5	1 1/2	28,9	21,9	3,5	1 1/2	35,8	39,3	32,3	10,4	4 1/2
5	11	2,309	1,479	138,430	136,951	135,472	28,6	3,5	1 1/2	32,1	25,1	3,5	1 1/2	40,1	43,6	36,6	11,5	5
6	11	2,309	1,479	163,830	162,351	160,872	28,6	3,5	1 1/2	32,1	25,1	3,5	1 1/2	40,1	43,6	36,6	11,5	5

1) For parallel threaded parts diametral tolerances equivalent to the length tolerances in columns 13 and 14 will apply (1/16 of the length tolerances in column 13).

2) The design of internally threaded parts shall make allowance for accommodating pipe ends up to the lengths given in column 16, and the minimum length of useful thread shall be not less than 80% of the values in column 17.

ANNEX 1¹⁾

TABLE 2 — Thread dimensions (in inches)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Designation of thread	Number of threads in 25,4 mm	Pitch P in	Depth of thread h in	Diameters at gauge plane (basic)			Gauge length (distance of gauge plane from pipe end)			Position of gauge plane on internal threads			Length of useful thread on pipe end ³⁾ not less than :			Fitting allowance Turns of thread ≈ in		
				Major (gauge diameter) d in	Pitch d_2 in	Minor d_1 in	Basic in	Tolerance + and - $T_{1/2}$ Turns of thread ≈ in	max. in	min. in	Tolerance ²⁾ + and - $T_{2/2}$ Turns of thread ≈ in	For basic gauge length in	For maximum gauge length in	For minimum gauge length in				
1/16	28	0.03571	0.0229	0.304	0.2811	0.2582	0.1563	0.0357	1	0.1920	0.1206	0.0446	1 1/4	0.2545	0.2902	0.2188	0.0982	2 3/4
1/8	28	0.03571	0.0229	0.383	0.3601	0.3372	0.1563	0.0357	1	0.1920	0.1206	0.0446	1 1/4	0.2545	0.2902	0.2188	0.0982	2 3/4
1/4	19	0.05263	0.0337	0.518	0.4843	0.4506	0.2367	0.0526	1	0.2893	0.1841	0.0658	1 1/4	0.3814	0.4340	0.3288	0.1447	2 3/4
3/8	19	0.05263	0.0337	0.656	0.6223	0.5886	0.2500	0.0526	1	0.3026	0.1974	0.0658	1 1/4	0.3947	0.4473	0.3421	0.1447	2 3/4
1/2	14	0.07143	0.0457	0.825	0.7793	0.7336	0.3214	0.0714	1	0.3928	0.2500	0.0893	1 1/4	0.5178	0.5892	0.4464	0.1964	2 3/4
3/4	14	0.07143	0.0457	1.041	0.9953	0.9496	0.3750	0.0714	1	0.4464	0.3036	0.0893	1 1/4	0.5714	0.6428	0.5000	0.1964	2 3/4
1	11	0.09091	0.0582	1.309	1.2508	1.1926	0.4091	0.0909	1	0.5000	0.3182	0.1136	1 1/4	0.6591	0.7500	0.5682	0.2500	2 3/4
1 1/4	11	0.09091	0.0582	1.650	1.5918	1.5335	0.5000	0.0909	1	0.5909	0.4091	0.1136	1 1/4	0.7500	0.8409	0.6591	0.2500	2 3/4
1 1/2	11	0.09091	0.0582	1.882	1.8238	1.7656	0.5000	0.0909	1	0.5909	0.4091	0.1136	1 1/4	0.7500	0.8409	0.6591	0.2500	2 3/4
2	11	0.09091	0.0582	2.347	2.2888	2.2306	0.6250	0.0909	1	0.7159	0.5341	0.1136	1 1/4	0.9204	1.0113	0.8295	0.2954	3 1/4
2 1/2	11	0.09091	0.0582	2.960	2.9018	2.8436	0.6875	0.1364	1 1/2	0.8239	0.5511	0.1364	1 1/2	1.0511	1.1875	0.9147	0.3636	4
3	11	0.09091	0.0582	3.460	3.4018	3.3436	0.8125	0.1364	1 1/2	0.9489	0.6761	0.1364	1 1/2	1.1761	1.3125	1.0397	0.3636	4
4	11	0.09091	0.0582	4.450	4.3918	4.3336	1.0000	0.1364	1 1/2	1.1364	0.8636	0.1364	1 1/2	1.4091	1.5455	1.2727	0.4091	4 1/2
5	11	0.09091	0.0582	5.450	5.3918	5.3336	1.1250	0.1364	1 1/2	1.2614	0.9886	0.1364	1 1/2	1.5795	1.7159	1.4431	0.4545	5
6	11	0.09091	0.0582	6.450	6.3918	6.3336	1.1250	0.1364	1 1/2	1.2614	0.9886	0.1364	1 1/2	1.5795	1.7159	1.4431	0.4545	5

1) This annex will be deleted in the next revision.

2) For parallel threaded parts diametral tolerances equivalent to the length tolerances in columns 13 and 14 will apply (1/16 of the length tolerances in column 13).

3) The design of internally threaded parts shall make allowance for accommodating pipe ends up to the lengths given in column 16, and the minimum length of useful thread shall be not less than 80 % of the values in column 17.