

# 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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**Descriptors :** pipe threads, pipe fittings, specifications, designation, dimensions, dimensional tolerances

Price based on 5 pages

## 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:

|                    |                        |                       |
|--------------------|------------------------|-----------------------|
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| Belgium            | India                  | South Africa, Rep. of |
| Brazil             | Israel                 | Spain                 |
| Bulgaria           | Italy                  | Sweden                |
| Canada             | Japan                  | Switzerland           |
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| 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/I, *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 <sub>p</sub> | Parallel internal pipe thread where pressure-tight joints are made on the threads |
| R <sub>c</sub> | 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

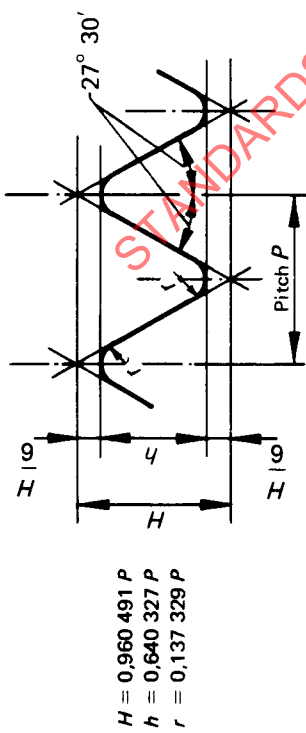


FIGURE 1 — Parallel thread

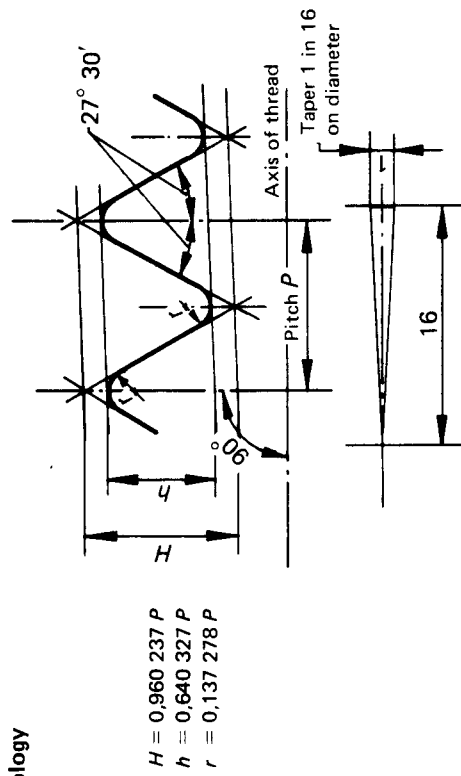


FIGURE 2 — Taper thread

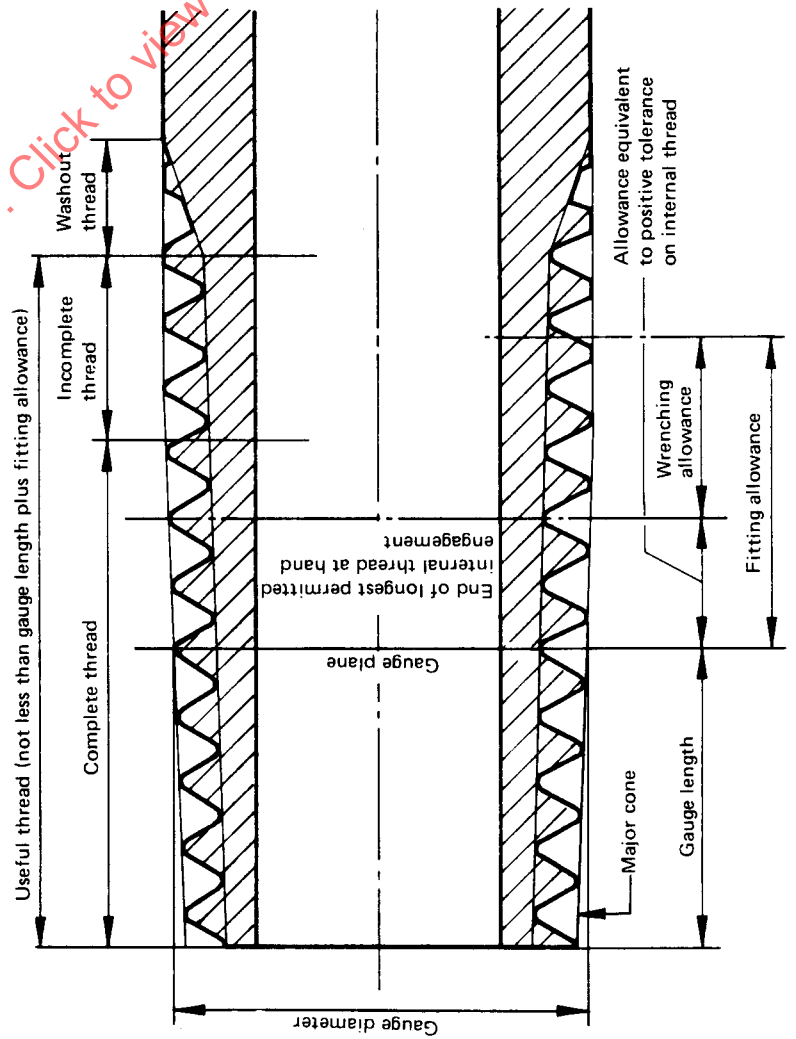


FIGURE 3 — Terms relating to pipe threads

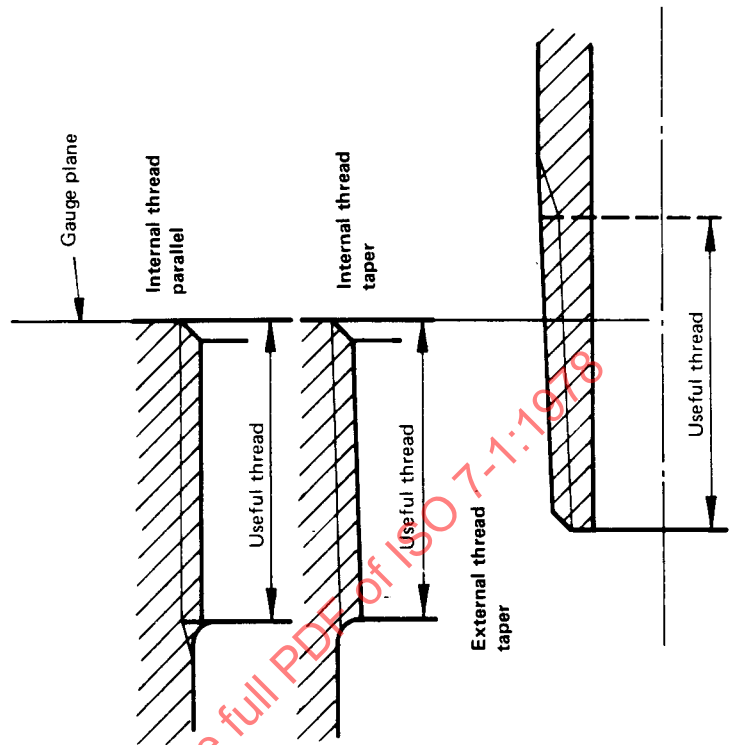


FIGURE 4 — Position of gauge plane, useful thread

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 $P$<br>mm | Depth of thread $h$<br>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 <sup>2)</sup> not less than : |                              |                                | Fitting allowance              |                 |                 |
|                       |                              |                 |                           | Major (gauge diameter) $d$<br>mm | Pitch $d_2$<br>mm | Minor $d_1$<br>mm | Basic<br>mm                                          | Tolerance + and - $T_1/2$<br>mm | Turns of thread $\approx$ | max.<br>mm | min.<br>mm                                  | Tolerance <sup>1)</sup> + and - $T_2/2$<br>mm | Turns of thread $\approx$                                         | For basic gauge length<br>mm | For maximum gauge length<br>mm | For minimum gauge length<br>mm | $\approx$<br>mm | Turns of thread |
| 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.