

# INTERNATIONAL STANDARD

**ISO**  
**228-1**

Third edition  
1994-05-15

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## Pipe threads where pressure-tight joints are not made on the threads —

### Part 1:

Dimensions, tolerances and designation

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*Filetages de tuyauterie pour raccordement sans étanchéité dans le  
filet —*  
<https://standards.iteh.ai/catalog/standards/sist/e196e9e1-3232-49dc-8f55-638940316b/iso-228-1-1994>  
*Partie 1: Dimensions, tolérances et désignation*

INTERNATIONAL

ISO



Reference number  
ISO 228-1:1994(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 228-1 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 (ISO 228-1:1982), which has been technically revised.

ISO 228 consists of the following parts, under the general title *Pipe threads where pressure-tight joints are not 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 228 is for information only.

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# Pipe threads where pressure-tight joints are not made on the threads —

## Part 1:

## Dimensions, tolerances and designation

### 1 Scope

This part of ISO 228 specifies the requirements for thread form, dimensions, tolerances and designation for fastening pipe threads, thread sizes 1/16 to 6 inclusive. Both internal and external threads are parallel threads and intended for the mechanical assembly of the component parts of fittings, cocks and valves, accessories, etc.

These threads are not suitable as jointing threads where a pressure-tight joint is made on the thread. If assemblies with such threads must be made pressure-tight, this should be effected by compressing two tightening surfaces outside the threads, and by interposing an appropriate seal.

#### NOTES

1 For pipe threads where pressure-tight joints are made on the threads, see ISO 7-1.

2 ISO 228-2 gives details of methods of verification of fastening 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 228. 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 228 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.

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

### 3 Symbols

- G Pipe thread where pressure-tight joints are not made on the threads
- A Tighter class of tolerance of external pipe threads where pressure-tight joints are not made on the threads
- B Wider class of tolerance of external pipe threads where pressure-tight joints are not 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 =  $d$ ; major diameter of the internal thread
- $D_1$  =  $D - 1,280\,654\,P = d_1$ ; minor diameter of the internal thread
- $D_2$  =  $D - 0,640\,327\,P = d_2$ ; pitch diameter of the internal thread
- d Major diameter of the external thread

|          |   |
|----------|---|
| $d_1$    | $= d - 1,280\ 654\ P$ ; minor diameter of the external thread |
| $d_2$    | $= d - 0,640\ 327\ P$ ; pitch diameter of the external thread |
| $T_{D1}$ | Tolerance on the minor diameter of the internal thread        |
| $T_{D2}$ | Tolerance on the pitch diameter of the internal thread        |
| $T_d$    | Tolerance on the major diameter of the external thread        |
| $T_{d2}$ | Tolerance on the pitch diameter of the external thread        |

## 4 Dimensions

The profile of these threads is identical with that of the parallel thread specified in ISO 7-1. The internal and external threads covered by this part of ISO 228 are both parallel.

Unless otherwise specified, the thread in accordance with this part of ISO 228 is a right-hand thread. (See also 5.4.)

Threads are normally of the truncated form, with crests truncated to the limits of tolerance as given in columns 14 and 15 of table 1, except on internal threads when they are likely to be assembled with external threads in accordance with ISO 7-1, in which case the thread length shall be equal to or greater than that specified in ISO 7-1.

The tolerances on the pitch diameter of the internal threads correspond to the positive deviation of the diameter tolerances in ISO 7-1, with the exception of those for thread sizes 1/16, 1/8, 1/4 and 3/8, for which slightly higher values have been specified.

For external threads, two classes of tolerances on the pitch diameter have been specified (see table 1):

Class A (column 10): entirely negative, equivalent in value to the tolerance for the internal thread.

Class B (column 11): entirely negative, value twice that of class A.

The choice between class A and class B depends on the conditions of application and shall be made in product standards where threads in accordance with this part of ISO 228 are specified.

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

Figure 1 shows fastening threads with full form profiles and their tolerances, figure 2 shows fastening threads with truncated profiles and their tolerances.

## 5 Designation

The designation of threads according to this part of ISO 228 shall consist of the following elements in the sequence given:

### 5.1 The description block shall be:

Pipe thread

### 5.2 The International Standard number block shall be:

ISO 228

### 5.3 The individual item block shall be one of the following:

- the letter G followed by the designation of the thread size from column 1 of table 1 for internal threads (one class of tolerance only);
- the letter G followed by the designation of the thread size from column 1 of table 1 and the letter A for class A external threads;
- the letter G followed by the designation of the thread size from column 1 of table 1 and the letter B for class B external threads.

### EXAMPLES

The complete designation for right-hand thread size 1 1/2 is as follows:

|                 |                            |  |
|-----------------|----------------------------|--|
| Internal thread | (one tolerance class only) | <b>Pipe thread<br/>ISO 228 - G 1 1/2</b>   |
| External thread | { tolerance class A        | <b>Pipe thread<br/>ISO 228 - G 1 1/2 A</b> |
|                 | { tolerance class B        | <b>Pipe thread<br/>ISO 228 - G 1 1/2 B</b> |

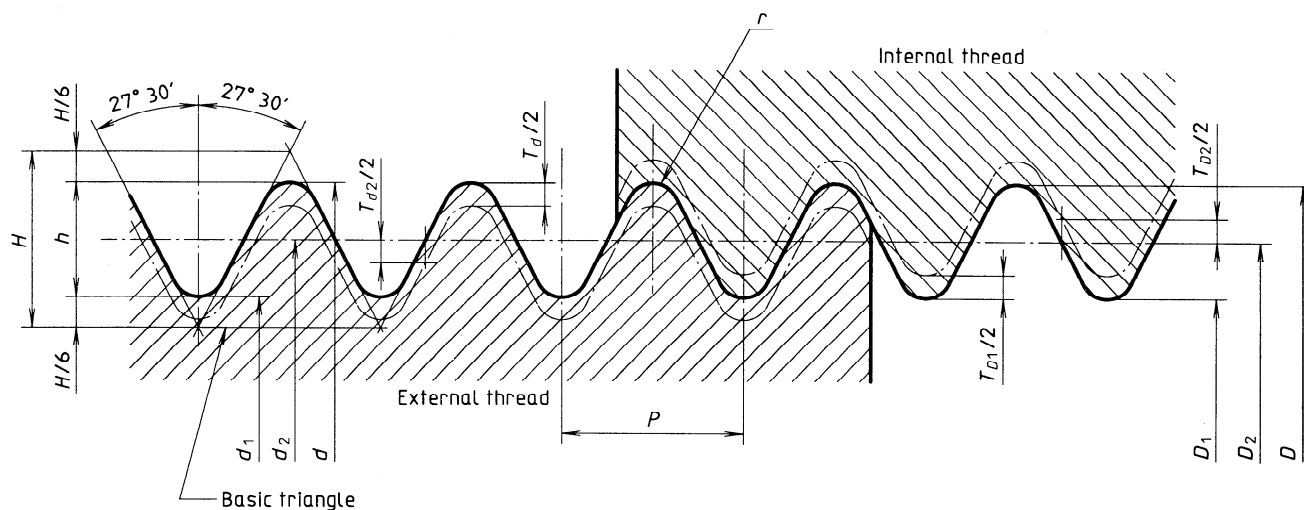
### 5.4 For left-hand threads, the letters LH shall be added to the designation. Right-hand threads require no special designation.

## 6 Combination with jointing 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 tolerance of the internal thread in accordance with 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 leaktight joint.



$$H = 0,960\,491\,P$$

$$h = 0,640\,327\,P$$

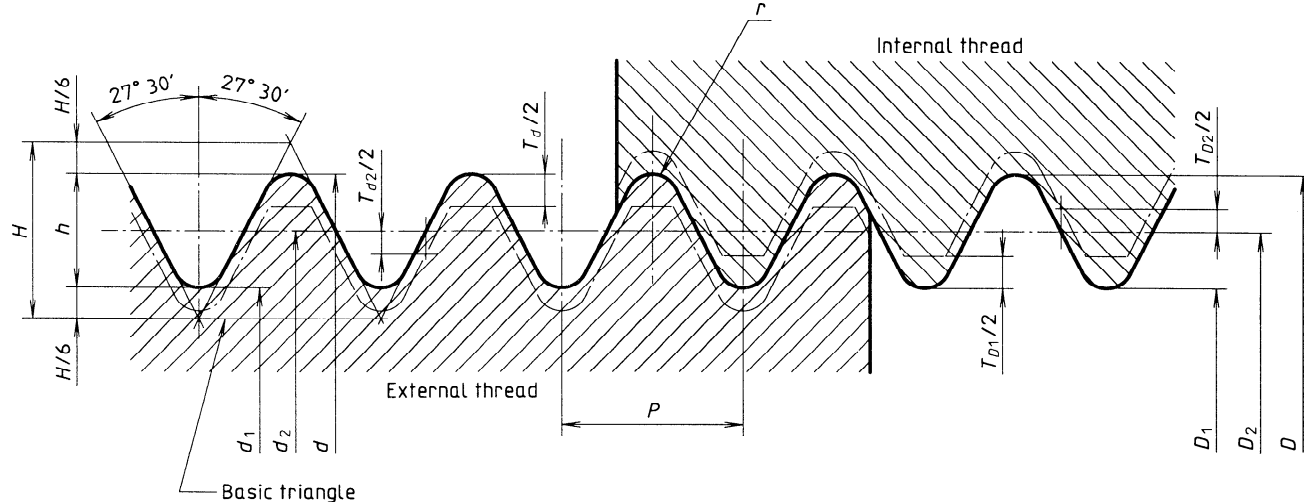
$$r = 0,137\,329\,P$$

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Figure 1 — Full form thread profile and tolerance zones

ISO 228-1:1994

<https://standards.iteh.ai/catalog/standards/sist/e196e9e1-3232-49dc-8f55-ec638f40316b/iso-228-1-1994>



$$H = 0,960\,491\,P$$

$$h = 0,640\,327\,P$$

$$r = 0,137\,329\,P$$

Figure 2 — Truncated form thread profile and tolerance zones

Table 1 — Thread dimensions

Dimensions in millimetres

| 1                          | 2                            | 3     | 4                | 5         | 6       | 7           | 8  | 9               | 10                      | 11                       | 12              | 13              | 14                       | 15              | 16                    |                                 |  |
|----------------------------|------------------------------|-------|------------------|-----------|---------|-------------|--|-----------------|-------------------------|--------------------------|-----------------|-----------------|--------------------------|-----------------|-----------------------|---------------------------------|--|
| Designation of thread size | Number of threads in 25,4 mm | Pitch | Height of thread | Diameters |         |             | Tolerances on pitch diameter <sup>1)</sup> |                 |                         |                          |                 |                 |                          |                 |                       | Tolerance on the major diameter |  |
|                            |                              |       |                  | Major     | Pitch   | Minor       | Internal thread $T_{D2}$                   |                 |                         | External thread $T_{d2}$ |                 |                 | Internal thread $T_{D1}$ |                 | External thread $T_d$ |                                 |  |
|                            |                              |       |                  |           |         |             | Lower deviation                            | Upper deviation | Lower deviation class A | Lower deviation class B  | Upper deviation | Lower deviation | Upper deviation          | Lower deviation | Upper deviation       |                                 |  |
| 1/16                       | 28                           | 0,907 | 0,581            | 7,723     | 7,142   | $d_1 = D_1$ | 0  | + 0,107         | - 0,107                 | - 0,214                  | 0               | 0               | + 0,282                  | - 0,214         | 0                     |                                 |  |
| 1/8                        | 28                           | 0,907 | 0,581            | 9,728     | 9,147   | 8,566       | 0  | + 0,107         | - 0,107                 | - 0,214                  | 0               | 0               | + 0,282                  | - 0,214         | 0                     |                                 |  |
| 1/4                        | 19                           | 1,337 | 0,856            | 13,157    | 12,301  | 11,445      | 0  | + 0,125         | - 0,125                 | 0,250                    | 0               | 0               | + 0,445                  | - 0,250         | 0                     |                                 |  |
| 3/8                        | 19                           | 1,337 | 0,856            | 16,662    | 15,806  | 14,950      | 0  | + 0,125         | - 0,125                 | - 0,250                  | 0               | 0               | + 0,445                  | - 0,250         | 0                     |                                 |  |
| 1/2                        | 14                           | 1,814 | 1,162            | 20,955    | 19,793  | 18,631      | 0  | + 0,142         | - 0,142                 | - 0,284                  | 0               | 0               | + 0,541                  | - 0,284         | 0                     |                                 |  |
| 5/8                        | 14                           | 1,814 | 1,162            | 22,911    | 21,749  | 20,587      | 0  | + 0,142         | - 0,142                 | - 0,284                  | 0               | 0               | + 0,541                  | - 0,284         | 0                     |                                 |  |
| 3/4                        | 14                           | 1,814 | 1,162            | 26,441    | 25,279  | 24,117      | 0  | + 0,142         | - 0,142                 | - 0,284                  | 0               | 0               | + 0,541                  | - 0,284         | 0                     |                                 |  |
| 7/8                        | 14                           | 1,814 | 1,162            | 30,201    | 29,039  | 27,877      | 0  | + 0,142         | - 0,142                 | - 0,284                  | 0               | 0               | + 0,541                  | - 0,284         | 0                     |                                 |  |
| 1                          | 11                           | 2,309 | 1,479            | 33,249    | 31,770  | 30,291      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 1 1/8                      | 11                           | 2,309 | 1,479            | 37,897    | 36,418  | 34,939      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 1 1/4                      | 11                           | 2,309 | 1,479            | 41,910    | 40,431  | 38,952      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 1 1/2                      | 11                           | 2,309 | 1,479            | 47,803    | 46,324  | 44,845      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 1 3/4                      | 11                           | 2,309 | 1,479            | 53,746    | 52,267  | 50,788      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 2                          | 11                           | 2,309 | 1,479            | 59,614    | 58,135  | 56,656      | 0  | + 0,180         | - 0,180                 | 0,360                    | 0               | 0               | + 0,640                  | - 0,360         | 0                     |                                 |  |
| 2 1/4                      | 11                           | 2,309 | 1,479            | 65,710    | 64,231  | 62,752      | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 2 1/2                      | 11                           | 2,309 | 1,479            | 75,184    | 73,705  | 72,226      | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 2 3/4                      | 11                           | 2,309 | 1,479            | 81,534    | 80,055  | 78,576      | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 3                          | 11                           | 2,309 | 1,479            | 87,884    | 86,405  | 84,926      | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 3 1/2                      | 11                           | 2,309 | 1,479            | 100,330   | 98,851  | 97,372      | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 4                          | 11                           | 2,309 | 1,479            | 113,030   | 111,551 | 110,072     | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 4 1/2                      | 11                           | 2,309 | 1,479            | 125,730   | 124,251 | 122,772     | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 5                          | 11                           | 2,309 | 1,479            | 138,430   | 136,951 | 135,472     | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 5 1/2                      | 11                           | 2,309 | 1,479            | 151,130   | 149,651 | 148,172     | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |
| 6                          | 11                           | 2,309 | 1,479            | 163,830   | 162,351 | 160,872     | 0  | + 0,217         | - 0,217                 | 0,434                    | 0               | 0               | + 0,640                  | - 0,434         | 0                     |                                 |  |

1) For thin-walled parts, the tolerances apply to the mean pitch diameter, which is the arithmetical mean of two diameters measured at right angles to each other.

1) For thin-walled parts, the tolerances apply to the mean pitch diameter, which is the arithmetical mean of two diameters measured at right angles to each other.

## **Annex A**

(informative)

### **Bibliography**

- [1] ISO 228-2:1987, *Pipe threads where pressure-tight joints are not made on the threads — Part 2: Verification by means of limit gauges.*

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**ICS 21.040.30**

**Descriptors:** pipe threads, pipe fittings, pipe joints, specifications, dimensions, dimensional tolerances, designation, symbols.

Price based on 5 pages

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