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**ISO general purpose metric screw  
threads — Tolerances —**

**Part 5:**

Limits of sizes for internal screw threads to  
mate with hot-dip galvanized external screw  
threads with maximum size of tolerance  
position h before galvanizing

*Filetages métriques ISO pour usages généraux — Tolérances —*

*Partie 5: Dimensions limites pour filetages intérieurs pour assemblages  
avec des filetages extérieurs galvanisés à chaud de position de tolérance  
maximale h avant galvanisation*



## 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 965-5 was prepared by Technical Committee ISO/TC 1, *Screw threads*, Subcommittee SC 2, *Tolerances*.

ISO 965 consists of the following parts, under the general title *ISO general purpose metric screw threads – Tolerances*

- *Part 1: Principles and basic data*
- *Part 2: Limits of sizes for general purpose bolt and nut threads – Medium quality*
- *Part 3: Deviations for constructional screw threads*
- *Part 4: Limits of sizes for hot-dip galvanized external threads to mate with internal threads tapped with tolerance position H or G after galvanizing*
- *Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*

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Printed in Switzerland

# ISO general purpose metric screw threads — Tolerances —

## Part 5:

Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing

### 1 Scope

This part of ISO 965 specifies deviations and limits of sizes for pitch and crest diameters for ISO general purpose metric internal screw threads conforming to ISO 262 having basic profile according to ISO 68-1.

Internal screw threads according to this part of ISO 965 are intended to mate with external screw threads with maximum size of tolerance position h before hot-dip galvanizing.

The limits of sizes for the tolerance quality specified are derived from tolerances specified in ISO 965-1.

The fundamental deviations for internal screw threads with a tolerance position AZ have been calculated according to the following formula:

$$EI_{AZ} = + (300 + 20P)$$

where

$EI$  is expressed in micrometres;

$P$  is expressed in millimetres.

The fundamental deviations for internal screw threads with a tolerance position AX have been calculated according to the following formula:

$$EI_{AX} = + (220P - 20)$$

where

$EI$  is expressed in micrometres;

$P$  is expressed in millimetres.

Products made with thread tolerances according to this part of ISO 965 may show load failure when tested in accordance with ISO 898-2 without adjustment of the other mechanical properties.

Internal screw threads with thread tolerances according to this part of ISO 965 must not be mated with external screw threads having thread tolerances according to ISO 965-4 because such combinations will create severe risk of thread stripping.

**NOTE** Internal screw threads with tolerance class 6AZ are primarily intended to mate with external screw threads centrifuged after hot-dip galvanizing.

Internal screw threads with tolerance class 6AX are primarily intended to mate with hot-dip galvanized external screw threads with heavy coating not centrifuged.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 965. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 965 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 68-1:1998, *ISO general purpose screw threads — Basic profile — Part 1: Metric screw threads*.

ISO 262:1998, *ISO general purpose metric screw threads — Selected sizes for screw, bolts and nuts*.

ISO 898-2:1992, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values — Coarse thread*.

ISO 965-1:1998, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*.

ISO 965-4:1998, *ISO general purpose metric screw threads — Tolerances — Part 4: Limits of sizes for hot-dip galvanized external screw threads to mate with internal screw threads tapped with tolerance position H or G after galvanizing*.

ISO 5408:1983, *Cylindrical screw threads — Vocabulary*.

## 3 Definitions

For the purpose of this part of ISO 965 the definitions given in ISO 5408 apply.

## 4 Designation

Tolerance designation for internal screw threads is

6AZ

or

6AX

Example:

M12 - 6AZ

or

M12 - 6AX

## 5 Deviations

The deviations for internal screw threads as specified in table 1 are derived from the formulae for fundamental deviations below and from tolerances specified in ISO 965-1.

The fundamental deviations,  $EI_{AZ}$  and  $EI_{AX}$ , have been calculated according to the following formulae:

$$EI_{AZ} = + (300 + 20P)$$

and

$$EI_{AX} = + (220P - 20)$$

where

$EI$  is expressed in micrometres;

$P$  is expressed in millimetres

**Table 1 — Deviations**

| Thread        | Pitch<br>$P$<br><br>mm | Tolerance<br>class | Internal thread  |                  |                    |                  |
|---------------|------------------------|--------------------|------------------|------------------|--------------------|------------------|
|               |                        |                    | Pitch diameter   |                  | Minor diameter     |                  |
|               |                        |                    | $ES$<br>µm       | $EI$<br>µm       | $ES$<br>µm         | $EI$<br>µm       |
| M10           | 1,5                    | 6AZ<br>6AX         | + 510<br>+ 490   | + 330<br>+ 310   | + 630<br>+ 610     | + 330<br>+ 310   |
| M12           | 1,75                   | 6AZ<br>6AX         | + 535<br>+ 565   | + 335<br>+ 365   | + 670<br>+ 700     | + 335<br>+ 365   |
| M14, M16      | 2                      | 6AZ<br>6AX         | + 552<br>+ 632   | + 340<br>+ 420   | + 715<br>+ 795     | + 340<br>+ 420   |
| M18, M20, M22 | 2,5                    | 6AZ<br>6AX         | + 574<br>+ 754   | + 350<br>+ 530   | + 800<br>+ 980     | + 350<br>+ 530   |
| M24, M27      | 3                      | 6AZ<br>6AX         | + 625<br>+ 905   | + 360<br>+ 640   | + 860<br>+ 1 140   | + 360<br>+ 640   |
| M30, M33      | 3,5                    | 6AZ<br>6AX         | + 650<br>+ 1 030 | + 370<br>+ 750   | + 930<br>+ 1 310   | + 370<br>+ 750   |
| M36, M39      | 4                      | 6AZ<br>6AX         | + 680<br>+ 1 160 | + 380<br>+ 860   | + 980<br>+ 1 460   | + 380<br>+ 860   |
| M42, M45      | 4,5                    | 6AZ<br>6AX         | + 705<br>+ 1 285 | + 390<br>+ 970   | + 1 060<br>+ 1 640 | + 390<br>+ 970   |
| M48, M52      | 5                      | 6AZ<br>6AX         | + 735<br>+ 1 415 | + 400<br>+ 1 080 | + 1 110<br>+ 1 790 | + 400<br>+ 1 080 |
| M56, M60      | 5,5                    | 6AZ<br>6AX         | + 765<br>+ 1 545 | + 410<br>+ 1 190 | + 1 160<br>+ 1 940 | + 410<br>+ 1 190 |
| M64           | 6                      | 6AZ<br>6AX         | + 795<br>+ 1 675 | + 420<br>+ 1 300 | + 1 220<br>+ 2 100 | + 420<br>+ 1 300 |

## 6 Limits of sizes — Internal screw threads — Coarse thread series

Tolerance quality: medium

Thread engagement: normal

Tolerance classes: 6AZ and 6AX

**Table 2 — Internal screw thread limits for tolerance class 6AZ**

Dimensions in millimetres

| Thread                                                                                                                                                                                                                                                                                                                                                                           | Length of thread engagement |                     | Major diameter <sup>a</sup> | Pitch diameter <sup>a</sup> |        | Minor diameter <sup>c</sup> |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|-----------------------------|-----------------------------|--------|-----------------------------|--------|
|                                                                                                                                                                                                                                                                                                                                                                                  | over                        | up to and including | min. <sup>b</sup>           | max.                        | min.   | max.                        | min.   |
| M10                                                                                                                                                                                                                                                                                                                                                                              | 5                           | 15                  | 10,330                      | 9,536                       | 9,356  | 9,006                       | 8,706  |
| M12                                                                                                                                                                                                                                                                                                                                                                              | 6                           | 18                  | 12,335                      | 11,398                      | 11,198 | 10,776                      | 10,441 |
| M14                                                                                                                                                                                                                                                                                                                                                                              | 8                           | 24                  | 14,340                      | 13,253                      | 13,041 | 12,550                      | 12,175 |
| M16                                                                                                                                                                                                                                                                                                                                                                              | 8                           | 24                  | 16,340                      | 15,253                      | 15,041 | 14,550                      | 14,175 |
| M18                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 18,350                      | 16,950                      | 16,726 | 16,094                      | 15,644 |
| M20                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 20,350                      | 18,950                      | 18,726 | 18,094                      | 17,644 |
| M22                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 22,350                      | 20,950                      | 20,726 | 20,094                      | 19,644 |
| M24                                                                                                                                                                                                                                                                                                                                                                              | 12                          | 36                  | 24,360                      | 22,676                      | 22,411 | 21,612                      | 21,112 |
| M27                                                                                                                                                                                                                                                                                                                                                                              | 12                          | 36                  | 27,360                      | 25,676                      | 25,411 | 24,612                      | 24,112 |
| M30                                                                                                                                                                                                                                                                                                                                                                              | 15                          | 45                  | 30,370                      | 28,377                      | 28,097 | 27,141                      | 26,581 |
| M33                                                                                                                                                                                                                                                                                                                                                                              | 15                          | 45                  | 33,370                      | 31,377                      | 31,097 | 30,141                      | 29,581 |
| M36                                                                                                                                                                                                                                                                                                                                                                              | 18                          | 53                  | 36,380                      | 34,082                      | 33,782 | 32,650                      | 32,050 |
| M39                                                                                                                                                                                                                                                                                                                                                                              | 18                          | 53                  | 39,380                      | 37,082                      | 36,782 | 35,650                      | 35,050 |
| M42                                                                                                                                                                                                                                                                                                                                                                              | 21                          | 63                  | 42,390                      | 39,782                      | 39,467 | 38,189                      | 37,519 |
| M45                                                                                                                                                                                                                                                                                                                                                                              | 21                          | 63                  | 45,390                      | 42,782                      | 42,467 | 41,189                      | 40,519 |
| M48                                                                                                                                                                                                                                                                                                                                                                              | 24                          | 71                  | 48,400                      | 45,487                      | 45,152 | 43,697                      | 42,987 |
| M52                                                                                                                                                                                                                                                                                                                                                                              | 24                          | 71                  | 52,400                      | 49,487                      | 49,152 | 46,697                      | 46,987 |
| M56                                                                                                                                                                                                                                                                                                                                                                              | 28                          | 85                  | 56,410                      | 53,193                      | 52,838 | 51,206                      | 50,456 |
| M60                                                                                                                                                                                                                                                                                                                                                                              | 28                          | 85                  | 60,410                      | 57,193                      | 56,838 | 55,206                      | 54,456 |
| M64                                                                                                                                                                                                                                                                                                                                                                              | 32                          | 95                  | 64,420                      | 60,898                      | 60,523 | 58,725                      | 57,925 |
| <sup>a</sup> Dimensions apply to internal screw threads after galvanizing and tapping oversize.<br><sup>b</sup> Refers to the imaginary coaxial cylinder through the points where the requirement with regard to straightness of flank ceases.<br><sup>c</sup> Dimensions apply to internal screw threads before galvanizing or after galvanizing and removal of zinc fragments. |                             |                     |                             |                             |        |                             |        |

Table 3 — Internal screw thread limits for tolerance class 6AX

Dimensions in millimetres

| Thread                                                                                                                                                                                                                                                                                                                                                                           | Length of thread engagement |                     | Major diameter <sup>a</sup><br>min. <sup>b</sup> | Pitch diameter <sup>a</sup> |        | Minor diameter <sup>c</sup> |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|--------------------------------------------------|-----------------------------|--------|-----------------------------|--------|
|                                                                                                                                                                                                                                                                                                                                                                                  | over                        | up to and including |                                                  | max.                        | min.   | max.                        | min.   |
| M10                                                                                                                                                                                                                                                                                                                                                                              | 5                           | 15                  | 10,310                                           | 9,516                       | 9,336  | 8,986                       | 8,686  |
| M12                                                                                                                                                                                                                                                                                                                                                                              | 6                           | 18                  | 12,365                                           | 11,428                      | 11,228 | 10,806                      | 10,471 |
| M14                                                                                                                                                                                                                                                                                                                                                                              | 8                           | 24                  | 14,420                                           | 13,333                      | 13,121 | 12,630                      | 12,255 |
| M16                                                                                                                                                                                                                                                                                                                                                                              | 8                           | 24                  | 16,420                                           | 15,333                      | 15,121 | 14,630                      | 14,255 |
| M18                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 18,530                                           | 17,130                      | 16,906 | 16,274                      | 15,824 |
| M20                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 20,530                                           | 19,130                      | 18,906 | 18,274                      | 17,824 |
| M22                                                                                                                                                                                                                                                                                                                                                                              | 10                          | 30                  | 22,530                                           | 21,130                      | 20,906 | 20,274                      | 19,824 |
| M24                                                                                                                                                                                                                                                                                                                                                                              | 12                          | 36                  | 24,640                                           | 22,956                      | 22,691 | 21,892                      | 21,392 |
| M27                                                                                                                                                                                                                                                                                                                                                                              | 12                          | 36                  | 27,640                                           | 25,956                      | 25,691 | 24,892                      | 24,392 |
| M30                                                                                                                                                                                                                                                                                                                                                                              | 15                          | 45                  | 30,750                                           | 28,757                      | 28,477 | 27,521                      | 26,961 |
| M33                                                                                                                                                                                                                                                                                                                                                                              | 15                          | 45                  | 33,750                                           | 31,757                      | 31,477 | 30,521                      | 29,961 |
| M36                                                                                                                                                                                                                                                                                                                                                                              | 18                          | 53                  | 36,860                                           | 34,562                      | 34,262 | 33,130                      | 32,530 |
| M39                                                                                                                                                                                                                                                                                                                                                                              | 18                          | 53                  | 39,860                                           | 37,562                      | 37,262 | 36,130                      | 35,530 |
| M42                                                                                                                                                                                                                                                                                                                                                                              | 21                          | 63                  | 42,970                                           | 40,362                      | 40,047 | 38,769                      | 38,099 |
| M45                                                                                                                                                                                                                                                                                                                                                                              | 21                          | 63                  | 45,970                                           | 43,362                      | 43,047 | 41,769                      | 41,099 |
| M48                                                                                                                                                                                                                                                                                                                                                                              | 24                          | 71                  | 49,080                                           | 46,167                      | 45,832 | 44,377                      | 43,667 |
| M52                                                                                                                                                                                                                                                                                                                                                                              | 24                          | 71                  | 53,080                                           | 50,167                      | 49,832 | 48,377                      | 47,667 |
| M56                                                                                                                                                                                                                                                                                                                                                                              | 28                          | 85                  | 57,190                                           | 53,973                      | 53,618 | 51,986                      | 51,236 |
| M60                                                                                                                                                                                                                                                                                                                                                                              | 28                          | 85                  | 61,190                                           | 57,973                      | 57,618 | 55,986                      | 55,236 |
| M64                                                                                                                                                                                                                                                                                                                                                                              | 32                          | 95                  | 65,300                                           | 61,778                      | 61,403 | 59,605                      | 58,805 |
| <sup>a</sup> Dimensions apply to internal screw threads after galvanizing and tapping oversize.<br><sup>b</sup> Refers to the imaginary coaxial cylinder through the points where the requirement with regard to straightness of flank ceases.<br><sup>c</sup> Dimensions apply to internal screw threads before galvanizing or after galvanizing and removal of zinc fragments. |                             |                     |                                                  |                             |        |                             |        |

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## ICS 21.040.10

**Descriptors:** screw threads, ISO metric threads, hot-dip galvanizing, internal threads, dimensions, dimensional tolerances, dimensional deviations, designation.

Price based on 5 pages

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