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ISO general purpose metric screw threads — Tolerances —

Part 6: Limits of sizes for internal and external threads (fine and medium tolerance qualities, first and second choices)

Filetages métriques ISO pour usages généraux — Tolérances —

Partie 6: Limites de dimensions pour les filetages intérieurs et extérieurs (qualités de tolérances fine et moyenne, premier et deuxième choix)

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Foreword

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This document was prepared by Technical Committee ISO/TC 1, *Screw threads*.

A list of all parts in the ISO 965 series can be found on the ISO website.

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ISO general purpose metric screw threads — Tolerances —

Part 6: Limits of sizes for internal and external threads (fine and medium tolerance qualities, first and second choices)

1 Scope

This document specifies the limits of sizes for major, pitch and minor diameters of ISO general purpose metric screw threads (M) conforming to ISO 261 and having basic and design profiles in accordance with ISO 68-1.

This document is applicable to the metric fastening screw threads with the ten tolerance classes (4H, 5H, 6H, 7H, 6G, 4h, 6h, 6g, 6f and 6e) recommended in ISO 965-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 5408, *Screw threads — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5408 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Limits of sizes

4.1 General

The limits of sizes specified shall be derived from the fundamental deviations and tolerances specified in ISO 965-1.

The limits of sizes for major, pitch and minor diameters of screw threads (M) have been calculated by the following formulae, derived from the formulae provided in ISO 68-1 and ISO 965-1, and rounded to the third decimal place.

Internal thread:

Major diameter $D_{\text{min}} = D + EI$

Pitch diameter $D_{2\,\text{min}} = D_2 + EI = D - 0{,}649\,519\,P + EI$

$D_{2\,\text{max}} = D_{2\,\text{min}} + T_{\text{D2}}$

Minor diameter $D_{1\,\text{min}} = D_1 + EI = D - 1{,}082\,532\,P + EI$

$D_{1\,\text{max}} = D_{1\,\text{min}} + T_{\text{D1}}$

External thread:

Major diameter $d_{\text{max}} = d + es$

$d_{\text{min}} = d_{\text{max}} - T_{\text{d}}$

Pitch diameter $d_{2\,\text{max}} = d_2 + es = d - 0{,}649\,519\,P + es$

$d_{2\,\text{min}} = d_{2\,\text{max}} - T_{\text{d2}}$

Minor diameter $d_{1\,\text{max}} = d_1 + es = d - 1{,}082\,532\,P + es$

$d_{3\,\text{max}} = d_{1\,\text{max}} - 0{,}866\,025\,404\,P/2 + 2\,C_{\text{max}}$

$d_{3\,\text{min}} = d_{1\,\text{max}} - T_{\text{d2}} - 0{,}866\,025\,404\,P/2 + 0{,}250\,P$

Where es is a negative value.

For the symbols and their definitions see ISO 965-1.

The maximum major diameter of internal thread D_{max} is not specified.

Usually, the minimum major diameter of internal thread D_{min} and the maximum minor diameter of external thread $d_{1\,\text{max}}$ are gauged by the crest diameter of GO thread gauges in accordance with ISO 1502.

For external threads, controlling the maximum minor diameter $d_{1\,\text{max}}$ and the minimum root radius $R_{1\,\text{min}}$ ensures the conformity of the maximum minor diameter $d_{3\,\text{max}}$.

Whether to measure the maximum and minimum minor diameters of external thread, $d_{3\,\text{max}}$ and $d_{3\,\text{min}}$, shall be decided according to the relevant threaded product documents. Unless specifically defined otherwise, it is not necessary to carry out a measurement of the minor diameter d_3.

For the ten tolerance classes and nominal diameter ranges see Table 1.

Table 1 — M screw threads with the ten recommended tolerance classes

Screw thread	Tolerance class	Nominal diameter mm	Table number
Internal thread	4H	From 1 to 100	Table 2
	5H	From 1 to 300	Table 3
	6H	From 1,4 to 300	Table 4
	7H	From 3 to 200	Table 5
	6G	From 1,4 to 200	Table 6

Table 1 *(continued)*

Screw thread	Tolerance class	Nominal diameter mm	Table number
External thread	4h	From 1 to 100	Table 7
	6h	From 1 to 100	Table 8
	6g	From 1 to 300	Table 9
	6f	From 1,6 to 200	Table 10
	6e	From 3 to 200	Table 11

4.2 Internal threads

Limits of sizes for the internal threads with tolerance class 4H shall be as specified in Table 2.

Table 2 — Limits of sizes for the internal threads with tolerance class 4H

Dimensions in millimetres

Nominal diameter D	Pitch P	Major diameter	Pitch diameter		Minor diameter	
		D_{min}[a]	$D_{2\,\text{max}}$	$D_{2\,\text{min}}$	$D_{1\,\text{max}}$	$D_{1\,\text{min}}$
1	0,2	1,000	0,910	0,870	0,821	0,783
1	0,25	1,000	0,883	0,838	0,774	0,729
1,1	0,2	1,100	1,010	0,970	0,921	0,883
1,1	0,25	1,100	0,983	0,938	0,874	0,829
1,2	0,2	1,200	1,110	1,070	1,021	0,983
1,2	0,25	1,200	1,083	1,038	0,974	0,929
1,4	0,2	1,400	1,310	1,270	1,221	1,183
1,4	0,3	1,400	1,253	1,205	1,128	1,075
1,6	0,2	1,600	1,512	1,470	1,421	1,383
1,6	0,35	1,600	1,426	1,373	1,284	1,221
1,8	0,2	1,800	1,712	1,670	1,621	1,583
1,8	0,35	1,800	1,626	1,573	1,484	1,421
2	0,25	2,000	1,886	1,838	1,774	1,729
2	0,4	2,000	1,796	1,740	1,638	1,567
2,2	0,25	2,200	2,086	2,038	1,974	1,929
2,2	0,45	2,200	1,968	1,908	1,793	1,713
2,5	0,35	2,500	2,326	2,273	2,184	2,121
2,5	0,45	2,500	2,268	2,208	2,093	2,013
3	0,35	3,000	2,829	2,773	2,684	2,621
3	0,5	3,000	2,738	2,675	2,549	2,459
3,5	0,35	3,500	3,329	3,273	3,184	3,121
3,5	0,6	3,500	3,181	3,110	2,950	2,850
4	0,5	4,000	3,738	3,675	3,549	3,459
4	0,7	4,000	3,620	3,545	3,354	3,242
4,5	0,5	4,500	4,238	4,175	4,049	3,959
4,5	0,75	4,500	4,088	4,013	3,806	3,688
5	0,5	5,000	4,738	4,675	4,549	4,459
5	0,8	5,000	4,560	4,480	4,259	4,134

[a] Refers to the imaginary coaxial cylinder through the endpoints of straight flanks.