INTERNATIONAL STANDARD

ISO 965-4

Second edition
2021-07

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

Filetages métriques ISO pour usages généraux — Tolérances —

Partie 4: Dimensions limites pour filetages extérieurs galvanisés à chaud pour assemblages avec des filetages intérieurs de position de tolérance H ou G après galvanisation

Reference number
ISO 965-4:2021(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 965-4:1998), which has been technically revised.

The main changes compared to the previous edition are as follows:

— in Clause 1, the third paragraph, including the formula for the fundamental deviation az, has been deleted;

— the tolerance classes 6AZ and 6AX, internal threads, have been replaced with the tolerance class 6az, external threads (NOTE of Clause 1 in ISO 965-4:1998; first paragraph of Clause 4 in ISO 965-4:2021);

— in Table 1, the deviation values for the minor diameter of external threads, stress calculation, have been deleted, and M8 is added;

— the phrase “basic profiles” has been replaced by “basic profile and fundamental deviation” (fourth paragraph of Clause 6 in ISO 965-4:1998; fifth paragraph of Clause 7 in ISO 965-4:2021);

— in Table 2, the maximum values for the minor diameter of external threads, stress calculation, have been deleted, and M8 is added.

— an informative annex is added for the external screw thread minor diameter, d_3, used by ISO/TC 2 to calculate the nominal stress area, $A_{s,nom}$.

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

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

1 Scope

This document specifies limit deviations and limits of sizes for the pitch and crest diameters of the hot-dip galvanized metric external screw threads conforming to the coarse thread series of ISO 262 (from M8 to M64) having a basic profile according to ISO 68-1.

This document is applicable to the hot-dip galvanized metric external screw threads to mate with the internal screw threads tapped with tolerance position H or G after galvanizing.

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 — Tolerances — Part 1: Principles and basic data*

ISO 965-5, *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*

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 terminological 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 General

After the hot-dip galvanization the external threaded products with the tolerance class 6az shall be centrifuged immediately.

Products made with thread tolerances in accordance with this document may show lower ultimate tensile loads than the full loadability specified in ISO 898-1 due to reduction of the stress area.

External screw threads with thread tolerances according to this document shall not be mated with internal screw threads with thread tolerances in accordance with ISO 965-5 because such combinations will create severe risk for thread stripping.

5 Designation

The complete designation of metric screw threads shall be done according to ISO 965-1.

The tolerance class designation for external screw threads, ISO 965-4, is 6az.

EXAMPLE M12 - 6az

6 Limit deviations

The limit deviations for external screw threads are specified in Table 1. They are derived from Formula (1) for fundamental deviations and from tolerances specified in ISO 965-1.

The fundamental deviation, es_{az}, is calculated according to Formula (1):

$$es_{az} = -(300 + 20P) \quad (1)$$

where

es_{az} is the fundamental deviation, expressed in micrometres;

P is the pitch, expressed in millimetres.

Table 1 — Limit deviations

Thread	Pitch	External thread tolerance class 6az			
		Pitch diameter		Major diameter	
	P	*es*	*ei*	*es*	*ei*
	mm	µm	µm	µm	µm
M8	1,25	-325	-443	-325	-537
M10	1,5	-330	-462	-330	-566
M12	1,75	-335	-485	-335	-600
M14, M16	2	-340	-500	-340	-620
M18, M20, M22	2,5	-350	-520	-350	-685
M24, M27	3	-360	-560	-360	-735
M30, M33	3,5	-370	-582	-370	-795
M36, M39	4	-380	-604	-380	-855
M42, M45	4,5	-390	-626	-390	-890
M48, M52	5	-400	-650	-400	-930
M56, M60	5,5	-410	-675	-410	-970
M64	6	-420	-700	-420	-1020

7 Limits of sizes – External screw threads – Coarse thread series

Tolerance quality: medium

Thread engagement group: normal

Tolerance class: 6az

The limits of sizes for external screw threads are specified in Table 2.

The actual root contour shall not at any point transgress the basic profile and fundamental deviation.

For hot-dip galvanized screw threads, the tolerances apply to the parts before galvanizing. After galvanizing, the actual thread profile shall not at any point transgress the maximum material limits for tolerance position h and are intended to mate with internal screw threads of tolerance position H or G only.

NOTE See Annex A for the external screw thread minor diameter, d_3, used by ISO/TC 2 to calculate the nominal stress area, $A_{s,nom}$.

Table 2 — External thread limits of sizes for tolerance class 6az

Dimensions in millimetres

Thread	Length of thread engagement		Major diameter		Pitch diameter		Root radius 0,125*P*
	>	≤	max	min	max	min	min
M8	4	12	7,675	7,463	6,863	6,745	0,156
M10	5	15	9,670	9,434	8,696	8,564	0,188
M12	6	18	11,665	11,400	10,528	10,378	0,219
M14	8	24	13,660	13,380	12,361	12,201	0,250
M16	8	24	15,660	15,380	14,361	14,201	0,250
M18	10	30	17,650	17,315	16,026	15,856	0,313
M20	10	30	19,650	19,315	18,026	17,856	0,313
M22	10	30	21,650	21,315	20,026	19,856	0,313
M24	12	36	23,640	23,265	21,691	21,491	0,375
M27	12	36	26,640	26,265	24,691	24,491	0,375
M30	15	45	29,630	29,205	27,357	27,145	0,438
M33	15	45	32,630	32,205	30,357	30,145	0,438
M36	18	53	35,620	35,145	33,022	32,798	0,500
M39	18	53	38,620	38,145	36,022	35,798	0,500
M42	21	63	41,610	41,110	38,687	38,451	0,563
M45	21	63	44,610	44,110	41,687	41,451	0,563
M48	24	71	47,600	47,070	44,352	44,102	0,625
M52	24	71	51,600	51,070	48,352	48,102	0,625
M56	28	85	55,590	55,030	52,018	51,753	0,688
M60	28	85	59,590	59,030	56,018	55,753	0,688
M64	32	95	63,580	62,980	59,683	59,403	0,750

Annex A
(informative)

External screw thread minor diameters, d_3, used by ISO/TC 2 for the calculation of nominal stress area, $A_{s,nom}$

A.1 External screw thread minor diameters, d_3

The external screw thread minor diameters, d_3, used by ISO/TC 2 for the calculation of nominal stress area, $A_{s,nom}$, are given in Table A.1.

The external screw thread minor diameters, d_3, are calculated according to Formula (A.1).

$$d_3 = d_1 - H/6 + es_{az} = d - 2 \times 5H/8 - H/6 + es_{az} \quad \text{(A.1)}$$

Table A.1 — External screw thread minor diameters, d_3, used by ISO/TC 2 for the calculation of nominal stress area, $A_{s,nom}$

Dimensions in millimetres

Nominal diameter d	Pitch P	es_{az} µm	External screw thread minor diameters, d_3, for stress calculation
8	1,25	-325	6,141
10	1,5	-330	7,830
12	1,75	-335	9,518
14	2	-340	11,206
16	2	-340	13,206
18	2,5	-350	14,583
20	2,5	-350	16,583
22	2,5	-350	18,583
24	3	-360	19,959
27	3	-360	22,959
30	3,5	-370	25,336
33	3,5	-370	28,336
36	4	-380	30,713
39	4	-380	33,713
42	4,5	-390	36,089
45	4,5	-390	39,089
48	5	-400	41,466
52	5	-400	45,466
56	5,5	-410	48,842
60	5,5	-410	52,842
64	6	-420	56,219