INTERNATIONAL STANDARD

ISO 965-4

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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 965-4:1998(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 965-4 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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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 part of ISO 965 specifies deviations and limits of sizes for pitch and crest diameters for ISO general purpose metric external screw threads conforming to ISO 262 having a basic profile according to ISO 68-1.

External screw threads according to this part of ISO 965 are intended to mate with internal screw threads tapped with tolerance position H or G after hot dip galvanizing.

The limits of sizes for the tolerance quality specified are derived from tolerances specified in ISO 965-1 and the fundamental deviations according to the following formula:

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

where

es is expressed in micrometres;

P is expressed in millimetres.

Products made with thread tolerances in accordance with this part of ISO 965 may show failure at lower ultimate tensile loads than those specified in ISO 898-1 due to reduction of the stress area.

External screw threads with thread tolerances according to this part of ISO 965 must not be mated with internal screw threads with thread tolerances according to ISO 965-5 because such combinations will create severe risk for thread stripping.

NOTE If the tolerance class 6az is not specified the external screw threads are to mate with internal screw threads with tolerance position 6AZ if the products are centrifuged and with hot-dip galvanized internal screw threads with tolerance position 6AX if the products are 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 screws, bolts and nuts.*

ISO 898-1:— [1], *Mechanical properties of fasteners made of carcon steel and alloy steel — Part 1: Bolts, screws and studs.*

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

ISO 965-5:1998, *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 5408:1983, *Cylindrical screw threads — Vocabulary.*

3 Definitions

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

4 Designation

Tolerance designation for external screw threads is 6az.

Example:

M12-6az

1) To be published. (Revision of ISO 898-1:1988)

5 Deviations

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

The fundamental deviations, es_{az}, have been calculated according to the following formula:

$$es_{az} = -(300 + 20P).$$

where

es_{az} is expressed in micrometres;

P is expressed in millimetres

Table 1 — Deviations

Thread	Pitch	External thread tolerance class 6az				
		Pitch diameter		Major diameter		Minor diameter
	P	es	ei	es	ei	Deviations for stress calculation
	mm	µm	µm	µm	µm	µm
M10	1,5	− 330	− 462	− 330	− 566	− 547
M12	1,75	− 335	− 485	− 335	− 600	− 588
M14, M16	2	− 340	− 500	− 340	− 620	− 629
M18, M20, M22	2,5	− 350	− 520	− 350	− 685	− 711
M24, M27	3	− 360	− 560	− 360	− 735	− 793
M30, M33	3,5	− 370	− 582	− 370	− 795	− 875
M36, M39	4	− 380	− 604	− 380	− 855	− 957
M42, M45	4,5	− 390	− 626	− 390	− 890	− 1 040
M48, M52	5	− 400	− 650	− 400	− 930	− 1 122
M56, M60	5,5	− 410	− 675	− 410	− 970	− 1 204
M64	6	− 420	− 700	− 420	− 1 020	− 1 286

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

Tolerance quality: medium

Thread engagement group: normal

Tolerance class: 6az

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

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.

Table 2 — External thread limits for tolerance class 6az

Dimensions in millimetres

Thread	Length of thread engagement		Major diameter		Pitch diameter		Minor diameter (for stress calculation)	Root radius
	over	up to and including	max.	min.	max.	min.	max.	min.
M10	5	15	9,670	9,434	8,696	8,564	7,829	0,188
M12	6	18	11,665	11,400	10,528	10,378	9,518	0,219
M14	8	24	13,660	13,380	12,361	12,201	11,206	0,250
M16	8	24	15,660	15,380	14,361	14,201	13,206	0,250
M18	10	30	17,650	17,315	16,026	15,856	14,583	0,313
M20	10	30	19,650	19,315	18,026	17,856	16,583	0,313
M22	10	30	21,650	21,315	20,026	19,856	18,583	0,313
M24	12	36	23,640	23,265	21,691	21,491	19,959	0,375
M27	12	36	26,640	26,265	24,691	24,491	22,959	0,375
M30	15	45	29,630	29,205	27,357	27,145	25,336	0,438
M33	15	45	32,630	32,205	30,357	30,145	28,336	0,438
M36	18	53	35,620	35,145	33,022	32,798	30,713	0,500
M39	18	53	38,620	38,145	36,022	35,798	33,713	0,500
M42	21	63	41,610	41,110	38,687	38,451	36,089	0,563
M45	21	63	44,610	44,110	41,687	41,451	39,089	0,563
M48	24	71	47,600	47,070	44,352	44,102	41,465	0,625
M52	24	71	51,600	51,070	48,352	48,102	45,465	0,625
M56	28	85	55,590	55,030	52,018	51,753	48,842	0,688
M60	28	85	59,590	59,030	56,018	55,753	52,842	0,688
M64	32	95	63,580	62,980	59,683	59,403	56,219	0,750