INTERNATIONAL STANDARD

ISO 4759-1

Second edition 2000-11-15

Tolerances for fasteners —

Part 1:

Bolts, screws, studs and nuts — Product grades A, B and C

Tolérances des éléments de fixation EW Partie 1: Vis, goujons et écrous — Grades A, B et C (standards.iteh.ai)

ISO 4759-1:2000 https://standards.iteh.ai/catalog/standards/sist/d631c3ca-3424-488a-b176-b07244c96bae/iso-4759-1-2000



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 4759 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4759-1 was prepared by Technical Committee ISO/TC 2, Fasteners, Subcommittee SC 7, Reference Standards for fasteners (mainly covering terminology, dimensioning, sizes and tolerancing).

This second edition cancels and replaces the first edition (ISO 4759-1:1978), which has been technically revised.

ISO 4759 consists of the following parts, under the general title Tolerances for fasteners:

- Part 1: Bolts, screws, studs and nuts Product grades A, B and C
- Part 3: Plain washers for bolts, screws ans nuts—Product grades A and C

Annexes A to C of this part of ISO 4759 are for information only.

Tolerances for fasteners —

Part 1:

Bolts, screws, studs and nuts — Product grades A, B and C

1 Scope

This part of ISO 4759 specifies a selection of tolerances for bolts, screws, studs and nuts with ISO metric threads and with product grades A, B and C and for tapping screws with product grade A.

NOTE The product grades refer to the size of the tolerances where grade A is the most precise and grade C is the least precise.

The tolerances, except tolerances for threads, are selected from the system of limits and fits specified in ISO 286-1 and ISO 286-2. The tolerances for metric threads are taken from the series of tolerance classes specified in ISO 965-3. The tolerances for tapping screw threads are covered in ISO 1478.

The tolerances of form and position are specified and indicated in accordance with ISO 1101, ISO 8015 and ISO 2692.

The tolerances specified in this part of ISO 4759 apply to-fasten ers prior to coating unless otherwise specified. See also ISO 4042. https://standards.iteh.ai/catalog/standards/sist/d631c3ca-3424-488a-b176-

b07244c96bae/iso-4759-1-2000

Deviations from the tolerances specified in this part of ISO 4759 are only permitted in product standards where there are valid technical reasons. In cases where there is a difference between the tolerance requirements in this part of ISO 4759 and the product standard, the product standard takes precedence.

It is recommended that these tolerances also be used for non-standard fasteners.

Dimensions and tolerances given in this part of ISO 4759 are in millimetres.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 4759. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 4759 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 225:1983, Fasteners — Bolts, screws, studs and nuts — Symbols and designation of dimensions.

ISO 286-1:1988, ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits.

ISO 286-2:1988, ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.

ISO 885:2000, General purpose bolts and screws — Metric series — Radii under the head.

ISO 965-3:1998, ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads.

ISO 1101:2000, Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out.

ISO 1478:1999, Tapping screws thread.

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ISO 1479:1983, Hexagon head tapping screws. (standards.iteh.ai)

ISO 2692:1988, Technical drawings — Geometrical tolerancing — Maximum material principle.

ISO 4032:1999, Hexagon nuts, style darts Product grades A and B_{1631c3ca-3424-488a-b176-}

b07244c96bae/iso-4759-1-2000

ISO 4042:1999, Fasteners — Electroplated coatings.

ISO 4757:1983. Cross recesses for screws.

ISO 7053:1992, Hexagon washer head tapping screws.

ISO 7721:1983, Countersunk head screws — Head configuration and gauging.

ISO 8015:1985, Technical drawings — Fundamental tolerancing principle.

ISO 10509:1992, Hexagon flange head tapping screws.

ISO 10642:1997, Hexagon socket countersunk head screws.

ISO 10664:1999, Hexalobular internal driving feature for bolts and screws.

3 Tolerances for metric bolts, screws and studs

3.1 Dimensional tolerances

Symbols and designations of dimensions are specified in ISO 225.

Facture	Tolerance for	Notes		
Feature	A		С	Notes
3.1.1 Tolerance level				
Shank and bearing surface	close	close	wide	
Other features	close	wide	wide	
3.1.2 External thread	6g	6g	8g (but 6g for property class 8.8 and higher)	For certain products and coatings, other tolerance classes for threads may be specified in the relevant product and coating standards.
3.1.3 Driving features iTeh ST	ANDARD PE	REVIEV	V	
3.1.3.1 External (S1	andar Tolerance	ai) s	Tolerance	
	≤ 30 h13	≤ 18	h14	
3.1.3.1.1 Width across flats https://standards.iteh.a	SO 4759-1:2000 	> 18 ≤ 60 3ca-3424-488a-	h15 b176-	
b	07244c96bae/iso-4759-1-20	09 60 ≤ 180	h16	
Figure 1		> 180	h17	
Figure 2				

Feature	Tolerance for product grades				Tolerance for product grades		Notes
reature	Α	В	C	;	Notes		
3.1.3.1.2 Width across corners		emin =	1.13 Smin				
	e_{\min} = 1,13 s_{\min} e_{\min} = 1,12 s_{\min} for bolts and screws with flange and other cold forged heads without trimming operation						
Figure 3			T				
e		e _{min} =	= 1,3 s _{min}				
Figure 4							
3.1.3.1.3 Height of head iTeh S	TAND	ARD P	REVIE	Tolerance			
https://standards.ite	h.ai/catalog/sta	1759-1:2000	≥ 10 31c3ca-3424-48	js16 js17 8a-b176-			
Figure 5							

_	Tolerance for			
Feature	Α	В	С	Notes
	For hexagon bolts and s defined only as a maxim		nge, <i>k</i> is	
Figure 6				
3.1.3.1.4 Wrenching height K	ANDARD PR andards.iteh. ISO 4759-1:2000 i/catalog/standards/sist/d631c 07244c96bae/iso-4759-1-20 $k_{\text{wmin}}^{\text{b}} = 0.7 \left[(k_{\text{max}} - \text{IT15}) - x \right]$ is the greater of c_{min} δ is the flange angle Dimensions k_{w}^{a} , k , d_{w} , e_{with} ISO 225.	$\frac{3\text{ca}-3424-488\text{a}-1}{00} \left(x + \frac{d_{\text{W min}} - e_{\text{n}}}{2}\right)$ $1,25 \text{ or } C_{\text{min}}$	$\frac{\sin}{1} \tan \delta_{\max}$	k _w defines the length over which e _{min} applies but excluding any chamfer, washer face or radius specified in the appropriate product standard. The formulae for k _{w min} only apply to the products illustrated. ^a The symbol k _w replaces the previously used k'. ^b For gauging, see annex A of the product standards
	k Figu	ure 8 a)		

Feature	Tolerance for product grades				Notes
reature	,	4	В	С	Notes
3.1.3.2 Internal					
3.1.3.2.1 Hexagon sockets	<i>e</i> _{min} = 1	,14 s _{min}			
	S	Tolerance			
	0,7	EF8			
	0,9	JS9			
	1,3	K9			
	1,5				
	2	D11	_	_	
S	2,5	2			
Figure 9	3				
	4	E11			
	5				
*Tab C	6	A D D D		XX 7	
iTeh S	TAND standa	E12	REVIE	W	
	stafida	rds.ite	h.ai)		
	12 14 ISO	4759-1:2000			
https://standards.it	ch.ai/catalog/sta	.ndards/sist/d6.	31c3ca-3424-48	8a-b176-	
24222	b07244c96b	ae/is D17 59-1	-2000		
3.1.3.2.2 Slots		Tolerance			Tolerance field
	n - 1	+ 0,20			C13 for $n \le 1$
	≼ 1	+ 0,20			C13 101 n \le 1
	> 1 ≤ 3	+ 0,31			C14 for <i>n</i> > 1
	71 8 3	+ 0,06			014101 11 2 1
c	> 3 ≤ 6	+ 0,37			
	70 40	+ 0,07			
		. 0,01	_	_	
7° _, m _, ax.					
7° max.					
Figure 10					

	Tolerance for product grades				
Feature	A	В	С	Notes	
3.1.3.2.3 Depth of hexagon sockets and slots	The depth of hexagon sockets and slots is specified in product standards only as a minimum. It is restricted by the minimum wall thickness w.	_	_	For the time being generally applicable tolerances cannot be specified.	
Figure 11 iTeh ST	ANDARD PF	REVIEV	V		
3.1.3.2.4 Cross recesses (SI	See ISO 4757 for all dir				
	etration depths. For per appropriate product sta		is see		
3.1.3.2.5 Hexalobular recesses https://standards.itch.a	See ISO 10664 for all detration depths. For per appropriate product sta	netration depth			
3.1.4 Other features					
3.1.4.1 Head diameter	h13 ^a	-	_	^a ±IT13 for knurled heads	
Figure 12					
				Combined control of diameter and height for counter- sunk head screws in accordance with ISO 7721 or	
Figure 13	h14	_	_	ISO 10642.	

	Tolera	nce for product	grades	
Feature	A	В	С	Notes
3.1.4.2 Head height (except for hexagon heads)				
	≼ M5: h13	_	_	
	> M5: h14			
Figure 14				
iTeh S	For countersunk product standard LANDAR standards	Combined control of diameter and height for countersunk head screws in accordance		
https://standards.itu	ISO 4759- h.ai/catalog/standard b07244c96bae/iso-	with ISO 7721 or ISO 10642.		
3.1.4.3 Bearing face diameter and	$d_{\text{W min}} = s_{\text{min}} - \text{IT}$	16 for width acros	ss flats < 21 mm	For product
height of washer-faced portion	$d_{\text{w min}} = 0.95 s_{\text{mir}}$	for width across	flats ≥ 21 mm	grade C a washer face is
X	$d_{\text{W max}} = s_{\text{actual}}$			not mandatory.
	Thread diameter	min.	max.	
	≥ 1,6 to 2,5	0,10	0,25	
	> 2,5 to 4	0,15	0,40	
	> 4 to 6	0,15	0,50	
	> 6 to 14	0,15	0,60	
	> 14 to 36	0,20	0,80	
0,1	> 36	0,30	1,0	
X				
a Reference datum for d_{W}				
Figure 16				

	Tolera	Tolerance for product grades				
Feature	Α	В	Í.	С	Notes	
X						
0,1 A	$d_{ m W}$ is defined in priminimum.	product standar	ds only as	а		
a Reference datum for $d_{\rm w}$						
Figure 17						
X _ (S	Thr	ead	'	d_{W}	For product grade	
	lanuar wen >	eterh.ai) ≤	n	nin.	A only	
bitting distandards the	ISO 4759-1.24 ai/catalog/standards/si 07244c96bae/iso-47	000 ct/d631c 2 c 5 _3424		0,14		
a'	07244c96bae/iso-47	59-1-2008	$d_{\rm k mir}$	- 0,25		
0,1	5	10		-0,4		
X	10	16		_n – 0,5		
a Reference datum for $d_{ m W}$	16	24	$d_{k\;mi}$	-0.8		
Figure 18	24	36	d_{k} m	_{nin} – 1		
5	36	_	$d_{k\;mi}$	_n – 1,2		
	$d_{\rm a}$ for products without undercut is specified in ISO 885.				$d_{\rm a}$ for undercut products, see the appropriate product standard.	
Figure 19						

Factions	Tolerance for	r product grad	Tolerance for product grades		
Feature	Α	В	С	Notes	
3.1.4.4 Length					
	js15	js17	<i>l</i> ≤ 150: js17		
iTeh S	TANDARD F	REVIE	150: ± IT17		
	standards.ite	h.ai)			
	ISO 4759-1:2000				
https://standards.ite	h.ai/catalog/standards/sist/d6. b07244c96bae/iso-4759-1	31c3ca-3424-48 -2000	8a-b176-		
l					
Figure 20					

	Tolerance for	r product grad	des	Notos	
Feature	Α	В	С	Notes	
3.1.4.5 Thread length				P is the pitch of thread.	
Bolt				$l_{\rm S}$ is the minimum length of the unthreaded (plain) shank.	
l _s b Tie rod	b +2P 0	b +2P 0	<i>b</i> +2 <i>P</i> 0	$l_{\rm g}$ is the maximum length of the unthreaded shank (thread run-out included) and is therefore the minimum clamping length.	
b b b stud iTeh ST	b +2P 0	<i>b</i> +2 <i>P</i> 0	<i>b</i> +2 <i>P</i> 0	Tolerance + 2 P related to dimension b applies only where l_s and l_g are not specified in the product	
Otau	andards.iteh	ai)	V	in the product standard.	
b _m https://standards.iteh.a	b +2P ISO 4769-1:2000 i/catalog/standards/sist/d631c 07244c96 bm [\$16 4759-1-20	b^{+2P} 0 3ca-3424-488a-	<i>b</i> + ² <i>P</i> 0 5176- <i>b</i> _m js17	b _m refers to metal end of studs only.	
Figure 21	0/2 110 900 00/150-1 /39-1-20	00 1117	,		
3.1.4.6 Shank diameter					
	h13	h14	± IT 15	The tolerance is not applicable in the areas of the underhead fillet and thread run-out.	
	Reduced shank dia	meter ≈ pitch o	diameter		
Figure 22					