

INTERNATIONAL STANDARD

ISO
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Second edition
1991-10-15

Tolerances for fasteners —

Part 3:

Plain washers for bolts, screws and nuts with nominal thread diameters from 1 mm up to and including 150 mm — Product grades A and C

Tolérances pour éléments de fixation —

Partie 3: Rondelles plates pour vis et écrous de diamètre nominal de filetage de 1 mm à 150 mm inclus — Grades A et C



Reference number
ISO 4759-3:1991(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 4759-3 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This second edition cancels and replaces the first edition (ISO 4759-3:1977), of which it constitutes a technical revision.

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

- *Part 1: Bolts, screws and nuts with thread diameters between 1,6 (inclusive) and 150 mm (inclusive) and product grades A, B and C*
- *Part 2: Bolts, screws and nuts with thread diameters from 1 up to 3 mm and product grade F, for fine mechanics*
- *Part 3: Plain washers for bolts, screws and nuts with nominal thread diameters from 1 mm up to and including 150 mm — Product grades A and C*
- *Part 4: Tapping screws with nominal thread diameters from 1,5 mm up to and including 9,5 mm — Product grade A*

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Tolerances for fasteners —

Part 3:

Plain washers for bolts, screws and nuts with nominal thread diameters from 1 mm up to and including 150 mm — Product grades A and C

1 Scope

This part of ISO 4759 establishes a selection of tolerances for use in the preparation of ISO product standards for washers, grades A and C, for bolts, screws and nuts with nominal thread diameters from 1 mm up to and including 150 mm.

Deviations from the tolerances specified in this part of ISO 4759 are permitted in product standards only for valid technical reasons.

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

In cases where the maximum material principle according to ISO 2692 is appropriate to certain features of certain products in these ISO product standards, other tolerances may be applicable.

NOTE 1 The product grades refer to the quality of the product and to the size of the tolerances, grade A being the most precise and grade C the least precise (see also ISO 4759-1).

2 Normative reference

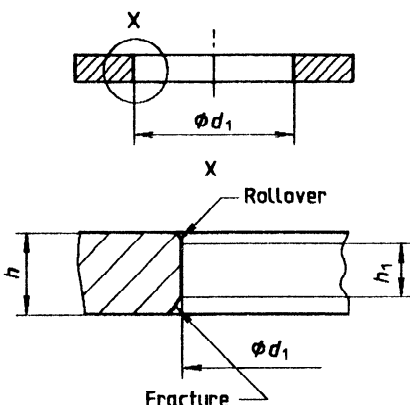
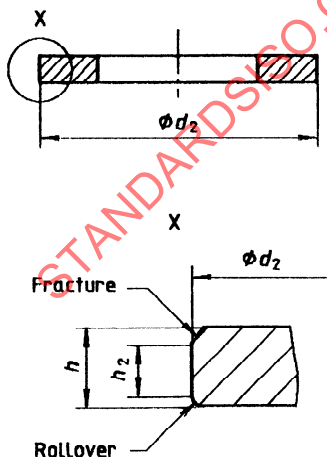
The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 4759. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4759 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

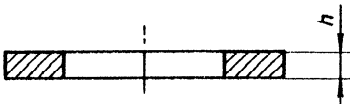
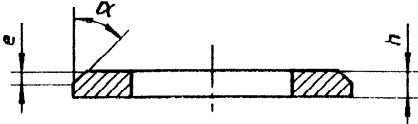
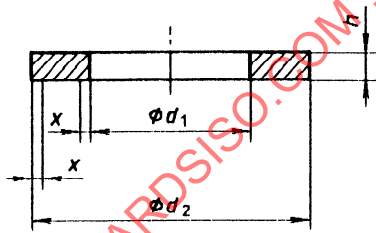
ISO 2692:1988, *Technical drawings — Geometrical tolerancing — Maximum material principle*.

3 Required characteristics

The tolerances for product grades A and C are given in table 1.

Table 1

Feature	Tolerances				
	Product grades				
	A			C	
3.1 Clearance hole (punched)	h mm	d_1 tol.	h_1 min.	h mm	d_1 tol.
	$h \leq 4$	H13	$0,5 h$	$h \leq 4$	H14
	$h > 4$	H14	$0,3 h$	$h > 4$	H15
	Rollover and fracture are undefined but shall be present.			h_1 , rollover and fracture are undefined but shall be present.	
	h_1 is the part of the hole which is within the tolerance specified for d_1 .				
3.2 Outside diameter (punched)	h mm	d_2 tol.		d_2 tol.	
	$h \leq 4$	h14			h16
	$h > 4$	h15			
	h_2 , rollover and fracture are undefined but present.				
	h_2 is the part of the outer contour which is within the tolerance specified for d_2 .				

Feature	Tolerances			
	Product grades			
	A		C	
3.3 Thickness	h	tol.	h	tol.
	mm	mm	mm	mm
	$h \leq 0,5$	$\pm 0,05$		
	$0,5 < h \leq 1$	$\pm 0,1$	$h \leq 1$	$\pm 0,2$
	$1 < h \leq 2,5$	$\pm 0,2$	$1 < h \leq 2,5$	$\pm 0,3$
	$2,5 < h \leq 4$	$\pm 0,3$	$2,5 < h \leq 4$	$\pm 0,6$
	$4 < h \leq 6$	$\pm 0,6$	$4 < h \leq 6$	± 1
	$6 < h \leq 10$	± 1	$6 < h \leq 10$	$\pm 1,2$
	$10 < h \leq 20$	$\pm 1,2$	$10 < h \leq 20$	$\pm 1,6$
3.4 Chamfer	$\alpha = 30^\circ \text{ to } 45^\circ$ $e_{\min} = 0,25 h$ $e_{\max} = 0,5 h$			
				
3.5 Tolerances of form and position				
3.5.1 Thickness variation Δh on the same part	h	Δh	(No requirements)	
	mm	mm		
	$h \leq 0,5$	0,025		
	$0,5 < h \leq 1$	0,05		
	$1 < h \leq 2,5$	0,1		
	$2,5 < h \leq 4$	0,15		
	$4 < h \leq 6$	0,2		
	$6 < h \leq 10$	0,3		
	$10 < h \leq 20$	0,4		
NOTE — Requirements for Δh apply at a distance of $x = 0,1(d_2 - d_1)$ from both the edge of the hole and the outer edge, i.e. on 60 % of the ring width only.				

Feature	Tolerances			
	Product grades			
	A		C	
3.5.2 Coaxiality	d_2 mm	t_1	d_2 mm	t_1
	$d_2 \leq 50$	2 IT12	$d_2 \leq 50$	2 IT15
	$d_2 > 50$	2 IT13	$d_2 > 50$	2 IT16
3.5.3 Flatness	h mm	t_2 ¹⁾ mm	(No requirements)	
	$h \leq 0,5$	0,1		
	$0,5 < h \leq 1$	0,15		
	$1 < h \leq 2,5$	0,2		
	$2,5 < h \leq 4$	0,3		
	$4 < h \leq 6$	0,4		
	$6 < h \leq 10$	0,6		
	$10 < h \leq 20$	1		
	1) Flatness is measured after removal of burrs. For washers made from stainless steel, the tolerance of flatness is $2t_2$.			