
**Plain washers for screw and washer
assemblies — Small, normal and large
series — Product grade A**

*Rondelles plates pour vis à rondelle plate incorporée — Séries étroite,
normale et large — Grade A*

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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.

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 10673 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

Annex A of this International Standard is for information only.

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Plain washers for screw and washer assemblies — Small, normal and large series — Product grade A

1 Scope

This International Standard specifies the characteristics of plain steel washers, small, normal and large series, of product grade A with hardness classes 200 HV and 300 HV for metric screw and washer assemblies according to ISO 10644.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 3269:1988, *Fasteners — Acceptance inspection*.

ISO 4042:—¹⁾, *Fasteners — Electroplated coatings*.

ISO 4759-3:1991, *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*.

ISO 6507-1:1997, *Metallic materials — Vickers hardness test — Part 1: Test method*.

ISO 10644:1998, *Screw and washer assemblies with plain washers — Washer hardness classes 200 HV and 300 HV*.

3 Classification

Washers of product grade A for metric screw and washer assemblies are classified into three types:

- type S: small series, preferably for hexagon socket head cap screws and for cheese head screws.
- type N: normal series, preferably for hexagon head screws.
- type L: large series, preferably for hexagon head screws.

1) To be published. (Revision of ISO 4042:1989)

4 Dimensions

4.1 Washers type S (small series)

See figure 1 and table 1.

Surface roughness in micrometres

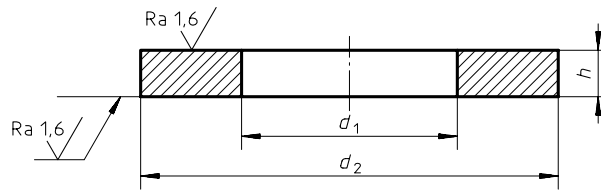


Figure 1

Table 1

Dimensions in millimetres

Nominal size (Nominal thread diameter, d)	Clearance hole		Outside diameter		Thickness		
	nom. (min.)	max.	nom. (max.)	min.	nom.	max.	min.
2	1,75	1,85	4,5	4,2	0,6	0,65	0,55
2,5	2,25	2,35	5	4,7	0,6	0,65	0,55
3	2,75	2,85	6	5,7	0,6	0,65	0,55
4	3,6	3,72	8	7,64	0,8	0,85	0,75
5	4,55	4,67	9	8,64	1	1,06	0,94
6	5,5	5,62	11	10,57	1,6	1,68	1,52
8	7,4	7,55	15	14,57	1,6	1,68	1,52
10	9,3	9,52	18	17,57	2	2,09	1,91
12	11	11,27	20	19,48	2	2,09	1,91

4.2 Washers type N (normal series)

See figure 2 and table 2.

Surface roughness in micrometres

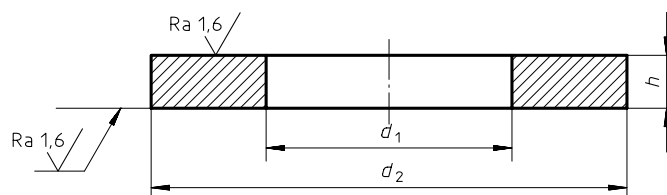


Figure 2

Table 2

Dimensions in millimetres

Nominal size (Nominal thread diameter, d)	Clearance hole		Outside diameter		Thickness		
	nom. (min.)	d_1 max.	nom. (max.)	d_2 min.	nom.	h max.	min.
2	1,75	1,85	5	4,7	0,6	0,65	0,55
2,5	2,25	2,35	6	5,7	0,6	0,65	0,55
3	2,75	2,85	7	6,64	0,6	0,65	0,55
3,5	3,2	3,32	8	7,64	0,8	0,85	0,75
4	3,6	3,72	9	8,64	0,8	0,85	0,75
5	4,55	4,67	10	9,64	1	1,06	0,94
6	5,5	5,62	12	11,57	1,6	1,68	1,52
8	7,4	7,55	16	15,57	1,6	1,68	1,52
10	9,3	9,52	20	19,48	2	2,09	1,91
12	11	11,27	24	23,48	2,5	2,6	2,4

4.3 Washers type L (large series)

See figure 3 and table 3.

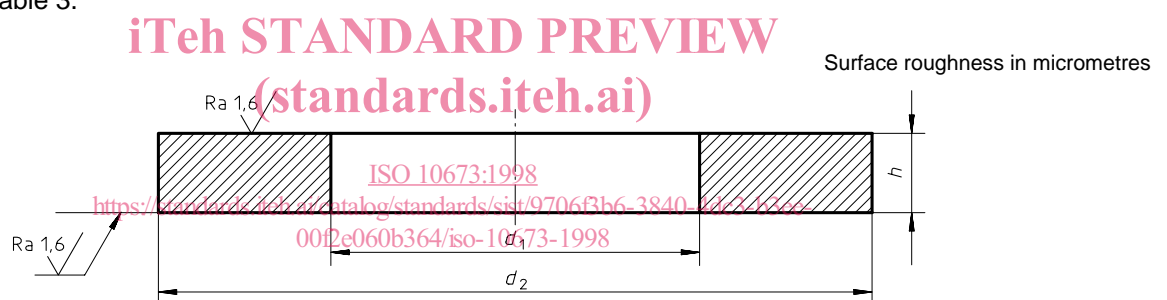


Figure 3

Table 3

Dimensions in millimetres

Nominal size (Nominal thread diameter, d)	Clearance hole		Outside diameter		Thickness		
	nom. (min.)	d_1 max.	nom. (max.)	d_2 min.	nom.	h max.	min.
2,5	2,25	2,35	8	7,64	0,6	0,65	0,55
3	2,75	2,85	9	8,64	0,8	0,85	0,75
3,5	3,2	3,32	11	10,57	0,8	0,85	0,75
4 3,6	3,72	12	11,57	1	1,06	0,94	
5	4,55	4,67	15	14,57	1	1,06	0,94
6	5,5	5,62	18	17,57	1,6	1,68	1,52
8	7,4	7,55	24	23,48	2	2,09	1,91
10	9,3	9,52	30	29,48	2,5	2,6	2,4
12	11	11,27	37	36,38	3	3,11	2,89

5 Requirements and reference International Standards

See table 4.

Table 4

Material ¹⁾		Steel	
Mechanical properties	Hardness class	200 HV	300 HV
	Hardness range ²⁾	200 HV to 300 HV	300 HV to 370 HV
Tolerances	Product grade	A ³⁾	
	International Standard	ISO 4759-3	
Finish	Plain, i.e. washers to be supplied in natural finish, treated with a protective lubricant or with other coatings as agreed between customer and supplier. Requirements for electroplating are covered in ISO 4042. All tolerances shall apply prior to the application of a plating or coating.		
Workmanship	Parts shall be uniform in quality and free of irregularities or detrimental defects. No protruding burrs shall appear on the washer.		
Acceptability	For the acceptance procedure see ISO 3269.		
1) Other materials as agreed between customer and supplier. 2) Hardness testing according to ISO 6507-1. Test force: HV 2 for nominal thicknesses $h \leq 0,6$ mm; HV 10 for nominal thicknesses $0,6 \text{ mm} < h \leq 1,2$ mm; HV 30 for nominal thicknesses $h > 1,2$ mm. 3) Product grade A does not apply to the tolerances of the clearance hole d_1 , and the thickness h .			

6 Designation

EXAMPLE:

A plain steel washer for screw and washer assemblies, type N (normal series), of nominal size 8 mm, hardness class 200 HV is designated as follows:

Washer ISO 10673 - N - 8 - 200 HV

Annex A
(informative)

Bibliography

- [1] ISO 6507-2:1997, *Metallic materials — Vickers hardness test — Part 2: Verification of testing machines.*

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ICS 21.060.30

Descriptors: fasteners, washers, plain washers, classification, specifications, dimensions, characteristics, designation.

Price based on 5 pages
