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Plain washers

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Research Institute for Screw Threads and Fasteners (JFRI) /Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

This Standard is prepared by dividing the text part and Annex 1 (normative) of **JIS B 1256:1998** and revising the text part so as to conform to the technical contents of corresponding International Standards. For square washers shown in Annex 2 (informative) of **JIS B 1256:1998**, it is retained as Annex JA (informative). For Annex 1, it is newly established as **JIS B 1250**.

Consequently **JIS B 1256:1998** is replaced with this Standard.

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Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Plain washers

Introduction

This Japanese Industrial Standard has been prepared by unifying the second editions of ISO 7089, ISO 7090, ISO 7091, ISO 7092 and ISO 7094 published in 2000 and the first editions of ISO 7093-1 and ISO 7093-2 published in 2000 without modifying the technical contents with respect to the corresponding items (classification, shape and dimensions, product specification and designation of product) ; however, the item (marking) not included in the corresponding International Standards is added to this Standard.

The portions given sidelines or dotted underlines in the text and whole Annex JA are the matters not stated in the original International Standards. A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies the circular plain washers (hereafter referred to as “plain washers”) made of steel and stainless steel used for bolts, screws and nuts of general use.

When requiring the dimensions of washers other than those specified in the text of this Standard, the reference dimensions should be selected from those in JIS B 1250 and the tolerances should be selected from those in JIS B 1022.

The shape and dimensions of square washer is shown in Annex JA as reference.

NOTE : The International Standards corresponding to this Standard are as follows.

ISO 7089 : 2000 *Plain washers — Normal series — Product grade A*

ISO 7090 : 2000 *Plain washers, chamfered — Normal series — Product grade A*

ISO 7091 : 2000 *Plain washers — Normal series — Product grade C*

ISO 7092 : 2000 *Plain washers — Small series — Product grade A*

ISO 7093-1 : 2000 *Plain washers — Large series — Part 1 : Product grade A*

ISO 7093-2 : 2000 *Plain washers — Large series — Part 2 : Product grade C*

ISO 7094 : 2000 *Plain washers — Extra large series — Product grade C*
(Overall evaluation : MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standards and JIS are

IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 1022 *Tolerances for fasteners — Part 3 : Plain washers for bolts, screws and nuts — Product grades A and C*

NOTE : Corresponding International Standard : ISO 4759-3 : 2000 *Tolerances for fasteners — Part 3 : Plain washers for bolts, screws and nuts — Product grades A and C* (IDT)

JIS B 1044 *Fasteners — Electroplated coatings*

NOTE : Corresponding International Standard : ISO 4042 : 1999 *Fasteners — Electroplated coatings* (IDT)

JIS B 1046 *Fasteners — Non-electrolytically applied zinc flake coatings*

NOTE : Corresponding International Standard : ISO 10683 : 2000 *Fasteners — Non-electrolytically applied zinc flake coatings* (IDT)

JIS B 1054-1 *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs*

NOTE : Corresponding International Standard : ISO 3506-1 : 1997 *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1 : Bolts, screws and studs* (IDT)

JIS B 1091 *Fasteners — Acceptance inspection*

NOTE : Corresponding International Standard : ISO 3269 : 2000 *Fasteners — Acceptance inspection* (IDT)

JIS B 1250 *Plain washers for metric bolts, screws and nuts for general purposes — General plan*

NOTE : Corresponding International Standard : ISO 887 : 2000 *Plain washers for metric bolts, screws and nuts for general purposes — General plan* (IDT)

JIS Z 2244 *Vickers hardness test — Test method*

NOTE : Corresponding International Standard : ISO 6507-1 : 1997 *Metallic materials — Vickers hardness test — Part 1 : Test method* (MOD)

3 Classification

The classification of plain washers shall be in accordance with table 1.

Table 1 Classification of plain washers

Classification	Hardness class	Examples of fasteners desirable to apply	Range of nominal diameter to be applied	Corresponding International Standard
Small series — product grade A ^{a)}	200 HV	— Cheese head screw of property class 8.8 or under or made of stainless steel — Hexagon socket head cap screw of property class 8.8 or under or made of stainless steel — Hexalobular socket head cap screw of property class 8.8 or under or made of stainless steel — Case hardened and tempered cheese head thread rolling screw	1.6 mm to 36 mm	ISO 7092 : 2000
	300 HV	— Hexagon socket head cap screw of property class 10.9 or under — Hexalobular socket head cap screw of property class 10.9 or under		
Normal series — product grade A ^{a)}	200 HV	— Hexagon head bolt and screw of product grades A and B of property class 8.8 or under — Hexagon nut of product grades A and B of property class 8 or under — Hexagon bolt, screw and nut made of stainless steel — Case hardened and tempered thread rolling screw	1.6 mm to 64 mm	ISO 7089 : 2000
	300 HV	— Hexagon head bolt and screw of product grades A and B of property class 10.9 or under — Hexagon nut of product grades A and B of property class 10 or under		
Normal series, chamfered — product grade A ^{a)}	200 HV	— Bolt and screw of product grades A and B of property class 8.8 or under — Nut of product grades A and B of property class 8 or under — Bolt, screw and nut made of stainless steel — Case hardened and tempered thread rolling screw	5 mm to 64 mm	ISO 7090 : 2000
	300 HV	— Bolt and screw of products grade A and B of property class 10.9 or under — Nut of product grade A and B of property class 10 or under		
Normal series — product grade C ^{a)}	100 HV	— Hexagon head bolt and screw of product grade C of property class 6.8 or under — Hexagon nut of product grade C of property class 6 or under — Case hardened and tempered thread rolling screw	1.6 mm to 64 mm	ISO 7091 : 2000

Table 1 (concluded)

Classification	Hardness class	Examples of fasteners desirable to apply	Range of nominal diameter to be applied	Corresponding International Standard
Large series — product grade A ^{b)}	200 HV	— Hexagon head bolt and screw of product grades A and B of property class 8.8 or under — Hexagon nut of product grade A and B of property class 8 or under — Hexagon bolt, screw and nut made of stainless steel — Case hardened and tempered thread rolling screw	3 mm to 36 mm	ISO 7093-1 : 2000
	300 HV	— Hexagon head bolt and screw of product grades A and B of property class 10.9 or under — Hexagon nut of product grades A and B of property class 10 or under		
Large series — product grade C ^{b)}	100 HV	— Hexagon head bolt and screw of product grade C of property class 6.8 or under — Hexagon nut of product grade C of property class 6 or under — Case hardened and tempered thread rolling screw	3 mm to 36 mm	ISO 7093-2 : 2000
Extra large series — product grade C ^{c)}	100 HV	— Hexagon head bolt and screw of product grade C of property class 6.8 or under — Hexagon nut of product grade C of property class 6 or under	5 mm to 36 mm	ISO 7094 : 2000
Notes ^{a)} When the clamped part is soft or the clearance hole in the clamped part is large, the user should check the technical suitability. ^{b)} It is intended that the washer is used in the soft clamped part or the clearance hole in the clamped part is large. In the latter case, the suitability of the washer thickness should be checked. ^{c)} For timber structures.				

4 Shape and dimensions, product specification and designation of product

The shape and dimensions, product specification and designation of product of plain washers shall be in accordance with table 2.

Table 2 Shape and dimensions, product specification and designation of product

Classification	Shape and dimension			Product specification	Designation of product
	Figure	First choice	Second choice		
Small series-product grade A	figure 1	table 3	table 4	table 5	table 6
Normal series-product grade A	figure 2	table 7	table 8	table 9	table 10
Normal series, chamfered- product grade A	figure 3	table 11	table 12	table 13	table 14
Normal series-product grade C	figure 4	table 15	table 16	table 17	table 18
Large series-product grade A	figure 5	table 19	table 20	table 21	table 22
Large series-product grade C	figure 6	table 23	table 24	table 25	table 26
Extra large series-product grade C	figure 7	table 27	table 28	table 29	table 30

5 Marking

5.1 Marking on product

Generally, marking on the product of plain washer is not performed.

5.2 Marking on package

The following items shall be marked on the outside surface of package.

- Number or title of this Standard
- Classification
- Nominal dimension $\times$ outside diameter ¹⁾ of plain washer
- Hardness class
- Material

For the marking of material, the steel grade shall be shown for plain washers made of stainless steel and omitted for those made of steel, in general.

- Specified item ²⁾
- Quantity
- Name of manufacturer or its abbreviation

Notes ¹⁾ The reference dimension (max.) of outside diameter shall be shown for the outside diameter.

²⁾ For the specified items, type of surface treatment and the like shall be shown as required.

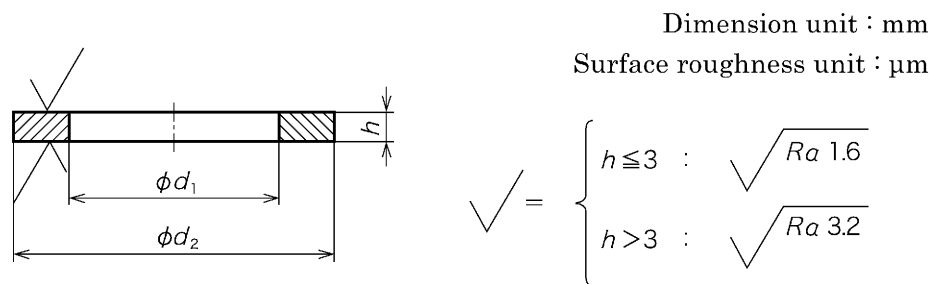


Figure 1 Shape of small series—product grade A

Table 3 Dimensions of small series — product grade A (first choice)

Unit : mm

Nominal diameter of plain washer (nominal diameter of thread d)	Inside diameter d_1		Outside diameter d_2		Thickness h		
	Reference dimension (min.)	Max.	Reference dimension (max.)	Min.	Reference dimension	Max.	Min.
1.6	1.70	1.84	3.5	3.2	0.3	0.35	0.25
2	2.20	2.34	4.5	4.2	0.3	0.35	0.25
2.5	2.70	2.84	5.0	4.7	0.5	0.55	0.45
3	3.20	3.38	6.0	5.7	0.5	0.55	0.45
4	4.30	4.48	8.00	7.64	0.5	0.55	0.45
5	5.30	5.48	9.00	8.64	1	1.1	0.9
6	6.40	6.62	11.00	10.57	1.6	1.8	1.4
8	8.40	8.62	15.00	14.57	1.6	1.8	1.4
10	10.50	10.77	18.00	17.57	1.6	1.8	1.4
12	13.00	13.27	20.00	19.48	2	2.2	1.8
16	17.00	17.27	28.00	27.48	2.5	2.7	2.3
20	21.00	21.33	34.00	33.38	3	3.3	2.7
24	25.00	25.33	39.00	38.38	4	4.3	3.7
30	31.00	31.39	50.00	49.38	4	4.3	3.7
36	37.00	37.62	60.0	58.8	5	5.6	4.4

Table 4 Dimensions of small series — product grade A (second choice)

Unit : mm

Nominal diameter of plain washer (nominal diameter of thread d)	Inside diameter d_1		Outside diameter d_2		Thickness h		
	Reference dimension (min.)	Max.	Reference dimension (max.)	Min.	Reference dimension	Max.	Min.
3.5	3.70	3.88	7.00	6.64	0.5	0.55	0.45
14	15.00	15.27	24.00	23.48	2.5	2.7	2.3
18	19.00	19.33	30.00	29.48	3	3.3	2.7
22	23.00	23.33	37.00	36.38	3	3.3	2.7
27	28.00	28.33	44.00	43.38	4	4.3	3.7
33	34.00	34.62	56.0	54.8	5	5.6	4.4