

Plain washers — Normal series — Product grade A

The European Standard EN ISO 7089:2000 has the status of a
British Standard

ICS 21.060.30

National foreword

This British Standard is the official English language version of EN ISO 7089:2000. It is identical with ISO 7089:2000.

The UK participation in its preparation was entrusted by Technical Committee FME/9, Bolts, Nuts and Accessories (+QA & hose clamps), to Subcommittee FME/9/6, General Purposes Fasteners and Accessories, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the ENISO title page, the ENISO foreword, the ISO title page, pages ii and iii, a blank page, pages 1 to 5, the annex ZA page, an inside back cover and a back cover.

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This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 September 2000

Amendments issued since publication

Amd. No.	Date	Comments

ICS 21.060.30

English version

**Plain washers - Normal series - Product grade A (ISO
7089:2000)**

Rondelles plates - Série normale - Grade A (ISO
7089:2000)

Flache Scheiben - Normale Reihe - Produktklasse A (ISO
7089:2000)

This European Standard was approved by CEN on 1 June 2000.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of the International Standard ISO 7089:2000 has been prepared by Technical Committee ISO/TC 2 "Fasteners" in collaboration with Technical Committee CEN/TC 185 "Threaded and non-threaded mechanical fasteners and accessories", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 7089:2000 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

INTERNATIONAL
STANDARD

ISO
7089

Second edition
2000-06-01

**Plain washers — Normal series — Product
grade A**

Rondelles plates — Série normale — Grade A



Reference number
ISO 7089:2000(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.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 7089 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This second edition cancels and replaces the first edition (ISO 7089:1983), which has been technically revised.

Plain washers — Normal series — Product grade A

1 Scope

This International Standard specifies the characteristics of normal-series, product-grade-A plain washers in the 200 HV and 300 HV hardness classes and of nominal sizes (nominal thread diameters) ranging from 1,6 mm to 64 mm inclusive.

Washers of hardness class 200 HV are suitable for

- hexagon bolts and screws of product grades A and B in property classes up to and including 8.8;
- hexagon nuts of product grades A and B in property classes up to and including 8;
- hexagon bolts, screws and nuts of stainless steel of similar chemical composition;
- case-hardened thread rolling screws.

Washers of hardness class 300 HV are suitable for

- hexagon bolts and screws of product grades A and B in property classes up to and including 10.9;
- hexagon nuts of product grades A and B in property classes up to and including 10.

If dimensions other than those listed in this International Standard are required, they should be selected from those given in ISO 887.

When soft material pieces are clamped, or large clearance holes in the workpiece are used, the user should check the technical suitability of this type of washer.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 887:2000, *Plain washers for metric bolts, screws and nuts for general purposes — General plan.*

ISO 3269:2000, *Fasteners — Acceptance inspection.*

ISO 3506-1:1997, *Mechanical properties of corrosion-resistant stainless-steel fasteners — Part 1: Bolts, screws and studs.*

ISO 4042:1999, *Fasteners — Electroplated coatings.*

ISO 4759-3:2000, *Tolerances for fasteners — Part 3: Plain washers for bolts, screws and nuts — Product grades A and C.*

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

ISO 10683—¹⁾, *Fasteners — Non-electrolytically applied zinc flake coatings.*

3 Dimensions

See Figure 1 and Tables 1 and 2.

Dimensions in millimetres,
surface roughness values in micrometres

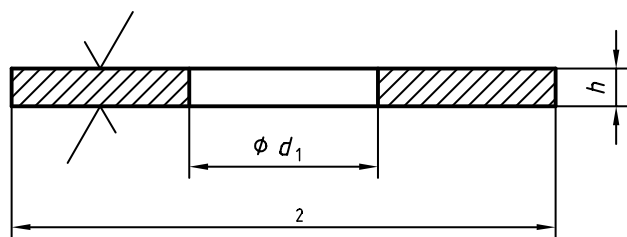


Figure 1 — Dimensions

1) To be published.

Table 1 — Preferred dimensions

Dimensions in millimetres

Nominal size (Nominal thread diameter, d)	Clearance hole		Outside diameter		Thickness		
	d_1		d_2		h		
	nom. (min.)	max.	nom. (max.)	min.	nom.	max.	min.
1,6	1,70	1,84	4,0	3,7	0,3	0,35	0,25
2	2,20	2,34	5,0	4,7	0,3	0,35	0,25
2,5	2,70	2,84	6,0	5,7	0,5	0,55	0,45
3	3,20	3,38	7,00	6,64	0,5	0,55	0,45
4	4,30	4,48	9,00	8,64	0,8	0,9	0,7
5	5,30	5,48	10,00	9,64	1	1,1	0,9
6	6,40	6,62	12,00	11,57	1,6	1,8	1,4
8	8,40	8,62	16,00	15,57	1,6	1,8	1,4
10	10,50	10,77	20,00	19,48	2	2,2	1,8
12	13,00	13,27	24,00	23,48	2,5	2,7	2,3
16	17,00	17,27	30,00	29,48	3	3,3	2,7
20	21,00	21,33	37,00	36,38	3	3,3	2,7
24	25,00	25,33	44,00	43,38	4	4,3	3,7
30	31,00	31,39	56,00	55,26	4	4,3	3,7
36	37,00	37,62	66,0	64,8	5	5,6	4,4
42	45,00	45,62	78,0	76,8	8	9	7
48	52,00	52,74	92,0	90,6	8	9	7
56	62,00	62,74	105,0	103,6	10	11	9
64	70,00	70,74	115,0	113,6	10	11	9

Table 2 — Non-preferred dimensions

Dimensions in millimetres

Nominal size (Nominal thread diameter, d)	Clearance hole		Outside diameter		Thickness		
	d_1		d_2		h		
	nom. (min.)	max.	nom. (max.)	min.	nom.	max.	min.
3,5	3,70	3,88	8,00	7,64	0,5	0,55	0,45
14	15,00	15,27	28,00	27,48	2,5	2,7	2,3
18	19,00	19,33	34,00	33,38	3	3,3	2,7
22	23,00	23,33	39,00	38,38	3	3,3	2,7
27	28,00	28,33	50,00	49,38	4	4,3	3,7
33	34,00	34,62	60,0	58,8	5	5,6	4,4
39	42,00	42,62	72,0	70,8	6	6,6	5,4
45	48,00	48,62	85,0	83,6	8	9	7
52	56,00	56,74	98,0	96,6	8	9	7
60	66,00	66,74	110,0	108,6	10	11	9

4 Requirements and International Standards of reference

See Table 3.

Table 3 — Specifications and International Standards of reference

Material ^a	Steel		Stainless steel	
	Grade ^b		A2 F1 C1 A4 C4	
	International Standard		ISO 3506-1	
Mechanical properties	Hardness class	200 HV	300 HV ^c	200 HV
	Hardness range ^d	200 HV to 300 HV	300 HV to 370 HV	200 HV to 300 HV
Tolerances	Product grade	A		
	International Standard	ISO 4759-3		
Surface finish	<p>Plain: i.e. washers to be supplied in natural finish, treated with a protective lubricant or with other coatings as agreed by customer and supplier.</p> <p>Requirements for electroplating covered in ISO 4042.</p> <p>Requirements for non-electrolytically applied zinc flake coatings covered in ISO 10683.</p> <p>For hardened and tempered washers, appropriate plating or coating processes should be employed to avoid hydrogen embrittlement. When washers are electroplated or phosphated, they shall be suitably treated immediately after plating or coating to obviate detrimental hydrogen embrittlement.</p> <p>All tolerances shall apply prior to the application of a plating or coating.</p>		Plain: i.e. washers shall be supplied in natural finish.	
Workmanship	Parts shall be free of irregularities or detrimental defects. No protruding burrs shall appear on the washer.			
Acceptability	Acceptance procedure covered in ISO 3269.			
<p>^a Other metallic materials as agreed between customer and supplier.</p> <p>^b Related to chemical composition only.</p> <p>^c Hardened and tempered.</p> <p>^d Hardness testing according to ISO 6507-1.</p> <p>Test force: HV 2 for nominal thickness $h \leq 0,6$ mm</p> <p>HV 10 for nominal thickness $0,6 < h \leq 1,2$ mm</p> <p>HV 30 for nominal thickness $h > 1,2$ mm</p>				

5 Designation

EXAMPLE 1 A normal-series, product-grade-A plain washer made of steel, of nominal size 8 mm and hardness class 200 HV is designated as follows:

Washer ISO 7089-8-200 HV

EXAMPLE 2 A normal-series, product-grade-A plain washer made of grade A2 stainless steel, of nominal size 8 mm and hardness class 200 HV is designated as follows:

Washer ISO 7089-8-200 HV-A2

Annex ZA (normative)

Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 3506-1	1997	Mechanical properties of corrosion-resistant stainless-steel fasteners - Part 1: Bolts, screws and studs	EN ISO 3506-1	1997
ISO 4042	1999	Fasteners - Electroplated coatings	EN ISO 4042	1999
ISO 4759-3	2000	Tolerances for fasteners - Part 3: Plain washers for bolts, screws and nuts - Products grades A and C	EN ISO 4759-3	2000
ISO 6507-1	1997	Metallic materials - Vickers hardness test - Part 1: Test method	EN ISO 6507-1	1997

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