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

*Rondelles plates pour vis et écrous métriques pour usages généraux —  
Plan général*

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Printed in Switzerland

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

This second edition cancels and replaces the first edition (ISO 887:1983), which has been technically revised.

Annex A of this International Standard is for information only.

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# Plain washers for metric bolts, screws and nuts for general purposes — General plan

## 1 Scope

This International Standard specifies the full range of the nominal dimensions of product-grade-A and -C plain washers for general-purpose bolts, screws and nuts of nominal thread diameters ranging from 1 mm to 150 mm inclusive.

This International Standard is not applicable to washers for screw and washer assemblies in relation to hole diameters and thicknesses.

Information on the use of plain washers is given in annex A.

## 2 Normative reference

The following normative document contains 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 edition of the normative document 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 273:1979, *Fasteners — Clearance holes for bolts and screws*.

## 3 Clearance holes

The clearance hole diameters  $d_1$  for washers (see Figure 1) shall be chosen in accordance with those specified in ISO 273, as follows:

- fine series for washers of product grade A and with a nominal thickness of less than 6 mm, i.e. for nominal sizes < 39 mm;
- medium series for washers of product grade A with a nominal thickness equal to or greater than 6 mm, i.e. for nominal sizes  $\geq 39$  mm and for washers of product grade C.

NOTE The tolerances for clearance holes given in ISO 273 for information are not applicable to plain washers of product grades A and C; see clause 6.

#### 4 Outside diameters

The outside diameters  $d_2$  for washers (see Figure 1) shall be chosen from the values given in Table 1.

**Table 1 — Dimensions  $d_2$**

Values in millimetres

2,5	8	18	39	80	125	185
3	9	20	44	85	135	200
3,5	10	22	50	92	140	210
4	11	24	56	98	145	220
4,5	12	28	60	105	160	230
5	14	30	66	110	165	240
6	15	34	72	115	175	250
7	16	37	78	120	180	

#### 5 Thicknesses

The washer thicknesses  $h$  (see Figure 1) shall be chosen from the values given in Table 2.

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**Table 2 — Dimensions  $h$**

Values in millimetres

0,3	1	2	4	8	14
0,5	1,2	2,5	5	10	16
0,8	1,6	3	6	12	18

#### 6 Tolerances

The tolerances for washers are specified in ISO 4759-3.

## 7 Preferred combinations of plain-washer dimensions

The preferred combinations of nominal dimensions  $d_1$ ,  $d_2$  and  $h$  for plain washers of product grades A and C (see Figure 1) are given in Table 3. The washers are divided into four series: small, normal, large and extra large. These series are related to the size of the outside diameter  $d_2$ .

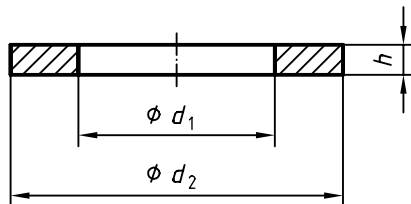


Figure 1 — Dimensions

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Table 3 — Nominal dimensions of plain washers

Dimensions en millimètres

Nominal size (Thread size, <i>d</i> )	Series																			
	Small				Normal				Large				Extra large							
	Product grade A				Product grade C				Product grade A				Product grade C							
	$d_1$	$d_2$	$h$	ISO 7092	$d_1$	$d_2$	$h$	ISO 7091	$d_1$	$d_2$	$h$	ISO 7093-1	$d_1$	$d_2$	$h$	ISO 7093-2	$d_1$	$d_2$	$h$	ISO 7094
1	1,1	2,5	0,3	X	1,1	3	0,3	X	1,7	4	0,3	X	1,8	5	0,3	X	1,8			
1,2	1,3	3	0,3		1,3	3,5	0,3		2,1	4,5	0,3		2,1				2,1			
1,4	1,5	3	0,3		1,5	4	0,3		2,2	5	0,3	X	2,2	6	0,5	X	2,4			
1,6	1,7	3,5	0,3	X	1,7	4	0,3	X	2,4	5	0,3		2,4				2,6			
1,8	2	4	0,3		2	4,5	0,3		2,6	6	0,5		2,6				2,9			
2	2,2	4,5	0,3	X	2,2	5	0,3	X	3,2	7	0,5	X	3,2	9	0,8	X	3,4			
2,2	2,4	4,5	0,3		2,4	6	0,5		3,7	8	0,5	X	3,7	11	0,8	X	3,9			
2,5	2,7	5	0,5	X	2,7	6	0,5	X	4,3	9	0,8	X	4,3	12	1	X	4,5			
3	3,2	6	0,5	X	3,2	7	0,5	X	4,8	10	0,8		4,8	15	1		5			
3,5	3,7	7	0,5	X	3,7	8	0,5	X	5,3	10	1	X	5,3	15	1,2	X	5,5			
4	4,3	8	0,5	X	4,3	9	0,8	X	5,5	10	1	X	5,5	15	1,2	X	5,5			
4,5	4,8	9	0,8		4,8	10	0,8		6,4	12	1,6	X	6,4	18	1,6	X	6,6			
5	5,3	9	1	X	5,3	10	1	X	7,4	14	1,6		7,4	22	2		7,6			
6	6,4	11	1,6	X	6,4	12	1,6	X	8,4	16	1,6	X	8,4	24	2	X	9			
7	7,4	12	1,6		7,4	14	1,6		10,5	20	2	X	10,5	30	2,5	X	11			
8	8,4	15	1,6	X	8,4	16	1,6	X	13	24	2,5	X	13	37	3	X	13,5			
10	10,5	18	1,6	X	10,5	20	2	X	15	28	2,5	X	15	44	3	X	15,5			
12	13	20	2	X	13	24	2,5	X	17	30	3	X	17	50	3	X	17,5			
14	15	24	2,5	X	15	28	2,5	X	19	34	3	X	19	56	4	X	20			
16	17	28	2,5	X	17	30	3	X	21	37	3	X	21	60	4	X	22			
18	19	30	3	X	19	34	3	X	23	39	3	X	23	66	5	X	24			
20	21	34	3	X	21	37	3	X	25	44	4	X	25	72	5	X	26			
22	23	37	3	X	23	39	3	X	28	50	4	X	28	85	6	X	30			
24	25	39	4	X	25	44	4	X	30	50	4	X	30	92	6	X	33			
27	28	44	4	X	28	50	4	X	31	56	4	X	31	105	6	X	33			
30	31	50	4	X	31	56	4	X	34	60	5	X	34	105	6	X	36			
33	34	56	5	X	34	60	5	X												



36	37	60	5	X	37	66	5	X	39	66	5	X	39	42	45	48	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
39			6		42	72	6	X	42	72	6	X	42	42	45	48	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
42			8		45	78	8	X	45	78	8	X	45	45	45	48	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
45			8		48	85	8	X	48	85	8	X	48	48	48	48	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
48			8		52	92	8	X	52	92	8	X	52	52	52	52	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
52			8		56	98	8	X	56	98	8	X	56	56	56	56	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
56			10		62	105	10	X	62	105	10	X	62	62	62	62	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
60			10		66	110	10	X	66	110	10	X	66	66	66	66	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
64			10		70	115	10	X	70	115	10	X	70	70	70	70	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
68			10		74	120	10		74	120	10		74	74	74	74	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
72			10		78	125	10		78	125	10		78	78	78	78	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
76			10		82	135	10		82	135	10		82	82	82	82	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
80			12		86	140	12		86	140	12		86	86	86	86	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
85			12		91	145	12		91	145	12		91	91	91	91	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
90			12		96	160	12		96	160	12		96	96	96	96	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
95			12		101	165	12		101	165	12		101	101	101	101	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
100			14		107	175	14		107	175	14		107	107	107	107	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
105			14		112	180	14		112	180	14		112	112	112	112	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
110			14		117	185	14		117	185	14		117	117	117	117	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
115			14		122	200	14		122	200	14		122	122	122	122	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
120			16		127	210	16		127	210	16		127	127	127	127	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
125			16		132	220	16		132	220	16		132	132	132	132	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
130			16		137	230	16		137	230	16		137	137	137	137	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
140			18		147	240	18		147	240	18		147	147	147	147	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16
150			18		157	250	18		157	250	18		157	157	157	157	85	92	98	105	120	10	74	86	140	12	101	165	12	117	185	14	132	220	16

NOTE The crosses indicate washers specified in the corresponding International Standards.

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