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## रोलिंग बेयरिंग — एक्सेसरीज़

भाग 2 लॉकनट और लॉकिंग डिवाइस की माप

## Rolling Bearings — Accessories

Part 2 Dimensions for Locknuts and Locking Devices

ICS 21.100.20

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भारतीय मानक ब्यूरो

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## NATIONAL FOREWORD

This Indian Standard (Part 2) which is identical with ISO 2982-2 : 2013 'Rolling bearings — Accessories — Part 2: Dimensions for locknuts and locking devices' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Bearing Sectional Committee and approval of the Production and General Engineering Division Council.

This Standard is published in two parts. Other part of this standard is:

Part 1 Dimensions for adapter sleeve assemblies and withdrawal sleeves

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions and terminologies are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to the following International Standard for which Indian Standard also exists. The corresponding Indian Standard which is to be substituted in its place is listed below along with its degree of equivalence for the edition indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 5593 Rolling bearings — Vocabulary	IS 2399 : 2002 Rolling bearings — Vocabulary ( <i>second revision</i> )	Identical with ISO 5593 : 1997

The technical committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

<i>International Standard</i>	<i>Title</i>
ISO 15241	Rolling bearings — Symbols for physical quantities

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

ROLLING BEARINGS — ACCESSORIES

PART 2 DIMENSIONS FOR LOCKNUTS AND LOCKING DEVICES

## 1 Scope

This part of ISO 2982 specifies:

- dimensions of locknuts;
- runout tolerance of locknut clamp face with respect to pitch diameter of screw thread;
- dimensions of lockwashers with straight inner tab for use with 4-slot locknuts;
- dimensions of locking clip assemblies for use with 8-slot locknuts.

The locknuts are also suitable for axial location of bearing inner rings on shafts and for dismounting of withdrawal sleeves.

For adapter sleeve assemblies and withdrawal sleeves, see ISO 2982-1.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5593, *Rolling bearings — Vocabulary*

ISO 15241, *Rolling bearings — Symbols for physical quantities*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5593 and the following apply.

### 3.1

#### **locking clip**

part in C-shape for securing a locknut

### 3.2

#### **locking clip assembly**

assembly comprising a locking clip and a bolt

## 4 Symbols

### 4.1 General

For the purposes of this document, the symbols given in ISO 15241 and the following listed in [4.2](#), [4.3](#), [4.4](#) and [4.5](#) apply.

The symbols shown in [Figure 1](#), [Figure 2](#), [Figure 3](#) and [Figure 4](#) and the values given in [Table 1](#), [Table 2](#), [Table 3](#) and [Table 4](#) denote nominal dimensions, unless specified otherwise.

## 4.2 Locknuts with 4 slots

See [Figure 1](#).

$B$  locknut width

$b$  width of slot in locknut

$d_1$  outside diameter of clamp face of locknut

$d_2$  outside diameter of locknut

$G$  designation of screw thread

$h$  depth of slot in locknut

$t_s$  runout tolerance of locknut clamp face with respect to pitch diameter of screw thread

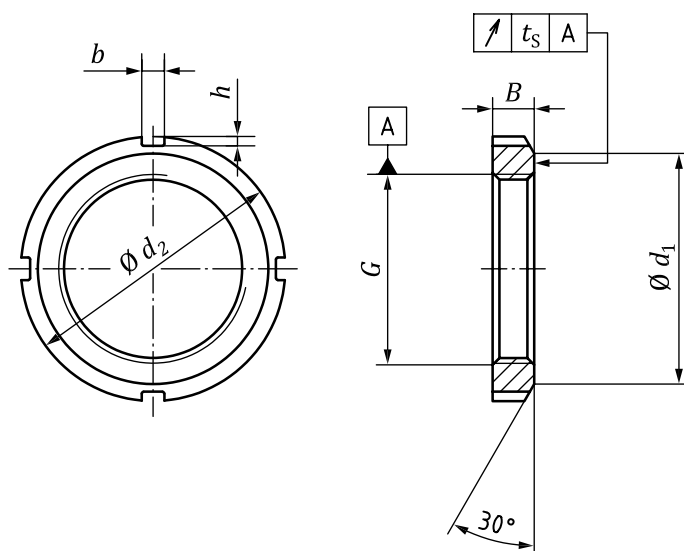


Figure 1 — Locknut with 4 slots

### 4.3 Lockwashers with straight inner tab

See [Figure 2](#).

- $B_7$  material thickness of lockwasher
- $d_3$  bore diameter of lockwasher
- $d_4$  root diameter of outer tab of lockwasher
- $d_5$  outside diameter of lockwasher
- $f$  width of outer tab of lockwasher
- $f_1$  width of inner tab of lockwasher
- $M$  distance between inner tab and bore ( $d_3 -$  height of inner tab)
- $N$  minimum number of outer tabs of lockwasher

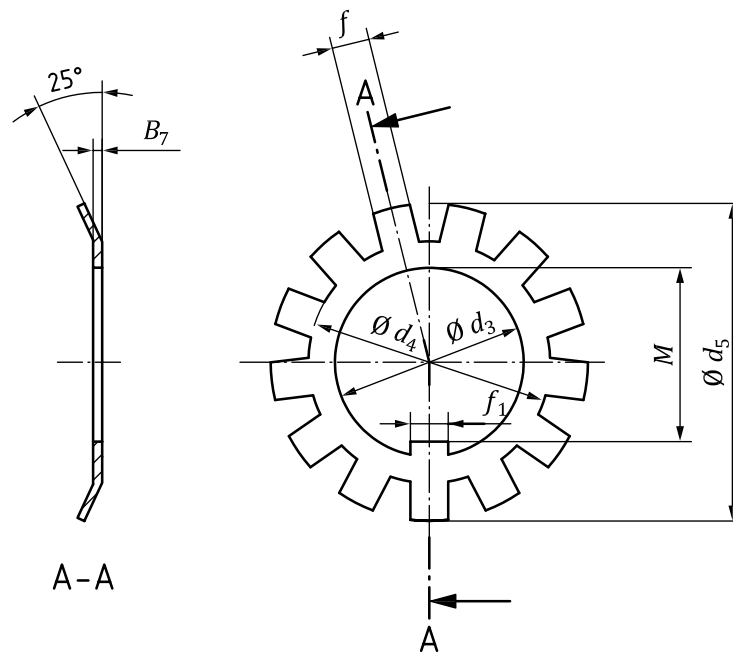


Figure 2 — Lockwasher with straight inner tab

#### 4.4 Locknuts with 8 slots

See [Figure 3](#).

- $B$  locknut width
- $b$  width of slot in locknut
- $d_1$  outside diameter of clamp face of locknut
- $d_2$  outside diameter of locknut
- $G_1$  designation of screw thread of the locknut bore
- $h$  depth of slot in locknut
- $t_s$  runout tolerance of locknut clamp face with respect to pitch diameter of screw thread

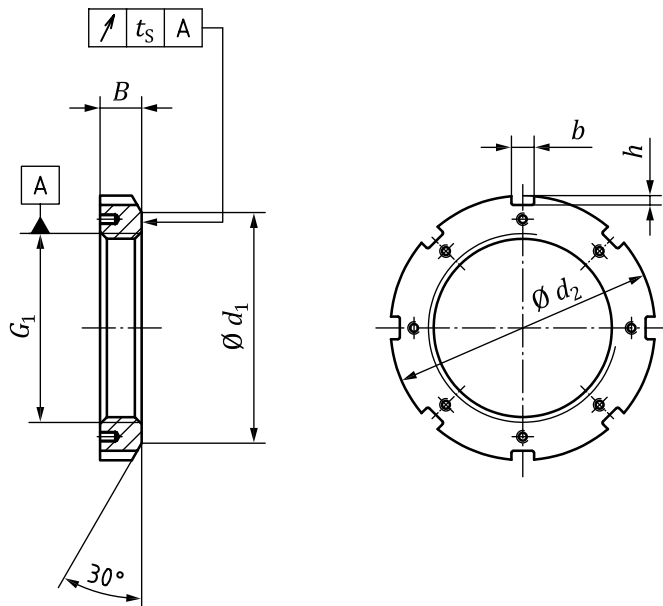
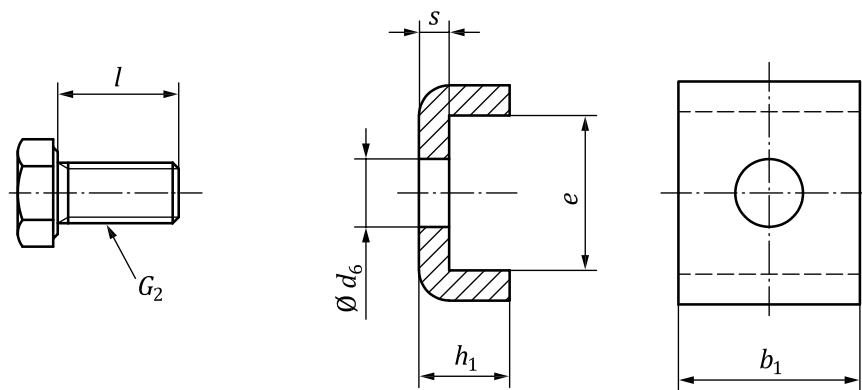


Figure 3 — Locknut with 8 slots

## 4.5 Locking clip assemblies

See [Figure 4](#) for bolt and locking clip.

- $b_1$  width of locking clip
- $d_6$  diameter of hole in locking clip
- $e$  inner width of locking clip
- $G_2$  designation of screw thread
- $h_1$  height of locking clip
- $l$  length of bolt
- $s$  material thickness of locking clip



NOTE The bolt may or may not be secured to prevent loosening.

Figure 4 — Locking clip assembly

## 5 Dimensions

### 5.1 Locknuts with 4 slots

Dimensions and runout tolerance,  $t_s$ , of locknuts with 4 slots are given in [Table 1](#).

**Table 1 — Locknuts with 4 slots**

Dimensions and tolerances in millimetres

$G^a$	$d_2$	$d_1$	$B$	$b$	$h$	$t_5^b$
M10 × 0,75	18	13,5	4	3	2	0,04
M12 × 1	22	17	4	3	2	0,04
M15 × 1	25	21	5	4	2	0,04
M17 × 1	28	24	5	4	2	0,04
M20 × 1	32	26	6	4	2	0,04
M25 × 1,5	38	32	7	5	2	0,04
M30 × 1,5	45	38	7	5	2	0,04
M35 × 1,5	52	44	8	5	2	0,04
M40 × 1,5	58	50	9	6	2,5	0,04
M45 × 1,5	65	56	10	6	2,5	0,04
M50 × 1,5	70	61	11	6	2,5	0,04
M55 × 2	75	67	11	7	3	0,05
M60 × 2	80	73	11	7	3	0,05
M65 × 2	85	79	12	7	3	0,05
M70 × 2	92	85	12	8	3,5	0,05
M75 × 2	98	90	13	8	3,5	0,05
M80 × 2	105	95	15	8	3,5	0,05
M85 × 2	110	102	16	8	3,5	0,05
M90 × 2	120	108	16	10	4	0,05
M95 × 2	125	113	17	10	4	0,05
M100 × 2	130	120	18	10	4	0,05
M105 × 2	140	126	18	12	5	0,05
M110 × 2	145	133	19	12	5	0,05
M115 × 2	150	137	19	12	5	0,05
M120 × 2	145	135	20	12	5	0,05
M120 × 2	155	138	20	12	5	0,05
M125 × 2	160	148	21	12	5	0,06
M130 × 2	155	145	21	12	5	0,06
M130 × 2	165	149	21	12	5	0,06
M135 × 2	175	160	22	14	6	0,06
M140 × 2	165	155	22	12	5	0,06
M140 × 2	180	160	22	14	6	0,06
M145 × 2	190	171	24	14	6	0,06
M150 × 2	180	170	24	14	5	0,06
M150 × 2	195	171	24	14	6	0,06
M155 × 3	200	182	25	16	7	0,06
M160 × 3	190	180	25	14	5	0,06
M160 × 3	210	182	25	16	7	0,06
M165 × 3	210	193	26	16	7	0,06
M170 × 3	200	190	26	16	5	0,06
M170 × 3	220	193	26	16	7	0,06
M180 × 3	210	200	27	16	5	0,06
M180 × 3	230	203	27	18	8	0,06
M190 × 3	220	210	28	16	5	0,06
M190 × 3	240	214	28	18	8	0,06
M200 × 3	240	222	29	18	8	0,06
M200 × 3	250	226	29	18	8	0,06
Tr210 × 4	270	238	30	20	10	0,12
Tr220 × 4	280	250	32	20	10	0,12
Tr230 × 4	290	260	34	20	10	0,12
Tr240 × 4	300	270	34	20	10	0,12
Tr250 × 4	320	290	36	20	10	0,12
Tr260 × 4	330	300	36	24	12	0,12
Tr280 × 4	350	320	38	24	12	0,12

<sup>a</sup> Tolerance class 5H, ISO 965-3, for metric threads and 7H, ISO 2901, for metric trapezoidal threads.

<sup>b</sup> Measurements taken at a radius = (thread outside diameter +  $d_1$ ) / 4.



## 5.2 Lockwashers with straight inner tab

Dimensions of lockwashers with straight inner tab are given in [Table 2](#).

**Table 2 — Lockwashers with straight inner tab**

Dimensions in millimetres

$d_3$	$d_4$	$d_5$ ≈	$f_1$ max.	$M$	$f^a$	$B_7^b$ ≈	$N_c$
10	13,5	21	3	8,5	3	1	9
12	17	25	3	10,5	3	1	11
15	21	28	4	13,5	4	1	11
17	24	32	4	15,5	4	1	11
20	26	36	4	18,5	4	1	11
25	32	42	5	23	5	1,25	13
30	38	49	5	27,5	5	1,25	13
35	44	57	6	32,5	5	1,25	13
40	50	62	6	37,5	6	1,25	13
45	56	69	6	42,5	6	1,25	13
50	61	74	6	47,5	6	1,25	13
55	67	81	8	52,5	7	1,5	17
60	73	86	8	57,5	7	1,5	17
65	79	92	8	62,5	7	1,5	17
70	85	98	8	66,5	8	1,5	17
75	90	104	8	71,5	8	1,5	17
80	95	112	10	76,5	8	1,8	17
85	102	119	10	81,5	8	1,8	17
90	108	126	10	86,5	10	1,8	17
95	113	133	10	91,5	10	1,8	17
100	120	142	12	96,5	10	1,8	17
105	126	145	12	100,5	12	1,8	17
110	133	154	12	105,5	12	1,8	17
115	137	159	12	110,5	12	2	17
120	135	151	14	115	12	2	17
120	138	164	14	115	12	2	17
125	148	170	14	120	12	2	17
130	145	161	14	125	12	2	17
130	149	175	14	125	12	2	17
135	160	185	14	130	14	2	17
140	155	171	16	135	12	2	17
140	160	192	16	135	14	2	17
145	171	202	16	140	14	2	17
150	170	188	16	145	14	2	17
150	171	205	16	145	14	2	17
155	182	212	16	147,5	16	2,5	19
160	180	199	18	154	14	2,5	19
160	182	217	18	154	16	2,5	19
165	193	222	18	157,5	16	2,5	19
170	190	211	18	164	16	2,5	19
170	193	232	18	164	16	2,5	19
180	200	221	20	174	16	2,5	19
180	203	242	20	174	18	2,5	19
190	210	231	20	184	16	2,5	19
190	214	252	20	184	18	2,5	19

**Table 2 (continued)**

$d_3$	$d_4$	$d_5$ ≈	$f_1$ max.	$M$	$f^a$	$B_7^b$ ≈	$N^c$
200	222	248	20	194	18	2,5	19
200	226	262	20	194	18	2,5	19
210	—	—	—	—	—	—	19
220	250	292	24	213	20	3	19
230	—	—	—	—	—	—	19
240	270	312	24	233	20	3	19
250	—	—	—	—	—	—	19
260	300	342	28	253	24	3	19
280	320	362	28	273	24	3	19

a  $f$  shall be  $< b$  (see [Figure 1](#) and [Table 1](#)).

b The thickness is only approximate and small variations are permissible.

c Since the locknut has 4 slots,  $N$  shall be an odd number.

### 5.3 Locknuts with 8 slots

Dimensions and runout tolerance,  $t_s$ , of locknuts with 8 slots are given in [Table 3](#).

**Table 3 — Locknuts with 8 slots**

Dimensions and tolerances in millimetres

$G_1^a$	$d_2$	$d_1$	$B$	$b$	$h$	$t_s^b$	Suitable locking clip No.
Tr220 × 4	260	242	30	20	9	0,12	1
Tr240 × 4	290	270	34	20	10	0,12	2
Tr260 × 4	310	290	34	20	10	0,12	2
Tr280 × 4	330	310	38	24	10	0,12	3
Tr300 × 4	360	336	42	24	12	0,12	4
Tr300 × 4	380	340	40	24	12	0,12	5
Tr320 × 5	380	356	42	24	12	0,12	6
Tr320 × 5	400	360	42	24	12	0,12	7
Tr340 × 5	400	376	45	24	12	0,12	6
Tr340 × 5	440	400	55	28	15	0,12	8
Tr360 × 5	420	394	45	28	13	0,12	9
Tr360 × 5	460	420	58	28	15	0,12	8
Tr380 × 5	450	422	48	28	14	0,12	10
Tr380 × 5	490	440	60	32	18	0,12	11
Tr400 × 5	470	442	52	28	14	0,12	10
Tr400 × 5	520	460	62	32	18	0,12	12
Tr420 × 5	490	462	52	32	14	0,15	13
Tr420 × 5	540	490	70	32	18	0,15	12
Tr440 × 5	520	490	60	32	15	0,15	14
Tr440 × 5	560	510	70	36	20	0,15	15
Tr460 × 5	540	510	60	32	15	0,15	14
Tr460 × 5	580	540	75	36	20	0,15	15
Tr480 × 5	560	530	60	36	15	0,15	16
Tr480 × 5	620	560	75	36	20	0,15	17
Tr500 × 5	580	550	68	36	15	0,15	16
Tr500 × 5	630	580	80	40	23	0,15	18
Tr530 × 6	630	590	68	40	20	0,15	19
Tr530 × 6	670	610	80	40	23	0,15	20
Tr560 × 6	650	610	75	40	20	0,15	21
Tr560 × 6	710	650	85	45	25	0,15	22

Table 3 (continued)

$G_1^a$	$d_2$	$d_1$	$B$	$b$	$h$	$t_s^b$	Suitable locking clip No.
Tr600 × 6	700	660	75	40	20	0,15	19
Tr600 × 6	750	690	85	45	25	0,15	22
Tr630 × 6	730	690	75	45	20	0,2	23
Tr630 × 6	800	730	95	50	28	0,2	24
Tr670 × 6	780	740	80	45	20	0,2	25
Tr670 × 6	850	775	106	50	28	0,2	26
Tr710 × 7	830	780	90	50	25	0,2	27
Tr710 × 7	900	825	106	55	30	0,2	28
Tr750 × 7	870	820	90	55	25	0,2	29
Tr750 × 7	950	875	112	60	34	0,2	30
Tr800 × 7	920	870	90	55	25	0,2	29
Tr800 × 7	1 000	925	112	60	34	0,2	30
Tr850 × 7	980	925	90	60	25	0,2	31
Tr850 × 7	1 060	975	118	70	38	0,2	32
Tr900 × 7	1 030	975	100	60	25	0,2	31
Tr900 × 7	1 120	1 030	125	70	38	0,2	33
Tr950 × 8	1 080	1 025	100	60	25	0,2	34
Tr950 × 8	1 170	1 080	125	70	38	0,2	35
Tr1000 × 8	1 140	1 085	100	60	25	0,2	36
Tr1000 × 8	1 240	1 140	125	70	38	0,2	37
Tr1060 × 8	1 200	1 145	100	60	25	0,2	36
Tr1060 × 8	1 300	1 210	125	70	38	0,2	37
Tr1120 × 8	1 260	1 205	100	60	25	0,2	36

<sup>a</sup> Tolerance class 7H, ISO 2901 for metric trapezoidal threads.

<sup>b</sup> Measurements taken at a radius = (thread outside diameter +  $d_1$ ) / 4.

#### 5.4 Locking clip assemblies

Dimensions of locking clip assemblies are given in [Table 4](#).

**Table 4 — Locking clip assemblies**

Dimensions in millimetres

Locking clip No.	$s^a$ $\approx$	$b_1^b$	$h_1$	$e$	$d_6$	$l^c$ $\approx$	$G_2$
1	4	20	12	13,5	7	12	M6
2	4	20	12	17,5	9	16	M8
3	4	24	12	17,5	9	16	M8
4	4	24	12	20,5	9	16	M8
5	4	24	12	30,5	12	20	M10
6	5	24	15	21	9	16	M8
7	5	24	15	31	12	20	M10
8	5	28	15	38	14	25	M12
9	5	28	15	20	9	16	M8
10	5	28	15	24	12	20	M10
11	5	32	15	40	14	25	M12
12	5	32	15	45	18	30	M16
13	5	32	15	24	12	20	M10
14	5	32	15	28	14	25	M12
15	5	36	15	43	18	30	M16
16	5	36	15	28	14	25	M12
17	5	36	15	53	18	30	M16
18	5	40	15	45	18	30	M16
19	7	40	21	34	18	30	M16
20	7	40	21	51	22	40	M20
21	7	40	21	29	18	30	M16
22	7	45	21	54	22	40	M20
23	7	45	21	34	18	30	M16
24	7	50	21	61	22	40	M20
25	7	45	21	39	18	30	M16
26	7	50	21	66	22	40	M20
27	7	50	21	39	18	30	M16
28	7	55	21	69	26	50	M24
29	7	55	21	39	18	30	M16
30	7	60	21	70	26	50	M24
31	7	60	21	44	22	40	M20
32	7	70	21	71	26	50	M24
33	7	70	21	76	26	50	M24
34	7	60	21	46	22	40	M20
35	7	70	21	78	26	50	M24
36	7	60	21	51	22	40	M20
37	7	70	21	88	26	50	M24

<sup>a</sup> The thickness is only approximate and small variations are permissible.

<sup>b</sup>  $b_1$  shall be  $< b$  (see [Figure 3](#) and [Table 3](#)).

<sup>c</sup> The lengths shown correspond to preferred length of the bolt for the screw thread sizes listed; however, variations are permissible.

## Annex A (informative)

### Lockwashers with bent inner tab

#### A.1 General

In addition to lockwashers with straight inner tab given in 5.2, lockwashers with bent inner tab are available. They are used with 4-slot locknuts and are intended to be used for threaded shafts.

#### A.2 Symbols

See [Figure A.1](#).

In addition to the symbols given in 4.3, the following symbol is used.

$B_2$  protrusion of bent inner tab of lockwasher

The symbols shown in [Figure A.1](#) and the values given in [Table A.1](#) denote nominal dimensions, unless noted otherwise.

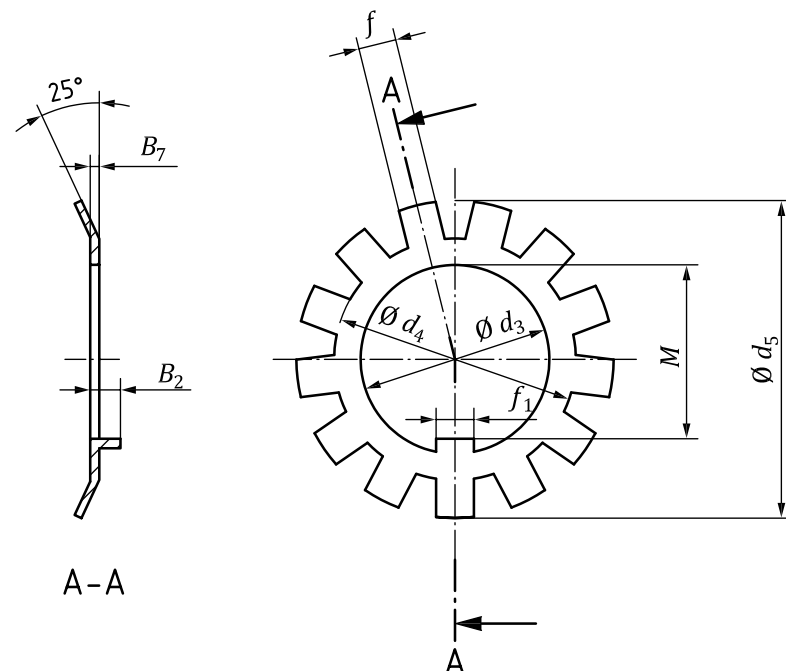


Figure A.1 — Lockwasher with bent inner tab

#### A.3 Dimensions

Dimensions of lockwashers with bent inner tab are shown in [Table A.1](#).

**Table A.1 — Lockwashers with bent inner tab**

Dimensions in millimetres

$d_3$	$d_4$	$d_5$ ≈	$f_1$ max.	$M$	$f^a$	$B_2$	$B_7^b$ ≈	$N^c$
10	13,5	21	3	8,5	3	3	1	9
12	17	25	3	10,5	3	3	1	11
15	21	28	4	13,5	4	4	1	11
17	24	32	4	15,5	4	4	1	11
20	26	36	4	18,5	4	4	1	11
22	28	38	4	20,5	4	4	1	11
25	32	42	5	23	5	4	1,25	13
28	36	46	5	26	5	4	1,25	13
30	38	49	5	27,5	5	4	1,25	13
32	40	52	5	29,5	5	4	1,25	13
35	44	57	6	32,5	5	4	1,25	13
40	50	62	6	37,5	6	5	1,25	13
45	56	69	6	42,5	6	5	1,25	13
50	61	74	6	47,5	6	5	1,25	13
55	67	81	8	52,5	7	5	1,5	17
60	73	86	8	57,5	7	6	1,5	17
65	79	92	8	62,5	7	6	1,5	17
70	85	98	8	66,5	8	6	1,5	17
75	90	104	8	71,5	8	6	1,5	17
80	95	112	10	76,5	8	6	1,8	17
85	102	119	10	81,5	8	6	1,8	17
90	108	126	10	86,5	10	8	1,8	17
95	113	133	10	91,5	10	8	1,8	17
100	120	142	12	96,5	10	8	1,8	17
105	126	145	12	100,5	12	10	1,8	17
110	133	154	12	105,5	12	10	1,8	17
115	137	159	12	110,5	12	10	2	17
120	138	164	14	115	12	10	2	17
125	148	170	14	120	12	10	2	17
130	149	175	14	125	12	10	2	17
135	160	185	14	130	14	10	2	17
140	160	192	16	135	14	10	2	17
145	171	202	16	140	14	10	2	17
150	171	205	16	145	14	10	2	17
155	182	212	16	147,5	16	12	2,5	19
160	182	217	18	154	16	12	2,5	19
165	193	222	18	157,5	16	12	2,5	19
170	193	232	18	164	16	12	2,5	19
180	203	242	20	174	18	12	2,5	19
190	214	252	20	184	18	12	2,5	19
200	226	262	20	194	18	12	2,5	19
220	250	292	24	213	20	14	3	19
240	270	312	24	233	20	14	3	19
260	300	342	28	253	24	14	3	19
280	320	362	28	273	24	14	3	19

<sup>a</sup>  $f$  is  $< b$  (see [Figure 1](#) and [Table 1](#)).

<sup>b</sup> The thickness is only approximate and small variations are permissible.

<sup>c</sup> Since the locknut has 4 slots,  $N$  is an odd number.

## Bibliography

- [1] ISO 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*
- [2] ISO 2901, *ISO metric trapezoidal screw threads — Basic profile and maximum material profiles*
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