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प्रारंभिक मसौदा

शुंडाकार रोलर बियरिंग्स के लिए विशिष्टि — एक्सेसरीज भाग 2 लॉकनट्स और लॉकिंग डिवाइस के लिए आयाम

[IS 16605-2 *का पहला पुनरीक्षण*]

Preliminary Draft

Specification for Rolling Bearings — Accessories Part 2 Dimensions for Locknuts And Locking Devices

[*First revision of* IS 16605-2]
ICS 21.100.20

Bearings Sectional Committee, PGD 13	Last date for Comment:

FOREWORD

(*Formal clauses will be added later on***)**

This Indian Standard (First Revision) will be adopted by Bureau of Indian Standards after the draft is finalized by the Bearings Sectional Committee and approval by the Production and General Engineering Division Council (PGDC).

This standard was first published in 2018 and has now been revised to keep up the pace with the latest technological developments and international practices.

In this revision, the following major modifications have been made:

a) Reference standard has been added in normative references. (*See* section 2);
b) Types and designation have been added. (*See* section 3.1 & 3.2);
c) Slot bottom spacing dimension (T) is added in locknut symbols and in Table 1 (*See* section 4.2 and Fig. 1);
d) Locknut with lockwasher and locking clip Figure added. (*See* Fig. 1 and 3);
e) New section of symbol for shaft groove has been added. (*See* section 4.6);
f) Designation has been updated in Table 1, 2, 3 and 4;
g) In Table 1, value of h converted to reference dimension for threads M10 to M100;
h) In Table 2, shaft groove dimensions added;
j) New section of material has been added. (*See* section 6);
k) New section of design has been added. (*See* section 7);
m) New section of Workmanship and delivery requirement has been added. (*See* section 8);
n) New section of Packaging has been added. (*See* section 9);
p) New section of Marking has been added. (*See* section 10); and
q) New section of Sampling and criteria for acceptance has been added. (*See* section 11).

This standard has another part, under the general title "Rolling bearings — Accessories: Part 1 Dimensions for adapter sleeve assemblies and withdrawal sleeves".

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 : 2022 ‘Rules for rounding off numerical values (*second revision*).’ The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CONTENTS

Indian Standard

ROLLING BEARINGS — ACCESSORIES
PART-2 DIMENSIONS FOR LOCKNUTS AND LOCKING DEVICES

(*First Revision*)

1 SCOPE

This part of IS 16605(Part-2) 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* IS 16605(Part-1).

2 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.

IS No./Other Standards	*Title*
IS 919 (Part 1) : 2014	Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes: Part 1 Basis of tolerance, deviation and fits (*Third Revision*)
IS1364 (Part 2) : 2018	Hexagon head bolts, screws and nuts of product grades A and B: Part 2 Hexagon head screws (Size Range M 1.6 To M 64) (*Fifth Revision*)
IS 2399: 2024	Rolling bearings — Vocabulary (*Third Revision*)
IS 4905: 2015	Random sampling and randomization procedures (*First Revision*)
IS 5669: 2019	Rolling bearings — Radial bearings — Boundary dimensions, general plan (*Second Revision*)
IS 7008 (Part 4) : 2021	ISO metric trapezoidal screw threads: Part 4 Tolerances (*Third Revision*)
IS 14962 (Part 3) : 2022	ISO general purpose metric screw threads - Tolerances: Part 3 Limit deviations for screw threads (*First Revision*)
IS 15726: 2021	Technical product documentation — Edges of undefined shape — Indication and dimensioning (*First Revision*)
IS 16605 (part 1)	Rolling bearings — Accessories — Part 1: Dimensions for adapter sleeve assemblies and withdrawal sleeves
PGD 13 (24061) / ISO 15241 : 2012	Rolling bearings — Symbols for physical quantities

3 TYPES AND DESIGNATION

For the purposes of this document, the terms and definitions given in IS 2399 and the following apply.

3.1 TYPE

3.1.1 *Locknuts*

The nut thread shall be countersunk on both sides at 90° to 120° to the minor diameter.

a) Locknuts for use with Lockwashers with at least 4 slots on the casing (*See* Fig. 1)

KM . . . Standard design in the case of nuts with metric thread.

KML . . . Identical with KM, except that diameters d_1 and d_2 are reduced.

HM . . . T Reinforced design compared with KM, and with a trapezoidal thread.

b) Locknuts for use with locking clips with at least 8 slots on the casing and associated tapped blind holes (*see* Fig. 3)

HM . . . Standard design in the case of nuts with trapezoidal thread.

3.1.2 *Lockwashers* (*see* Fig. 2)

MB . . . Designed for type KM and HM…T locknuts.

MBL . . . Identical with MB, except that diameters d_2 and d_3 are reduced.

3.1.3 *Locking clip and its assembly* (*See* Fig. 4)

Part in C-shape for securing a locknut.

Assembly comprising a locking clip and a bolt.

MS . . . Designed for type HM locknuts.

3.2 Designation

3.2.1 *Locknuts*

Designation of a locknut with thread G = M 130 × 2, d_2 = 155 mm external diameter and B = 21 mm width (symbol KML 26):

Locknut IS 16605 (Part-2) — KML 26

Designation of a locknut with thread G = Tr 240 × 4, d_2 = 300 mm external diameter and B = 34 mm width (symbol HM 48 T):

Locknut IS 16605 (Part-2) — HM 48 T

Designation of a locknut with thread G = Tr 340 × 5, d_2 = 400 mm external diameter and B = 45 mm width (symbol HM 3038):

Locknut IS 16605 (Part-2) — HM 3068

3.2.2 *Lockwashers*

Designation of a lockwasher with d_1 = 130 mm bore diameter, d_2 = 175 mm external diameter and d_3 = 149 mm root diameter of outer tab (symbol MB 26) for use with KM 26 locknut:

Lockwasher IS 16605 (Part-2) — MB 26

Designation of a lockwasher with the same d_1 = 130 mm bore diameter, but reduced d_2 = 161 mm external diameter and reduced d_3 = 145 mm root diameter of outer tab (symbol MBL 26) for use with KML 26 Locknut:

Lockwasher IS 16605 (Part-2) — MBL 26

3.2.3 *Locking Clip*

Designation of a locking clip with fixing screw and securing element (symbol MS 3072) for use with HM 3072 locknut:

Locking clip IS 16605 (Part-2) — MS 3072

4 SYMBOLS

4.1 General

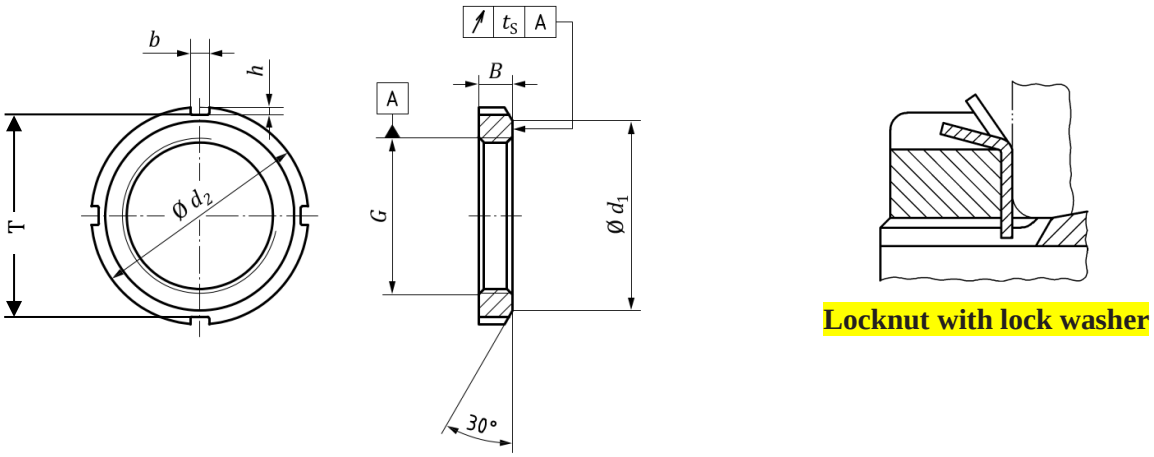
For the purposes of this document, the symbols given in ISO 15241 and the following listed in **4.2, 4.3, 4.4, 4.5** and **4.6** apply.

The symbols shown in Fig. 1, Fig. 2, Fig. 3, Fig. 4 and Fig. 5 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 Fig. 1.

T	Slot bottom spacing
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



NOTE — a Dimensions for assembly tool for locknuts up to M 100 x 2

FIG. 1 LOCKNUT WITH 4-SLOTS

4.3 Lockwashers with Straight Inner Tab

See Fig. 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

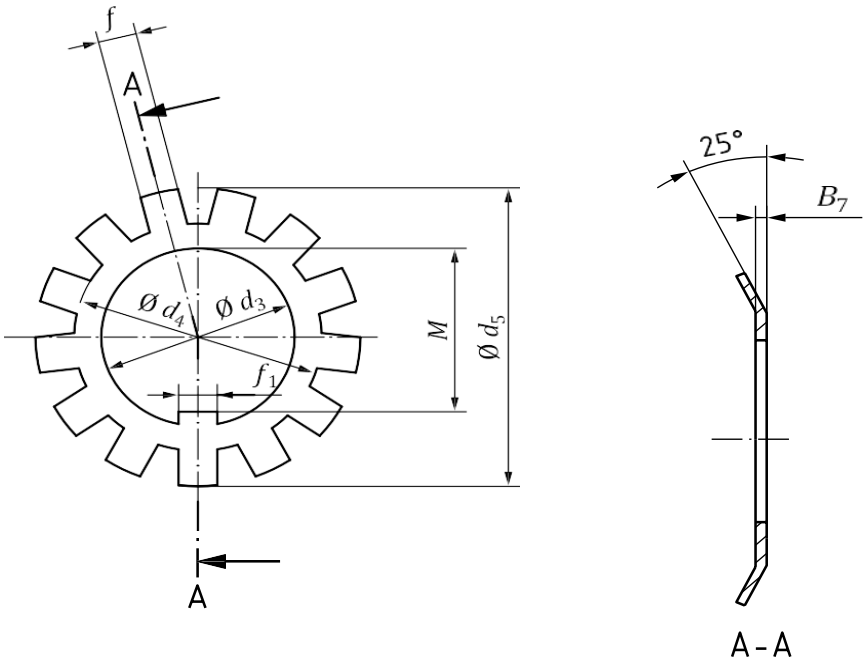


FIG. 2 LOCKWASHER WITH STRAIGHT INNER TAB

4.4 Locknuts with 8 Slots

See Fig. 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

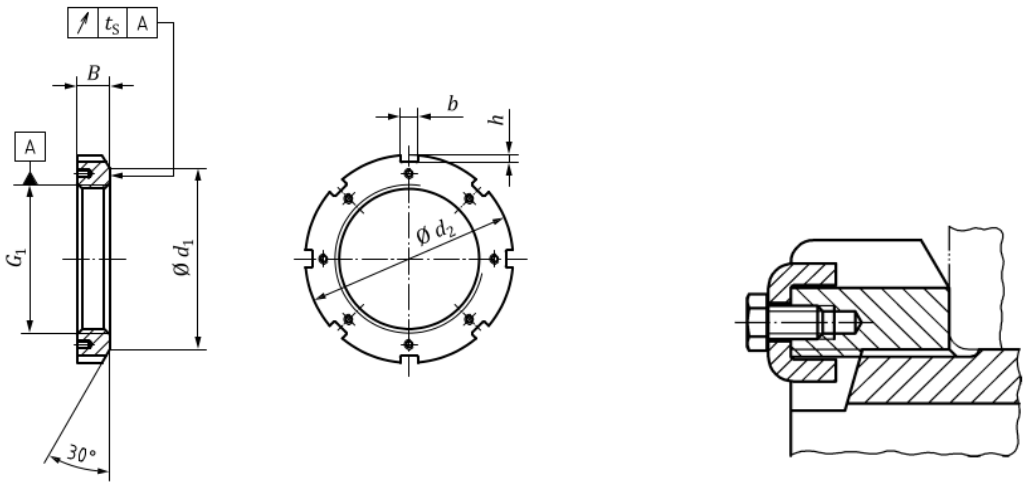
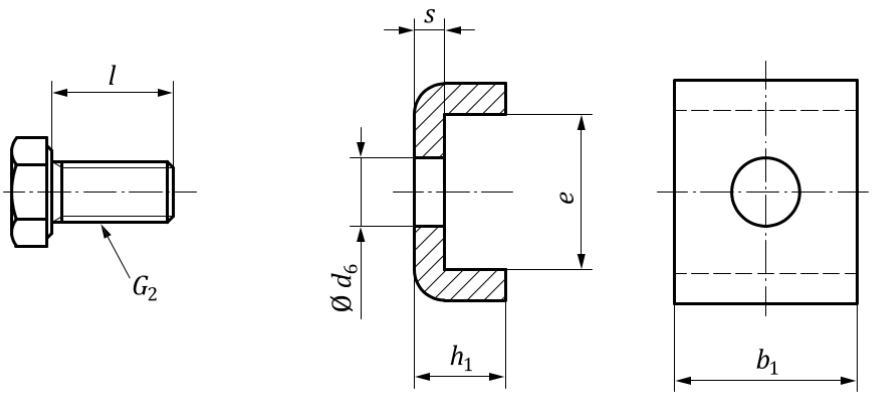


FIG. 3 LOCKNUT WITH 8 SLOTS

4.5 Locking Clip Assemblies

See Fig. 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.

FIG. 4 LOCKING CLIP ASSEMBLY

4.6 Symbols for Shaft Groove

See Fig. 5 for shaft.

b_2 Groove width

h_2 Groove depth

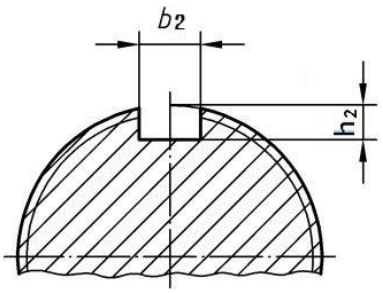


FIG. 5 GROOVE DIMENSION WHEN DIRECTLY LOCKED TO THE SHAFT

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

(*Clause* 4.1 and 5.1)

Dimensions and tolerances in millimeters

G^a	d_2	d_1	B	b	h	T^b	$t_S{}^c$	Designation	Type of suitable lock washer
M10 × 0,75	18	13.5	4	3	(2)	014	0.04	**KM 0**	MB 0
M12 × 1	22	17	4	3	(2)	018	0.04	**KM 1**	MB 1
M15 × 1	25	21	5	4	(2)	021	0.04	**KM 2**	MB 2
M17 × 1	28	24	5	4	(2)	024	0.04	**KM 3**	MB 3
M20 × 1	32	26	6	4	(2)	028	0.04	**KM 4**	MB 4
M25 × 1,5	38	32	7	5	(2)	034	0.04	**KM 5**	MB 5
M30 × 1,5	45	38	7	5	(2)	041	0.04	**KM 6**	MB 6
M35 × 1,5	52	44	8	5	(2)	048	0.04	**KM 7**	MB 7
M40 × 1,5	58	50	9	6	(2.5)	053	0.04	**KM 8**	MB 8
M45 × 1,5	65	56	10	6	(2.5)	060	0.04	**KM 9**	MB 9
M50 × 1,5	70	61	11	6	(2.5)	065	0.04	**KM 10**	MB 10
M55 × 2	75	67	11	7	(3)	069	0.05	**KM 11**	MB 11
M60 × 2	80	73	11	7	(3)	074	0.05	**KM 12**	MB 12
M65 × 2	85	79	12	7	(3)	079	0.05	**KM 13**	MB 13
M70 × 2	92	85	12	8	(3.5)	085	0.05	**KM 14**	MB 14
M75 × 2	98	90	13	8	(3.5)	091	0.05	**KM 15**	MB 15
M80 × 2	105	95	15	8	(3.5)	098	0.05	**KM 16**	MB 16
M85 × 2	110	102	16	8	(3.5)	103	0.05	**KM 17**	MB 17
M90 × 2	120	108	16	10	(4)	112	0.05	**KM 18**	MB 18
M95 × 2	125	113	17	10	(4)	117	0.05	**KM 19**	MB 19
M100 × 2	130	120	18	10	(4)	122	0.05	**KM 20**	MB 20
M105 × 2	140	126	18	12	5	-	0.05	**KM 21**	MB 21
M110 × 2	145	133	19	12	5	-	0.05	**KM 22**	MB 22
M115 × 2	150	137	19	12	5	-	0.05	**KM 23**	MB 23
M120 × 2	145	135	20	12	5	-	0.05	**KML 24**	MBL 24
M120 × 2	155	138	20	12	5	-	0.05	**KM 24**	MB 24
M125 × 2	160	148	21	12	5	-	0.06	**KM 25**	MB 25
M130 × 2	155	145	21	12	5	-	0.06	**KML 26**	MBL 26
M130 × 2	165	149	21	12	5	-	0.06	**KM 26**	MB 26
M135 × 2	175	160	22	14	6	-	0.06	**KM 27**	MB 27
M140 × 2	165	155	22	12	5	-	0.06	**KML 28**	MBL 28
M140 × 2	180	160	22	14	6	-	0.06	**KM 28**	MB 28
M145 × 2	190	171	24	14	6	-	0.06	**KM 29**	MB 29
M150 × 2	180	170	24	14	5	-	0.06	**KML 30**	MBL 30
M150 × 2	195	171	24	14	6	-	0.06	**KM 30**	MB 30
M155 × 3	200	182	25	16	7	-	0.06	**KM 31**	MB 31
M160 × 3	190	180	25	14	5	-	0.06	**KML 32**	MBL 32
M160 × 3	210	182	25	16	7	-	0.06	**KM 32**	MB 32
M165 × 3	210	193	26	16	7	-	0.06	**KM 33**	MB 33
M170 × 3	200	190	26	16	5	-	0.06	**KML 34**	MBL 34
M170 × 3	220	193	26	16	7	-	0.06	**KM 34**	MB 34

Table 1 (continued)

G^a	d_2	d_1	B	b	h	T^b	$t_S{}^c$	Designation	Type of suitable lock washer
M180 × 3	210	200	27	16	5	-	0.06	**KML 36**	MBL 36
M180 × 3	230	203	27	18	8	-	0.06	**KM 36**	MB 36
M190 × 3	220	210	28	16	5	-	0.06	**KML 38**	MBL 38
M190 × 3	240	214	28	18	8	-	0.06	**KM 38**	MB 38
M200 × 3	240	222	29	18	8	-	0.06	**KML 40**	MBL 40
M200 × 3	250	226	29	18	8	-	0.06	**KM 40**	MB 40
Tr210 × 4	270	238	30	20	10	-	0.12	**HM 42 T**	–
Tr220 × 4	280	250	32	20	10	-	0.12	**HM 44 T**	MB 44
Tr230 × 4	290	260	34	20	10	-	0.12	**HM 46 T**	–
Tr240 × 4	300	270	34	20	10	-	0.12	**HM 48 T**	MB 48

Tr250 × 4	320	290	36	20	10	-	0.12	**HM 50 T**	–
Tr260 × 4	330	300	36	24	12	-	0.12	**HM 52 T**	MB 52
Tr280 × 4	350	320	38	24	12	-	0.12	**HM 56 T**	MB 56

a. Tolerance class 5H, IS 14962 (Part-1) for metric threads and 7H, IS 7008 (Part-4) for metric trapezoidal threads.
b. Slot bottom spacing T for locknuts up to G = M 100 × 2; clip dimension h = design dimension.
c. Measurements taken at a radius = (thread outside diameter + d_1) / 4.

5.2 Lockwashers with straight inner tab

Dimensions of lock washers with straight inner tab are given in Table 2.

Table 2 Lockwashers with Straight Inner Tab

(*Clause* 4.1, 5.2 and 7.2)

Dimensions in millimeters

d_3	d_4	$d_5 \approx$	f_1 max.	M	f [a]	B_7 [b] $\approx$	N [c]	b_2	h_2	Designation	Type of suitable locknut
10	13,5	21	3	8.5	3	1	9	4	2	MB 0	KM 0
12	17	25	3	10.5	3	1	11	4	2	MB 1	KM 1
15	21	28	4	13.5	4	1	11	5	2	MB 2	KM 2
17	24	32	4	15.5	4	1	11	5	2	MB 3	KM 3
20	26	36	4	18.5	4	1	11	5	2	MB 4	KM 4
25	32	42	5	23	5	1.25	13	6	3	MB 5	KM 5
30	38	49	5	27.5	5	1.25	13	6	4	MB 6	KM 6
35	44	57	6	32.5	5	1.25	13	7	4	MB 7	KM 7
40	50	62	6	37.5	6	1.25	13	7	4	MB 8	KM 8
45	56	69	6	42.5	6	1.25	13	7	4	MB 9	KM 9
50	61	74	6	47.5	6	1.25	13	7	4	MB 10	KM 10
55	67	81	8	52.5	7	1.5	17	9	4	MB 11	KM 11
60	73	86	8	57.5	7	1.5	17	9	4	MB 12	KM 12
65	79	92	8	62.5	7	1.5	17	9	4	MB 13	KM 13
70	85	98	8	66.5	8	1.5	17	9	5	MB 14	KM 14
75	90	104	8	71.5	8	1.5	17	9	5	MB 15	KM 15
80	95	112	10	76.5	8	1.8	17	11	5	MB 16	KM 16
85	102	119	10	81.5	8	1.8	17	11	5	MB 17	KM 17
90	108	126	10	86.5	10	1.8	17	11	5	MB 18	KM 18
95	113	133	10	91.5	10	1.8	17	11	5	MB 19	KM 19
100	120	142	12	96.5	10	1.8	17	14	5	MB 20	KM 20
105	126	145	12	100.5	12	1.8	17	14	6	MB 21	KM 21

Table 2 (continued)

d_3	d_4	$d_5 \approx$	f_1 max.	M	f [a]	B_7 [b] $\approx$	N [c]	b_2	h_2	Designation	Type of suitable locknut
110	133	154	12	105.5	12	1.8	17	14	6	MB 22	KM 22
115	137	159	12	110.5	12	2	17	14	6	MB 23	KM 23
120	135	151	14	115	12	2	17	16	7	MBL 24	KML 24
120	138	164	14	115	12	2	17	16	7	MB 24	KM 24
125	148	170	14	120	12	2	17	16	7	MB 25	KM 25
130	145	161	14	125	12	2	17	16	7	MBL 26	KML 26
130	149	175	14	125	12	2	17	16	7	MB 26	KM 26
135	160	185	14	130	14	2	17	16	7	MB 27	KM 27
140	155	171	16	135	12	2	17	18	7	MBL 28	KML 28
140	160	192	16	135	14	2	17	18	7	MB 28	KM 28
145	171	202	16	140	14	2	17	18	7	MB 29	KM 29
150	170	188	16	145	14	2	17	18	7	MBL 30	KML 30
150	171	205	16	145	14	2	17	18	7	MB 30	KM 30

155	182	212	16	147.5	16	2.5	19	18	9	MB 31	KM 31
160	180	199	18	154	14	2.5	19	20	8	MBL 32	KML 32
160	182	217	18	154	16	2.5	19	20	8	MB 32	KM 32
165	193	222	18	157.5	16	2.5	19	20	9	MB 33	KM 33
170	190	211	18	164	16	2.5	19	20	8	MBL 34	KML 34
170	193	232	18	164	16	2.5	19	20	8	MB 34	KM 34
180	200	221	20	174	16	2.5	19	22	8	MBL 36	KML 36
180	203	242	20	174	18	2.5	19	22	8	MB 36	KM 36
190	210	231	20	184	16	2.5	19	22	8	MBL 38	KML 38
190	214	252	20	184	18	2.5	19	22	8	MB 38	KM 38
200	222	248	20	194	18	2.5	19	22	8	MBL 40	KML 40
200	226	262	20	194	18	2.5	19	22	8	MB 40	KM 40
210	—	—	—	—	—	—	19	-	-	-	-
220	250	292	24	213	20	3	19	26	9	MB 44	HM 44 T
230	—	—	—	—	—	—	19	-	-	-	-
240	270	312	24	233	20	3	19	26	9	MB 48	HM 48 T
250	—	—	—	—	—	—	19	-	-	-	-
260	300	342	28	253	24	3	19	30	9	MB 52	HM 52 T
280	320	362	28	273	24	3	19	30	9	MB 56	HM 56 T

[a] f shall be < b (*see* Fig. 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

(*Clause* 4.1 and 5.3)

Dimensional Tolerances in millimeters

G_1[a]	d_2	d_1	B	b	h	t_S[b]	Suitable lockingclip No.	Designation	Type of suitable locking clip
Tr220 × 4	260	242	30	20	9	0.12	1	**HM 3044**	MS 3044
Tr240 × 4	290	270	34	20	10	0.12	2	**HM 3048**	MS 3048
Tr260 × 4	310	290	34	20	10	0.12	2	**HM 3052**	MS 3048
Tr280 × 4	330	310	38	24	10	0.12	3	**HM 3056**	MS 3056
Tr300 × 4	360	336	42	24	12	0.12	4	**HM 3060**	MS 3060
Tr300 × 4	380	340	40	24	12	0.12	5	**HM 3160**	MS 3160
Tr320 × 5	380	356	42	24	12	0.12	6	**HM 3064**	MS 3064
Tr320 × 5	400	360	42	24	12	0.12	7	**HM 3164**	MS 3164
Tr340 × 5	400	376	45	24	12	0.12	6	**HM 3068**	MS 3064
Tr340 × 5	440	400	55	28	15	0.12	8	**HM 3168**	MS 3168
Tr360 × 5	420	394	45	28	13	0.12	9	**HM 3072**	MS 3072
Tr360 × 5	460	420	58	28	15	0.12	8	**HM 3172**	MS 3168
Tr380 × 5	450	422	48	28	14	0.12	10	**HM 3076**	MS 3076
Tr380 × 5	490	440	60	32	18	0.12	11	**HM 3176**	MS 3176
Tr400 × 5	470	442	52	28	14	0.12	10	**HM 3080**	MS 3076
Tr400 × 5	520	460	62	32	18	0.12	12	**HM 3180**	MS 3180
Tr420 × 5	490	462	52	32	14	0.15	13	**HM 3084**	MS 3084
Tr420 × 5	540	490	70	32	18	0.15	12	**HM 3184**	MS 3180
Tr440 × 5	520	490	60	32	15	0.15	14	**HM 3088**	MS 3088
Tr440 × 5	560	510	70	36	20	0.15	15	**HM 3188**	MS 3188
Tr460 × 5	540	510	60	32	15	0.15	14	**HM 3092**	MS 3088
Tr460 × 5	580	540	75	36	20	0.15	15	**HM 3192**	MS 3188

Tr480 × 5	560	530	60	36	15	0.15	16	**HM 3096**	MS 3096
Tr480 × 5	620	560	75	36	20	0.15	17	**HM 3196**	MS 3196
Tr500 × 5	580	550	68	36	15	0.15	16	**HM 30/500**	MS 3096
Tr500 × 5	630	580	80	40	23	0.15	18	**HM 31/500**	MS 31/500
Tr530 × 6	630	590	68	40	20	015	19	**HM 30/530**	MS 30/530
Tr530 × 6	670	610	80	40	23	0.15	20	**HM 31/530**	MS 31/530
Tr560 × 6	650	610	75	40	20	0.15	21	**HM 30/560**	MS 30/560
Tr560 × 6	710	650	85	45	25	0.15	22	**HM 31/560**	MS 31/560
Tr600 × 6	700	660	75	40	20	0.15	19	**HM 30/600**	MS 30/530
Tr600 × 6	750	690	85	45	25	0.15	22	**HM 31/600**	MS 31/560
Tr630 × 6	730	690	75	45	20	0.2	23	**HM 30/630**	MS 30/630
Tr630 × 6	800	730	95	50	28	0.2	25	**HM 31/630**	MS 31/630
Tr670 × 6	780	740	80	45	20	0.2	24	**HM 30/670**	MS 30/670
Tr670 × 6	850	775	106	50	28	0.2	26	**HM 31/670**	MS 31/670
Tr710 × 7	830	780	90	50	25	0.2	27	**HM 30/710**	MS 30/710
Tr710 × 7	900	825	106	55	30	0.2	28	**HM 31/710**	MS 31/710
Tr750 × 7	870	820	90	55	25	0.2	29	**HM 30/750**	MS 30/750
Tr750 × 7	950	875	112	60	34	0.2	30	**HM 31/750**	MS 31/750
Tr800 × 7	920	870	90	55	25	0.2	29	**HM 30/800**	MS 30/750
Tr800 × 7	1 000	925	112	60	34	0.2	30	**HM 31/800**	MS 31/750
Tr850 × 7	980	925	90	60	25	0.2	31	**HM 30/850**	MS 30/850

Table 3 (continued)

G_1 [a]	d_2	d_1	B	b	h	t_S [b]	Suitable lockingclip No.	Designation	Type of suitable locking clip
Tr850 × 7	1 060	975	118	70	38	0.2	32	**HM 31/850**	MS 31/850
Tr900 × 7	1 030	975	100	60	25	0.2	31	**HM 30/900**	MS 30/850
Tr900 × 7	1 120	1 030	125	70	38	0.2	33	**HM 31/900**	MS 31/900
Tr950 × 8	1 080	1 025	100	60	25	0.2	34	**HM 30/950**	MS 30/950
Tr950 × 8	1 170	1 080	125	70	38	0.2	35	**HM 31/950**	MS 31/950
Tr1000 × 8	1 140	1 085	100	60	25	0.2	36	**HM 30/1000**	MS 30/1000
Tr1000 × 8	1 240	1 140	125	70	38	02	37	**HM 31/1000**	MS 31/1000
Tr1060 × 8	1 200	1 145	100	60	25	0.2	36	**HM 30/1060**	MS 30/1000
Tr1060 × 8	1 300	1 210	125	70	38	0.2	37	**HM 31/1060**	MS 31/1000
Tr1120 × 8	1 260	1 205	100	60	25	0.2	36	**HM 30/1120**	MS 30/1000

a. Tolerance class 7H, IS 7008 (Part-4) for metric trapezoidal threads.
b. 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

(*Clause* 4.1, 5.4 and 7.3)

Dimensions in millimeters

Locking clipNo.	s [a] ≈	b_1 [b]	h_1	e	d_6	l [c] ≈	G_2	Designation	b_2	h_2	Type of suitable locknut
1	4	20	12	13.5	7	12	M6	MS 3044	20	7.5	HM 3044
2	4	20	12	17.5	9	16	M8	MS 3048	20	7.5	HM 3048, HM 3052
3	4	24	12	17.5	9	16	M8	MS 3056	24	7.5	HM 3056
4	4	24	12	20.5	9	16	M8	MS 3060	24	7.5	HM 3060
5	4	24	12	30.5	12	20	M10	MS 3160	24	7.5	HM 3160

6	5	24	15	21	9	16	M8	MS 3064	24	9	HM 3064, HM 3068
7	5	24	15	31	12	20	M10	MS 3164	24	9	HM 3164
8	5	28	15	38	14	25	M12	MS 3168	28	9	HM 3168, HM 3172
9	5	28	15	20	9	16	M8	MS 3072	28	9	HM 3072
10	5	28	15	24	12	20	M10	MS 3076	28	9	HM 3076, HM 3080
11	5	32	15	40	14	25	M12	MS 3176	32	9	HM 3176
12	5	32	15	45	18	30	M16	MS 3180	32	9	HM 3180, HM 3184
13	5	32	15	24	12	20	M10	MS 3084	32	9	HM 3084
14	5	32	15	28	14	25	M12	MS 3088	32	9	HM 3088, HM 3092
15	5	36	15	43	18	30	M16	MS 3188	36	9	HM 3188, HM 3192
16	5	36	15	28	14	25	M12	MS 3096	36	9	HM 3096, HM 30/500
17	5	36	15	53	18	30	M16	MS 3196	36	9	HM 3196
18	5	40	15	45	18	30	M16	MS 31/500	40	9	HM 31/500
19	7	40	21	34	18	30	M16	MS 30/530	40	12	HM 30/530, HM 30/600
20	7	40	21	51	22	40	M20	MS 31/530	40	12	HM 31/530
21	7	40	21	29	18	30	M16	MS 30/560	40	12	HM 30/560
22	7	45	21	54	22	40	M20	MS 31/560	45	12	HM 31/560, HM 31/600
23	7	45	21	34	18	30	M16	MS 30/630	45	12	HM 30/630
24	7	45	21	39	18	30	M16	MS 30/670	45	12	HM 30/670
25	7	50	21	61	22	40	M20	MS 31/630	50	12	HM 31/630

Table 4 (continued)

Locking clip No.	s^a ≈	$b_1{}^b$	h_1	e	d_6	l^c ≈	G_2	Designation	b_2	h_2	Type of suitable locknut
26	7	50	21	66	22	40	M20	MS 31/670	50	12	HM 31/670
27	7	50	21	39	18	30	M16	MS 30/710	50	13	HM 30/710
28	7	55	21	69	26	50	M24	MS 31/710	55	13	HM 31/710
29	7	55	21	39	18	30	M16	MS 30/750	55	13	HM 30/750, HM 30/800
30	7	60	21	70	26	50	M24	MS 31/750	60	13	HM 31/750, HM 31/800
31	7	60	21	44	22	40	M20	MS 30/850	60	13	HM 30/850, HM 30/900
32	7	70	21	71	26	50	M24	MS 31/850	70	13	HM 31/850
33	7	70	21	76	26	50	M24	MS 31/900	70	13	HM 31/900
34	7	60	21	46	22	40	M20	MS 30/950	60	13	HM 30/950
35	7	70	21	78	26	50	M24	MS 31/950	70	13	HM 31/950
36	7	60	21	51	22	40	M20	MS 30/1000	60	13	HM 30/1000, HM 30/1060
37	7	70	21	88	26	50	M24	MS 31/1000	70	13	HM 31/1000

a. The thickness is only approximate and small variations are permissible.
b. b_1 shall be < b (*see* Fig. 3 and Table 3).
c. The lengths shown correspond to preferred length of the bolt for the screw thread sizes listed; however, variations are permissible.

6 MATERIAL AND METHOD OF MANUFACTURE

Locknuts shall be made from steel with a minimum tensile strength of 350 N/mm². The method of manufacture shall be at the manufacturer's discretion.

Lockwashers and locking clips shall be made from steel with a minimum tensile strength of 300 N/mm², with the method of manufacture being at the manufacturer's discretion.
The screw material shall be at the manufacturer's discretion as per IS 1364(Part 2).

7 DESIGNS

7.1 The following tolerances shall apply for Locknut:

a) External diameter of locknut clamp face, d_1
- Tolerance zone h13 acc. to IS 919 (Part 1)

b) External diameter of locknut, d_2
- Tolerance zone h13 acc. to IS 919 (Part 1)

c) Locknut width, *B*
- Tolerance zone h13 acc. to IS 919 (Part 1)

d) Width of slot in locknut, *b*
- Tolerance zone JS14 acc. to IS 919 (Part 1)

e) Slot bottom spacing, *A*
- Tolerance zone h11 acc. to IS 919 (Part 1)

f) Depth of slot in locknut, h
- Tolerance zone H17 acc. to IS 919 (Part 1)

g) Thread, G
- Metric fine screw thread as specified in IS 14962 (Part 1), tolerance class 6H
- Metric trapezoidal screw thread as specified in IS 7008 (Part 4), tolerance class 7H

h) Workpiece outer edges
- Burrs are not permitted, according to IS 15726

7.2 The following tolerances shall apply for Lockwashers:

a) Bore diameter, d_3
- Tolerance zone C11 acc. to IS 919 (Part 1)

b) External diameter, d_5
- Tolerance zone js17 acc. to IS 919 (Part 1)

c) Root diameter of outer tab, d_4
- Tolerance zone h13 acc. to IS 919 (Part 1)

d) Tab widths, *f* and f_1
- Tolerance zone a15 acc. to IS 919 (Part 1)

e) Clear width, *M*
- Tolerance zone C11 acc. to IS 919 (Part 1)

f) Material thickness, B_7
- Table 2 gives preferred values; minor deviations are permitted.

g) Workpiece outer edges
- Burrs are not permitted, according to IS 15726

7.3 The following tolerances shall apply for locking clips:

a) Clip width, b_1
- Tolerance zone a15 acc. to IS 919 (Part 1)

b) Clip height, h_1
- Tolerance zone js16 acc. to IS 919 (Part 1)

c) Inner width, e:
- Tolerance zone H13 acc. to IS 919 (Part 1)

d) Diameter of hole in locking clip, d6:
- Tolerance ± 0,5 mm acc. to IS 919 (Part 1)

e) Material thickness, *s*:
- Table 4 gives preferred values; minor deviations are permitted.

f) Workpiece outer edges
- Burrs are not permitted, according to IS 15726

g) Fixing screws and securing elements:
- At manufacturer’s discretion.

7.4 The following tolerances shall apply for shaft grooves:

a) Groove width, b_2
- Tolerance zone H11 acc. to IS 919 (Part 1)

b) Groove depth, h_2:
- Tolerance 0 mm to +0,5 mm

8 WORKMANSHIP AND DELIVERY REQUIREMENT

8.1 Visual Inspection

The surfaces of the bore, outside diameter and sides shall be smooth and shall not show any damaged areas.

8.2 Protection against corrosion

The type of protection against corrosion shall be decided by the manufacturer depending on the packing material used. Under proper storage conditions, the anti-corrosive treatment shall be effective for at least 12 months to ensure a satisfactory functioning of the locknut, lockwasher and locking clips, unless otherwise required by the purchaser.

8.2.1 For proper storage conditions, the purchaser may consult the manufacturer.

9 PACKING

Locknut, lockwasher and locking clips shall be packed individually and several pieces may be packed together in suitable containers depending on the size. The packing shall be such as to protect the contents from external influences.

10 MARKING

10.1 Packed containers shall be marked with the following:

a) Manufacturer’s name or trademark.
b) Designation of the Locknut, lockwasher and locking clips.
c) Coded or direct indication of month and year of manufacture
d) Quantity.
e) Country of origin in English (upper case)

10.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

11 SAMPLING AND CRITERIA FOR ACCEPTANCE

Shall be as given in Annex B.

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 Fig. 6.

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 Fig. 6 and the values given in Table 5 denote nominal dimensions, unless noted otherwise.

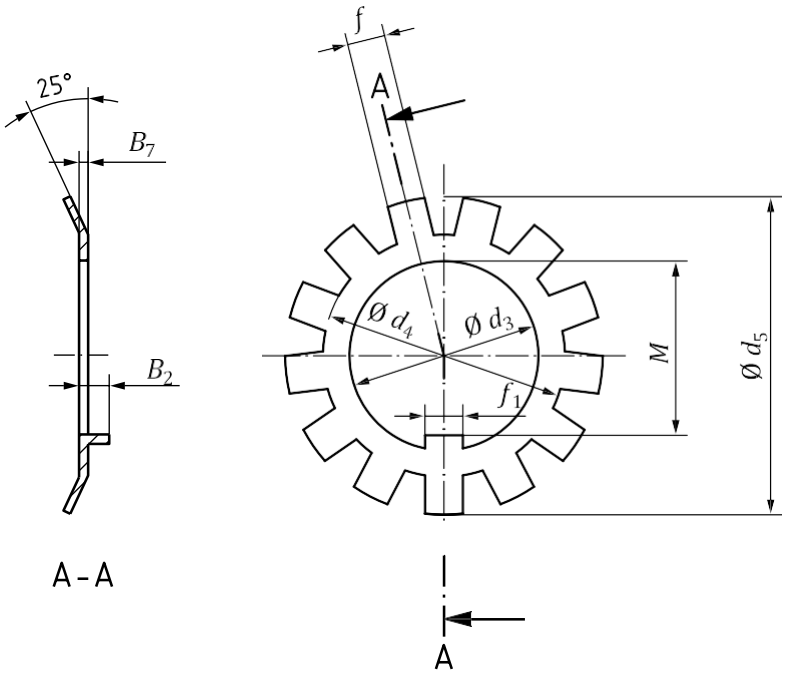


FIG. 6 LOCKWASHER WITH BENT INNER TAB

A.3 Dimensions

Dimensions of lockwashers with bent inner tab are shown in Table 5.

Table 5 Lockwashers with Bent Inner Tab

(*Clause* A.1 and A.3)

Dimensions in millimeters

d_3	d_4	$d_5 \approx$	f_1 max.	M	f [a]	B_2	B_7 [b] $\approx$	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

a f is < b (*see* Fig. 1 and Table 1).
b The thickness is only approximate and small variations are permissible.
c Since the locknut has 4 slots, N is an odd number.

Annex B
(Clause 11)

Sampling and Criteria for Acceptance

B-1 Scale of Sampling

B-1.1 Lot — In any consignment all locknuts, lockwashers and locking clips of the same designation and manufactured under similar conditions of production shall be grouped together to constitute a lot.

B-1.2 Locknuts, lockwashers and locking clips from each lot shall be examined to ascertain its conformity to the requirements of the relevant specification.

B-1.3 Unless otherwise agreed to between the supplier and the purchaser the number of locknuts, lockwashers and locking clips to be selected at random shall be in accordance with col 1 and 2 of Table 6 To ensure randomness, selection methods given in IS 4905 shall be followed.

B-1.4 Number of Tests and Criteria for Conformity

B-1.4.1 The locknuts, lockwashers and locking clips selected according to A-1.3 shall be inspected for dimensions and tolerances, workmanship, surface finish and protection against corrosion. Any locknuts, lockwashers and locking clips failing to meet requirements for any one or more of the above characteristics shall be declared as defective.

B-1.4.1.1 The lot shall be considered conforming to the requirements of the above characteristics, if the number of locknuts, lockwashers and locking clips found defective according to A-1.3 is less than or equal to the corresponding acceptance number given under col 3 of Table 6

Table 6 Scale of Sampling and Criteria for Conformity
(*Clauses* B-1.3, B-1.4.1.1 and B-1.4.2)

Lot Size	Sampling Size	Acceptance Number	Sub-sample Size
(1)	(2)	(3)	(4)
Up to 50	5	0	3
51 to 160	8	0	5
161 to 300	13	0	5
301 to 500	20	0	8
501 to 1 000	32	1	13
1 001 and above	60	1	13

A-1.4.2 If the lot is found satisfactory according to A-1.4.1.1, a number of locknuts, lockwashers and locking clips corresponding to sub-sample size given under col 4 of Table 6 shall be selected and subjected to tensile strength test.

A-1.4.2.1 The lot shall be considered satisfactory to the requirements of the specification if none of the locknuts, lockwashers and locking clips fails to meet the requirement for tensile strength.