

Spherical washers and conical seats

DIN
6319

ICS 21.060.30

Supersedes
October 1997 edition.

Kugelscheiben, Kegelpfannen

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

Foreword

This standard has been prepared by Technical Committee *Grundnormen für Spannzeuge und Vorrichtungen* of the *Normenausschuss Werkzeuge und Spannzeuge* (Tools and Clamping Devices Standards Committee).

Amendments

This standard differs from the October 1997 edition in that it has been editorially revised and the specifications for surface roughness and hardness have been amended.

Previous editions

DIN 6333: 1940-05; DIN 6319: 1935-08, 1944x-07, 1963-04, 1987-04, 1991-09, 1997-10.

All dimensions are in millimetres.

1 Scope

This standard specifies dimensions, the material and design of spherical washers and conical seats. These elements are designed to accommodate bolting forces where such are needed to compensate for clamping faces that are not parallel. Use of spherical washers together with conical seats permits bolts to be inclined up to 3° relative to the axis of the assembly. For slots, such as those in clamps covered in DIN 6314, DIN 6315 and DIN 6316, only type G conical seats shall be used, whilst type D seats are only to be used together with plain washers.

2 Normative references

This 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 titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 13-1	General purpose ISO metric screw threads – Nominal sizes for 1 mm to 68 mm diameter coarse pitch threads
DIN 6314	Straight clamps
DIN 6315	Forked clamps
DIN 6316	Goose neck clamps
DIN 6330	Hexagon nuts with a height of 1,5 <i>d</i>
DIN EN 24014	Hexagon head bolts – Product grades A and B (ISO 4014 : 1988)

Continued on pages 2 to 4.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

DIN EN 24032 Hexagon nuts, style 1 – Product grades A and B (ISO 4032 : 1986)
ISO 2768-1 : 1989 General tolerances – Part 1: Tolerances for linear and angular dimensions without individual tolerance indications

3 Dimensions and designation

Design details left unspecified in figures 1 and 2 shall be selected as appropriate.
General tolerances shall be class m tolerances as in ISO 2768-1.

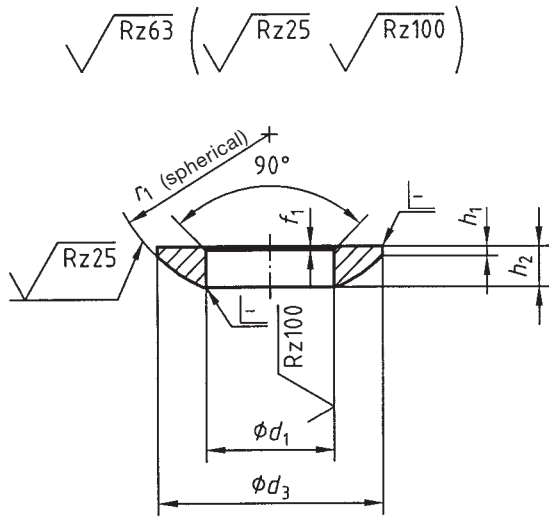


Figure 1: Dimensions of spherical washer (C)
(notation)

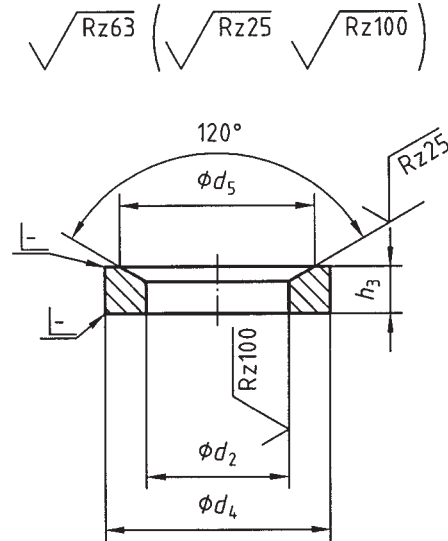


Figure 2: Dimensions of conical seat
(type D: $d_4 = d_3$; type G: $d_4 > d_3$) (notation)

Designation of a spherical washer (C), with $d_1 = 17$ mm:

Spherical washer DIN 6319 – C 17

Designation of a type D conical seat, with $d_2 = 19$ mm:

Conical seat DIN 6319 – D 19

Table 1: Dimensions of spherical washers and conical seats

d_1	d_2	d_3	d_4		d_5	f_1	h_1	h_2	h_3		r_1 (spherical)	Approx. mass, in kg, per 100 units Types			Thread size	Maximum bolting force, in kN
			D	G					D	G		C	D	G		
6,4	7,1	12	12	17	11	0,3	0,7	2,3	2,8	4	9	0,09	0,14	0,56	M6	9
8,4	9,6	17	17	24	14,5	0,5	0,6	3,2	3,5	5	12	0,25	0,38	1,3	M8	17
10,5	12	21	21	30	18,5	0,5	0,8	4	4,2	5	15	0,47	0,65	1,86	M10	26
13	14,2	24	24	36	20	0,5	1,1	4,6	5	6	17	0,71	1,06	3,7	M12	38
15 ¹⁾	16,5 ¹⁾	28	28	40	24,8	0,5	1,2	5	5,6	6	22	1,00	1,80	4,8	M14	53
17	19	30	30	44	26	0,5	1,3	5,3	6,2	7	22	1,23	1,87	7,0	M16	73
21	23,2	36	36	50	31	0,5	2	6,3	7,5	8	27	2,08	3,2	9,4	M20	117
25	28	44	44	60	37	0,8	2,4	8,2	9,5	10	32	4,2	6,3	16,9	M24	168
31	35	56	56	68	49	0,8	3,6	11,2	12	12	41	8,7	13,3	23,8	M30	269
37	42	68	68	–	60	1	4,6	14	15	–	50	18,4	23,6	–	M36	394
43	49	78	78	–	70	1	6,5	17	18	–	58	29,7	36,5	–	M42	542
50	56	92	92	–	82	1	8	21	22	–	67	52,5	64,1	–	M48	714

¹⁾ This size is compatible with M14 external thread, series 2, as specified in DIN 13-1.

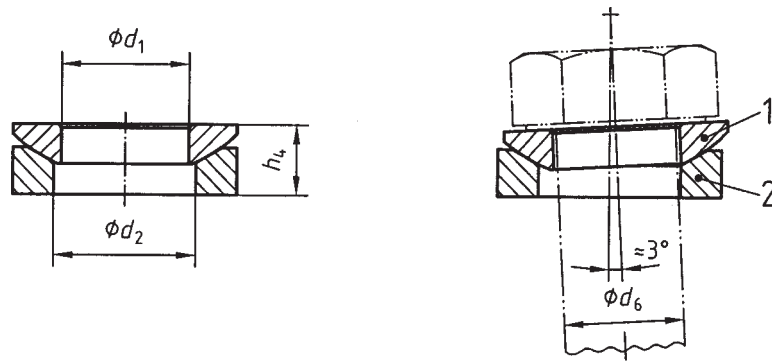
4 Material

Spherical washers and type D conical seats shall be made of case hardening steel and type G seats of steel for quenching and tempering, the grade being at the manufacturer's discretion.

5 Hardness

Spherical washers and type D conical seats shall be case hardened to a depth of $(0,2 + 0,2)$ mm (450 HV 1), with a hardness of $(550 + 100)$ HV 10. Type G seats shall be quenched and tempered and have a hardness of $(350 + 80)$ HV 30.

6 Connecting dimensions



Key to figure

- 1 Spherical washer
- 2 Conical seat (type D)

Figure 3: Spherical washer/conical seat combinations

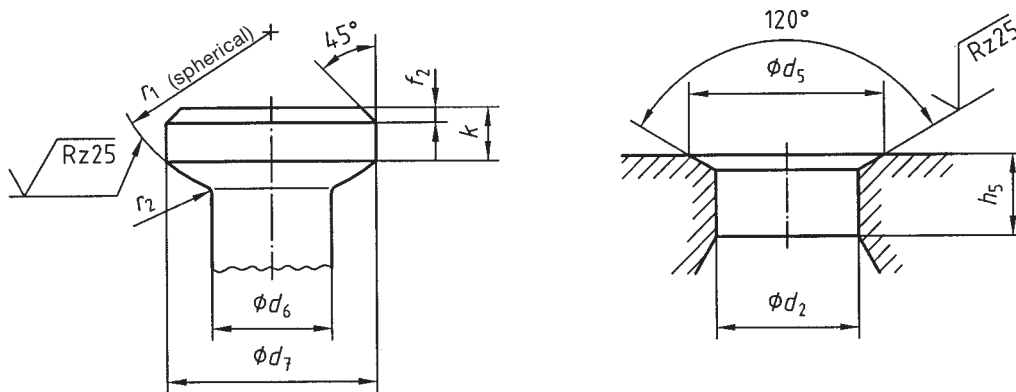


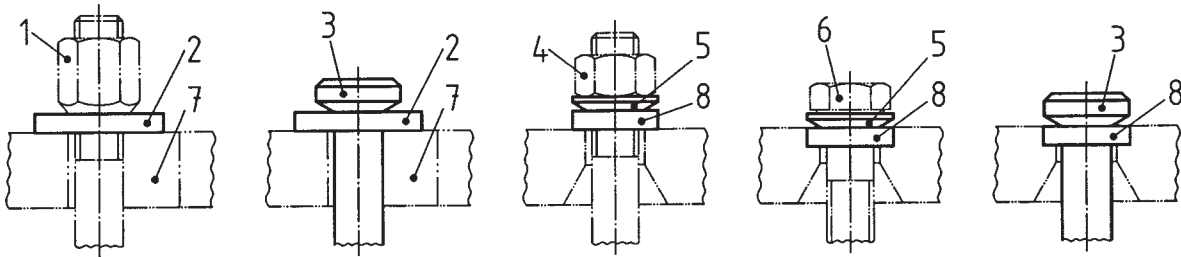
Figure 4: Clamping bolt head and countersunk hole

Table 2: Connecting dimensions

d_1 H13	d_2 H13	d_5	d_6	d_7	f_2	$h_4^{1)}$ (approx.) with conical seat of type		$h_5^{2)}$	k	r_1 (spher- ical)	r_2
						D	G				
6,4	7,2	11	6	12	1	4,2	5,4	3,3	3	9	0,3
8,4	9,6	14,5	8	16	1,5	5,6	7,1	5,5	3,2	12	0,5
10,2	12	18,5	10	20	2	6,5	7,3	7,1	4	15	0,5
13	14,2	20	12	22	2	8	9	6,2	5	17	1
15	16,5	24,8	14	25	2	8,5	9,5	7	6	22	1
17	19	26	16	28	2	9,6	10,4	10,7	7	22	1
21	23,2	31	20	34	2	11,7	12,2	8,4	9	27	1
25	28	37	24	40	2	15,2	15,7	12,9	10,5	32	1,6
31	35	49	30	52	2	19,2	19,7	14,5	12,5	41	1,6
37	42	60	36	64	3	23,5	–	16,8	15	50	1,6
43	49	70	42	74	3	29	–	20	17	58	1,6
50	56	82	48	86	3	35,5	–	22,5	19	67	2

1) Average workshop values based on tolerance class m as specified in ISO 2768.

2) This dimension enables the bolt to be inclined up to approximately 3° relative to the axis of the assembly.



Key to figure

- | | |
|-------------------------------------|--|
| 1 Type B hexagon nut as in DIN 6330 | 5 Spherical washer |
| 2 Type G conical seat | 6 Hexagon head bolt as in DIN EN 24014 |
| 3 Clamping bolt head | 7 Slot |
| 4 Hexagon nut as in DIN EN 24032 | 8 Type D conical seat |

Figure 5: Examples of application