
British Standard Specification for
**Insulator and conductor fittings
for overhead power lines**

**Part 3. Dimensions of ball and socket couplings
of string insulator units**

Accessoires pour les isolateurs et les conducteurs pour lignes aériennes

Partie 3. Dimensions des assemblages à rotule et logement de rotule des éléments de chaînes d'isolateurs

Freileitungsarmaturen

Teil 3. Maße von Klöppel-Pfannen-Verbindungen von Kettenisolatoren

Foreword

This Part of BS 3288 has been prepared under the direction of the Power Electrical Engineering Standards Committee. It is technically equivalent to IEC 120 : 1984, published by the International Electrotechnical Commission (IEC), except that the more compact British design of the size 28 coupling has been added as size 28B.

This Part of BS 3288 implements CENELEC Harmonization Document HD 474 and includes the 28B ball and socket coupling which the UK has been permitted to retain as a national type.

It is not envisaged that split-pins will be used in 28B couplings and the dimensions of the corresponding holes have not been included.

For ease of production the text of the IEC publication has been used. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

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British Standard Specification for

Insulator and conductor fittings for overhead power lines

Part 3. Dimensions of ball and socket couplings of string insulator units

1. Scope

This standard applies to string insulator units of the cap and pin and long rod types and their associated metal fittings.

2. Object

The object of this standard is to define the dimensions of a series of standard ball and socket couplings using the standard locking devices (see BS 3288 : Part 4) in order to permit the assembly of insulators or metal fittings supplied by different manufacturers.

Note. — Only the dimensions necessary for assembly are dealt with in this standard. Properties of material and working loads are not specified. The co-ordination of dimensions with strength classes is specified in BS 137 : Part 2.

3. Plan of the standard

This standard includes standard sizes designated by the nominal pin diameters which form the basis of the standard. Each standard size is defined by the dimensions of the pin ball, of the socket and of the hook-on “GO” gauge specified in Clauses 9 to 11. Dimensions of twin-balled pins for coupling of two sockets are stated in Clause 12. Clearance and locking conditions are tabulated in Clauses 13 and 14. Dimensions of the hole for the locking device are stated in Clauses 15 and 16.

All dimensions are expressed in millimetres.

For the pin ball and the socket, dimensions apply to the finished product after any surface treatment.

Extreme positions of the pin ball in the socket are given in Appendix A.

Typical examples of gauges for checking the dimensions of pin balls and sockets are given in Appendix B.

4. Pin ball

The pin ball shall conform to the dimensions specified in Clause 9. The main dimensions governing the shape of the pin ball are h_1 , d_2 , r_1 and r_2 . Dimension r_3 is given for guidance because its accurate value may be obtained only by the drawing. In addition, the shank diameter d_1 , shall not exceed the specified values within a length equal to H_3 of the corresponding worn hook-on “GO” gauge (see Clause 11).

Note. — There are two designs for the 28 mm ball and socket coupling. The one adopted by IEC is listed in this standard as “28”; the more compact British design is listed as “28B”. The 28B coupling is available only with a W-clip.

5. Socket

The socket interior shall conform to the dimensions specified in Clause 10, which also specifies the minimum thickness of the locking device.

- Notes 1.* — Sockets according to the clause mentioned are shown with flat bottoms. Sockets with rounded bottoms with radii of curvature not less than the dimensions r_2 of the pin balls can also be used. In this case, the dimensions R_5 have to be correspondingly decreased.
2. — The 16 mm standard size according to Clause 10 includes two alternative sockets. The reason for this is that, on the one hand, there is a need for a socket fitting exactly the standard pin ball and its predecessors with $r_1 = 23$ (alternative A) and, on the other hand, there is a need for a socket also accepting pin balls with $r_2 = 50$ (alternative B). Alternative A and alternative B are identical except for dimensions H_1 , H_2 and T . Alternative A, having the smaller dimensions, is preferable where assembly with existing pin balls does not require alternative B.
3. — See Note to Clause 4 for an explanation of 28 and 28B couplings.

6. Hook-on “GO” gauge

The external dimensions of the socket have not been laid down. However, the socket shall permit acceptance of the hook-on “GO” gauge according to Clause 11.

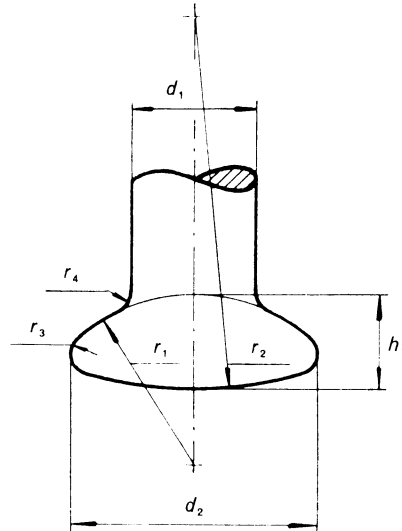
7. Lower part of the insulator

The shape of the lower part of the insulator shall be such that assembly with the socket of maximum external dimensions according to Clause 6 will always be possible.

8. Locking device

The locking device, i.e. a split-pin or W-clip, shall be designed for locking the minimum-size pin ball in the maximum size socket. This requirement is fulfilled if the locking devices standardized in BS 3288 : Part 4 are used.

9. Dimensions of the pin ball

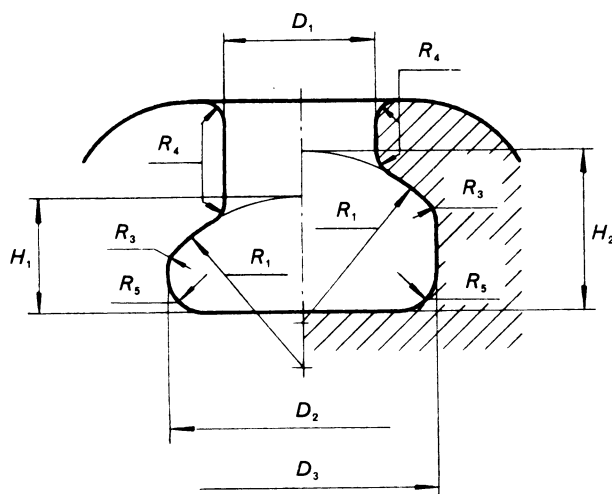


Designated size of coupling	d_1	d_2	h_1	r_1	r_2	r_3^*	r_4
11	$11,9 \begin{smallmatrix} 0 \\ -1,1 \end{smallmatrix}$	$22,8 \begin{smallmatrix} 0 \\ -1,3 \end{smallmatrix}$	$9,1 \begin{smallmatrix} 0 \\ -1,2 \end{smallmatrix}$	35	35	3,5	$1,5 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$
16	$17 \begin{smallmatrix} 0 \\ -1,2 \end{smallmatrix}$	$33,3 \begin{smallmatrix} 0 \\ -1,5 \end{smallmatrix}$	$13,4 \begin{smallmatrix} 0 \\ -1,3 \end{smallmatrix}$	23	50	3	$3 \begin{smallmatrix} +1 \\ -0,5 \end{smallmatrix}$
20	$21 \begin{smallmatrix} 0 \\ -1,3 \end{smallmatrix}$	$41 \begin{smallmatrix} 0 \\ -1,6 \end{smallmatrix}$	$19,5 \begin{smallmatrix} 0 \\ -1,4 \end{smallmatrix}$	27	60	5,7	$3,5 \begin{smallmatrix} +1 \\ -1 \end{smallmatrix}$
24	$25 \begin{smallmatrix} 0 \\ -1,4 \end{smallmatrix}$	$49 \begin{smallmatrix} 0 \\ -1,8 \end{smallmatrix}$	$21 \begin{smallmatrix} 0 \\ -1,7 \end{smallmatrix}$	40	70	6,6	$4 \begin{smallmatrix} +1,5 \\ -1,0 \end{smallmatrix}$
28 ¹⁾	$29 \begin{smallmatrix} 0 \\ -1,5 \end{smallmatrix}$	$57 \begin{smallmatrix} 0 \\ -1,9 \end{smallmatrix}$	$23,5 \begin{smallmatrix} 0 \\ -1,8 \end{smallmatrix}$	55	80	8	$4,5 \begin{smallmatrix} +1,5 \\ -1,0 \end{smallmatrix}$
28B ¹⁾	$29 \begin{smallmatrix} 0 \\ -1,5 \end{smallmatrix}$	$56 \begin{smallmatrix} 0 \\ -1,8 \end{smallmatrix}$	$21 \begin{smallmatrix} 0 \\ -1,7 \end{smallmatrix}$	50	100	64	$4,5 \begin{smallmatrix} +1,5 \\ -1,0 \end{smallmatrix}$
32	$33 \begin{smallmatrix} 0 \\ -1,6 \end{smallmatrix}$	$65 \begin{smallmatrix} 0 \\ -2,1 \end{smallmatrix}$	$27 \begin{smallmatrix} 0 \\ -1,9 \end{smallmatrix}$	70	90	10	$5 \begin{smallmatrix} +1,5 \\ -1,0 \end{smallmatrix}$

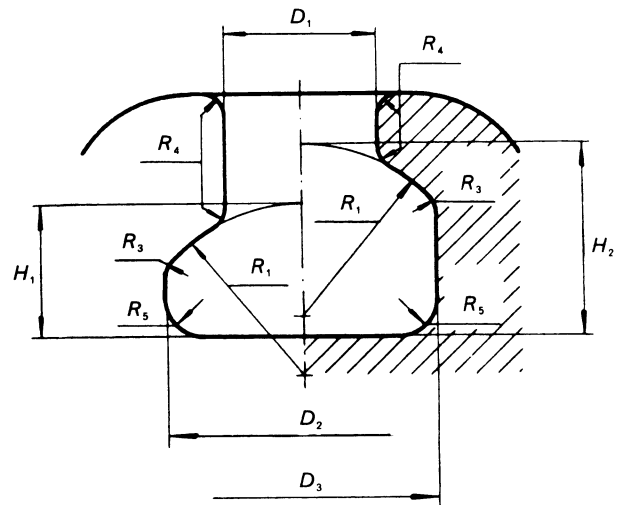
* Given for guidance.

¹⁾ See Note to Clause 4.

10. Dimensions of the socket end



Coupling 11, 16A, 24, 28B



Coupling 16B, 20, 28, 32

Designated size of coupling	D_1	D_2	D_3	H_1	H_2 for W-clips and alternative split-pins	$H_2^{(3)}$ for standard split-pins	R_1	R_3	R_4	R_5	$T^{(2)}$
		Min.	Min.		Min.	Min.					Min.
11	$12,5 + \frac{1,3}{0}$	24,5	24,5	$10,5 + \frac{1,3}{0}$	15,5	16,3	35	4	1,5	4	4,8
16A ¹⁾	$19,2 + \frac{1,6}{0}$	34,5	34,5	$14,5 + \frac{1,6}{0}$	20,5	21,6	23	3	3	5	5,5
16B ¹⁾	$19,2 + \frac{1,6}{0}$	34,5	34,5	$17 + \frac{1,6}{0}$	25	25,5	23	3	3	5	7,9
20	$23 + \frac{2,1}{0}$	42,5	42,5	$20,5 + \frac{2,1}{0}$	28,5	29,3	27	6	3,5	7	7,0
24	$27,5 + \frac{2,5}{0}$	51	51	$23,5 + \frac{2,5}{0}$	32,5	33,5	40	5	4	10	8,7
28 ⁴⁾	$32 + \frac{2,9}{0}$	59	59	$26 + \frac{2,9}{0}$	36,5	37,4	55	8	4,5	12	10
28B ⁴⁾	$31,5 + \frac{2,5}{0}$	58	58	$23,5 + \frac{2,5}{0}$	32,5	—	50	5	5	10	8,7
32	$36 + \frac{3,3}{0}$	67,5	67,5	$30 + \frac{3,3}{0}$	42	43	70	10	5	14	11,5

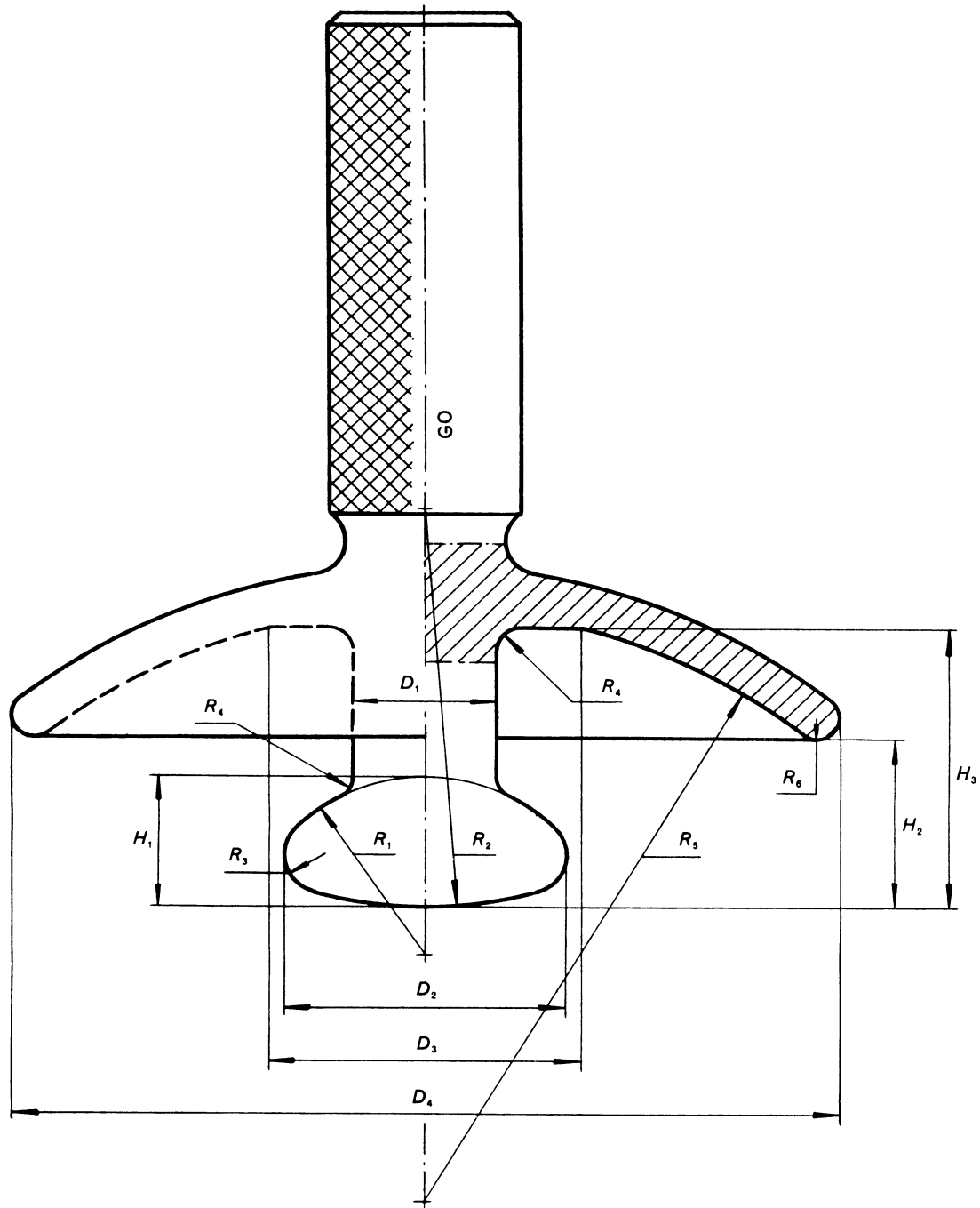
1) See Note 2 to Clause 5.

2) Thickness of the locking device.

3) A greater value is given because in this case the split-pin does not always rest on the bottom of the socket. The position of the standard split-pin is determined by the position H_3 of the centre of the hole and its diameter D_4 (see Clause 15) and dimension F_2 (see BS 3288 : Part 4) and is also influenced by the tips of the legs resting in contact with the socket. The values of H_2 ensure the correct clearances for split-pins.

4) See Note to Clause 4.

11. Dimensions of the hook-on “GO” gauge



Designated size of coupling	Gauge		D_1	D_2	D_3	D_4	H_1	H_2	H_3	R_1	R_2	R_3	R_4	R_5	R_6
11	New	Max. contour ¹⁾	12,000	22,950	25,322	60,15	9,250	17,775	23,775	35,075	35,075	3,631	1,450	49,70	2,80
		Nominal contour	11,980	22,920	25,348	59,95	9,220	17,860	23,860	35,060	35,060	3,616	1,460	49,80	2,70
		Min. contour ¹⁾	11,960	22,890	25,374	59,75	9,190	17,945	23,945	35,045	35,045	3,601	1,470	49,90	2,60
	Worn ²⁾		11,900	22,800	25,400	59,55	9,100	18,000	24,000	35,000	35,000	3,556	1,500	50,00	2,50
16	New	Max. contour ¹⁾	17,122	33,490	35,326	90,59	13,572	20,686	31,786	23,086	50,086	3,071	2,939	71,70	2,80
		Nominal contour	17,096	33,450	35,351	90,39	13,536	20,768	31,868	23,068	50,068	3,055	2,952	71,80	2,70
		Min. contour ¹⁾	17,070	33,410	35,376	90,19	13,500	20,850	31,950	23,050	50,050	3,039	2,965	71,90	2,60
	Worn ²⁾		17,000	33,300	35,400	89,99	13,400	20,900	32,000	23,000	50,000	2,993	3,000	72,00	2,50
20	New	Max. contour ¹⁾	21,150	41,220	45,484	120,95	19,702	25,551	42,151	27,101	60,101	5,845	3,425	89,55	3,45
		Nominal contour	21,120	41,170	45,523	120,65	19,656	25,678	42,278	27,078	60,078	5,824	3,440	89,70	3,30
		Min. contour ¹⁾	21,090	41,120	45,561	120,35	19,610	25,805	42,405	27,055	60,055	5,803	3,455	89,85	3,15
	Worn ²⁾		21,000	41,000	45,600	120,05	19,500	25,900	42,500	27,000	60,000	5,753	3,500	90,00	3,00
24	New	Max. contour ¹⁾	25,172	49,250	50,490	140,90	21,242	25,971	46,171	40,121	70,121	6,732	3,914	104,55	3,45
		Nominal contour	25,136	49,190	50,527	140,60	21,186	26,093	46,293	40,093	70,093	6,706	3,932	104,70	3,30
		Min. contour ¹⁾	25,100	49,130	50,564	140,30	21,130	26,215	46,415	40,065	70,065	6,680	3,950	104,85	3,15
	Worn ²⁾		25,000	49,000	50,600	140,00	21,000	26,300	46,500	40,000	70,000	6,615	4,000	105,00	3,00
28 ³⁾	New	Max. contour ¹⁾	29,190	57,290	66,870	165,94	23,770	29,100	51,100	55,135	80,135	7,994	4,414	129,55	3,45
		Nominal contour	29,150	57,215	66,915	165,64	23,708	29,250	51,250	55,104	80,104	7,967	4,432	129,70	3,30
		Min. contour ¹⁾	29,110	57,140	66,960	165,34	23,646	29,400	51,400	55,073	80,073	7,938	4,450	129,85	3,15
	Worn ²⁾		29,000	57,000	67,000	165,04	23,500	29,500	51,500	55,000	80,000	7,864	4,500	130,00	3,00
28B ³⁾	New	Max. contour ¹⁾	29,190	56,280	79,850	170,90	21,242	28,000	43,900	50,130	100,150	6,473	4,914	169,55	3,45
		Nominal contour	29,150	56,210	79,900	170,60	21,186	28,101	44,000	50,100	100,100	6,448	4,932	169,70	3,30
		Min. contour ¹⁾	29,110	56,140	79,950	170,30	21,130	28,203	44,100	50,070	100,050	6,423	4,950	169,85	3,15
	Worn ²⁾		29,000	56,000	80,000	170,00	21,000	28,305	44,200	50,000	100,000	6,360	5,000	170,00	3,00
32	New	Max. contour ¹⁾	33,220	65,310	85,800	198,45	27,300	34,000	61,400	70,150	90,150	9,719	4,914	149,55	3,45
		Nominal contour	33,170	65,230	85,850	198,22	25,225	34,175	61,600	70,112	90,113	9,683	4,932	149,70	3,30
		Min. contour ¹⁾	33,120	65,150	87,900	197,98	27,150	34,350	61,800	70,075	90,075	9,647	4,950	149,85	3,15
	Worn ²⁾		33,000	65,000	86,000	197,83	27,000	34,500	62,000	70,000	90,000	9,572	5,000	150,00	3,00

¹⁾ The contour of the new gauge should fall between the maximum and minimum contours.

²⁾ See Clause B1.

³⁾ See Note to Clause 4.