BS 3288-2:2009

BSI British Standards

Insulator and conductor fittings for overhead power lines

Part 2: Specification for a range of insulator fittings

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Contents

List of tables

Summary of pages
This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 88, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 3288 is published by BSI and came into effect on 31 May 2009. It was prepared by Technical Committee PEL/11, *Overhead lines*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This part of BS 3288 supersedes BS 3288-2:1990, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes.

- Errors in figures and tables identified in the previous edition have been corrected and proposed amendments where appropriate included.
- Where fittings were previously shown with a clevis pin, washer and split pin, a hex. bolt, nut and split pin is now shown in accordance with the current UK industry preferred practice, and the suffix "A" has been added to the reference number. The option of using a clevis pin, washer and split pin has, however, been retained.
- A number of new insulator fittings that are in common use have been included, for example; 70 kN socket thimbles, 70 kN and 125 kN cranked/parallel links, 300 kN and 400 kN ball-clevis/clevis-tongue fittings, 190 kN and 300 kN yoke plates, 300 kN and 400 kN sag adjuster sets. Some insulator fittings that have become obsolete, or have limited use, have been excluded.

NOTE This standard sets out to cover the more common insulator fittings in use. It is not practical to include every type of insulator fitting as the range is too extensive.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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1 Scope

This part of BS 3288 specifies requirements for a range of insulator fittings for overhead power lines and also includes typical suspension clamps for conductors.

The dimensions are given in Figures 1 to 91 and Tables 1 to 39.

2 Normative references

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

BS 916, *Specification for black bolts, screws and nuts, hexagon and square, with B.S.W. threads and partly machined bolts, screws and nuts, hexagon and square, with B.S.W. or B.S.F. threads* [1)]

BS 1574, *Specification for split pins (inch series)*

BS 3288-1, *Insulator and conductor fittings for overhead power lines – Part 1: Performance and general requirements* [1)]

BS 3643-2, *ISO metric screw threads – Part 2: Specification for selected limits of size*

BS 4190, *ISO metric black hexagon bolts, screws and nuts – Specification*

BS 4320, *Specification for metal washers for general engineering purposes – Metric series*

BS EN 60372, *Locking devices for ball and socket couplings of string insulator units – Dimensions and tests*

BS EN 61284, *Overhead lines – Requirements and tests for fittings*

BS EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

BS EN ISO 3651-2, *Determination of resistance to intergranular corrosion of stainless steels – Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels – Corrosion test in media containing sulfuric acid*

IEC 60120, *Dimensions of ball and socket couplings of string insulator units*

3 Performance and general requirements

The fittings shall conform to the appropriate requirements of BS EN 61284.

[1)] Obsolescent.

4 Dimensions and tolerances

The following tolerances shall apply to the dimensions given in Figures 1 to 89 and Tables 1 to 39, except for dimensions given in parentheses or indicated by the suffix "max." or "min." or for dimensions for gauged parts, gauges or screw threads (see Clause **6**, Clause **7** and Clause **8**).

- Dimensions up to and including 35 mm: ±0.7 mm.
- Dimensions greater than 35 mm: ±2%.

NOTE Dimensions shown in parentheses are given for guidance only.

All dimensions except diameters of bolts and pins, thicknesses of rolled plates and widths and thicknesses of rolled rectangular material shall apply after galvanizing. For the exceptions stated, the dimensions shall apply before galvanizing. All holes shall be parallel sided.

5 Galvanizing

All ferrous components shall be hot dip galvanized in accordance with BS EN ISO 1461.

6 Insulator pins

6.1 Reference numbers

The reference number for each type of insulator pin and each type of head shall be as given in Table 1.

6.2 Dimensions

The dimensions of every insulator pin shall be in accordance with the appropriate figure, as given in Table 1.

6.3 Gauges

The accuracy of the dimensions of the head shall be checked after galvanizing by means of the gauge referred to in Table 1 and shown in Figure 6.

6.4 Shanks

The thread on the shank, before galvanizing, shall be ISO metric coarse pitch series "free" class (8g) conforming to BS 3643-2. The effective thread on the shank shall be not less than 45 mm long for the 50 mm shank and not less than 75 mm long for the 130 mm shank.

NOTE For the purposes of this subclause, "effective thread" means that the thread, after galvanizing, takes a nut for the distance stated.

6.5 Nuts

The external dimensions of the nut, before galvanizing, shall conform to BS 4190 and it shall have a thread, cut after galvanizing, conforming to BS 3643-2, but sufficiently oversize to accommodate the threaded part of the galvanized shank, as specified in **6.4**. The

increase in diameter to conform to this requirement shall not however exceed 0.4 mm. The threads of nuts shall be oiled.

6.6 Failing loads

The minimum failing load of the pin shall be 0.7 kN (pilot pins only), 5 kN or 10 kN, as given in Table 1.

Table 1 **Insulator pins**

Head				Type of pin	Stalk length	Shank		Minimum failing load with standard mounting arrangement (see BS 3288-1 [2])	Pin reference number	Pin figure number
Description	Reference number and figure number	Gauges				Diameter	Length			
		Reference number	Figure number							
					mm	mm	mm	kN		
Small steel	15 Figure 1	15R	6	Line	165	18	50 or 130	10	23	3
				Pilot	500	20	50 or 150	0.7	49	5
Large steel	16 Figure 2	16R	6	Line	165	18	50 or 130	5	26	4
								10	27	4
					230	**22**	**50** or 130	5	28	4
								10	**29**	**4**
					305	**22**	**50** or 130	5	30	4
								10	**31**	**4**
				Pilot	**400**	**20**	**50** or 150	**0.7**	**45**	**5**
					500	**20**	**50** or 150	**0.7**	**50**	**5**

NOTE 1 Underlined bold characters represent preferred British practice.

NOTE 2 The stalk and shank lengths of pilot pins are measured above and below the bottom face of the top nut (see Figure 5).

NOTE 3 A washer is required if an insulator pin with a 50 mm shank is to be used with a crossarm 7 mm or less in thickness.

7 Line post insulator studs

7.1 Studs

The shank length shall be measured below the seating surface of the metal base. The thread on the stud, before galvanizing, shall be ISO metric coarse pitch series "free" class (8g) conforming to BS 3643-2. The effective thread on the stud shall be not less than 45 mm long for the 50 mm shank and not less than 75 mm long for the 130 mm shank.

NOTE 1 The preferred diameter of line post insulator studs is 22 mm, with alternative shank lengths of 50 mm and 130 mm.

NOTE 2 For the purposes of this subclause, "effective thread" means that the thread, after galvanizing, takes a nut for the distance stated.

NOTE 3 When line post insulator studs are ordered separately, care should be taken to ensure that the upper part of the stud is suitable for the insulator.

[2] Obsolescent.

7.2 Nuts

The external dimensions of nuts before galvanizing shall conform to BS 4190 and they shall have threads, cut after galvanizing, conforming to BS 3643-2 but sufficiently oversize to accommodate the threaded part of the galvanized pin shank as specified in **6.4**. The increase in diameter to meet this requirement shall not however exceed 0.4 mm. The threads of nuts shall be oiled.

8 Insulator set fittings

NOTE The reference number assigned to each type of insulator set fitting is given in Annex A and, for convenience, a list of fittings in order of reference numbers is given in Annex B.

8.1 Marking

All insulator set fittings shall be marked before galvanizing in accordance with BS EN 61284.

8.2 Dimensions

The dimensions of insulator set fittings shall be as given in the appropriate table and figure.

NOTE Dimensional variations may be agreed between the supplier and purchaser providing such variations do not affect the function, interchangeability, electrical performance or mechanical strength of the fitting or string.

8.3 Ball and socket couplings

Where fittings are provided with ball and socket couplings, the dimensions of the ball and socket shall be as given in IEC 60120 for the appropriate size of coupling. The dimensions of ball or socket shall be checked by means of the gauges described in IEC 60120.

8.4 Failing loads

The minimum failing load of the fitting shall be as given in Figures 7 to 78 and/or the appropriate tables.

8.5 Bolts and nuts

Where bolts and nuts are supplied as parts of clevis-ended fittings (as provided for in the relevant figures), the bolts shall be ISO metric hexagon bolts conforming to BS 4190 before galvanizing. In addition, bolts shall have screwed length and cross drilling dimensions as given in Figure 91 and Table 39, except arcing horn bolts which are not covered by Figure 91. The thread lengths of arcing horn bolts shall conform to BS 4190 and the bolts shall be fitted with a plain washer and two full nuts.

The external dimensions of the nuts, before galvanizing, shall conform to BS 4190 and the bolts shall have threads, cut after galvanizing, conforming to BS 3643-2 but sufficiently oversize to accommodate the galvanized bolts. The increase in diameter to meet this requirement shall not however exceed 0.4 mm. The threads of nuts shall be oiled.

8.6 Washers

When washers are supplied they shall have dimensions before galvanizing as given in BS 4320.

8.7 Split pins

Split pins shall conform to BS 1574 and shall be of austenitic stainless steel capable of conforming to the intergranular corrosion test requirements of BS EN ISO 3651-2, Method A. In addition, split pin sizes shall be as given in Figure 90 (and Table 38) and Figure 91 (and Table 39).

8.8 Security clips

Socket type fittings shall be supplied complete with security clips conforming to BS EN 60372.

9 Suspension clamps and termination fittings

Suspension clamps and termination fittings are not completely standardized dimensionally, however, typical suspension clamps are illustrated in Figure 77 and Figure 78.

NOTE Termination fittings are no longer included in this standard. Purchasers should specify the type and size of coupling required, i.e. ball, socket, clevis or tongue, with appropriate dimensions where applicable.

General notes on figures and tables

*NOTE 1 Dimensions given in parentheses are for guidance only. All other dimensions are subject to the tolerances given in Clause **4**.*

NOTE 2 Where the geometric form of the contour of a component is not fully specified by, or capable of being deduced from, the dimensions given, it will suffice for the form to approximate to that shown in the figure.

NOTE 3 First angle projection is used throughout.

NOTE 4 Spacing dimensions of socket-ended fittings should be checked with a ball in the socket. The GO gauge ball detailed in IEC 60120 should be used for this purpose.

NOTE 5 For clarity, the hex. bolt has been omitted from one view of each clevis-ended fitting.

NOTE 6 Where fittings are available with either a hex. bolt, nut and split pin or cotter pin, washer and split pin, the hex. bolt option has been shown as being the current UK industry preferred practice, and the suffix "A" has been added to the reference number in accordance with existing convention. If cotter pins are required the suffix "A" should be removed from the reference number. Some fittings in the past were allocated a suffix "A", "B" or "C" to the reference number to denote minor differences. When one of these fittings is supplied with a hex. bolt the suffix becomes "AA", "BA" or "CA".

NOTE 7 In Figure 11, Figure 13, Figure 15, Figure 17, Figure 18, Figure 19 and Figures 21 to 27, both holes and registration ledges are shown for use with arcing horns. It is intended that the ledges should be, as far as is practicable, at right angles to the fixing face.

NOTE 8 Details of bolts, pins and split pins are given in Figure 90 and Figure 91.

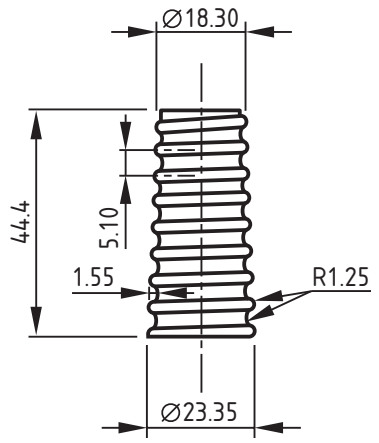
NOTE 9 Ball and socket couplings are designated in IEC 60120, which gives the detailed dimensions and gauges to be used.

NOTE 10 The dimensions of security clips are given in BS EN 60372, which also includes test requirements.

NOTE 11 Typical arrangements of sag adjuster assemblies are shown in Figure 79, Figure 80, Figure 81, Figure 82 and Figure 83.

Figure 1 **Dimensions of small steel insulator pin head**
(see Table 1, reference number 15)

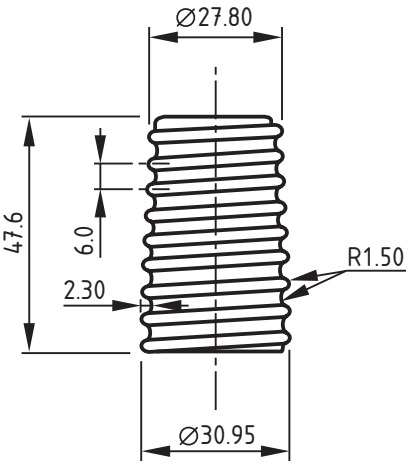
Dimensions in millimetres



*NOTE Insulator pin heads are subject to gauging (see **6.3**).*

Figure 2 **Dimensions of large steel insulator pin head**
(see Table 1, reference number 16)

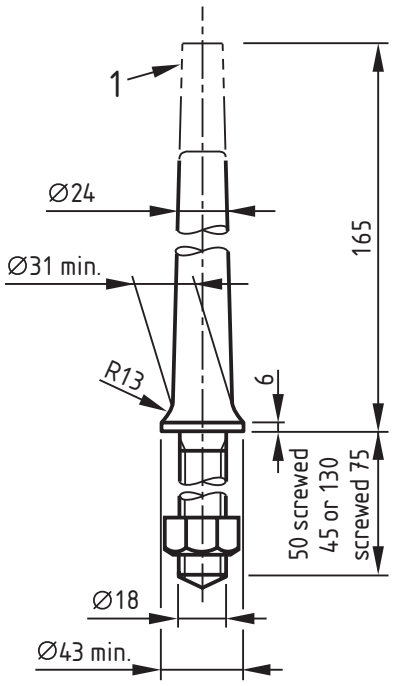
Dimensions in millimetres



*NOTE Insulator pin heads are subject to gauging (see **6.3**).*

Figure 3 **Insulator pin with small steel head: reference number 23**
(minimum failing load 10 kN)

Dimensions in millimetres

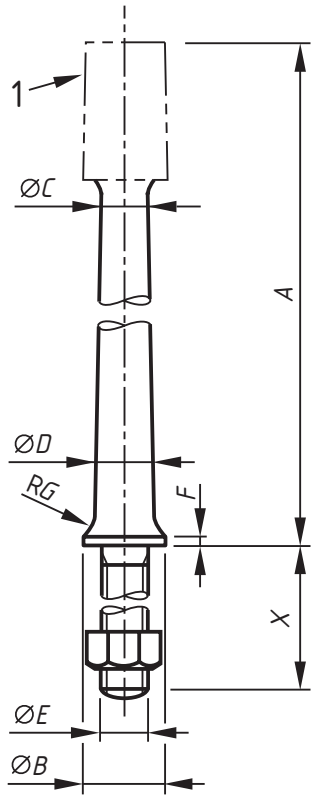


Key

1 Small steel head

NOTE A washer is required if an insulator pin with a 50 mm shank is to be used with a crossarm 7 mm or less in thickness.

Figure 4 **Insulator pin with large steel head**



Key

1 Large steel head

NOTE A washer is required if an insulator pin with a 50 mm shank is to be used with a crossarm 7 mm or less in thickness.

Table 2 **Dimensions of insulator pin with large steel head**

Reference number	**Minimum failing load** kN	***A*** mm	***ØB*** min. mm	***ØC*** mm	***ØD*** min. mm	***ØE*** mm	***F*** mm	**(R*G*)** mm	***X*** [A] mm
26	5	165	37	24	24	18	5	13	50 or 130
28	5	230	40	24	28	22	6	13	50 or 130
30	5	305	43	24	31	22	6	13	50 or 130
27	10	165	43	24	31	18	6	13	50 or 130
29	10	230	50	25	37	22	6	13	50 or 130
31	10	305	63	27	40	22	6	16	50 or 130

[A] Dimension *X* to be 50 mm screwed 45 mm, or 130 mm screwed 75 mm.

Figure 5 **Pilot insulator pin**

Dimensions in millimetres

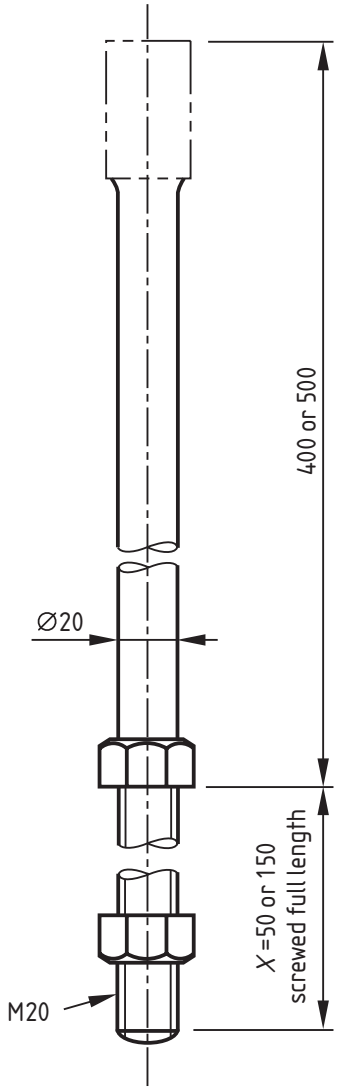


Table 3 **Details of pilot insulator pin**

Reference number of pin		**Type of head**	**Reference number of head** (see Figures 1 and 2)
Length			
400 mm	**500 mm**		
—	49	Small steel	15
45	50	Large steel	16

Figure 6 **Ring gauge for head of insulator pin**

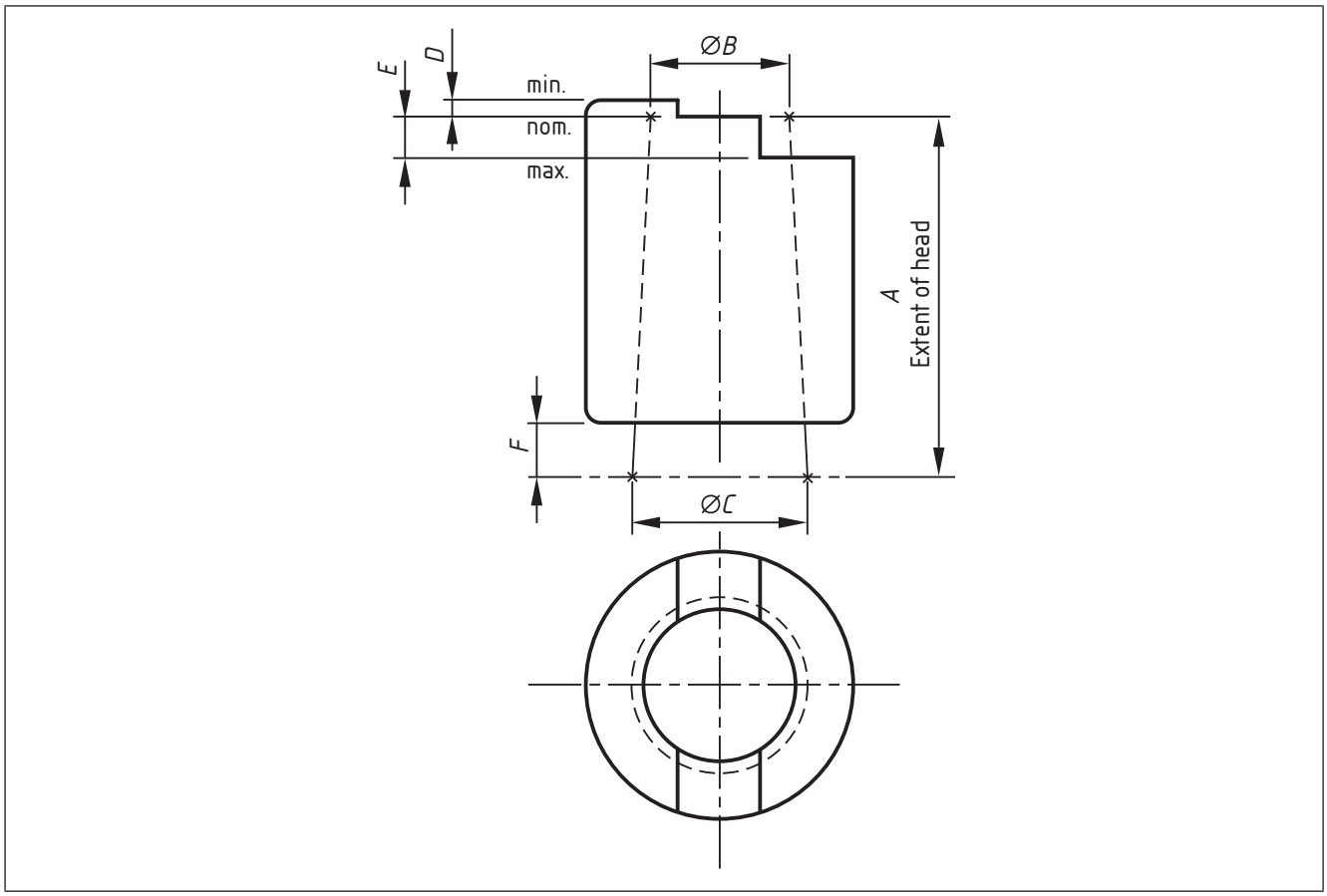


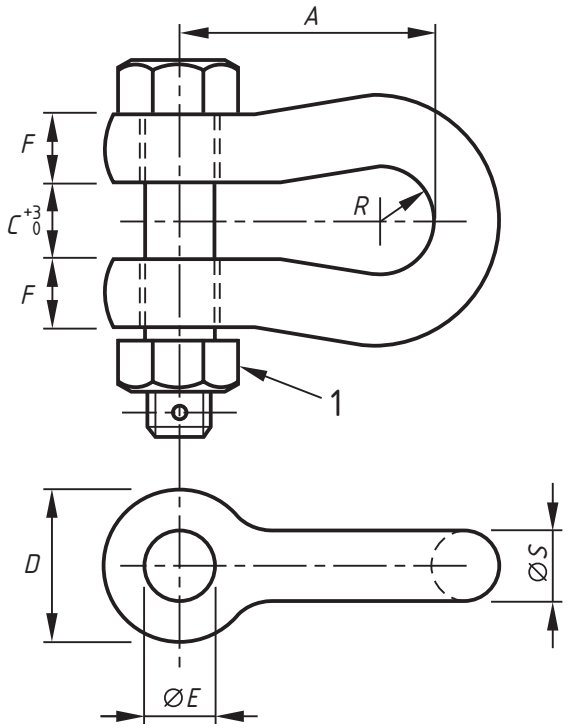
Table 4 **Dimensions of ring gauge for head of insulator pin**

Reference number of gauge	Size of head	Reference number of head	*A* mm	*ØB* mm	*ØC* mm	*D* mm	*E* mm	*F* mm
15R	Small	15	44.4	18.30	23.35	1.60	4.75	6.35
16R	Large	16	47.6	27.80	30.95	1.60	4.75	6.35

NOTE 1 Tolerance on specified dimensions ±0.02 mm.

NOTE 2 The dimension C is the base of the conic frustrum which determines the taper of the gauge.

Figure 7 **Shackle: reference numbers 15/29A, 28/29A, 42/29A, 42/103, 67/103A, 15/129A, 42/129A and 28/108A**



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

Table 5 **Dimensions of bow shackle: reference numbers 15/29A, 28/29A, 42/29A, 42/103, 67/103A, 15/129A and 42/129A**

Reference number	Minimum failing load kN	*A* mm	*C* mm	*D* mm	*ØE* mm	*F* mm	*R* mm	*ØS* mm	Bolt		Pin	
									Diameter	Length mm	Diameter mm	Length mm
15/29A	70	70	19	35	18	9.5	16	16	M16	70	16	60
28/29A	125	76	21	54	22	13	19	19	M20	85	20	65
42/29A	190	83	27	51	24	22	17	22	M22	115	22	95
42/103 (see Note 2)	190	83	28	51	27	22	17	22	(see Note 1)			
67/103A	300	90	27	60	29	25	20	25	M27	120	27	105
15/129A	70	90	22	44	18	19	19	19	M16	90	16	90
42/129A	190	102	28	57	32	22	17	22	M30	120	30	100

NOTE 1 Bolts, nuts and split pins (or pins, washers and split pins) are included, except for reference number 42/103.

NOTE 2 Reference number 42/103 is used in sag adjuster assemblies (see Figure 79).

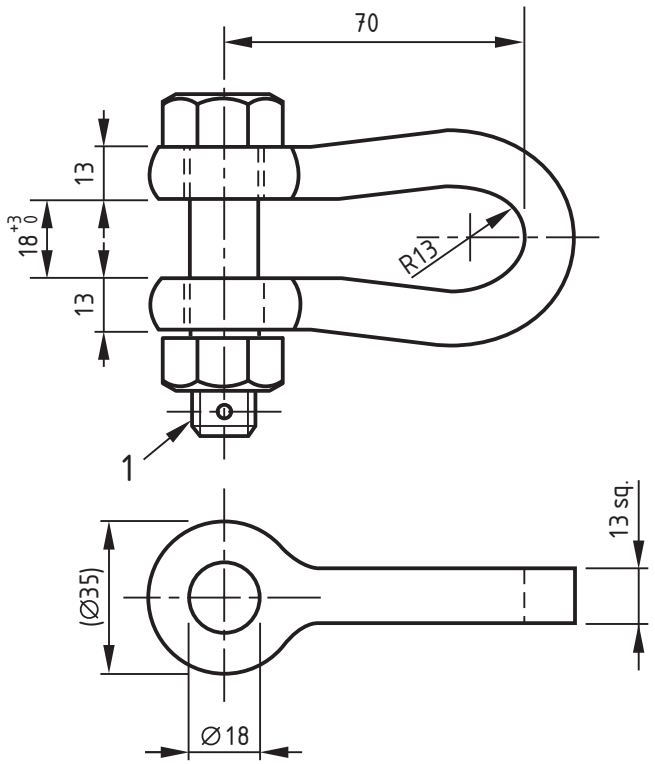
Table 6 **Dimensions of "D" shackle: reference number 28/108A**

Reference number	Minimum failing load kN	*A* mm	*C* mm	*D* mm	*ØE* mm	*F* mm	*R* mm	*ØS* mm	Bolt		Pin	
									Diameter	Length mm	Diameter mm	Length mm
28/108A	125	84	38	45	24	20	19	20	M22	125	22	105

NOTE The "D" shackle reference number 28/108A has a different profile to that illustrated.

Figure 8 **Shackle: reference number 15/33A**
(minimum failing load 70 kN)

Dimensions in millimetres



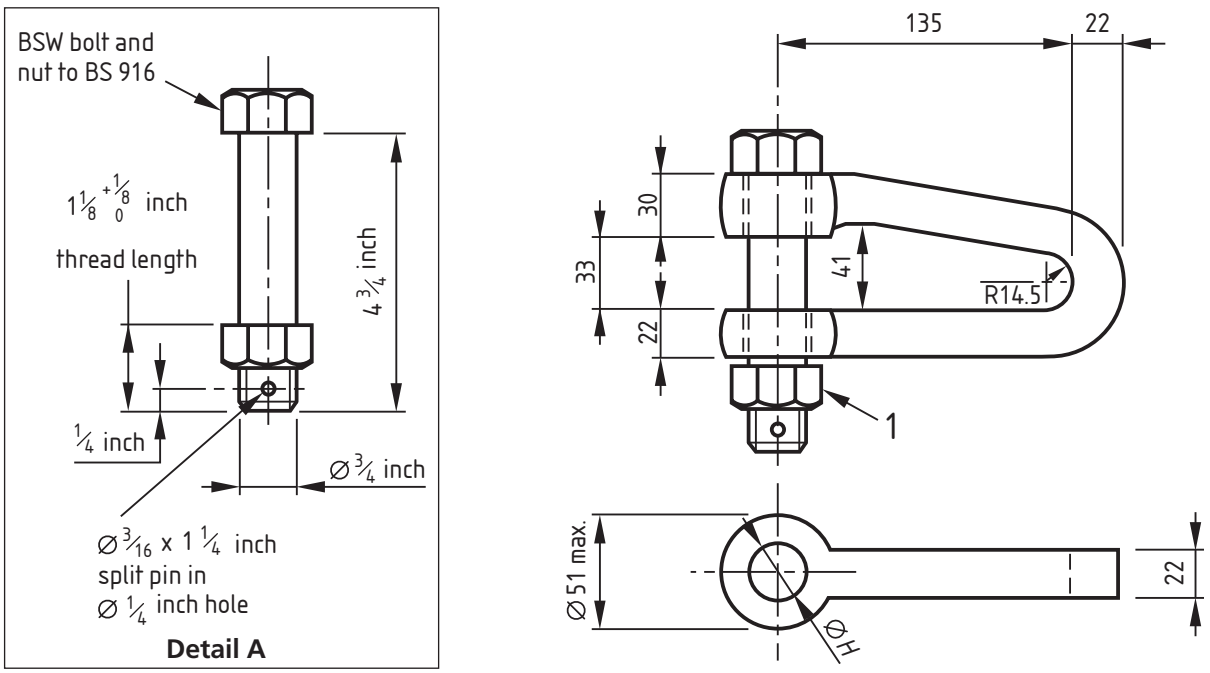
Key

1 M16 × 75 hex. bolt with nut and split pin or Ø16 × 65 pin with washer and split pin

NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 9 **Shackle: reference numbers 28/34A, 42/34A and 67/34A**

Dimensions in millimetres (except Detail A)



Key

1 Hex. bolt with nut and split pin (see Detail A)

NOTE 1 Shackle 28/34A is shown supplied with a BSW bolt. This is necessary when used with existing towers drilled for a Ø¾ inch bolt.

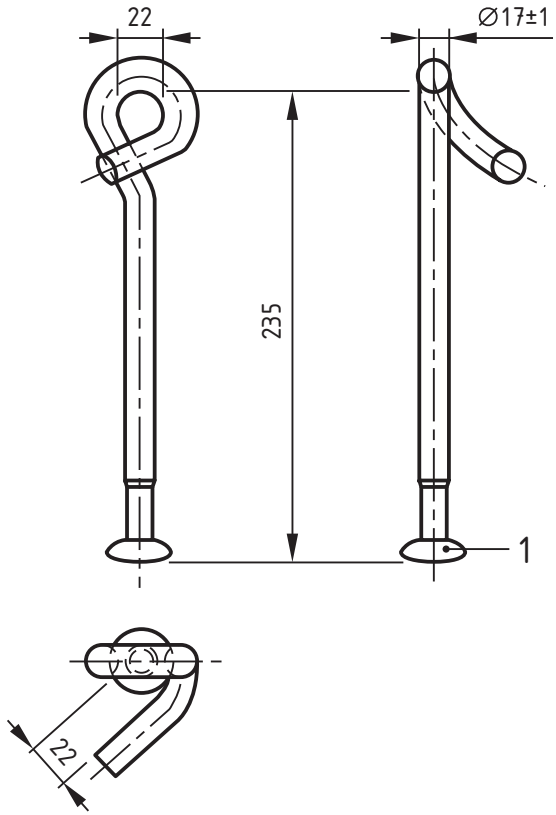
NOTE 2 Bolt, nut and split pin are included.

Table 7 **Dimensions of shackle: reference numbers 28/34A, 42/34A and 67/34A**

Reference number	**Minimum failing load** kN	***ØH*** mm	**Bolt diameter**	**Bolt length**
28/34A	125	21	See inset drawing	See inset drawing
42/34A	190	27	M24	125
67/34A	300	29	M27	130

Figure 10 **Ball-ended hook: reference number 4/88**
(minimum failing load 20 kN)

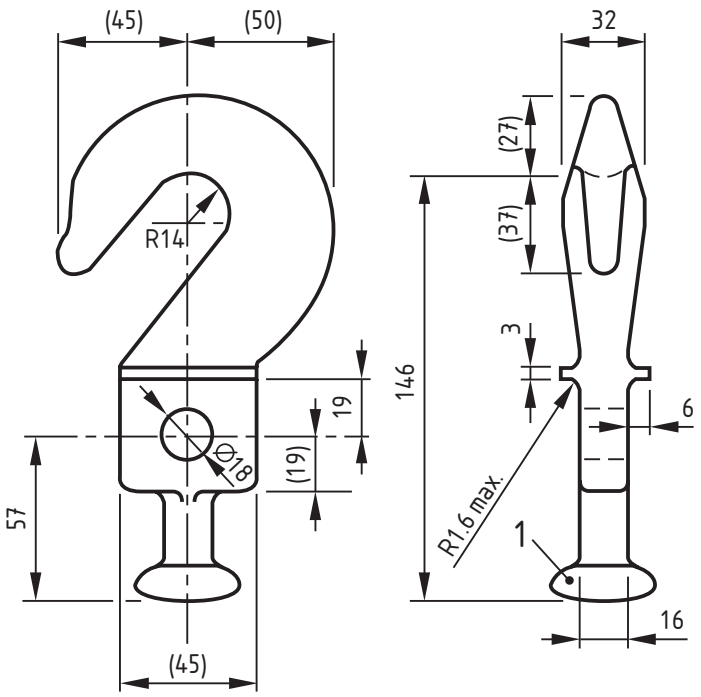
Dimensions in millimetres



Key
1 16 ball and shank

Figure 11 **Ball-ended hook (with arcing horn attachment): reference number 15/32** (minimum failing load 70 kN)

Dimensions in millimetres

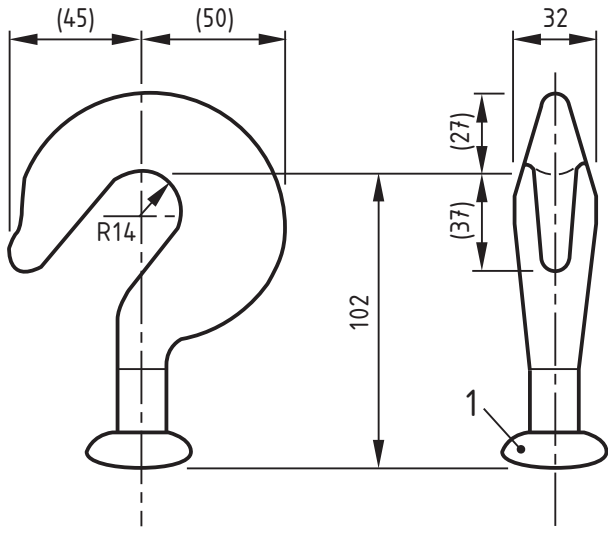


Key

1 16 ball and shank

Figure 12 **Ball-ended hook: reference number 15/81** (minimum failing load 70 kN)

Dimensions in millimetres

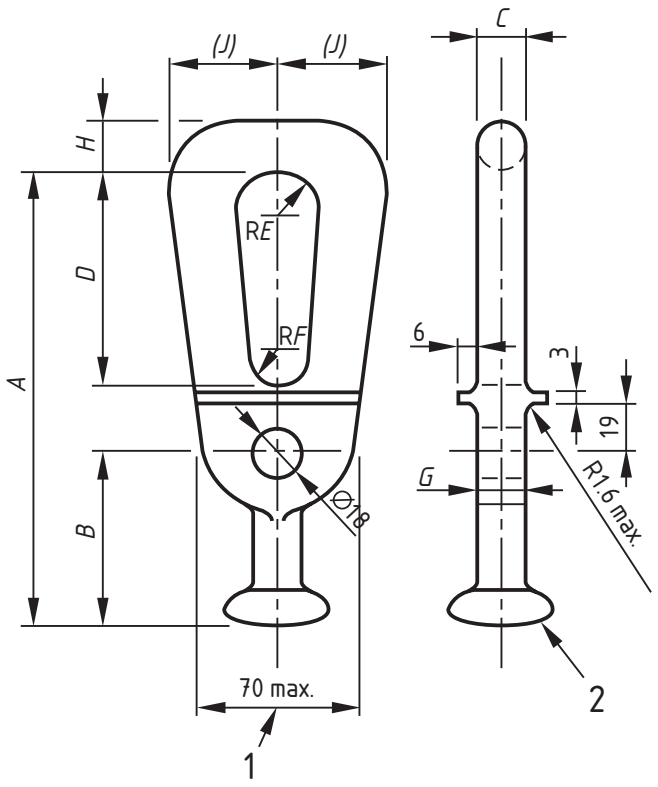


Key

1 16 ball and shank

Figure 13 **Ball-ended eye link (with arcing horn attachment): reference numbers 15/30, 28/30 and 42/30**

Dimensions in millimetres



Key

1 To accommodate arcing horn

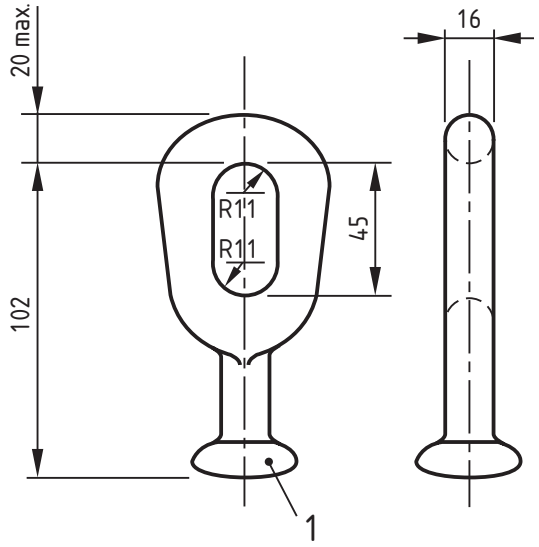
2 Refer to Table 8 for ball and shank designation

Table 8 **Dimensions of ball-ended eye link (with arcing horn attachment): reference numbers 15/30, 28/30 and 42/30**

Reference number	Minimum failing load kN	Ball and shank designation	*A* mm	*B* mm	*C* mm	*D* mm	R*E* mm	R*F* mm	*G* mm	*H* max. mm	*J* mm	Reference number of shackle used with eye links
15/30	70	16	146	57	16	45	11	11	16	20	34	15/29A
28/30	125	20	165	67	19	74	16	9.5	20	23	37	28/29A
42/30	190	24	168	75	20.5	65	16	13	25	25	38	42/29A

Figure 14 **Ball-ended eye link: reference number 15/82**
(minimum failing load 70 kN)

Dimensions in millimetres



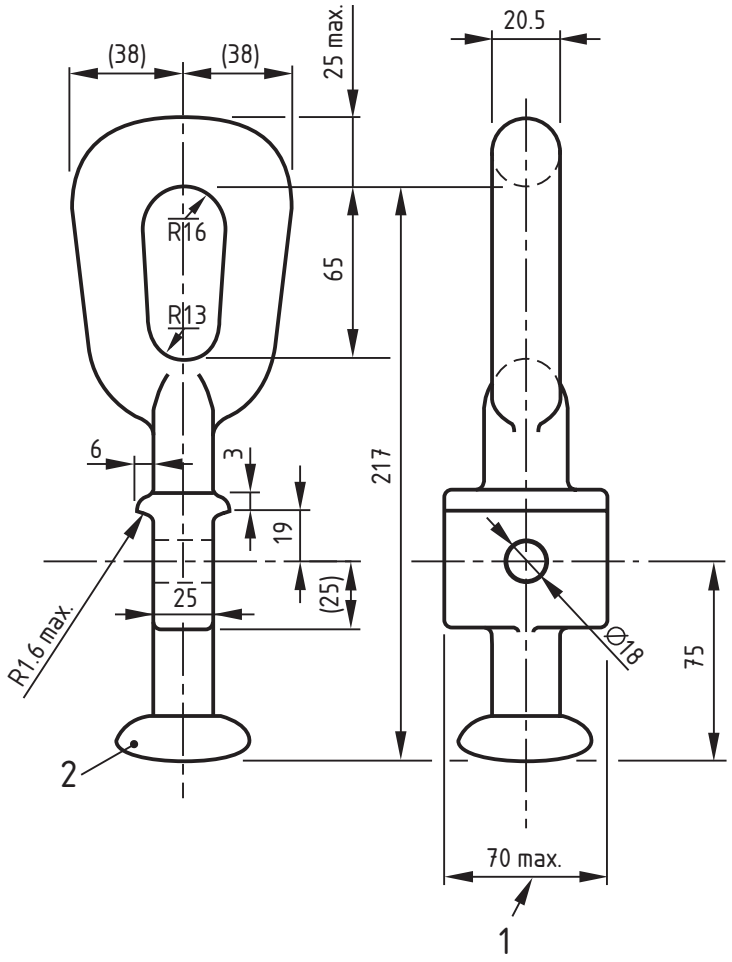
Key

1 16 ball and shank

NOTE For use with shackle reference number 15/29A.

Figure 15 **Twisted ball-ended eye link (with arcing horn attachment): reference number 42/44**
(minimum failing load 190 kN)

Dimensions in millimetres



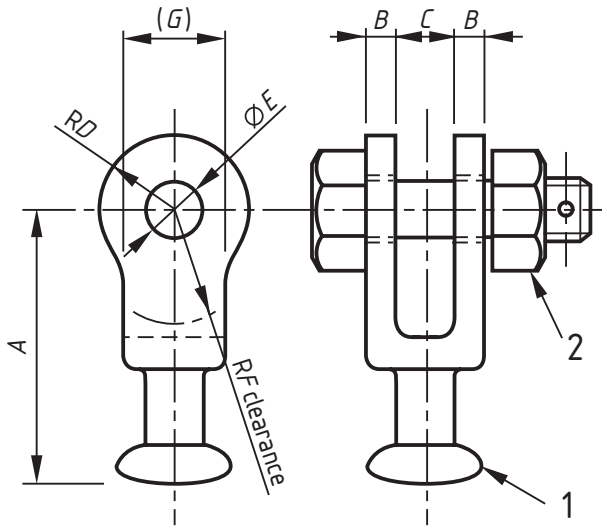
Key

1 To accommodate arcing horn

2 24 ball and shank

NOTE For use with shackle reference number 42/29A.

Figure 16 **Ball clevis: reference numbers 15/83A, 28/83A and 84/83A**



Key

1 Refer to Table 9 for ball and shank designation

2 Hex. bolt with nut and split pin or pin with washer and split pin

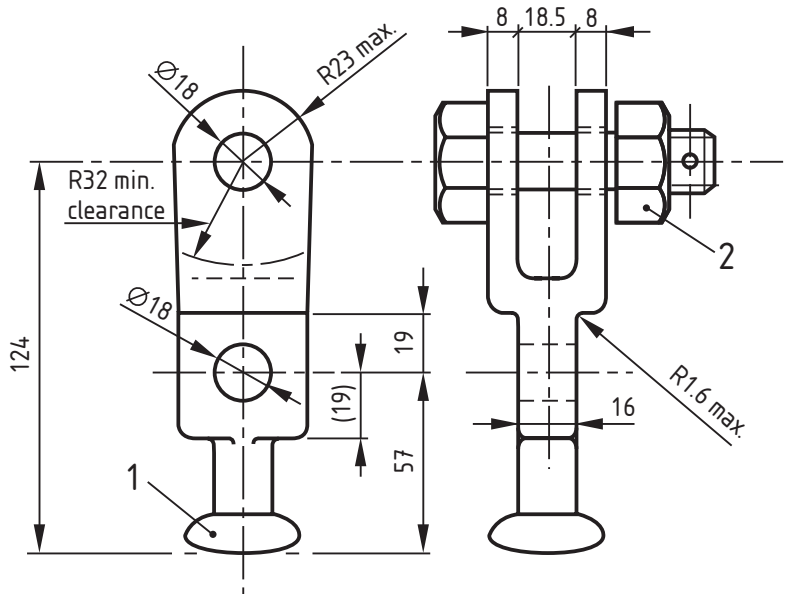
NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Table 9 **Dimensions of ball clevis: reference numbers 15/83A, 28/83A and 84/83A**

Reference number	**Min. failing load** kN	**Ball and shank designation**	***A*** mm	***B*** mm	***C*** mm	**R*D*** max. mm	***ØE*** mm	**R*F*** min. mm	***G*** mm	**Bolt**		**Pin**	
										Diameter	**Length** mm	**Diameter** mm	**Length** mm
15/83A	70	16	89	8	18.5	23	18	32	29	M16	65	16	50
28/83A	125	20	95	11	21.5	32	22	32	45	M20	80	20	60
84/83A	400	28B	127	16	28.5	46	32	51	45	M30	110	30	85

Figure 17 **Ball clevis (with arcing horn attachment): reference number 15/25A** (minimum failing load 70 kN)

Dimensions in millimetres



Key

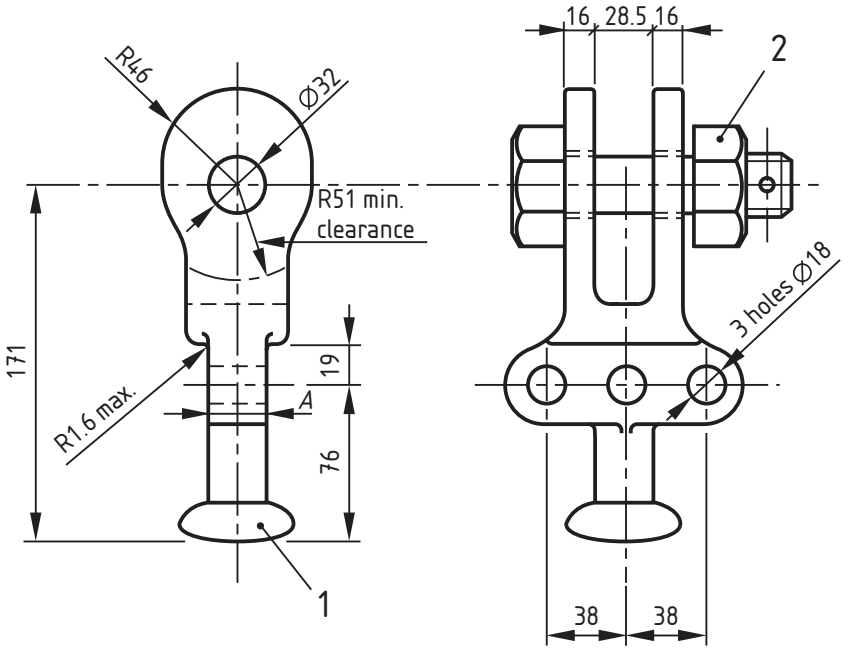
1 16 ball and shank

2 M16 × 65 hex. bolt with nut and split pin or Ø16 × 50 pin with washer and split pin

NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 18 **Ball clevis (with arcing horn attachment): reference numbers 67/25A and 84/25A**

Dimensions in millimetres



Key

1 Refer to Table 10 for ball and shank designation

2 Hex. bolt with nut and split pin or pin with washer and split pin

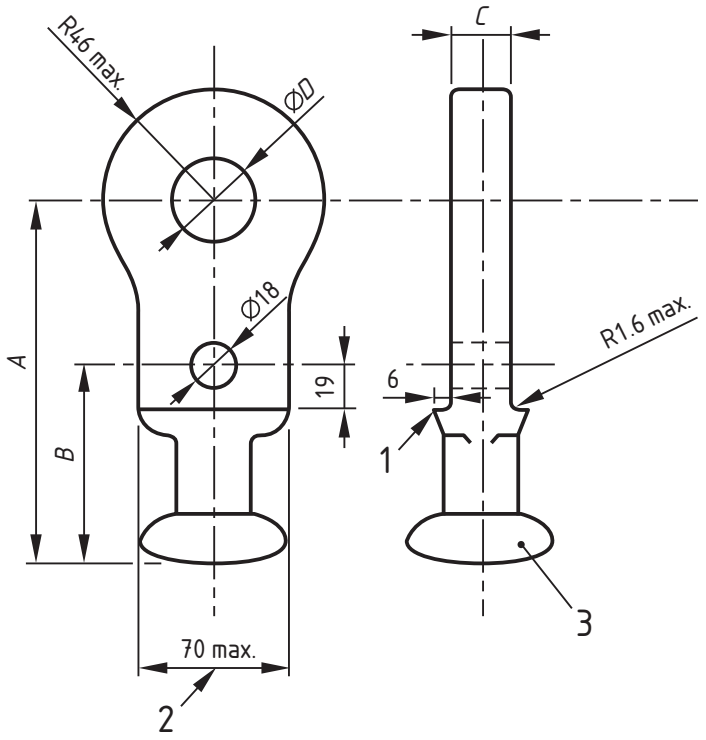
NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Table 10 **Dimensions of ball clevis (with arcing horn attachment): reference numbers 67/25A and 84/25A**

Reference number	Minimum failing load kN	Ball and shank designation	*A* mm	Bolt		Pin	
				Diameter	Length mm	Diameter mm	Length mm
67/25A	300	24	25	M30	110	30	85
84/25A	400	28B	28.5	M30	110	30	85

Figure 19 **Ball tongue (with arcing horn attachment): reference numbers 67/48 and 84/48**

Dimensions in millimetres



Key

1 Radius edge

2 To accommodate arcing horn

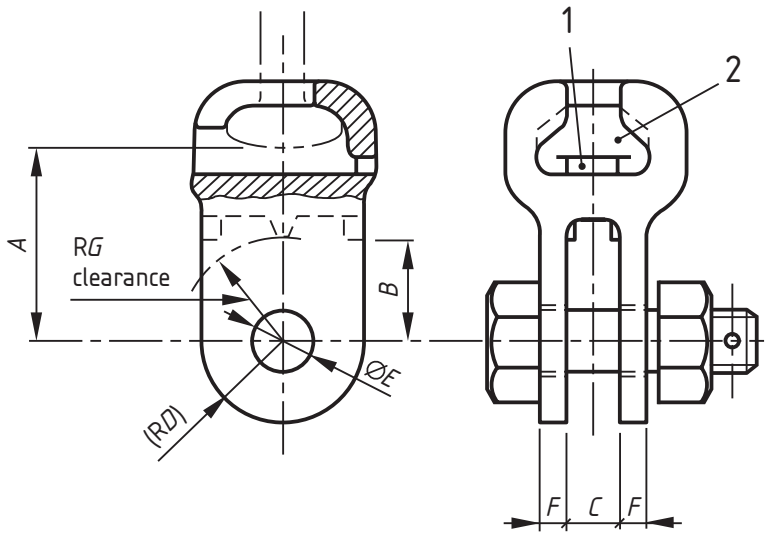
3 Refer to Table 11 for ball and shank designation

Table 11 **Dimensions of ball tongue (with arcing horn attachment): reference numbers 67/48 and 84/48**

Reference number	**Minimum failing load** kN	**Ball and shank designation**	***A*** mm	***B*** mm	***C*** mm	***ØD*** mm
67/48	300	24	165	83	25	29
84/48	400	28B	159	83	25	32

Figure 20 **Socket clevis: reference numbers 15/84A, 28/37A, 42/37A, 42/46A, 42/104A and 84/37A**

Dimensions in millimetres



Key

1 Slot for W security clip

2 Refer to Table 12 for socket designation

3 Hex. bolt with nut and split pin or pin with washer and split pin

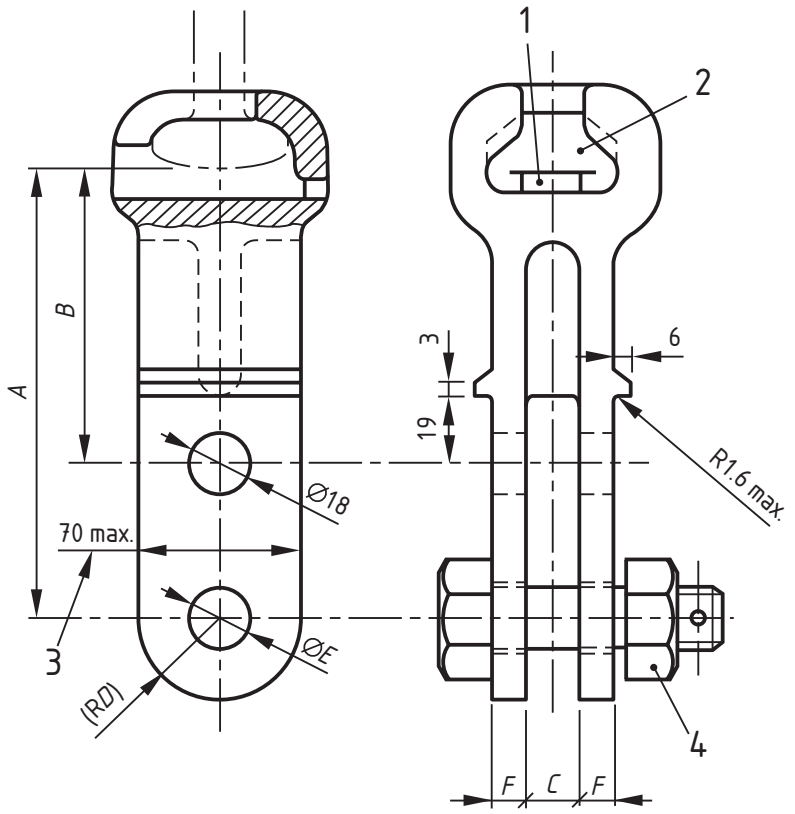
NOTE Security clip, bolt, nut and split pin (or pin, split pin and washer) are included.

Table 12 **Dimensions of socket clevis: reference numbers 15/84A, 28/37A, 42/37A, 42/46A, 42/104A and 84/37A**

Reference number	**Minimum failing load** kN	**Socket designation**	***A*** mm	***B*** mm	***C*** mm	**RD** max. mm	***ØE*** mm	***F*** mm	**RG** min. mm	**Bolt**		**Pin**	
										Diameter	**Length** mm	**Diameter** mm	**Length** mm
15/84A	70	16B	59	—	18.5	23	18	8	38	M16	65	16	50
28/37A	125	20	76	41	18.5	32	22	9.5	—	M20	70	20	55
42/37A	190	24	76	41	21.5	35	24	13	—	M22	90	22	70
42/46A	190	24	121	—	28.5	35	24	13	45	M22	95	22	75
42/104A	190	24	105	—	28.5	46	32	22	64	M30	120	30	100
84/37A	400	28B	105	—	28.5	46	32	22	64	M30	120	30	100

Figure 21 **Socket clevis (with arcing horn attachment): reference numbers 15/31A, 28/31A and 42/31A**

Dimensions in millimetres



Key

1 Slot for W security clip
2 Refer to Table 13 for socket designation
3 To accommodate arcing horn
4 Hex. bolt with nut and split pin or pin with washer and split pin

NOTE 1 Security clip, bolt, nut and split pin (or pin, split pin and washer) are included.

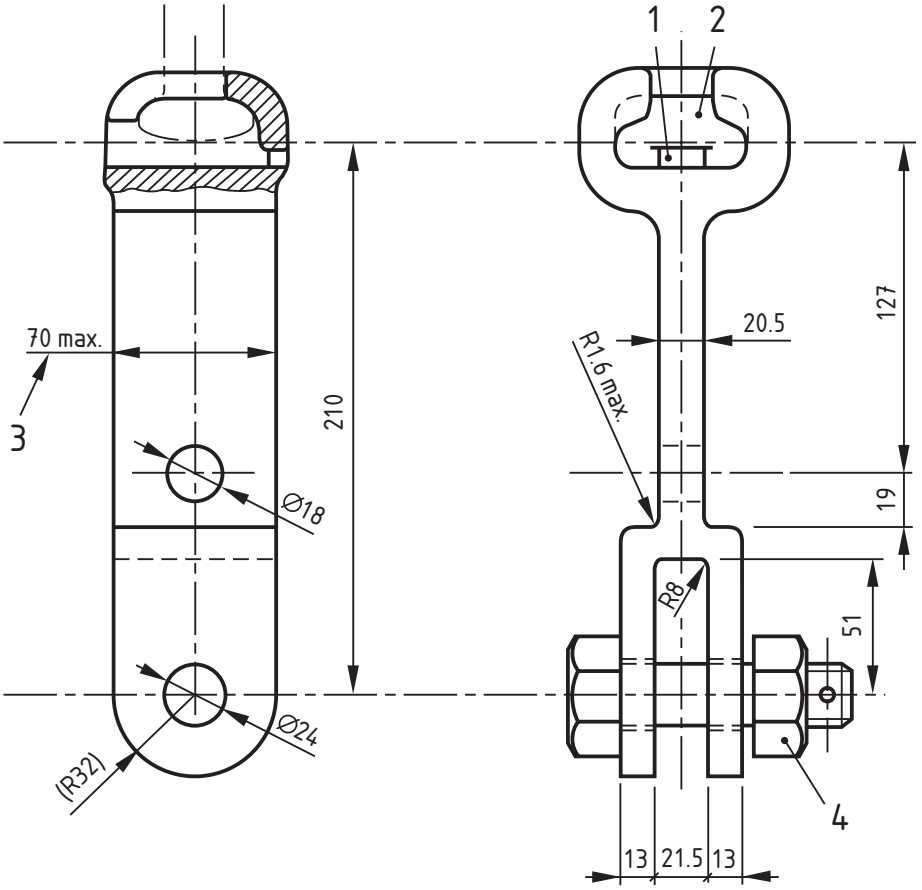
NOTE 2 For socket clevis 67/31A see Figure 23.

Table 13 **Dimensions of socket clevis (with arcing horn attachment): reference numbers 15/31A, 28/31A and 42/31A**

Reference number	Minimum failing load kN	Socket designation	*A* mm	*B* mm	*C* mm	*RD* max. mm	*ØE* mm	*F* mm	Bolt		Pin	
									Diameter	Length mm	Diameter mm	Length mm
15/31A	70	16B	130	86	18.5	23	18	8	M16	65	16	50
28/31A	125	20	122	71	21.5	32	22	9.5	M20	75	20	55
42/31A	190	24	159	76	25	35	24	13	M22	95	22	75

Figure 22 **Socket clevis (with arcing horn attachment): reference number 42/45A** (minimum failing load 190 kN)

Dimensions in millimetres



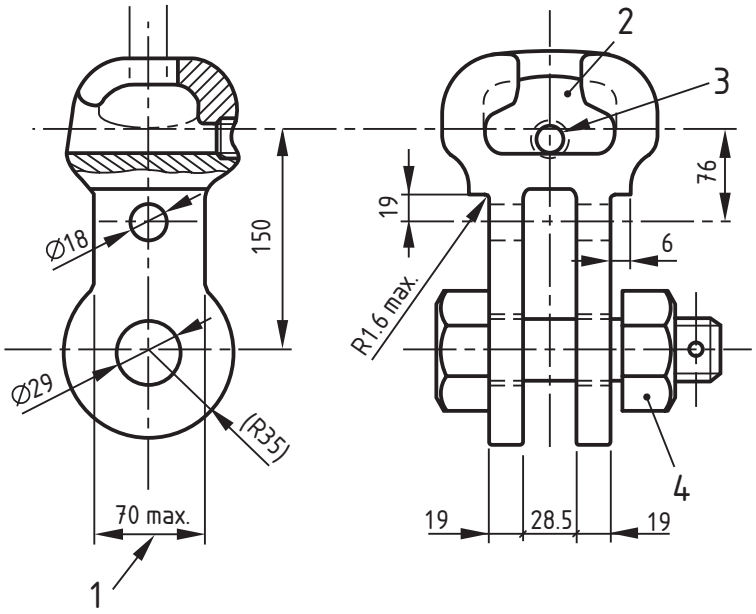
Key

1 Slot for W security clip
2 24 socket
3 To accommodate arcing horn
4 M22 × 90 hex. bolt with nut and split pin or Ø22 × 70 pin with washer and split pin

NOTE Security clip, bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 23 **Socket clevis (with arcing horn attachment): reference number 67/31A** (minimum failing load 300 kN)

Dimensions in millimetres



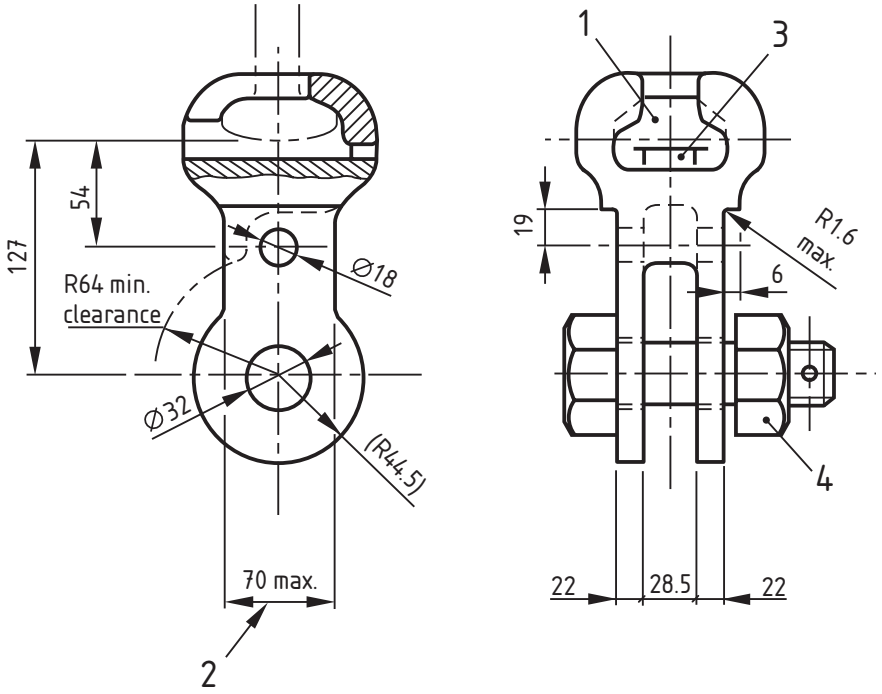
Key

1 To accommodate arcing horn
2 24 socket
3 Hole for split pin security clip
4 M27 × 110 hex. bolt with nut and split pin or Ø27 × 95 pin with washer and split pin

NOTE Security clip, bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 24 **Socket clevis (with arcing horn attachment): reference number 84/31A** (minimum failing load 400 kN)

Dimensions in millimetres



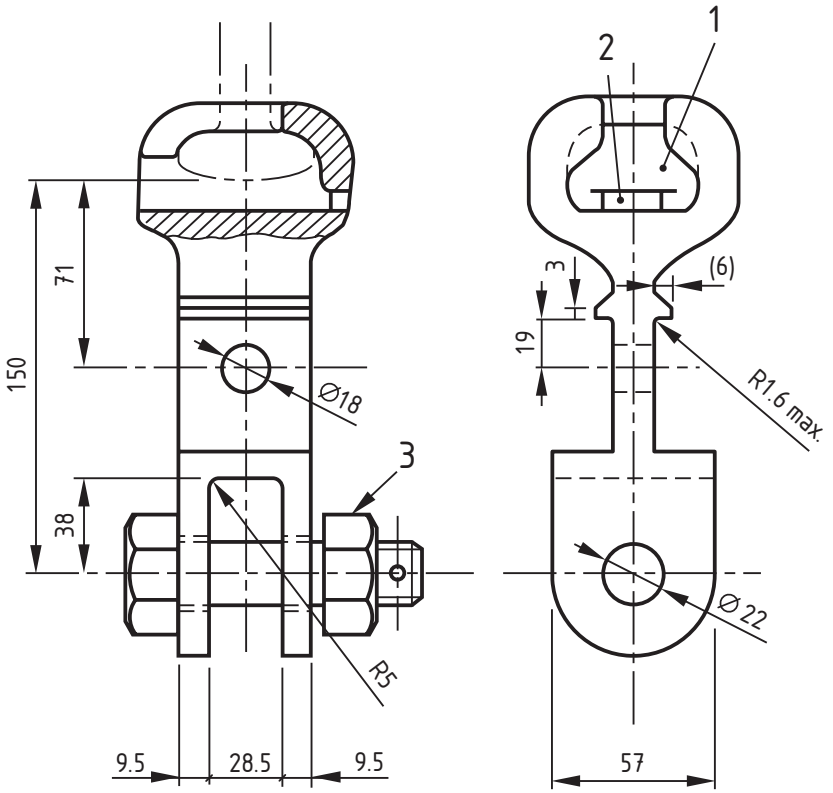
Key

1 28B socket
2 To accommodate arcing horn
3 Slot for W security clip
4 M30 × 120 hex. bolt with nut and split pin or Ø30 × 100 pin with washer and split pin

NOTE Security clip, bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 25 **Twisted socket-clevis (with arcing horn attachment): reference number 28/131A** (minimum failing load 125 kN)

Dimensions in millimetres



Key

1 20 socket

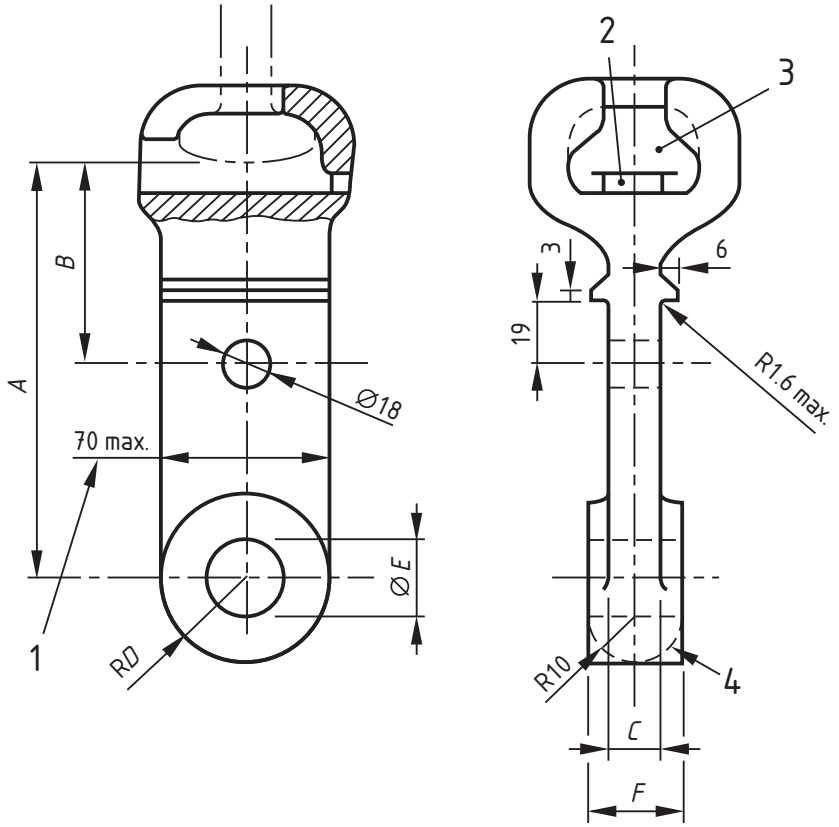
2 Slot for W security clip

3 M20 × 80 hex. bolt with nut and split pin

NOTE Security clip, bolt, nut and split pin are included.

Figure 26 **Socket tongue (with arcing horn attachment): reference numbers 15/35, 28/36A, 28/36B, 28/36C, 28/135, 42/35 and 42/36**

Dimensions in millimetres



Key

1 To accommodate arcing horn
2 Slot for W security clip
3 Dashed line applies to 28/36A only
4 Refer to Table 14 for socket designation

NOTE 1 Security clip is included.

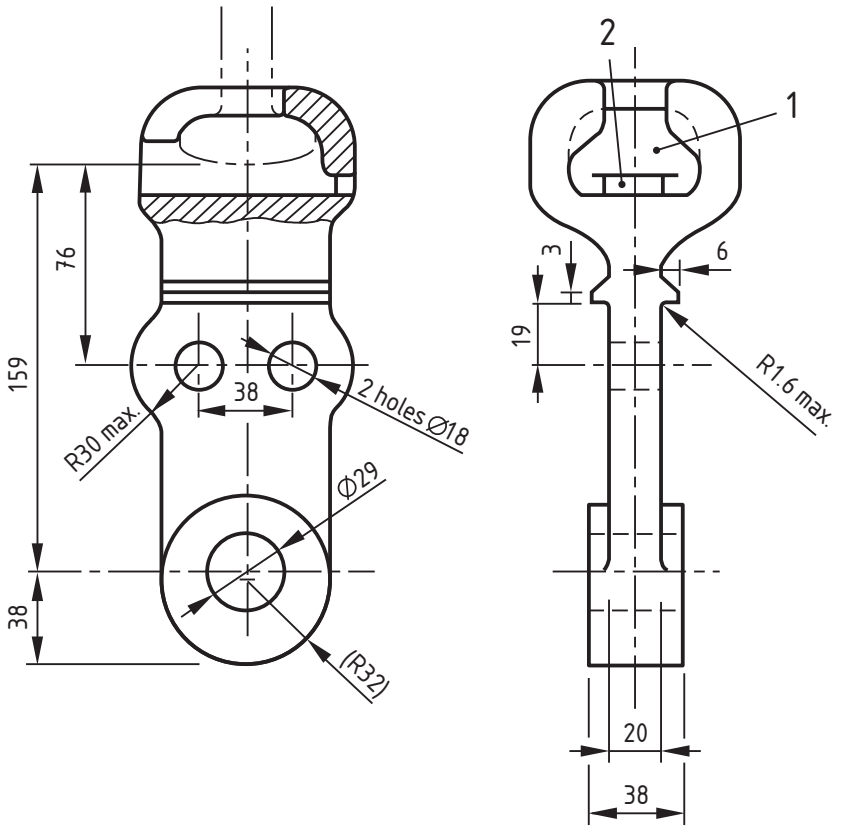
NOTE 2 For reference number 42/36 the Ø29 hole in the boss is offset similar to Figure 27.

Table 14 **Dimensions of socket tongue (with arcing horn attachment): reference numbers 15/35, 28/36A, 28/36B, 28/36C, 28/135, 42/35 and 42/36**

Reference number	**Minimum failing load** kN	**Socket designation**	***A*** mm	***B*** mm	***C*** mm	**R*D*** max. mm	**Ø*E*** mm	***F*** mm
15/35	70	16B	130	86	16	23	18	16
28/36A	125	20	143	70	17.5	30	22	25
28/36B	125	20	143	70	17.5	30	27	32
28/36C	125	20	143	70	17.5	38	29	38
28/135	125	20	143	70	17.5	30	22	17.5
42/35	190	24	159	76	22	35	24	22
42/36	190	24	159	76	20	38	29	38

Figure 27 **Socket tongue (with arcing horn attachment): reference number 42/51** (minimum failing load 190 kN)

Dimensions in millimetres



Key

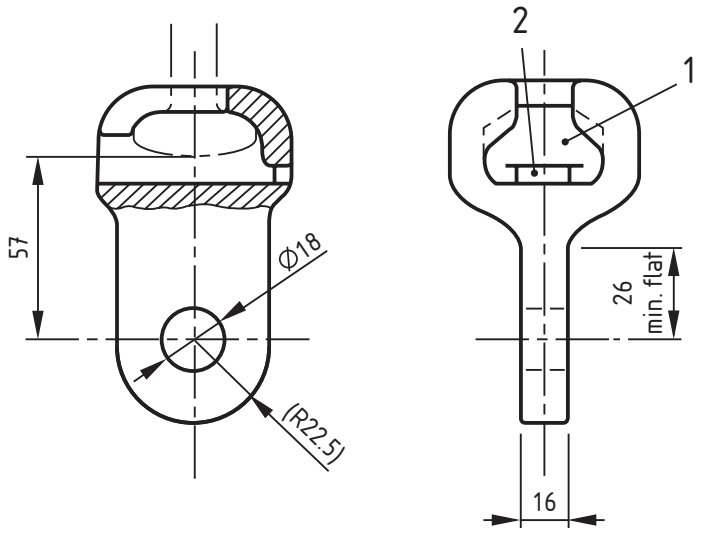
1 24 socket

2 Slot for W security clip

NOTE Security clip is included.

Figure 28 **Socket tongue: reference number 15/85**
(minimum failing load 70 kN)

Dimensions in millimetres



Key

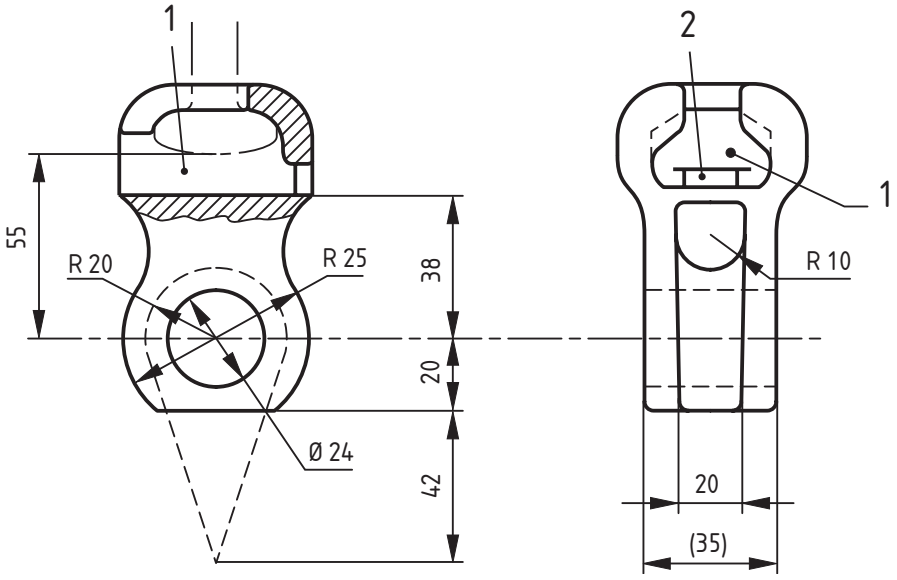
1 16B socket

2 Slot for W security clip

NOTE Security clip is included.

Figure 29 **Socket thimble: reference number 15/60**
(minimum failing load 70 kN)

Dimensions in millimetres



Key

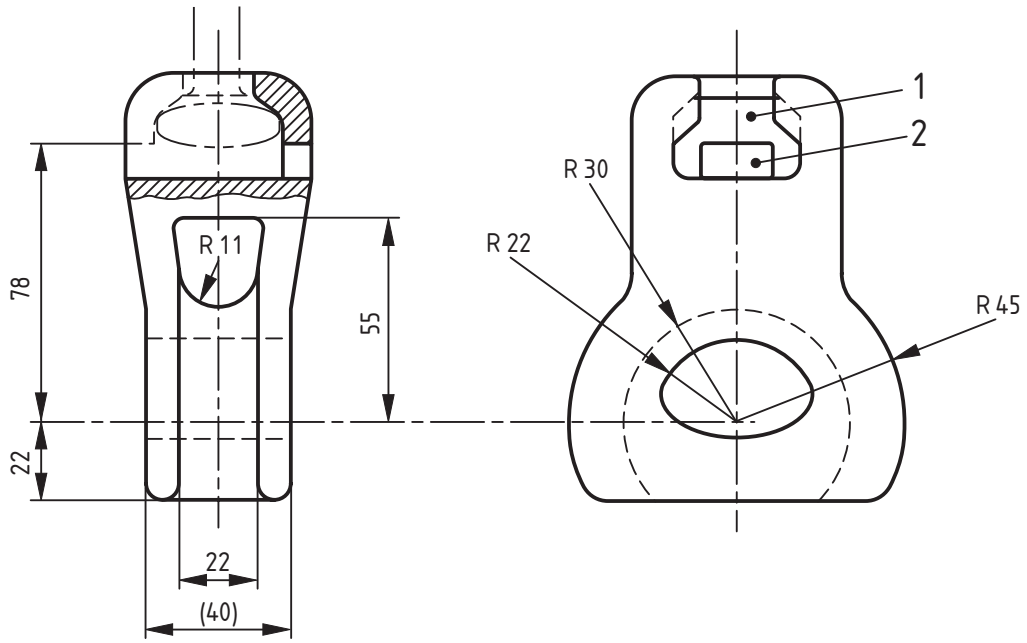
1 16B socket

2 Slot for W security clip

NOTE Security clip is included.

Figure 30 **Socket thimble: reference number 15/61**
(minimum failing load 70 kN)

Dimensions in millimetres



Key

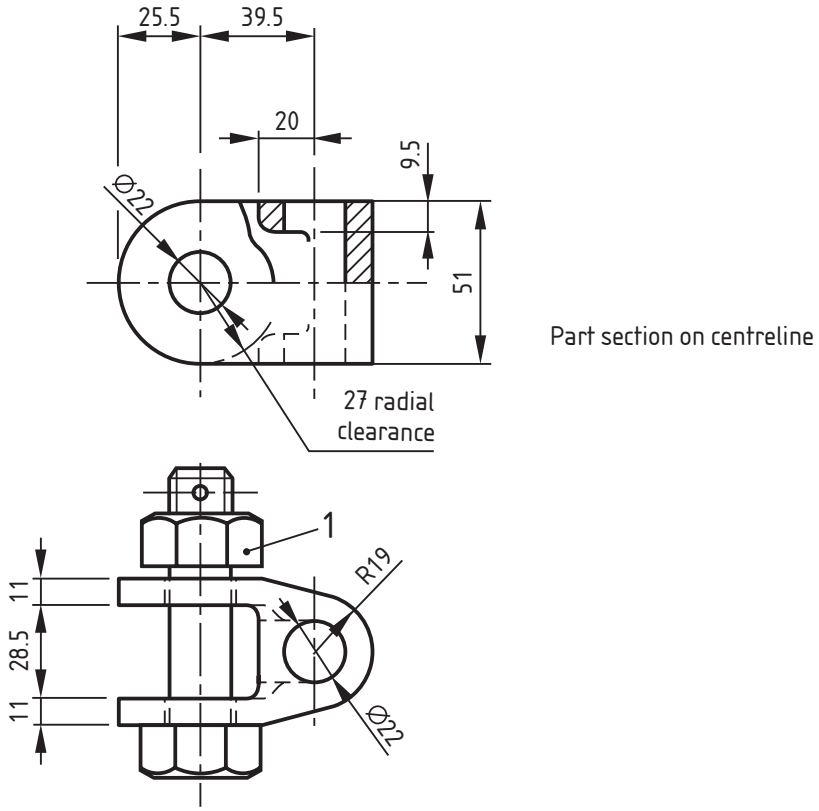
1 16B socket

2 Slot for W security clip

NOTE Security clip is included.

Figure 31 **Clevis tongue: reference number 28/28A**
(minimum failing load 125 kN)

Dimensions in millimetres



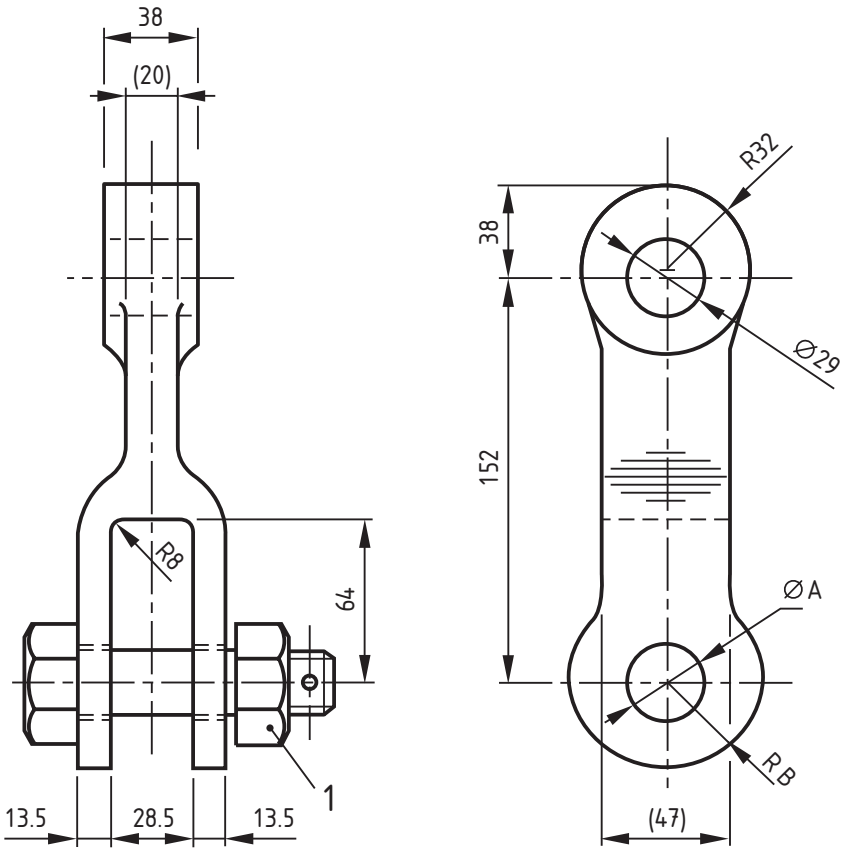
Key

1 M20 × 85 long hex. bolt with nut and split pin or Ø20 × 70 pin with washer and split pin

NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Figure 32 **Clevis tongue: reference numbers 42/28AA, 42/28B and 42/28CA** (minimum failing load 190 kN)

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

NOTE Bolt, nut and split pin (or pin, split pin and washer) are included (except for reference number 42/28B).

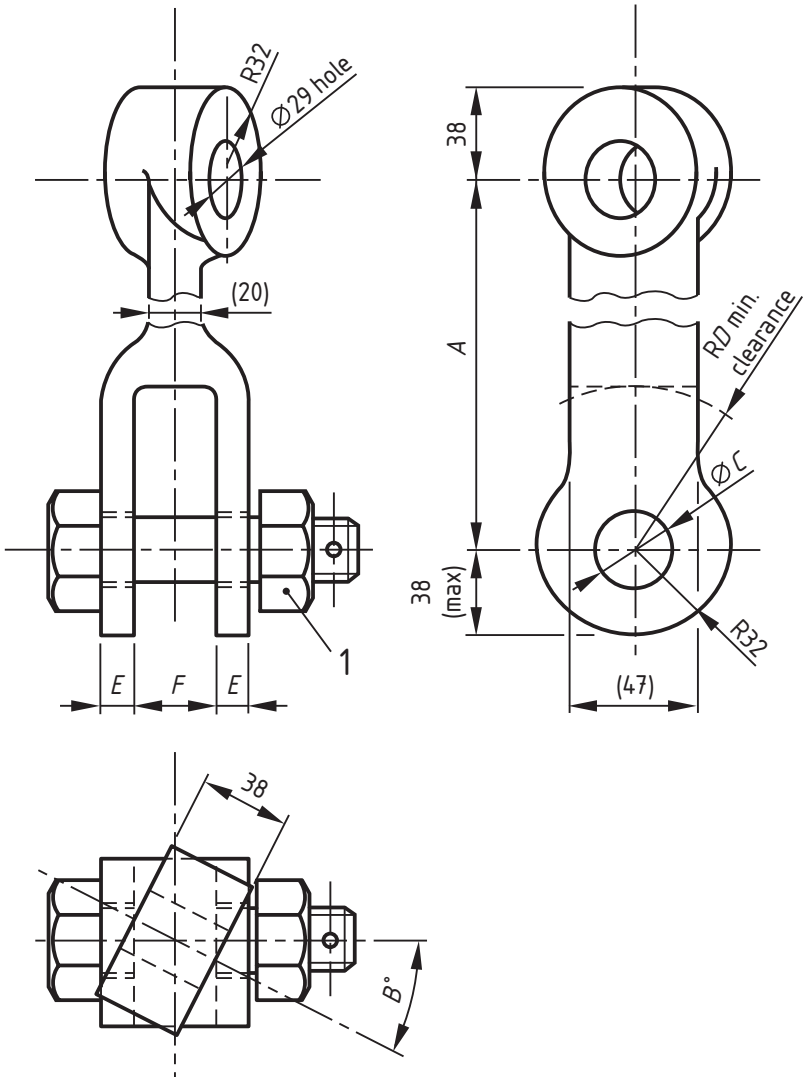
Table 15 **Dimensions of clevis tongue: reference numbers 42/28AA, 42/28B and 42/28CA**

Reference number	***ØA*** mm	***RB*** mm	**Bolt**		**Pin**	
			Diameter	**Length** mm	**Diameter** mm	**Length** mm
42/28AA	32	37	M30	105	30	80
42/28B	27	32	—	—	—	—
42/28CA	27	37	M24	100	24	80

NOTE Clevis tongue 42/28AA is earthwire adaptor C.

Figure 33 **Clevis tongue: reference numbers 42/39AA, 42/39BA, 42/54A, 42/54B and 42/139A** (minimum failing load 190 kN)

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

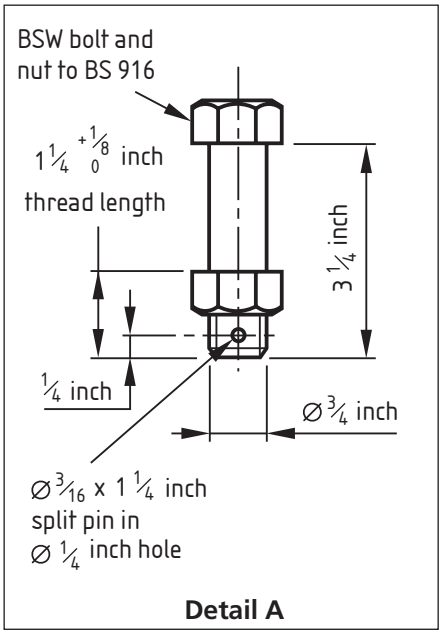
NOTE Bolt, nut and split pin (or pin, split pin and washer) are included (except for reference numbers 42/54A and 42/54B).

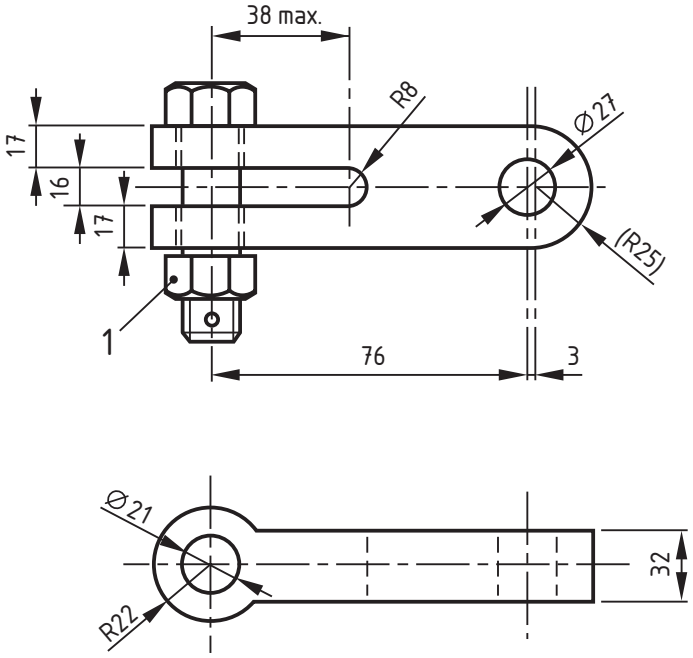
Table 16 **Dimensions of clevis tongue: reference numbers 42/39AA, 42/39BA, 42/54A, 42/54B and 42/139A**

Reference number	*A*	*B*	*ØC*	R*D*	*E*	*F*	Bolt		Pin		Remark
	mm	degrees	mm	mm	mm	mm	Diameter	Length	Diameter	Length	
								mm	mm	mm	
42/39AA	508	15	29	41	16	41	M27	120	27	100	As drawn
42/39BA											Opposite twist
42/54A	152	25	27	56	13.5	28.5	—	—	—	—	As drawn
42/54B											Opposite twist
42/139A	500	0	29	41	16	41	M27	120	27	100	—

Figure 34 **Earthwire adaptor: reference number 28/50A**
(minimum failing load 125 kN)

Dimensions in millimetres (except Detail A)





Key

1 Hex. bolt with nut and split pin (Detail A)

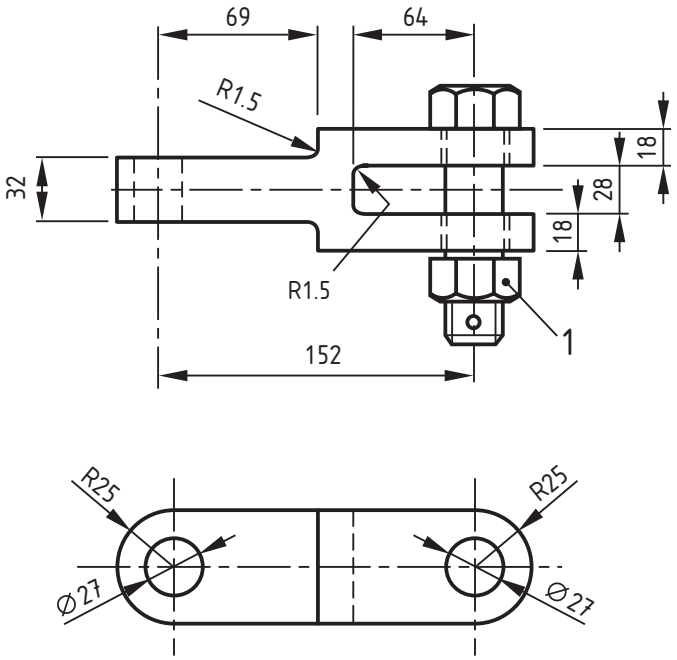
NOTE 1 When the earthwire adaptor is used to refurbish lines which were erected prior to 1940, the 38 mm and 76 mm dimensions are increased to 56 mm and 130 mm respectively. This lengthened version of the adaptor is designated 28/50AX.

NOTE 2 The adaptor is shown supplied with a BSW bolt. This is necessary when used with existing towers drilled for a Ø¾ inch bolt.

NOTE 3 Bolt, nut and split pin are included.

Figure 35 **Earthwire adaptor: reference number 28/40A**
(minimum failing load 125 kN)

Dimensions in millimetres



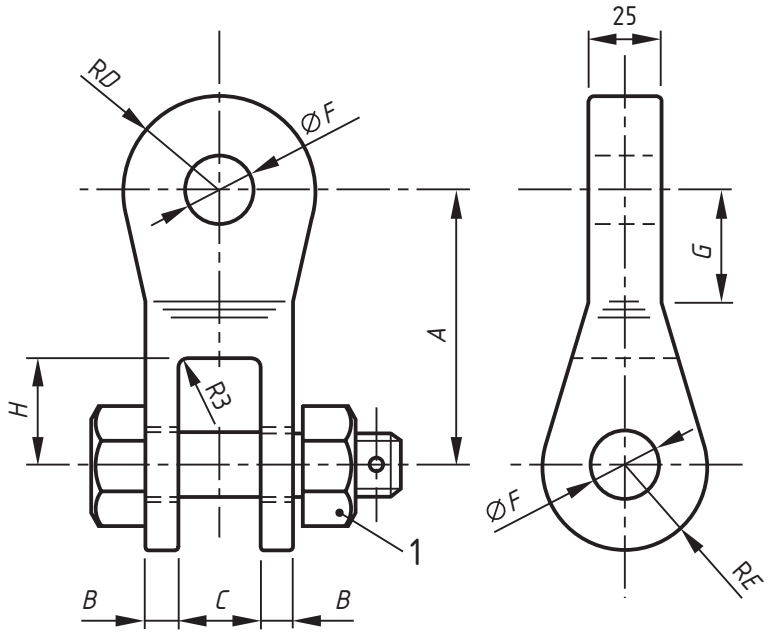
Key

1 M24 × 105 hex. bolt with nut and split pin

NOTE Bolt, nut and split pin are included.

Figure 36 **Twisted clevis-tongue: reference numbers 42/27A, 67/27A and 84/27A**

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

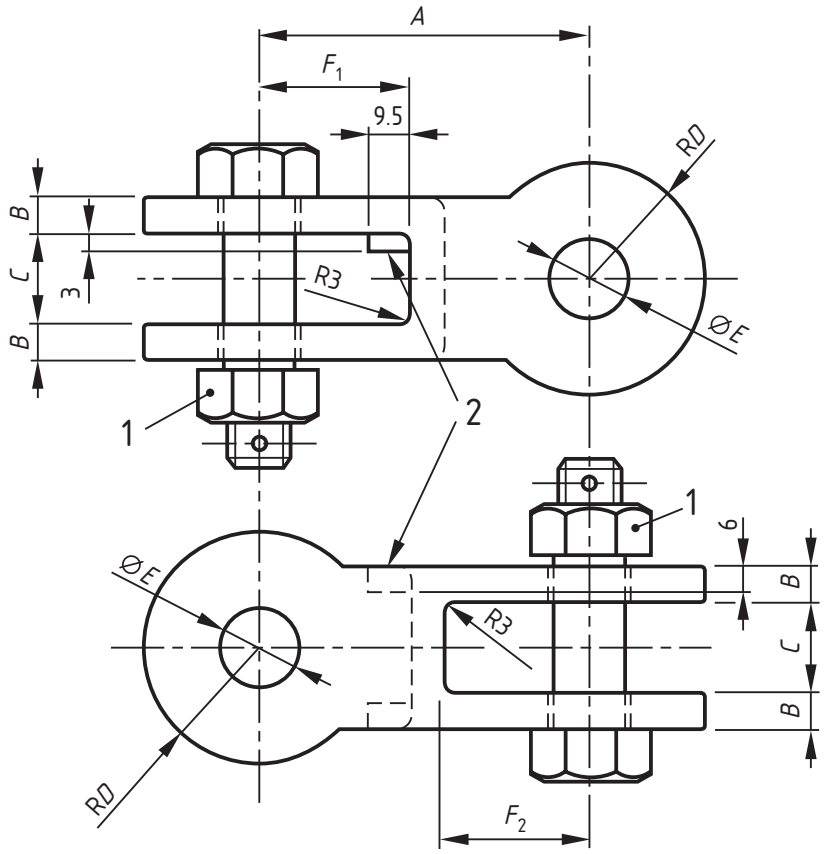
NOTE Bolt, nut and split pin (or pin, split pin and washer) are included.

Table 17 **Dimensions of twisted clevis-tongue: reference numbers 42/27A, 67/27A and 84/27A**

Reference number	**Minimum failing load** kN	***A*** mm	***B*** mm	***C*** mm	**R*D*** mm	**R*E*** mm	***ØF*** mm	***G*** mm	***H*** mm	**Bolt**		**Pin**	
										Diameter	**Length** mm	**Diameter** mm	**Length** mm
42/27A	190	110	13	28	38	32	27	44	44	M24	95	24	75
67/27A	300	120	19	28.5	45	45 max.	29	45 min.	54	M27	110	27	90
84/27A	400	160	20	28.5	55	46	32	55	65	M30	110	30	90

Figure 37 **Twisted clevis-clevis: reference numbers 15/23A, 28/23A, 67/23A and 84/23A**

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

2 For 67/23A and 84/23A only

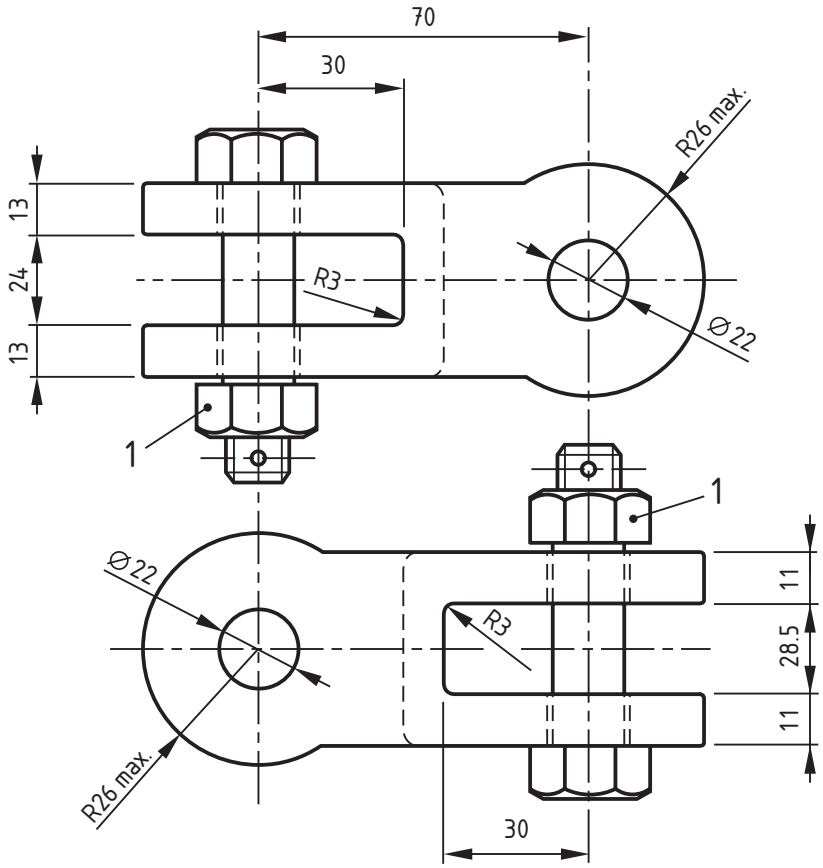
NOTE Bolts, nuts & split pins (or pins, split pins and washers) are included.

Table 18 **Dimensions of twisted clevis-clevis: reference numbers 15/23A, 28/23A, 67/23A and 84/23A**

Reference number	**Minimum failing load** kN	***A*** mm	***B*** mm	***C*** mm	***RD*** max. mm	***ØE*** mm	F_1 mm	F_2 mm	**Bolts (2)**		**Pins (2)**	
									Diameter	**Length** mm	**Diameter** mm	**Length** mm
15/23A	70	70	8	18.5	26	18	31	31	M16	65	16	50
28/23A	125	102	9.5	21.5	32	22	41	41	M20	75	20	60
67/23A	300	184	19	28.5	46	29	57	102	M27	110	27	90
84/23A	400	184	19	28.5	46	32	57	102	M30	115	30	90

Figure 38 **Twisted clevis-clevis: reference number 28/24A**
(minimum failing load 125 kN)

Dimensions in millimetres



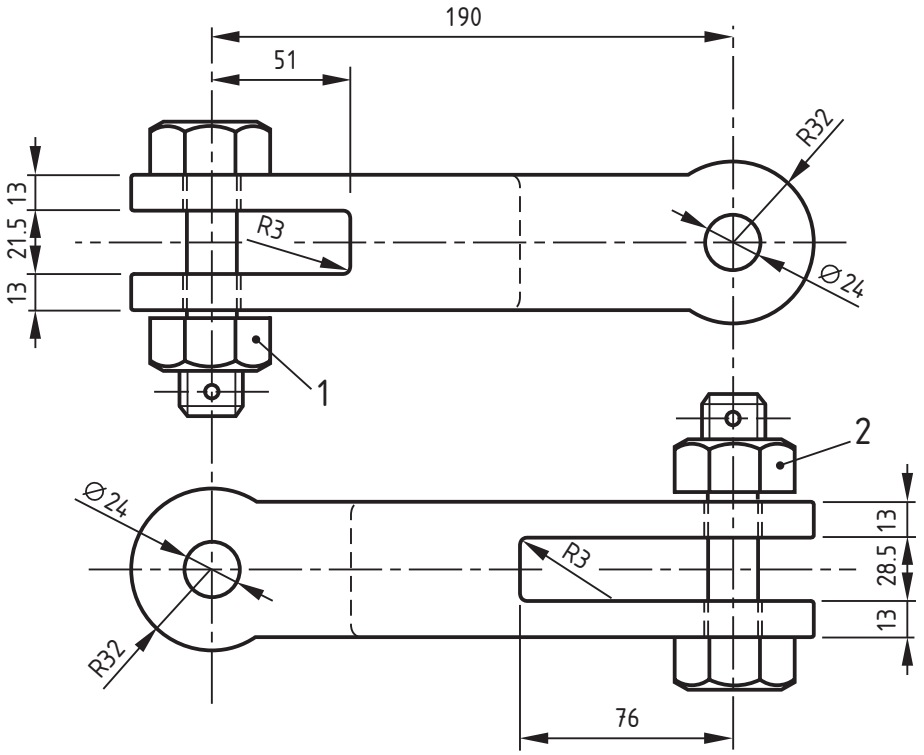
Key

1 M20 × 85 hex. bolt with nut and split pin or Ø20 × 65 pin with washer and split pin

NOTE Bolts, nuts and split pins (or pins, split pins and washers) are included.

Figure 39 **Twisted clevis-clevis: reference number 42/23A**
(minimum failing load 190 kN)

Dimensions in millimetres



Key

1 M22 × 90 hex. bolt with nut and split pin or Ø22 × 70 pin with washer and split pin

2 M22 × 95 hex. bolt with nut and split pin or Ø22 × 75 pin with washer and split pin

NOTE Bolts, nuts and split pins (or pins, split pins and washers) are included.

Figure 40 **Adaptor: reference numbers 15/27B, 15/27C, 15/27D, 28/27B, 28/27C and 28/47**

Dimensions in millimetres

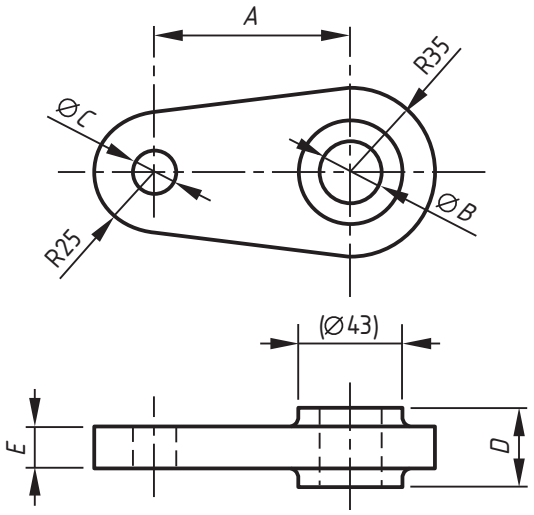
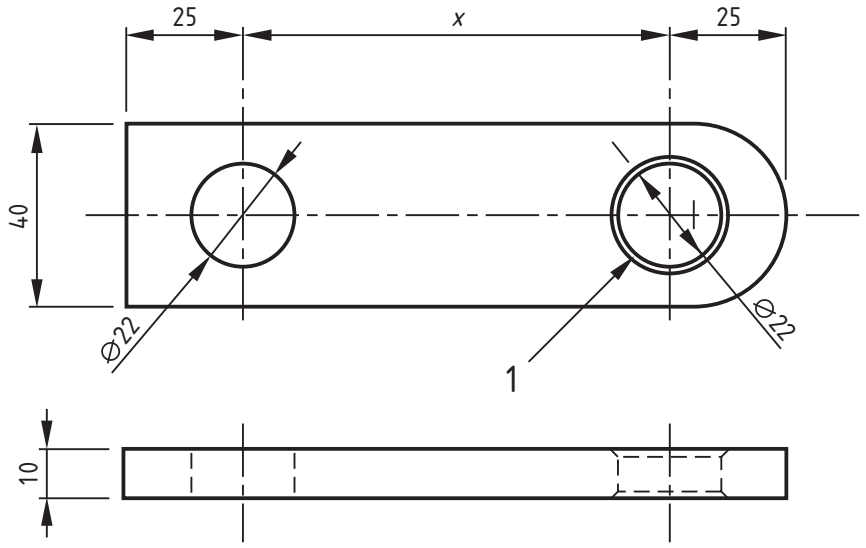


Table 19 **Dimensions of adaptor: reference numbers 15/27B, 15/27C, 15/27D, 28/27B, 28/27C and 28/47**

Reference number	**Minimum failing load** kN	***A*** mm	***ØB*** mm	***ØC*** mm	***D*** mm	***E*** mm
15/27B	70	76	27	18	32	16
15/27C	70	76	29	18	38	16
15/27D	70	140	29	18	25	16
28/27B	125	76	27	22	32	20
28/27C	125	76	29	22	38	20
28/47	125	108	29	22	38	20

Figure 41 **Terminating strap: reference numbers 4/89A and 4/89B** (minimum failing load 20 kN)

Dimensions in millimetres



Key

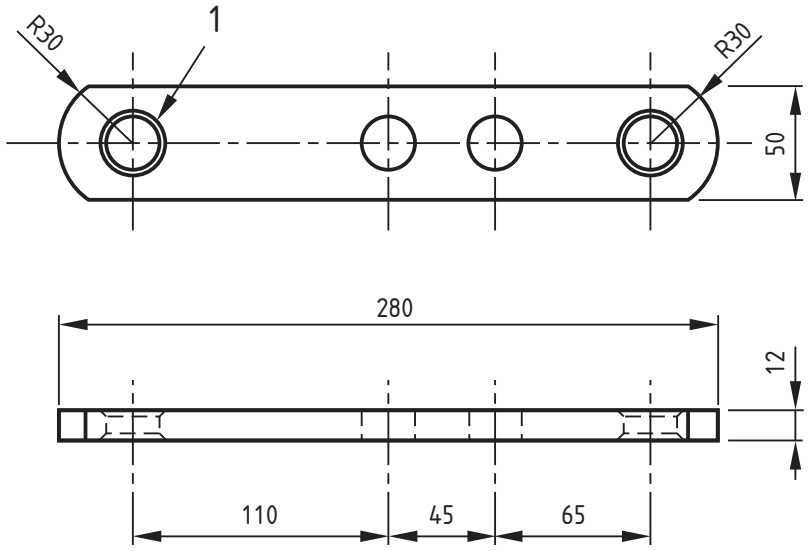
1 This hole to be chamfered 1.5 on both sides of strap.

Table 20 **Dimensions of terminating strap: reference numbers 4/89A and 4/89B**

Reference number	***x*** mm
4/89A	90
4/89B	125

Figure 42 **Strap section and terminal: reference number 4/90**
(minimum failing load 20 kN)

Dimensions in millimetres



Key

1 4 holes Ø22 (2 outer holes to be chamfered 1.5 on both sides of strap)

Figure 43 **Single link: reference numbers 15/86, 28/86, 42/86 and 67/86**

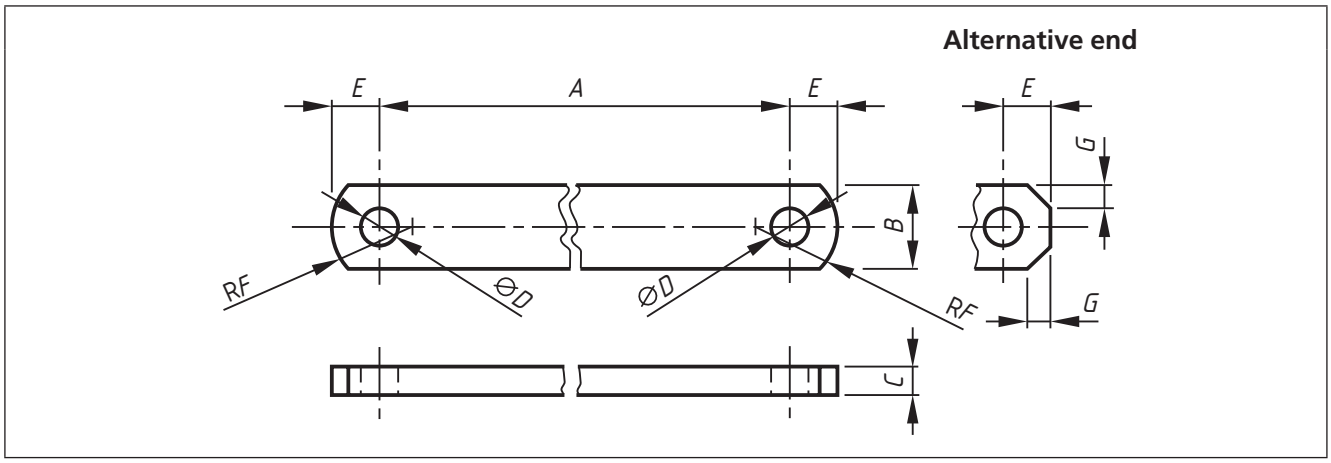


Table 21 **Dimensions of single link: reference numbers 15/86, 28/86, 42/86 and 67/86**

Reference number	**Minimum failing load** kN	***A***	***B*** mm	***C*** mm	***ØD*** mm	***E*** mm	***RF*** max. mm	***G*** mm
15/86	70	*	40	12	18	22	38	10
28/86	125	*	50	20	22	29	38	12
42/86	190	*	65	22	27	38	38	15
67/86	300	*	80	25	29	45	60	20

* As required. Preferred values are 150 mm and 400 mm.

NOTE Reference number 42/86 may be manufactured from strip 25 mm thick with the ends reduced to 22 mm.

Figure 44 **Single conversion link: reference number 42/115** (minimum failing load 190 kN)

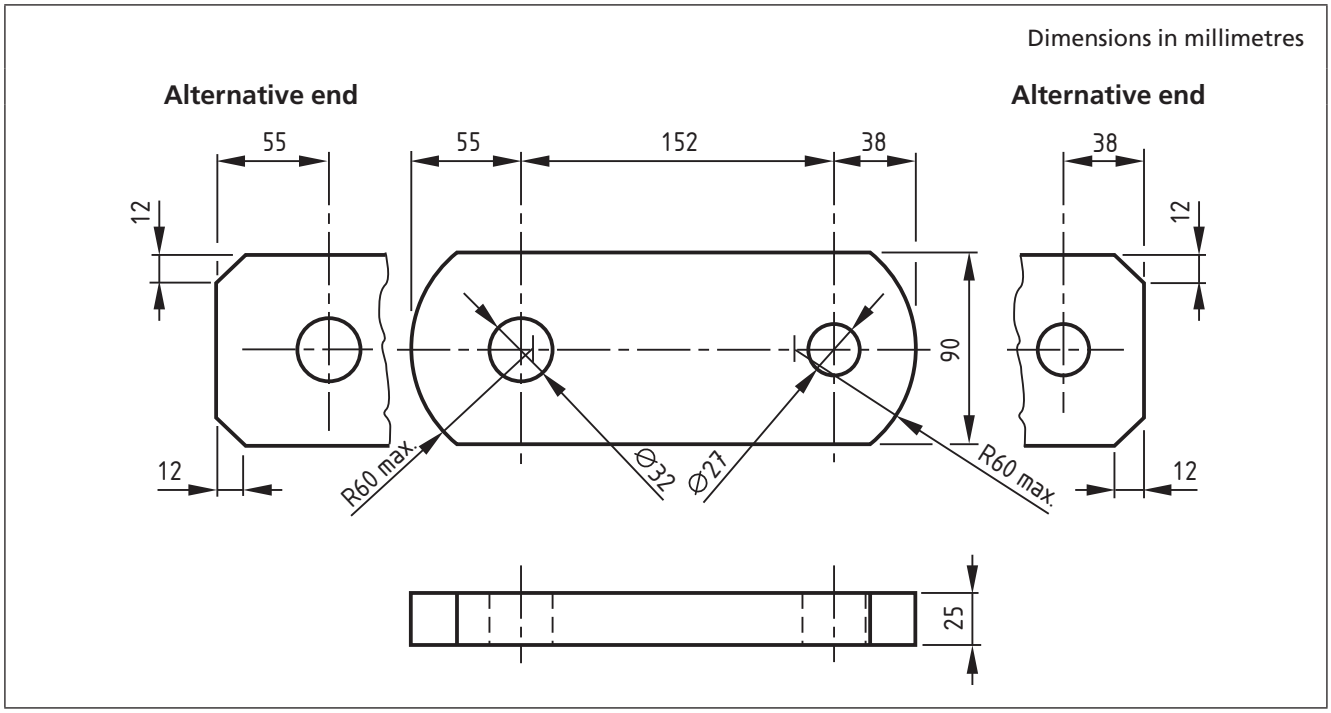
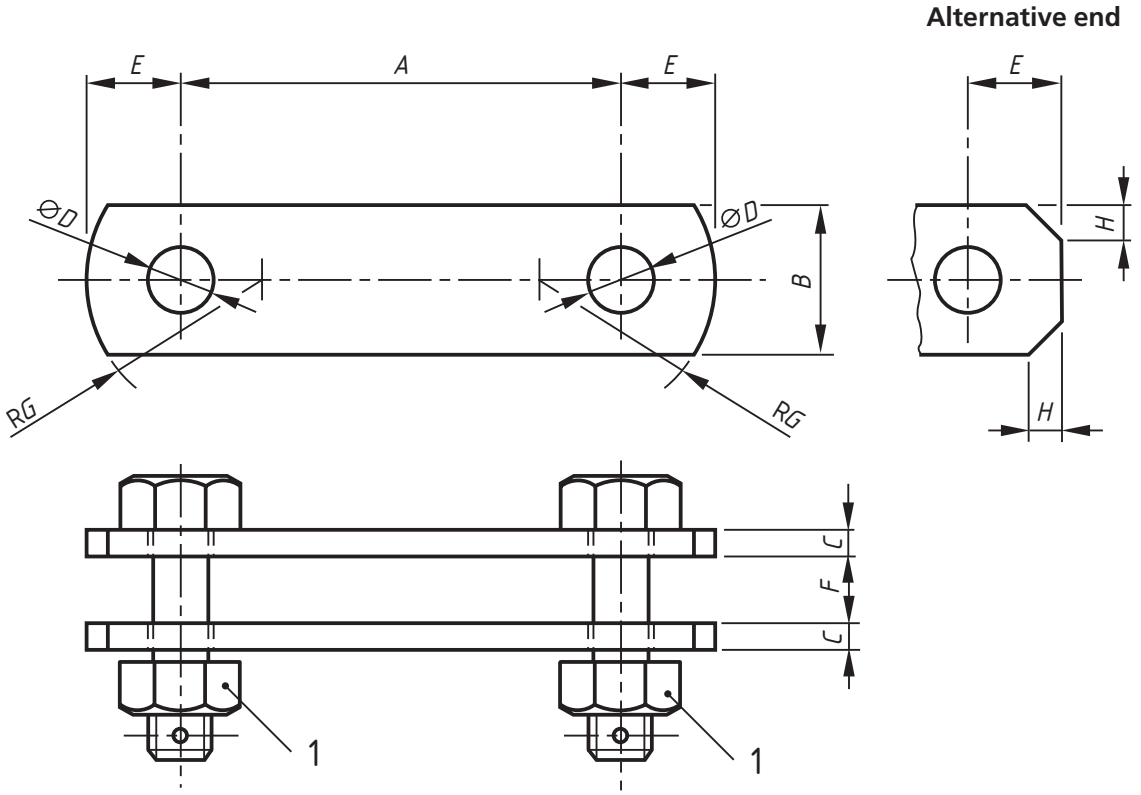


Figure 45 **Parallel links: reference numbers 15/88A, 28/88A, 42/88AA, 42/88BA, 42/88CA, 67/88A and 84/88A**



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

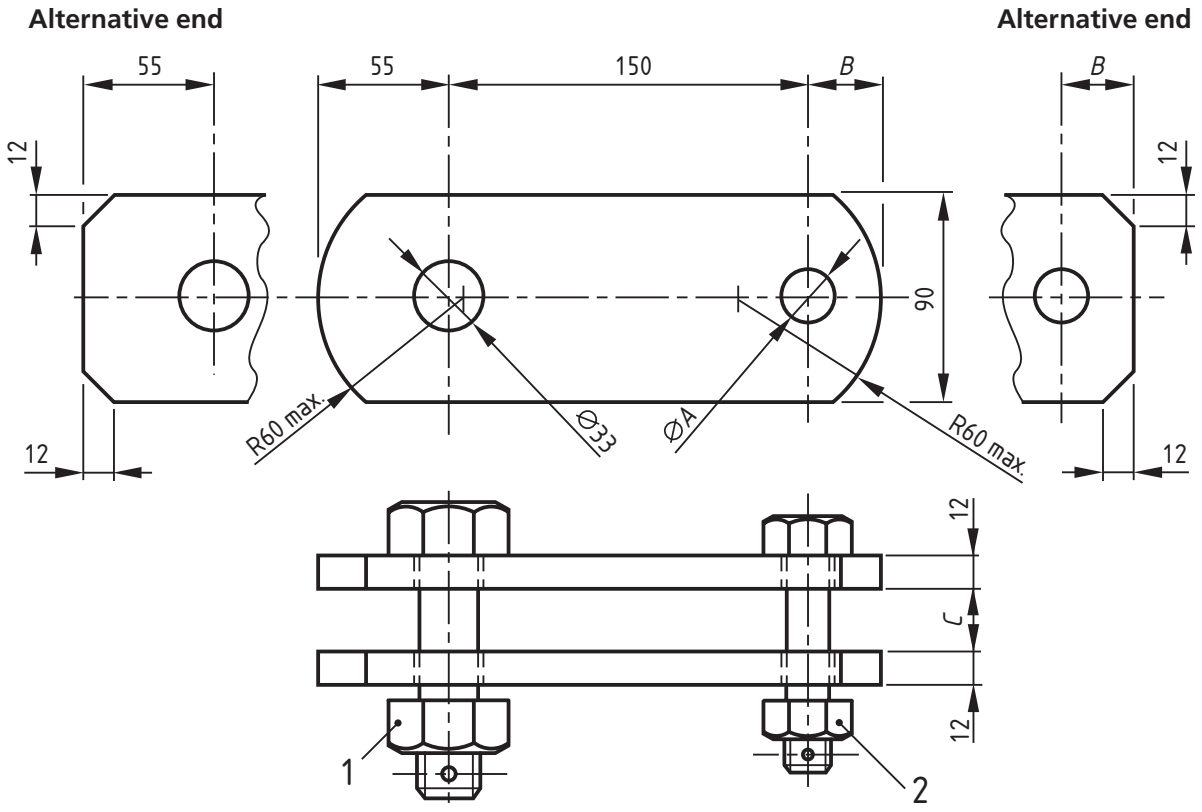
NOTE Bolts, nuts and split pins (or pins, washers and split pins) are included.

Table 22 **Dimensions of parallel links: reference numbers 15/88A, 28/88A, 42/88AA, 42/88BA, 4288CA, 67/88A and 84/88A**

Reference number	Minimum failing load	*A*	*B*	*C*	*ØD*	*E*	*F*	RG max.	*H*	Bolts (2)		Pins (2)	
	kN	mm	mm	mm	mm	mm	mm	mm	mm	Diameter	Length mm	Diameter mm	Length mm
15/88A	70	150	40	6	18	22	18.5	38	10	M16	65	16	50
28/88A	125	150	65	8	22	30	22	38	12	M20	70	20	55
42/88AA	190	185	65	12	27	38	27	38	15	M24	95	24	75
42/88BA	190	127	65	12	27	38	27	38	15	M24	95	24	75
42/88CA	190	150	65	12	27	38	27	38	15	M24	95	24	75
67/88A	300	200	80	12	29	45	26	60	20	M27	95	27	75
84/88A	400	152	90	12	32	55	29	60	25	M30	100	30	80

Figure 46 **Parallel conversion links: reference numbers 28/89A, 42/89A and 67/89A**

Dimensions in millimetres



Key

1 M30 × 100 hex. bolt with nut and split pin or Ø30 × 80 pin with washer and split pin

2 Hex. bolt with nut and split pin or pin with washer and split pin (see Table 23)

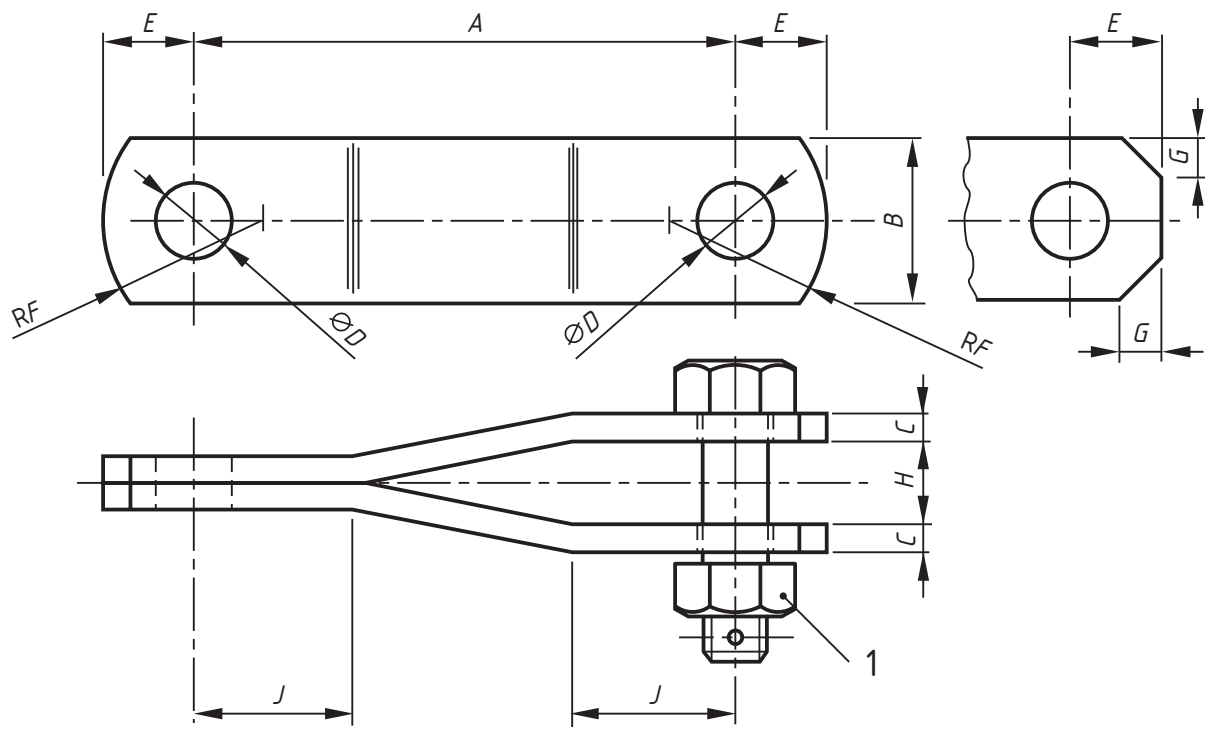
NOTE Bolts, nuts and split pins (or pins, washers and split pins) are included.

Table 23 **Dimensions of parallel conversion links: reference numbers 28/89A, 42/89A and 67/89A**

Reference number	Minimum failing load kN	*ØA* mm	*B* mm	*C* mm	Bolt		Pin	
					Diameter	Length mm	Diameter mm	Length mm
28/89A	125	22	30	27	M20	85	20	70
42/89A	190	27	35	29	M24	95	24	80
67/89A	300	29	45	29	M27	100	27	80

Figure 47 **Cranked links: reference numbers 15/87A, 28/87A, 42/87A and 67/87A**

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

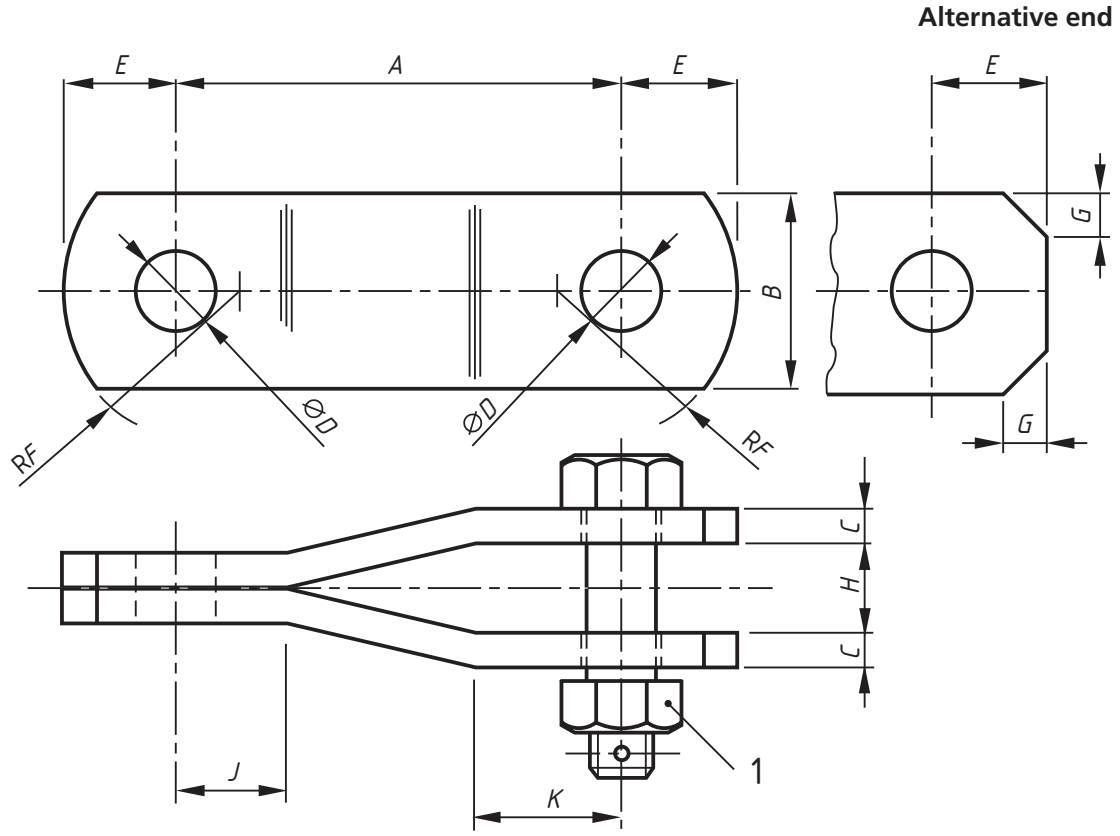
NOTE Bolt, nut and split pin (or pin, washer and split pin) are included.

Table 24 **Dimensions of cranked links: reference numbers 15/87A, 28/87A, 42/87A and 67/87A**

Reference number	Minimum failing load kN	*A*	*B* mm	*C* mm	*ØD* mm	*E* mm	*RF* max. mm	*G* mm	*H* mm	*J* min. mm	Bolt		Pin	
											Diameter	Length mm	Diameter mm	Length mm
15/87A	70	*	40	6	18	22	38	10	18.5	38	M16	65	16	50
28/87A	125	*	65	8	22	29	38	12	21.5	38	M20	70	20	55
42/87A	190	*	70	10	27	38	38	15	26	45	M24	90	24	70
67/87A	300	*	80	12	29	45	60	20	26	65	M27	95	27	75

* As required but at least 127 mm. Preferred values are 150 mm, 200 mm and 300 mm.

Figure 48 **Cranked links: reference numbers 42/102A and 84/102A**



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

NOTE Bolt, nut and split pin (or pin, washer and split pin) are included.

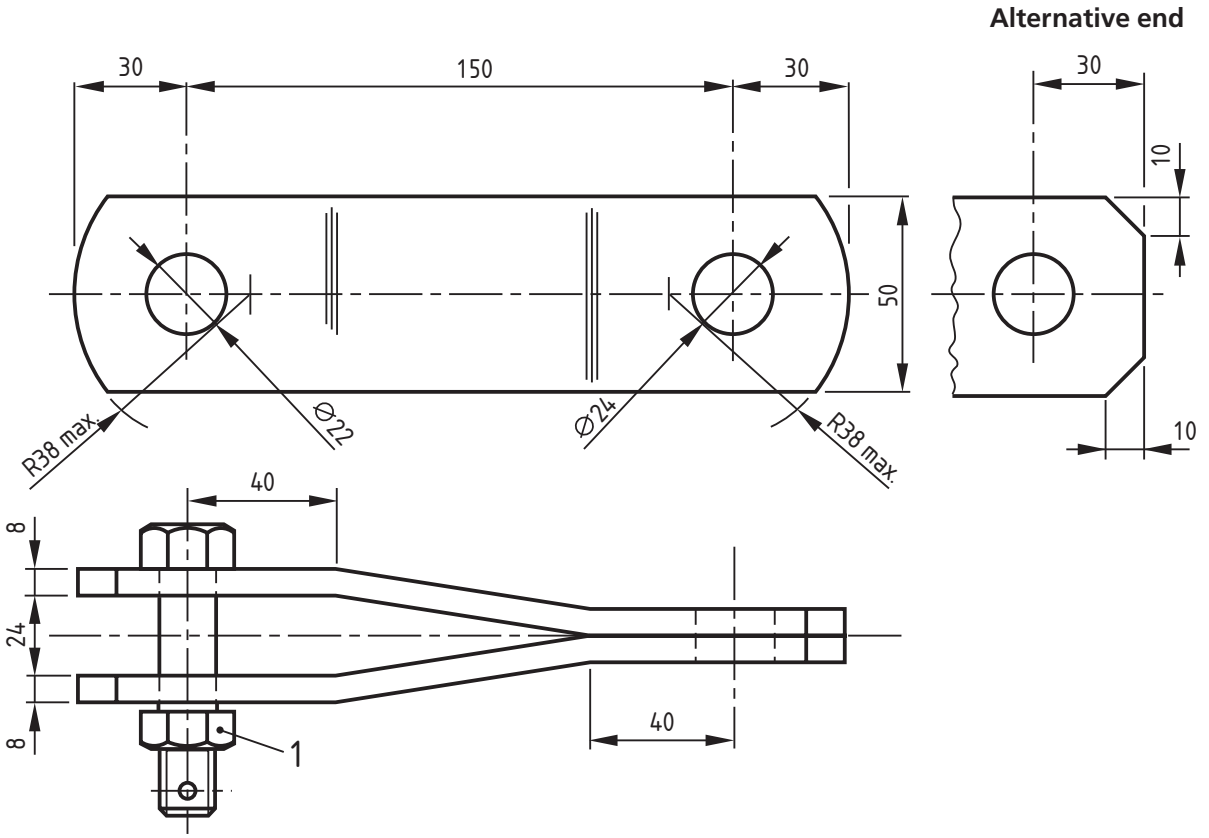
Table 25 **Dimensions of cranked links: reference numbers 42/102A and 84/102A**

Reference number	**Minimum failing load** kN	***A*** mm	***B*** mm	***C*** mm	***ØD*** mm	***E*** mm	***RF*** max. mm	***G*** mm	***H*** mm	***J*** min. mm	***K*** min. mm	**Bolt**		**Pin**	
												Diameter	**Length** mm	**Diameter** mm	**Length** mm
42/102A	190	152	65	12	27	38	38	15	26	38	50	M24	95	24	76
84/102A	400	200	100	12	32	55	60	25	27	60	60	M30	100	30	80

NOTE Link 42/102A was previously known as link F and link 84/102A was previously known as link G.

Figure 49 **Cranked links: reference number 28/186A**
(minimum failing load 125 kN)

Dimensions in millimetres



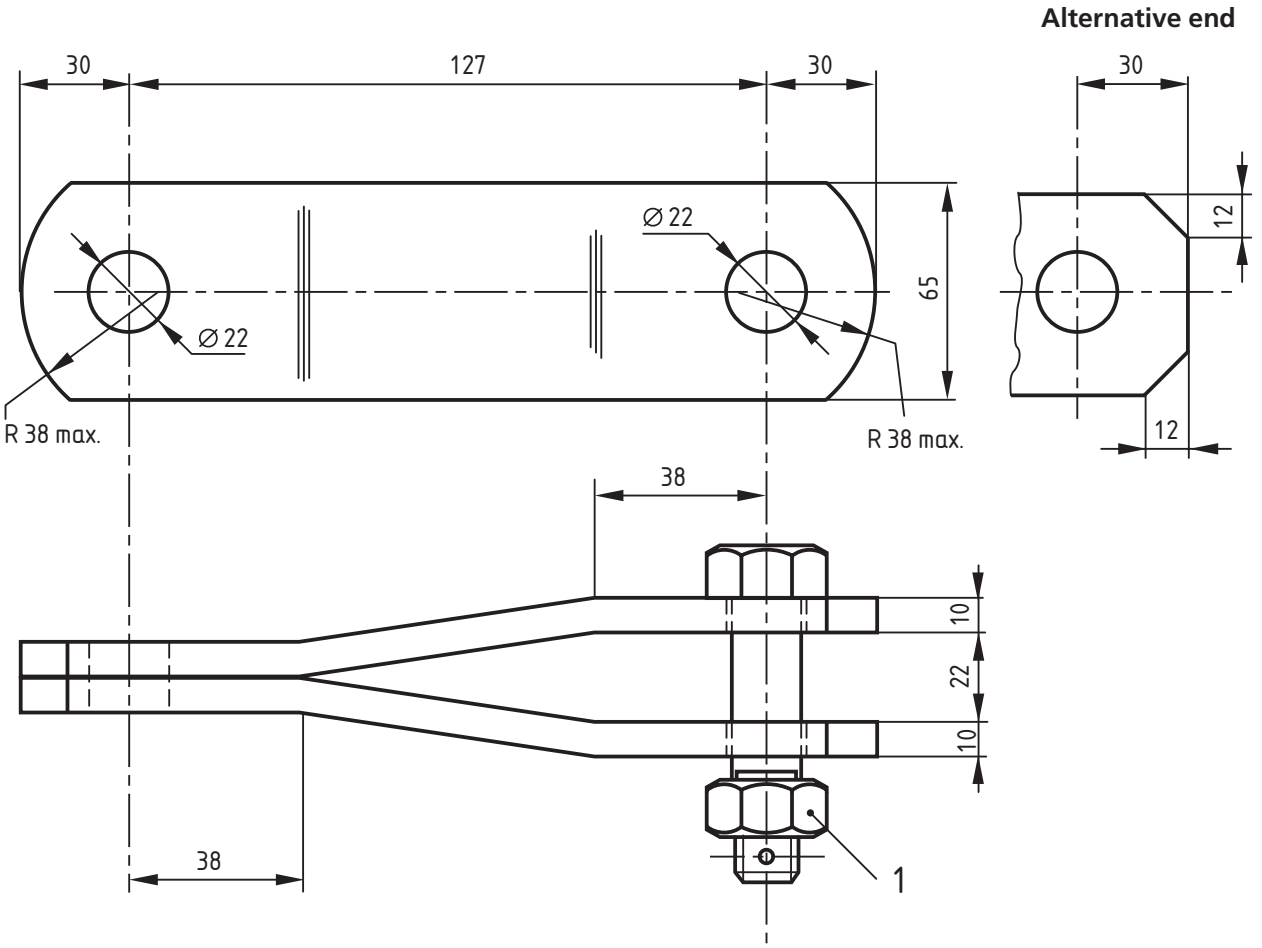
Key

1 M20 × 70 hex. bolt with nut and split pin

NOTE Bolt, nut and split pin are included.

Figure 50 **Cranked links: reference number 28/187A**
(minimum failing load 125 kN)

Dimensions in millimetres



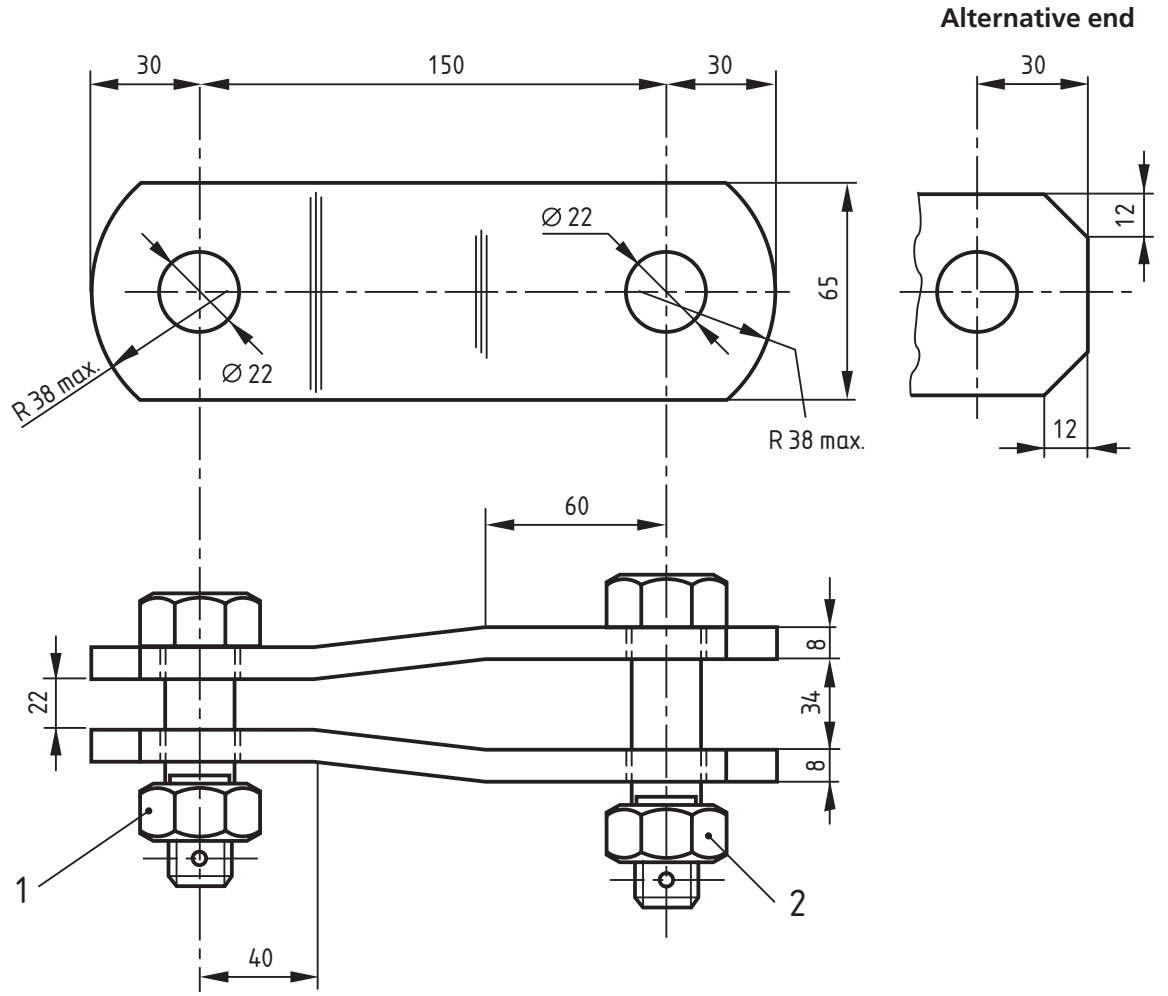
Key

1 M20 × 75 hex. bolt with nut and split pin

NOTE Bolt, nut and split pin are included.

Figure 51 **Cranked links: reference number 28/188A**
(minimum failing load 125 kN)

Dimensions in millimetres



Key

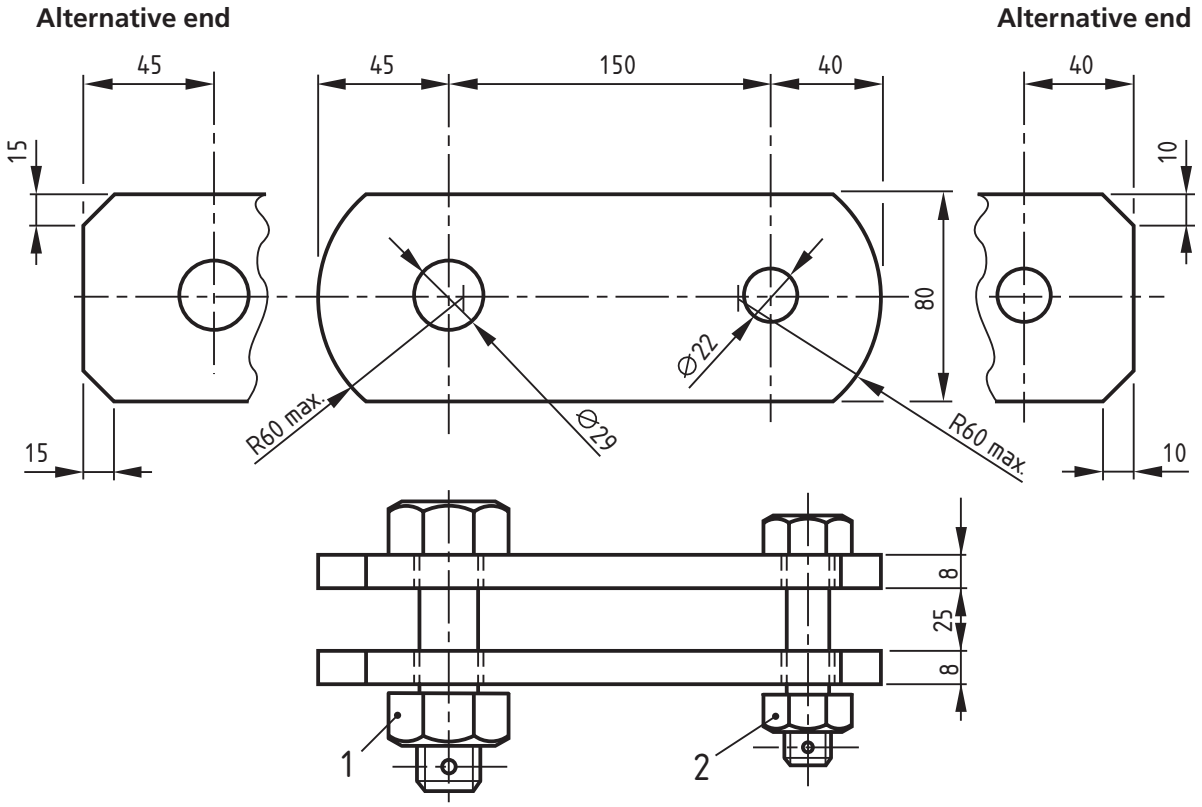
1 M20 × 70 hex. bolt with nut and split pin

2 M20 × 85 hex. bolt with nut and split pin

NOTE Bolts, nuts and split pins are included.

Figure 52 **Cranked links: reference number 28/189A**
(minimum failing load 125 kN)

Dimensions in millimetres



Key

1 M27 × 85 hex. bolt with nut and split pin

2 M20 × 75 hex. bolt with nut and split pin

NOTE Bolts, nuts and split pins are included.

Figure 53 **Landing plate: reference numbers 15/21, 28/21 and 42/21**

Dimensions in millimetres

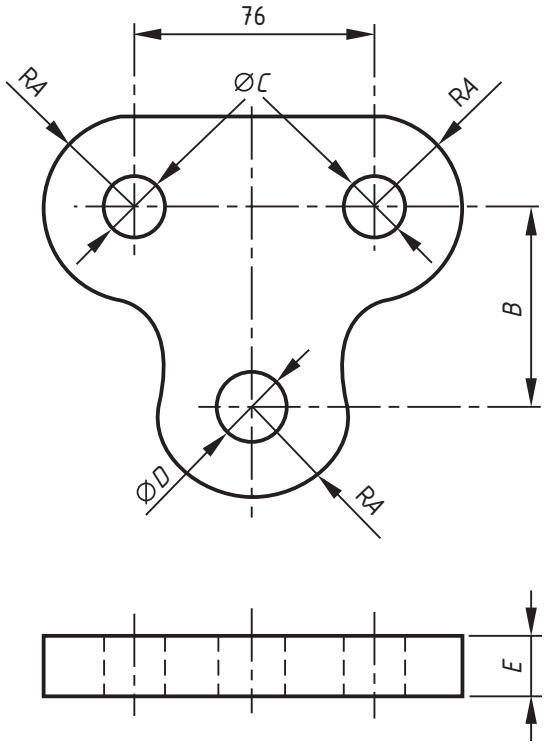


Table 26 **Dimensions of landing plate: reference numbers 15/21, 28/21 and 42/21**

Reference number	**Minimum failing load** kN	**R*A*** max. mm	***B*** mm	***ØC*** mm	***ØD*** mm	***E*** mm
15/21	70	23	57	18	18	15
28/21	125	32	65	22	24	20
42/21	190	37	65	24	24	22

Figure 54 **Sag adjuster plate: reference number 15/101**
(minimum failing load 70 kN)

Dimensions in millimetres

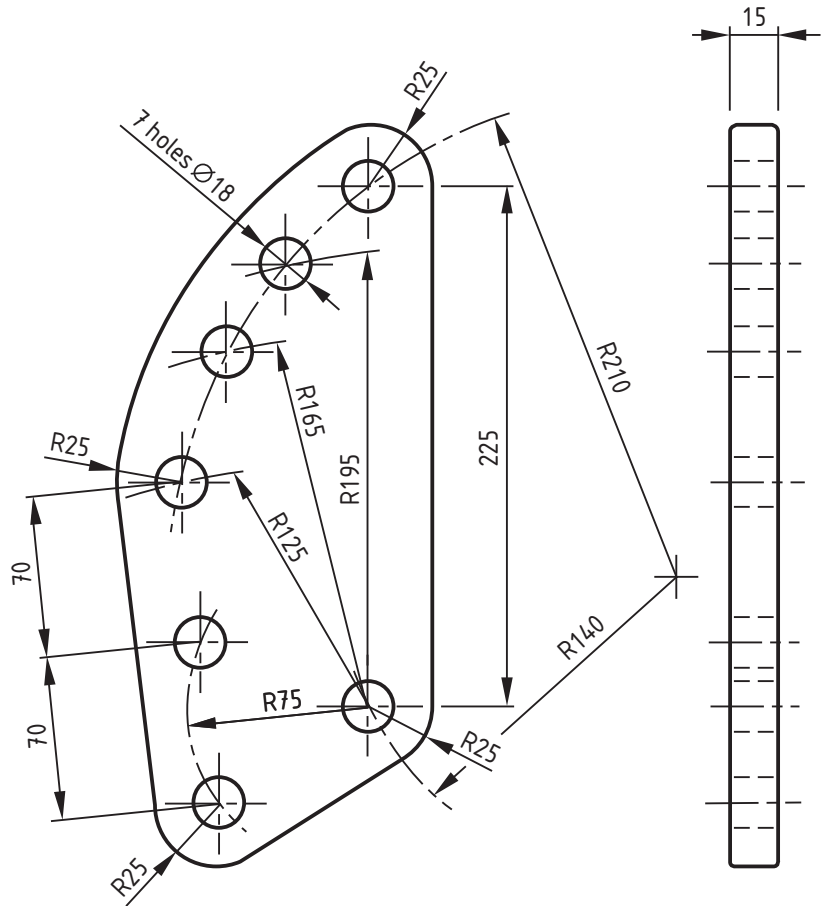


Figure 55 **Sag adjuster plate: reference number 28/100**
(minimum failing load 125 kN)

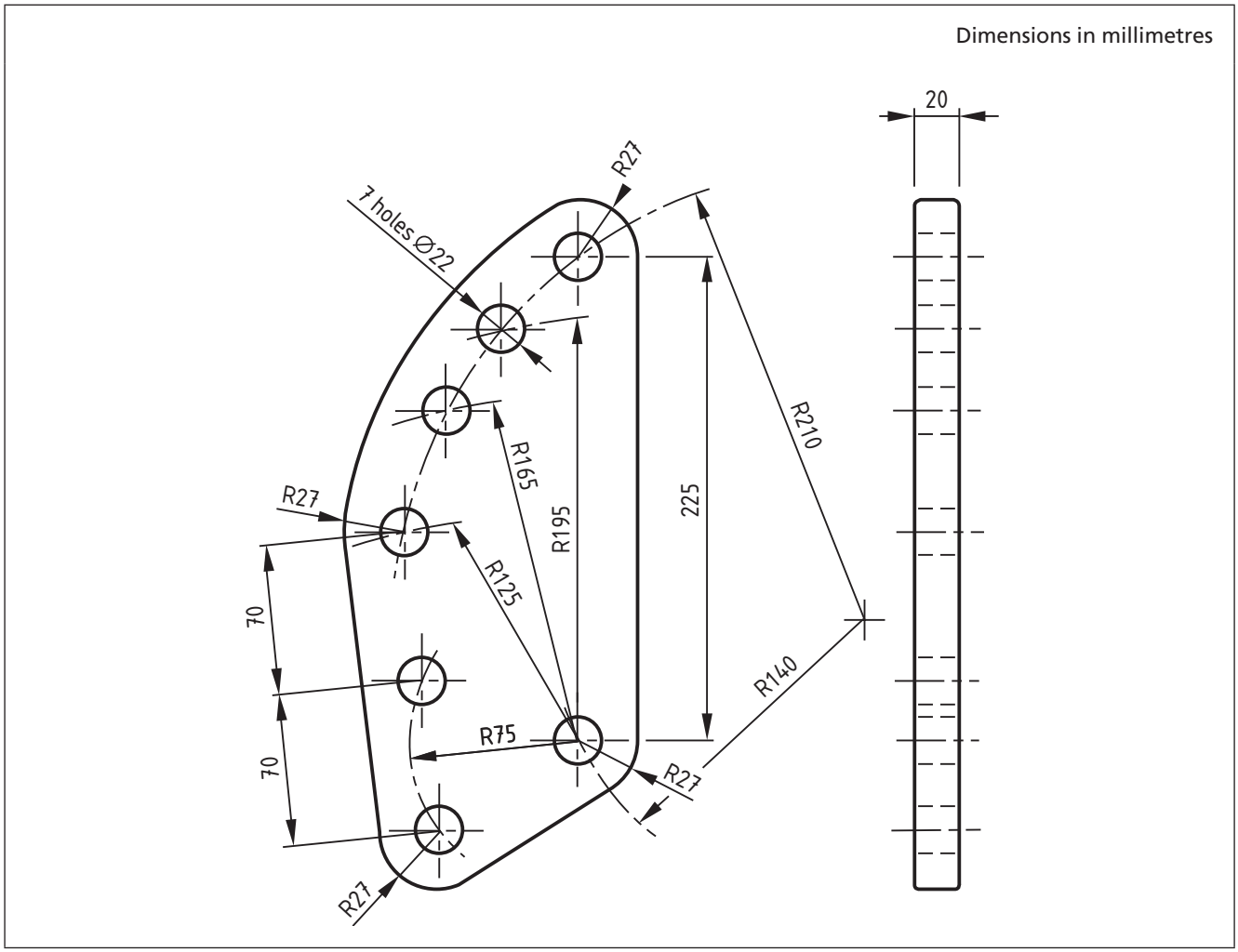
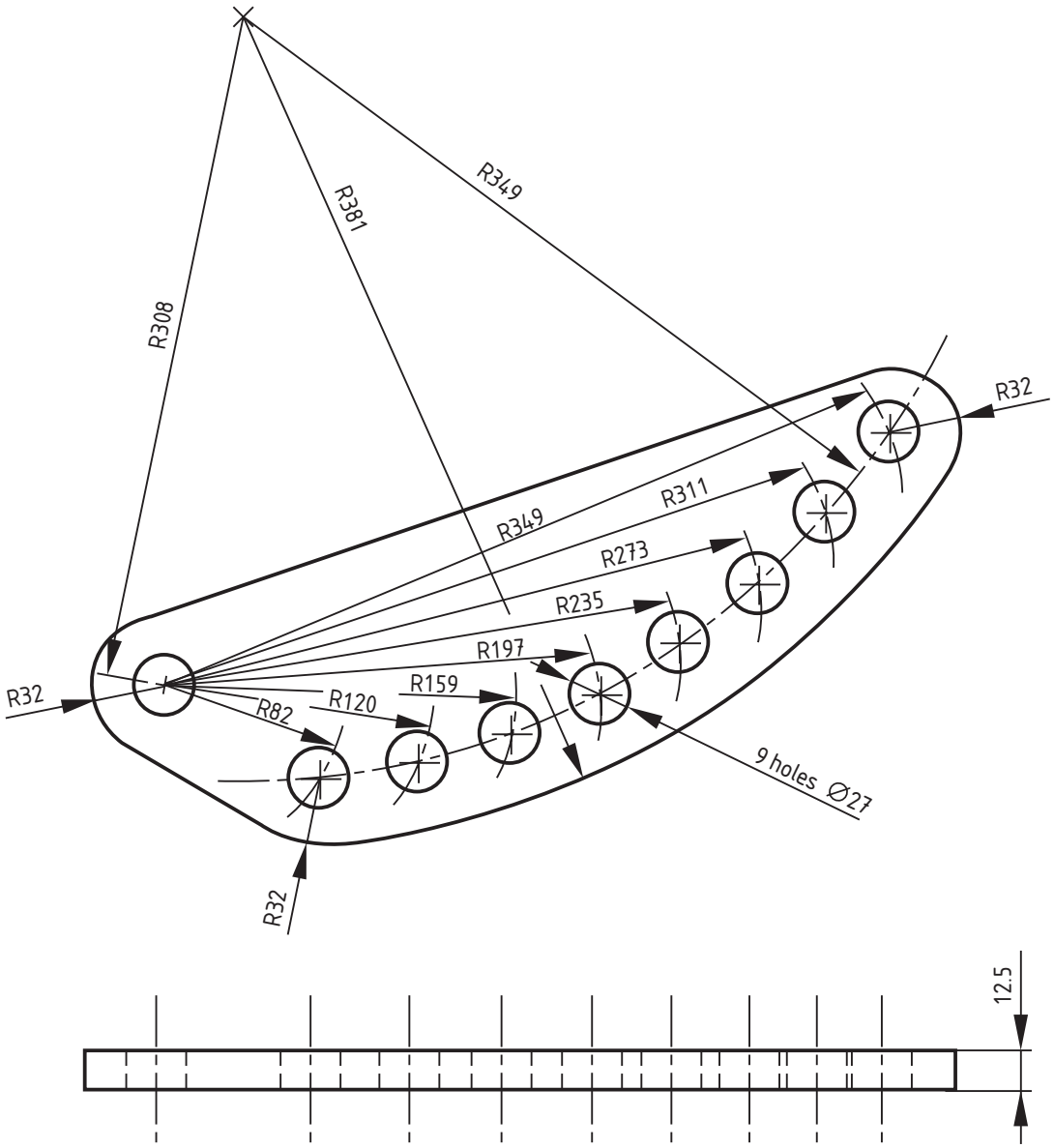


Figure 56 **Sag adjuster plate: reference number 42/100**
(minimum failing load 190 kN for a pair of plates)

Dimensions in millimetres

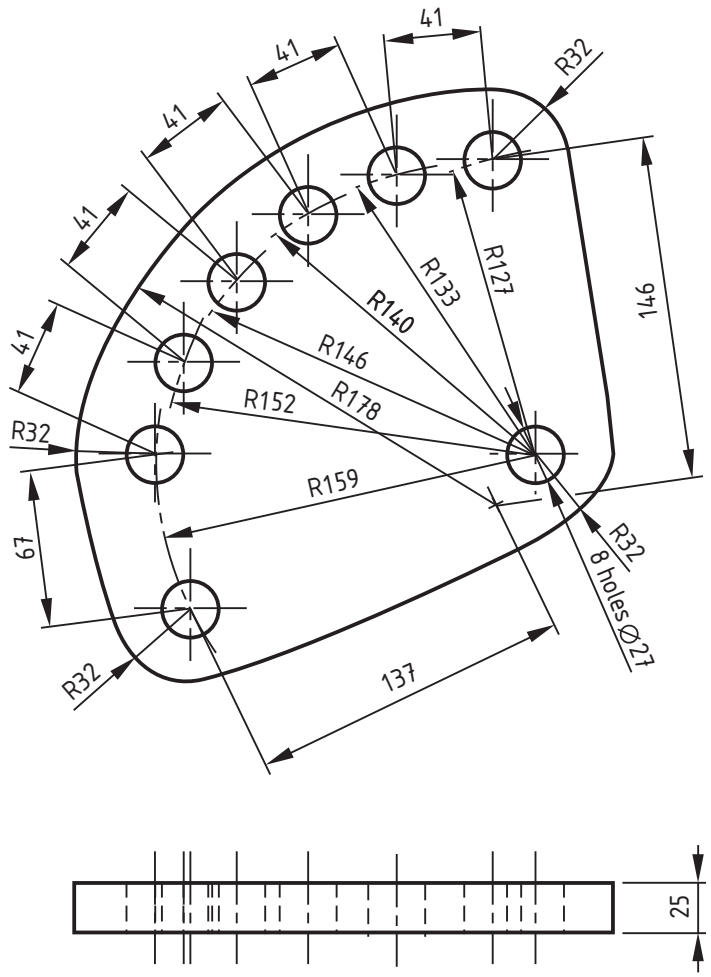


NOTE 1 See Figure 79 for sag adjuster assembly.

NOTE 2 Plates are used in pairs.

Figure 57 **Sag adjuster plate: reference number 42/101**
(minimum failing load 190 kN)

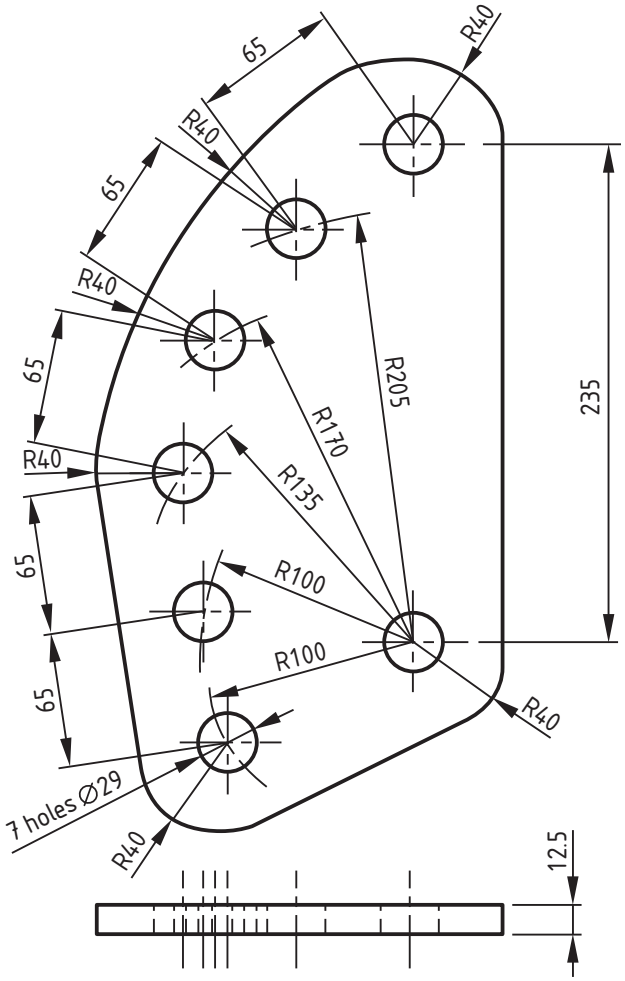
Dimensions in millimetres



NOTE See Figure 79 for sag adjuster assembly.

Figure 58 **Sag adjuster plate: reference number 67/100**
(minimum failing load 300 kN for a pair of plates)

Dimensions in millimetres

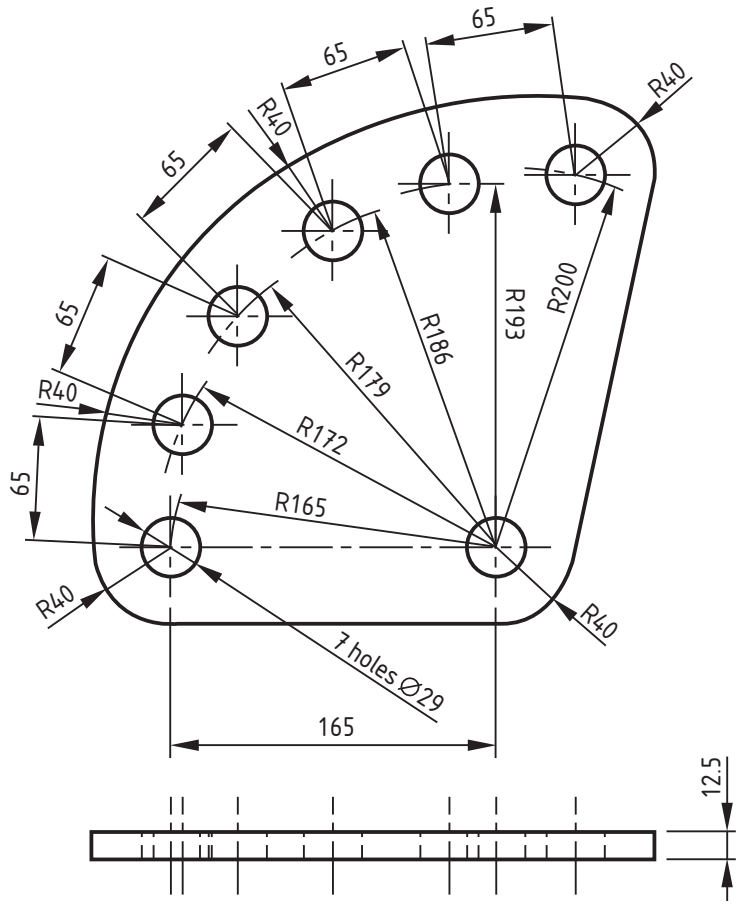


NOTE 1 See Figure 80 and Figure 81 for sag adjuster assemblies.

NOTE 2 Plates are used in pairs.

Figure 59 **Sag adjuster plate: reference number 67/101**
(minimum failing load 300 kN for a pair of plates)

Dimensions in millimetres

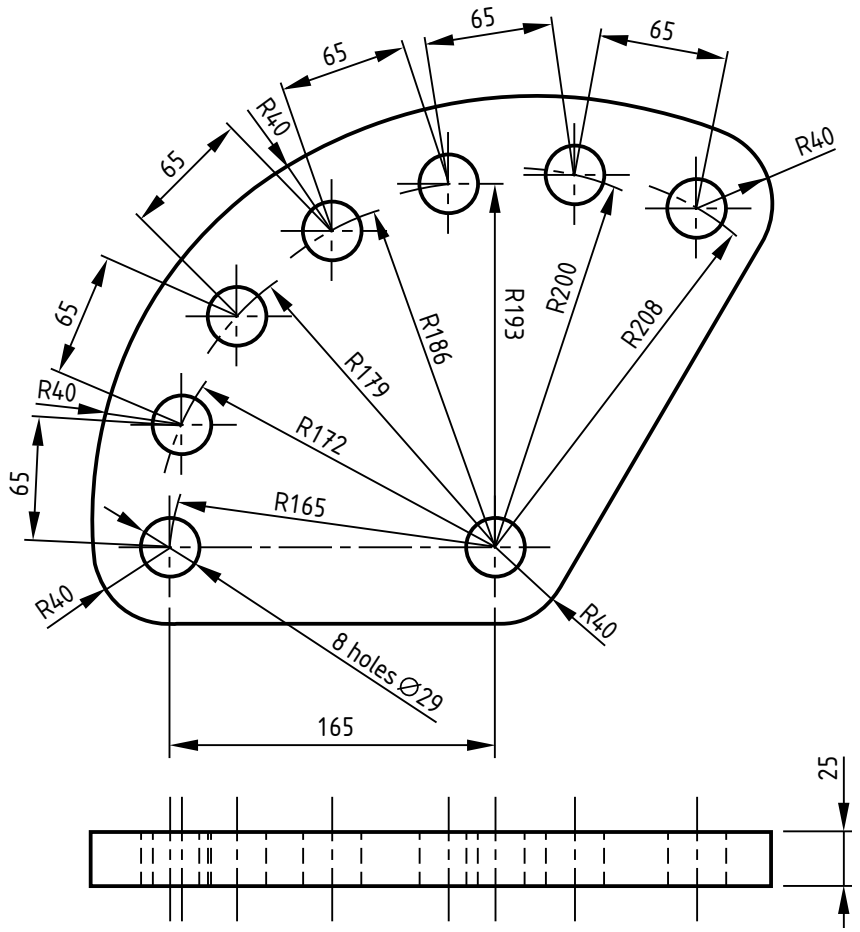


NOTE 1 See Figure 80 for sag adjuster assembly.

NOTE 2 Plates are used in pairs.

Figure 60 **Sag adjuster plate: reference number 67/110A**
(minimum failing load 300 kN)

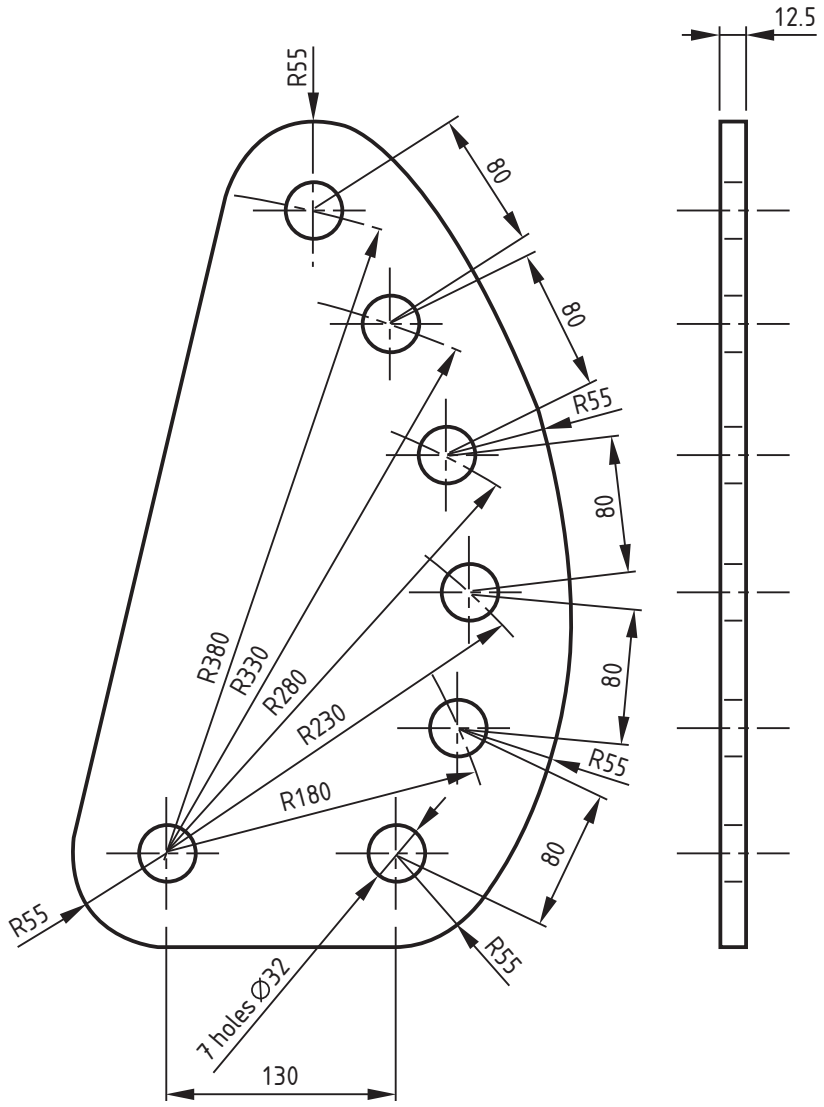
Dimensions in millimetres



NOTE See Figure 81 for sag adjuster assembly.

Figure 61 **Sag adjuster plate: reference number 84/100**
(minimum failing load 400 kN for a pair of plates)

Dimensions in millimetres

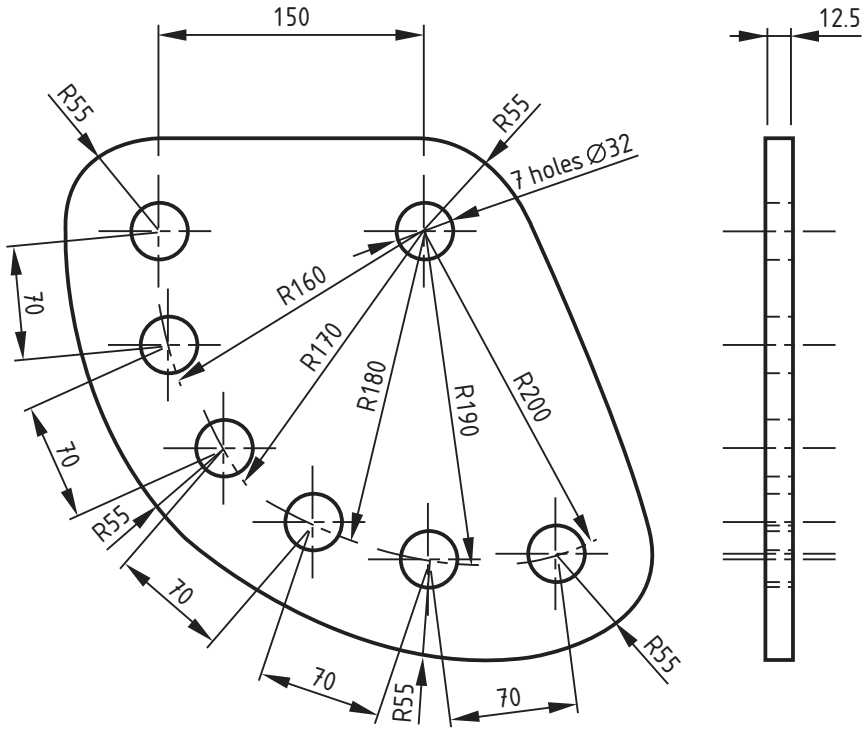


NOTE 1 See Figure 82 and Figure 83 for sag adjuster assemblies.

NOTE 2 Plates are used in pairs.

Figure 62 **Sag adjuster plate: reference number 84/101**
(minimum failing load 400 kN for a pair of plates)

Dimensions in millimetres

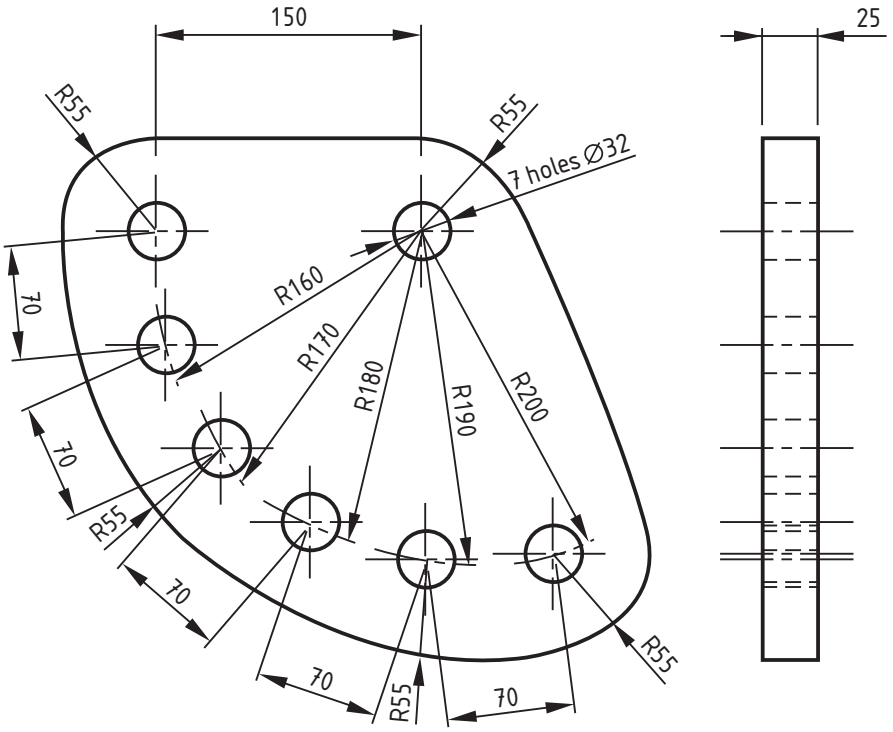


NOTE 1 See Figure 82 for sag adjuster assembly.

NOTE 2 Plates are used in pairs.

Figure 63 **Sag adjuster plate: reference number 84/110**
(minimum failing load 400 kN)

Dimensions in millimetres



NOTE 1 See Figure 83 for sag adjuster assembly.

Figure 64 **Yoke plate: reference number 15/22**
(minimum failing load 70 kN)

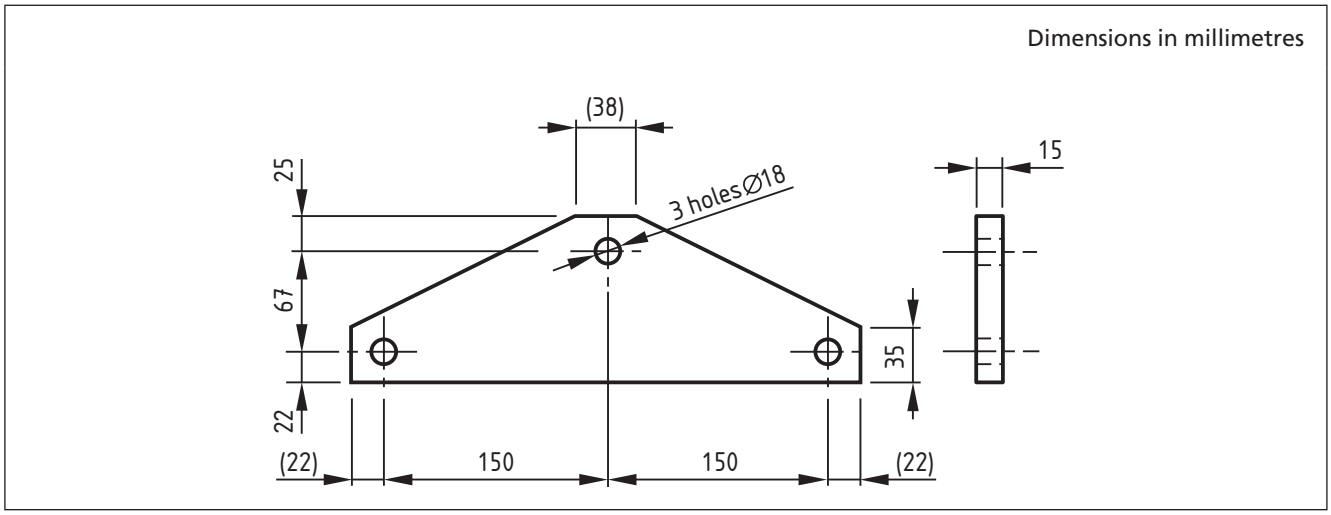


Figure 65 **Yoke plate: reference number 42/52**
(minimum failing load 190 kN)

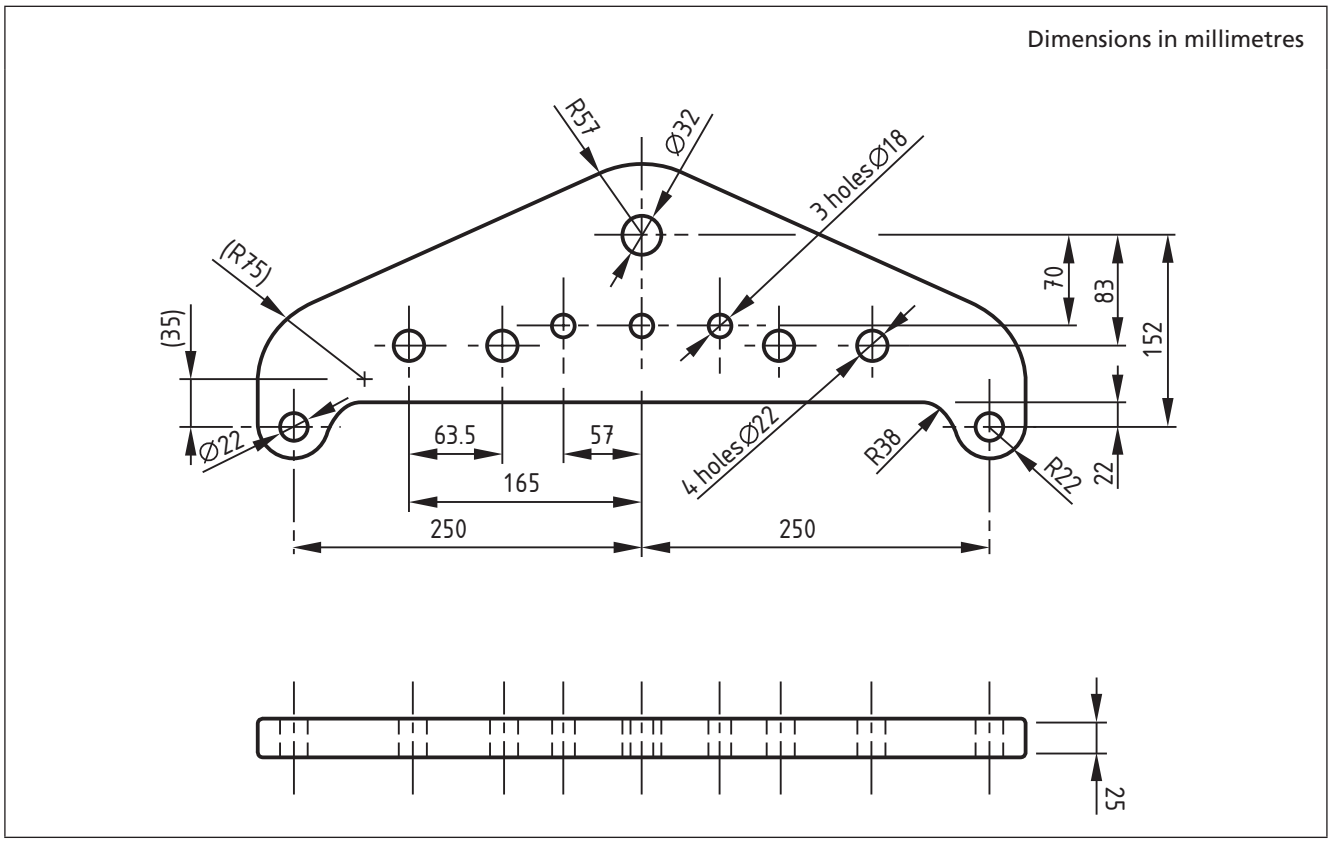


Figure 66 **Yoke plate: reference numbers 67/40 and 67/41**
(minimum failing load 300 kN)

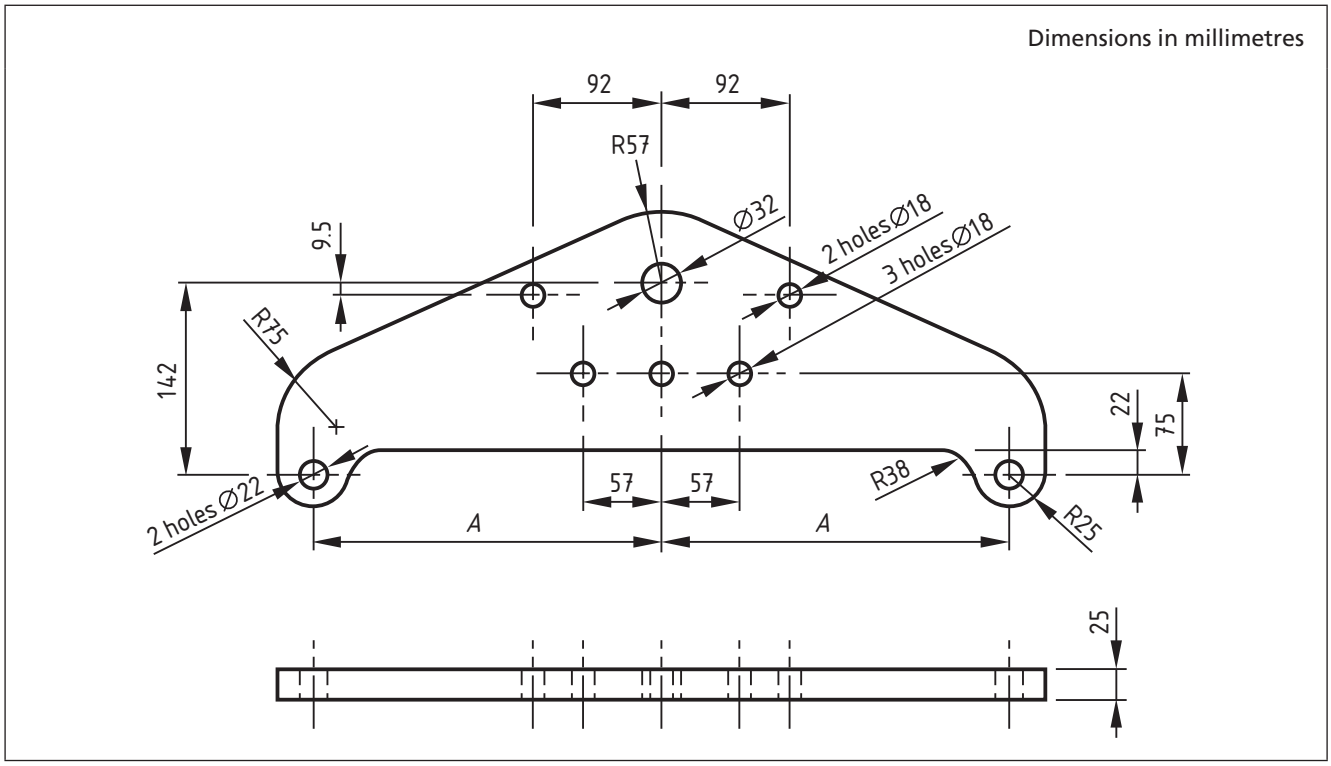


Table 27 **Dimensions of yoke plate: reference numbers 67/40 and 67/41**

Reference number	***A*** mm
67/40	250
67/41	275

Figure 67 **Yoke plate: reference number 67/42**
(minimum failing load 300 kN)

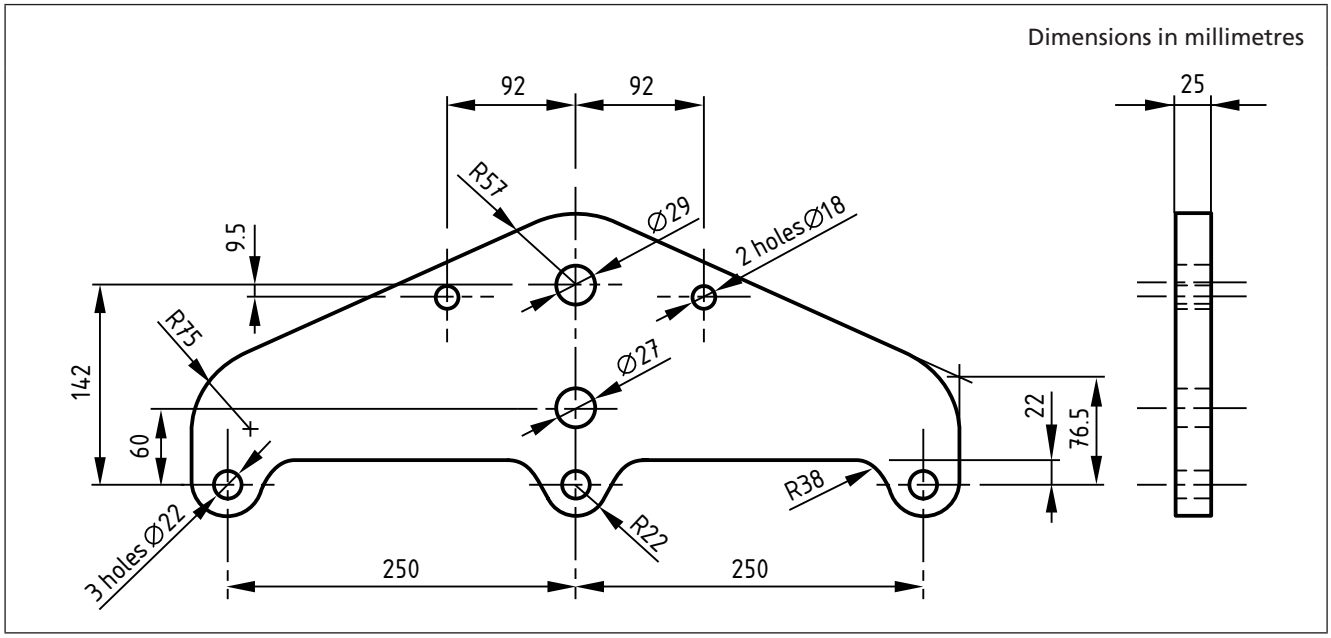
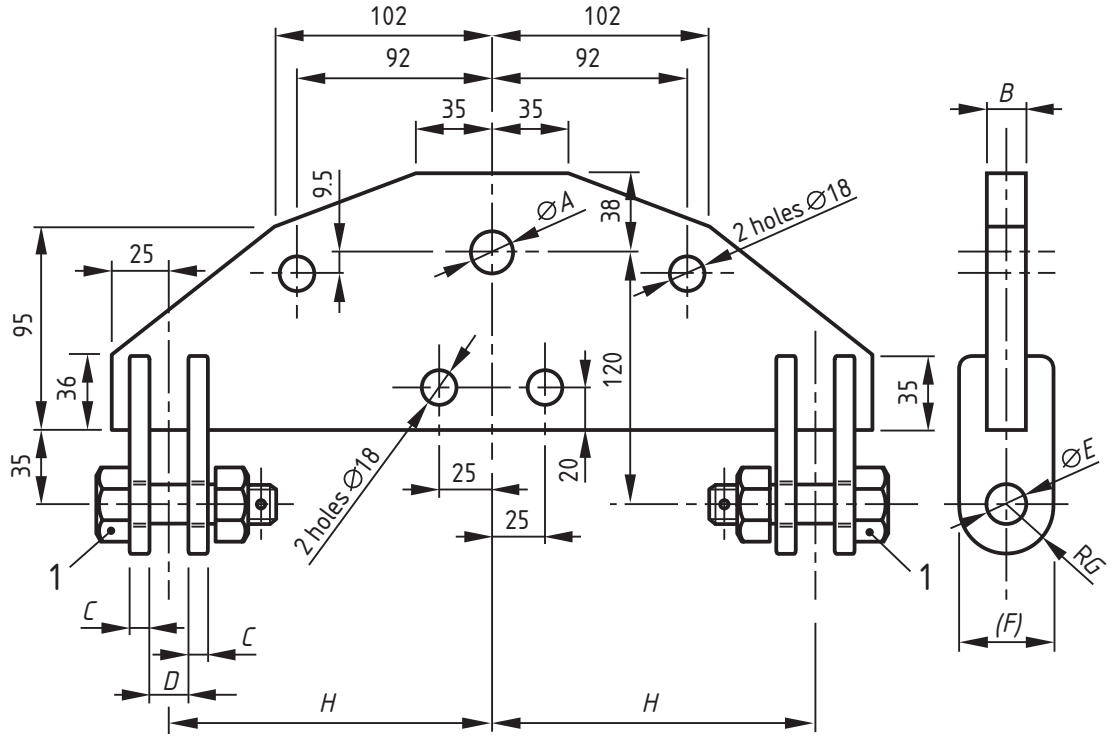


Figure 68 **Yoke plate: reference numbers 28/22A, 42/22A and 42/124A**

Dimensions in millimetres



Key

1 Hex. bolt with nut and split pin or pin with washer and split pin

NOTE Bolts, nuts and split pins (or pins, split pins and washers) are included.

Table 28 **Dimensions of yoke plate: reference numbers 28/22A, 42/22A and 42/124A**

Reference number	Minimum failing load	*ØA*	*B*	*C*	*D*	*ØE*	*F*	R*G*	*H*	Bolts (2)		Pins (2)	
										Diameter	Length	Diameter	Length
	kN	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm
28/22A	125	22	15	8	18.5	18	45	22.5	150	M16	65	16	50
42/22A	190	24	20	10	21.5	22	57	28.5	150	M20	75	20	60
42/124A	190	24	20	10	21.5	22	57	28.5	200	M20	75	20	60

Figure 69 **Yoke plate: reference number 28/43**
(minimum failing load 125 kN)

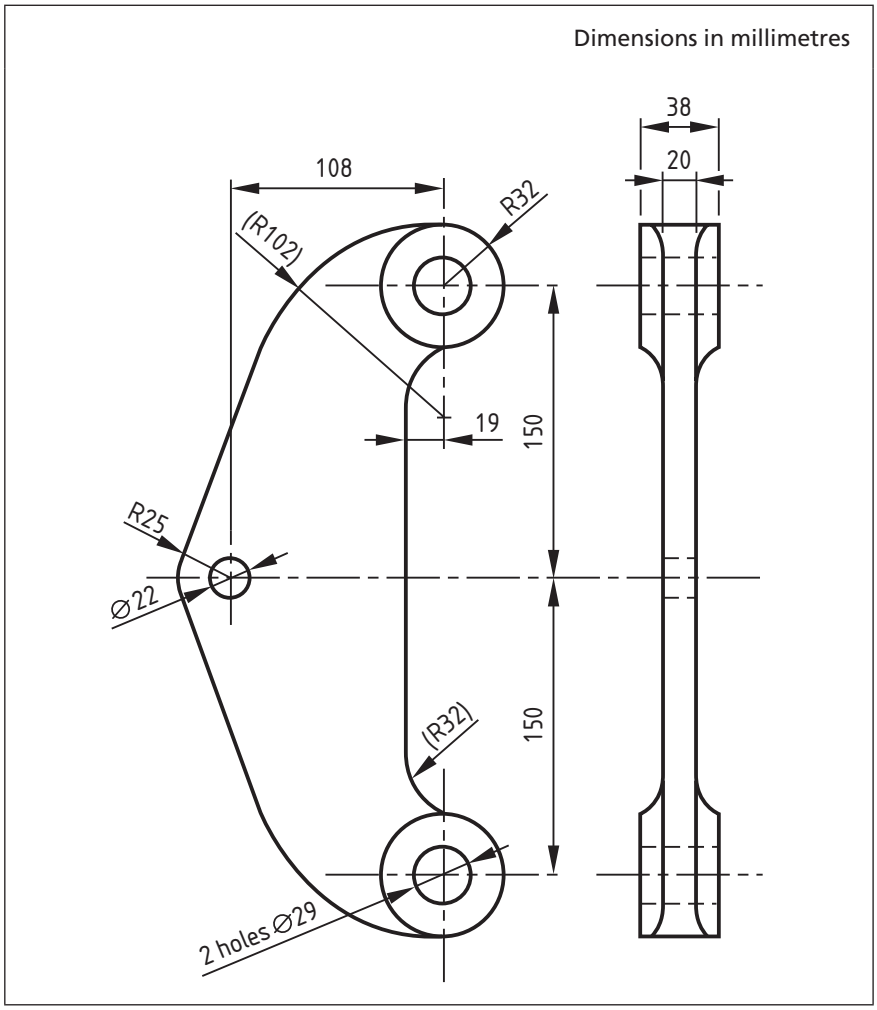


Figure 70 **Yoke plate: reference number 84/40**
(minimum failing load 400 kN)

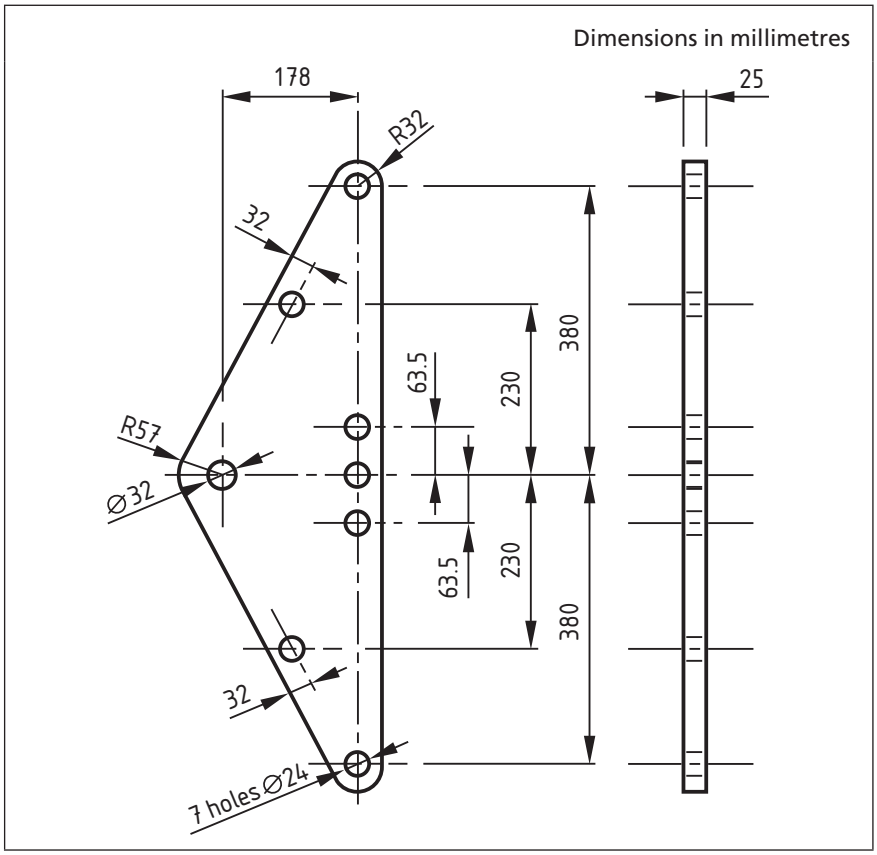


Figure 71 **Yoke plate: reference number 84/41**
(minimum failing load 400 kN)

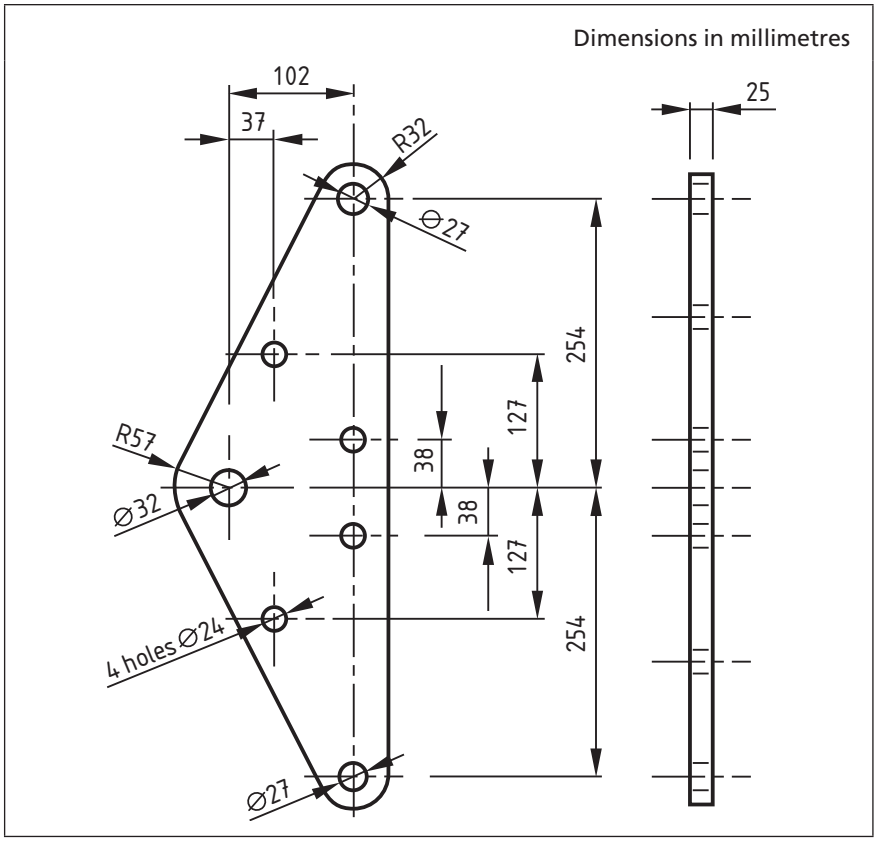


Figure 72 **Yoke plate: reference number 84/42**
(minimum failing load 400 kN)

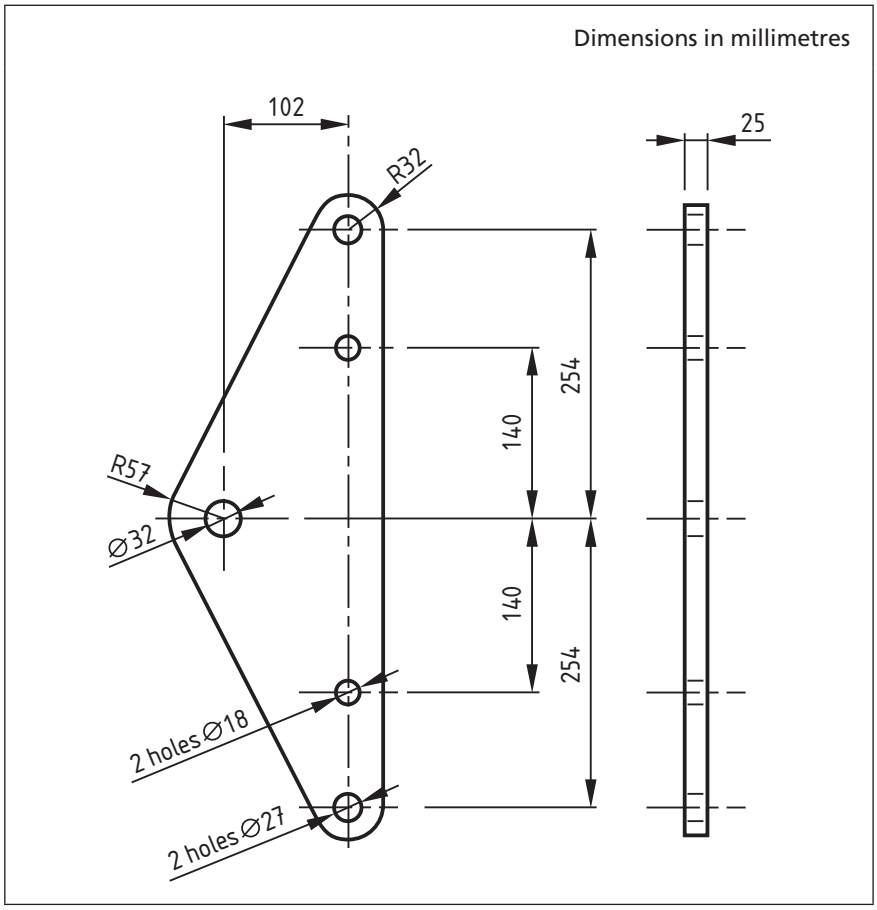


Figure 73 **Yoke plate: reference numbers 42/42 and 42/106**
(minimum failing load 190 kN)

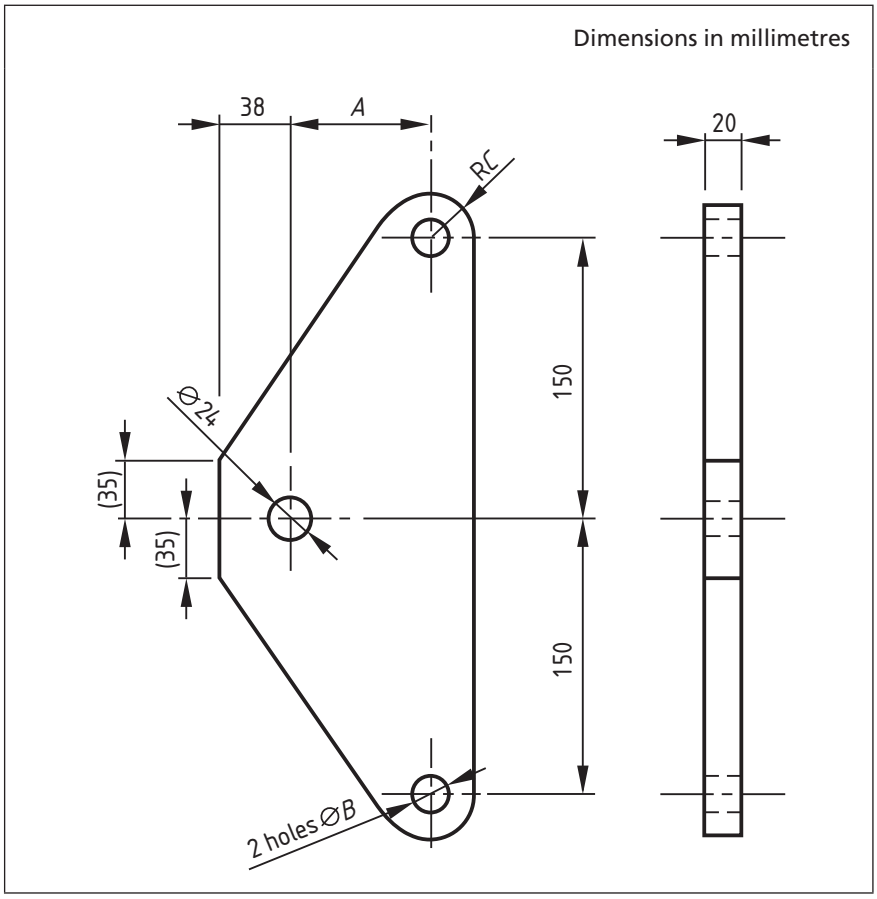


Table 29 **Dimensions of yoke plate: reference numbers 42/42 and 42/106**

Reference number	***A***	***ØB***	**RC**
	mm	mm	mm
42/42	76	22	25
42/106	100	29	45

Figure 74 **Yoke plate: reference number 84/52**
(minimum failing load 400 kN)

Linear dimensions in millimetres

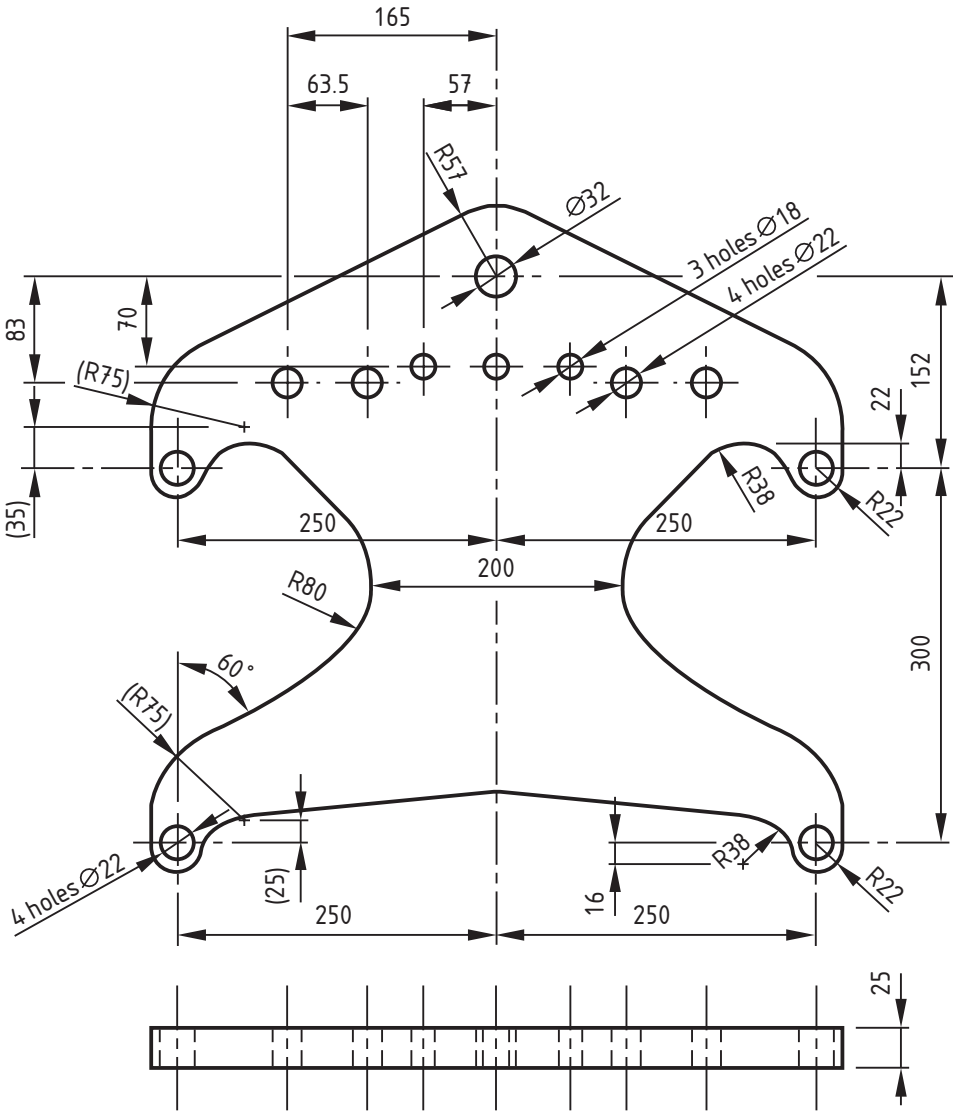


Figure 75 **Yoke plate: reference numbers 67/53A and 84/53**

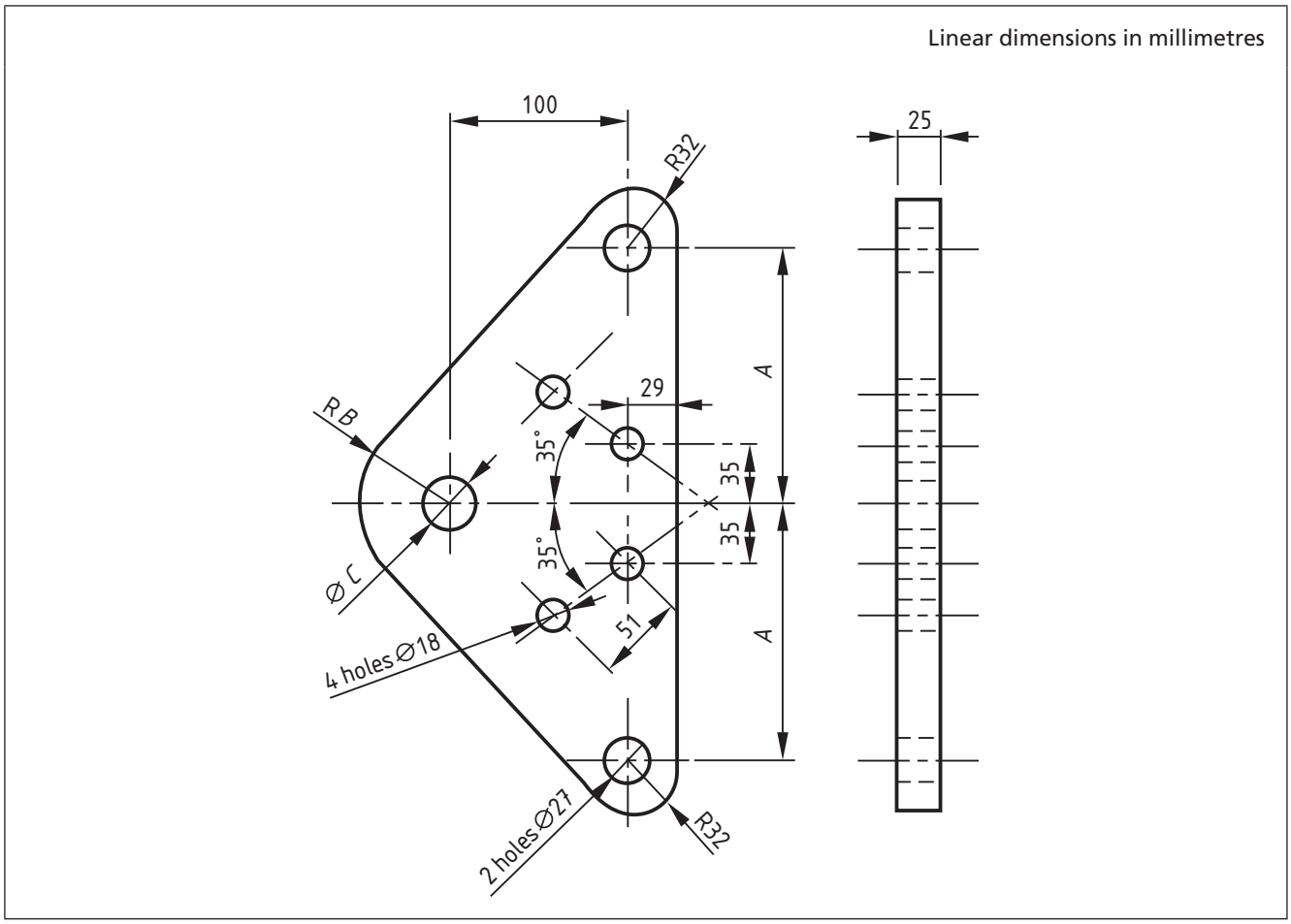


Table 30 **Dimensions of yoke plate: reference numbers 67/53A and 84/53**

Reference number	**Minimum failing load** kN	***A*** mm	**R*B*** mm	**Ø*C*** mm
67/53A	300	250	50	29
84/53	400	150	57	32

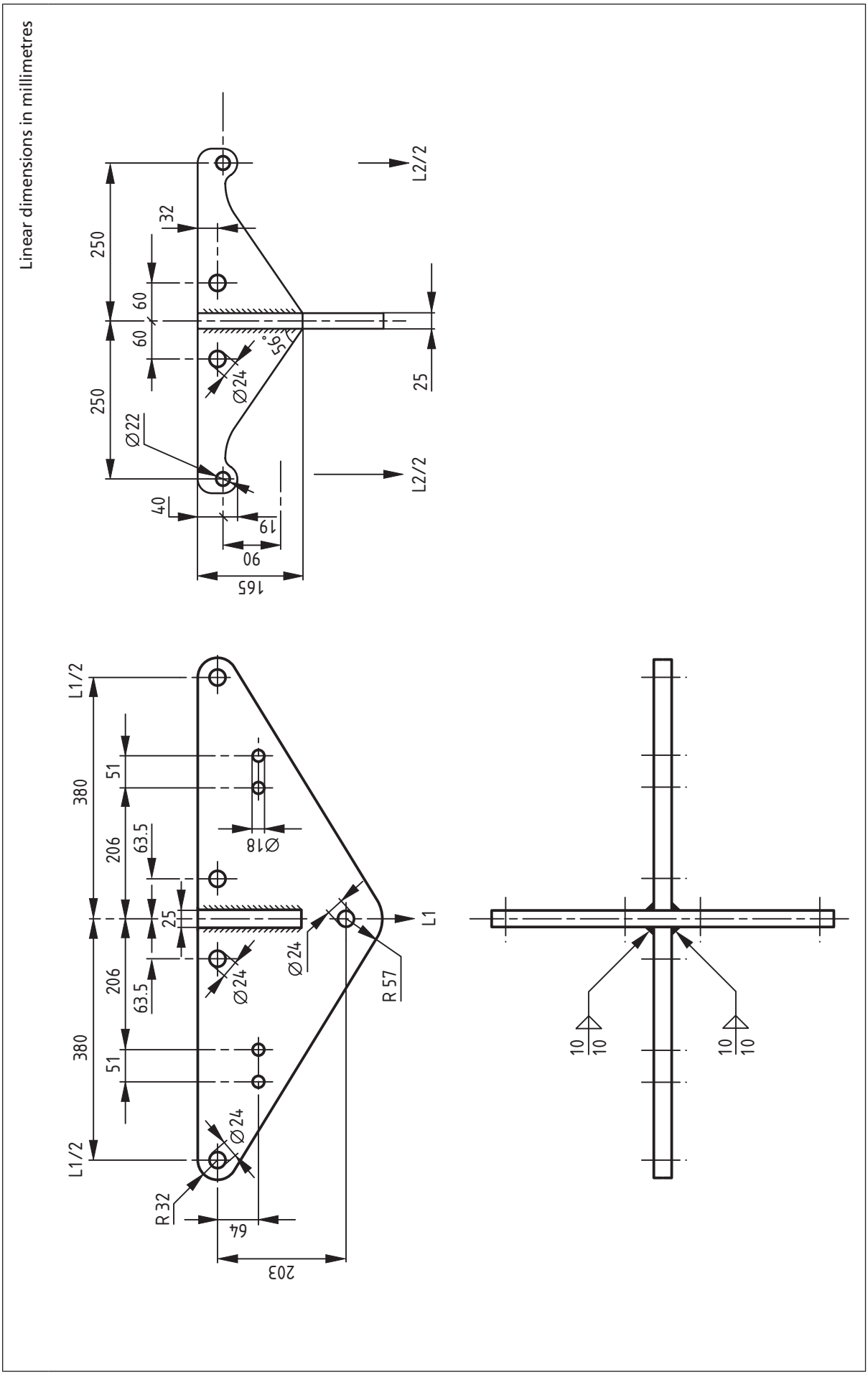
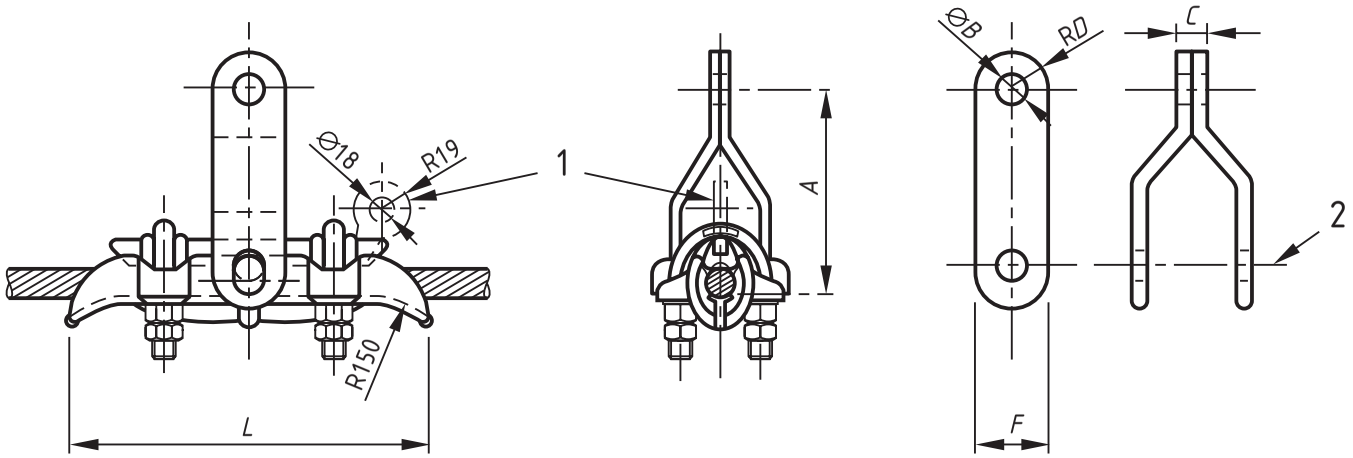


Figure 76 **Cruciform yoke plate: reference number 84/38C**
(minimum failing load L1 = 400 kN; L2 = 210 kN)

Figure 77 **Suspension clamp body with keeper for line and earth conductors: illustrated with closed type straps**

Dimensions in millimetres



Suspension clamp body
Keeper type (with U-bolts)

Suspension clamp straps
Closed type

Key

1 See note 1

2 Centreline of conductor

NOTE 1 Keeper type clamps that are not corona free are unsuitable for line conductors at 275 kV and above unless fitted with a corona shield.

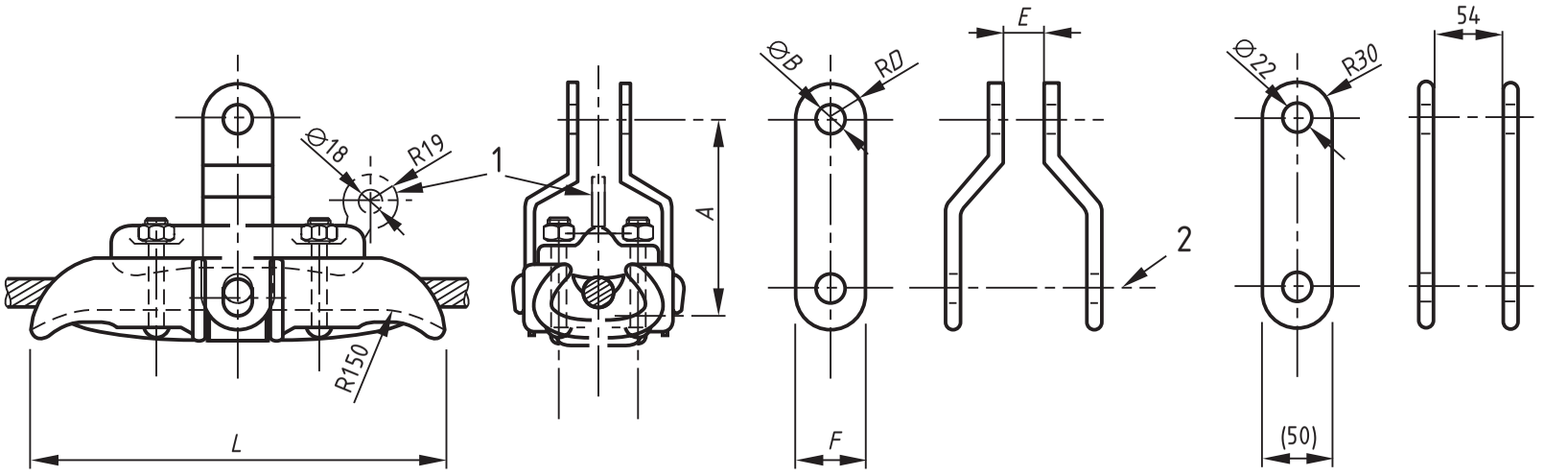
NOTE 2 Aluminium keeper with lug for earth bond is used for earthwire applications only.

Table 31 **Dimensions of suspension clamp body with keeper for line and earth conductors: closed type straps**

Conductor	**Minimum failing load**	***A***	***ØB***	***C***	***D***	***F***	***L***
mm	kN	mm	mm	mm	mm	mm	mm
13 to 24	70	127	18	12	25	50	(250)
24 to 34	95	127	22	16	(27.5)	(55)	(290)
34 to 38	95	(165)	22	20	(27.5)	(55)	(300)

Figure 78 **Suspension clamp body with keeper for line and earth conductors: corona free type: illustrated with open type straps**

Dimensions in millimetres



Suspension clamp body
Keeper type (with corona free bolts)

Suspension clamp straps
Open type

Alternative suspension clamp straps
Straight type

Key

1 See note

2 Centreline of conductor

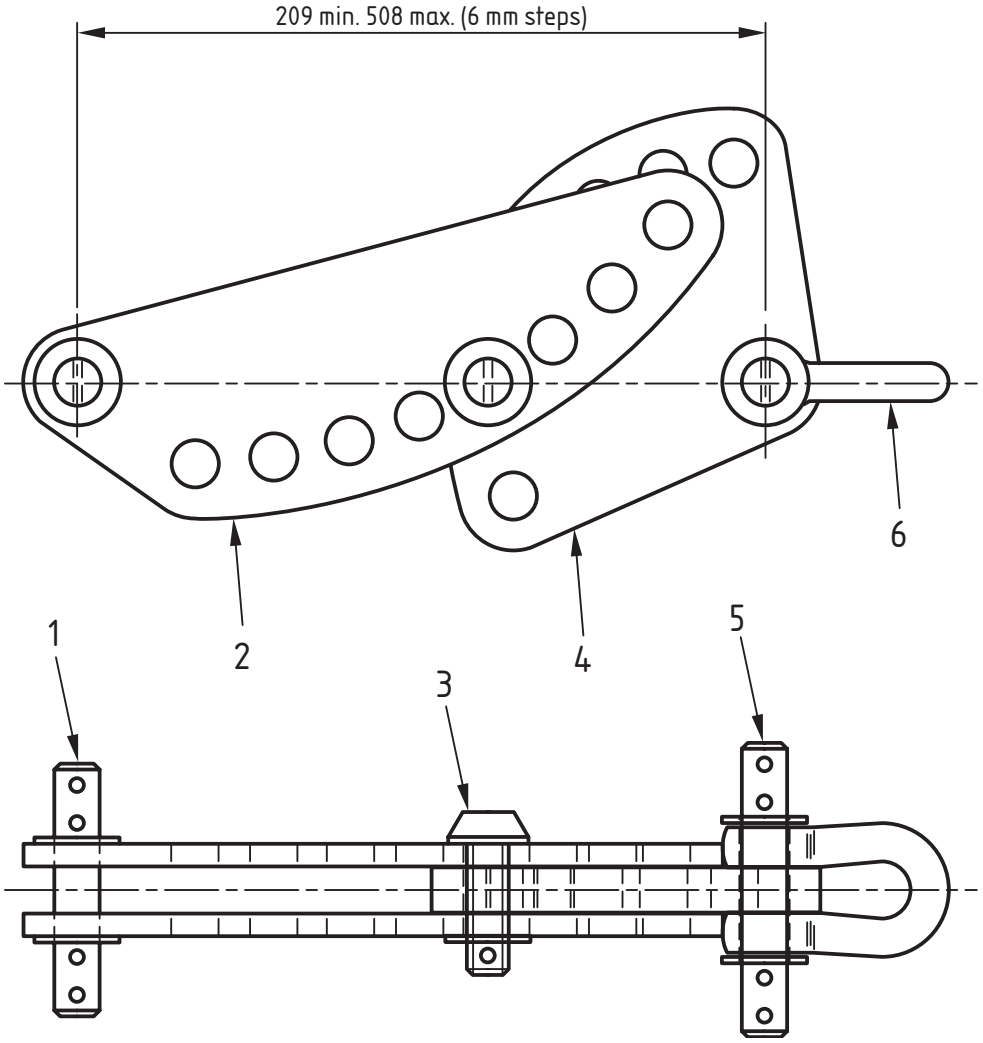
NOTE Aluminium keeper with lug for earth bond is used for earthwire applications only.

Table 32 **Dimensions of suspension clamp body with keeper for line and earth conductors: corona free type: open type straps**

Conductor mm	**Minimum failing load** kN	***A*** mm	***ØB*** mm	***D*** mm	***E*** mm	***F*** mm	***L*** mm
13 to 24	70	127	18	25	19	50	(250)
24 to 34	95	127	22	(27.5)	22	(55)	(290)
34 to 42	95	(165)	22	(27.5)	—	(55)	(300)

Figure 79 **190 kN sag adjuster assemblies: Type L and Type M**

Dimensions in millimetres



Key

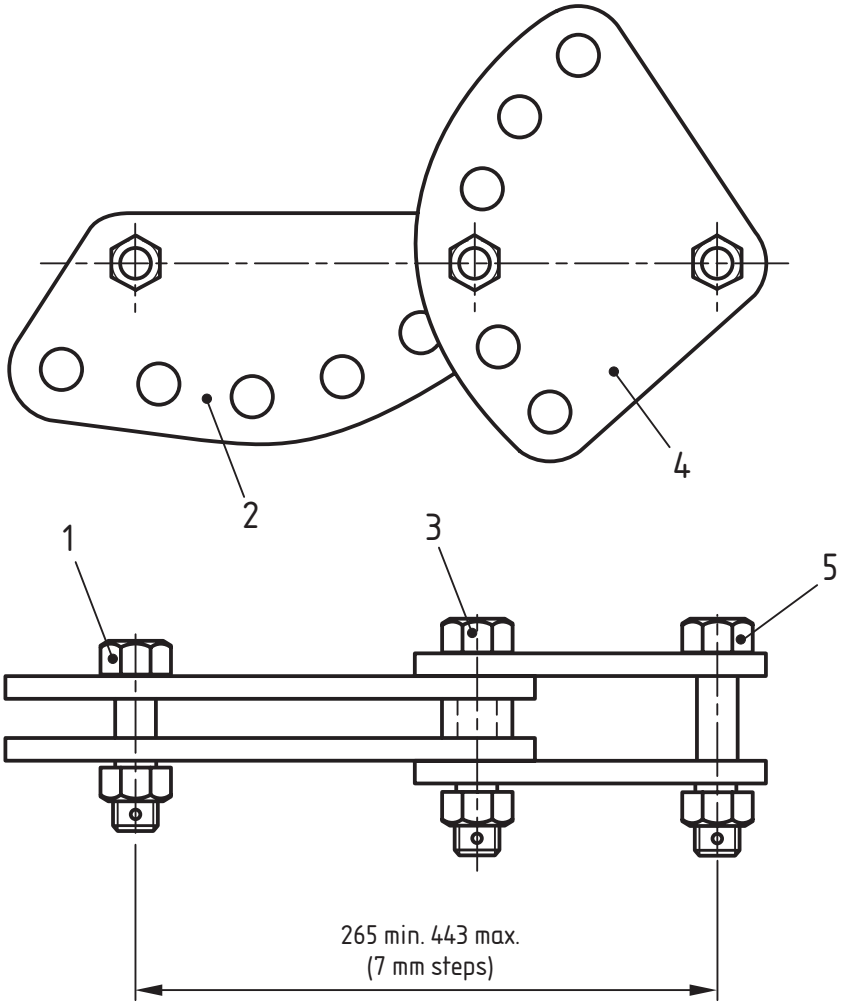
1	Pin H	4	42/101
2	42/100 (2 off)	5	Pin L
3	Pin J	6	Shackle 42/103

NOTE 1 Sag adjuster assembly Type L is illustrated. Sag adjuster assembly Type M uses pin M in place of pin L with 42/28B, 42/54A or 42/54B.

NOTE 2 See Figure 84 and Figure 86 for details of pins.

Figure 80 **300 kN sag adjuster assembly**

Dimensions in millimetres



Key

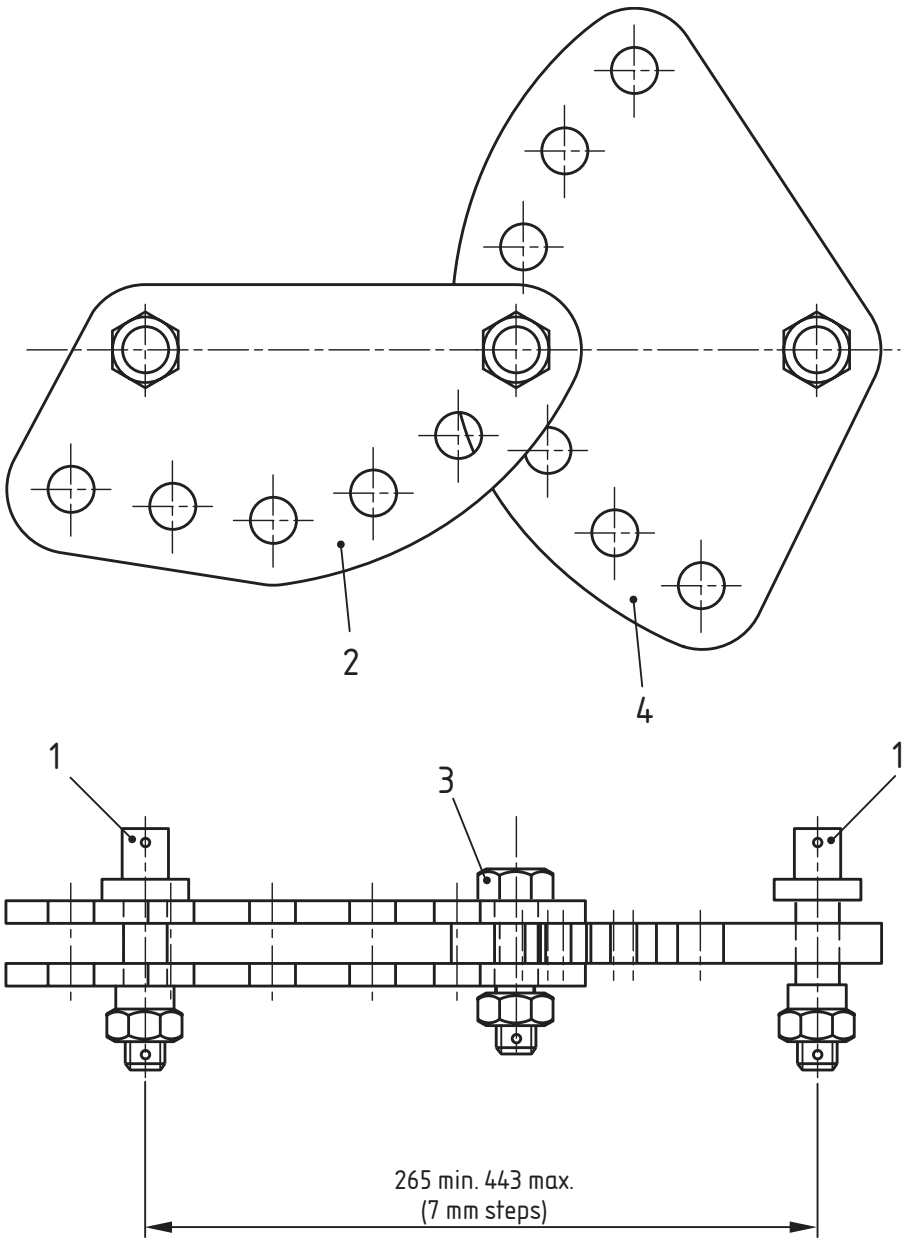
1 Bolt or pin P
2 67/100 (2 off)
3 Bolt or pin R with spacer
4 67/101 (2 off)
5 Bolt or pin R

NOTE 1 See Figure 87 for details of pins or bolts.

NOTE 2 See Figure 88 for details of spacer.

Figure 81 **Alternative 300 kN sag adjuster assembly**

Dimensions in millimetres



Key

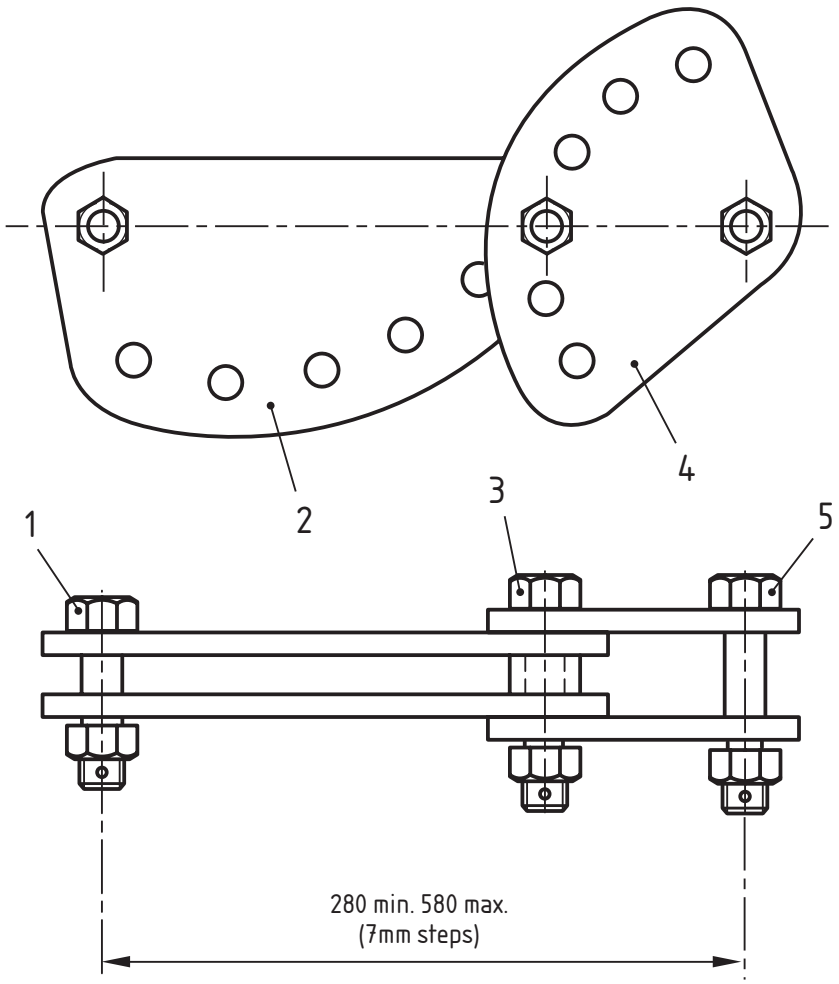
1 300 kN jack locating pin (2 off)
2 67/100 (2 off)
3 M27 × 100 hex. bolt with nut and split pin
4 67/110A

NOTE 1 See Figure 85 for details of jack locating pin.

NOTE 2 See Figure 91 for details of hex. bolt and split pin.

Figure 82 **400 kN sag adjuster assembly**

Dimensions in millimetres



Key

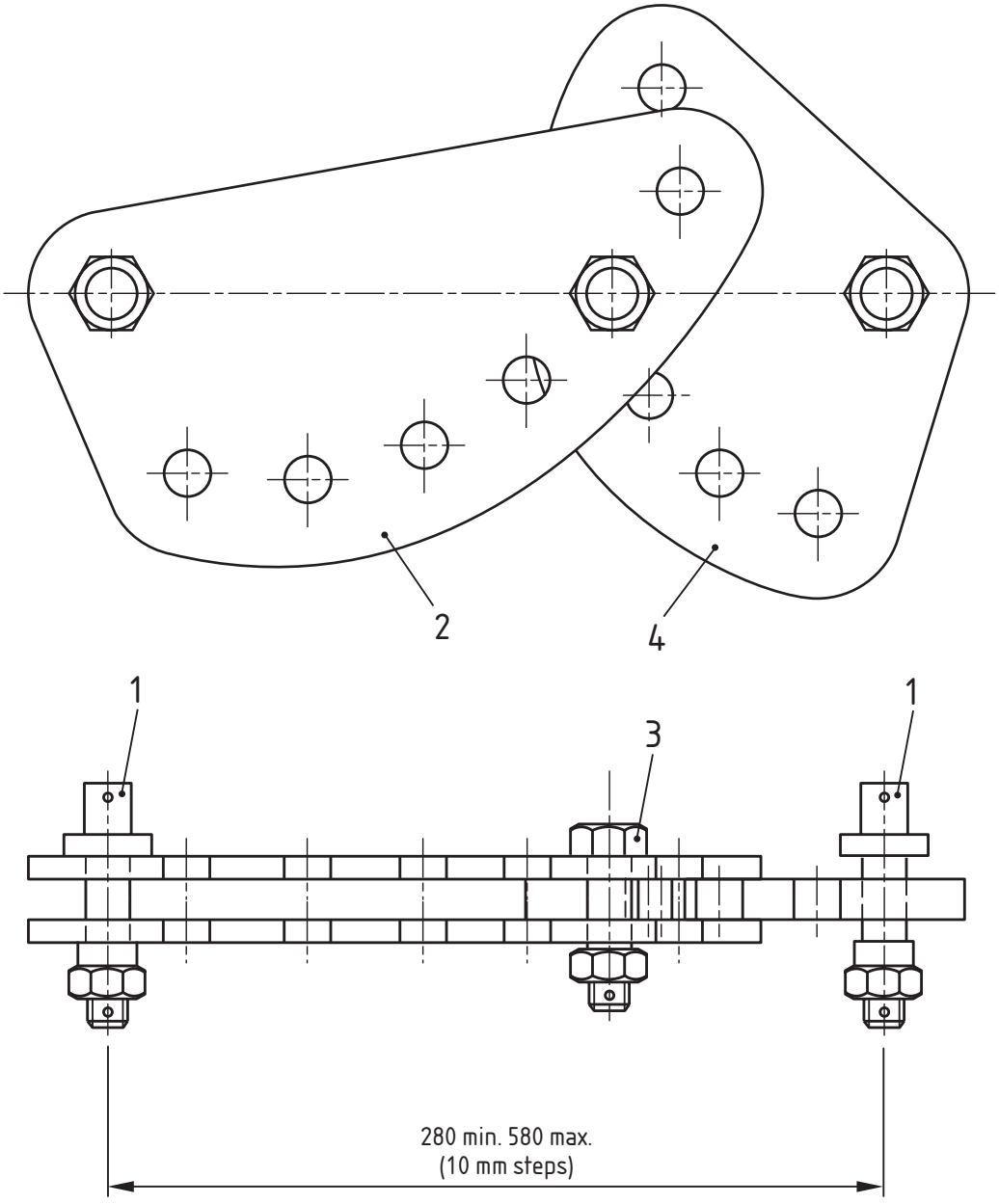
1 Bolt or pin Q
2 84/100 (2 off)
3 Bolt or pin S with spacer
4 84/101 (2 off)
5 Bolt or pin S

NOTE 1 See Figure 87 for details of pins or bolts.

NOTE 2 See Figure 88 for details of spacer.

Figure 83 **Alternative 400 kN sag adjuster assembly**

Dimensions in millimetres



Key

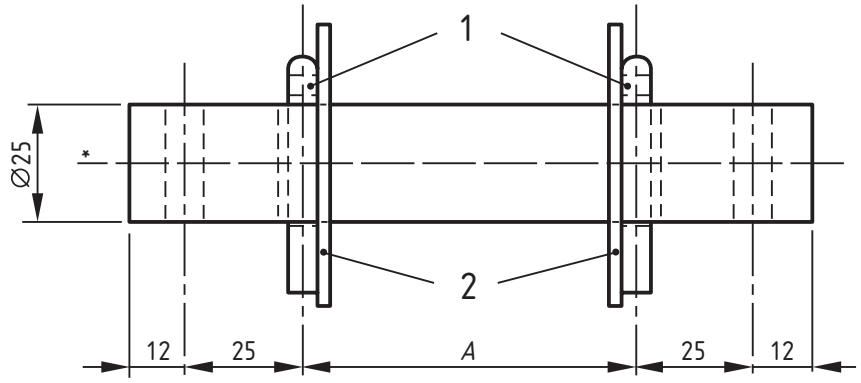
1 400 kN jack locating pin (2 off)
2 84/100 (2 off)
3 M30 × 100 hex. bolt with nut and split pin
4 84/110

NOTE 1 See Figure 85 for details of jack locating pin.

NOTE 2 See Figure 91 for details of hex. bolt and split pin.

Figure 84 **Sag adjuster/shackle pins H, L and M complete with washers and split pins** (minimum failing load 190 kN)

Dimensions in millimetres



Key

1 Ø6.3 split pins in Ø8 holes

2 M25 flat washers

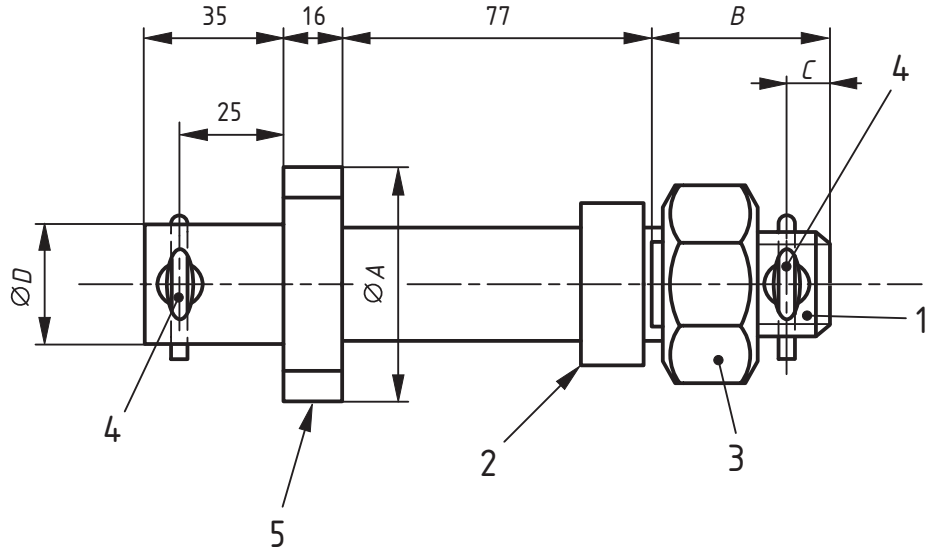
* Indicates where reference letter is to be stamped.

Table 33 **Dimensions of sag adjuster/shackle pins H, L and M complete with washers and split pins**

Reference	***A*** mm
H	70
L	92
M	76

Figure 85 **Sag adjuster jack locating pin 300 kN and 400 kN complete with nut and split pins**

Dimensions in millimetres



Key

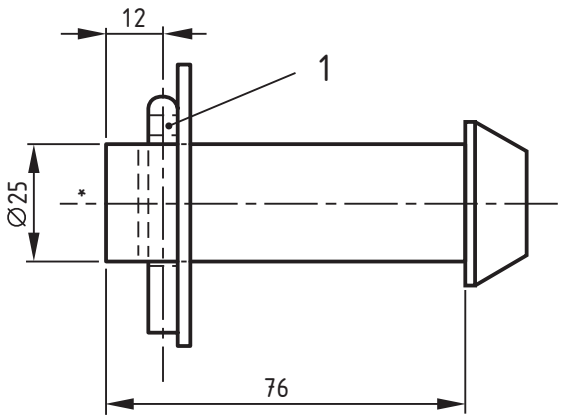
1 Thread
2 Spacer (see Figure 88 for details)
3 Hex. nut
4 Split pin Ø6.3 × 50
5 2 × flats for spanner attachment (see Table 34 for A/F dimensions)

Table 34 **Dimensions of sag adjuster jack locating pin 300 kN and 400 kN complete with nut and split pins**

Reference	***ØA*** mm	***B*** mm	***C*** mm	***ØD*** mm	**A/F** mm	**Thread**
300 kN	50	38	10	27	41	M27
400 kN	53	40	10	30	46	M30

Figure 86 **Sag adjuster pin J complete with washer and split pin** (minimum failing load 190 kN)

Dimensions in millimetres



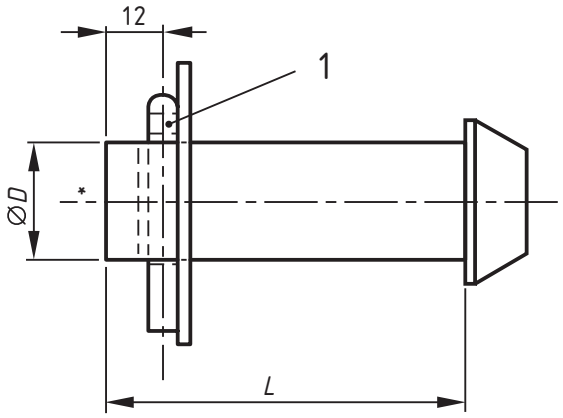
Key

1 Ø6.3 split pin in Ø8 hole

* Indicates where reference letter is to be stamped.

Figure 87 **Sag adjuster bolt/pin P, Q, R and S complete with washer and split pin**

Dimensions in millimetres



Key

1 Ø6.3 split pin in Ø8 hole

* Indicates where reference letter is to be stamped.

Table 35 **Dimensions of sag adjuster bolt/pin P, Q, R and S**

Reference	**Minimum failing load** kN	**Bolt**		**Pin**	
		ØD	***L*** mm	***ØD*** mm	***L*** mm
P	300	M27	100	27	70
Q	400	M30	100	30	75
R	300	M27	120	27	90
S	400	M30	125	30	125

Figure 88 **Spacer for sag adjuster bolt/pin R and S and jack locating pins 300 kN and 400 kN**

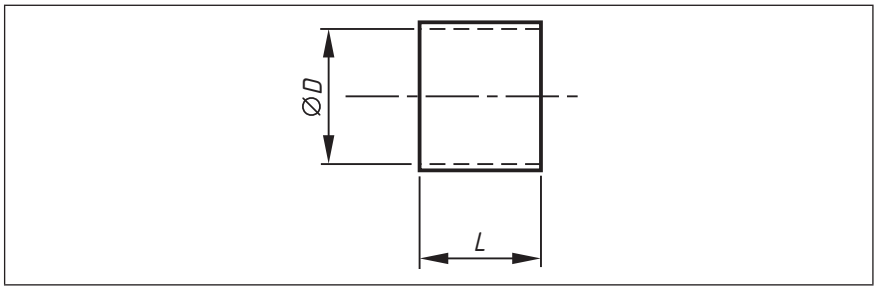


Table 36 **Dimensions of spacer for sag adjuster bolt/pin R and S**

Bolt/pin reference	*ØD* mm	*L* mm
R	29	25
S	32	25

Table 37 **Dimensions of spacer for jack locating pin 300 kN and 400 kN**

Pin reference	*ØD* mm	*L* mm
300 kN	29	20
400 kN	32	20

Figure 89 **Typical arcing horn flags**

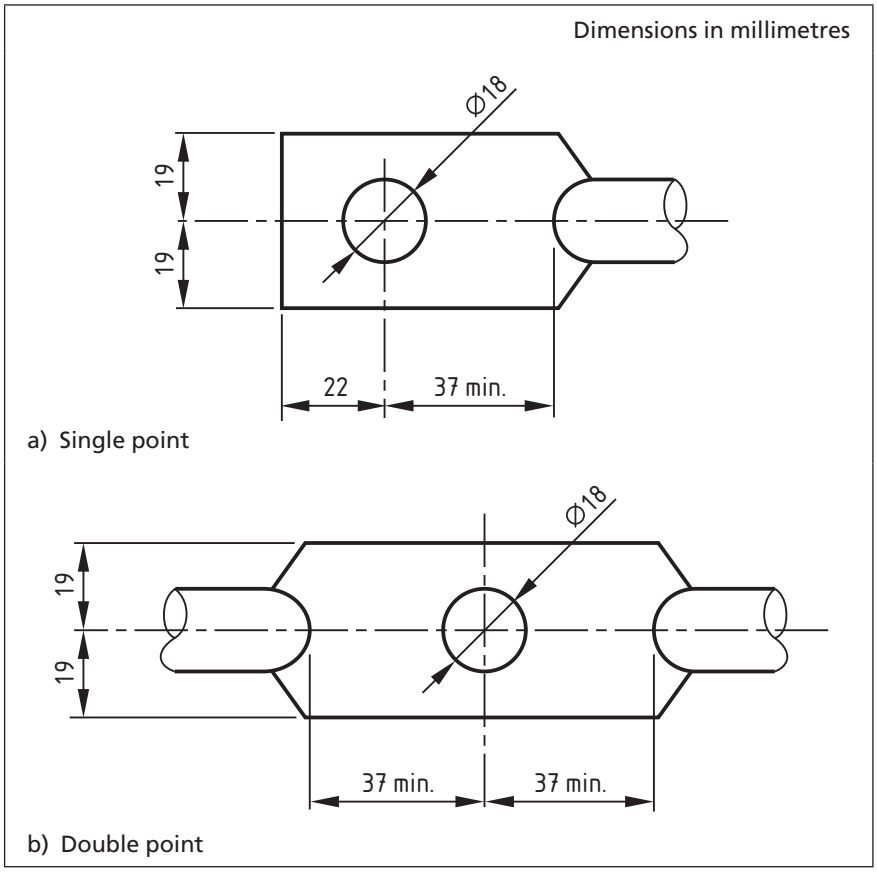


Figure 90 **Clevis pin and split pin**

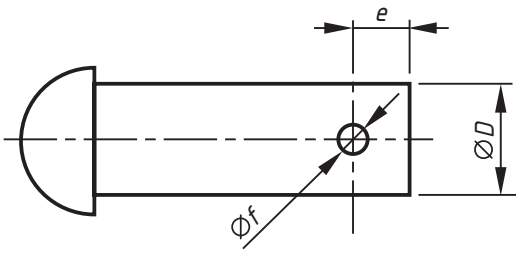


Table 38 **Dimensions of clevis pin and split pin**

ØD mm	***e*** mm	***Øf*** mm	**Nominal split pin size** mm	**Split pin length** mm
16	6	6.3	5	32
20	6	6.3	5	32
22	10	8.0	6.3	40
24	10	8.0	6.3	40
27	12	8.0	6.3	50
30	12	8.0	6.3	50

Figure 91 **Hex. bolt and split pin**

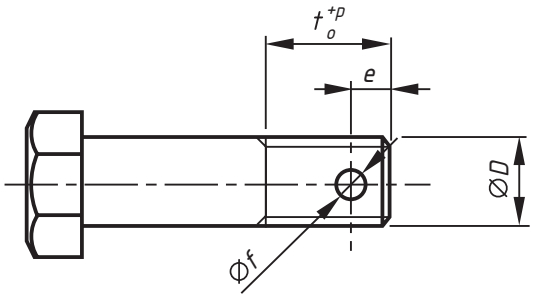


Table 39 **Dimensions of bolt and split pin**

ØD	**Screwed length, *t*** mm	**Tolerance, *p*** mm	***e*** mm	***Øf*** mm	**Nominal split pin size** mm	**Split pin length** mm
M16	25	2.0	6	6.3	5	32
M20	27	2.5	6	6.3	5	32
M22	35	2.5	10	8.0	6.3	40
M24	35	3.0	10	8.0	6.3	40
M27	38	3.0	10	8.0	6.3	50
M30	40	3.5	10	8.0	6.3	50

Annex A (informative) List of insulator set fittings

Description	Min. failing load kN	Reference number	Fig.
Shackle	70	15/29A	7
	70	15/129A	7
	70	15/33A	8
	125	28/29A	7
	125	28/108A	7
	125	28/34A	9
	190	42/29A	7
	190	42/103	7
	190	42/129A	7
	190	42/34A	9
	300	67/103A	7
	300	67/34A	9
Ball-ended hook	20	4/88	10
	70	15/32	11
	70	15/81	12
Ball-ended eye link	70	15/30	13
	125	28/30	13
	190	42/30	13
	70	15/82	14
	190	42/44	15
Ball clevis	70	15/83A	16
	70	15/25A	17
	125	28/83A	16
	300	67/25A	18
	400	84/83A	16
	400	84/25A	18
Ball tongue	300	67/48	19
	400	84/48	19
Socket clevis	70	15/84A	20
	70	15/31A	21
	125	28/37A	20
	125	28/31A	21
	190	42/37A	20
	190	42/46A	20
	190	42/104A	20
	190	42/31A	21
	190	42/45A	22
	300	67/31A	23
	400	84/37A	20
	400	84/31A	24
Twisted socket-clevis	125	28/131A	25
Socket tongue	70	15/35	26
	70	15/85	28
	125	28/36A, B, C	26
	125	28/135	26
	190	42/35	26
	190	42/36	26
	190	42/51	27
Socket thimble	70	15/60	29
	70	15/61	30
Clevis tongue	125	28/28A	31
	190	42/28AA, B, CA	32
	190	42/39AA, BA	33
	190	42/54A, B	33
	190	42/139A	33
Earthwire adaptor	125	28/50A	34
	125	28/40A	35
Twisted clevis-tongue	190	42/27A	36
	300	67/27A	36
	400	84/27A	36
Twisted clevis-clevis	70	15/23A	37
	125	28/23A	37
	125	28/24A	38
	190	42/23A	39
	300	67/23A	37
	400	84/23A	37

Description	Min. failing load kN	Reference number	Fig.
Adaptor	70	15/27B, C, D	40
	125	28/27B, C	40
	125	28/47	40
Terminating strap	20	4/89A, B	41
Strap section and terminal	20	4/90	42
Single link	70	15/86	43
	125	28/86	43
	190	42/86	43
	300	67/86	43
Single conversion link	190	42/115	44
Parallel links	70	15/88A	45
	125	28/88A	45
	190	42/88AA, BA, CA	45
	300	67/88A	45
	400	84/88A	45
Parallel conversion links	125	28/89A	46
	190	42/89A	46
	300	67/89A	46
Cranked links	70	15/87A	47
	125	28/87A	47
	125	28/186A	49
	125	28/187A	50
	125	28/188A	51
	125	28/189A	52
	190	42/87A	47
	190	42/102A	48
	300	67/87A	47
	400	84/102A	48
Landing plate	70	15/21	53
	125	28/21	53
	190	42/21	53
Sag adjuster plate	70	15/101	54
	125	28/100	55
	190	42/100	56
	190	42/101	57
	300	67/100	58
	300	67/101	59
	300	67/110A	60
	400	84/100	61
	400	84/101	62
	400	84/110	63
Yoke plate	70	15/22	64
	125	28/22A	68
	125	28/43	69
	190	42/52	65
	190	42/22A	68
	190	42/124A	68
	190	42/42	73
	190	42/106	73
	300	67/40	66
	300	67/41	66
	300	67/42	67
	300	67/53	75
	400	84/40	70
	400	84/41	71
	400	84/42	72
	400	84/52	74
	400	84/53	75
Cruciform yoke plate	400	84/38C	76

Annex B (informative) List of insulator set fittings in order of reference number

Reference number	Description	Fig.
4/88	Ball-ended hook	10
4/89A, B	Terminating strap	41
4/90	Strap section and terminal	42
15/21	Landing plate	53
15/22	Yoke plate	64
15/23A	Twisted clevis-clevis	37
15/25A	Ball clevis	17
15/27B, C, D	Adaptor	40
15/29A	Shackle	7
15/30	Ball-ended eye link	13
15/31A	Socket clevis	21
15/32	Ball-ended hook	11
15/33A	Shackle	8
15/35	Socket tongue	26
15/60	Socket thimble	29
15/61	Socket thimble	30
15/81	Ball-ended hook	12
15/82	Ball-ended eye link	14
15/83A	Ball clevis	16
15/84A	Socket clevis	20
15/85	Socket tongue	28
15/86	Single link	43
15/87A	Cranked links	47
15/88A	Parallel links	45
15/101	Sag adjuster plate	54
15/129A	Shackle	7
28/21	Landing plate	53
28/22A	Yoke plate	68
28/23A	Twisted clevis-clevis	37
28/24A	Twisted clevis-clevis	38
28/27B, C	Adaptor	40
28/28A	Clevis tongue	31
28/29A	Shackle	7
28/30	Ball-ended eye link	13
28/31A	Socket clevis	21
28/34A	Shackle	9
28/36A, B, C	Socket tongue	26
28/37A	Socket clevis	20
28/40A	Earthwire adaptor	35
28/43	Yoke plate	69
28/47	Adaptor	40
28/50A	Earthwire adaptor	34
28/83A	Ball clevis	16
28/86	Single link	43
28/87A	Cranked links	47
28/88A	Parallel links	45
28/89A	Parallel conversion links	46
28/100	Sag adjuster plate	55
28/108A	Shackle	7
28/131A	Twisted socket-clevis	25
28/135	Socket tongue	26
28/186A	Cranked links	49
28/187A	Cranked links	50
28/188A	Cranked links	51
28/189A	Cranked links	52
42/21	Landing plate	53
42/22A	Yoke plate	68
42/23A	Twisted clevis-clevis	39
42/27A	Twisted clevis-tongue	36
42/28AA, B, CA	Clevis tongue	32
42/29A	Shackle	7
42/30	Ball-ended eye link	13
42/31A	Socket clevis	21
42/34A	Shackle	9
42/35	Socket tongue	26
42/36	Socket tongue	26
42/37A	Socket clevis	20
42/39AA, BA	Clevis tongue	33
42/42	Yoke plate	73
42/44	Ball-ended eye link	15
42/45A	Socket clevis	22
42/46A	Socket clevis	20
42/51	Socket tongue	27
42/52	Yoke plate	65
42/54A, B	Clevis tongue	33
42/86	Single link	43
42/87A	Cranked links	47
42/88AA, BA, CA	Parallel links	45
42/89A	Parallel conversion links	46
42/100	Sag adjuster plate	56
42/101	Sag adjuster plate	57
42/102A	Cranked links	48
42/103	Shackle	7
42/104A	Socket clevis	20
42/106	Yoke plate	73
42/115	Single conversion link	44
42/124A	Yoke plate	68
42/129A	Shackle	7
42/139A	Clevis tongue	33
67/23A	Twisted clevis-clevis	37
67/25A	Ball clevis	18
67/27A	Twisted clevis-tongue	36
67/31A	Socket clevis	23
67/34A	Shackle	9
67/40	Yoke plate	66
67/41	Yoke plate	66
67/42	Yoke plate	67
67/48	Ball tongue	19
67/53	Yoke plate	75
67/86	Single link	43
67/87A	Cranked links	47
67/88A	Parallel links	45
67/89A	Parallel conversion links	46
67/100	Sag adjuster plate	58
67/101	Sag adjuster plate	59
67/103A	Shackle	7
67/110A	Sag adjuster plate	60
84/23A	Twisted clevis-clevis	37
84/25A	Ball clevis	18
84/27A	Twisted clevis-tongue	36
84/31A	Socket clevis	24
84/37A	Socket clevis	20
84/38C	Cruciform yoke plate	76
84/40	Yoke plate	70
84/41	Yoke plate	71
84/42	Yoke plate	72
84/48	Ball tongue	19
84/52	Yoke plate	74
84/53	Yoke plate	75
84/83A	Ball clevis	16
84/88A	Parallel links	45
84/100	Sag adjuster plate	61
84/101	Sag adjuster plate	62
84/102A	Cranked links	48
84/110	Sag adjuster plate	63

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