

Specification for

Eyebolts for lifting purposes

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Mechanical Engineering Standards Committee (MEE/-) to Technical Committee MEE/12 upon which the following bodies were represented:

Associated Offices Technical Committee
 British Chain Manufacturers' Association
 British Ports Association and the National Association of Ports Employers
 British Railways Board
 Chain Testers' Association of Great Britain
 Corporation of Trinity House
 Department of Trade and Industry (National Physical Laboratory)
 Department of Transport (Marine Directorate)
 Electricity Supply Industry in England and Wales
 Engineering Equipment and Materials Users' Association
 Federation of Civil Engineering Contractors
 Federation of Manufacturers of Construction Equipment and Cranes
 Federation of Wire Rope Manufacturers of Great Britain
 Health and Safety Executive
 Ministry of Defence
 National Association of Drop Forgers and Stampers
 National Coal Board
 Coopted members

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association of Supervisory and Executive Engineers
 Drop Forging Research Association

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Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee and is the first full revision of the metric edition which was published in 1968; this revision supersedes BS 4278:1968, which is now withdrawn. Previously steel eyebolts were covered in BS 529-1 and BS 529-2 (withdrawn).

The standard specifies three types of eyebolt: namely the collar eyebolt, the eyebolt with link and the dynamo eyebolt. Eyebolts without collars for lift suspension purposes are specified in BS 5655-8, which replaced BS 529-2. For all three types, metric dimensions and threads are specified but, in addition, full details of imperial threaded shanks are given in appendix A. These imperial threaded eyebolts are intended for replacement purposes only for assembly into imperial threaded equipment already in existence. In the previous edition of this standard only brief details concerning imperial threads were given and only collar and dynamo eyebolts were covered. More importantly, no advice was given on the selection of suitable forgings for imperial threading; this is now fully covered.

It will be noted that eyebolts with a shank thread smaller than M12 are not specified in view of their susceptibility to damage due to over-tightening. Exceptions to this are the $\frac{3}{8}$ in diameter collar and dynamo eyebolts which have been retained in order to preserve the safe working load (SWL) relationship with BS 529-1 (see below).

Collar eyebolts and eyebolts with link have been uprated by 25 % in this revision as a result of work undertaken by the National Physical Laboratory and the Research and Laboratories Services Division of the Health and Safety Executive (HSE). This uprating has also enabled the SWLs of imperial threaded collar eyebolts given in Table 4, to be made equivalent to those given in BS 529-1 so that they may be used for replacement purposes. Collar eyebolts are generally used with shackles and are suitable for reduced SWLs when used for inclined loading in the plane of the eye. (See appendix B.) When used at 90° loading to the eyebolt axis (i.e. trunnions) the SWL for each eyebolt should not be more than 25 % of the SWL in axial loading marked on the eyebolt (see appendix B).

Eyebolts with link are now specified with both metric and imperial threads. These eyebolts are generally used in pairs without the need for shackles and are suitable for inclined loading in any plane at reduced SWLs (see Table 8). It should be emphasized that a collar eyebolt to Table 1 fitted with a link cannot be considered as an "eyebolt with link" to Table 2. In addition, the collar eyebolt requires a deeper tapped hole and therefore care is necessary if eyebolts with link are replaced by collar eyebolts.

Dynamo eyebolts are intended for axial lifting only and, if used in pairs a spreader beam should always be used. Loading out of axial by even 5° imposes undue stress on the screw thread run-out. For this reason collar eyebolts or eyebolts with link should be a first preference and dynamo eyebolts should be used only if axial loading can be ensured.

The dangers of the mismatch arising from eyebolts being inadvertently screwed into holes with a different thread form are explained and recommendations are made in HSE Guidance Note PM 16, "Eyebolts", and in PD 6494. In this revision of this standard certain non-preferred metric sizes which were likely to be incorrectly assembled with other metric threaded holes have been deleted. Some other metric thread sizes have been changed to give as far as possible, first choice metric threads complying with BS 3643-2.

Recommendations for the selection, care and use of eyebolts are given in Appendix B. Some of the material in Appendix B is based on Section 3 of the “Code of Practice for the safe use of lifting equipment”, published by the Chain Testers’ Association of Great Britain to whom acknowledgement is made. Users wishing to obtain more detailed information are recommended to refer to this Code.¹⁾

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ Obtainable from the Chain Testers’ Association of Great Britain (see **B.5** for address).

1 Scope

This British Standard covers three types of eyebolt as follows:

- a) collar eyebolt, in the range 0.25 tonnes to 30 tonnes SWL;
- b) eyebolt with link, in the range 1.0 tonnes to 6.3 tonnes SWL;
- c) dynamo eyebolt, in the range 0.25 tonnes to 10.0 tonnes SWL.

Guidance on the selection of appropriate forgings and of SWL ratings when screwing eyebolts with imperial threads [see 4.1 b) and 4.1 c)] is given in Appendix A.

Recommendations on the correct selection and safe use of eyebolts are given in the foreword and Appendix B.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Material

The material used in the manufacture of both the eyebolts and the links shall comply with one of the following steel specifications of BS 970-1:

- 080A27²⁾
- 080A30
- 080M30
- 070M26

3 Form and dimensions

The form and dimensions of eyebolts shall be in accordance with the following:

- a) collar eyebolts shall be as shown in Figure 1 and as given in Table 1 for metric threads, or Table 4 for imperial threads;
- b) eyebolts with links shall be as shown in Figure 2 and as given in Table 2 for metric threads, or Table 5 for imperial threads;
- c) dynamo eyebolts shall be as shown in Figure 3 and as given in Table 3 for metric threads, or Table 6 for imperial threads.

NOTE For special applications the length of the shank (dimension *H*) may be increased provided that the eyebolt and shank are drop forged in one piece.

4 Screw threads

4.1 The screw threads of the shanks of the eyebolts shall comply with the following British Standards:

- a) Metric threads complying with BS 3643-2, coarse pitch series, tolerance class 6g, in accordance with the sizes specified in Table 1, Table 2 and Table 3 of this standard, i.e. BS 4278. For metric thread diameter 72 mm, in Table 1 of this standard, a pitch of 6 mm, and a tolerance class 6g shall be used.
- b) Whitworth threads in accordance with Table 4 of BS 84:1956, coarse thread series, BSW, medium class.
- c) Unified threads in accordance with Table 5 of BS 1580-1:1962, coarse series, UNC, class 2A.

NOTE It is expected that newly designed equipment will have tapped holes to receive eyebolts screwed in accordance with a) above. Eyebolts threaded to b) and c) are intended for use with imperial threaded equipment which is already in existence.

4.2 The portion of the shank at the end of the screw thread shall have a run-out and, in the case of collar eyebolts and eyebolts with link, the collar shall be recessed in accordance with dimensions *J* and *K* of Table 1 to Table 6.

5 Workmanship

5.1 **All eyebolts.** The whole of each eyebolt, including the shank, shall be cleanly drop forged in one piece and shall be free from patent defects. The underside of the collar shall be machined in true alignment at right-angles to the axis of the shank. The shank shall be screwed concentrically with the outside diameter of the collar. The thread run-out and recess if any shall be smoothly radiused and free from surface irregularities.

5.2 **Eyebolts with link.** The link of the eyebolt with link (see Figure 2, Table 2 and Table 5) shall be welded by one of the following methods:

- a) electric resistance butt welding;
- b) flash-butt welding;
- c) atomic hydrogen welding;
- d) inert gas shielded-arc welding.

The weld shall be smoothly finished all round and care shall be taken to avoid porosity and to ensure penetration and fusion throughout.

6 Tolerances

6.1 **General.** The tolerances given in 6.2 and 6.3 shall apply.

6.2 **Drop forgings.** The tolerances on dimensions of drop forgings shall comply with quality F of BS 4114.

²⁾ As specified in the 1972 edition. Steel 080A27 is not included in the 1983 edition of BS 970-1.

6.3 Links. The size of the material of the link shall not differ from the nominal size (see dimension d , Table 2 and Table 5) by more than $\pm 5\%$.

7 Heat treatment

All eyebolts, after forging, and links, after welding, shall be heated to a temperature between $860\text{ }^{\circ}\text{C}$ and $890\text{ }^{\circ}\text{C}$ and then quenched in oil or water and tempered at a suitable temperature between $550\text{ }^{\circ}\text{C}$ and $660\text{ }^{\circ}\text{C}$.

8 Hardness test

8.1 General. Eyebolts shall have a Brinell hardness between 163 and 217. Either the test shall be made in accordance with BS 240-1 using a 10 mm ball and a load of 3 000 kg, or if another method is employed the conversion shall be made in accordance with BS 860.

8.2 Procedure. The surface on which the impression is to be made shall be obtained by filing, grinding or smooth machining.

NOTE Suitable precautions should be taken to ensure that the surface tested is representative of the material and that its hardness is not affected by decarburization, carburization, or by the method used for the preparation of the test surface.

9 Proof loading

Each eyebolt, and eyebolt with link, after manufacture and subsequent heat treatment, shall be subjected to an axial proof load equal to at least twice the safe working load specified in Table 1, Table 2 or Table 3 or, in the case of imperial threaded eyebolts, at least twice the safe working load specified in Table 4, Table 5 and Table 6, which it shall withstand without showing any visible permanent set.

After the removal of the proof load, each eyebolt and eyebolt with link shall be thoroughly examined by a competent person and shall be accepted only if found free from visible flaw or defect.

10 Marking

10.1 General. Each eyebolt shall be legibly and permanently marked in a manner that does not impair its mechanical strength. The symbols shall be as large as possible but in any case not less than 3 mm high. In the case of collar and dynamo eyebolts, the symbols shall be marked on raised flat areas positioned on both sides of the lower parts of the eye as shown in Figure 1 and Figure 3. In the case of eyebolts with links, the symbols shall be marked on the side of the link as shown in Figure 2.

NOTE If (as for example in the case of smaller eyebolts) the areas mentioned above provide insufficient space for marking all the requisite information, marking can be carried out on low stressed areas such as the periphery of the collar of an eyebolt.

The information given in 10.2 to 10.5 shall be marked on each eyebolt.

10.2 Quality mark. Each eyebolt shall be marked with the symbol "M" enclosed in a circle. The quality mark shall be kept remote from any metric thread identification.

NOTE 1 The quality mark may, if drop forged, be on the side of the crown of the eye.

NOTE 2 In the previous issue of this standard the symbol "04" was used as the quality mark. Eyebolts with this marking may still be available, complying with the requirements of this standard.

10.3 Safe working load (axial lift). The SWL as specified in Table 1, Table 2 and Table 3 or in the case of imperial threaded eyebolts the SWL as specified in Table 4, Table 5 and Table 6, or a lower value if required by the purchaser shall be marked on the eyebolt, e.g. "SWL 1.6 t".

10.4 Thread identification. Each eyebolt shall be marked with one of the following thread identifications as appropriate:

- a) "M" to denote ISO metric threads, coarse series, including the accepted metric thread diameter designation, e.g. M12;
- b) "BSW" to denote BS Whitworth threads, including the accepted BSW thread diameter designation, e.g. $\frac{1}{2}$ BSW;
- c) "UNC" to denote unified coarse threads, including the accepted UNC thread diameter designation, e.g. $\frac{1}{2}$ UNC.

10.5 Distinguishing mark. Each eyebolt shall be marked with such marks or symbols as will allow identification with the certificate of test.

11 Certificate of test

The manufacturer or supplier shall provide a certificate with each consignment of eyebolts giving at least the following information for each eyebolt:

- a) distinguishing mark or symbol (see 10.5);
- b) form and size of screw thread (see clause 4 and 10.4);
- c) proof load applied (see clause 9);
- d) safe working load (see Table 1, Table 2, Table 3 or Table 4, Table 5, Table 6 and 10.3).

The certificate shall declare that each eyebolt was proof loaded in accordance with clause 9 and was subsequently examined by a competent person and that it complies with this standard, i.e. BS 4278. It shall state the name and address of the testing establishment and the status of the signatory.

NOTE The certificate may be the appropriate statutory form, provided the required information is given.

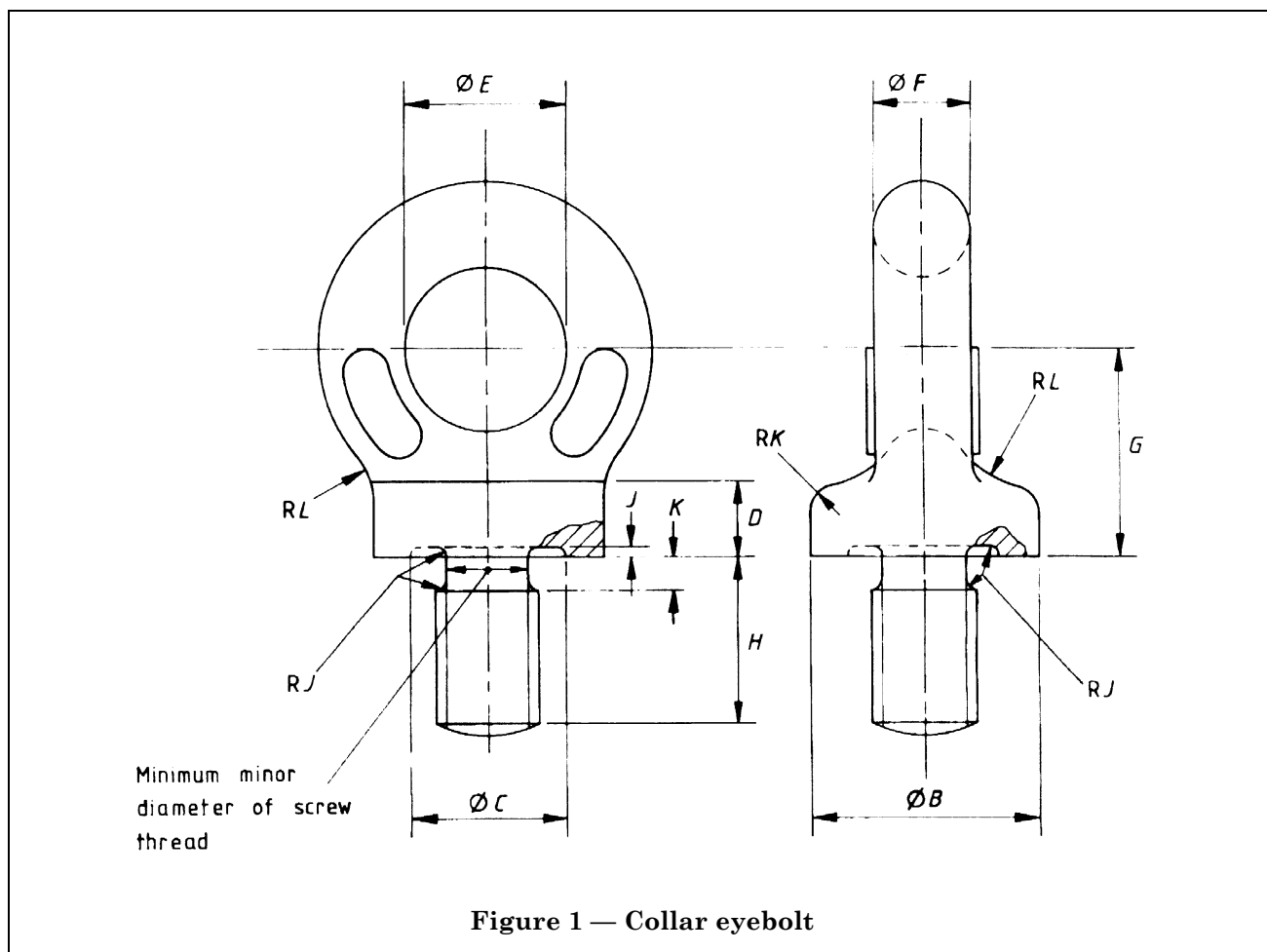


Table 1 — Collar eyebolt (see Figure 1)

Safe working load (axial)	Metric thread dia.	B $= 1.5E$	C $= E$	D $= 0.5E$	E^a	F $= 0.6E$	G $= 1.33E$	H $= 1.17E$	J	K $= 0.17E$	L $= 0.6E$
tonnes	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.4	12	22	15	7	15	9	20	18	1	3	9
0.8	16	29	20	10	20	12	26	23	1	3	12
1.6	20	40	27	14	27	16	36	32	1	5	16
2.5	24	52	35	17	35	21	46	40	2	6	21
4.0	30	65	44	22	44	26	58	51	2	7	26
6.3	36	81	54	27	54	32	72	63	3	9	32
8.0	42	90	60	30	60	36	80	70	3	10	36
10.0	48	101	68	34	68	40	90	79	3	11	40
12.5	52	115	76	38	76	46	102	89	3	13	46
16.0	56	128	86	43	86	51	114	100	4	14	51
20.0	64	144	96	48	96	58	128	112	4	16	58
25.0	72	162	108	54	108	65	144	126	4	18	65

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

^a $E \approx 21.6 \sqrt{\text{SWL}}$

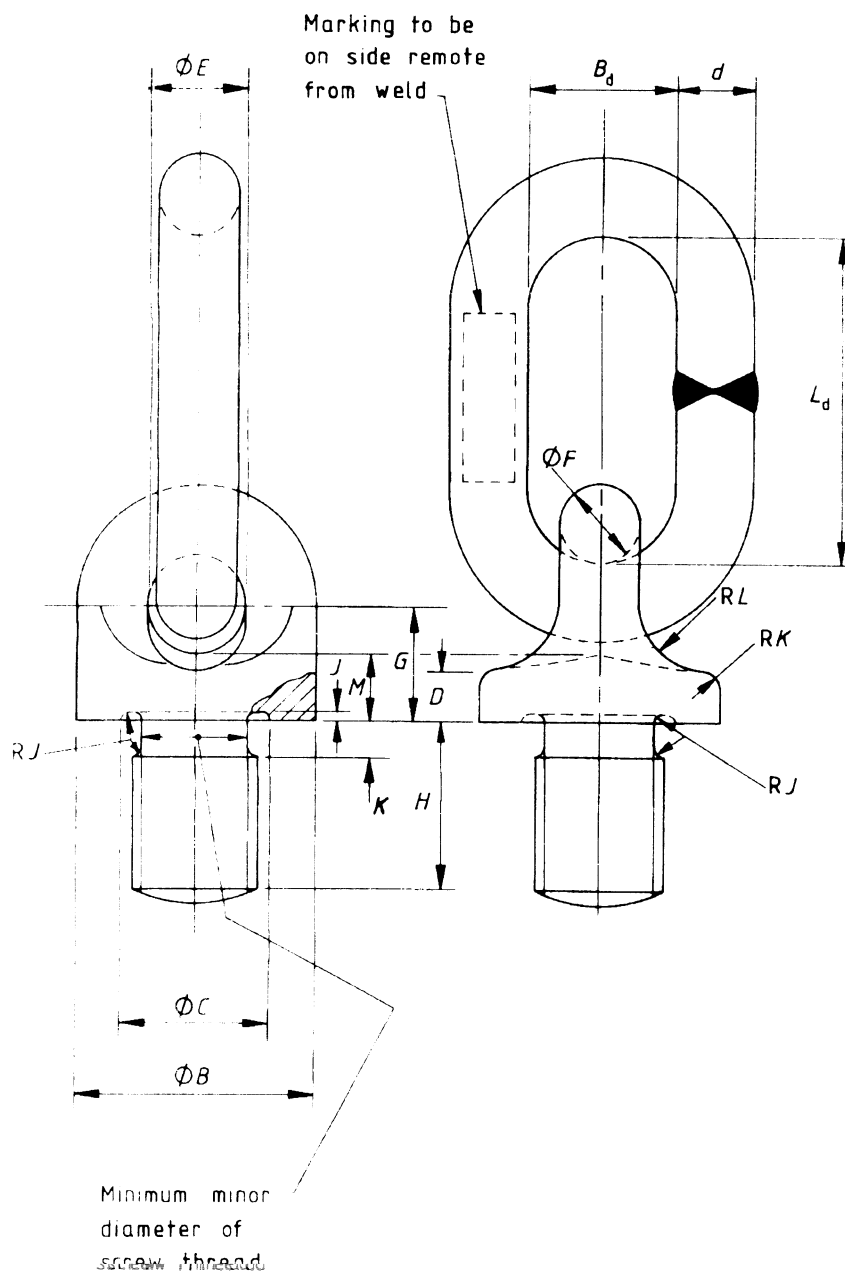


Figure 2 — Eyebolt with link

Table 2 — Eyebolt with link (see Figure 2)

Safe working load (axial)	Metric thread dia.	$B = 2.6E$	$C = 1.6E$	$D = 0.6E$	E^b	$F = 0.8E$	$G = 1.3E$	$H = 1.8E$	J	$K = 0.25E$	$L = 0.9E$	$M = 0.8E$	Link		
													$d = 0.84E$	$B_d = 1.6E$	$L_d = 3.5E$
tonnes	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.0	20	39	24	9	15	12	20	27	1	4	14	12	13	24	53
1.6	24	47	29	11	18	14	23	32	1	5	16	14	15	29	63
2.5	30	60	37	14	23	18	30	41	2	6	21	18	19	37	80
4.0	36	75	46	17	29	23	38	52	2	7	26	23	24	46	102
6.3	48	94	58	22	36	29	47	65	3	9	32	29	30	58	126

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

$^b E \approx 14.5 \sqrt{\text{SWL}}$

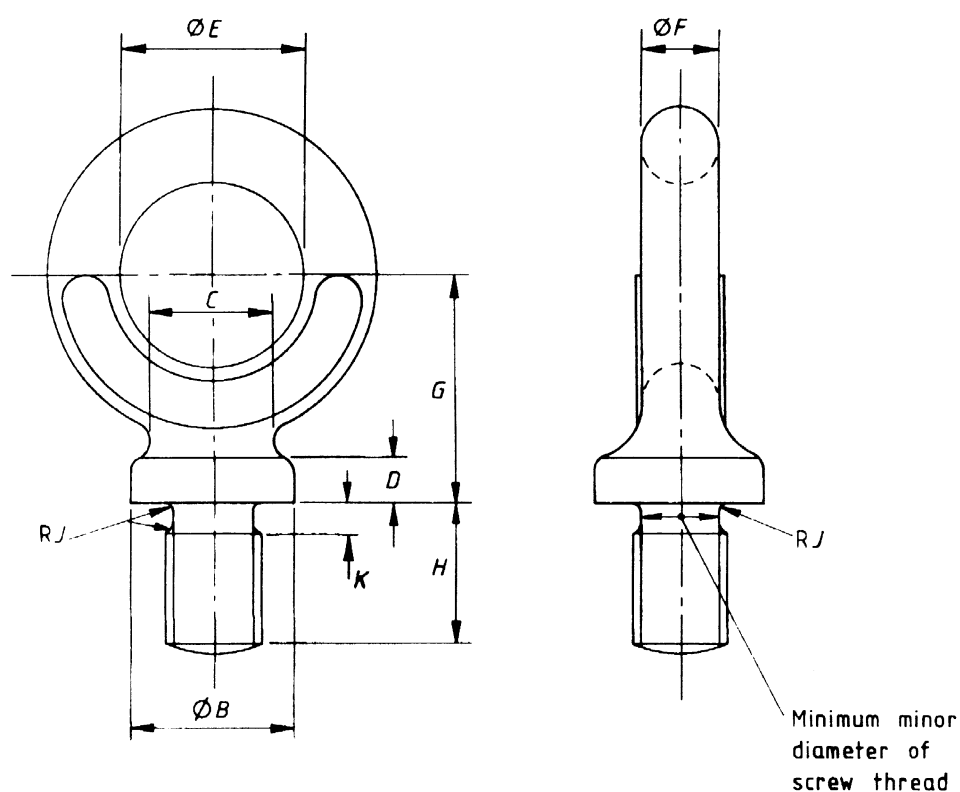


Figure 3 — Dynamo eyebolt

Table 3 — Dynamo eyebolt (see Figure 3)

Safe working load (axial)	Metric thread dia.	B $= 0.8E$	C $= 0.64E$	D $= 0.23E$	E^a	F $= 0.38E$	G $= 1.2E$	H $= 0.8E$	J	K $= 0.11E$
tonnes	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.32	12	17	14	5	22	9	27	18	1	3
0.63	16	23	18	6	29	11	34	23	1	3
1.25	20	32	25	9	40	15	47	32	1	5
2.0	24	40	32	12	51	19	60	40	2	6
3.2	30	51	41	14	64	24	76	51	2	7
5.0	36	63	50	18	79	30	95	63	3	9
6.3	42	70	56	20	88	33	105	70	3	10
8.0	48	79	63	22	99	37	118	79	3	11
10.0	52	89	71	26	112	42	134	89	3	13

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

IMPORTANT. Dynamo eyebolts are to be used only for axial lift. If fitted in pairs or in groups a spreader beam should always be used.

^a $E \approx 35.6 \sqrt{SWL}$

Appendix A Dimensions of eyebolts with imperial threads

The safe working loads and dimensions of eyebolts with imperial threads are given in Table 4, Table 5 and Table 6

Table 4 — Collar eyebolt (imperial threads) (see Figure 1)

Safe working load (axial) ^b	Imperial thread diameter BSW or UNC	B = $1.5E$	C = E	D = $0.5E$	E^a	F = $0.6E$	G = $1.33E$	H = $1.17E$	J	K = $0.17E$	L = $0.6E$
tonnes	in	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.25	$\frac{3}{8}$	22	15	7	15	9	20	18	1	3	9
0.5	$\frac{1}{2}$	29	20	10	20	12	26	23	1	3	12
0.9	$\frac{5}{8}$	36	24	12	24	14	32	28	1	4	14
1.4	$\frac{3}{4}$	45	30	15	30	18	40	35	1	5	18
2.0	$\frac{7}{8}$	52	35	17	35	21	46	40	2	6	21
2.75	1	58	39	20	39	23	52	46	2	7	23
3.5	$1\frac{1}{8}$	65	44	22	44	26	58	51	2	7	26
4.5	$1\frac{1}{4}$	72	48	24	48	29	64	56	3	8	29
6.5	$1\frac{1}{2}$	86	57	29	57	33	76	67	3	9	33
9.0	$1\frac{3}{4}$	101	68	34	68	40	90	79	3	11	40
12.0	2	115	76	38	76	46	102	89	3	13	46
15.0	$2\frac{1}{4}$	128	86	43	86	51	114	100	4	14	51
20.0	$2\frac{1}{2}$	144	96	48	96	58	128	112	4	16	58
30.0	3	172	114	57	114	67	153	133	4	19	67

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

^a $E \approx 23.0 \sqrt{\text{SWL}}$

^b The SWL values correspond to the values given in BS 529-1 (withdrawn).

Table 5 — Eyebolt with link (imperial threads) (see Figure 2)

Safe working load (axial)	Imperial thread diameter BSW or UNC	B	C	D	E^a	F	G	H	J	K	L	M	Link		
		$= 2.6E$	$= 1.6E$	$= 0.6E$		$= 0.8E$	$= 1.3E$	$= 1.8E$		$= 0.25E$	$= 0.9E$	$= 0.8E$	d	B_d	L_d
tonnes	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1.0	$\frac{3}{4}$	39	24	9	15	12	20	27	1	4	14	12	13	24	53
1.6	1	47	29	11	18	14	23	32	1	5	16	14	15	29	63
2.5	$1\frac{1}{4}$	60	37	14	23	18	30	41	2	6	21	18	19	37	80
4.0	$1\frac{1}{2}$	75	46	17	29	23	38	52	2	7	26	23	24	46	102
6.3	$1\frac{3}{4}$	94	58	22	36	29	47	65	3	9	32	29	30	58	126

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

^a $E \approx 14.5 \sqrt{\text{SWL}}$

Table 6 — Dynamo eyebolt (imperial threads) (see Figure 3)

Safe working load (axial)	Imperial thread diameter BSW or UNC	B	C	D	E^a	F	G	H	J	K
		$= 0.8E$	$= 0.64E$	$= 0.23E$		$= 0.38E$	$= 1.2E$	$= 0.8E$		$= 0.11E$
tonnes	in	mm	mm	mm	mm	mm	mm	mm	mm	mm
0.25	$\frac{3}{8}$	17	14	5	22	9	27	18	1	3
0.5	$\frac{1}{2}$	23	18	6	29	11	34	23	1	3
0.9	$\frac{5}{8}$	28	22	8	35	14	42	28	1	4
1.25	$\frac{3}{4}$	32	25	9	40	15	47	32	1	5
1.6	$\frac{7}{8}$	35	28	10	44	17	53	35	1	5
2.0	1	40	32	12	51	19	60	40	2	6
3.2	$1\frac{1}{4}$	51	41	14	64	24	76	51	2	7
5.0	$1\frac{1}{2}$	63	50	18	79	30	95	63	3	9
8.0	$1\frac{3}{4}$	79	63	22	99	37	118	79	3	11
10	2	89	71	26	112	42	134	89	3	13

NOTE Dimension K is to be regarded as a minimum and may be increased to 2.5 times the thread pitch in order to facilitate die head screwing.

IMPORTANT. Dynamo eyebolts are to be used only for axial lift. If fitted in pairs or in groups a spreader beam or frame should always be used.

^a $E \approx 35.7 \sqrt{\text{SWL}}$

Appendix B Recommendations for the selection, care and use of eyebolts

B.1 Selection of eyebolts

B.1.1 Collar eyebolts. Collar eyebolts may be used up to the marked safe working load, for axial lifting only. Collar eyebolts may also be used for non-axial loading provided that the SWL is reduced by the appropriate factors (see Table 7 and Table 9). In non-axial loading the load should be applied within $\pm 5^\circ$ of the plane of the eye (see **B.2.2**).

Collar eyebolts are not suitable for direct connection to a hook, and a shackle is normally used for this attachment.

B.1.2 Eyebolts with link. Eyebolts with link offer considerable advantages over collar eyebolts when loading needs to be applied at angles to the axis and/or the plane of the eye. Their safe working loads are relatively greater than those of collar eyebolts used in the same condition and, unlike the collar eyebolt, the load can be applied at any angle to the plane of the eye.

Eyebolts with link can, in all respects, be considered as the general purpose type, used especially whenever the loading cannot be confined to the plane of the eye. They may be loaded in any direction up to the marked safe working load, provided that the angle of the load to the axis of the screw thread of the eyebolt does not exceed 15° .

Eyebolts with link may be used for non-axial loading at inclinations greater than 15° provided the SWL is appropriately reduced (see Table 8).

The eyebolt with link is designed to accept a sling hook without the need for an intermediate component.

B.1.3 Dynamo eyebolt. The dynamo eyebolt is intended for axial lifting only. Loading by even 5° out of the axial, causes undue stress in the screw thread and shank. Where axial lifting cannot be ensured, a collar eyebolt or an eyebolt with link should be used.

B.2 Correct fitting of eyebolts

B.2.1 General. Eyebolts should only be selected and fitted by a trained person who should inspect the eyebolt before fitting (see **B.3**) and should verify that the eyebolt thread and the tapped hole into which it is to be screwed, are free from debris, and are compatible (see HSE Guidance Note PM 16, "Eyebolts", which refers to the dangers of mismatching threads).

The contacting surface around the tapped hole should be smooth, clean, flat, perpendicular to the thread axis and large enough to accept the eyebolt collar. The eyebolt should be firmly screwed down without over-tightening and the collar should sit evenly on the contacting surface.

If a single eyebolt is used for lifting a load which is liable to revolve or twist, a swivel type hook should be used to prevent the eyebolt unscrewing.

Care should be taken to ensure that the tapped hole has sufficient threaded length to engage fully the eyebolt shank and that the material of the tapping is of adequate strength. This is particularly important when screwing eyebolts into blind holes, as it is essential to ensure that the collar is fully seated before the eyebolt thread reaches the bottom of the tapped hole.

B.2.2 Fitting pairs of collar eyebolts. The plane of the eye of each of a pair of collar eyebolts should ideally be within $\pm 5^\circ$ of the plane containing the axes of the two eyebolts (see Figure 4). If at first this condition is not fulfilled, it can be achieved by the insertion of shims which should not exceed in thickness, half the pitch of the relevant screw thread, or by machining the contacting surface but not the underside of the eyebolt collar. Under no circumstances should the eyebolt be over-tightened in an attempt to achieve correct alignment. Care should also be taken to avoid an alignment whereby the application of the angular load tends to unscrew the eyebolt from its seating.

The correct method of slinging using a pair of eyebolts is shown in Figure 4. A sling should not be reeved through the eyebolts (see Figure 5) as by this method the angular loading of the eyebolt is considerably increased.

B.2.3 Trunnion lifting. When eyebolts are to be used in trunnion lifting, as shown in Figure 6, they should be of the collar type (Table 1 or Table 4) or eyebolts with link type (Table 2 or Table 5).

The load taken by a single eyebolt in trunnion lifting should not exceed 25 % of its marked safe working load in the case of collar eyebolts or 63 % in the case of eyebolts with link. Care should be taken that the applied loading is in the plane of the eye of the eyebolt.

B.3 Inspection

Eyebolts should be regularly inspected with particular attention to the following features:

- a) the marking, as detailed in clause 10, should be legible;
- b) threads should be free from wear, corrosion and damage;

- c) there should be no debris present in the thread or underside of the collar;
- d) there should be no distortion of the eyebolt, i.e. bent shank, deformed eye, reduced diameter at the undercut, nor should any damage, i.e. nicks, cracks, gouges, or corrosion, be present.

B.4 Storage and handling

Eyebolts should be handled with care and normal precautions should be taken to protect the machined surfaces, i.e. the thread and the underside of the collar. To protect the machined surfaces and to prevent corrosion, eyebolts should be lightly oiled or greased and stored in a dry place.

B.5 Further information and guidance

Attention is drawn to the following publications which give further information on the selection and safe use of eyebolts.

- a) "Code of Practice for the safe use of lifting equipment. Section 3 Eyebolts", published by the Chain Testers' Association of Great Britain, 21-23 Woodgrange Road, Forest Gate, London E7 8BA.
- b) HSE Guidance Note PM 16, "Eyebolts", obtainable from HMSO.

B.6 Maximum recommended loads for eyebolts used in pairs in inclined loading

Table 7, Table 8 and Table 9 give the maximum recommended working loads for eyebolts used in pairs, in inclined loading conditions. It should be noted that the reduction factors given only apply when the axes of the eyebolts are parallel to each other and to the direction of the load.

Further de-rating will be necessary if the axes of the eyebolts are not in this alignment, e.g. when eyebolts are used for lifting a load with a concave or convex surface, in which case the advice of a competent person should be sought to determine the appropriate maximum loading.

Table 7 — Maximum recommended working loads for collar eyebolts (metric threads) when used in pairs for inclined loading conditions

Safe working load (single eyebolt axial) (see Table 1)	Maximum load W to be lifted by a pair of eyebolts when the angle between sling legs is:		
	$0 < \alpha \leq 30^\circ$	$30^\circ < \alpha \leq 60^\circ$	$60^\circ < \alpha \leq 90^\circ$
tonnes	tonnes	tonnes	tonnes
0.4	0.5	0.32	0.2
0.8	1.0	0.64	0.4
1.6	2.0	1.25	0.8
2.5	3.2	2.0	1.25
4.0	5.0	3.2	2.0
6.3	8.0	5.0	3.2
8.0	10	6.3	4.0
10	12.5	8.0	5.0
12.5	16	10	6.3
16	20	12.5	8.0
20	25	16	10
25	32	20	12.5
Reduction factor	0.63	0.4	0.25

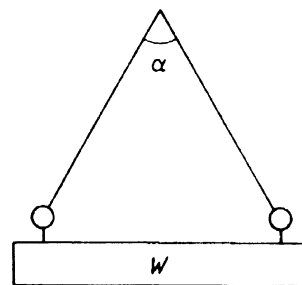
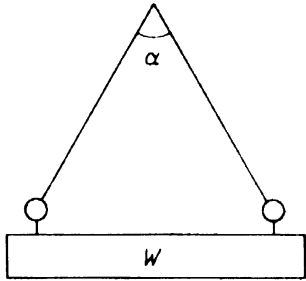
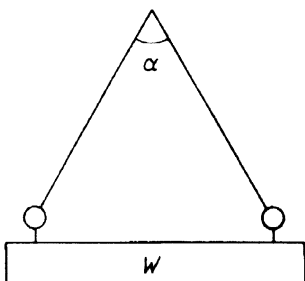


Table 8 — Maximum recommended working loads for eyebolts with link (imperial and metric threads) when used in pairs for inclined loading conditions

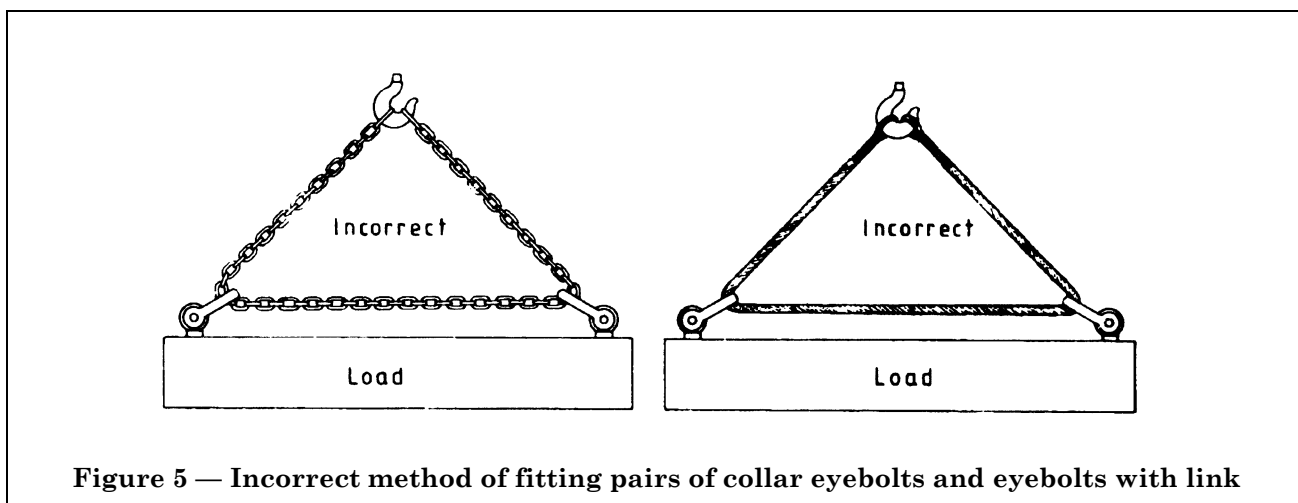
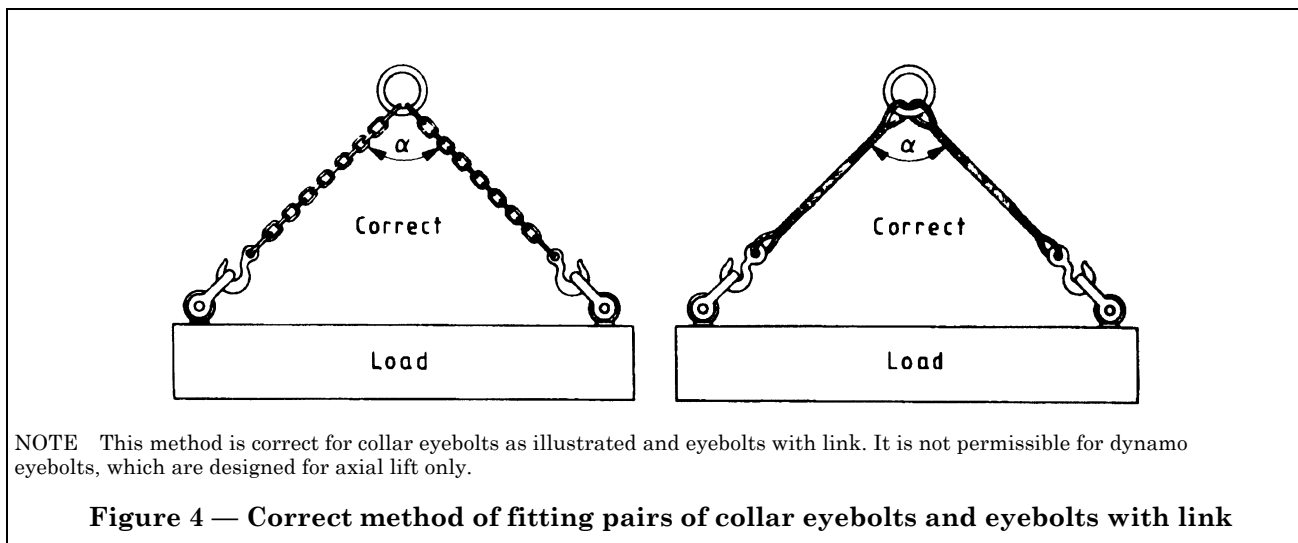


Safe working load (single eyebolt axial) (see Table 2 and Table 5)	Maximum load W to be lifted by a pair of eyebolts when the angle between the sling legs is:		
	$0 < \alpha \leq 30^\circ$	$30^\circ < \alpha \leq 60^\circ$	$60^\circ < \alpha \leq 90^\circ$
tonnes	tonnes	tonnes	tonnes
1.0	2.0	1.6	1.25
1.6	3.2	2.5	2.0
2.5	5.0	4.0	3.2
4.0	8.0	6.3	5.0
6.3	12.6	10.0	8.0
Reduction factor	1.0	0.8	0.63

Table 9 — Maximum recommended working loads for collar eyebolts (imperial threads) when used in pairs for inclined loading conditions



Safe working load (single eyebolt axial) (see Table 4)	Maximum load W to be lifted by a pair of eyebolts when the angle between sling legs is:		
	$0 < \alpha \leq 30^\circ$	$30^\circ < \alpha \leq 60^\circ$	$60^\circ < \alpha \leq 90^\circ$
tonnes	tonnes	tonnes	tonnes
0.25	0.32	0.2	0.13
0.5	0.63	0.4	0.25
0.9	1.13	0.72	0.45
1.4	1.76	1.12	0.7
2.0	2.52	1.6	1.0
2.75	3.47	2.2	1.38
3.5	4.41	2.8	1.75
4.5	5.67	3.6	2.25
6.5	8.19	5.2	3.25
9.0	11.34	7.2	4.5
12.0	15.12	9.6	6.0
15.0	18.9	12.0	7.5
20.0	25.2	16.0	10.0
30.0	37.8	24.0	15.0
Reduction factor	0.63	0.4	0.25



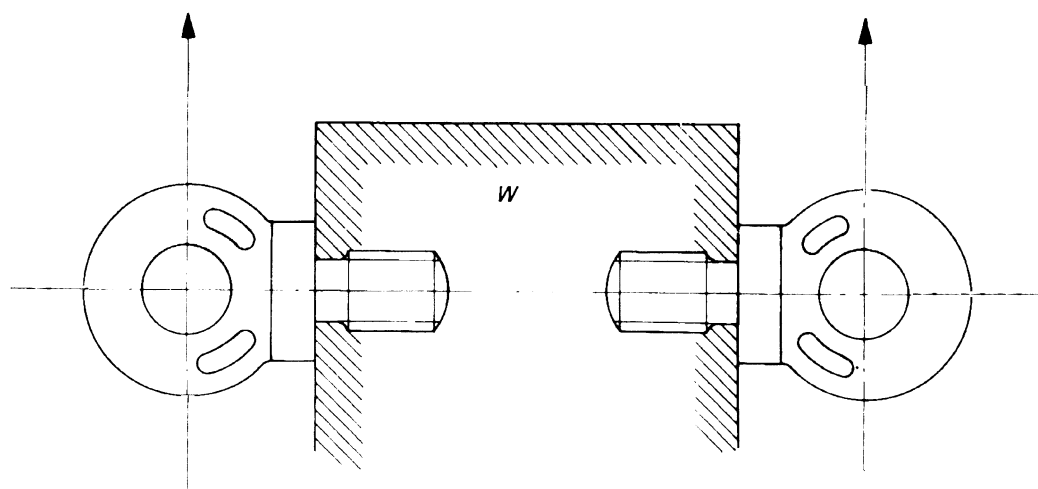


Figure 6 — Trunnion lifting

Publications referred to

BS 84, *Parallel screw threads of Whitworth form (obsolescent)*.

BS 240, *Method for Brinell hardness test*.

BS 240-1, *Testing of metals*.

BS 860, *Tables for comparison of hardness scales*.

BS 970, *Specification for wrought steels for mechanical and allied engineering purposes*.

BS 970-1, *General inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels*.

BS 1580, *Unified screw threads*.

BS 1580-1 and BS 1580-2, *Diameters $\frac{1}{4}$ in and larger*.

BS 3643, *ISO metric screw threads*.

BS 3643-2, *Specification for selected limits of size*.

BS 4114, *Dimensional and quantity tolerances for steel drop and press forgings and for upset forgings made on horizontal forging machines*.

BS 5655, *Lifts and service lifts*.

BS 5655-8, *Specification for eyebolts for lift suspension³⁾*.

PD 6494, *Mismatch of screw thread systems³⁾*.

³⁾ Referred to in the foreword only.

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