Collar eyebolts for lifting purposes

DIN 580

ICS 21.060.10

Supersedes March 1972 edition.

Ringschrauben

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

Foreword

This standard has been prepared by Technical Committee *Ringschrauben/Ringmuttern* of the *Normenausschuss Mechanische Verbindungselemente* (Fasteners Standards Committee).

Amendments

This standard differs from the March 1972 edition in that it has been completely revised.

Previous editions

DIN 581-1: 1926-01, 1942-01; DIN 580-1: 1926-01, 1942-01, 1956x-02; DIN 580: 1970-09, 1972-03.

All dimensions are in millimetres.

1 Scope

This standard specifies dimensions and technical delivery conditions for steel collar eyebolts for lifting purposes. It also gives safe working loads for such eyebolts, and provides guidance on their safe use.

Eyebolts conforming to this standard are suitable for use at temperatures ranging from –20 °C to +200 °C without a reduction in their lifting capacity.

Continued on pages 2 to 5.

Translation by DIN-Sprachendienst.

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

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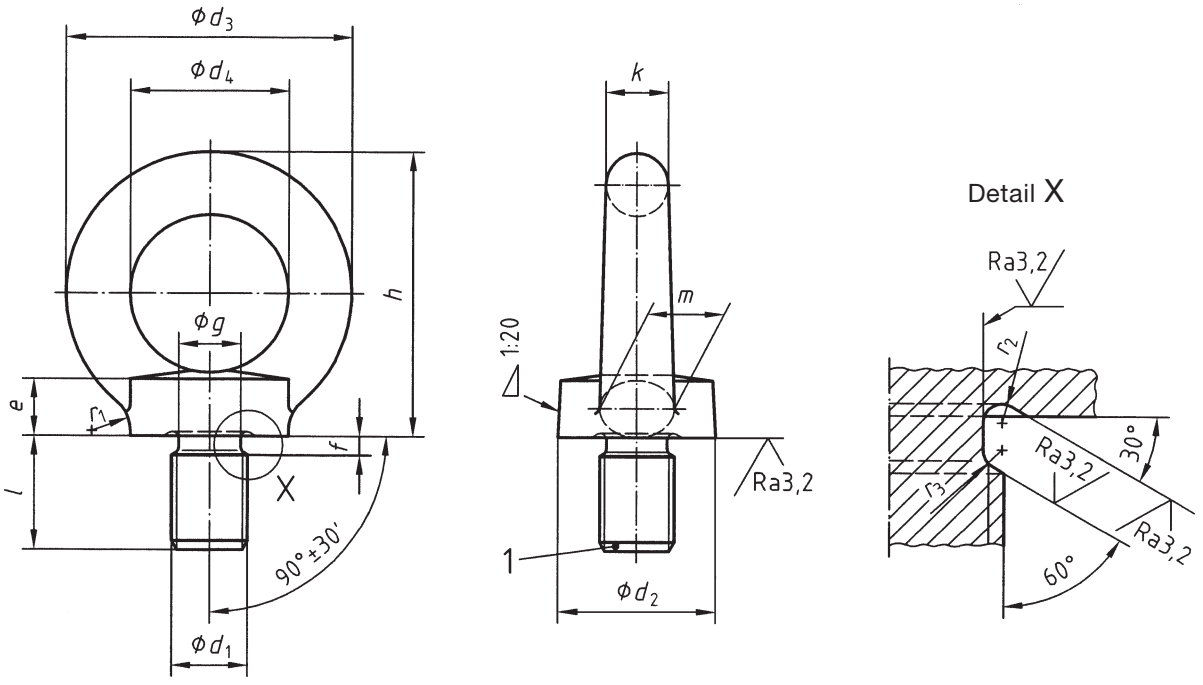
2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 50601	Metallographic examination – Determination of the ferritic or austenitic grain size of steel and ferrous materials
DIN EN 10045-1	Charpy impact test on metallic materials – Test method
DIN EN 10084	Case hardening steels – Technical delivery conditions
DIN EN 10243-1	Steel die forgings – Tolerances on dimensions – Part 1: Drop and press forgings
DIN EN 10254	Steel closed die forgings – General technical delivery conditions
DIN EN 26157-3	Fasteners – Surface discontinuities – Part 3: Bolts, screws and studs for special requirements (ISO 6157-3 : 1988)
DIN EN ISO 3506-1	Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs (ISO 3506-1 : 1997)
DIN EN ISO 4753	Fasteners – Ends of parts with external ISO metric screw thread (ISO 4753 : 1999)
DIN EN ISO 16048	Passivation of corrosion-resistant stainless steel fasteners (ISO 16048 : 2003)
DIN ISO 965-1	ISO general purpose metric screw threads – Tolerances – Part 1: Principles and basic data (ISO 965-1 : 1998)
DIN ISO 965-2	ISO general purpose metric screw threads – Tolerances – Part 2: Limits of sizes for general purpose external and internal screw threads – Medium quality (ISO 965-2 : 1998)

3 Dimensions

Eyebolt dimensions shall be as given in figure 1 and table 1.



Key to figure

1 End chamfered or rounded as in DIN EN ISO 4753 (optional)

Figure 1: Eyebolt dimensions (notation)

Table 1: Eyebolt dimensions

Parameter \ Thread size (d_1)	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64	M72 × 6	M80 × 6	M100 × 6
d_2	20	25	30	35	40	50	65	75	85	100	110	120	150	170	190
d_3	36	45	54	63	72	90	108	126	144	166	184	206	260	296	330
d_4	20	25	30	35	40	50	60	70	80	90	100	110	140	160	180
e	6	8	10	12	14	18	22	26	30	35	38	42	50	55	60
f	2,5	3	3,5	4	5	6	7	8	9	10	11	12	12	12	12
g (h13)	6	7,7	9,4	13	16,4	19,6	25	30,3	35,6	41	48,3	55,7	63,7	71,7	91,7
h	36	45	53	62	71	90	109	128	147	168	187	208	260	298	330
k	8	10	12	14	16	20	24	28	32	38	42	48	60	68	75
l (± ½ IT 15)	13	17	20,5	27	30	36	45	54	63	68	78	90	100	112	130
m	10	12	14	16	19	24	28	32	38	46	50	58	72	80	88
r_1	4	4	6	6	8	12	15	18	20	22	25	25	35	35	40
r_2	1	1	2	2	2	2	3	3	3	4	4	4	4	4	4
r_3	1	1	1,2	1,2	1,6	2	2	2	2,5	2,5	3	3	3	3	3
Approx. mass, in kg, per unit	0,06	0,11	0,18	0,28	0,45	0,74	1,66	2,65	4,03	6,38	8,80	12,4	23,3	34,2	49,1

4 Technical delivery conditions

4.1 Material

Eyebolts shall be made of grade C15E steel as in DIN EN 10084, with an aluminium content of 0,02 % to 0,05 % (m/m), or of grade A2, A3, A4 or A5 austenitic steel as in DIN EN ISO 3506-1.

Eyebolts made of grade C15E steel shall be normalized to obtain an austenitic grain size finer than 5 in accordance with DIN 50601. When tested as specified in DIN EN 10045-1, the impact energy, KU (ISO U-notch test piece), shall be 40 J.

For eyebolts made of austenitic steel, solution heat treatment is required.

NOTE: Property classes as in DIN EN ISO 3506-1 are not specified here since testing of the relevant mechanical properties is not possible.

4.2 Workmanship

Eyebolts shall be cleanly drop forged in one piece. Tolerances on the dimensions of unmachined parts and on residual flash and mismatch shall be as specified in DIN EN 10243-1. The general technical delivery conditions specified in DIN EN 10254 shall apply.

Limits for surface discontinuities of the threaded shank shall be as given in DIN EN 26157-3.

Eyebolts made of stainless steel shall be passivated as specified in DIN EN ISO 16048.

Eyebolts of sizes exceeding M36 may be provided with a centre hole in the upper part of the eye.

4.3 Screw threads

Threads shall be produced to tolerance 6g as in DIN ISO 965-2 for thread engagement group N as specified in DIN ISO 965-1.

5 Minimum breaking load

When subjected to proof loading, the minimum breaking load of eyebolts shall be as specified in table 2.

Table 2: Minimum breaking load

Thread size (d_1)	M8	M10	M12	M16	M20	M24	M30	M36
Minimum breaking load, in kN	8,4	13,8	19,8	41,4	70,8	106	188	270

Thread size (d_1)	M42	M48	M56	M64	M72 × 6	M80 × 6	M100 × 6
Minimum breaking load, in kN	372	504	678	942	1 180	1 650	2 350

6 Testing

6.1 Proof loading

Compliance with the requirements specified in clause 5 shall be verified by proof loading carried out on two pairs of eyebolts, fitting the samples axially in the grips of a tensile testing machine. The diameter of the pin to receive the bolt shall be equal to 1 × k to 1,5 × k.

6.2 Inspection

Each eyebolt shall be visually checked for the features specified in subclause 4.2. For eyebolts made of stainless steel, this check shall be carried out after passivation.

7 Designation

Designation of an M20 eyebolt (M20) made of grade C15E steel:

Eyebolt DIN 580 – M20 – C15E

Designation of an M20 eyebolt (M20) made of grade A2 stainless steel (A2):

Eyebolt DIN 580 – M20 – A2

8 Marking

Eyebolts shall be permanently and legibly marked with the manufacturer's trademark, the symbol denoting the material grade (e.g. C15E or A2), and with any details required by statutory regulations.

9 User information

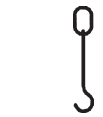
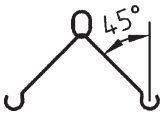
Eyebolts shall be supplied with the relevant information for their safe and proper use. This information shall include at least the details given in Annex B.

Annex A

Lifting capacity

The maximum lifting capacity (safe working load) of eyebolts used with single-strand or double-strand slings is given in table A.1. The values are based on the minimum breaking loads specified in table 2, taking into account a safety factor of 6.

Table A.1: Maximum lifting capacity

Thread size (d_1)		M8	M10	M12	M16	M20	M24	M30	M36
Capacity for eyebolt used with single-strand sling, in kg		140	230	340	700	1 200	1 800	3 200	4 600
Capacity for eyebolt used with double-strand sling (45°), in kg		100	170	240	500	860	1 290	2 300	3 300

Thread size (d_1)	M42	M48	M56	M64	M72 × 6	M80 × 6	M100 × 6
Capacity for eyebolt used with single-strand sling, in kg	6 300	8 600	11 500	16 000	20 000	28 000	40 000
Capacity for eyebolt used with double-strand sling (45°), in kg	4 500	6 100	8 200	11 000	14 000	20 000	29 000

Annex B

User information

Eyebolts conforming to this standard are primarily intended as permanent attachments on equipment such as motors, control cabinets, gear boxes, etc. When used as temporary attachments on larger objects such as large tools for transportation only, the next largest thread size should be used.

The safe working load values given in table A.1 are based on the following assumptions:

a) The eyebolt is firmly screwed down and the collar sits evenly on the contact surface.

b) The material of the equipment is capable of accommodating the stresses induced without any deformation liable to impair safety.

c) Tapped holes have a threaded length sufficient to ensure that the eyebolt shank is fully engaged and the collar fully seated.

In eyebolt/nut assemblies with clearance hole, a washer should be used.

The values given for eyebolts used with double-strand slings (cf. table A.1, line 2) apply only if the angle between each sling branch and the vertical does not exceed 45°. Larger angles and any lateral loading of eyebolts should be avoided.

Before being used, eyebolts should be checked for correct seating and apparent damage (e.g. corrosion, deformation).

Deformed eyebolts should be discarded.