UDC 621.882.217.2

March 1972

# Lifting Eye Bolts

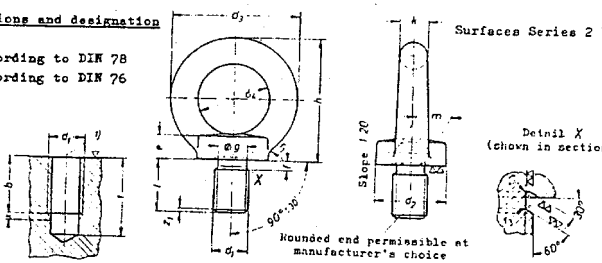
DIN 580

## Ringschrauben

Dimensions in mm

### 1. Dimensions and designation

$z_1$ according to DIN 78
x according to DIN 76




Designation of a lifting eye bolt with thread $d_1$ = M 20:

Lifting eye bolt M 20 DIN 580

| $d_1$ | M 8 | M 10 | M 12 | M 12×1,5[1] | M 16 | M 16×1,5[1] | M 20 | M 20×2 | M 24 | M 24×2 | M 30 | M 30×2 | M 36 | M 36×3 | M 42 | M 42×3 | M 48 | M 48×3 | M 56 | M 56×4 | M 64 | M 64×4 | M 72×6 | M 72×4 | M 80×6 | M 80×4 | M 100×6 | M 100×4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $b$ min. | 13 | 17 | 20,5 | | 27 | | 30 | | 36 | | 45 | | 54 | | 63 | | 68 | | 78 | | 90 | | 100 | | 112 | | 130 | |
| $d_2$ | 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 | 1,2 | 1 | 1,6 | 1,2 | 2 | 1,2 | 2 | 1,2 | 2 | 2,5 | 2 | 2,5 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 |
| $t$ min. | 18,5 | 22,5 | 26,5 | | 33,5 | | 37,5 | | 44,5 | | 55 | | 65 | | 75 | | 81 | | 93 | | 106 | | 116 | | 128 | | 146 | |
| Weight kg/piece ≈ | 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 | | 34,7 | | 49,1 | |
| Maximum loadings by the piece lifted in kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Direction of pull for one bolt | 140 | 230 | 340 | | 700 | | 1200 | | 1800 | | 3600 | | 5100 | | 7000 | | 8600 | | 11 500 | | 16 000 | | 21 000 | | 28 000 | | 38 000 | |
| Direction of pull for two bolts, total | 95 | 170 | 240 | | 500 | | 830 | | 1270 | | 2600 | | 3700 | | 5000 | | 6100 | | 8300 | | 11 000 | | 15 000 | | 20 000 | | 27 000 | |

[1]) Experience indicates that it is unnecessary to specify a permissible angular variation between the axis of the tapped hole and the bearing face if both are manufactured during the same clamping of the workpiece.

[2]) Only for the aircraft industry

Continued on page 2
Explanations on pages 2 and 3

## 2. Technical conditions of delivery

### 2.1. Material

Lifting eye bolts according to the present Standard shall be manufactured solely from C 15 steel according to DIN 17210. They must be normalized and possess a minimum notched bar impact strength of 80 N m/cm$^2$ (ISO round notch test bar) or of 90 N m/cm$^2$ (DVM test bar).

### 2.2. Finish

Lifting eye bolts must be clean drop forgings. The permissible variations applying to forging class F according to DIN 7526 are applicable to the dimensions of the unmachined piece and to the flash and mismatch.

Forging defects which are likely to affect adversely the purpose of the lifting eye bolts by anything more than an insignificant degree are not permissible.

After the blanks have been normalized, they must be de-scaled.

### 2.3. Screw threads

Tolerance quality medium (m), screwed assembly group N according to DIN 13 Part 14 (new edition at present still in draft form).

### 2.4. Inspection and acceptance

The manufacturer shall guarantee that the specifications laid down in Sections 2.1 to 2.3 above have been strictly adhered to.

Special acceptance testings can be mutually agreed. The notched bar impact strength shall be verified on a specimen taken from the normalized basic material, according to DIN 50115.

### 2.5. Marking

Each lifting eye bolt shall have the material symbol C 15 and the manufacturer's trade mark stamped on its collar.

### 2.6. Mode of delivery

Lifting eye bolts shall be delivered in such a way that they are protected against mechanical damage during transport to the greatest possible extent.

## 3. Assembly

Lifting eye bolts must always be screwed tight in such a way that they fit flush against the bearing face.

Any loading at right angles to the plane of the eye is not permissible.

If a given orientation in relation to an axis, edge or the like has been prescribed for a screwed-in lifting eye bolt, shims shall be inserted if necessary to exclude the possibility of incorrect loading.

The loading values specified apply solely to the use of lifting eye bolts according to the present Standard on workpieces made of steel, cast steel or grey cast iron.

## Explanations

The February 1956x edition of DIN 580 Part 1 specified Siemens-Martin steel St 34 or C 15 as materials for the manufacture of lifting eye bolts, at manufacturer's choice. The present new edition of the Standard solely prescribes C 15, which is somewhat more ductile than St 34. The technical conditions of delivery have been revised accordingly. The values for the maximum permissible loadings also had to be re-evaluated in this connection.

For this purpose, a series of tensile tests was carried out on lifting eye bolts made from C 15, in the plane of the eye, both at right angles to the direction of the axis and at an angle of 45° to the direction of the axis. This corresponds with the two methods of loading specified in the Standard. The object of the tests was to determine the onset of permanent deformation and the ultimate load at fracture. The results of these tests led to the new loading values specified in the present Standard. These values are higher than the previous ones and apply solely to lifting eye bolts made from C 15, they incorporate an adequate safety margin against incipient permanent deformation.

In order to avoid any confusion in future, all lifting eye bolts made from C 15 must be stamped with the material symbol. Any lifting eye bolts which do not feature the C 15 symbol may only be loaded up to the previously valid loading values listed in the Table below.

| | d | M 8 | M 10 | M 12 | M 16 | M 20 | M 20 × 2 | M 24 | M 24 × 2 | M 30 | M 30 × 2 | M 36 | M 36 × 3 | M 42 | M 42 × 3 | M 48 | M 48 × 3 | M 56 | M 56 × 4 | M 64 | M 64 × 4 | M 72 × 6 | M 72 × 4 | M 80 × 6 | M 80 × 4 | M 100 × 6 | M 100 × 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | l min. | 20 | 24 | 29 | 35 | 38 | | 47 | | 55 | | 66 | | 77 | | 83 | | 95 | | 106 | | 121 | | 136 | | 146 | |
| | | Maximum loadings by the piece lifted in kg | | | | | | | | | | | | | | | | | | | | | | | | | |
| Direction of pull | for one bolt | | 85 | 150 | 220 | 380 | 570 | 1050 | | 1700 | | 2500 | | 3400 | | 5200 | | 6500 | | 8700 | | 13 000 | | 17 000 | | 20 000 | |
| | for two bolts, total | | | | | | | 1000 | | 1800 | | 2600 | | 3600 | | 5200 | | 6500 | | 8400 | | 12 000 | | 18 000 | | 22 000 | |

During the elaboration of the new edition of the Standard, it was realized that there was no logical relationship between the existing threaded stud lengths and the thread diameter. The ratios of threaded stud length to thread diameter varied between 1.9 and 1.3. There was no logical explanation or technical necessity for this discrepancy. One of the criticisms levelled against this state of affairs was the fact that the unnecessarily long threaded studs required equally deep tapped holes to accommodate them, and this resulted in wall thicknesses of bearing coverplates and similar components for which there was no real necessity. On the other hand, the opinion was expressed that the existing threaded stud lengths should not be shortened unduly for safety reasons.

The present edition therefore lists threaded stud lengths which do not differ markedly from the previous ones, and which have the following ratios to their respective thread diameters:

$l = 1.7\ d_1$ for sizes up to M 16
$l = 1.5\ d_1$ for sizes from M 20 up to M 42
$l = 1.4\ d_1$ for sizes from M 48 up to M 80
$l = 1.3\ d_1$ for size M 100

The modified threaded stud lengths naturally required a modification of the depth of the tapped holes (dimensions b and t). Here again, there are no really marked differences in comparison with the previous depths, but there may be an interchangeability problem in certain cases where an attempt is made to use the old lifting eye bolts in new tapped holes. Therefore the old tapped hole depths t listed in the Table above are valid for all lifting eye bolts which do not feature the material symbol C 15.

The following modifications and additions have also been made in comparison with the February 1956x edition of DIN 580 Part 1:

a) The values for the width f of the thread undercut have been taken from DIN 76.

b) At manufacturer's choice, the threaded stud may be provided with a rounded end.

c) The permissible variations have been deleted in part, and superseded by a reference to DIN 7526.

d) The intermediate sizes previously listed above have been deleted.

e) The technical conditions of delivery have been formulated afresh and more precisely.

f) A section on "Assembly" has been incorporated for the first time.

g) The suffix "Part 1" to the number of the Standard sheet has been dropped, because DIN 580 Part 2 was withdrawn as long ago as 1967.

h) The screw thread sizes M 16 x 1.5 and M 20 x 1.5 have been incorporated for the requirements of the aircraft industry. This has made Standard DIN 7612 superfluous.

Attention is drawn to the fact that the lifting eye bolts according to the present Standard are intended first and foremost for load applications as illustrated in the Table on page 1. In the case of transport of shafts with centre holes according to DIN 332 for example, the threaded stud lengths $l$, especially for sizes M 20 and above, are insufficient to ensure an adequate number of load-carrying threads equal to $0.8\ d_1$.

In the September 1970 issue the above amendments and additions to the standard were implemented. However, this previous issue contained printing errors affecting thread length b for sizes up to M 16 x 1.5 and the correction of these has necessitated the present new issue.