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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Forged shackles for general lifting purposes — Dee shackles and bow shackles

Manilles forgées pour levage — Manilles droites et manilles lyres

Reference number
ISO 2415 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2415 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, lifting hooks and accessories*.

This second edition cancels and replaces the first edition (ISO 2415 : 1973), ISO 2731 : 1973 and ISO 2791 : 1973, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Forged shackles for general lifting purposes — Dee shackles and bow shackles

1 Scope and field of application

This International Standard specifies the general characteristics, performance and critical dimensions necessary for interchangeability and compatibility with other components, of forged dee and bow shackles in a range of sizes having working load limits from 0,63 to 100 t, and in grades M(4), S(6) and T(8).

In the case of dee shackles for use with forged steel lifting hooks (see ISO 4779 and 7597), it may be necessary to use an intermediate component to make the connection.

2 References

ISO 261, *ISO general purpose metric screw threads — General plan.*

ISO 263, *ISO inch screw threads — General plan and selection for screws, bolts and nuts — Diameter range* 0.06 *to* 6 in.

ISO 643, *Steels — Micrographic determination of the ferritic or austenitic grain size.*

ISO 4779, *Forged steel lifting hooks with point and eye for use with steel chains of grade M(4).*

ISO 4948-1, *Steel — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition.*

ISO 6506, *Metallic materials — Hardness test — Brinell test.*

ISO 6508, *Metallic materials — Hardness test — Rockwell test (scales A — B — C — D — E — F — G — H — K).*

ISO 7597, *Forged steel lifting hooks with point and eye for use with steel chains of grade T(8).*

3 Definitions

For the purposes of this International Standard, the following definitions apply. See also figures 1 and 2.

3.1 shackle: A component consisting of two readily separable parts, the body and the pin.

3.2 body: One of the two parts of the shackle, consisting of a bar of suitable section formed through an appropriate angle (see 3.6 and 3.7) and terminating in coaxial eyes.

3.3 crown: The part of the shackle body opposite the pin.

3.4 eyes: Bosses on the ends of the body with coaxial holes through which the pin passes.

3.5 pin: A straight bar of circular section which passes through the eyes, arranged so as to be secure when in position and which can be readily disassembled. (See figures 1, 2 and 3.)

3.6 dee shackle: A shackle the crown of which forms a semicircle of internal radius half the width, W, between the eyes. (See figure 1.)

3.7 bow shackle: A shackle the crown of which forms more than a semicircle of internal radius more than half the width, W, between the eyes. (See figure 2.)

3.8 ultimate strength: The maximum force reached during tensile testing of a shackle at the end of which the shackle fails to retain the load.

3.9 proof force, F_e: The force applied as a test to a finished shackle as specified in clause 13.

3.10 working load limit (WLL): The maximum mass which a shackle is designed to sustain in general service.

3.11 working load (WL): The maximum mass which a shackle may sustain in a particular stated service.

4 Forms and dimensions

4.1 Dee shackles

The dimensions of dee shackles shall comply with the requirements laid down in table 1 and figure 1.

4.2 Bow shackles

The dimensions of bow shackles shall comply with the requirements laid down in table 2 and figure 2.

4.3 Hole diameter

The diameter of the unthreaded hole or holes in the body of the shackle shall not exceed the following values:

a) Hole diameter for pins having a diameter up to and including 20 mm: $D + 1$ mm

b) Hole diameter for pins having a diameter over 20 mm and up to and including 45 mm: $D + 1{,}5$ mm

c) Hole diameter for pins having a diameter over 45 mm: $D + 2$ mm

where D is the actual pin diameter.

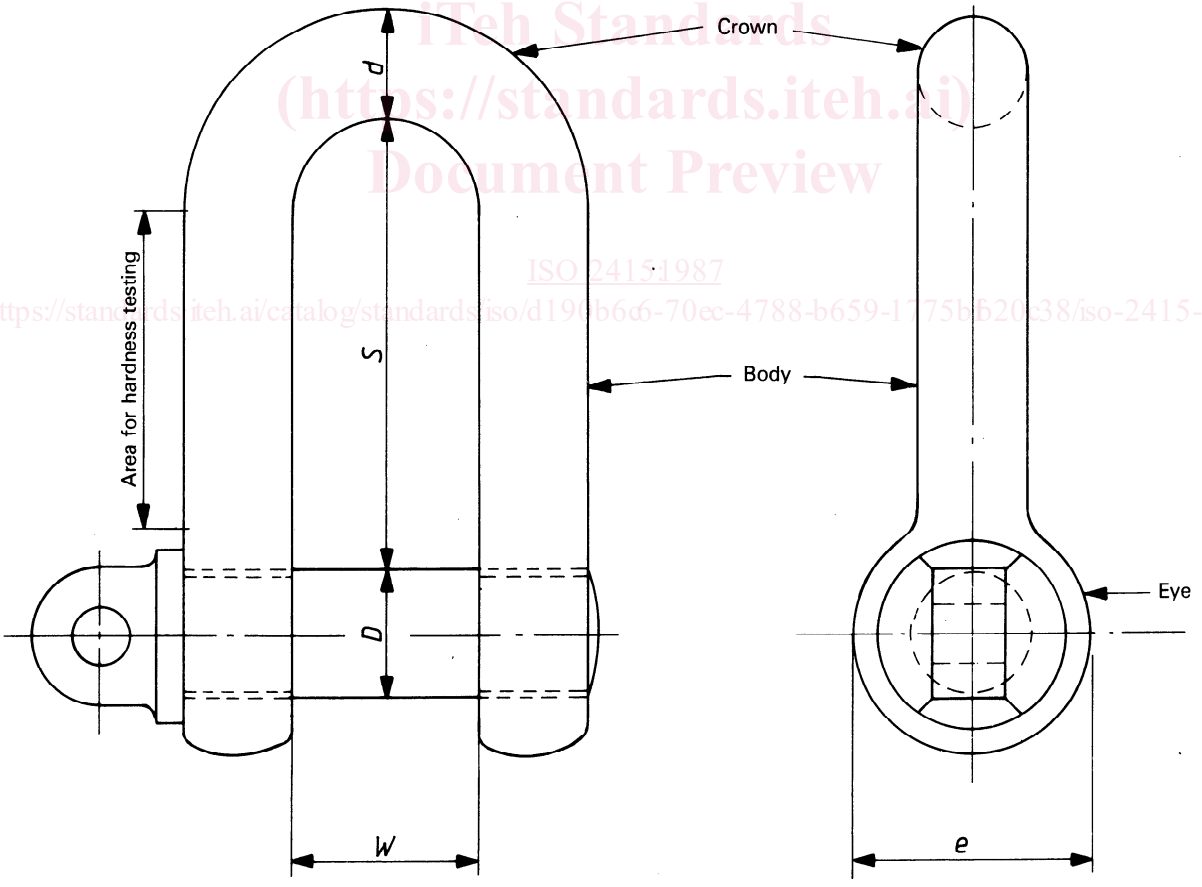

Figure 1 — Dimensions of dee shackles

Table 1 — Dimensions of dee shackles

Working load limit for grades			d [1] max.	D [2] max.	e max.	S [3] min.	W [2] min.
M(4)	S(6)	T(8)					
t			mm	mm		mm	mm
—	—	0,63	8	9	2,2 D max.	18	9
—	0,63	0,8	9	10		20	10
—	0,8	1	10	11,2		22,4	11,2
0,63	1	1,25	11,2	12,5		25	12,5
0,8	1,25	1,6	12,5	14		28	14
1	1,6	2	14	16		31,5	16
1,25	2	2,5	16	18		35,5	18
1,6	2,5	3,2	18	20		40	20
2	3,2	4	20	22,4		45	22,4
2,5	4	5	22,4	25		50	25
3,2	5	6,3	25	28		56	28
4	6,3	8	28	31,5		63	31,5
5	8	10	31,5	35,5		71	35,5
6,3	10	12,5	35,5	40		80	40
8	12,5	16	40	45		90	45
10	16	20	45	50		100	50
12,5	20	25	50	56		112	56
16	25	32	56	63		125	63
20	32	40	63	71		140	71
25	40	50	71	80		160	80
32	50	63	80	90		180	90
40	63	—	90	100		200	100
50	80	—	100	112		224	112
63	100	—	112	125		250	125
80	—	—	125	140		280	140
100	—	—	140	160		315	160

1) Formulae used to calculate values of d max. :
   - M(4) : $14\sqrt{\text{WLL}}$
   - S(6) : $11{,}2\sqrt{\text{WLL}}$
   - T(8) : $10\sqrt{\text{WLL}}$

2) Formulae used to calculate values of D max. and W min. :
   - M(4) : $16\sqrt{\text{WLL}}$
   - S(6) : $12{,}5\sqrt{\text{WLL}}$
   - T(8) : $11{,}2\sqrt{\text{WLL}}$

3) Formulae used to calculate values of S min. :
   - M(4) : $31{,}5\sqrt{\text{WLL}}$
   - S(6) : $25\sqrt{\text{WLL}}$
   - T(8) : $22{,}4\sqrt{\text{WLL}}$

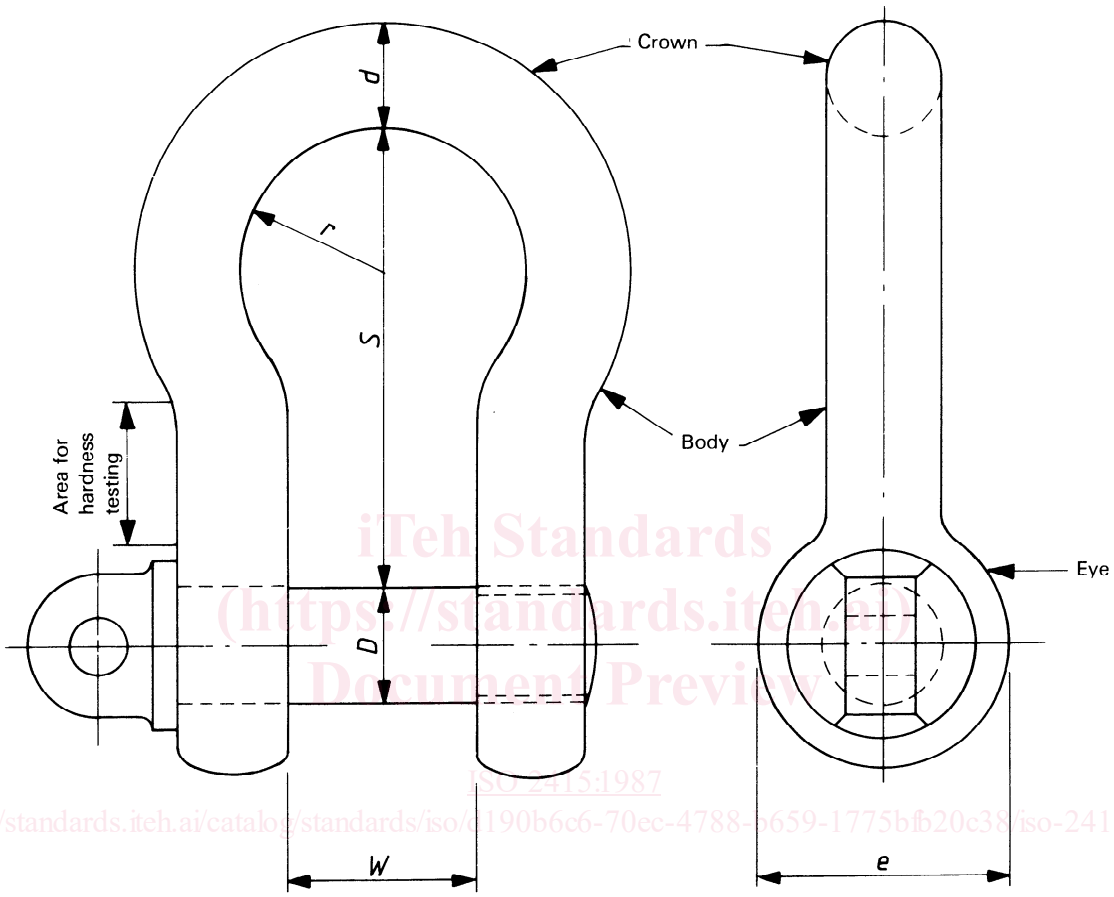

Figure 2 — Dimensions of bow shackles