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

*Manilles forgées pour levage — Manilles droites et manilles lyres*

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Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

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## 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2415 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, chain slings, components and accessories*, Subcommittee SC 3, *Components and accessories*.

This third edition cancels and replaces the second edition (ISO 2415:1987), which has been technically revised.

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

## 1 Scope

This International Standard specifies the general characteristics of forged dee and bow shackles in a range of sizes having working load limits of from 0,32 t to 100 t and in Grades 4, 6 and 8, and presents their performance and critical dimensions necessary for their interchangeability and compatibility with other components.

In the case of dee shackles for use with forged steel lifting hooks in conformance with ISO 4779 and ISO 7597, an intermediate component could be necessary for making the connection.

## 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.

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 apparent 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 steel based on chemical composition*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)*

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

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **shackle**

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 or forged to the appropriate shape and terminating in coaxial eyes

**3.3**  
**crow**  
that part of the shackle body opposite the pin

**3.4**  
**eye**  
boss on the end of the body with coaxial hole through which the pin passes

**3.5**  
**pin**  
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

**3.6**  
**dee shackle**  
a shackle the crown of which forms a semicircle or internal radius half the width, between the eyes

See Figure 1.

**3.7**  
**bow shackle**  
shackle, the crown of which forms more than a semicircle of internal radius more than half the width, between the eyes

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See Figure 2.

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**3.8**  
**ultimate strength**  
 $F_u$   
maximum force reached during the static tensile testing of a shackle at the end of which the shackle fails to retain the load

**3.9**  
**proof force**  
 $F_e$   
force applied as a test to a finished shackle in accordance with Clause 13

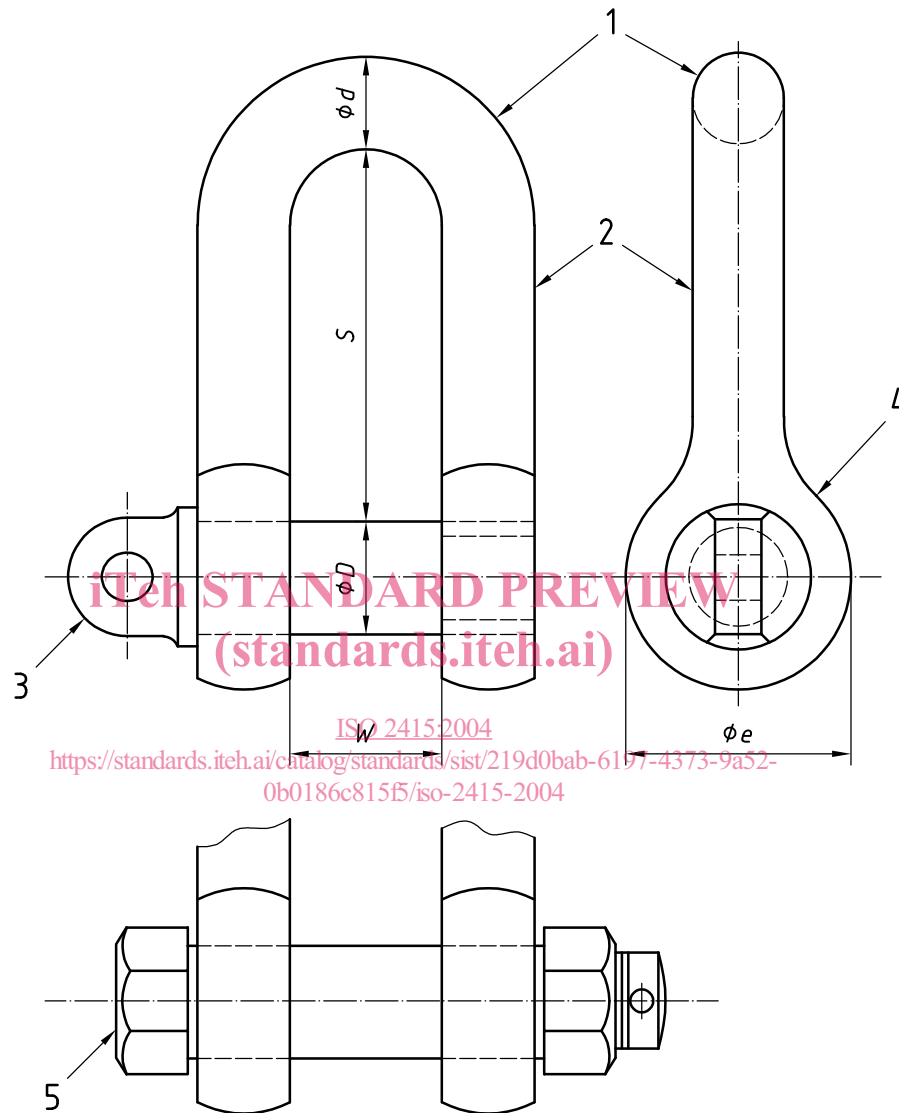
**3.10**  
**working load limit**  
**WLL**  
maximum mass a shackle is designed to sustain in general service

**3.11**  
**working load**  
**WL**  
maximum mass a shackle may sustain in a particular stated service

## 4 Form and dimensions

### 4.1 Dee shackles

The dimensions of dee shackles shall be in accordance with Figure 1 and Table 1.



#### Key

- 1 crown
- 2 body
- 3 screwed pin with eye and collar — Type W (example)
- 4 eye
- 5 bolt-type pin with hexagon head, hexagon nut and split cotter pin — Type X

NOTE This diagram is intended only to show where dimensions are measured. It does not purport to indicate any detailed design of any part of the shackle.

**Figure 1 — Dimensions of dee shackles**

Table 1 — Dimensions of dee shackles

Working load limit WLL			$d^a$	$D^b$	$e^c$	$S^d$	$W^b$
Grade 4	Grade 6	Grade 8	max.	max.	max.	min.	min.
t			mm	mm	mm	mm	mm
0,32	0,50	0,63	8	9	19,8	18	9
0,40	0,63	0,8	9	10	22	20	10
0,50	0,8	1	10	11,2	24,64	22,4	11,2
0,63	1	1,25	11,2	12,5	27,5	25	12,5
0,8	1,25	1,6	12,5	14	30,8	28	14
1	1,6	2	14	16	35,2	31,5	16
1,25	2	2,5	16	18	39,6	35,5	18
1,6	2,5	3,2	18	20	44	40	20
2	3,2	4	20	22,4	49,28	45	22,4
2,5	4	5	22,4	25	55	50	25
3,2	5	6,3	25	28	61,8	56	28
4	6,3	8	28	31,5	69,3	63	31,5
5	8	10	31,5	35,5	78,1	71	35,5
6,3	10	12,5	35,5	40	88	80	40
8	12,5	16	40	45	99	90	45
10	16	20	45	50	110	100	50
12,5	20	25	50	56	123,2	112	56
16	25	32	56	63	138,6	125	63
20	32	40	63	71	156,2	140	71
25	40	50	71	80	178	160	80
32	50	63	80	90	198	180	90
40	63	80	90	100	220	200	100
50	80	100	100	112	246,4	224	112
63	100	—	112	125	275	250	125
80	—	—	125	140	308	280	140
100	—	—	140	160	352	315	160

<sup>a</sup> The formula used to calculate this dimension is given in A.1.1.

<sup>b</sup> The formula used to calculate this dimension is given in A.1.2.

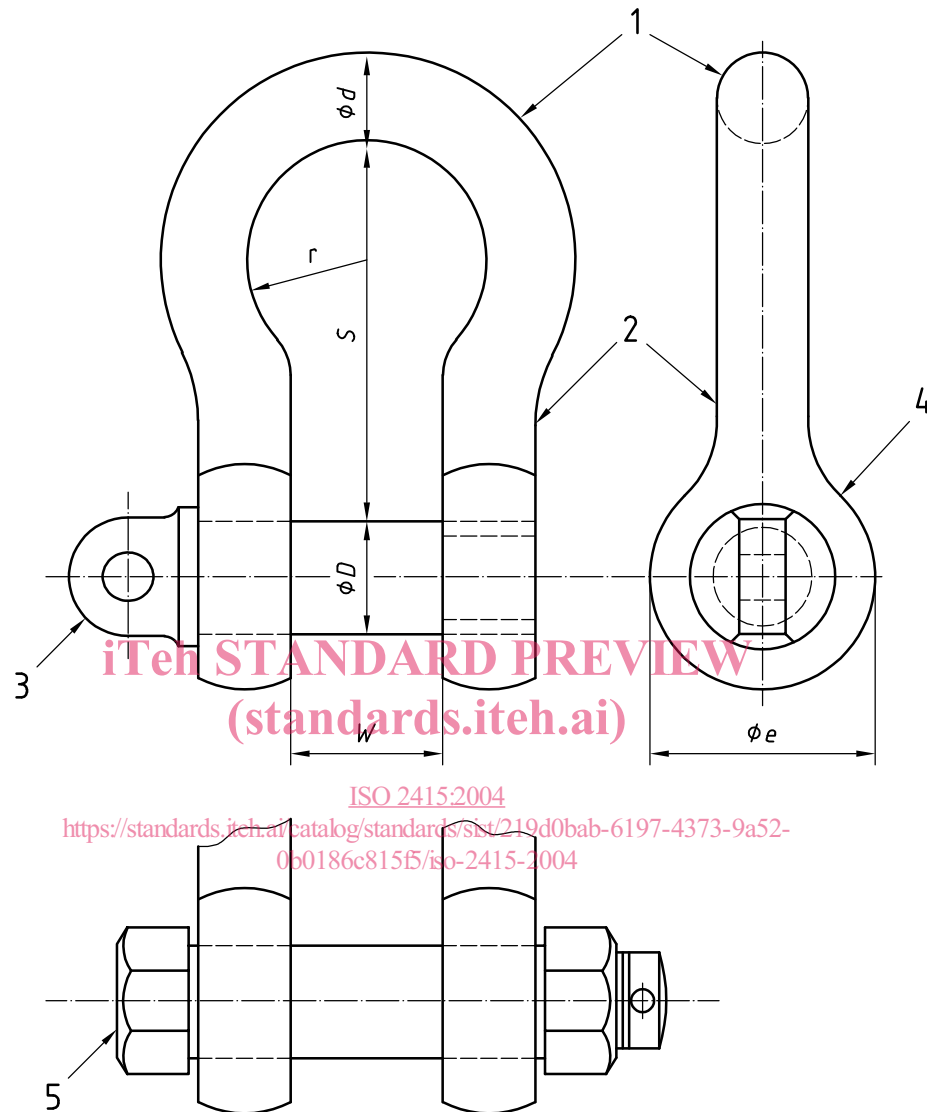
<sup>c</sup> The formula used to calculate this dimension is given in A.1.4.

<sup>d</sup> The formula used to calculate this dimension is given in A.1.3.



## 4.2 Bow shackles

The dimensions of bow shackles shall be in accordance with Figure 2 and Table 2.



### Key

- 1 crown
- 2 body
- 3 screwed pin with eye and collar — Type W (example)
- 4 eye
- 5 bolt-type pin with hexagon head, hexagon nut and split cotter pin — Type X

NOTE This diagram is intended only to show where dimensions are measured. It does not purport to indicate any detailed design of any part of the shackle.

**Figure 2 — Dimensions of bow shackles**

Table 2 — Dimensions of bow shackles

Working load limit WLL			$d^a$	$D^b$	$e^c$	$2r^d$	$S^e$	$W^b$
Grade 4	Grade 6	Grade 8	max.	max.	max.	min.	min.	min.
t			mm	mm	mm	mm	mm	mm
0,32	0,50	0,63	9	10	22	16	22,4	10
0,40	0,63	0,8	10	11,2	24,64	18	25	11,2
0,50	0,8	1	11,2	12,5	27,5	20	28	12,5
0,63	1	1,25	12,5	14	30,8	22,4	31,5	14
0,8	1,25	1,6	14	16	35,2	25	35,5	16
1	1,6	2	16	18	39,6	28	40	18
1,25	2	2,5	18	20	44	31,5	45	20
1,6	2,5	3,2	20	22,4	49,28	35,5	50	22,4
2	3,2	4	22,4	25	55	40	56	25
2,5	4	5	25	28	61,8	45	63	28
3,2	5	6,3	28	31,5	69,3	50	71	31,5
4	6,3	8	31,5	35,5	78,1	56	80	35,5
5	8	10	35,5	40	88	63	90	40
6,3	10	12,5	40	45	99	71	100	45
8	12,5	16	45	50	110	80	112	50
10	16	20	50	56	123,2	90	125	56
12,5	20	25	56	63	138,6	100	140	63
16	25	32	63	71	156,2	112	160	71
20	32	40	71	80	176	125	180	80
25	40	50	80	90	198	140	200	90
32	50	63	90	100	220	160	224	100
40	63	—	100	112	246,4	180	250	112
50	80	—	112	125	275	200	280	125
63	100	—	125	140	308	224	315	140
80	—	—	140	160	352	224	355	160
100	—	—	160	180	396	280	400	180

- a The formula used to calculate this dimension is given in A.2.1.
- b The formula used to calculate this dimension is given in A.2.2.
- c The formula used to calculate this dimension is given in A.2.5.
- d The formula used to calculate this dimension is given in A.2.3.
- e The formula used to calculate this dimension is given in A.2.4.

### 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 an actual pin diameter  $D \leq 20$  mm:  $D + 1$  mm;
- b) hole diameter for pins having a diameter  $D > 20$  mm and  $\leq 45$  mm:  $D + 1,5$  mm;
- c) hole diameter for pins having a diameter  $D > 45$  mm:  $D + 2$  mm.

### 4.4 Types of shackle pin

The threaded shackle pins shown in Figure 3 illustrate only typical examples of pins; other suitable forms of pin are acceptable.

The pins illustrated are of the following types:

- Type W: screwed with eye and collar;
- Type X: bolt with hexagon head, hexagon nut and split cotter pin;
- Type Y: countersunk and slotted head.

For the purpose of the designation system (see Annex B), all other types of pin are designated as being of Type Z.

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