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

Manilles forgées pour levage — Manilles droites et manilles lyres

ICS: 53.020.30

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 2415:2004), which has been technically revised.

The main changes compared to the previous edition are as follows:

— xxx xxxxxxx xxx xxxx

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 from 0,5 t to 120 t and in Grades 6, 8 and 10, and presents their performance and preferred dimensions necessary for their interchangeability and compatibility with other components for use in the temperature range of -20 °C to 200 °C.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

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 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 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 10474, *Steel and steel products — Inspection documents*

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 a shackle, consisting of a bar of suitable cross section formed or forged to the appropriate shape and terminating in coaxial eyes

3.3
crown
that part of the shackle body opposite the pin

3.4
eye
boss on each end of the body with coaxial holes through which the pin passes

3.5
pin
straight bar of circular cross section which passes through the eye, holes and secured in a manner that can be readily disassembled. Some types may have additional components for example: a nut

3.6
dee shackle
shackle, the crown of which forms a semicircle with an inner radius of half the width between the eyes

See Figure 1.

3.7
bow shackle
shackle, the crown of which forms more than a semicircle with an inner radius of more than half the width between the eyes

See Figure 2.

3.8
breaking force
F_b
maximum force reached during a static tensile test before the assembly being tested fails to retain the load

3.9
proof force
F_e
force applied as a test to a finished shackle

See Table 2.

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

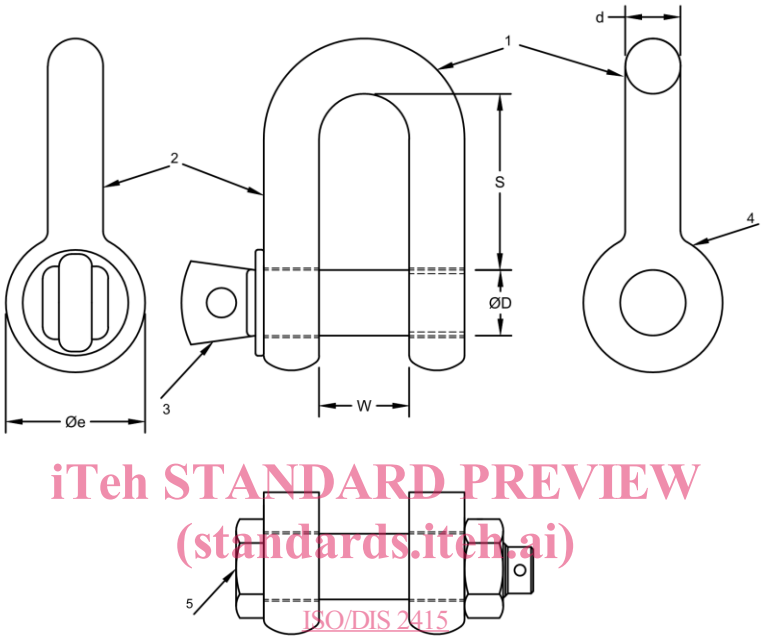
3.11
working load
WL
maximum mass a shackle may sustain in a particular stated service

3.12
finished condition
finished condition of a shackle shall include any surface finish. Shackles are supplied in various surface finishes including descaled, electroplated, hot dip galvanized or painted. If shackles are to be hot dip galvanized or subjected to similar processes, such processing should only be carried out under the control of the shackle manufacturer

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 (see Figure 3)

4 eye

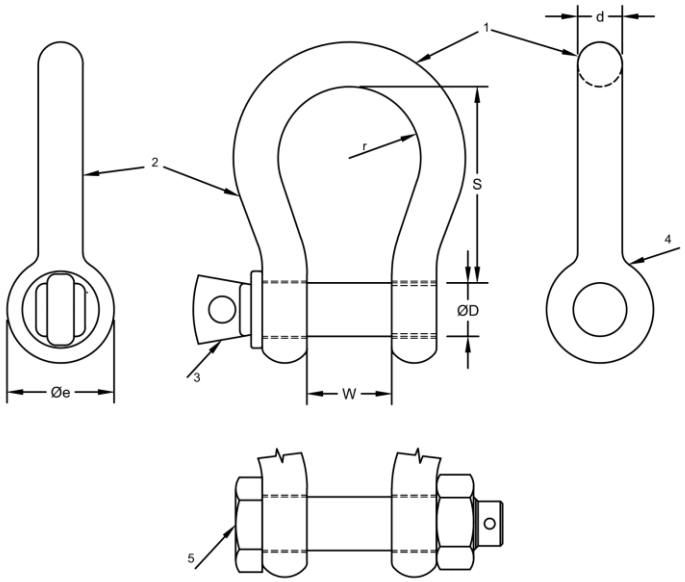
5 bolt-type pin with hexagon head, hexagon nut and split cotter pin — Type X (see Figure 3)

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

4.2 Bow shackles

The dimensions of bow shackles shall be in accordance with Figure 2 and Table 1.



Key

1 crown

2 body

3 screwed pin with eye and collar — Type W (see Figure 3)

4 eye

5 bolt-type pin with hexagon head, hexagon nut and split cotter pin — Type X (see Fcigure 3)

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 1 — Preferred Dimensions of Dee and Bow Shackles

Dimensions in millimetres

Working Load Limit (WLL) t			*d*			*D*			*W*			*e*			*S*		*2r*
Grade 6	**Grade 8**	**Grade 10**	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	min.
0,5	0,75		5,5	7	8	7	8	9	9,5	12	14,5	15,5	17	18,5	20	27	19
0,75	1		7	9	10	8,5	9,5	10,5	11	13,5	16	18,5	20	21,5	25	29	20
1	1,5	2	9	10	11,5	10	11	12	14	16,5	19	22	23,5	25	27	32	24
1,5	2	2,5	10,2	11	12,7	11,2	12,2	13,2	16,5	19	21,5	25	26,5	28	33	39	27
2	2,5	3,3	12,5	13,5	15	15	16	17	19	21,5	24	29,5	32	34,5	38	44	30
3,25	4	5	14	16	19	17	19	21	24	27	30	38	40	43	47	57	39
4,75	6,3	7	17,5	19	22,5	20	22	24	28,5	31,5	34,5	44	46	49	52	65	48
6,5	8,5	9,5	20,5	22	25,5	23	25	27	33,5	36,5	39,5	50	52	55	65	76	55
8,5	9,5	12,5	23	25	28	26	28	30	40	43	46	56	59	62	74	88	64
9,5	12	15	26,5	28	31,5	30	32	34	43,5	46,5	49,5	64	67	70	83	101	70
12	13,5	18	30,5	32	35,5	33	35	37	47,5	51,5	55,5	70	73	76	87	108	78
13,5	17	21	33,5	35	39,5	36	38	40	53	57	61	76	80	84	104	126	85
17	25	30	36,5	38	42,5	40	42	44	56	60	64	84	88	92	115	139	94
25	35	40	43	45	49	49	51	53	70	74	78	100	104	108	139	168	119
35	42,5	50	48	50	52	56	58	60	79	83	87	108	112	116	155	182	130
42,5	50	55	55	57	59	63	65	67	90	95	100	126	130	134	170	205	150
55	70	85	62	65	68	68	70	72	100	105	110	140	145	150	185	240	170
85	100	120	72	75	78	80	83	86	122	127	132	157	162	167	205	300	180
120			87	90	95	92	95	98	142	147	152	205	210	215	250	370	225

NOTE Sizes, tolerances and loads in other standards are not specifically excluded by this table and may be deemed compliant.

4.3 Hole diameter

The maximum diameter of the unthreaded hole or holes in the body of the shackle shall be either 1,1 x D or D + 1,5 mm, whichever is greater, where D is the actual pin diameter.

Holes in shackle bodies shall be generally aligned coaxially with each other and concentric to the outside diameter of the eyes. Centre of the shackle eye and centre of the hole to be the same within a tolerance of ±5% of the nominal diameter of the shackle pin.

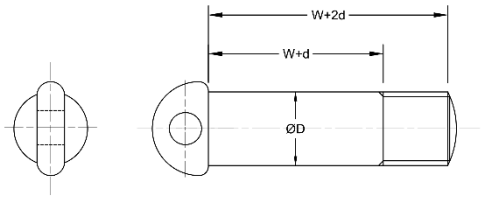
4.4 Types of shackle pin

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

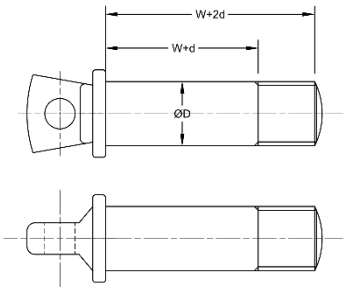
The pins illustrated are of the following types:

- A)Type V: screwed with eye;
- B)Type W: screwed with eye and collar;
- C)Type X: bolt with hexagon head, hexagon nut and a retainer, for example a split pin;
- D)Type Y: countersunk and slotted head.

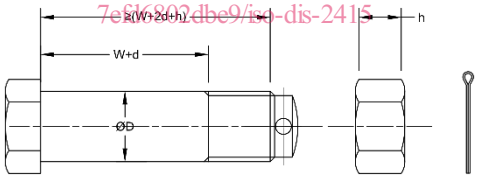
For the purpose of the designation system (see Annex A), all other types of pins are designated as being of Type Z.



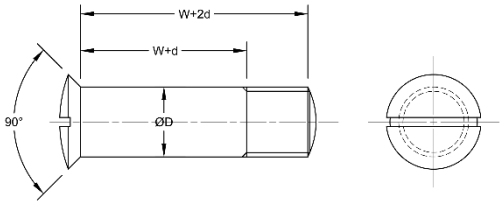
a) Type V: screwed with eye



b) Type W: screwed with eye and collar



c) Type X: bolt with hexagon head, hexagon nut and a retainer: for example a split pin



d) Type Y: countersunk and slotted head

Figure 3 — Typical examples of shackle pin types