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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

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

*Crochets de levage forgés en acier à bec et à œil destinés à être utilisés avec des chaînes en
acier de classe T(8)*

(standards.iteh.ai)

ISO 7597:1987

<https://standards.iteh.ai/catalog/standards/sist/f8fe6205-b5b0-497d-becc-cf524eb84d79/iso-7597-1987>

Reference number
ISO 7597:1987 (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 7597 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, lifting hooks and accessories*.

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.

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

1 Scope and field of application

This International Standard specifies requirements for forged steel lifting hooks with point and eye, as shown in the figure, in a range of sizes having performance compatibility with the corresponding nominal sizes of grade T(8) chain complying with ISO 3076. Performance compatibility encompasses component strength and the necessary physical dimensions.

2 References

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

ISO 3076, *Short link chain for lifting purposes — Grade T(8), non-calibrated, for chain slings, etc.*

ISO 4778, *Chain slings of welded construction — Grades M(4), S(6) and T(8).*

ISO 7593, *Chain slings assembled by methods other than welding — Grade T(8).*

ISO 8539, *Forged steel lifting components for use with grade T(8) chain.*

3 Definitions

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

3.2 working load (WL): The maximum mass which a hook should be used to sustain in a particular stated service.

3.3 proof force, F_e : A force applied as a test to the hook as specified in clause 9.

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

4 Form and dimensions

4.1 Dimensions

The principal dimensions of the hooks shall comply with the requirements of table 1¹⁾ in which the hook dimensions are related to the nominal size of the chain.

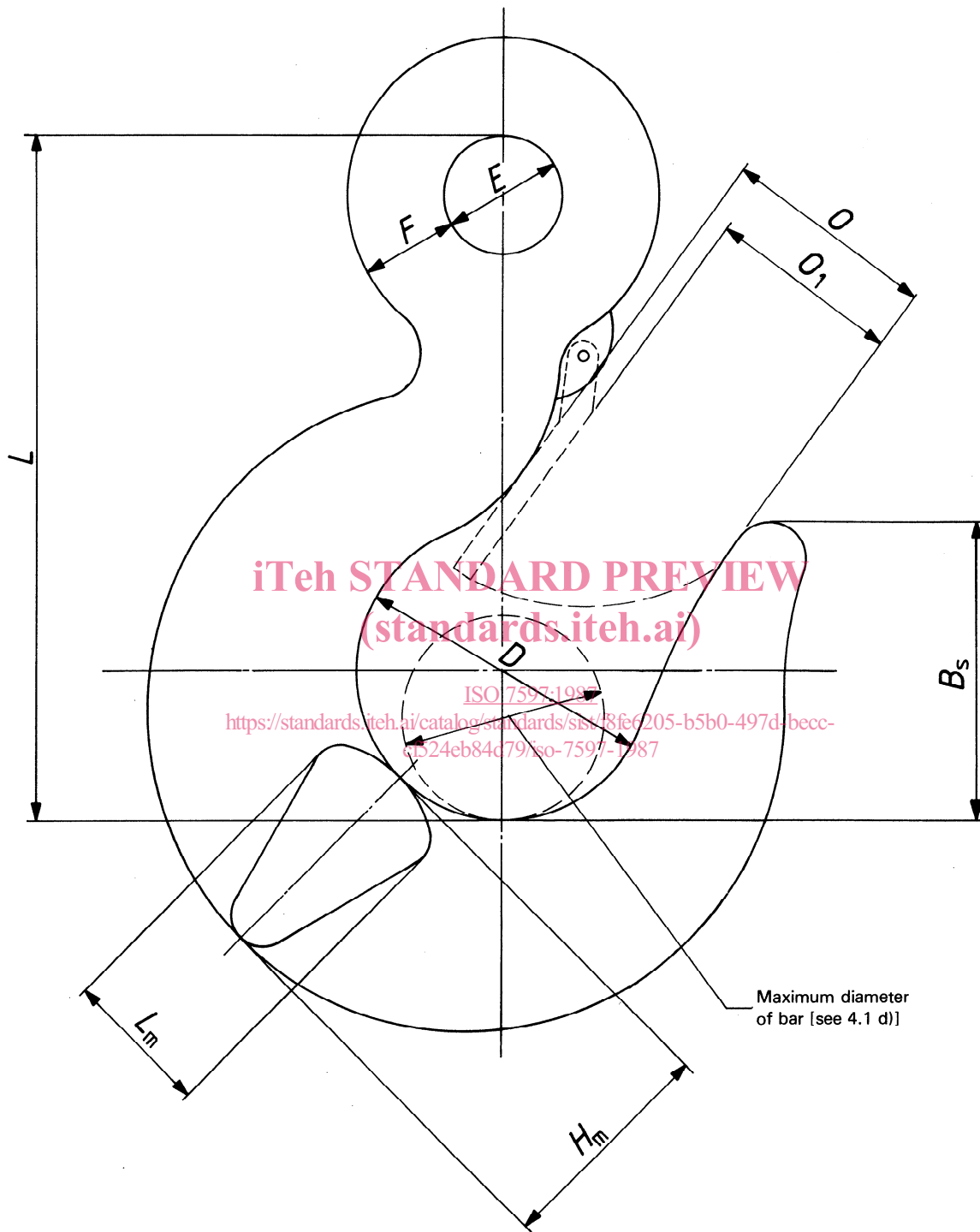
In addition, the following requirements shall be met:

- the actual point height, B_s , shall be equal to or greater than the actual throat opening, O , of the same hook (see the figure);
- the actual throat opening, O , shall not exceed 95 % of the actual seat diameter, D , of the same hook;
- the minimum value for E specified in table 1 (i.e. $1,75 d_n$), applies to hooks used in all-welded slings; for hooks used in slings assembled by methods other than welding, the minimum value for E shall be $2,0 d_n$;
- if a safety latch is fitted, it shall be capable of closing over the maximum diameter of bar which can be admitted through the actual throat opening, O_1 , as indicated by the dotted lines in the figure.

4.2 Form

The form of the hook is not specified in detail. For example, a minimum value of dimension E (as measured in any direction) is specified so that the eye of the hook can accommodate a pin, but the eye of the hook need not be circular.

1) Hooks of dimensions which do not comply with dimensions specified in table 1 may comply with the requirements laid down in ISO 8539.



NOTE — This diagram is only intended to show where the dimensions are measured. It does not purport to indicate any detailed design of any part of the hook. (See 4.2.)

Figure — Dimensions of hooks

Table 1 — Dimensions of hooks

Dimensions in millimetres

Nominal size of chain ¹⁾	Working load limit (WLL)	D (= 3,8 d_n)	O (= 2,9 d_n)	O_1 (= 2,7 d_n)	E (= 1,75 d_n)	F (= 1,8 d_n)	H_m (= 4,3 d_n)	L (= 15,5 d_n)	L_m (= 2,9 d_n)
	t	min.	min.	min.	min.	max.	max.	max.	max.
6	1,1	22,8	17,4	16,2	10,5	10,8	25,8	93	17,4
7	1,5	26,6	20,3	18,9	12,3	12,6	30,1	108,5	20,3
8	2	30,4	23,2	21,6	14	14,4	34,4	124	23,2
10	3,2	38	29	27	17,5	18	43	155	29
13	5,4	49,4	37,7	35,1	22,8	23,4	55,9	201,5	37,7
16	8	60,8	46,4	43,2	28	28,8	68,8	248	46,4
18	10	68,4	52,2	48,6	31,5	32,4	77,4	279	52,2
19	11,5	72,2	55,1	51,3	33,3	34,2	81,7	294,5	55,1
20	12,5	76	58	54	35	36	86	310	58
22	15,5	83,6	63,8	59,4	38,5	39,6	94,6	341	63,8
23	16,9	87,4	66,7	62,1	40,3	41,4	98,9	356,5	66,7
25	20	95	72,5	67,5	43,8	45	107,5	387,5	72,5
26	21,6	98,8	75,4	70,2	45,5	46,8	111,8	403	75,4
28	25	106,4	81,2	75,6	49	50,4	120,4	434	81,2
32	32	121,6	92,8	86,4	56	57,6	137,6	496	92,8
36	40	136,8	104,4	97,2	63	64,8	154,8	558	104,4
40	50	152	116	108	70	72	172	620	116
45	63	171	130,5	121,5	78,8	81	193,5	697,5	130,5

1) Nominal diameter, d_n , in millimetres

NOTE — Hooks of dimensions which do not comply with the dimensions specified in table 1 may comply with the requirements laid down in ISO 8539.

5 Mechanical properties

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Table 2 — Mechanical properties of hooks

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5.1 General

The mechanical properties of the hooks shall be as specified in table 2 in which the hook properties are related to the nominal size of the chain.

5.2 Proof force

Each hook, tested in accordance with 8.2, shall be capable of sustaining the proof force specified in table 2 without a permanent increase in the throat opening exceeding 0,5 % of the actual throat opening or 0,2 mm, whichever is the greater.

5.3 Ultimate strength

Each hook, tested in accordance with 8.3, shall have an ultimate strength at least equal to that specified in table 2.

On completion of the test, the hook shall show evidence of an increase in the throat opening.

5.4 Fatigue resistance

Hooks with a working limit of up to and including 10 t, when tested in accordance with 8.4, shall, after at least 10 000 cycles, be capable of retaining the load.

Nominal size of chain ¹⁾	Working load limit (WLL)	Proof force F_e	Minimum ultimate strength
	t	kN	kN
6	1,1	22,7	45,4
7	1,5	30,8	61,6
8	2	40,3	80,6
10	3,2	63	126
13	5,4	107	214
16	8	161	322
18	10	204	408
19	11,5	227	454
20	12,5	252	504
22	15,5	305	610
23	16,9	333	666
25	20	393	786
26	21,6	425	850
28	25	493	986
32	32	644	1 288
36	40	815	1 630
40	50	1 006	2 012
45	63	1 273	2 546

1) Nominal diameter, d_n , in millimetres

NOTE — The values given in this table are the same as the values for grade T(8) chain specified in ISO 3076.

6 Materials and heat treatment

6.1 Quality of material

6.1.1 General

The steel used shall be produced by the open-hearth, the electric or an oxygen-blown process and shall possess reliable forging quality.

In its finished state, as supplied to the hook manufacturer, the steel shall comply with the requirements specified in 6.1.2, as determined by check analysis on the bar or finished hook.

6.1.2 Specific requirements

The steel shall be fully killed, and shall contain alloying elements in sufficient quantities to guarantee the mechanical properties of the hook after appropriate heat treatment. The alloy steel used shall contain at least two of the following alloying elements:

- nickel;
- chromium;
- molybdenum.

Its content of sulfur and phosphorus shall be restricted as specified in table 3.

Table 3 — Sulfur and phosphorus content

Element	Maximum content, % (m/m), as determined by	
	cast analysis	check analysis
Sulfur	0,035	0,04
Phosphorus	0,035	0,04

The steel shall be made in conformity with fine grain practice in order to obtain an austenitic grain size of 5 or finer when tested in accordance with ISO 643. This could be achieved, for example, by ensuring that it contains sufficient aluminium or an equivalent element to permit the manufacture of hooks stabilized against strain-age embrittlement during service; a minimum value of 0,02 % (m/m) of metallic aluminium is given for guidance.

Within the limitations specified above, it is the responsibility of the hook manufacturer to select steel so that the finished hook, suitably heat-treated, complies with the requirements for the mechanical properties specified in this International Standard.

6.2 Heat treatment

All hooks shall be heat treated in such a way as to achieve the required mechanical and metallurgical properties.

Hooks can be used up to a maximum temperature of 400 °C (see ISO 3056) without impairment or change to their metallurgical and mechanical properties when returned to room

temperature. When requested, for verification, sample hooks shall be tested after they have been re-heated to 400 °C, maintained at that temperature for 1 h and then cooled to room temperature.

7 Manufacturing methods and workmanship

The hook shall be forged hot in one piece. It shall be free from any harmful surface defects, including cracks.

8 Type testing

8.1 General

Type tests demonstrate that hooks certified by the manufacturer as complying with the requirements laid down in this International Standard possess the mechanical properties specified in this International Standard. The purpose of these tests is to prove the design, material, heat treatment and method of manufacture of each size of finished hook. Any change in design, material specification, heat treatment, method of manufacture or in any dimension outside normal manufacturing tolerances which may lead to a modification of the mechanical properties defined in clause 5 shall require that the type tests specified in 8.2 to 8.4 be carried out on the modified hook.

All hooks to be type tested shall comply with all the other requirements laid down in this International Standard. The tests specified in 8.2 to 8.4 shall be carried out on each size of hook of each design, material, heat treatment and method of manufacture.

In the tests specified in 8.2 to 8.4, the force shall be applied to the hook axially without shock, using a component of diameter approximately equal to two-thirds of the actual seat diameter of the hook.

8.2 Deformation test

Three samples shall be tested and each shall be capable of sustaining the proof force specified for the hook in table 2 without permanent deformation, as measured across the throat of the hook, exceeding 0,5 % of the actual throat opening or 0,2 mm, whichever is the greater.

NOTE — See also clause 9 for proof testing of all hooks, where required.

8.3 Static strength test

NOTE — This test may be carried out on the same hooks that have been submitted to the deformation test.

Three samples shall be tested and each shall have an ultimate strength at least equal to the minimum value specified for the hook in table 2.

It is not necessary to test the hook up to its actual ultimate strength for the mechanical property specified to be demonstrated. It is sufficient that the minimum ultimate strength specified is exceeded and that the hook deforms significantly at the maximum force of the test.

8.4 Fatigue test

Hooks with a working load limit of up to and including 10 t shall be subjected to the fatigue test. Three samples shall be tested.

The force range applied during each cycle shall be equal to 0,75 times the proof force specified in table 2 for the hook. The minimum force in each cycle shall be positive and less than or equal to 3 kN. The frequency of force application shall be between 5 and 25 Hz. The samples tested shall be capable of sustaining at least 10 000 cycles of the force range specified above without failing to retain the load.

8.5 Acceptance criteria for type testing

8.5.1 Deformation test (see 8.2)

All three samples tested shall pass the deformation test in order for the hook of the size submitted for type testing to comply with this International Standard.

8.5.2 Static strength test and fatigue test (see 8.3 and 8.4)

If all three samples pass the test, the hook of the size submitted for type testing complies with this International Standard.

If one of the samples fails, two further samples shall be tested and both shall pass the test in order for the hook of the size submitted for type testing to comply with this International Standard.

If two or three samples fail the test, the hook of the size submitted for type testing does not comply with this International Standard.

9 Proof test

If required by the purchaser, by national regulations or by other standards, rules or tests, each finished hook (i.e. after manufacture, heat treatment and machining, including protective coating, if applied) shall be subjected to the appropriate proof specified in table 2, which it shall sustain without permanent deformation, as measured across the throat of the hook, exceeding 0,5 % of the actual throat opening or 0,2 mm, whichever is the greater.

NOTE — If the hooks are used as part of a chain sling assembly, grade T(8), complying with either ISO 4778 or ISO 7593, the proof testing requirements laid down in those International Standards apply.

10 Manufacturer's certificate

When the type testing as specified in clause 8 has been carried out with satisfactory results, the manufacturer may issue certificates of conformity for hooks of the same nominal dimensions, size, material, heat treatment and method of manufacture as the hooks tested.

The manufacturer shall keep a record, for at least 10 years after the last certificate has been issued, of the material specification, heat treatment, dimensions, test results and all relevant data concerning the hooks which have satisfied the type tests. This record shall also include the manufacturing specifications which shall apply to subsequent production.

Any change in material specification, in method of manufacture, in heat treatment or in any dimension outside normal manufacturing tolerances of a hook which may lead to a modification of the mechanical properties as specified in clause 5 shall be considered as a design change. Tests in accordance with clause 8 shall be required before the manufacturer is permitted to issue certificates of conformity for any modified design.

11 Marking

Each hook shall be legibly and indelibly marked in a manner which will not impair the mechanical properties of the hook. This marking shall include at least the following information placed on the hook by the manufacturer:

- a) the nominal size of the chain with which the hook is compatible;
- b) the grade letter or number, T or 8;
- c) manufacturer's identification mark or symbol;
- d) any marking required by national standards, statutory regulations or by agreement between the manufacturer and the purchaser.

NOTE — Care should be taken to ensure that the marking applied cannot be mistaken for the working load of the hook.

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Price based on 5 pages
