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[MED 14: Cranes, Lifting Chains and Related Equipment]



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IS : 7847 - 1975

Indian Standard
GENERAL CHARACTERISTICS OF
LIFTING HOOKS

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Indian Standard

GENERAL CHARACTERISTICS OF LIFTING HOOKS

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Indian Standard

GENERAL CHARACTERISTICS OF LIFTING HOOKS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 October 1975, after the draft finalized by the Lifting Chains and Associated Fittings and Components Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 Hooks form an important part of lifting gears extensively used for construction, erection and operation in industrial establishment, and for material handling.

0.3 On account of the need for reliability, it is recommended that supplies should be obtained from manufacturers possessing adequate facilities for heat treatment and testing equipment and employing competent staff for inspection.

0.4 Users are warned that the hooks shall not be taken as complying with this standard unless the specified tests have been made and the test requirements obtained in the presence of a person representing or approved by the purchaser.

0.5 In the preparation of this standard, assistance has been derived from ISO 2141-1972 'Lifting hooks—General characteristics' issued by International Organization for Standardization.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard defines the general characteristics of lifting hooks, as well as the test methods for inspecting new hooks. Steel hooks used on lifting appliances of all kinds and on their accessories, except laminated hooks, are covered by this standard.

*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Lifting Capacity, C_p — Maximum value of the mass which the hook is authorized to support in general service when its axis of traction is vertical.

2.2 Safe Working Load — Maximum value of the mass which the hook is authorized to support in a particular stated service, when its axis of traction is vertical.

2.3 Proof Load, F_e — Force applied in a static tensile test which the hook shall sustain without showing permanent deformation or other visible defects.

2.4 Processing — Any treatment of the hook subsequent to forging, such as heat treatment, polishing, etc.

2.5 Competent Person — A person who is approved and declared as such under the relevant statutory provisions.

2.6 Grade of Hook — The grade of hook is determined by the mechanical properties of the finished hook and not simply by the strength of the material. Each grade is identified by a letter in the series M, P, S, T, V.

2.6.1 For grade M the mean stress at the specified minimum breaking load is 400 N/mm², for grade S 630 N/mm², for grade T 800 N/mm², for grade V 1 000 N/mm².

2.7 Pattern Number — The hooks are numbered according to their dimensional characteristics which are such that, for a given grade of hook, the maximum lifting capacities are in accordance with the R 10 series of preferred numbers. The number thus defined is called the 'pattern number' to make clear that it does not correspond with the lifting capacity.

3. LIFTING CAPACITIES AND BASIC DESIGN LOADS

3.1 Lifting Capacities, C_p — The lifting capacities are expressed in tonnes and they follow R 10 series of preferred numbers in accordance with IS : 1076-1967* and are given in Table 1.

3.1.1 Above 100 tonnes, lifting capacities follow the R 20 series, but preference should be given to R 10 series.

3.2 Basic Design Loads — The basic design loads of lifting hooks are equal to the proof loads (F_e), they are expressed in kilonewtons and are given in Table 1, indicating the correspondence with the lifting capacity.

*Preferred number (first revision).

TABLE 1 LIFTING CAPACITIES AND PROOF LOADS OF HOOKS

(Clauses 3.1, 3.2 and 7.1)

LIFTING CAPACITY C_p	PROOF LOAD F_e
tonnes	kN
(0.100)	(2)
0.125	2.5
(0.160)	(3.2)
(0.200)	(4)
0.250	5
0.320	6.3
(0.400)	(8)
0.500	10
(0.630)	(12.5)
(0.800)	(16)
1	20
(1.25)	(25)
(1.6)	(32)
2	40
(2.5)	(50)
(3.2)	(63)
(4)	(80)
5	100
6.3	125
8	160
10	200
12.5	250
16	315
20	400
25	500
32	600
40	700
50	850
63	1 000
80	1 200
100	1 430

NOTE 1 — 1 tonne force = 1 000 kgf = 9.81 kN \approx 10 kN.

NOTE 2 — Certain hooks are very little used. Their lifting capacities and proof loads are given in brackets.

NOTE 3 — This table is in accordance with ILO Recommendations.

4. FORMS AND DIMENSIONS

4.1 The forms and dimensions are prescribed in the Indian Standards for each type of hook. In principle, the dimensions are calculated from the basic design loads in accordance with **4.2** and are such that the hook as a whole does not show any permanent deformation when subjected to the proof load. Any change in the section shall be made by fillets of appropriate forms.

4.2 Tolerances — The tolerances on dimensions of a hook shall be specified separately in Indian Standards on each type of hook.

5. MATERIAL

5.1 The steel shall be fully killed, capable of being hammer-forged or drop-forged and shall not be liable to strain age embrittlement. Within these limitations, the manufacturer shall select the material as mentioned in individual standards on hooks.

5.1.1 If so required by the purchaser, the manufacturer shall supply a copy of the steelworks cast analysis. When an analysis of the steel from the hook is required by the purchaser, such analysis shall be made on millings taken from a complete transverse section on a hook. The latter can be a hook which has been submitted to a destructive test. The cost of such an analysis shall be borne by the purchaser.

6. MANUFACTURE AND WORKMANSHIP

6.1 The hook shall be hammer-forged or drop-forged hot in one piece in such a manner that the macroscopic flow lines follow the body outline of the hook. It shall be free of any harmful surface defects including cracks and shall have a smooth surface. When machining is necessary, special care shall be taken at the transition between the forged surface and the machined surface to minimize stress concentrations.

6.1.1 Other methods of manufacture may also be used provided that the hook so produced fully meets the conditions stipulated by this Indian Standard and the relevant Indian Standard for each type of hook.

6.2 Heat Treatment — After hammer-forging, or drop-forging, the hook shall be heat treated in accordance with the quality of the material.

7. TESTING

7.1 Proof Testing — After application and then removal of the proof load as given in Table 1, a lifting hook shall not show permanent deformation nor any other visible defects. For the purpose of this standard, the hook shall be deemed to comply with this requirement if the opening does not deform by more than 0.25 percent measured across the throat.

7.2 Destruction Test — A lifting hook subjected to a load equal to at least twice the proof load shall not break or open out to the point of not being able to retain the load. This test shall be carried out on a hook selected out of a lot of every 50 hooks.

7.3 Test Procedure — The tests specified in **7.1** and **7.2** shall be made on a hammer-forged or drop-forged hook as required in the relevant Indian Standard, by tension applied axially without shock through the intermediary of a link of diameter approximately equal to a one-third of the seat diameter

of the hook ($D/3$). When machining is necessary, it shall be done before testing.

7.4 Other Tests — If required by the purchaser, hooks may also be subjected to radiographic/ultrasonic examination.

8. INSPECTION, CERTIFICATE OF TEST AND EXAMINATION

8.1 The inspector shall have access to the works of the manufacturer at all suitable times for the purpose of witnessing the specified tests and inspecting the machine and methods of examination. The manufacturer shall give the inspector copies of the reports of the tests made in his presence.

8.2 The manufacturer shall supply a certificate of test and examination in the form shown in Appendix A with every supply of hooks. The certificate shall give the results of all tests made.

8.3 For the purpose of this standard, test certificate in Form V of the Indian Dock Labourers Regulations, 1948, is acceptable provided that it is endorsed in column 2 by the manufacturer or supplier that the hooks comply in all respects with this standard and that it states the material of which the hooks are made, the details of heat treatment to which they have been subjected and the destructive test results.

9. DESIGNATION

9.1 A hook shall be designated by a group of letters and numbers indicating the shape of the hook and its dimensions (pattern number) and by a letter corresponding to the grade of hook.

Example: An eye hook of pattern number 20 and Grade M shall be designated as :
Eye hook 20 M IS : 7847

10. MARKING

10.1 Provided that the hook passes the proof test, each hook shall be legibly and indelibly marked on parts not highly stressed. This marking shall include at least the following information:

- a) The pattern number;
- b) The grade letter;
- c) Safe working load; and
- d) Manufacturer's identification mark.

APPENDIX A

(Clause 8.2)

PRO FORMA FOR THE CERTIFICATE OF TEST AND EXAMINATION

DISTINGUISHING MARK	DESCRIPTION OF HOOKS	MATERIAL	NUMBER TESTED	PROOF LOAD APPLIED	LOAD APPLIED IN THE DESTRUCTION TEST ON THE TEST SAMPLE	SAFE WORKING LOAD
(1)	(2)	(3)	(4)	(5) kN	(6) kN	(7) tonnes
..
..
..

Particulars of heat treatment to which the hooks have been subjected, stating temperatures and methods of cooling, are as follows:

.....
.....

We hereby certify that the hooks described above, comply in all respects with IS : 7847-1975, and that they were subjected to the proof load and subsequently examined and passed by a competent person.

Signature

Date

INDIAN STANDARDS

ON

LIFTING CHAINS AND ASSOCIATED FITTINGS

- IS:
- 2429 (Part I)-1970 Round steel short link chain (electric butt welded) Grade 30 : Part I Non-calibrated load chain for lifting purposes (*second revision*)
- 2429 (Part II)-1970 Round steel short link chain (electric butt welded) Grade 30 : Part II Calibrated load chain for pulley blocks and other lifting appliances (*second revision*)
- 2758-1969 Mild steel point hooks for use with wire rope thimbles
- 2759-1969 Higher tensile steel point hooks for use with wire rope thimbles
- 2760-1972 Mild steel chain slings
- 3109 (Part I)-1970 Round steel link chain (electric butt welded) Grade 40 : Part I Non-calibrated load chain for lifting purposes (*first revision*)
- 3109 (Part II)-1970 Round steel link chain (electric butt welded) Grade 40 : Part II Calibrated load chain for pulley blocks and other lifting appliances (*first revision*)
- 3813-1967 'C' hooks for use with swivels
- 3814-1967 Metal arc welded short link, uncalibrated steel chain, Grade 30 for lifting purposes
- 3815-1969 Point hooks with shank for general engineering purposes
- 3822-1966 Eye hooks for use with chains
- 3832-1971 Hand operated chain pulley blocks (*first revision*)
- 4164-1967 'C' hooks for use with chains
- 4178-1967 Eyebolts with collars
- 4190-1967 Eyebolts with collars
- 4591-1968 Swivels
- 5537-1970 Lashing chains
- 5604-1970 Universal gearless hand operated pulling and lifting machines
- 5616-1970 Electric butt welded steel chains for lifting purposes — general conditions of acceptance
- 5626-1970 Shackle type connector units for high tensile steel chain for conveyors in mines
- 5629-1970 Mild steel forged triangular lifting eyes
- 5729-1970 Treble swivel assembly for ships' union purchase
- 5749-1970 Forged ramshorn hooks
- 6132 (Part I)-1971 Shackles : Part I General requirements
- 6132 (Part II)-1972 Shackles : Part II Dimensions of dee shackles
- 6132 (Part III)-1971 Shackles : Part III Dimensions of bow shackles
- 6168-1971 'C' hooks with eye for marine purposes
- 6215-1971 Round steel link chain (electric butt welded), Grade 80 non-calibrated for lifting purposes
- 6216-1971 Alloy steel calibrated load chain, Grade 80 for pulley blocks and other lifting appliances
- 6217-1971 Round steel link chain (electric butt welded), Grade 63 Non-calibrated for lifting purposes
- 6294-1971 Point hooks with shank (for capacities 63 tonnes to 160 tonnes)
- 6296-1971 Round steel link chains (electric butt welded), Grade 63 calibrated load chain for pulley blocks and other lifting appliances
- 6498-1971 Glossary of terms used in connection with pulley blocks
- 6547-1972 Electric chain hoists
- 6549-1972 Glossary of terms used in connection with lifting tackle

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