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IS 11340 (1985): Specification for Ratchet Lever Hoist [MED  
14: Cranes, Lifting Chains and Related Equipment]



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“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

## SPECIFICATION FOR RATCHET LEVER HOIST

**1. Scope** — Prescribes materials, dimensions, general requirements and testing of ratchet lever hoist fitted with either link chain or roller chain with lifting capacities of 0.8, 1.6, 3.2 and 5 tonnes.

### 2. Terminology

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

**2.1 Ratchet Lever Hoist** — A portable tool fitted with a load chain and operated by a lever through ratchet mechanism so as to give a mechanical advantage.

**2.2 Working Load Limit** — The maximum mass which a ratchet lever hoist can lift in general service.

**2.3 Safe Working Load** — The maximum mass which a ratchet lever hoist can lift in a particular stated service. It shall never be greater than the working load limit.

**2.4 Rating or Capacity** — The safe working load in tonnes specified by the manufacturer of the hoist.

**2.5 Factor of Safety** — The ratio between the ultimate strength of the hoist as a unit and the rated load where the ultimate strength of the ratchet lever hoist is the maximum load on the load hook under which the load chain or any other component of the hoist gives way.

**2.6 Effort** — Average operating effort applied on the lever to raise a load equal to the working load limit together with the effective radius of the handle of the hoist.

**2.7 Range of Lifting** — The distance between the upper and lower limits of travel of the load hook.

**2.8 Suspension/Anchoring Level** — The level of the suspended hook bed.

**2.9 Head Room/Drawn up Dimensions** — The distance between the saddle of the load hook and anchoring level when the load hook is in the highest position.

**2.10 Extended Dimensions** — The distance between the suspension/anchoring level and the bottom hook is in the lowest operating position. It equals the sum of the head room and the range of lifting.

**2.11 Competent Person** — The person who is approved and declared as such under the relevant statutory provisions.

**2.12 Inspector** — The representative of the purchaser.

**3. Design** — The ratchet lever hoist shall be so designed that all components shall withstand all the tests given in 9.

### 4. Construction

**4.1 Housing** — The housing of hoist, either cast or fabricated, shall be designed for proper strength and maintain alignment under all expected condition of service. If, of fabricated construction, it shall be stress relieved before machining and assembly.

**4.2 Gears** — The gears shall be made of alloy steel and designed for proper strength and surface durability, such as to afford efficient operation throughout the period guaranteed by the manufacturers. In case of enclosed gearing, means shall be provided for ample lubrication.

**4.3 Load Brake** — An automatic mechanical brake shall be provided, will prevent selflowering of the load and arrest and sustain load in all working positions whilst the load chain is in tension. The load brake shall also allow smooth lowering of the load without serious overheating which may impair efficient working of the ratchet lever hoist.

**4.3.1** After each operation the brake shall automatically and instantaneously engage, so that the load is held suspended in any position.

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#### **4.4 Pawls**

**4.4.1** Pawls shall be of sufficient strength to arrest the full load from lowering due to gravity.

**4.4.2** The pawls shall engage with the ratchet wheel either by means of a spring other than tension spring or by some other equally effective means.

**4.4.3** It shall be so positioned that it engages the ratchet wheel under gravity, should its operating mechanism fail.

**4.4.4** Adequate arrangement shall be made to ensure that the pawl does not seize on the pawl pin.

**4.4.5** The pawl and the ratchet shall be made of steel duly heat treated to provide satisfactory degree of wear resistance together with toughness. The hardness of the pawl tip shall not be less than 40 HRC and that of ratchet not less than 30 HRC.

#### **4.5 Suspension**

**4.5.1 Hooks** — Top and bottom hook shall conform to IS : 3815-1969 'Specification for point hooks with shank for general engineering purposes' or IS : 8610-1977 'Specification for point hooks with shank capacity up to 25 tonnes-trapezoidal section'.

The bottom hooks shall be so designed that it shall be free to swivel in the loaded conditions without twisting the load chain. The top hook, if required to swivel, shall be fitted with plain bearings. Ball and roller bearing shall not be used.

The continuous length of the shank engaged by nut on the load side shall at least be equal to  $\frac{2}{3}$  times the diameter of the shank before being interrupted by the drilling for split pins or other fixings unless the shank is shaped from the solid to afford the same degree of security as though fitted with a nut.

**4.5.2** Both the hooks shall be fitted with safety catches.

**4.5.3 Other fittings (top and bottom blocks)** — Suspension fittings other than hooks shall be of sufficient strength.

**4.5.4** All suspension fittings shall be readily detachable for inspection of stressed parts, such as shanks.

#### **4.6 Load Chain**

**4.6.1** The load chain shall be of suitable grade and comply with the requirements of relevant standard. A terminal chain stop shall be provided at the free end of the chain.

**4.6.1.1 Roller chain** — Load chain of roller type shall conform to IS : 2403-1975 'Specification for transmission steel roller chain and chain wheels (first revision)'.

**4.6.1.2 Link chain** — Calibrated short link alloy steel chain of minimum Grade 40 shall be used. It shall conform to IS : 3109 (Part 2)-1982 'Specification for calibrated load chain for pulley blocks and other lifting appliances (second revision)'.

**Note** — Grade 80 chains conforming to IS : 6216-1982 'Short link chain, grade T(8) calibrated for pulley blocks and other lifting appliances (first revision)' should be preferred as they have longer service life.

**4.6.2 Length of the chain** — The total length of the load chain shall exceed the minimum length required to give the presented range of lift by not less than three links per fall to ensure that the slack end anchorage is not loaded.

##### **4.6.3 Load chain wheel**

**4.6.3.1 For roller chain** — It shall be made of suitable material duly heat treated and shall conform to IS : 2403-1975.

**4.6.3.2 For link chain** — The load chain wheel shall be made of material suitable for use with load chain employed and be of adequate strength and shall be suitably designed to ensure effective operation of the chain. It shall be suitably heat treated for longer use.

**4.6.4 Guide** — Means shall be provided to ensure effective guidance of the load chain into chain wheel.

**4.6.5 Stripper** — A stripper shall be provided to ensure effective disengagement of the load chain from the load chain wheel.

**4.6.6 Idler wheels** — The ratchet lever hoist shall be provided with idler wheels in case of multifalls so shaped as to avoid the twisting of the chain when passing round. The pitch diameter of the idler wheel shall not be less than 16 times of size of the chain unless they are so shaped as to avoid the bending action of the link.

**4.7 Actuating Ratchet Wheel** — It shall be made of steel with machine cut teeth and suitably heat treated for improving surface hardness.

**4.8 Operating Lever** — It shall be made of light weight and adequate strength. Its shape shall be such to have an easy grip.

**4.9 Reversing Knob** — A suitably shaped and designed reversing knob shall be provided to reverse the direction of the operation without lowering the load.

**4.10 Hand Wheel** — A hand wheel of convenient shape shall be provided to enable quick winding of loose chain when the hoist is not under load.

**4.10.1 Quick release lever** — A lever may also be provided for releasing pawl engagement in case of quick winding under no load which increases the life of pawl.

**4.11** Information to be supplied by the purchaser with the enquiry and order is given in Appendix A.

**4.12** Recommendation for the use and maintenance of ratchet lever hoist are given in Appendix B.

**5. Materials** — The materials used in the construction of ratchet lever hoist shall conform to the following Indian Standards:

<i>Name of the Part</i>	<i>Conforming to</i>
Frame	IS : 226-1975 Structural steel ( standard quality ) ( <i>fifth revision</i> )
Top and bottom block	IS : 617-1975 Aluminium and aluminium alloy ingots and castings for general engineering purposes ( <i>second revision</i> )
Operating lever	IS : 961-1975 Structural steel ( high tensile ) ( <i>second revision</i> ) IS : 1030-1982 Carbon steel castings for general engineering purposes ( <i>third revision</i> ) IS : 2062-1980 Structural steel ( fusion welding quality ) ( <i>second revision</i> ) IS : 2107-1977 Whiteheart malleable iron castings ( <i>first revision</i> ) IS : 2108-1277 Blackheart malleable iron castings ( <i>first revision</i> )
Chain wheel	IS : 617-1975 IS : 1030-1982 IS : 2107-1977 IS : 2108-1977
Fasteners	IS : 1367-1967 Technical supply conditions for threaded fasteners ( <i>first revision</i> )

**5.1** If other materials are used, the manufacturer shall produce evidence satisfactory to those concerned that such materials have the essential qualities of the standard materials.

**6. Dimensions** — The dimensions of ratchet hoist shall be as given in Table 1. The arrangement shall be as shown in Fig. 1.

**TABLE 1 MAIN DIMENSIONS OF RATCHET LEVER HOIST**

( Clause 6; and Fig. 1 )

Size No.	Capacity, Tonnes	Lift Min m	A Max mm	B Max mm	C	H Max mm	L Max mm	No. of Falls	Mass Max kg
1	0.8	1.3	145	150	25	310	500	1	10
2	1.6	1.3	200	160	34	390	500	1	16
3	3.2	1.35	200	175	44	465	500	2	25
4	5	1.35	255	175	55	600	500	3/4	35

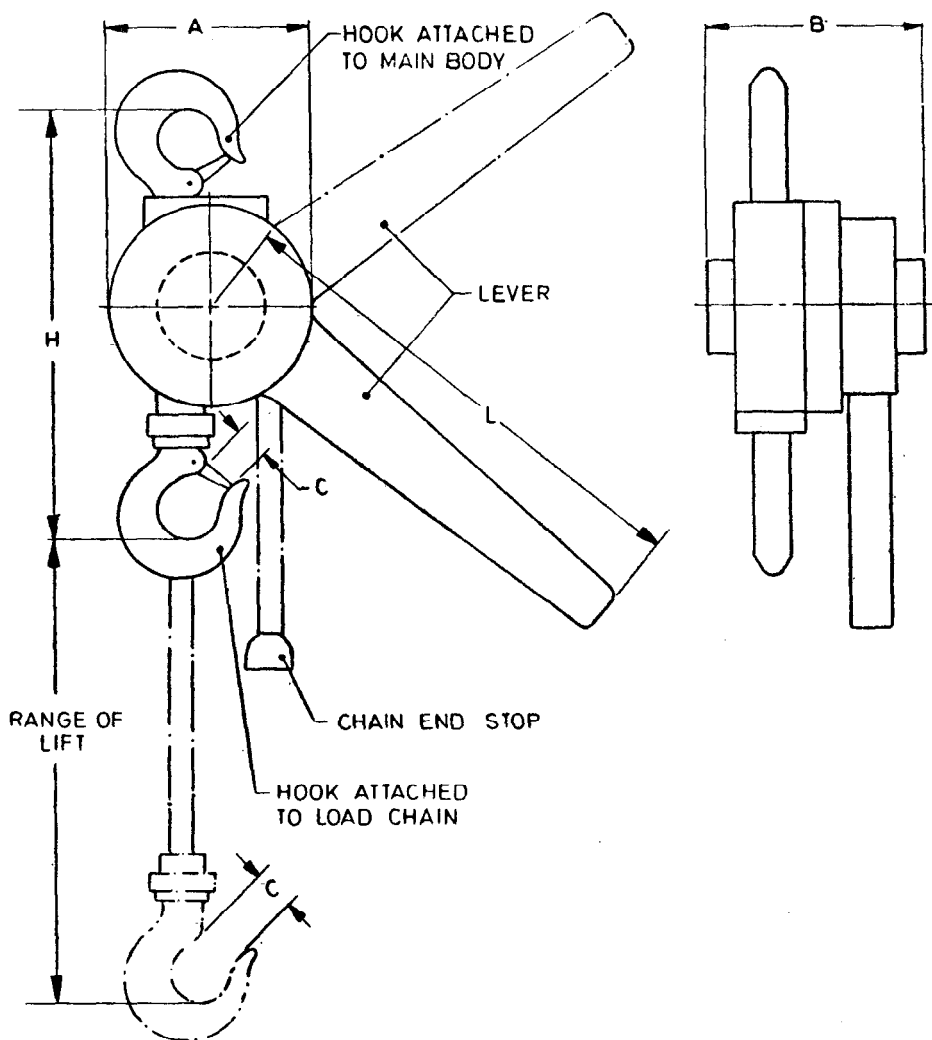


FIG. 1 MAIN DIMENSIONS OF RATCHET LEVER HOIST

**7. Lubrication** — Adequate lubricating arrangement shall be provided for all the moving parts of the hoist.

**8. Rating** — Ratchet lever hoist shall be rated according to the safe working load, which in case of a hoist with multifalls shall be determined from the safe working load of the load chain, considering the angles introduced into the chain run and the friction occurred during movement.

These can be manufactured in the range of capacity 0.8, 1.6, 3.2 and 5.0 tonnes.

**9. Effort** — The manufacturer shall declare the operating effort on the lever required to raise a load equal to the working load limit, together with the effective radius of the operating lever of the hoist.

## 10. Tests

**10.1 Design Test** — At the purchaser's option and expense a sample chain lever hoist or hoists shall be selected by the representative of the purchaser and shall be subjected to at least 4 times the working load limit for at least one minute, without breakage of material, partial or complete, or such distortion as could result in the release of the load. Following this test all parts shall be defaced to make them unusable.

**10.2 Operational Proof Test** — Each ratchet lever hoist shall be subjected by the manufacturer to an operational proof load of 1.5 times the safe working load through a lift which will ensure that each part of the hoist mechanism and each tooth of gear comes under load.

**10.3 Examination** — After the proof loading the hoist shall be thoroughly examined by a competent person. It complies with this standard only if it is found free from deformation, cracks, flaws and other defects.

**11. Inspection, Certificate of Test and Examination**

**11.1 Inspection** — The representative of the purchaser shall have access to the works of the manufacturer at all reasonable times for the purpose of witnessing the specified test and inspecting the testing equipment and methods of examination.

**11.2 Certificate of Test and Examination** — A certificate of test and examination shall be issued with every consignment of hoists, giving the following information for each one:

- a) Safe working load;
- b) Distinguishing mark;
- c) Chain, size and grade; and
- d) Proof load applied.

**12. Marking** — After the hoist passes the proof test, it shall be permanently and legibly marked on a suitable part or on a name plate giving the following information:

- a) Manufacturer's name and trade-mark,
- b) Safe working load, and
- c) Size and grade of chain.

**12.1 ISI Certification Mark** — Details available with the Indian Standards Institution.

**APPENDIX A**

( Clause 4.11 )

**INFORMATION TO BE SUPPLIED BY THE PURCHASER**

**A-1.** The enquiry and order should state the following:

- a) Number of this standard,
- b) Safe working load,
- c) Maximum range of lift, and
- d) If additional tests are required.

**APPENDIX B**

( Clause 4.12 )

**RECOMMENDATIONS FOR USE AND MAINTENANCE OF RATCHET LEVER HOISTS**

**B-1.** Ratchet lever hoists are precision made and should be treated with appropriate care. They should not be dropped from a height.

**B-2.** The ratchet lever hoist should never be subjected to greater load than the safe working load marked on the hoist. The hoist has been tested to more than this load, but it has been done under carefully controlled conditions. The use of a ratchet lever hoist at any load greater than the safe working load may result in damage.

**B-3.** Attention is particularly drawn to the possibility of overloading a ratchet lever hoist when pulling load over uneven ground.

**B-4.** Never increase the length of the lever.

**B-5.** The chains should be well lubricated along their whole length and especially at the contact points between the links. Where oils and lubricants are not desirable, use a dry lubricant. Failure to maintain correct lubrication reduces the life of the chain.

**B-6.** If the chain jumps or does not work smoothly or marks in use, it is probably out of pitch and should be replaced.



**B-7.** Before use, the chain should be examined to ensure that there is no twist. In the case of hoisting of chain, twist can arise from the chain hook being accidentally turned over. Never load the point of the hook.

**B-8.** Never use a load chain as a sling, that is, by back hooking. Do not tie knots in the load chain or join it by bolts.

**B-9.** Do not allow dirt or hard grease to gather in the pockets of the sprockets.

**B-10.** Never run the chain out too far. When the maximum range of travel is exceeded, an excessive and dangerous load is imposed on the load chain terminal stop.

**B-11.** It should be made sure that the brake setting or adjustment is maintained in accordance with the manufacturing instructions.

## **EXPLANATORY NOTE**

In the preparation of this standard, assistance has been derived from BS 4898-1973 'Chain lever hoists' issued by the British Standards Institution (BSI).