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Document Title: Final Specification of Hydraulic Track Jack 15T (Non-Infringing)			



**SPECIFICATION OF HYDRAULIC TRACK JACK 15T Cap.  
(NON INFRINGING)**

**(No.TM/SM/31 dt. 08.05.1996)**

Second Revision, July 2022

**Track Machines & Monitoring Directorate**

**RESEARCH DESIGNS AND STANDARDS ORGANISATION  
Manak Nagar, Lucknow-226011**



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**1.0 Scope:**

- 1.1 The specification covers requirements of a non-infringing lightweight hydraulic track jack having a safe working load of 15 ton. The non infringing feature would be that the jack could be released instantaneously in the face of an approaching train and none of its component would project above the rail level during the passage of a train.
- 1.2 The jack may be designed for a single or multiple stage lifting.
- 1.3 Preference to make in India: Compliance of the instructions contained in Public procurement (Preference to Make in India) order-2017 or latest instructions issued on subject shall be ensured.
- 1.4 Supplier is fully responsible to maintain the quality of product supplied to Indian Railways.

**2.0 References:**

Following code/ documents have been referred to in this specification. Updated copy of the same should be available at the works of the manufacturer/supplier.

(i)	IS: 4552 (Part.2): 1993 (Reaffirmed 2019)	Automotive Vehicles – Portable Jacks for Automobiles Part 2- Hydraulic Jacks
(ii)	IS:6838-1973 (Reaffirmed 2005)	Dimensions for ‘O’ ring and grooves for vacuum flange
(iii)	IS: 617-1994 (Reaffirmed 2020)	Cast Aluminium and its Alloys
(iv)	IS:3930-1994 (Reaffirmed 2019)	Flame and Induction Hardening Steels
(v)	IS:1875-1992 (Reaffirmed 2014)	Carbon Steel Billets, Blooms, Slabs and Bars for Forgings
(vi)	IS 5415-1969 (Reaffirmed 2019)	Code of practice for packing and packaging of optical mathematical instruments and components
(vii)	BS:970	For mechanical and Allied Engineering Steel

**3.0 Materials, Processing and Workmanship:**

- 3.1 The jack shall be of a special Aluminum alloy of high strength generally confirming to IS: 617-1994 (Reaffirmed 2020) alloy 2550 (A-12) or alloy steel of equivalent strength similar to IS: 3930-1994 (Reaffirmed 2019), Design: 40Ni2 Cr1 Mo28 or En81-En91 EN24 to BS:970 for body material and IS: 1875-1992 (Reaffirmed 2014) C1.IV and EN 8 to BS-970 for ram materials. Manufacturers may also explore possibilities of using fiber glass material wherever feasible keeping in view the lightweight and guaranteed life of jack

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units to withstand 15 tones of load and working pressure of 400-500 kg/sq cm suitably designing the body and ram diameters.

- 3.2 All metal surfaces shall be properly finished. Rough and sharp edges shall be removed.
- 3.3 All the working parts and the parts subjected to wear shall be accurately machined to such tolerances as will ensure the fitting of spares with minimum of adjustments.
- 3.4 The manufacturer /supplier shall supply a complete analysis of the materials of all the different component parts of the jack when required to do so by the purchaser or the inspecting officer. Such analysis should be got done by him from a Government approved laboratory/Test House.
- 3.5 In case of any doubt in the use of specified materials, the inspecting officer shall be free to take samples from the component for complete C&M analysis at the expense of the manufacturer /supplier.
- 3.6 All working surfaces of the jack shall be coated with suitable rust preventive. All other surfaces shall be painted with the paint of approved colour and specification. The jack shall be supplied packed in suitable wooden crates, according to best trade practices generally conforming to IS 5415-1969 (Reaffirmed 2019). All the working parts shall be oiled before being assembled.

#### **4.0 Functional requirements:**

- 4.1 Hydraulic track jack should be lightweight. Its weight should be 13.0 kg. Maximum without handle and should have easy portability.
- 4.2 The jack should have rigid, mono block construction of cylinder reservoir and pump with base area approximately 300 cm<sup>2</sup>. It should be of single casting or fabrication for rough and rugged use in the field and to prevent leakage of hydraulic oil through joints and oil seals etc., during normal operation.
- 4.3 The hydraulic jack should have a sufficiently large capacity pump such that in about 90/95 strokes, the pump should lift the load through a height of about 80+3 mm.
- 4.4 The ram shall be of one single diameter throughout its length for single stage lifting and of uniform diameters for multiple stage lifting for each part of the ram. It shall have a swiveling ram cap or saddle for better grip.
- 4.5 Release valve should be so provided as can be closed by the clockwise movement of the handle at the time of operation. The anti-clockwise movement of the handle should enable the release valve to open there by lowering the jack ram. The position of the release valve shall be facing the operator.

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- 4.6 Release should be instantaneous and preferably obtained by a single twist of the handle
- 4.7 The hydraulic track jack should be fitted with a two-way overload safety release valve, which bypasses the pump, when the jack reaches its maximum or pre-set load, and instantaneously causes the jack to field safety, if a sudden overload occurs.
- 4.8 The maximum capacity of the overload safety release valve should be 18.0 tonnes, but it should normally be possible to preset to a load of 11 tonnes for BG and 7.5 tonnes for MG so that the release device will trip automatically under the wheel load of an approaching train. This should be used as a safety measure only for emergency tripping in situation of failure by manual release.
- 4.9 The jack should be provided with a carrying handle/sling.
- 4.10 The oil used for hydraulic jack shall be suitable good quality and easily available in the market.
- 4.11 Oil seals (Nutring, O-Ring, Washer, etc.) should be of special high pressure brand of synthetic Neoprene/Nitrile rubber/Viton of Taflon material (superior brand to be provided) generally conforming to IS: 6838-1973 (Reaffirmed 2005).

**5.0 Technical Features:****5.1 Dimensions:**

i)	Maximum lifting capacity	15 ton
ii)	Maximum close height	166 mm $\pm$ 3 mm
iii)	Hydraulic lift of load (Travel of ram)	80 mm $\pm$ 3mm
iv)	Weight of jack (excluding operating handle)	13.0 kg maximum
v)	Length of operating handle	750 mm (approx.) made of tubular section and gripping end should have suitable bend so as not to hit the ballast profile during operation.
All tolerances will be within 5% of nominal dimensions as indicated above except those of mating/moving parts.		

**5.2 Operating torque:**

Jack shall be operated by one operator easily.

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## 6.0 Tests:

### 6.1 Acceptance Tests (Test during supply):

The hydraulic jacks shall be subjected to the following tests as per sequences mentioned in para 6.1.10 for ascertaining their suitability generally conforming to IS 4552 (Pt.2): 1993 (Reaffirmed 2019).

#### 6.1.1 Visual & Dimensional test :

The jacks shall be free from manufacturing defects like cracks, blow holes, etc. The jacks shall be subjected to detailed dimensional check and shall conform as per technical features.

#### 6.1.2 No load test:

The jacks shall be operated without load to its maximum lift during which it shall work smoothly, jerk free and there shall be no leakage. After the jack lifts to its maximum lift the release valve shall be opened and the ram shall be made to retract to its closed height by applying a load of maximum 30 kg. The Jack shall not show any sign of leakage.

#### 6.1.3 Overload Test before Performance:

Jacks shall be loaded with a load of 120 percent of rated capacity and operated from the minimum to maximum position and back. During this test the jack shall operate smoothly throughout the range without any slip or other visible damage. During this test safety valve, shall be adjusted to higher pressure.

#### 6.1.4 Performance Test:

Jacks shall be loaded with a load of rated capacity and operated from the minimum to the maximum position and back. After repeating the cycle 100 times with an interval of 10 minutes between each cycle, the jack shall work smoothly throughout the range without undue play or slip between the moving parts.

#### 6.1.5 Safety valve opening test:

The safety valve shall be set in such way that opens between the pressure range corresponding to 110 percent to 120 percent load of its rated capacity shall be checked at the end of all tests.

#### 6.1.6 Over Load Test after Performance:

The test shall be repeated in accordance with 6.1.3

#### 6.1.7 Load Sustaining Test:

The saddle of the jack shall be lifted to the middle of its stroke and loaded to 120 percent of the nominal lifting capacity. The load shall be sustained for one hour. After end of one hour, the reduction in the height of the saddle shall not be more than 3 mm. The load shall be removed after the end of this period and the test repeated three times. After this test, Jack shall be left for 24 hours and room temperature and shall not show any sign of distortion or leakage of oil at the end of this test. This test shall be conducted after adjusting the safety valve for higher pressure and preferably at a temperature of 27<sup>0</sup> C.

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**6.1.8 Field Test:**

Jacks shall be checked in actual field condition at different locations to ascertain its working in the field.

**6.1.9 Material & Processing check:**

Jack shall conform for material, heat treatment/ hardness, etc., as stipulated in Para 3.0. Supplier/Manufacturer shall submit all necessary test certificates in this respect.

**6.1.10 Sequence of Testing during Acceptance tests** (to be carried out as per criteria mentioned above):

(i)	Visual, Dimensional Check	Every Jack
(ii)	No load test	Every Jack
(iii)	Over load test before performance	Every Jack
(iv)	Performance test for 25 operations only.	One out of every 20 or part there of
(v)	Over load test after performance	Every Jack
(vi)	Safety Valve opening test	Every Jack
(vii)	Load sustaining test for one hour	Every Jack
(viii)	Field test	For the Jacks subjected to Performance Test.
(ix)	Materials & Processing Check	Necessary test certificates to submitted which will be applicable for whole consignment.

6.1.11 **Any** of the jacks subjected to above tests which fail to comply with the requirements of this **specification** may be rejected. All the rejected jacks shall be marked with a paint of different colour or otherwise for identification to the satisfaction of the inspecting official.

6.2 Jack shall be subjected to the above tests in order of laid down sequences. The tests shall be carried out either on actual vehicle/trailer/work or on a rig simulating operating of a jack on a vehicle /actual use for ascertaining their conformity to this standard. In these cases the jacks may be subjected to tilted loads up to  $\pm 5^0$  angle. Necessary arrangements for test shall made by manufacturer/supplier.

**7.0 Marking and Packing**

The jacks shall be legibly and indelibly marked with:

- i) Name, initials and trade-marks of manufacturer.
- ii) Nominal, lifting capacity of the jack in tones.
- iii) Serial number of jack.
- iv) The jack alongwith spare parts shall be packed in wooden/suitable carton, according to best trade practices.

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**8.0 Training and Commissioning:**

Adequate training for operation and maintenance of the Jacks shall be imparted to the operators at consignee end which shall be treated as part of commissioning.

**9.0 Documentations:**

Each set of jack shall be supplied with the following information in booklet or pamphlet form:

- i) Instructions for safe operation of the jacks.
- ii) Salient feature of the jack.
- iii) Parts list, with isometric drawing of the components for easy identification.
- iv) Sequential procedure for increasing/decreasing the Load carrying capacity of the automatic safety Release mechanism.
- v) Detailed instruction pamphlet for replacing oil periodically if needed.

**10.0 Service Facility and Spare Parts:**

**10.1 Each set of jack shall be supplied with the following spares.**

- i) Oil Seals – Two nos. of each size
- ii) Valves – Two nos. of each type

**10.2 Necessary tools for its day to day work/maintenance**

**10.3 The supplier shall ensure prompt and continuous service and delivery of spare parts for a minimum period of five years.**

**11.0 Warranty & AMC**

The manufacturer / supplier shall warranty the material covered by the specification to be free from defects under normal use and service. His obligation under this warranty shall be for repairing of the jack and replace free of cost those parts which shall be found defective within one year from the date of commissioning for manufacturing and material defects. During procurement Railway may go Post warranty AMC with the manufacturer / supplier for a pre determined period as decided by purchaser. This shall be incorporated in tender document as condition of contract.

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