सत्यमेव जयते
Government of India

RESEARCH DESIGNS AND STANDARDS ORGANISATION
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SPECIFICATION OF MECHANICAL TRACK JACK 8 T Capacity (NON INFRINGING TYPE)

(No.TM/SM/21, Third Revision, 2022)

1.0 Scope:

This specification covers the technical, functional and testing requirement of a non-infringing light weight mechanical track jack having working load of 8 t. The jack is used for lifting of track in regular maintenance practice in P.Way only.The non- infringing feature would be that the jack could be released instantaneously in the face of an approaching train and none of its components would project above the rail level during the passage of a train. The mechanical track jack will be termed as 'jack' in this specification for convenience. This specification chiefly covers the technical provisions having no connections with necessary contractual provisions.

The jack may be designed for a single or multiple stage lifting.
"The mechanical track Jack can be of two types as indicated below:

(i) Rack and pinion type having a lift of 3 to 6 mm per stroke of the operating lever. <u>One man is required for the pumping of the operating handle</u>.

(ii) Rack and pawl type having a lift of 13 to 15 mm per stroke of the operating handle. <u>Two men are required for the pumping of the operating lever</u>."

2.0 Reference: Following codes have been referred to in this specification. Latest copy of the same shall be available in the Works of the manufacturer:

S.N.	Reference Documents	Description
1.	IS**:** 4552-1993 (Re-affirmed :2019	Automotive Vehicle –Portable Jacks for automobiles: Part-1 Mechanical Jack-Specification

3.0 Materials, Workmanship and finish:

3.1 Strength and other essential physical properties of the component parts of the jack shall be adequate for the purpose intended. All castings, forgings, machining which shall be in accordance with the appropriate Indian Standards, shall be of uniform quality, free of blow holes, porosity, hard spots, shrinkages, cracks or other deleterious defect, which mighty be adversely affect the intended use. Process such as pinning or plugging shall not be used on castings, or forgings for reclaiming any part of the jack.

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 subject to wear shall be accurately machined to such tolerances as will ensure the fitting of spares with the minimum of adjustments.

4.0 Technical Features:

S.N.	Features	Parameters
(i).	Weight	≤ 20 kg without handle
(ii)	Minimum lifting capacity	(a) with top – 8 t
		(b) with toe - 7 t
(iii).	Height of top of jack in lowest position	250 mm (max.)
(iv)	Height of toe of jack in lowest position	120 mm (max.)

(v)	Area of base plate		155 x 300 mm approx.
(vi)	Length & size of operating handle		
	(a)	Rack and pinion type jack	800 mm long, 20/20 mm round
	(b)	Rack and pawl type jack	1250 mm long, 30/30 mm round
(vii)	Lift		100 mm(minimum)
(viii)	Lift per stroke of the operating lever		
	(a)	Rack and pinion type jack	3 mm to 6 mm
	(b)	Rack and pawl type jack	13 mm to 15 mm

5.0 Functional Requirements:

5.1 The mechanical track jack shall be light weight. The weight shall not be more than 20 kg without handle and should have easy portability.

5.2 The jack should have rigid and robust construction.

5.3 The rack shall be a monolithic structure and shall work as a lifting member actuated by the pinion. (in case of rack and pinion type) or by the pawl (in case of rack and pawl type).

5.4 Release shall be instantaneous and preferably obtained by a single twist of the handle or hitting the lowering pedal with foot.

5.5 The jack shall be provided with a carrying handle/sling.

5.6 The base of the jack shall be so designed that it adequately prevents tilting during normal position.

5.7 Each jack shall be supplied with a suitable operating lever.

5.8 The top of saddle shall be suitably chequered or serrated or shall be cup shaped with locking fingers to prevent slipping during operation.

6.0 Tests:

The jacks shall be subjected to following tests as per IS: 4552-1993(Re affirmed -2019).

6.1 Visual and dimensional test**.**

The jacks shall be free from material as well as manufacturing defects like cracks, blowholes, etc. subjected to detailed dimensional check and shall conform to the functional dimensions or manufacturers drawings approved by Railway Board/ RDSO/ Standing Committee on small track machines. Jacks shall conform for material, heat treatment/ hardness, etc., as stipulated in the applicable drawings &specifications mentioned under various clauses. Supplier/ Manufacturer shall submit all necessary test certificates in this respect.

6.2 No-load test.

The jacks shall be subjected to a tilted load of $\pm 5^0$ angle. 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 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 slip, wreckage.

6.3 Performance test.

Jack shall be loaded with a load of rated capacity and operated from a minimum to maximum position and back. After repeating the cycles 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.

6.4 Overload test

(a) Overload Test Before Performance Test.

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.

(b)Over Load Test after Performance Test:

The test shall be repeated in accordance with 6.4

6.5 Operating Torque Test :

This test shall be carried out by loading the jacks to its rated capacity and torque required at the end of handle may be measured either by torque wrench or any other suitable means. The maximum torque for operating the spindle shall be as per IS : 4552 (part-1)- 1993 (Re-affirmed 2019).

6.6 Field Tests:

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

6.7 Sequence of testing: The sequence of tests of the jack and the frequency shall be as given below:

i) Visual and Dimensional Test- Every jack
ii) No-load test - Every jack
iii) First Overload test - Every jack
iv) Performance test - One out of every 20 (randomly picked) or part
v) Second Overload test - For the jack subjected to performance test.

After completing of the sequence of test given in 6.7 the jack shall not show signs of damage and shall operate without undue play between parts or slip when a load equal to nominal lifting capacity is raised or lowered.

7.0 Acceptance test :

7.1 The following shall constitute acceptance tests:

(a)	Visual test	Every Jack
(b)	Dimensional check	Every Jack
(c)	No load test	Every Jack
(d)	Overload test before performance(First Overload test)	Every jack
(e)	Performance test (for 25 operations only)	One out of every 20 or part there of
(f)	Overload test after performance(Second Overload test)	For Jack subjected to performance test
(g)	Operating Torque Test	Every Jack
(h)	Field Test	For jacks subjected to performance tests

7.2 Above tests shall be conducted as per criteria mentioned in Clause6.0.

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

7.4 Jack shall be subjected to the following above tests in order of 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 $+5^0$ angle. Necessary arrangements for test shall made by manufacturer/supplier.

8.0 Inspection:

8.1 The inspection of the jack shall be carried out by the purchaser zonal railway or any representative authorized by the purchaser/CTE of the zonal railway. The cost of inspection and testing shall be borne by the supplier/manufacturer. Minimum level of inspecting official should be SE (Section Engineer).

8.2 The jacks as mentioned above shall be inspected as per clause 6.0 and the sequence of testing shall be as per 6.7.

8.3 In jack submitted, fails initially, then the supplier shall submit a fresh two new jacks which shall be tested as per procedure detailed in clause 6.0 and both should withstand the test

8.4 In case of any doubt in the use of specified materials the Inspecting Officer shall be free to take representative samples of raw materials procured and used in manufacture of finished jacks be tested to ensure to conform for complete C&M analysis to the specifications stipulated in drawings or the manufacturer/supplier may produce a certificate from RDSO/NABL accredited laboratory in this regard during procurement.

8.5 Compliance to the specification shall be verified at the time of inspection.

9.0 Marking and Packing:

9.1 Jack shall be legibly and indelibly marked , punched or embossed with:

a) Name, initial or trade-mark of manufacturer.
b) Contact details of manufacturer/ supplier
c) Nominal lifting capacity in tons
d) Month and year of manufacture

9.2 All working surfaces of the jack shall be coated with suitable rust preventive. All other surfaces shall be painted. The jacks shall be supplied packed according to best trade practice.

10.0 Documentations:

10.1 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) Contact details of manufacturer/Supplier
iii) Salient feature of the jack.
iv) Parts list, with isometric drawing of the components for easy identification.

10.2 The spare parts required time to time shall be detailed in a list indicating description, part number, source of procurement and expected life etc.

10.3 Maker's test certificate :Copies of the maker's certificate guaranteeing the performance of the jack shall be supplied in three copies along with each machine

11.0 Warranty and AMC:

11.1 The jack shall be in warranty for one year for manufacturing as well as material defects.

11.2 The manufacturer/supplier shall bear the entire cost of the repair or replacement of any parts found deficient/defective due to faulty material, poor workmanship as required by the purchaser.

11.3 The manufacturer shall be responsible for the subsequent availability of spares to ensure trouble free service for the lift of track jack.

12.0. Manufacturer/Supplier has sole responsibility to maintain the quality of the product supplied to railways and other units.

13.0 Preference to Make in India: The Government of India policy on 'Make in India' shall be applicable.

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