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Document Title: Specification of Hydraulic Sleeper Spacer			



SPECIFICATION OF HYDRAULIC SLEEPER SPACER

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Rev. 02 of 2022

Track Machines & Monitoring Directorate

**RESEARCH DESIGNS AND STANDARDS ORGANISATION
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SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 1 of 6
Prepared By:	Checked By:	Approved By:	

1213527/2022/O/o PED/INFRA-1/RDSO

ISO:9001-2015	Document No.:TM/SM/17	Version- 2.0	Date Effective from: 03/06/2022
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1.0 Scope:

- 1.1 This specification cover the requirement of a non infringing light weight hydraulic sleeper spacer used for squaring and re-spacing of sleepers specially concrete sleeper of railway track.
- 1.2 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.
- 1.3 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 sleeper spacer shall be manufactured from a special aluminium alloy of high strength generally conforming to IS : 617-1994 (Reaffirmed 2020) alloy 2550 (A 12) or alloy steel of equivalent strength similar to IS : 3930- 1994 (Reaffirmed 2019), Design : 40 Ni 2 Cr.I Mo 28 or En 8/En 9/En 24 to BS : 970 for body material and IS : 1875- 1992 (Reaffirmed 2014) Cl. IV and En 8 to BS : 970 for raw material. Manufacturers may also explore possibilities of using fibre glass material wherever feasible keeping in view the light weight and guaranteed life of jack unit to withstand 8 tonnes of load and working pressure of 500 kg/cm² suitably designing the body and ram diameters with adequate factor of safety as per standard practices.
- 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.
- 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 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.

SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 2 of 6
Prepared By:	Checked By:	Approved By:	

1213527/2022/O/o PED/INFRA-1/RDSO

ISO:9001-2015	Document No.:TM/SM/17	Version- 2.0	Date Effective from: 03/06/2022
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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.

4.0 Functional Requirements:

4.1 The hydraulic sleeper spacer shall be of weight as low as possible. The weight of hydraulic sleeper spacer shall not be more than 14.0 Kg., excluding the weight of operating handle / lever and reaction rods for binding sleepers. This 14.0 Kg. Weight of hydraulic sleeper spacer includes the weight of hydraulic jack, back plate (having tapered thickness) and saddle cap.

4.2 The equipment shall have easy portability.

4.3 The jack or equipment shall have rigid, mono block construction of cylinder, reservoir and pump with base area approximately 210 sq. cm. It shall be suitable for rough and rugged use in the field and to prevent leakage of hydraulic oil through joints and oil seals etc., during normal operation.

4.4 The hydraulic jack of equipment shall have a sufficiently large capacity pump such that in about 70/75 strokes, the pump should lift the load through a height of about 125 mm.

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 shall enable the release valve to open thereby lowering the jack ram. The position of the release valve shall be facing the operator.

4.6 Release shall be instantaneous and preferably obtained by a single twist of handle.

4.7 The equipment shall be provided with a carrying handle / sling. The oil used for hydraulic jack shall be IOC SERVO-32/46 or its equivalent (suitable for proper functioning of Jack).

4.8 Oil seals (Nut-ring, O-ring, washers etc.) should be of special high pressure brand of synthetic Neoprene/ Nitrile rubber / Teflon material (superior brand to be provided) generally conforming to IS:6838- 1973 (Reaffirmed 2005)

4.9 The jack shall have an extra arrangement at both ends to suit slanting side face of concrete sleepers and it shall be removable to facilitate vertical operation to adjust rubber pads.

4.10 The equipment shall take the reaction to square / re-space the sleepers preferably from rail or adjacent sleeper in such manner that does not get displaced from its position.

5.0 Technical Features:

The dimensions and capacity of jack shall be as follows:

(i)	Rated capacity	: 8 ton.
(ii)	Maximum permissible closed length	: 200 mm.
(iii)	Hydraulic lift (travel of ram)	:125 mm (min.)
(iv)	Screw extension	: 75 mm (min.)
(v)	Base size	:150X140 mm ² (approx)
(vi)	Length of operating handle	: 750 mm long approx.& 22 mm round

Note: Closed length shall be measured after removing back plate and saddle plate.

SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 3 of 6
Prepared By:	Checked By:	Approved By:	

1213527/2022/O/o PED/INFRA-1/RDSO

ISO:9001-2015	Document No.:TM/SM/17	Version- 2.0	Date Effective from: 03/06/2022
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6.0 TESTS:

6.1.1 **Acceptance Test** (Test at the time of supply):

6.1.2 Sequence of Testing:-The sequence of tests of the jacks and their frequency shall be as given below:

SN	Test	Quantity
i)	Visual and dimensional test	: Every jack
ii)	No load test	: Every jack
iii)	First overload test	: Every jack
iv)	Performance test	: 1 out of every 20 or part there of
v)	Second overload test	: For the jack subjected performance test
vi)	Load sustaining test	: For the jack subjected to performance test
vii)	Field Test	: For the jack subjected to performance test
Viii)	Material Check .	: For the jack subjected to performance test

Sample of hydraulic jack of the equipment shall be subjected to the following tests for ascertaining their suitability generally conforming to IS: 4552 1993 (Reaffirmed 2019).

- 6.1.3 **Visual and Dimensional Test:-** Jacks shall be free from defects such as cracks, blow hoes etc. Spacer shall be subjected to detailed dimensional check and shall conform as per technical features.
- 6.1.4 **No Load Test:-**Jack shall be operated without load to its maximum lift and shall work smoothly without undue clearance.
- 6.1.5 **Performance Test:-** Jack shall be loaded with a static load of 100% of nominal lifting capacity of jack and operated from the minimum to maximum position and back with release valve operation. After repeating this cycle 100 times jacks shall work smoothly throughout the range without undue play or slip between the moving parts and without oil leakage.
- 6.1.6 **Over Load Test:-** Jack shall be loaded with a static load of 120% of nominal lifting capacity of jack 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 visible damage and shall not show any sign of leakage of oil of any other abnormality.
- 6.1.7 **Load Sustaining Teat:-**The saddle of the jack shall be lifted to the middle of its stroke and loaded to 120% of the nominal lifting capacity. The load shall be sustained for one hour. After the end of one hour, the reduction in the height of 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 at room temperature and shall not shown any sign of distortion or leakage of oil at the end of this test.

SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 4 of 6
Prepared By:	Checked By:	Approved By:	

1213527/2022/O/o PED/INFRA-1/RDSO

ISO:9001-2015	Document No.:TM/SM/17	Version- 2.0	Date Effective from: 03/06/2022
Document Title: Specification of Hydraulic Sleeper Spacer			

6.1.8 Field Test:

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

6.1.9 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 The supplier/manufacturer shall provide a suitable testing frame at his works to enable the purchaser or his authorised representative to carry out the testing of the jacks as detailed above. In case these facilities are not available at the manufacturer/ supplier premises, he shall get them arranged in the nearby technical institute or Test House as per convenient of purchaser.

7.0 Marking and Packing:

The equipment shall be legibly and indelibly marked with:

- i) Name, initials and trademarks of manufacturer.
- ii) Nominal lifting capacity of the jack in tonnes.
- iii) Serial number of jack.

The jacks shall be supplied packed in suitable wooden crates according to best trade practice generally conforming to IS 5415-1969 (Reaffirmed 2019). All the working parts shall be oiled before being assembled.

8.0 Documentations:

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

- i) Instructions for safe operation of the jack.
- ii) Salient feature of the jack.
- iii) Parts list, with sectional drawing of the components.
- iv) Detailed instruction pamphlet for replacing oil periodically if needed.
- v) The manufacturer shall supply detailed drawings exhibiting clearly the materials and dimensions so that the user shall have a clear understanding of the equipment.
- vi) Detail operating manual, safety precautions to be taken, maintenance and service manual shall be supplied in 3 copies along with each equipment.
- vii) Copies of the test certificate guaranteeing the performance of equipment shall be supplied in duplicate along with delivery of each equipment.

9.0 Service Facility and Spare Parts:

- i) Each set of sleeper spacer shall be supplied with two sets of spare hydraulic seals including 'O' ring.
- ii) The manufacturer/ supplier shall assure prompt and continuous service and delivery of spare parts for a minimum period of 5 years.

SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 5 of 6
Prepared By:	Checked By:	Approved By:	

1213527/2022/O/o PED/INFRA-1/RDSO

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- iii) The spare parts required time to time shall be detailed in a list indicating description, part number, expected life etc.
- iv) Each machine shall be supplied with a complete kit of tools required by the operator in emergency and for normal working of the equipment.

10.0 Training and Commissioning:

Adequate training in operation and maintenance of the equipment shall be imparted to railway operators by the manufacturer/suppliers either at manufacturer's premises or at railway premises as per the convenience of purchaser at the rate of one operator per equipment.

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 for manufacturing and material defects from the date of commissioning.

SSE/SSRE/JRE	ARE/DTM/EDTM	PEDTM	Page 6 of 6
Prepared By:	Checked By:	Approved By:	