SPECIFICATION OF HYDRAULIC TRACK LIFTING CUM
SLEWING DEVICE (TRALIS) 15T capacity


1.0 Scope :

This specification covers essential material, and functional requirements with testing
criteria and guidelines for using hydraulic track lifting cum slewing device (TRALIS)
of 15 t capacity.

2.0 General :

The track lifting cum slewing device (hereinafter called TRALIS) is a hydraulic
device used to lift and slew plain track and turnouts. TRALIS consists of a pair of
lifting cum slewing unit and a pumping unit. Each lifting cum slewing unit comprises
of one vertical and one horizontal jack joined together and can be traversed laterally
/vertically by actuating the respective jack.

3.0 Reference Documents:

Following standards have been referred to in this specification. These standards with
up-date revisions/corrections/amendments shall be available at the manufacturer’s
works:

(i) IS : 3930-1979: Specification for flame and Induction Hardening
    Steels.
(ii) IS : 1875-1978: Carbon steel billets, blooms, slabs and bars for
     forging (Vth rev.)
(iii) IS : 1337-1980 : Electroplated coatings of Hard chromium on Iron
    and Steel for engineering purposes (second revision).
(iv) IS : 6838-1973 : Dimensions for O-rings and grooves for vacuum flange.
(v) IS:10585-2002 : Method of test for cylinders for oil hydraulic system
    (first revision)
(vi) IS:4552(Part2):1993 Portable Jacks for automobiles Part2-Hydraulic Jacks
(vii) BS:970:part:2 :1970: Specification for wrought steels in the form of Blooms,
     Billets, Bars and forgings. Part:2-Direct hardening alloy
     steels including alloy steels capable of hardening by
     nitriding.

4.0 Material :

4.1 Hydraulic Cylinder & Piston : The cylinder shall be made of steel of designation
40 Ni 6 Cr 4 MO3 conforming to IS: 3930-1979 or EN-24 steel of BS :970 and
having minimum tensile strength of 800 N/mm² while the piston shall be made of
carbon steel conforming to class IV of IS : 1875-1978 or EN-8 and shall have
minimum tensile strength of 600 N/mm². The working surface of piston shall be
hard chrome plated conforming to IS : 1337-1980 having minimum thickness of 50µm.

4.2 Reaction Trough and saddle plate: The reaction trough and swiveling saddle plate shall be made of carbon steel of class IV conforming to IS : 1875-1978 or EN-8 of BS : 970: Pt.2:1970. The top of saddle plate shall be insulated by providing suitable insulating material like resin-bonded fiber glass of minimum 3 mm thickness. To withstand abrasion, a thin aluminum sheet may be suitably fixed over 3 mm thick insulation.

4.3 Hand pump & connections: The hand pump shall be made of EN-8 conforming to BS : 970 or of Class IV steel conforming to IS : 1875-1978. The connecting tube & nuts shall be made of good quality steel to withstand working pressure of minimum 800 bars. The pump shall have sufficiently rigid and effective base to avoid tilting of pump unit during operation.

4.4 Hydraulic Hoses: Hydraulic hoses shall be double steel wire braided impregnated by rubber to withstand working pressure of 650 to 700 bars (minimum).

4.5 Oil Seals/O-rings/Nut-rings: All the sealing elements like, oil seals, O-rings, nut rings, washers etc shall be of special high brand of synthetic Neoprene/Nitrile rubber, generally conforming to IS : 6838:1973. The physical characteristic of oil seals, when tested in accordance with ASTMD-2000, shall be as mentioned in Annexure-I enclosed herewith.

5.0 Functional Requirement:

5.1 The TRALIS shall be capable to lift & slew plain track/turn out laid with wooden/CST-9/Steel Trough/PRC sleepers when operated by a single man with the hand pump.

5.2 The TRALIS shall be capable to provide differential lift for adjustment of cross level of track. The lifting oil lines shall have locking device to retain the lift during slewing.

5.3 The operation of the vertical and horizontal jacks shall be smooth and vibration free under fully loaded condition. The vertical jack shall have safety release valve pre-set at working capacity.

5.4 The length of hydraulic hoses shall be such that TRALIS can be operated with ease from cess.

5.5 The construction of the device shall be such that parts can be easily and quickly replaced in case of break down at work site. The device shall be easy to operate and maintain.

5.6 It shall be robust and rugged in construction, designed to withstand the various operating and handling forces. The device shall have electrical insulation at its
saddle/top of vertical jack to work in track circuited area. It shall not be hazardous in working with the device under high voltage OHE.

5.7 The device shall have suitable handle for easy carrying and handling.

6.0 Technical Features:

(i) Reaction trough size : 180 ± 5 mm x 720 ± 5 mm
(ii) Capacity : (a) Vertical jack : 15 tons.
               (b) Horizontal jack : 7.5 tons.
(i) Hydraulic lift : (a) Vertical jack : 120 mm ± 5.0 mm
                   (b) Horizontal jack : 150 mm ± 5.0 mm (left or right)
(iv) Overall weight including oil & hoses : 120 ± 05 kg
(vi) Close Height (top of saddle to bottom of plate) : 230 ± 02 mm

7.0 Workmanship and finish:

7.1 All metal surfaces shall be properly finished and sharp corners shall be suitably rounded off. Bottom edge of the vertical jack shall be rounded off by 3 mm radius (min.) in order to avoid scrapping of the top surface of the reaction trough during lateral traversing of the jack.

7.2 All welded portions shall be properly grounded and finished and the welds shall be free of defects like blow holes, cracks etc.

8.0 Marking:

The TRALIS shall be legibly marked with:
(i) Name & Trade Mark of the firm.
(ii) Lifting/slewing capacity.
(iii) Serial number, year and month of manufacture.

9.0 Tests:

9.1 Type tests : The manufacture shall make available two prototype samples for type tests. Type tests shall be carried out for approval purpose and not for regular supply order.

9.2 Type tests sequences:

(i) Visual & Dimensional Test [as per clause no 9.2.1] : Both Samples
(ii) No load test [as per clause no 9.2.2] : Both Samples
(iii) First Over load test [as per clause no 9.2.3] : Both Samples
(iv) Performance test : 100 cycles for 1st samples and
9.2.1 Visual & Dimensional Test:

(a) All components of TRALIS shall be free from defects such as blow holes in the body or cracks at welded joints and coupling etc.
(b) The equipment shall be checked dimensionally as per relevant drawings.
(c) The hydraulic stroke of horizontal and vertical jacks shall be checked in accordance with established practices.
(d) The thickness and uniformity of hard chrome plating on cylinder piston rod shall be checked with ‘Alcometer’. The thickness of chrome plating shall be minimum 50μm.

9.2.2 No Load Test:

Loading units of TRALIS shall be operated from zero to their maximum lifts and lateral movements and shall work smoothly without undue clearances between moving parts.

9.2.3 First overload Test (Overload Test Before Performance):

Both vertical and lateral jacks of loading unit shall be loaded with a load of 120 percent of rated capacity and operated from the minimum to maximum position and back. Both the loading units shall be subjected to simultaneous loading under the same test rig. During this test the jack shall operate smoothly throughout the range without any slip or other visible damage, leakage and any other abnormality.

9.2.4 Performance Test:

One complete cycle of operation, constitutes of sequences at static loading of 100 % of the nominal lifting capacity with full extension of vertical ram and the movement of horizontal cylinder by 150 mm towards either sides from its mean position and bringing back to initial position, both the vertical and lateral loads released. TRALIS shall be subjected to 100 cycles of operation (first sample) under a testing rig suitably designed for the 120% capacity of vertical and lateral jacks.
9.2.5 Second overload Test:

The test shall be repeated as per clause no. 9.2.3 for both the samples subject to performance test.

9.2.6 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 by adjusting the safety valve. 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 the test, Jack shall be left for 24 hours at room temperature and shall not show any sign of distortion or leakage of oil.

9.2.7 Electrical Insulation Test:

The electrical resistance across the top of saddle and rest of the metallic part shall be tested and the resistance shall not be less than 200 Ω.

9.2.8 Field Test:

TRALIS which withstand the above laboratory tests shall be subjected to field testing under a running railway track at near by station/yard as agreed mutually to ascertain its field behaviour under heaviest track structure and turnouts. The insulation quality of TRALIS shall also be tested in the track circuited areas. TRALIS shall withstand the various field operations with full satisfaction to the inspecting officials.

9.2.9 Material test:

The manufacturer shall arrange for the material testing of the samples /component(s) desired by the inspecting official from a Govt. approved test house. The manufacturer shall obtain a certificate from the test house indicating details of the test conducted, test result ,deviation if any etc. for each test sample. All the expenses of the testing shall be borne by the manufacturer.

10.0 Inspection:

10.1 Inspection of the device against zonal railways/ purchaser’s procurement order shall be carried out by purchaser or his authorized representative. The manufacturer shall provide all testing facilities including transportation required by the inspecting official for proper inspection of the equipment. Inspection of the device shall be carried out through following acceptance test.
10.2 Acceptance Test: Acceptance tests shall be carried out as per following sequence.

(i) Visual & Dimensional Test [as per clause no 9.2.1] : Every TRALIS
(ii) No. Load Test- [as per clause no 9.2.2] : Every TRALIS
(iii) First overload Test [as per clause no 9.2.3] : Every TRALIS
(iv) Performance Test for 25 Nos. cycle: One out of 10 TRALIS or part there of. [as per clause no 9.2.4]
(v) Second overload test [as per clause no 9.2.5] : TRALIS subjected to performance test.
(vi) Load Sustaining test [as per clause no 9.2.6] : -Do-
(vii) Electrical Insulation Test [as per clause no 9.2.7] : Every TRALIS
(viii) Field Test [as per clause no 9.2.8] : -Do-

10.2.1 Any of the equipment which fails in the testing as per sequences given in clause 10.2 shall be rejected and next randomly selected sample shall be tested. However, if the equipment subjected to performance test mentioned in clause 9.2.4 fails, the Inspecting Officials may reject whole lot or pass each equipment after subjecting it to performance test.

10.2.2 Equipment for performance test shall be picked up randomly.

10.2.3 Before offering the equipment for inspection and testing, manufacturer shall satisfy himself regarding performance of his equipment and shall give a certificate specifically mentioning that he has checked and tested hydraulic cylinder/hydraulic jacks of each equipment as per IS : 10585-2002/IS : 4552(Part2):1993 and it satisfies its provisions.

11.0 Protection from rust and packing conditions:

All working surfaces of the TRALIS shall be coated with suitable rust preventive agent. All other surfaces shall be painted with the paint of approved colour and specification. The TRALIS shall be supplied packed in suitable crates, according to best trade practices. All the working parts shall be oiled before being assembled.

12.0 Spare parts:

Following spare parts shall be supplied with each unit of TRALIS

(i) Oil seal /O -ring : 2 sets of every size with Brass/copper washer
(ii) Connecting saddles bolts : 1 dozen
13.0 **Tools:**

Each set of TRALIS shall be supplied with a complete kit of ordinary tools and special tools/kit required by the operator in emergency and for normal working of the machine. The supplier will give a complete list with sketches showing probable use of these tools.

14.0 **Manual and Drawings:**

The manufacturer shall supply a set of detailed drawings exhibiting overall dimensions and a copy of operating and maintenance manual with each TRALIS of the consignment being supplied by the firm to the purchaser.

15.0 **Warranty:**

The TRALIS shall be covered by warranty for two years for manufacturing and material defects. However for parts subjected to continuous wear and tear like o-rings, oil seals washer etc the validity of warranty shall be for a period of one year from the date of supply. The manufacturers shall bear the cost of repair/replacement of any parts found deficient/defective due to faulty material, poor workmanship etc. during the period of warranty.

16.0 **Transportation and Handling:**

Manufacturer shall provide suitable transportation boxes designed properly for convenient carrying of the TRALIS set to work spot.

17.0 **Training:**

Adequate training in operation and maintenance of the equipment shall be imparted to railway operators by the manufacturer either at manufacturer’s premises or at railway premises as agreed upon mutually at the rate of one operator per equipment.

18.0 **Field usage:**

(i) During working at least two sets of TRALIS shall be used for slewing a rail length, only in stages. In point & crossing area the numbers of TRALIS shall be increased as per site requirement.

(ii) The shoulder ballast shall be opened out before slewing and the same shall be packed after slewing.

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