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Document Title: Specification for Off Track Tamper (Power Pack Version)			



Specification of Off Track Tamper (Power Pack Version)

(Spec. No. - TM/SM/OTT/320 dated 28.01.09)

(Second Revision 2023)

Track Machines & Monitoring Directorate

RESEARCH DESIGNS AND STANDARDS ORGANISATION
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1.0 Scope:

- 1.1** This specification covers technical, material and functional requirements with testing details of off-track tampers. The off track tampers are intended to be used as a regular means of packing for spot attention/picking up slacks in between two successive tamping with heavy on track tamping machine on concrete sleeper track in Railway yards and mid-sections where machine could be carried on rail/road transportation or any other suitable arrangement. The power packs can also be used for driving other electrical small track machines. Off Track Tampers will be termed as “tamper” in this specification.
- 1.2** Manufacturers/suppliers are solely responsible to maintain quality of products supplied to Railways.
- 1.3** PREFERENCE TO MAKE IN INDIA POLICY:
Compliance of the instructions contained in public procurement (Preference to Make in India) order 2017 or latest instructions issued on subject shall be ensure.

2.0 References:

Following BIS codes/specifications have been referred to in this specification. Updated copy of the same shall be available at the firm's Works:

i)	IS: 443 -1975 (Reaffirmed-2012):	Method of Sampling and test for rubber hoses (Second Revision)
ii)	IS:1271-1985 (Reaffirmed-2001)	Thermal evaluation and classification of electrical insulation

3.0 Materials, Processing and Workmanship:

- 3.1** One set shall consist of four numbers of tamping equipment with tools/blades and one power sources. Power source may be electrical or hydraulic. These tamping equipment shall be able to tamp the concrete sleeper track including locations like points & crossings, bridge approaches, level crossing approaches and switch expansion joints etc.
- 3.2** The generator shall be of reputed make, proven record of service and of robust construction. It shall be light in weight so that two/three men can lift and carry the generator easily.
- 3.3** The generator shall be framed in tubular steel pipe structure fitted with wheels suitable to move on cess. For moving the generator on rail (mono), double flanged wheels may be provided at central position at the underneath of the frame.
- 3.4** The tamping tool of the tamping equipment shall be made of alloy steel / High Carbon steel or equivalent to attain following minimum parameters:-
(i) Tensile strength - 1100 N/mm²
(ii) Hardness - 280 HB

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4.0 Functional Requirements:

4.1 Tamping equipment:

- 4.1.1 The equipment shall be light in weight, portable and shall work without traffic block with normal track protection. The equipment shall be easily transportable to the sites of work.
- 4.1.2 The tool/blade of the tamping equipment shall be so designed that it can penetrate under all types of sleepers. The unit shall have sufficient power to push the ballast underneath the sleepers during packing without crushing. The tamping tools/blades shall be replaceable when they become thin/ rounded due to wear and tear. The technical features of the tamping equipment shall be as per clause 5.0.
- 4.1.3 In case of hydraulically operated tamping equipment the hydraulic hoses shall be sufficiently strong to withstand the rated oil pressure at full load. The hydraulic hoses shall be wire-reinforced of at least the grade of SAE100R2 or equivalent to withstand 120% of working pressure of the tamping equipment. The hoses shall have 'quick-fit' coupling arrangement to avoid wastage of time in connecting the tamping equipment with the power source.
- 4.1.4 The machine (the tamping equipment and the generator) shall be electrically insulated as per IS: 1271-1985 (Reaffirmed-2001) and accordingly the firm shall specify the thermal class of insulation during supply of the machine and produce a certificate in this regard.
- 4.1.5 The operation of both the tamper and the power generator shall be simple and easy so that the same can be operated easily.
- 4.1.6 The handle of the tamper shall be so designed that vibrations produced by the system during tamping shall not cause undesirable fatigue to the operator.
- 4.1.7 Fixing of tamping tool in the tamper shall be easy like push and rotate type/other suitable method.
- 4.1.8 The electrical connection of the machine shall be through a standard connection/extension board with an extension cable of length not less than 60m. There shall be a suitable arrangement for winding the cable in a light weight spring loaded drum which shall be supplied with the generator.
- 4.1.9 For ear-protection against the sound emitted during operation of machine, suitable ear protector shall be supplied along with safety apron and leather gloves (four sets) by the manufacturer with each set.
- 4.1.10 The length of the tamper including tool shall be sufficient so that operator needs not to bend his body forward during packing of the sleepers. The tamping tool shall be of 'swan neck' type to facilitate the penetration of ballast under the sleeper with a very little deflection of the tamper.

5.0 Technical Features:

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(a) Tamping equipment

SN	Description	Required Values
1.	Dry weight of the tamping equipment (without tool)	Up to 26 Kg(for hydraulically operated machine) Up to 12 Kg(for electrically operated machine)
2.	Power Source	External Source (Electrical generator set/Hydraulic power pack).
3.	Rated power (input)	1600 Watts (approx.) for electrically driven tamping equipment. 4-6 G.P.M. for hydraulically driven tamping equipment.
4.	Percussion rate	Min. 1500 blows/minutes
5.	Vibration Control	The tamper shall be fitted with suitable vibration dampening system so that it doesn't cause undesirable fatigue to the operator so that optimum use of the machine could be done for full duty hours.
6.	Length of cable between tamping equipment and power source	60 M min (with extension board)
7.	Working Atmospheric Temperature	0-55 degree C
8.	Working Relative Humidity	Up to 99%
9.	Noise level of power source.	110db (Max.)
10.	Spade of the tamping tool	The design should be such that it should penetrate the ballast easily without crushing it. The tamping tool shall be of 'swan neck' type.

(b) Power Source:

SN.	Description	Required Dimension
1.	Capacity of Power Source (Generator/Hydraulic Power Source)	Capable to feed two tamping equipment continuously at full load
2.	Fuel	Diesel/Petrol/other to be specified by manufacturer.
3.	Fuel Consumption	Economical (approx. 2.8 ltr/hr for Gen. and approx. 4.0 lt./hr for Hydraulic Power Source)
4.	Fuel Tank Capacity	10.0 liter(approx.)
5.	Weight	Up to 100Kg (approx.) (for electrically operated unit). Up to 150 Kg (approx.) (for hydraulically operated unit)
6.	Starting Mechanism	Rope start/ self-starter
7.	Continuous Rating	Min. 02 hours.

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8.	Working Atmospheric Temperature	0-55 degree C
9.	Working Relative Humidity	Up to 99%
10.	Transporting arrangement	The generator/hydraulic power source shall have suitable arrangement/wheels fitted to the frame to move it on monorail and on cess during shifting from one working point to another at site.

6.0 Tests:

6.1 (a) Test for Tamping Equipment:

(i) Visual and Dimensional check:

The tamping equipment shall be visually checked for its components, orientation of handle, power off/on switch, tool insertion sleeve, electrical cable connections etc. The design of tamping tools shall be as per clause 5.0(a).10.

- (ii) **Noise level test:** The noise of the tamping equipment during operation shall be tested at the distance of 1 m from the tamping equipment by a sound level meter. The maximum permissible noise shall be within 110 dB.

(iii) Field Test:

The tamping equipment shall be tested in field as per actual site conditions. For field test, a stretch of at least 40 m of concrete sleeper track fitted with 52 Kg/60 Kg rail with minimum clear ballast cushion of 100 mm shall be selected. The track shall have at least 25 GMT of traffic annually. The track portion under trial shall have dips/slacks/ and low joints, uneven surface. Testing patch near any stop signal shall be avoided. Detailed procedure of tamping shall be as mentioned in the working instructions vide para 605 and 606 of IRPWM – June 2020. The quality of the packing shall be checked by observing the movement of track under traffic before and after packing. During field test followings shall be checked for:

- Whether the ballast is penetrated in the voids/under the sleepers with ease.
- Whether sleeper corners and ballast is damaged due to vibration of tamping tool.
- The operator is experiencing excessive fatigue and how long the operator is able to operate the tamping equipment continuously.

(iv) Test for bursting pressure and bend of the hydraulic pipes:

In hydraulically operated tamping equipment following tests shall be carried out on the hoses (@ one hose sample from each category) used in the pressure line of the tamping equipment:

- Bend test as per IS: 443-1975
- Bursting pressure test as per IS: 443-1975.

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(v) **Test for chemical composition and mechanical properties of tamping Tool /blade:**

Certificate from Govt./Govt. approved laboratory shall be produced for chemical composition and mechanical properties of tamping tool/blade as per clause 3.4.

(b) **Tests for Generator**

(i) **Visual & Dimensional check:**

The generator shall be dimensionally checked as per manufacturers drawing/dimensions. Visually the generator shall be compact in design and fitting of all the visually viewed components like air cleaner, carburetors, out let manifold with silencer, fuel tank etc. shall be sound. No loosely fitted components shall be allowed.

(ii) **Operational Test:**

The engine shall be started, run for ten minutes and stopped thereafter. No unusual sound /behavior of the engine during these operations shall be allowed. This process shall be repeated five times with an interval of the 10 minutes in between two successive cycle of operation.

(iii) **Noise level Test:**

The engine shall be started and run full throttle. The level of noise shall be measured at a distance of 5m from the engine and shall not exceed 110 db.

(iv) **Rated out-put test:**

The generator shall run at half throttle and it shall be connected to an electrical load (which may be heating coil, bulbs in series/parallel or variable resistor) equivalent to minimum 120% of the rated consumption of two tamping equipment. This test shall be continued for 30 minutes. No drop in engine speed/voltage/wattage shall be allowed. In case of hydraulic power pack the rated out put test shall be carried out by connecting the power pack to any hydraulic machine/oil flow and working pressure measuring device capable of exerting minimum 120% of the rated oil flow (GPM) and pressure(bar) of two tamping equipment and shall be run for 30 minutes. No drop in engine speed shall be allowed.

(v) **Test for handling & transportation:**

The generator /hydraulic power pack shall be moved on cess /uneven ground and on rail. The movement shall be trouble free and smooth.

6.2 Tests at the time of supply (Acceptance Test):

6.2.1 Acceptance tests are meant to be conducted on selected samples/every tamper of the consignment which are taken from supplies under inspection against zonal railways' purchasers' P.O. Followings are the tests schedule for acceptance:

6.2.2 Test's schedule:

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a.	Test for Tamping equipment Test	No. of samples to be tested
i)	Visual & Dimensional check [as per clause 6.1.1 a (i)]	Every tamping equipment of the consignment
ii)	Noise level Test [as per clause 6.1.1 a (ii)]	Every tamping equipment of the consignment
iii)	Field Test [as per clause 6.1.1 a (iii)]	Every equipment (randomly selected @ 05% or min.02 sets of tamping equipment and power source per lot/PO)
iv)	Bursting pressure and bend of the hydraulic pipes [as per clause 6.1.1 a (iv)]	Manufacturer/supplier shall produce the certificate
v)	Chemical composition and mechanical properties of tamping tool/blade [as per clause 3.4]	Manufacturer/supplier shall produce the certificate
b.	Test for Generator	
i)	Visual & Dimensional check [as per clause 6.1.1 b (i)]	Every tamping equipment of the consignment
ii)	Operational Test [as per clause 6.1.1 b (ii)]	Every tamping equipment of the consignment
iii)	Noise level Test [as per clause 6.1.1 b (iii)]	Every tamping equipment of the consignment
iv)	Rated out-put test [as per clause 6.1.1 b (iv)]	Manufacturer/supplier's test certificate should accompany with consignment
v)	Test for handling & transportation	Every tamping equipment of the consignment

6.2.3 If the sample satisfies all the tests prescribed as per acceptance criteria, the lot is acceptable otherwise lot is rejected. However, the Inspecting Officials may pass each equipment after subjecting it to pass each test as per para 6.2.

6.2.4 After the equipment have been supplied at consignee premises, the supply shall be considered as complete only after field training is provided by the supplier as per clause 11.0.

7.0 INSPECTION:

7.1 The inspection of the machine shall be carried out by the purchaser Zonal Railway or any representative/agency authorized by CTE of the Zonal Railway. The cost of inspection and testing shall be borne by the supplier/manufacturer. Copies of maker's test certificate guaranteeing the performance of the machine should be supplied in duplicate along with the delivery of each machine.

8.0 Warranty & AMC:

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- 8.1 Any part of the tamping system failing or proving unsatisfactory in service due to defective design, material or workmanship within 12 months from the date of commissioning shall be replaced by supplier/manufacturer at his own expenses. If any design modifications is made in any part of the equipment offered, the period of 12 months would commence from the date of such modifications.
- 8.2 During procurement of the device railways should go post-warranty AMC with the supplier for a pre-determined period as decided by the purchaser railway. This shall be incorporated in the tender document as a condition of contract/Tender/Supply.

9.0 Service Facility and Spare Parts (including tools):

- 9.1 Each tamping equipment shall be supplied with a complete kit of tools and spare parts required by the operator in emergency and for normal working of the machine. A complete list of tools and a catalogue of spare tools shall be supplied along with the procedure to be used with the machine.
- 9.2 The manufacturer shall be responsible for subsequent availability of spares to ensure trouble free service for the normal life of the machine.
- 9.3 In order to facilitate subsequent maintenance in service, the manufacturer/supplier shall supply two set of schematic diagrams. These shall exhibit clearly the details of the various components.

10.0 Documentation:

Instruction Manual: Detailed operating and maintenance manual in duplicate for both the tamping equipment and the power source shall be supplied by the manufacturer with each set of the machine. The operating manual shall contain the trouble-shooting, maintenance instructions to be followed in the field and the normal life of the tamping equipment and the power source. The maintenance schedules shall be clearly indicated in the maintenance manual.

Copies of the maker's certificate guaranteeing the performance of the tamping equipment and power source should be supplied in duplicate along with the delivery of each tamping equipments.

11.0 Training & Commissioning:

- 11.1 Adequate training for operation and maintenance of both the tamping equipment and power source shall be imparted at the rate of eight operators per set which shall be treated as part of commissioning.
- 11.2 The service engineer shall guide the operating and maintenance staff during commissioning and warranty period of tamping equipment and power source for proper handling.

12.0 Marking and Packing:

- 12.1 Each tamping equipment and the power source shall be legibly and indelibly marked with the following details:
- (i) Name and trade mark/brand of the manufacturer/Supplier.

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- (ii) Contact No. of the manufacturer/Supplier
 - (iii) Capacity.
 - (iv) Month & year of supply.
- 12.2 The tamping equipment along with tamping tools/ blades shall be packed in a suitable case/ plastic molded durable suitcase of convenient size.
- 12.3 The power source shall be supplied in suitable/ wooden carton as per best trade practices.

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