
**RESEARCH DESIGNS AND STANDARDS ORGANISATION**
**Manak Nagar, Lucknow-226011**
**Track Machines & Monitoring Directorate**

# Specification for Abrasive Rail Cutter, Rail Drilling Machine, Concrete Sleeper Breaker and Concrete Sleeper Core Drilling Machine operated by Hydraulic Common Power Pack

**(Specification No.- TM/SM/HCPP-2)**

**(Rev 02 of 2023)**

**1.0 Scope:**

This specification covers the technical, material and functional requirements with testing criteria of Abrasive Rail Cutter, Rail Drilling Machine, Concrete Sleeper Breaker and Concrete Sleeper Core Drilling Machine operated by Hydraulic Common Power Pack. For convenience, the entire assembly will be referred as 'common power pack'. This specification mainly covers the technical provisions having no connections with necessary contractual provisions.

**2.0 Reference Documents:**

Following codes/documents have been referred to in this specification. The updated copies of the same shall be available at the firm's works.

**a)IS : 1991 (part 3) – 1987(Re-Affirmed-2002)** : Safety requirements for the use, care and protection of abrasive grinding wheels. Part-3: General machine requirements.

**b)IS: 1991 (part 4)–1988(Re-Affirmed-1998)** :Safety requirements for the use, care and protection of abrasive grinding wheels. Part-4: Safety Guard.

**c)IS: 5103 – 1969(Re-affirmed-2003)**:Specification for Twist Drills, Morse Taper Shanks(Reaffirmed 2002)

**d)IS:1991(Part 2)-1987(Re-affirmed-2007)**: Safety requirements for the use, care and protection of Abrasive Grinding Wheels. Part-2-Handling and storage.

**e)IS:1986-1981 (Re-affirmed-2006)**:Code Of Practice For Hard Chromium Plating on Iron and Steel For General Engineering purposes..

**3.0 Materials, Processing and Workmanship:**

**3.1** The machines shall be made of light weight metallic/ non-metallic material suitable for working in all weather in India.

**3.2** The outer surfaces of the machines shall be well finished, smooth and free from any unwanted projected part. The outer surfaces shall be free from surface defect like holes, sharp edged etc.

**3.3** The hydraulic power pack shall be of reputed make and shall provide the required oil flow at rated pressure to render sufficient speed to the power output shaft to make job done in the specified time and tolerance.

**3.4** Any exposed surface of hydraulic moving components like piston rod etc. shall be protected from rusting by chrome plating as per reference.

**4.0 Functional Requirements**

**A. Requirement of Hydraulic Power Pack)**

4.1 The power pack shall be self-propelled operated by an operator for travelling as well as for operation of hydraulic small track machine.

4.2 During travelling, the speed of the power pack shall not be more than 4-5km/h that of a man's normal walking speed.

4.3 The power pack shall be capable to operate the small track machines mentioned above in clause 1.0 and other similar type of machines requiring same power-input.

4.4 The power pack, when used as transporting cart, shall be capable to negotiate uneven, inclined and rough terrain on cess /land as well as on track. While travelling on track, it should preferably use the area within two lines of the track and it should not damage any track components/fittings during course of movement as well as able to negotiate guard rails.

4.5 Off-tracking the common power pack shall be within very short time preferably within 2 minutes.

4.6 The Common Power Pack shall have suitable ports to operate hydraulically operated Abrasive Rail Cutter, Rail Drilling Machine, Concrete sleeper breaker and Concrete Sleeper Core Drilling machine.

4.7 The machines must have proper clamping arrangement for rails either separate or common. In any case it must be able to cater the demands of swiveling around $90^0$including rearrangement of machine during any of the operation of cutting, drilling, or grinding.

4.8 It shall be able to operate more than two machines at the same time by connecting through suitable ports with common power pack (as and when required).

**B. Requirement of Abrasive Rail Cutting Unit**

i) The abrasive rail cutting unit shall be capable to cut all types of flat bottom rails up to 60 kg/m and of any metallurgy having UTS up to 120 kg/mm$^2$.

ii) The abrasive rail cutting unit shall have a strong and rigid clamping arrangement which shall fix the machine on rail near the cutting location. The clamping arrangement shall have a suitable location pointer to mark the cutting point on the rail. The fixing and removing mechanism shall be easy and quick in nature. The abrasive rail cutting unit while attached with clamp during cutting operation shall not be loosen/misaligned. The abrasive rail cutting unit shall be attached with the clamp by one pivot point to enable it to swing vertically.

iii) The machine shall function normally in tilted position during cutting.

iv) The abrasive rail cutting unit shall be so designed that there shall be minimum or no vibration during cutting operation to avoid possibility of misalignment and breakage of the abrasive cutting wheel.

**C. Requirement of Drilling Unit**

i) It shall be able to drill hole up to 35 mm dia. in the rail web of any type and section up to 60 kg/m having UTS up to 120kg/mm$^2$.

ii) It shall be able to drill a hole within 02 minutes in R-350(1175 HT) rails.

iii) The tolerance for the diameter and position of the hole shall be $\pm$ 0.7 mm.

iv) Weight of machine shall not be more than 22kg.

**D. Requirement of Concrete sleeper breaking unit:**

i) The equipment shall be simple and easy to operate by two men.

ii) The equipment shall be capable of operation in all positions and angle; however, performance may vary slightly in different positions.

iii) Action of equipment shall be fast enough to break the concrete sleeper into two pieces within 10 minutes.

iv) Fixing of chisel/drill bit and its replacement shall be easy.

v) Equipment shall be such that it can easily be removed in the face of an approaching train.

vi) The equipment shall be vibration dampened, ergonomically designed for minimum operator fatigue.

vii) Equipment shall be as light in weight as much as possible. Weight (without hoses and tool) shall not be more than 30Kg.

viii) Weight of machine shall not be more than35kg.

**E. Requirement of Concrete Sleeper Core drilling unit:**

i) Machine shall be able to core drill in Turn Out PRC Sleeper within 40 minutes depending upon nature of work i.e. condition and type of PRC Sleepers.

ii) The equipment shall be vibration dampened, ergonomically designed for minimum operator fatigue.

**5.0 Technical Features:**

**5.1For hydraulic common power pack**

| | | |
|---|---|---|
| i. | Self-Weight | Max. 110 kg without fixtures* |
| ii. | Engine | 18HP |
| iii. | Fuel Tank Capacity | Min. 7.2 liters |

**5.2For Abrasive Rail Cutting unit:**

| | | |
|---|---|---|
| i. | Rated capacity of power source | Sufficient to cut the rail within the specified time and tolerance. |
| ii. | Speed of the power output shaft | Sufficient to generate speed of power output shaft to cut the rail within the specified time and tolerance. |
| iii. | Overall weight (including rail clamp) | Maximum 22 kg |
| iv. | Cutting time (using abrasive rail cutting wheel as per RDSO spec. No. TM/SM/2 (Rev. 01-2020) | a) 60kg 90UTS rail –5min.(max)<br>b) 60kg 72UTS rail – 4min.(max)<br>c) 52kg 90UTS rail – 4min.(max)<br>d) 52kg 72UTS rail – 2min.(max) |

| | | |
|---|---|---|
| | | (e) R-350(1175 HT) rail-5min.(max) |
| v. | Fixing time of rail clamp and the abrasive rail cutter | Within one minute. |
| vi. | In engine driven cutter, fuel tank capacity | Sufficient to run for minimum 5 cuts for 60 kg 90 UTS rail/ 7 cuts in 52 kg 90 UTS rail and /4 cuts in 1 R-350(1175 HT) rail |
| vii. | Squareness of cuts | $\pm$0.5 mm for vertical and lateral direction. |

**5.3For Rail Drilling unit:**

| | | |
|---|---|---|
| i. | Capacity to drill hole | 60 R to 60 kg/m having UTS of 70 to 120kg/mm$^2$. |
| ii. | Time to drill a hole(dia.-35 mm) | Within 2 minutes in R-350(1175 HT) rails. |
| iii. | Tolerance for the diameter and position of the hole | $\pm$ 0.7 mm |
| iv. | Time required for fixing arrangement | Upto 2 minutes |
| v. | Fuel capacity (per litre) | To drill 10 holes in R-350(1175 HT) rail |
| vi. | Weight of the machine | 22kg (max.) |

**5.4For Concrete Sleeper breaking unit:**

| | | |
|---|---|---|
| i. | Time required to break the sleeper into two pieces | 10 minutes |
| ii. | weight (without required fixtures) | less than 30 kg |
| iii. | Weight of machine unit(with assembly) | 35 Kg.(max.) |

**5.5For concrete sleeper core drilling Unit:**

| | | |
|---|---|---|
| i. | Self Weight(Without drill bit) | 8.5 kg |
| ii. | Core bit size | 45 mm(outer diameter) |
| iii. | Drilling Time | 40 minutes for 5 holes |

**5.6**The overall weight of the entire machine unit shall be less than or equal to **258 kg.[wt.**(110+22+22+35+8.5)=260.50kg (max.)](excluding handling and transportation arrangement)

**6.0 : Tests at the time of supply(Acceptance Test)**

The manufacturer shall produce machine for conducting following tests:

i) Visual Examination
ii) Field Test.

**6.1** Visual Examination: Each machine unit shall be examined for external finish and workmanship.

**6.2** Field Test :

Each machine unit must be able to meet either the technical requirements mentioned in para 5.0 and field test is conducted as mentioned in their specifications as per the clause.

| S.No. | Name of the machine | Specification no. |
|---|---|---|
| 1. | Abrasive Rail Cutter | TM/SM/1 (Rev 02 of 2020) |

| | | |
|---|---|---|
| 2. | Rail Drilling Machine | TM/SM/3 dt. 19.11.1992(First Revision, 2020) |
| 3. | Concrete sleeper breaker | As per clause 4.0 D and clause 5.4 |
| 4. | Concrete sleeper core drilling machine | As per clause 4.0 E and clause 5.5 |
| 5. | Hydraulic Power Pack | TM/SM/TC dated 09.01.2014 (Rev 02 of 2022) |

For drilling unit: Each machine unit shall be tested in field for drilling at least 25 fresh holes in PSC sleepers.

**6.3 Sequence of Tests:**

Acceptance tests shall be carried out on the samples, randomly collected from the consignment as per following manner:

| S.N. | Consignment Size | No. of samples to be tested |
|---|---|---|
| 1. | 1-5 | 1 |
| 2. | 6-10 | 2 |
| 3. | 11-25 | 3 |
| 4. | 25-50 | 5 |
| 5. | More than 50 | 5+1 for every 20 or part thereof beyond 50 nos. |

Arrangement for the field test shall be done by the purchaser by mutual agreement with the manufacturer/ supplier.

**7.0 Inspection:**

7.1 The inspection of the machine unit 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.

7.2 After the machine units have been supplied at consignee's end, the supply shall be considered as complete only after conducting training on operation etc. is provided by the manufacturer/supplier as per clause 11.0.Minimum level of inspecting official shall be JE/SSE(Section Engineer).

**8.0 Warranty & AMC:**

8.1 Any part of the machine 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 are 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 machine purchaser railways may go post-warranty AMC with the supplier for a pre-determined period as decided by him. This may 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 machine shall be supplied with a complete kit of tools and following spare parts:

(i) A complete list of necessary tools and a catalogue of spare tools.

(ii) A complete set of all detachable tools

9.2 The manufacturer shall be responsible for subsequent availability of spares to ensure trouble free service for the normal life of the machine.

**10.0 Documentation:**

10.1 **Operation and Maintenance Manual**: Detailed operating and maintenance manual for the machine shall be supplied by the manufacturer with each unit of the machine in three copies. The operating manual shall contain the instruction for operation, trouble-shooting, maintenance instructions to be followed in the field during normal life of the machine unit. The maintenance schedules shall also be indicated in the maintenance manual.

10.2 Copies of the maker's certificate guaranteeing the performance of the individual machines should be supplied in duplicate along with the delivery of each machine unit (if machines purchased by more than one manufacturer assemble machine unit. Detailed maintenance, and service manual shall be specially prepared and copy of the same shall be supplied with each machine unit.

10.3 In order to facilitate subsequent maintenance in service, the manufacturer shall supply one set of drawing legible and indelible quality. The drawings shall exhibit clearly the materials mentioning relevant codes/specification, if any that are necessary for the manufacture of these items. In case of any proprietary items, the supplier shall indicate terms and conditions under which such drawing and technical knowledge can be made available to the purchaser.

**11.0 Training and commissioning:**

11.1 Adequate training for operation and maintenance of the machine shall be imparted at the rate of three operators per machine which shall be treated as part of commissioning. The training may be imparted either at manufacturer's premises or at consignee depot.

11.2 Adequate training for operation and maintenance of the machine unit shall be imparted at consignee end at the rate of four operators unit during supply which shall be treated as part of commissioning.

11.3 During commissioning, each machine unit of the consignment shall run for at least 30 minutes and at least three small track machines including grinding unit out of those mentioned in clause 1.0 shall be operated with rated pay load at specified speed. Only after successful and satisfactory running of the power pack, the supply should be treated as complete.

**12.0 Marking and Packaging:**

12.1 Each machine and the hydraulic power pack shall be legibly and indelibly marked with the following details:

i) Name and trade mark/brand of the manufacturer/supplier.
ii) Serial No.
iii) Month & year of supply.
iv) Capacity.
v) Contact no. of manufacturer/supplier.

12.2 All exposed surfaces shall be painted with yellow paint of standard quality to protect it from rusting and other weathering effects. All the working parts shall be oiled before

being assembled. The machine unit shall be supplied packed in suitable / wooden crates/plastic molded durable suitcase of convenient size with carrying handle, according to best trade practices to safely transport by rail/road and reach the consignee in safe and satisfactory manner.

13.0 Manufacturers/suppliers have sole responsibility to maintain quality of products supplied to Railways.

14.0 Preference for 'Make in India': The Government of India Policy on 'Make in India' shall be applicable for this specification.

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