

338558/2021/O/OPED/TMM/RDSO	Document No. TM-469	Version-01	Date : January-2021
Document Title: Functional requirement Specification of Hand Driven Portable Rail and Switch Grinding Machine			



Government of India

**Functional requirement Specification of Hand driven Portable  
Rail and Switch Grinding Machine**  
*(First Revision January-2021)*

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## Functional requirement Specification of Hand driven Portable Rail and Switch Grinding Machine

### 1. Scope:

These specifications provide for technical requirement of a hand driven rail-grinding machine for use on the tracks of Indian Railways. The Rail Grinding Machine to be supplied is meant for grinding the rails, switches and crossing including check rail and SEJ in required head profile corrective and preventive mode to clean up the fatigue marks, to improve the worn profile of rail head, rail wheel contact band, to remove fatigued material having micro cracks and other minor surface defects on the rail head. Machine should be able to ground at least 30° on gauge and field side from centre of rail, if 45° in gauge side preference give to that for clean minor cracks and should be especially efficient to grind gauge corner crack caused by rolling contact fatigue. Machine should have computer - human interface to control grinding function. Machine should be light weight (Maximum 120 Kg.) so that, it can on/off track by four persons easily.

### 2. Make in India:

Preference to make in India: Compliance of the instructions contained in Public procurement (Preference to Make in India) order-2017 or current guidelines in the matter shall be ensured.

### 3. Technical Features:

Other technical details are as given below:

Track Gauge	1676 mm
No of Stones	1 or more for each rail
Lateral Shift (Optional)	Up to 30mm either side of rail centre
Grind motor tilt	At least 30° on gauge and field side from rail head centre if 45° on gauge face side that is preferable.
Vertical stroke of Grinding stone	At least 100 mm above the running surface while locked, 50 mm above the running surface while non-grinding mode and in grinding mode adequate pressure on grinding stones.
Grind Power	adequate to perform rail head grinding in preventive and corrective mode
Grind motor Rotation	Minimum 3600 rpm
Diameter of grinding stone	Minimum 150 mm
Grind stone life	Minimum 6 grinding hrs with maximum power utilisation, actual life of stone required to be mentioned by the supplier.
Depth of cut	Minimum 0.15mm
Power supply	Trolley mounted portable, gasoline driven gen set
Power back up	Actual power backup mentioned by the supplier, minimum 6hrs in one day working.
Functional requirement	The rail grinding machine shall be capable of grinding rail

	profile of UIC 60/52 Kg rail section, in 72/90/110 UTS strength, insulated joints and welded joints in long welded rails and short welded and Head Hardened rails. It should also be able to grind rails laid on pre stressed concrete sleepers. It shall also function effectively on rails having surface defects such as wheel burns, shelling etc. Machine should be capable to control grinding operation to maintain rail profile during grinding and also smooth cross sectional profile without creating any sharp edge on the rail top table and gauge face.
Fuel Tank	Minimum capacity of fuel tank is required for 6 hrs/day working.

Complete system should be assembled on light weight Aluminium alloy tubular rolling trolley of heavy gauge to ensure firm grinding power at all time, having hardened single flange roller wheels. During working vibration generated by power source shall not impact the grinding. Grinding work shall be with protective shield to avoid any hazard to the operator or track components

Machine shall be compact and designed for on and off the track working and shall be handled by four persons only.

#### 4. **ISO:**

All the provisions contained in RDSO's ISO procedures laid down in document No. QOD.8.1-11 latest version (titled- "Vendor - Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.

#### 5. **Acceptance Tests (for trial & field):**

- i) Machine shall be physically examined for design, weight and handling by four persons during working.
- ii) During grinding, minimum and maximum grinding depth to be achieved without any metallurgical change i.e. blueing etc. of rail without metal deformation.
- iii) Life of grinding stone must be minimum 6 grinding hrs with full power.
- iv) Machine is able to perform grinding to maintain the rail profile within required surrounding rail profile with maximum tolerances of  $\pm 0.02\text{mm}$ .
- v) Rail surface finishing quality after grind is not less than  $15\mu\text{m}$  measured by digital surface roughness tester.
- vi) Grinding wheel shall be checked for any possible transport damage (ring test). Grinding wheels must be fitted easily on the grinding spindle or clamping device and must be firmly secured to them. After mounting the grinding wheel has to be balanced.

- vii) A good finish should have regular grind marks of the wheels (these are known as facets) with silver finish. A bad finish will have irregular marks or skipped grinding at regular interval or blue colour on rails at certain location (known as blueing defect) or irregular facet width etc. The facet width (the width of the marks left by grinding wheels) shall be about 10mm in the centre of the rail and 4mm at the corners.

#### 6. **Marking and Packing:**

The machine shall be legibly and indelibly marked with:

- i) Name, initials and trade-marks of manufacturer.
- ii) In grinding/ non grinding condition minimum clear gap from rail top.
- iii) Serial number of machine.
- iv) The machine in assemble or open condition along with spare parts shall be packed in wooden boxes, according to best trade practices to minimal wear/damage.
- v) Grinding wheels should be stored in a manner that they cannot be damaged. Grinding wheel is marked with the maximum permissible speed: Permissible r.p.m.

#### 7. **Training and Commissioning:**

Minimum two staff per machine required to be trained for operation and maintenance. This shall be imparted to the operators at consignee end which shall be treated as part of commissioning.

#### 8. **Technical Data Documentations:**

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

- i) Instructions for safe operation of the machine.
- ii) Machine assembly details.
- iii) Parts list, with isometric drawing of the components for easy identification.
- iv) Sequential procedure of the machine opening and closing.
- v) Sequential procedure of machine operation for grinding in safe mechanism.
- vi) Detailed instruction pamphlet for replacing grinding stones and other consumable if needed.

#### 9. **Service Facility and Spare Parts:**

Each set of grinding machine shall be supplied with the following spares.

- i) At least ten grind stones and also provide grind stone specification i.e. Type of grit material (Types Of Abrasives), Grit size, Bond strength or wheel hardness/grade, Bonding material, Structural porosity, Concentration ratio per cubic centimetre of grinding stone volume any other technical parameter as deemed relevant otherwise local availability ensure.
- ii) Required tool set for assembly and de-assemble of machine and grind stone.
- iii) Other consumable for minimum two years.

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- iv) The supplier shall ensure prompt and continuous service and delivery of spare parts for a minimum period of five years.

#### **10. Warranty & Commissioning:**

After qualified acceptance test, commissioning of machine will undertake for on/off track condition and examine all parameters within envelope of specification and machine commissioned on track in required pattern with in safe and secure way. Every machine will offer with minimum two years of onsite warranty including required spares are part of supply. Contractor shall provide the list of required consumable spares and ensure availability of the same in life span of machine.

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