केवल कार्यालयीन उपयोग हेतु
For official use only

भारत सरकार – **Government of India**
रेल मंत्रालय – **Ministry of Railways**

रेलपथ औजारों पर सार–संग्रह

COMPENDIUM ON TRACK TOOLS



केमटेक / 2014 / सि / सीटीटी / 1.0
CAMTECH/2014/C/CTT/1.0

जनवरी – 2014 / **JANUARY – 2014**

Indian Railways
Centre for Advanced Maintenance Technology

महाराजपुर, ग्वालियर – 474005
Maharajpur, Gwalior – 474005
✆ : 0751 - 2470869 & Fax : 0751 - 2470841

रेलपथ औजारों पर सार–संग्रह

COMPENDIUM ON TRACK TOOLS

प्राक्कथन

रेलपथ, रेल परिवहन व्यवस्था की रीढ़ है। रेल्वे भारी भार लम्बी दूरी एवं त्वरित ट्रेनों (गाड़ियों) के लिये रेल पथ संरचना में सुधार के लिये लगातार प्रयास कर रहा है। रेलपथ को सुरक्षित व ठीक हालत में रखने के लिये रेलपथ स्टाफ द्वारा दैनिक मरम्मत और निमार्ण कार्यों के लिये विभिन्न प्रकार के छोटे उपकरण व छोटी मशीनों का उपयोग किया जाता है।

केमटेक द्वारा तैयार पुस्तिका में विभिन्न प्रकार के आवश्यक छोटे उपकरण व छोटी मशीनों को शामिल किया गया है और उनके महत्व को संक्षिप्त में पुस्तक में वर्णित किया गया है।

यह उम्मीद की जाती है कि यह पुस्तिका इन गतिविधियों में लगे भारतीय रेल के सिविल इंजीनियरिंग कर्मियों के लिए निश्चित रुप से उपयोगी सिद्ध होगी।

केमटेक, ग्वालियर *(ए. आर. तुपे)*
दिनांक 26, फरवरी 2014 *कार्यकारी निदेशक*

FOREWORD

The track forms the backbone of railway transportation system. Railways have been striving continuously to improve track structure for heavier loads, longer and speedier trains. To keep the track in safe and fit condition, the different types of small tools and small machines are used by P. Way staff in day to day maintenance and construction works.

The handbook prepared by CAMTECH incorporates various kinds of small tools, which are essential and their importance is briefly described in the book.

It is expected that the handbook will be quite helpful to civil engineering personnel of Indian Railways engaged in these activities.

CAMTECH/Gwalior ***(A.R. Tupe)***
Date: 26, February 2014 ***Executive Director***

प्रस्तावना

भारतीय रेल के पास बी. जी. के लिये 86526 किमी., एम. जी. के लिये 18529 किमी. व एन. जी. के लिये 3651 किमी., रेलपथ का एक बड़ा नेटवर्क उपलब्ध है। विभिन्न प्रकार के उपकरण जिनमें हाथ के औजार तथा मशीन टूल्स शामिल हैं, को रेल पथ की दैनिक मरम्मत व निर्माण कार्यों के दौरान प्रयुक्त किया जाता है।

'रेलपथ औजारों पर सार–संग्रह' पर इस पुस्तिका को तैयार करने का उद्धेश्य रखरखाव/निर्माण कार्यो में व्यापक रुप से प्रयुक्त इन उपकरणों की तकनीकी जानकारी सिविल इंजीनियरिंग स्टाफ को उपलब्ध कराना है।

यह पुस्तिका वैधानिक नहीं है तथा इसमें दी गई जानकारी का उद्धेश्य रेल पथ मरम्मत व निर्माण गतिविधियों में शामिल सिविल इंजीनियरिंग कर्मियों के मार्गदर्शन के लिए ही है। विषय पर जानकारी अधिकांशतः साहित्य सर्वेक्षण और इण्टरनेट खोज पर आधारित है। इस पुस्तिका में शामिल किसी भी जानकारी के अंतिम क्रियान्वयन से पहले अधिक गहराई से जानकारी के लिये इस विषय पर प्रासंगिक साहित्य को निर्दिष्ट किया जाये।

हम आगे सुधार के लिये हमारे पाठकों से किसी भी सुझाव का स्वागत करते हैं।

केमटेक, ग्वालियर — *(एस.के.सक्सेना)*
दिनांक 25, फरवरी 2014 — *उप निदेशक/सिविल*

PREFACE

The Indian Railways have a large network of track covering track kilometres 86,526 for BG, 18529 for MG and 3651 for NG. The various kinds of tools comprising of hand tools as well as machine tools are deployed during day to day maintenance and construction work of track.

The objective to prepare this handbook on 'Compendium on Track Tools' is to disseminate the knowledge of these tools, which are widely used by maintenance/construction staff in track work.

This handbook is not statutory and contents are only for the purpose of guidance to the civil engineering personnel involved in maintenance/construction activities. Most of the data & information in some form or the other are based on literature survey and internet search. For more in-depth information, the relevant literature on the subject may be referred before final implementation of any information contained in this handbook.

We welcome any suggestions from our readers for further improvement.

CAMTECH/Gwalior ***(S.K. Saxena)***
Date: 25, February 2014 ***Dy. Director/Civil***

विषय–सूची / CONTENT

स.क्र. / S. NO.	विवरण / DESCRIPTION	पृष्ठ संख्या / PAGE NO.
	प्राक्कथन / FOREWORD	*i*
	प्रस्तावना / PREFACE	*ii*
	विषय सूची / CONTENT	*iii*
	संशोधन पर्ची / CORRECTION SLIP	*iv*
1.0	*परिचय / INTRODUCTION*	*01*
2.0	*हाथ वाले औजार / HAND TOOLS*	*02*
3.0	*मशीन औजार / MACHINE TOOLS*	*11*
	संदर्भ / REFERENCES	*24*
	टिप्पणी / NOTES	*25*

संशोधन पर्चियों का प्रकाशन
ISSUE OF CORRECTION SLIPS

इस हस्तपुस्तिका के लिये भविष्य में प्रकाशित होने वाली संशोधन पर्चियों को निम्नानुसार संख्यांकित किया जायेगाः

The correction slips to be issued in future for this handbook will be numbered as follows:

केमटेक / 2014 / सि / सीटीटी / 1.0 / सीएस # XX दिनांक _____

CAMTECH/2014/C/CTT/1.0/CS # XX date _____

जहॉ XX सम्बन्धित संशोधन पर्ची की क्रम संख्या है (01 से प्रारम्भ होकर आगे की ओर)

Where "XX" is the serial number of the concerned correction slip (starting from 01 onwards).

प्रकाशित संशोधन पर्चियॉ
CORRECTION SLIPS ISSUED

क्र.सं. / Sr. No.	प्रकाशन की तारीख / Date of issue	संशोधित पृष्ठ संख्या तथा मद संख्या / Page no. and Item No. modified	टिप्पणी / Remarks

Chapter – 1

परिचय/Introduction

An essential ingredient in the successful running of a railway is a well maintained system of Railway track, which consists of rails, sleepers and ballast on formation. It is the duty of P. Way officials to keep the track in safe, sound and in fit condition.

The railway track, which is multi gauge, multi traction system running across India and covering track kilometers 86,526 for BG, 18529 for MG and 3651 for NG requires frequent maintenance as far as safety of passengers is concerned. It is very important to maintain track manually as well as mechanically by employing various kinds of tools such as hand tools, machine tools, and other tools, which are important to check the track parameters.

In sub sequent chapters, the chapter – 2 covers hand tools which are generally used by Gangs in day to day work to maintain track manually. The chapter – 3 covers the machine tools which are power operated and effectively employed during track maintenance.

***

Go to index

Chapter – 2

हाथ वाले औजार/Hand Tools

These tools have been used for centuries. They are fast, simple, and effective in day to day maintenance practices generally adopted by the persons, who are deployed in track maintenance activities.

2.1 फावड़ा/Phowrah (Spade)

The tool consists of an iron blade adapted for pressing into the ground with the foot and a handle. It is used for digging the ground, for scalping and scraping away or uprooting weed, and for breaking and moving earth.

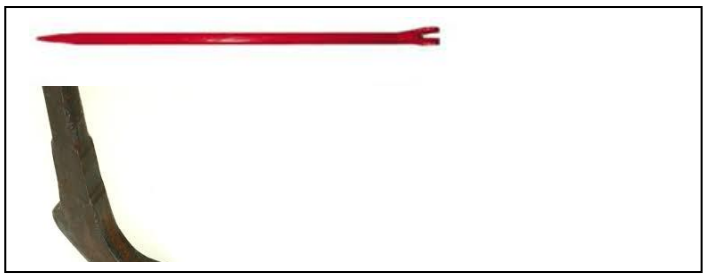


Uses: Essentially its use is specific in

- Surface dressing
- Clearing coarse weeds and undergrowth
- Dragging sand, soil, or fine stone
- Manual excavation
- Opening of ballast for track maintenance

2.2 पिन कटा/Crowbar

It is a steel bar, usually tapered at one end and slightly bent at the other end making it either flattened or break shaped.



Use:

1. Clawed end is used to take out the dog spike from the wooden sleepers.
2. To lift the track for surfacing.
3. To correct the alignment.
4. Sometimes the tapered end is also used for packing ballast under the concrete sleepers.

2.3 तगाड़ी/Pan mortar

A broad, shallow container of metal, usually having sides flaring outward toward the top is an essential tool, which required in track maintenance work.



Use: Filling ballast, earth and muck etc.

2.4 गैंती/Pick Beater

It is a tool designed to transmit force to an object by direct contact and thereby drive it forward. This hand tool consist of an iron or steel head, usually curved tapering to a point at one end and broadens at another end, is mounted on a wooden handle. The circumference of the wooden handle is wider at its base where it is attached to the metal blade.



Use:

1. The tapering end is used for

- Digging, loosening and breaking up hard and semi hard earth in between the sleepers.
- Digging below the sleepers.
- Packing small ballast under the sleepers.
- Creating space in between the ballast.

2. The broad end is used for driving ballast under the sleepers.

2.5 पिक कुल्हाड़ी/Pick Axe

A tool with a long wooden handle at right angles to a curved iron or steel bar with a point at one end and a chisel or point at the other, used for breaking up hard ground or rock. The Pick axe is a small sharp digging tool, generally used to breaking road surface on level crossing gates. It is also listed in tool list on L.C. gates.



2.6 बेलचा/Shovel

It is an implement that consists of broad metal blade attached to a long wooden handle. It has three parts. The blade made up of wrought steel conforming to IS:1570 Sch.VI, T-50, T-55 and T-60, is square mouth for carrying as well as moving or shifting ballast, sand, earth, etc another part is shaft made of hard wood conform to IS:2897. The third part is tubular made up of alloy steel.



Use: It is used to take up, removing and placing of ballast on the sleepers. It is also used to remove the earth from the track.

Go to index

2.7 दतार/Ballast Rake

It is generally used for handling of ballast. The material for rake should be wrought steel conforming IS: 1570 part 2. Fitted 1.5 m long shaft made of hard wood. Its use is specific in boxing to ballast section.



2.8 सब्बल/Bar Straightening

Straight Bar with ball and Point ends, which is generally used in many applications such as slewing, sleeper spacing, handling of material, etc. is also utilized for packing of sleepers.



2.9 दाब पहारी/Bar Claw

A claw bar is a long metal bar with a bend on one end normally made of medium-carbon steel. The bent head of a claw bar is shaped like a 'J'. It is used as a lever for lifting of track.



2.10 कटौनी/Tommy Bar (20 x 450mm)

A short bar as a lever to provide torque for tightening a box spanner or key is used for multipurpose, to clean the gaps in between running rails and check rails, to create gap to accommodate the liners in between rail foot and insert of PRC sleeper, for aligning the fish bolt hole to rail hole to insert bolt, For precise rail handling while loading and unloading of rails. It is essential tool to be kept on level crossing gates. It is also used to lift the rail for



- inserting the wedges underneath the rail while doing alignment process for A.T. welding.
- placing the rubber pads under rail foot.

Go to index

2.11 तार पंजा/Wire Claw

It is used to open/ close the track by pulling the ballast inside or out side the rail foot, to fill the ballast or earth in pan mortar. It is also a dressing tool, used in filling the impresions made by tamping tool during machine packing, and in dressing of shoulder ballast and cesses.



2.12 तार छन्ना/Wire Basket

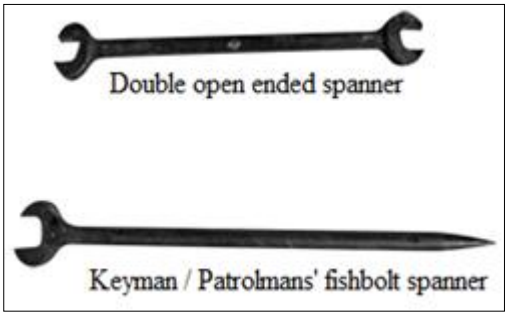
Wire baskets conform to IS: 6845- 1972 are used for screening ballasts manually in track maintenance in Indian Railways.



Material - The main body of the wire basket is woven from 2.80 mm galvanized mild steel wire conforming to IS: 280-1962 'Specification for mild steel wire for general engineering purposes (revised)'. The handle and frame is manufactured from galvanized wire of 10 mm diameter conforming to IS: 280-l 962. The handles is be fitted opposite each other on two sides and swing the basket freely on to the frame. The mesh size of the basket shall be 10 x 10 mm, max.

2.13 पाना/Spanners

Spanners are used for tightening the nuts. As shown in the figure the following spanners are used in various applications:

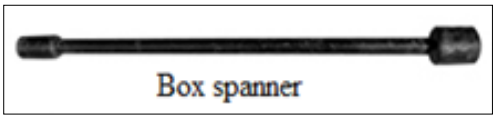


फिश बोल्ट/क्रासिंग बोल्ट पाना
Fish-bolt/Crossing bolt spanners – For Fish-plated rail joint

समायोज्य पाना/**Adjustable Spanner** – Generally used on Stretcher bar bolts, Rail bond bolts, etc.



रेल स्क्रू/प्लेट स्क्रू पाना/**Rail Screw/Plate Screw Spanner –** Used on Switch portion of Turnouts, SEJs, etc.





2.14 हथौड़ा/Hammer

Hammers conforming to IS: 841 are used as striking tools. Hand hammer is light in weight used by the smith himself. Sledge hammer is heavier in weight and is used by the smith's helper. Hammers are used to drive keys, spikes, nails, bolts and wedges. They are also used to strike chisels, punches and shape metals.







2.15 रेल छिद्रक रैचेट/Rail drilling Ratchet

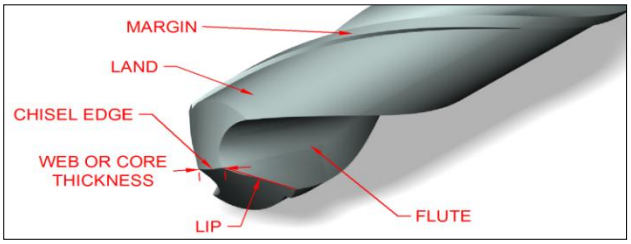
The ratchet serves hand drilling in railway track on most type of rails.



2.16 रेल बंध छिद्रक/Track Bond Drill/ Drill Twist

Drill bit shall be used conforming to IS: 5103 – 1969 (Reaffirmed 2002).

- High Speed Steel drill 31.75 mm Ø is used for drilling hole in rails for fixing fish plates on plane track. 28 mm Ø is used for drilling hole in rails for fixing joggle fish plate on weld joints.



- 26.50 mm Ø high Speed Steel drill is used to drill hole in rail on CMS crossing joints. 22.50 mm Ø high speed steel drill is used to drill hole in Stretcher bar in switches of T/out.

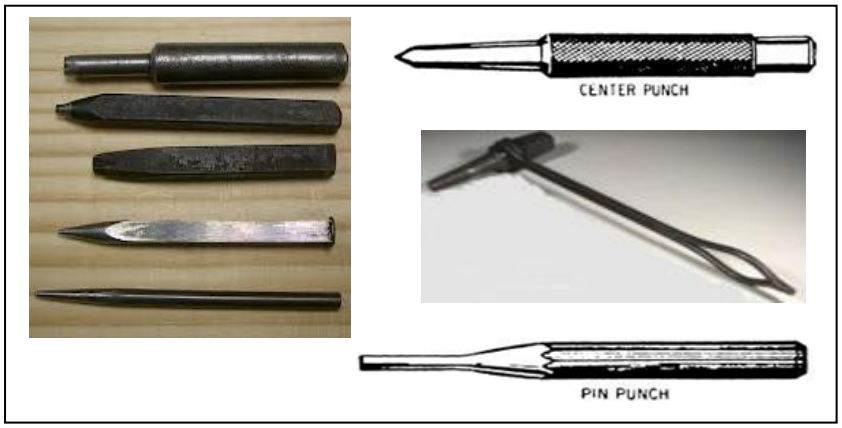


- Go to index

- 17.50 mm Ø high speed steel drill is used to drill hole in rail for traction bond in electrified areas.



2.17 सुंभी/Punches



A hand punch is a tool that is held in the hand or with the help of tong and struck on one end with a hammer. There are many kinds of punches designed to do a variety of jobs. Figure shows several types of punches. Most punches are made of tool steel.
Punches are used to punch hole in metals, to mark the metal. Drive pins or rivets to free frozen pin from their holes and aligns holes in different section of metal.

- **Centre punches** intended to start holes to drill with a twist drill.
- **Round punches** intended to punch holes in steel sheets.
- **Pin punches** intended to drive out straight or tapered pins.
- **Marking punch** intended to mark letters on metal.

2.18 छेनी/Chisel (IS: 402)

Chisels are used for cutting metals. Cold chisels are used to chip and cut cold metal, blacksmith chisels are used to cut hot metal. A special chisel is used to cut extra metal on hot AT weld.







2.19 रेल छेद चैम्फरिंग किट/Rail hole chamfering kit:

Chamfering kit is a tool used for chamfering and work hardening the sharp edges of the periphery of a fish-bolt hole. This tool is used in a pair on both sides of the rail web on the drilled fish bolt hole to be chamfered. The dimensions and assembling of different parts i.e. H.T. Bolt, packing sleeves chamfering kits and the H.T.S nut shall be as per drawing no. TM/0512.

Go to index

Use: Chamfering kit is used to chamfer rail holes to eliminate chances of developing crack at the sharp edge of drilled holes in rail.

A high tensile fish bolt 130 x 20 mm with nut as per drawing no. TM/0512 (Alternately high tensile hexagonal head bolt M 20 x 17.3 with nut as per IS-1367)	01 no.
Chamfering bits	02 nos.
19 mm Square drive sockets (Size 32 mm)	02 nos.
Packing pieces (sleeves)	02 nos.
Torque wrench with ratchet mechanism (Torque capacity 100 to 400 lb. ft.) 1.25 m long.	01 no.
Square box wrench of nominal size 19 mm (if hexagonal head bolt is used)	01 no.



2.20 पैन्ड्रोल क्लिप स्नेहन औजार/Tools for Lubrication of ERCs

PRC Insert cleaning brush: The eye of the insert shall be cleaned by suitable Brush. This brush may be used to clean inside of insert.



Wire brush and emery paper: The ERCs should be cleaned by wire brush and emery paper.



2.21 पैन्ड्रोल क्लिप निकालने एवं लगाने वाला/ERC Extractor / Applicator

It is applied for fixing or removing the ERCs on PRC sleepers.



2.22 रेल टंग/Rail Tongues

It is used for handling of rails.



2.23 रेल शंट केबिल (जम्पर)/Rail Shunt-Cable (Jumper)

Rail shunt Cable operating during track works, for bridging gaps which may be caused during removal of fish-plates or rails, temporary metallic jumpers of approved design is provided.



2.24 नाल काटना/Cutting Blowpipe

Use: Oxy cutting of Rails, nuts and bolts, dismantling of Tracks etc. To fabricate check rails and guard rails. It is an essential tool to meet out emergencies. It is recommended to keep with BCM working.



Feature:

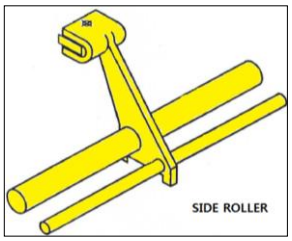
- Cutting Capacity until 300 mm
- Length 420 mm
- Oxygen and acetylene Valves

2.25 डीस्ट्रैसिंग रोलर/De-stressing Roller

These are used on every 15th sleeper on rail seat under foot of rail for easy longitudinal movement of rail.



If the track is curved, fit the side support rollers adjacent to the under-rollers on the outside of the curve, to maintain control of the rail laterally.



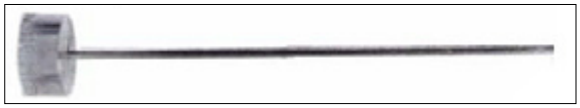
2.26 रेल रोलर/Rail Roller

Rail rollers are used for longitudinal movement of rail panels.



2.27 दुरमुट/Rammer

Used for hand compaction for road surface and ballast.



2.28 गिट्टी प्रोफाइल खाका/Ballast Profile Template

The ballast section is dressed to the specified dimensions, a template being used for the purpose.



2.29 सन की रस्सी/Hemp Cord

Hemp cords 6 mm. dia. of sufficient length is used for lining the top and bottom edges of the ballast section.



2.30 लकड़ी मैलेट/ Wooden Mallet

It is used to strike rails to assist in their longitudinal movement during de-stressing process.



***

Go to index

Chapter – 3

मशीन औजार/Machine Tools

Track maintenance and track laying manually is time consuming process. Due to growing traffic and introduction of heavier track structure, faster and more efficient methods of maintenance are needed to be evolved and thus use of machines has become a basic necessity. The role of small track machines has increased for quality maintenance of track. Different types of small machines have been developed for various activities on track. These small track machines are to be used for day-to-day maintenance, laying and construction of track.

3.1 रेल छिद्रक मशीन/Rail Drilling Machine



The machine comprises of driving engine with drilling unit coupled together rigidly. Fixing arrangements with rail i.e., clamping unit is also provided to ensure straight and correct position of drilling the holes.

Uses: Rail drilling machine is used for drilling of holes in rail web of all types of rails.

Fuel consumption:

- Minimum 10 Nos. of holes in 60 Kg/90 UTS rails with 1 litre of fuel.
- No. of holes that can be performed in a day: 60 holes (approx.)

Drill spindle rotation: 60 to 90 rpm (Tolerance for diameter and position of the hole: + 0.7 mm)

Drill bit: As per IS: 5103-1969, and shall last for 100 fish bolt holes in 60 Kg/90 UTS rails.

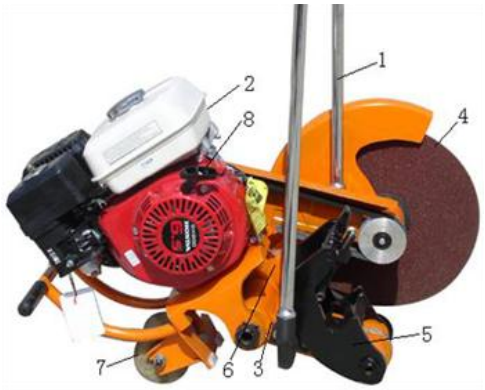
Important Features:

Overall weight	: 65 Kg (approx.)
Drilling time	: 3 to 4 minutes
Fixing time	: 2 minutes
Prime Mover (Engine)	: Petrol start, kerosene/petrol run 3 HP engine at 3000 to 4000 rpm.
Fuel tank capacity	: 2.0 Litres (approx)

3.2 घर्षण रेल कटर/Abrasive Rail Cutter

The machine comprises of petrol driven Engine, integrated with a cutting unit fitted with an abrasive disc.

Use: Abrasive rail cutter is used for quick cutting of all types of rail sections including wear resistant, head hardened rails up to 110 UTS.





1-operating lever, 2-internal combustion engine, 3-swing arm, 4-principal axis cutting disc, 5-clamp, 6-cutting arm, 7-running wheel, 8-hand power startup handle

Salient features:

Prime mover	A petrol engine of about 7 HP at 7000 RPM .
Fuel Tank Capacity	The fuel tank capacity shall be at least 1 litre, which shall be sufficient for at least 5 cuts in 52 kg 90 UTS rails.
Overall weight	Maximum 35 kg.
Tolerance	± 1 mm both from vertical and lateral faces of railhead.
No. of cuts per disc	Minimum 7 numbers of cuts on 52 Kg 90 UTS

Cutting time: Recommended Rail cutting time in minutes.

- 60 Kg/m, 110 UTS : 5 Minutes
- 60 Kg/m, 90 UTS : 4 Minutes
- 52 Kg/m, 90 UTS & other rails : 3 Minutes
- 52 Kg/m, 72 UTS & other rails : 2 Minutes

3.3 रेल कटिंग आरी मशीन/Rail Cutting Machine Saw Type

It is portable, is suitable for cutting of rails. It is a compact unit placed on a trolley which can be run mono rail as well as on the ground. Fixing clamp is also provided with the machine as an integral part.

Go to index

Salient features:

Prime mover	Petrol start, kerosene/petrol run engine 2.0 to 3.0 HP capacity at 3000-4000 rpm
Fuel tank capacity	Sufficient for making 4 to 5 rail cuts
Overall weight of the machine including wheel arrangement	70 Kg
Cutting time for each cut	Maximum time is 30 minutes
Tolerance of squareness both vertical and lateral	± 1.0 mm
Fuel consumption	Minimum two cuts for 1 litre fuel.



3.4 रेल पथ उत्तोलक/Track Jacks

These are used for lifting of track during track maintenance/construction work like spot attention, picking up slacks in isolated patches etc.

(a) Mechanical Track Jack: The mechanical track jack is a rack and pinion/rack and pawl assembly, housed in a robust frame having a base plate fitted at the bottom of the jack. In rack and pinion model, by moving the pinion through a gear train with an external handle, the rack is lifted upward. In rack and pawl model, the rack is lifted by movement of the pawl. The jack is non-infringing type and it can be released instantaneously in face of an approaching train.



1 – Rack & Pinion



2 – Rack & Pawl

Features:

Minimum lifting capacity	(a) with top – 8.0 Ton , (b) with toe - 7.0 Ton
Height of top of jack in lowest position	250 mm (maximum)
Height of toe of jack in lowest position	120 mm (maximum)
Area of base plate	155mmX 300 mm (approx.)
Length & size of operating handle	1250 mm long, 30 mm dia. (for rack and pawl model) 800 mm long, 20 mm dia.(approx.) (for rack and pinion model)

Lift	100 mm (minimum)
Weight (without handle)	20 Kg (Max.)

There are some other types of Mechanical Track Jacks, which are being used in different railways.





(b) Hydraulic Track Jack: The hydraulic track jack is a portable lifting device comprising of a hydraulic lifting ram integrated with a hydraulic hand pump. The jack is having a release key and a pre-set safety release valve.

Use: The hydraulic track jack (non–infringing type) is used for lifting of track in track maintenance/construction work.



Salient features:

Items	**10 Tones Jack**	**15 Tones Jack**
Capacity	10 tonnes	15 tonnes
Closed height	166 ± 3 mm	166 ± 3 mm
Maximum hydraulic lift	80 ± 3 mm	80 ± 3 mm
Weight (without handle)	10.5 ± 0.5 Kg	13.5 ± 0.5 Kg
Base Area	300 sq.cm. (approx)	300 sq.cm. (approx)
Length of operating handle	750 mm (approx)	750 mm (approx)

3.5 हाइड्रोलिक रेल टेन्सर (गैर उल्लंघनकारी प्रकार)/Hydraulic Rail Tensor (non-infringing type) 70 Tonne capacity: Hydraulic force is applied on the rail by means of two numbers double acting cylinders operated by a hand pump fitted with direction control valve, oil distributor and pressure gauge. Cylinder is connected to hand pump by means of high pressure rubber hoses and quick connect - disconnect couplers.

Use: It is a device used for rail de-stressing operation in LWR track and for stress free welding by maintaining specified gap at rail joints for A.T welding. The rail is evenly de-stressed throughout its length.

Main components of the machine:



- Rail gripping heads or yokes
- Right hand lever arm assembly
- Left hand over arm assembly
- Cylinders
- Connecting rods
- Pins
- Pump with tank

Salient features:

- Maximum total weight including hand pump : 375 Kg.
- Maximum weight of any individual part : 115 Kg
- Maximum pulling force : 70 t
- Maximum pushing force : 30 t
- Hydraulic ram stroke : 300 mm (minimum)
- Rail section to be handled (to pull up to 150 mm) : 90 R/52 Kg/60 Kg.

3.11 रेल बेन्डर (जिम क्रो)/Rail Bender (Jim Crow)

Use: Rail Bender is used for bending/ de-kinking of all types flat bottom rails in horizontal plane.



1. **Manual rail bender**: It is manually operated, force applied on its spindle with the help of bar straightening.

2. **Hydraulic Rail Bender Heavy duty:** The machine consists of hydraulic hand pump, C-frame with holding jaws, double flanged wheels and handle. The stroke i.e. lateral movement of rail that can be affected is minimum 40 mm.



Salient features:

Bending force : 60 tonnes
Maximum piston stroke : Not less than 40 mm

Weight : Maximum 115 Kg
Holding span for bending : 725-900 mm
Time for operation : 10 minutes (approx.)
Time for fixing : 2 minutes (approx.)

3.12 हाइड्रोलिक रेल जोड़ सीधा करने वाला/Hydraulic Rail Joint Straightener

The rail joint straightener consists of the following main components –

- Lifting beam
- Chassis i.e., main frame and hydraulic ram
- Out rigger with hand pump
- Loading bar and link. By operating the pump, the ram is actuated, which exerts pulling force at the lifting point through lifting bar.



Use: These are used for straightening the dipped fish plated joint. Hydraulic rail joint straightener is manually operated hydraulic equipment for de-hogging dipped welded / fish-plated joints for improving longitudinal profile of rail.

Salient Features:

- Maximum rated capacity : 80 tonnes
- Maximum Ram stroke : 60 mm
- Total weight : 275 Kg (Max.); Heaviest component–120 Kg
- Time for straightening of 60 Kg 90 UTS rail joint : 8 minutes (maximum)
- Assembling/dismantling time : 2 minutes (maximum)
- Maximum lift : 60 mm

3.13 रेल सरकन समायोजक/Rail Creep Adjuster

The rail creep adjuster comprises of a hydraulic cylinder with spigots for fixing on rail web at fish bolt holes and a pumping unit with direction control valve. The pump is connected to creep adjusting unit through hydraulic hoses. The cylinder, being double acting in nature acts in both pulling and pushing mode to enable the adjuster to close or widen the gap at rail joint as per site requirements.



Use: It is a hydraulic jacking device for creep adjustment of fish plated track.

Salient features:

- Approx. weight : 45 Kg.
- Minimum pulling force : 6.5 tonnes
- Minimum pushing force : 7.0 tonnes
- Maximum stroke : 150 mm
- Centre to centre distance between spigots : 330 mm (approx.)
- Time for assembly : 6 minutes (approx.)
- Time for operation : up to 5 minutes
- Overall dimensions (max) : Length 720 mm, Width 350 mm

3.14 हाइड्रोलिक स्लीपर स्पेसर/Hydraulic Sleeper Spacer

It is a light weight; non infringing type equipment used to re-space/square the sleepers. It consists of a 8t capacity hydraulic jack, back plate (having tapered thickness), saddle cap and reaction rods. When the pump is operated, the piston of the jack exerts sufficient pressure on the sleeper causing its lateral shifting.



Use: Hydraulic Sleeper Spacer is used for re-spacing/squaring of sleepers.

Salient features:

- Weight (without operating lever and reaction rods) : 14 Kg (maximum)
- Rated capacity : 8 tonnes
- Length of hydraulic jack in closed position : 200 mm
- Hydraulic lift : 125 mm (travel of ram)
- Screw extension : 75 mm (minimum)
- Time for squaring the sleeper : 5 –7 minutes including fixing and removal
- Base size : 150 mm x 140 mm

3.15 कंक्रीट स्लीपर ब्रेकर और कोण घिसने वाला/ Concrete Sleeper Breaker and Angle Grinder

Concrete sleeper breaker and angle grinder is an electrically /engine (petrol or diesel) driven breaking equipment which imparts vibration impacts through a drill bit /chisel to break concrete sleepers/pavement/brickwork into pieces.



Use: Concrete sleeper breaker and angle grinder is used primarily for breaking the concrete sleepers into pieces

thereby facilitating quick removal of damaged concrete sleepers and restoration of railway track in case of accidents/derailments and other such emergent situations. It may also be used for breaking brick work, asphalt and rocks.

Salient Features: (Angle Grinder)



- Power Input : 1400 watts
- No-load Speed : 11000 rpm
- Weight : 2Kg (approx) Angle Grinder

Salient Features: (Hammer Breaker)

- Rated voltage (electric prime mover) : 220 V single phase or 440 V 3 – phase
- Power input full load (electric prime mover) : 1700-2200 W approx.
- Impact rate of rated speed : 1000 rpm.(approx)
- Impact Energy : 50 J
- Weight : 30 Kg(approx)

The machine shall be electrically insulated as per IS: 1271-1985 (Reaffirmed-2001). Action of the equipment is fast enough to break a concrete sleeper into pieces within ten minutes.

3.16 कंक्रीट स्लीपर छिद्रक मशीन/Concrete Sleeper Drilling Machine

Concrete sleeper drilling machine is a hand held drilling equipment powered by an electrical motor or an engine. The machine can drill hole in concrete sleepers from 10 mm Ø to 22 mm Ø up to a max. depth of 150 mm.

Use: Concrete sleeper drilling machine is used to drill hole (vertically) into concrete sleeper in-situ for fixing of guard rail and check rails on concrete sleeper track at specified location.

Salient Features:



(a) For electrically driven machine:
Supply voltage: 230-250 Volts A.C., 50 Hz.
Weight: 10 kg (Maximum)

(b) For engine operated machine:
Prime Mover: I.C. engine
Weight: 50 Kg (Maximum)

(c) The machine shall be electrically insulated as per IS: 1271-1985 (Reaffirmed-2001).

Go to index

3.17 वहनीय डी सी वैल्डिंग जनरेटर/Portable D.C. Welding Generator

The portable D.C. welding generator comprises of an I.C. engine coupled with an alternator and control panel for welding as well as auxiliary output. For electric arc welding of worn out points and crossing, the generator supplies direct current whereas the auxiliary output supplies A.C. The generator set is mounted on a tubular frame having four nylon wheels to move on cess and two double flanged wheels to move on rail.



Use: It is a portable generator for producing DC current for the operation of arc welding equipment for reconditioning of points and crossings at site. It also has an auxiliary AC unit for producing alternating current required for miscellaneous applications such as lighting at work-site, operation of electrically driven devices like rail profile grinder, rail drilling/cutting machine etc.

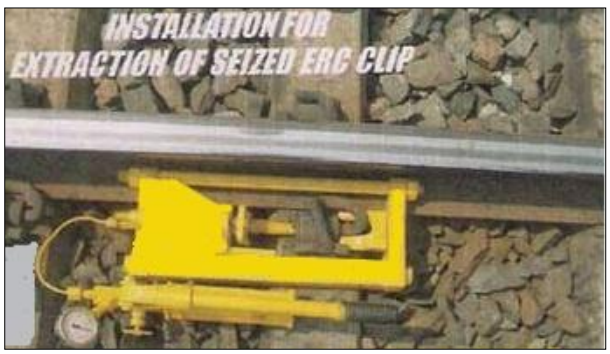
Salient features:

Engine	15 HP Petrol / Diesel/kerosene run engine
Range of welding current	60 to 200 amp
Rated current	Maximum welding current shall not be less than 200 amp at 60% duty cycle (one duty cycle of 5 minutes comprises of 3 min. welding load followed by 2 min. no load operation).
Current regulation	Current is regulated by regulating switch/device with graduation to show the magnitude of current range
Open circuit voltage	Max. 100 V
Auxiliary output	2500 watts at 220-240 v (A.C.) at 50/60 Hz
Weight	Max 150 kg (excluding transportation arrangement)

The machine shall be electrically insulated as per IS: 1271-1985 (Re-affirmed-2001).

3.18 पैन्ड्रोल क्लिप को निकालने वाला टिकाऊ हाइड्रोलिक यंत्र/Heavy Duty Hydraulic Extractor for Jammed ERCs

The equipment is compact and robust in design. It consists of a feed rod/pin and a hydraulic ram with pump fitted in a heavy and strong frame. The frame is having holding arrangement with the rail foot. The equipment can be operated without traffic block.



Use: Heavy Duty Hydraulic Extractor for Jammed ERCs is used to remove jammed ERCs from concrete sleepers without any damage to the sleeper.

Salient Features:

- Maximum weight : 40 Kg
- Extraction force exerted on clip : 10 tones (minimum)
- Extraction stroke : 20 mm (minimum)
- Ram screw extension : 25 mm
- Time taken for removing jammed ERC including fixing & removing : 5-10 minutes

3.19 ट्रॉलीस (वहनीय रेलपथ भारोत्तोलन एवं स्लूइंग यंत्र)/TRALIS (Portable Track Lifting and Slewing Device)

TRALIS consists of two sets of vertical and horizontal hydraulic jacks operated by a single hand pump. Jacks and hand pump is connected by hoses and has Oil Distributor. Jacks can be controlled for vertical lifting and horizontal slewing from a central location.

Use: It is a hydraulic device used for lifting and slewing of all types of tracks and turnouts for maintenance/ laying purpose.
Salient features:

Reaction Support plate size	Min 400 x 200 x50 mm (fabricated)
Reaction Trough size	140x 300 mm
Close Height	230mm (top of saddle to bottom of reaction support plate)
Vertical jack Capacity Vertical jack Hydraulic lift	10 tonnes 80 mm (approx.)
Horizontal jack Capacity Horizontal jack Hydraulic stroke	5 tonnes 100 mm (50mm left/50 mm right)
Overall weight (including hydraulic jacks , hoses, hydraulic pumps, valves and reaction troughs)	60 Kg (maximum)



- It is capable of lifting and slewing a track / turnout laid with wooden / CST-9/ST/PRC sleepers with 52 Kg/60 Kg rails. It can be operated by a single man by using its hydraulic hand pump connected with hydraulic cylinder / jacks through rubber hoses.
- It is capable of giving differential lift for adjustment of cross levels of track
- The length of rubber hoses is such that TRALIS can be operated from cess easily.
- It is capable of working in track circuited and electrified areas.

Go to index

3.20 हाथ द्वारा बाहरी रेलपथ टेम्पर/Hand held Off Track Tampers

The tamping tools of tamping equipment are made of alloy steel/high carbon steel. One set of off track tampers includes four hand held tampers with two external / internal power sources. Power source can be electrical, hydraulic or a mechanical engine fuelled suitably.





Use: Off track tampers are used for tamping of track for slack picking in concrete sleeper track as a means of intermediate attention in between the runs of on track tampers. These tamping equipments shall be able to tamp Concrete sleeper track including locations like points and crossings, bridge approaches, level crossing approaches and switch expansion joints etc.

Salient features

(i) Tamper :

- Weight of hand tamper : 12 Kg (Approx)
- Weight of tamping tool : 2.5 Kg (Approx)
- Power input : up to 1600 watts
- Impact rate (Blow/min) : 900 to 2200 in adjustable mode

(ii) Power source :

- Capacity : 3.6 Kw minimum at 230 V, AC at 7300 RPM
- Current output : up to 8.5 Amp
- Fuel : As specified by manufacturer
- Starting mechanism : Rope start/self start.
- Continuous operating time : Not less than 4 hours

The machine shall be electrically insulated as per IS: 1271-1985 (Reaffirmed- 2001).

3.21 रेलपथ आधारित चिकनाने वाला/Track based Lubricators



Para 427(2) of IRPWM provides that Rail flange lubricators should be provided on curves of radius

600 meters and less on Broad Gauge to avoid Rail face wear.It is well known that rail lubrication increases the wheel and rail life by preventing friction and decreasing the wear between the rail-wheel interfaces, saves energy, and can reduce wheel noise. It can also reduce lateral forces and flange climb forces that can lead to flange climb derailments.

3.22 एटी वैल्डिंग के लिये डबल एक्शन वेल्ड ट्रिमर (पावर पैक संस्करण)/Double Action Weld Trimmer for AT Welding (Power pack version)

The equipment consists of a trimming unit and a power pack. Two shear blades of trimming unit travel towards each other by hydraulic force provided by two double acting cylinders. The power pack comprises of a hydraulic pump with direction control valve and an engine. The hydraulic cylinders are connected to the pump through hydraulic hoses.

Use: This machine is used for trimming the extra weld metal from rail (top and sides) of AT welded rail joint after the welding operation.

Salient features:

Prime mover	Petrol start kerosene/petrol run engine of minimum rating 3 HP
Hydraulic stroke	120-150 mm
Minimum shearing force	18 tonnes
Total weight	175 Kg (Max.)
Life of shear blade	Trimming of minimum 200 joints



a. Tolerance before grinding (with respect to standard dimensions of rail section):-
   I. Top of rail head : + 0.5 mm to + 1.5 mm
   II. Side width of rail head : + 1.00 mm to + 2.0 mm
b. The machine is also provided with emergency hand pump device which can be used in case of failure of power pack for retrieving the trimming unit.

3.23 रेल प्रोफाइल वेल्ड ग्राइंडर/Rail Profile Weld Grinder

The rail profile weld grinder consists of a grinding unit coupled with an engine/electric motor and fitted to a light weight frame. The grinding unit can be moved up or down by a feed screw fitted to the frame. The frame is having two set of rollers right angle to each other attached at its both legs for to and fro movement of the grinder during grinding operation.



Use: Rail profile weld grinder is used for grinding of A.T. welded joints after weld trimming operation is complete.

Salient features:

- Power pack : Generator or A.C. supply
- Weight including power pack: 80 Kg (Maximum)
- Grinding time : 15 minutes (max.)
- Grinding tolerance:
  (a) 0.5 mm on top of rail head, gauge and non gauge faces with 1 metre straight edge,
  (b) 0.2 mm on top of rail head with 10 cm straight edge,
  (c) 0.3 mm on gauge and non gauge faces of rail head with 10 cm straight edge,
- The machine shall be electrically insulated as per IS: 1271-1985 (Reaffirmed-2001).

3.24 पावर्ड रेल हॉलिंग प्रणाली/Powered Rail Hauling System

The Powered Rail Hauling system is basically a powered winch. It consists of a winch coupled with an engine through cone clutch for transmission of power from engine to the winch. Special foundations are not required, as the robust construction allows the machine to be seated on the rail (anchor) at its anchoring brackets and held firmly by bolts at the fish-plate holes of the rail and can also be retained by suitable slings or chains. The engine is mounted on detachable base with drive transmitted by means of cone clutch.



Use: Powered Rail Hauling System is used for:

- Pairing and butting edges of long welded rails (10/20 rail panels)
- Stacking of long welded rails
- Hauling heavy material, structures, equipment during construction, accidents, derailments etc. ,
- Hauling vehicles, BFR, BRH and such equipment on track
- Hauling heavy cables for laying.

Salient features:

- Weight of complete unit : 190 Kg (approx.)
- Engine capacity : 6 H.P. (minimum) at 1500 rpm
- Fuel Tank capacity of engine : 4 litres (minimum)
- Mean rope hauling speed : 2-3 metres per minute.

***

Go to index

संदर्भ / REFERENCE

1	Indian Railways Permanent Way Manual
2	Indian Railways Small Track Machine Manual
3	RDSO Technical Specifications for Track Based Lubricators (Electronic & Hydraulic Type) (June 2013)
4	RDSO Specification of Magnetic Base Type Rail Thermometer (No. Tm-67 Dt. 28 .01 .2002) Rev.01 Of 2010
5	IS:6845- 1972 for Wire Basket For Screening Ballast

***

Go to index

टिप्पणी/NOTES

गुणवत्ता नीति

रेलों में यात्री और माल यातायात की बढती माँग को पूरा करने के लिए गुणवत्ता प्रबंध प्रणाली में अनुसंधान, डिजाइनों और मानकों में उत्कृष्टता तथा सतत् सुधारों के माध्यम से सांविधिक और नियामक अपेक्षाओं को पूरा करते हुए सुरक्षित, आधुनिक और किफायती रेल प्रौद्योगिकी का विकास करना।

QUALITY POLICY

To develop safe, modern and cost effective Railway technology complying with Statutory and Regulatory requirements, through excellence in Research, Designs & Standards and Continual improvements in Quality Management System to cater to growing demand of passenger and freight traffic on the Railways.

Go to index

डिस्क्लेमर/Disclaimer

The document prepared by CAMTECH is meant for the dissemination of the knowledge/ information mentioned herein to the field staff of Indian Railways. The contents of this handbook/booklet are only for guidance and not statutory. Most of the data & information contained herein in the form of numerical values are indicative and based on the tests/trials conducted by various agencies generally believed to be reliable. While reasonable care and effort has been taken to ensure that information given is at the time believed to be fare and correct and opinion based thereupon are reasonable. Due to very nature of research it can not be represented that it is accurate or complete and it should not be relied upon as such. The reader/user is supposed to refer the relevant codes/ manuals available on the subject before actual implementation in the field.

हमारा उद्देश्य

अनुरक्षण प्रौद्यौगिकी और कार्यप्रणाली को उन्नयन करना तथा उत्पादकता और रेल्वे की परिसम्पत्ति एवं जनशक्ति के निष्पादन में सुधार करना जिससे अन्तर्विषयों में विश्वसनीयता, उपयोगिता और दक्षता प्राप्त की जा सके।

यदि आप इस सन्दर्भ में कोई विचार और सुझाव देना चाहते हों तो कृपया हमें इस पते पर लिखें:

सम्पर्क सूत्र	:	उप निदेशक (सिविल)
पत्राचार का पता	:	भारतीय रेल उच्च अनुरक्षण प्रौद्योगिकी केन्द्र, महाराजपुर, ग्वालियर (म.प्र.) पिनकोड - **474005**
टेलीफोन	:	0751–2470869
फैक्स	:	0751–2470841
ई–मेल	:	**dircivilcamtech@gmail.com**

Go to index

Our Objective

To upgrade Maintenance Technologies and Methodologies and achieve improvement in productivity and performance of all Railway assets and manpower which inter-alia would cover Reliability, Availability, and Utilisation.

If you have any suggestion & comments, please write to us:

Contact person	**:**	**Dy. Director (Civil),**
Postal Address	**:**	**Indian Railway Centre for Advanced Maintenance Technology,** **Maharajpur, Gwalior (M.P.)** **Pin code – 474 005**
Phone	**:**	**(0751) - 2470869**
Fax	**:**	**(0751) – 2470841**
Email	**:**	**dircivilcamtech@gmail.com**