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No. :- TM/RGM/SRGM
सख्या :- टीएम/आरजीएम/ एसआरजीएम

Date : 01.2025
दिनांक : 01.2025

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II- मुख्य अभियंता (सी.पी.ओ.एच. कार्यशाला) अहमदाबाद — Chief Engineer (CPOH Workshop), Ahmedabad
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IV- प्रधानाचार्य भा.रे.रे.प.म.प्र.के. पीपलगांव प्रयागराज - 211011 — Principal IRTMTC, PipalGaon, Prayagraj -211011

Detailed addresses are enclosed herewith.

विषय : स्विच रेल ग्राइंडिंग मशीन - 20 स्टोन (हार्सको) की अनुरक्षण अनुसूची पुस्तिका .

Sub : Maintenance Schedule Manual of Switch Rail Grinding Machine -20 stone (Harsco).

स्विच रेल ग्राइंडिंग मशीन - 20 स्टोन (हार्सको) की अनुरक्षण अनुसूची पुस्तिका की मसौदा एवं अनंतिम क्रमशः पत्र सं टीएम/आरजीएम/एसआरजीएम दिनांक 08.04.2024 द्वारा 30 दिनो के लिये और टीएम/आरजीएम/एसआरजीएम दिनांक 17.05.2024 द्वारा 15 दिनो के लिये सभी क्षेत्रिय रेलवे, सी.पी.ओ.एच. कार्यशालाओं एवं भा.रे.रे.प.म.प्र.के. प्रयागराज को टिप्पणी हेतु जारी किया गया था, जिसके उपरांत प्राप्त टिप्पणी के आधार पर अब स्विच रेल ग्राइंडिंग मशीन - 20 स्टोन (हार्सको) की अनुरक्षण अनुसूची पुस्तिका अंतिम रूप मे तैयार की गई है, जिसकी प्रति आपके सूचनार्थ तथा मशीन के कर्मचारियों, जो फील्ड में कार्य कर रहे है के मार्ग दर्शन हेतु संलग्न है। यद्यपि उपरोक्त सूची बनाते समय सभी सावधानियाँ बरती गई है, फिर भी यदि कोई त्रुटि हो तो, कृपया अपने सुझावों/ टिप्पणियों को ईमेल/फैक्स/पत्राचार द्वारा अधोहस्ताक्षरी को अवगत करायें।

Draft and Provisional of Maintenance Schedule Manual of Switch Rail Grinding Machine -20 stone (Harsco) was circulated to all zonal railways, CPOHs and IRTMTC/PRYJ vide letter no. TM/RGM/SRGM dated 08.04.2024 for 30 days and vide letter no. TM/RGM/SRGM dated 17.05.2024 for 15 days respectively, for seeking comments/suggestions. After which on the basis of comments received from railway. Now, Maintenance Schedule Manual of Switch Rail Grinding Machine -20 stone (Harsco) has been finalized. A copy of the same is enclosed herewith for your information and guidance of the machine staff working in the field. However, every care has been taken during preparation of the above said list, discrepancy noticed, if any, may be brought to the knowledge of the undersigned for further improvement, by email/fax/post.

Email address: rgmtmmrdso@gmail.com

DA: As above

JAINENDRA KUMAR SINGH
Digitally signed by JAINENDRA KUMAR SINGH
Date: 2025.01.24 10:05:00 +05'30'

जैनेन्द्र कुमार सिंह
(Jainendra Kumar Singh)
निदेशक/ ट्रैक मशीन
(Director/Track Machine)

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15.0	पश्चिम मध्य रेलवे, जबलपुर - 482001	West Central Railway, Jabalpur-482 001
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Government of India - Ministry of Railways

Research Designs and Standards Organisation

भारत सरकार रेल मंत्रालय

GOVERNMENT OF INDIA MINISTRY OF RAILWAYS

स्विच रेल ग्राइंडिंग मशीन - 20 स्टोन (हार्सको) की अनुरक्षण अनुसूची पुस्तिका

Maintenance Schedule Manual for Switch Rail Grinding Machine - 20 Stone (Harsco)

रिपोर्ट संख्या टीएम – 296

REPORT NO. TM – 296

जनवरी – 2025

JANUARY – 2025

इंफ्रास्ट्रक्चर निदेशालय (रेलपथ मशीन एंव मानीटरिंग)

अनुसंधान अभिकल्प और मानक संगठनए लखनऊ -226011

DIRECTORATE OF INFRASTRUCTURE (TRACK MACHINE & MONITORING)

RESEARCH DESIGNS & STANDARDS ORGANISATION, LUCKNOW-226011

PREFACE

Maintenance of On-Track Machines is a challenging task. Maintenance of these machines is being done by Zonal Railways with the assistance of local trade available, Zonal Track Machine Workshops, CPOH / Allahabad, Rayanapadu, Kanchrapara & Ahmedabad and RDSO / Lucknow. With experience over the years, the railway engineers have developed adequate expertise in the maintenance of these machines. However, in absence of approved maintenance instructions, different maintenance practices have come into vogue. Therefore, it has become imperative to have a uniform maintenance standard throughout the Indian Railways.

Maintenance Schedule Manual of Rail Switch Rail Grinding Machine (SRGM/ Harsco) has been prepared on the basis of maintenance instructions given by Harsco manual and Indian Railways Track Machine Manual-2019. The manual is prepared for those items which is required for day to day maintenance. Apart from these instructions if any part of machine fails/breakdown that shall be attended immediately by the railway. The oiling and greasing shall be done on every moving part where as required in addition to manual depending on discretion of machine in charge. Some time machine modified/altered on the basis of experience or Harsco suggestion that shall be also undertaken in the maintenance practice. If the Engine of machine is under AMC then instruction/maintenance schedule of repairing/alteration of Engine may be followed as per terms and conditions of this manual.

While every care has been taken to make the maintenance schedules quite exhaustive, there is always scope for further improvement. Suggestions from the railways in this regard will be welcome and may be sent to the undersigned for future improvement.

(Jainendra Kumar Singh)
Director/Track Machine-VI
RDSO/Lucknow-226011

JAN. - 2025

EXPLANATORY NOTES

While preparing Maintenance Schedule Manual for Switch Rail Grinding Machine (SRGM/Harsco), the terms used and their meanings are explained below:-

CHECK - Ensure a specific condition does or does not exist.

INSPECT - Look for damage and defects including breakage, distortion, cracks, And Corrosion and wear check for leaks, security and that all items are completed.

CHANGE - Fit new or overhauled or reconditioned part in place of old parts and missing parts.

OVERHAUL - Dismantle, examine, recondition or renew parts as necessary against given specifications, reassemble, inspect and test.

Maintenance Schedule Manual for Switch Rail Grinding Machine (SRGM/Harsco)

S.N.	Schedule	Periodicity	Duration	Location
1.	Schedule I	Daily/ before working & running	08 hour.	In the track Machine Siding
2.	Schedule II	50 Engine hrs.	10 hours.	-do-
3.	Schedule III	250 Engine hrs.	12 hours.	-do-
4.	Schedule IV	1000 Engine hrs.	03 days	-do-
5.	Schedule V	3000 Engine hrs.	10 days	In CPOH Workshop
6.	Schedule VI	6000 Engine hrs.	20 days	In CPOH Workshop
7.	Schedule VII	15000 or 60 months whichever is earlier	1st POH- 45 days, 2nd POH- 60 days	In CPOH Workshop

Note: *Maintenance Schedule Manual for* Switch Rail Grinding Machine- 20 Stone (Harsco) *is taken as mentioned in IRTMM-2019. Any modification in this schedule will be done in future after gaining some experience in regard to maintenance of this machine*.

INDEX

SCHEDULE - I
(TO BE DONE DAILY)
DURATION 08 HOURS

S.N.	DESCRIPTION
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Inspect the engine alternator belt for Wear, Cracking, Flat spots, Stretching, Foreign contaminants on the belt, Tears, Abrasion, and Any missing ribs. Replace the main engine alternator belt, if necessary.
1.2.	Check for fuel tank level sight gauge cracks, leakage, and clarity. Clean or replace as Needed.
1.3.	Check the main engine coolant level on the coolant sight gauge.
1.4.	Inspect the engine oil levels. Fill as necessary.
1.5.	Inspect the engine area for leaks, spills, fuel odors, loose components or damaged parts.
1.6.	Inspect Fire Detection System.
1.7.	Walk around the machine and look for any abnormalities.
1.8.	Check engine oil level. Replenish as needed.
1.9.	Check engine coolant level. Replenish as needed.
1.10.	Drain water and sediment from fuel filter / water separator.
1.11.	Check air cleaner restriction indicators. If plugged filters are indicated, clean or replace filters.
1.12.	Visually inspect entire engine for signs of leaking fluids i.e. :fuel, lubricating oil and coolant. Tighten or repair components as needed.
1.13.	Visually inspect engine mounted hydraulic pumps for secure mounting, leaks, etc. Tighten, repair or replace components as needed.
1.14.	Visually inspect the entire engine, engine and skid mounting for signs or loose, missing or broken fasteners. Tighten, repair or replace components as needed.
1.15.	Visually inspect the entire engine, engine and skid mounting for signs or damaged, cracked or missing components. Repair or replace components as needed.
1.16.	Visually inspect engine cooling system radiator, fan blades, tubes, hoses, clamps, etc. for signs of leaking fluid, loose or damaged components. Tighten, repair or replace components as needed.
1.17.	Visually inspect entire fuel system including main fuel tank. Inspect for signs of leaking fuel, bent, cracked lines, loose or damaged components. Tighten, repair or replace components as needed.
1.18.	Visually inspect air cleaner housings, tubes, clamps and rubber elbows and adapters for tightness, cracks, damage, etc. Tighten, repair or replace components as needed.
1.19.	After engine is started, listen for unusual noises. Correct problems as necessary.
1.20.	Visually inspect battery charging alternator for build-up of dust or debris. Clean as necessary.
1.21.	Visually inspect engine wiring. Inspect for signs of fraying, cracked insulation, loose, corroded or bad connections. Repair components as needed.
1.22.	Check charge indicator on engine room fire suppression dry chemical cylinder.
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Inspect the engine alternator belt for Wear, Cracking, Flat spots, Stretching, Foreign contaminants on the belt, Tears, Abrasion, and Any missing ribs. Replace the aux engine alternator belt, if necessary.
2.2.	Check for fuel tank level sight gauge cracks, leakage, and clarity. Clean or replace as Needed.
2.3.	Check the main engine coolant level on the coolant sight gauge.
2.4.	Inspect the engine oil levels. Fill as necessary.
2.5.	Inspect the engine area for leaks, spills, fuel odors, loose components or damaged parts.
2.6.	Inspect Fire Detection System.(it will be inspected in general maintenance).
2.7.	Walk around the machine and look for any abnormalities.
2.8.	Check engine oil level. Replenish as needed.
2.9.	Check engine coolant level. Replenish as needed.
2.10.	Drain water and sediment from fuel filter / water separator.
2.11.	Check air cleaner restriction indicators. If plugged filters are indicated, clean or replace filters.
2.12.	Visually inspect entire engine for signs of leaking fluids i.e. fuel, lubricating oil and coolant. Tighten or repair components as needed.
2.13.	Visually inspect engine mounted hydraulic pumps for secure mounting, leaks, etc. Tighten, repair or replace components as needed.

S.N.	DESCRIPTION
2.14.	Visually inspect the entire engine, engine and skid mounting for signs or loose, missing or broken fasteners. Tighten, repair or replace components as needed.
2.15.	Visually inspect the entire engine, engine and skid mounting for signs or damaged, cracked or missing components. Repair or replace components as needed.
2.16.	Visually inspect engine cooling system radiator, fan blades, tubes, hoses, clamps, etc. for signs of leaking fluid, loose or damaged components. Tighten, repair or replace components as needed.
2.17.	Visually inspect entire fuel system including aux fuel tank. Inspect for signs of leaking fuel, bent, cracked lines, loose or damaged components. Tighten, repair or replace components as needed.
2.18.	Visually inspect air cleaner housings, tubes, clamps and rubber elbows and adapters for tightness, cracks, damage, etc. Tighten, repair or replace components as needed.
2.19.	After engine is started, listen for unusual noises. Correct problems as necessary.
2.20.	Visually inspect battery charging alternator for build-up of dust or debris. Clean as necessary.
2.21.	Visually inspect engine wiring. Inspect for signs of fraying, cracked insulation, loose, corroded or bad connections. Repair components as needed.
2.22.	Check charge indicator on engine room fire suppression dry chemical cylinder.
3.	**MAIN GENERATOR**
3.1.	Visually inspect bearing housings for signs of grease seepage.
3.2.	Check operating temperatures of generator stator windings with infrared temperature sensing gun.
3.3.	Check the control panel voltmeter for proper stability and voltage output.
3.4.	Monitor the power factor and generator loading during operation
4.	**AUX. GENERATOR**
4.1.	Visually inspect bearing housings for signs of grease seepage.
4.2.	Check operating temperatures of generator stator windings with infrared temperature sensing gun.
4.3.	Check the control panel voltmeter for proper stability and voltage output.
4.4.	Monitor the power factor and generator loading during operation
5.	**MECHANICAL**
5.1.	To remove the grind dust.
5.2.	To Clean the RPMS lens. (KLD Lens).
5.3.	Check the fluid level in the hydraulic reservoir using sight gauge on reservoir.
5.4.	Inspect all hydraulic piping, hoses, fittings and components in the grinding system for tightness, damage, wear, leaks, etc. Tighten, repair or replace components as needed.
5.5.	Use Jupiter hydraulic diagnostic panel to check for restricted pressure supply filter with engine running. Replace if necessary
5.6.	Check indicator on return filter housing for restricted return filter with engine running. Replace if necessary
5.7.	While operating, use Jupiter hydraulic diagnostic panel to monitor pump pressures and hydraulic fluid temperatures
6.	**HYDRAULIC SYSTEM - GRIND CARRIAGE**
6.1.	Check the hydraulic fluid level in the tank using the sight glass. Fill as necessary.
6.2.	Inspect the hydraulic system.
6.3.	Check & record maximum hydraulic oil temperature of the day during working.
6.4.	Check the hydraulic system in the control car, engine room and grind car for wear and damage.
6.5.	Check the hydraulic cooler fins and motor for any leakages.
7.	**HYDRAULIC SYSTEM - PROPEL**
7.1.	Check the fluid level in the hydraulic reservoir using sight gauge on reservoir
7.2.	Inspect all hydraulic piping, hoses, fittings and components in the grinding system for tightness, damage, wear, leaks, etc. Tighten, repair or replace components as needed.
7.3.	Use Jupiter hydraulic diagnostic panel to check for restricted pressure supply filter with engine running. Replace if necessary.
7.4.	Check indicator on return filter housing for restricted return filter with engine running. Replace if necessary
7.5.	While operating, use Jupiter hydraulic diagnostic panel to monitor pump pressures and hydraulic fluid temperatures.

S.N.	DESCRIPTION
8.	**PNEUMATIC**
8.1.	Check the air compressor oil level.
8.2.	Inspect the air compressor for any air or oil leaks.
8.3.	Inspect the air horn tank pressure regulator setting. The pressure should be 6.2 bar (90 psi).
8.4.	Check Automatic/independent brake application system.
9.	Check all type of brake application.
9.1.	Drain condensation from air reservoirs.
9.2.	Visually inspect air lines (pipe and hose), connections, reservoirs, valves, etc. for tightness, breaks, cracks, wear, fraying, damage, etc. Tighten, repair or replace components as needed.
9.3.	Fully charge air system. Inspect the entire system, listening for air leaks. Tighten, repair or replace components as needed.
9.4.	Clean dust from air compressor inlet filter using dust unloading valve.
10.	**ELECTRICAL**
10.1.	Check charging of batteries and its voltage.
10.2.	Check all lamp lenses and reflectors for damage. Replace if necessary.
10.3.	Check lighting system (head lights, tail, working lights & flasher light).
10.4.	Visually inspect electrical cables, conduits and connections for cracks, fraying, corrosion, tightness, damage, etc. Tighten, repair or replace components as needed.
10.5.	Visually inspect all running lights and work lights for proper operation.
11.	**BOGIE AND UNDERFRAME**
11.1.	Clean off any dirt or oil mixed deposits not removed by the air wand.
11.2.	Check that all accessible parts of the bogie frame, traction motors, and brake components are clean and free of damage or defects.
11.3.	Visually inspect the bogie frame, bolster, and supporting structure for any visible damage, cracks, and deformity.
11.4.	Visually inspect the connections to the frame or coach body for damage, cracks, loose bolt connections, cables and hoses, and side bearer pad thickness.
11.5.	Ensure all coil springs are not broken.
11.6.	Inspect all hose couplers for any damage.
11.7.	Inspect the under frame of the machine for loose, detached, corroded or damaged parts for the following areas: 1. Brake and running gear. 2. Bogie frame, springs, and bolster (including bolster mountings). 3. Body-to-bogie bond connections. 4. Body-to-bogie flexible hoses. Check for kinked hoses. 5. Couplers 6. Hook and buffer welded joints. 7. Stone storage box mountings. 8. Under frame tanks and mountings. 9. Diesel generator mountings. 10. Grind buggies and mountings. 11. Cab mounting pads and bolts.
11.8.	Inspect the wheel for signs of spalling or shelling which has metal expelled from the tread.
11.9.	Inspect the wheel for signs of tread buildup.
11.10.	Inspect the grooved tread, if one is visible.
11.11.	Inspect the wheel tread for flat spots.
11.12.	Visually inspect the entire bogie for signs or loose, missing or broken fasteners. Tighten, repair or replace components as needed.
11.13.	Visually inspect the entire bogie for signs or damaged, cracked or missing components. Repair or replace components as needed.
11.14.	Check the transmission shift air cylinder for air leaks and operation. Visually inspect the gear box and hydraulic drive motor for signs of leaking fluids i.e.: gear box lubricant and hydraulic oil. If leaking fluid is visible, determine the cause and make corrections as needed
11.15.	Check lubricant level gear boxes. Fill if required. (Two gear boxes per drive bogie, one drive bogie per car)

S.N.	DESCRIPTION
12.	**GRIND CARRIAGE**
12.1.	Clean and inspect the grease fittings for wear or damage. Replace any damaged or worn fittings as necessary.
12.2.	Inspect the motor top mounting bolts for tightness, damage, and wear. Replace any worn mounting bolts or tighten as necessary. The motor mounting bolts secure the grind motor to the grind module top/bottom plates.
12.3.	Inspect the grind motor grease fitting for leaks or breakage safety wires. Replace if necessary.
12.4.	Visually inspect the buggy up rotary limit switches/Sensor proximity switch.
12.5.	To inspect the grind motor bearing, free spinning for vibration & abnormal sound.
12.6.	Look for buggy hydraulic fluid leaks near the fittings and tighten any loose connections as necessary.
12.7.	Inspect the buggy hoses for blistering, brittleness, cracks, or any fraying to the fire-sleeve.
12.8.	Inspect the O-ring and backup ring. Replace if necessary.
12.9.	Check the tank temperature and sight glass.
12.10.	Tighten any fittings that are leaking. If the leak persists, replace the O-ring.
12.11.	Check UP/ DN mechanism of grinding modules.
12.12.	Check grinding wheels for cracks, chips or missing.
12.13.	Visually inspect guide tubes for wear, gouges and scoring.
12.14.	Visually inspect motor lift cylinder for leaks, damage, etc
12.15.	Visually inspect hydraulic cylinder bushings and pins.
12.16.	Visually inspect entire grinding carriage for loose, missing, worn, damaged, etc. components
12.17.	Check grinding carriage operation: raise / lower, latch, etc
12.18.	Visually inspect spark curtains for wear, excessive build-up of grinding debris, tears, etc. Replace worn or damaged spark curtains.
12.19.	Remove grinding dust and slag (blow down at end of work shift).
12.20.	Grease inner and outer guide tubes.
12.21.	Inspect grinding carriage wheels per rail road rules and specifications.
13.	**DUST COLLECTOR**
13.1.	Check dust collector filters for plugging. Replace as needed.
13.2.	Empty dust collection hoppers as needed.
13.3.	Grease dust collector fan motors as needed.
14.	**GENERAL**
14.1.	Do complete walks around of the rail grinding consist before the start of the work shift. Visually inspect for leaking fluids, missing guards or shields, damaged or missing components. Tighten, repair or replace components as needed.
14.2.	Make sure rail grinder work areas, platforms, etc. are clean of debris, oil, etc. Make sure all tools and supplies are secured in there storage locations.
14.3.	To clean a ditch sprayer.
14.4.	To inspect the hose reel.
14.5.	Clean/replace a faulty tie spray nozzle.
14.6.	Visually inspect all the brake shoes on both sides of the bogie. Replace the brake shoes if any worn, cracked, missing, or damaged.
14.7.	Check charge indicators on all portable fire extinguishers.
14.8.	Visually inspect all running lights and work lights for proper operation.
14.9.	Check all warning devices, communication radios, etc. for proper operation
14.10.	Check the security and condition of the couplers between the cars. At the same time, inspect the air brake lines, water lines, electrical cables and all connections between the cars.
14.11.	Check Fire prevention / fighting systems (water pumps, spray bars, water cannons, ditch spray, hose reels, etc.) for proper operation.
14.12.	Visually inspect the engine room air intake filter media. Clean /replace as needed.
14.13.	If required, perform daily brake test procedure per railroad rules.

S.N.	DESCRIPTION
	TO BE DONE AFTER 20 HOURS OF ENGINE RUNNING (In addition to above)
1.	**GRINDING CARRIAGE**
1.1.	Check guide tube bolts.
1.2.	Check spreader bracket bolts.
1.3.	Check cradle pivot bracket bolts
1.4.	Check lift plate bolts.
	TO BE DONE AFTER 20-40 HOURS OF ENGINE RUNNING (In addition to above)
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Visually inspect fan belts and alternator belt. Check belt condition and tension. Adjust / replace as necessary

SCHEDULE - II
(TO BE DONE AFTER 50 HOURS OF ENGINE RUNNING)
DURATION- 10 HOURS
(TO BE DONE IN ADDITION TO SCHEDULE-I)

S.N.	DESCRIPTION
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Visually check the fuel tank level sensor and cabling for any damage or possible failure.
1.2.	To drain water from the fuel tank.
1.3.	Examine all mounting fasteners and bolt for any wear, damage, or loosening.
1.4.	Inspect the air intake piping from the filters to the engine for any damaged or loose connections.
1.5.	Inspect exhaust piping for damage, loose connections, and missing or broken clamps.
1.6.	Inspect the engine and generator platforms for any indication of fluid leakage.
1.7.	Inspect all hose and pipe connections for leaks. If defects are found, shut down and lockout the affected engine. Drain the fuel tank, if necessary, to make repairs.
1.8.	Inspect the radiator fins, fans, and motors for any signs of damage. Check for cracks, loose rivets, and bent or loose fan blades. Ensure the fan is tightly secure.
1.9.	Inspect the intake piping for wear points and damage to piping, loose clamps, and punctures. Replace as necessary to prevent the air system leaking.
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Visually check the fuel tank level sensor and cabling for any damage or possible failure.
2.2.	To drain water from the fuel tank.
2.3.	Examine all mounting fasteners and bolt for any wear, damage, or loosening.
2.4.	Inspect the air intake piping from the filters to the engine for any damaged or loose connections.
2.5.	Inspect exhaust piping for damage, loose connections, and missing or broken clamps.
2.6.	Inspect the engine and generator platforms for any indication of fluid leakage.
2.7.	Inspect all hose and pipe connections for leaks. If defects are found, shut down and lockout the affected engine. Drain the fuel tank, if necessary, to make repairs.
2.8.	Inspect the radiator fins, fans, and motors for any signs of damage. Check for cracks, loose rivets, and bent or loose fan blades. Ensure the fan is tightly secure.
2.9.	Inspect the intake piping for wear points and damage to piping, loose clamps, and punctures. Replace as necessary to prevent the air system leaking.
3.	**MAIN GENERATOR**
3.1.	Visually inspect bearing housing exterior for build up of dust. Clean if necessary.
3.2.	Visually inspect voltage regulator to ensure that air flow is not restricted. Clean with compressed air. Air pressure is not to exceed 3.4 bar (50 psi).
3.3.	Check connections between voltage regulator and system to ensure that they are tight and free of corrosion.
4.	**AUXILIARY GENERATOR**
4.1.	Visually inspect bearing housing exterior for build up of dust. Clean if necessary.
4.2.	Visually inspect voltage regulator.
4.3.	Check connections between voltage regulator and system to ensure that they are tight and free of corrosion.
5.	**MECHANICAL**
5.1.	To clean the dust fan wheel and housing.
5.2.	Clean the dust housing baffle, inlet plenum, and frame interior.
5.3.	Visually inspect the drawbars for wear, damage on structures and/or paint. Replace any worn drawbars as necessary.
5.4.	To grease the main engine radiator fan motor.
6.	**HYDRAULIC**
6.1.	Inspect all buggies hydraulic hoses for wear and damages.
6.2.	Check hydraulic oil cooler for signs of leaks. Clean hydraulic oil cooler fins using compressed air.
7.	**PNEUMATIC**
7.1.	Check the oil level through the sight glass and replenish any lost oil.

S.N.	DESCRIPTION
8.	**ELECTRICAL**
8.1.	Check all battery terminals. Remove, clean and reinstall as necessary.
8.2.	Check electrolyte level, specific gravity of battery & record. Clean & tighten battery terminals & leads.
8.3.	Inspect & clean alternator of engine & tighten electrical connection.
9.	**BOGIE AND UNDERFRAME**
9.1.	Inspect all flanges attached to both hydraulic and HST cooler.
9.2.	Inspect the tank air breather filter for damage or leaks on the HST tank.
10.	**GRINDING CARRIAGE**
10.1.	Inspect cradle hydraulic cylinders
10.2.	Inspect and grease carriage connector and draw bar pivot bearings.
11.	**GENERAL**
11.1.	Inspect cab and electrical room pressurizer filters for dust build-up or plugging. Clean or replace filters as required
11.2.	Inspect and clean or replace air conditioner recirculating air filters.
	TO BE DONE AFTER 100 HOURS OF ENGINE RUNNING (In addition to above)
1.	**GRINDING CARRIAGE**
1.1.	Grease grinding motor upper and lower bearings.
1.2.	Grease motor lift cylinder rod and end caps.
1.3.	Grease cradle pivot pins.
2.	**BOGIES**
2.1.	Check brake cylinders and brake linkage components. Check for missing components, cracks or damage. Check tightness. Repair or replace as needed.
2.2.	Soap test all tubes and hoses leading to brake cylinders. Repair or replace as needed.
2.3.	Check the manual release device for the spring applied parking brake for proper operation. Repair or replace as needed.
2.4.	Inspect brake shoes and brake shoe mounting components. Check for missing components, cracks or damage. Check brake shoe thickness. Repair or replace as needed.
	TO BE DONE AFTER 200 HOURS OF ENGINE RUNNING (In addition to above)
1.	**PNEUMATIC**
1.1.	Clean / change air compressor inlet filter.
2.	**HYDRAULIC SYSTEM - PROPEL**
2.1.	Change hydraulic charge filters (if indicated).
2.2.	Change cooling loop filter (if indicated).
2.3.	Change hydraulic return filter (if indicated).
2.4.	Change hydraulic reservoir breather filter.
2.5.	Sample and test hydraulic system fluid.
3.	**ELECTRICAL - GENERAL**
3.1.	Clean electrical rooms and junction boxes.

SCHEDULE III
(TO BE DONE AFTER 250 HOURS OF ENGINE RUNNING)
DURATION-ONE DAY
(TO BE DONE IN ADDITION TO SCHEDULE-I &II)

S.N.	DESCRIPTION
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Inspect the condition of the flexible wire-way conduit between the generator and the electrical enclosure.
1.2.	To remove Primary filter in six month and Secondary 03 Month
1.3.	Check the fuel tank filling cap, vent valves, and covers for indications of corrosion, damage, or leaks. Replace if required.
1.4.	Visually inspect fan belts and alternator belt. Check belt condition and tension. Adjust / replace as necessary
1.5.	Replace the engine fuel/water separator filter.
1.6.	Replace the engine oil filters.
1.7.	Replace main engine new coolant filters.
1.8.	Clean battery terminals
1.9.	Obtain cooling system coolant sample
1.10.	Test / Add cooling system coolant additive (SCA)
1.11.	Clean / replace air cleaner element.
1.12.	Sample engine oil
1.13.	Change engine oil and filter.
1.14.	Check function of engine protection devices
1.15.	Lubricate fan drive bearing
1.16.	Replace fuel system secondary filter
1.17.	Inspect hoses and clamps
1.18.	Clean radiator
1.19.	Inspect/adjust Electronic Unit Injector, valve lash and valve rotators/Initial 250 Hours.
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Battery electrolyte level check
2.2.	Inspect the condition of the flexible wire-way conduit between the generator and the electrical enclosure.
2.3.	Check the fuel tank filling cap, vent valves, and covers for indications of corrosion, damage, or leaks. Replace if required.
2.4.	Visually inspect fan belts and alternator belt. Check belt condition and tension. Adjust / replace as necessary
2.5.	Clean battery terminals
3.	**MECHANICAL**
3.1.	Inspect the gasket and spring tension on cap.
3.2.	Inspect fan blades for cleanliness and free of cracks.
3.3.	Inspect fins for dust accumulation.
3.4.	Inspect the pulleys. The grooves should have no sharp edges or chips.
3.5.	Check that the pressurization blowers are working and there are no unusual noises.
3.6.	Lubricate the Dust Blower motor.
4.	**HYDRAULIC**
4.1.	Inspect all hoses for kinks, twists, or rubbing. Look for signs of leakage that may indicate a loose fitting.
4.2.	Inspect the sight glass for cracks.
4.3.	Inspect for signs of leaks.
4.4.	Check the hydraulic pump discharge pressures. • Low pressure: 8.3 bar (120 psi) (for propel 13.8 bar or 200 PSI & for grind system 103 to 107 bar or 1500 to 1550 PSI)

S.N.	DESCRIPTION
4.5.	Check gauges and filter restriction indicators on the hydraulic filter assemblies. • Red = Requires Action • Yellow = Report to Supervisor or Crew Chief • Green = Requires No Action
4.6.	Inspect for signs of leakage in the hydraulic system.
5.	**ELECTRICAL**
5.1.	Visually inspect all electrical wiring and components for indications of heat damage or loose connections.
5.2.	Inspect common bus cables for wear.
5.3.	Inspect inside the lockers for cleanliness. Clean as necessary.
5.4.	Replace any damaged or missing bonds/braids/straps as necessary.
5.5.	Inspect and close the enclosure.
5.6.	Inspect all lights for any damage or malfunctions, replace if required.
5.7.	Replace any defective lamps, outlets, and switches.
6.	**BOGIE AND UNDERFRAME**
6.1.	Check all fasteners for tightness around the entire cooler and both fan guards. Replace any missing fasteners.
6.2.	Re-tighten any loose fasteners and replace any damage fasteners.
6.3.	Replace any cables and hoses with rub marks larger than 1 centimeter (0.40 in.).
7.	**GRIND**
7.1.	Inspect the dust hopper and blower motor areas for any accumulation of grind dust.
7.2.	Inspect dust system welds for cracks or breaks.
7.3.	Check that the ducting is properly bolted/clamped and mounting brackets and dampeners are in good condition.
7.4.	Inspect for excessive vibration while the dust blower motors are running.
7.5.	Inspect filter doors for proper sealing.
	TO BE DONE AFTER 500 HOURS OF ENGINE RUNNING (In addition to above)
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Obtain cooling system coolant sample / Initial 500 Hours.
1.2.	Clean engine crankcase breather.
1.3.	Replace primary fuel filter element (water separator).
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Obtain cooling system coolant sample.
2.2.	Test / Add cooling system coolant additive (SCA)..
2.3.	Clean / replace air cleaner element.
2.4.	Sample engine oil.
2.5.	Change engine oil and filter.
2.6.	Check function of engine protection devices.
2.7.	Lubricate fan drive bearing.
2.8.	Replace fuel system secondary filter.
2.9.	Inspect hoses and clamps.
2.10.	Clean radiator.
2.11.	Inspect/adjust Electronic Unit Injector, valve lash and valve rotators/Initial 250 Hours.
3.	**PNEUMATIC**
3.1.	Change general purpose air filter element.
3.2.	Change coalescing air filter element
3.3.	Change dust particulate air filter element
4.	**HYDRAULIC SYSTEM - GRINDING CARRIAGE**
4.1.	Change hydraulic reservoir fill filter (if indicated)
5.	**BOGIES**
5.1.	Check the gear box torque reaction arms. Check for wear or damage to silent bushings. Check torque on all mounting fasteners. Repair or replace as needed.
5.2.	Visually inspect the side bearings and the wear plate surfaces on the car frame. Repair or replace as needed.

SCHEDULE IV
(TO BE DONE AFTER 1000 HOURS OF ENGINE RUNNING)
DURATION-03 DAYS
(TO BE DONE IN ADDITION TO SCHEDULE-I, II &III)

S.N.	DESCRIPTION
1.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
1.1.	Rotating rectifier check & test.
2.	**HYDRAULIC**
2.1.	Check pressure of all sections for rated settings and adjust if necessary.
3.	**ELECTRICAL**
3.1.	Inspect and clean the all battery terminals, cables and connections of self-starter, alternators for proper working.
4.	**GRIND**
4.1.	To grease the grind motor.
5.	**PNEUMATIC**
5.1.	Change air dryer desiccant.
	TO BE DONE AFTER 2000 HOURS OF ENGINE RUNNING (In addition to above)
1.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
1.1.	Inspect Alternator.
1.2.	Inspect engine mountings.
1.3.	Inspect starting motors.
1.4.	Generator winding insulation test.
2.	**MAIN GENERATOR**
2.1.	Remove generator outlet box cover. Visually inspect for cracked or damaged components. Check electrical connections for loose mounting or damage. Check for overall condition. Clean inside of box.(2000 hours or 6 months)
2.2.	Check machine vibrations and beating condition with a spectrum analyzer or shock pulse(2000 hours or 6 month)

SCHEDULE-V
(TO BE DONE AFTER 3000 HOURS OF ENGINE RUNNING)
DURATION- 10 DAYS
(TO BE DONE IN ADDITION TO SCHEDULE - I, II, III & IV)

S.N.	DESCRIPTION
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	To clean the engine cooling system.
1.2.	To remove and replace the generator air filter assembly.
1.3.	Change cooling system coolant (DEAC).
1.4.	Replace cooling system water temperature regulator.
1.5.	Inspect crankshaft vibration damper.
1.6.	Inspect/adjust electronic unit injector.
1.7.	Clean engine.
1.8.	Inspect engine mounts
1.9.	Check / clean / calibrate engine speed / timing sensors.
1.10.	Inspect/adjust engine valve lash.
1.11.	Inspect engine valve rotators.
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	To clean the engine cooling system.
2.2.	To remove and replace the generator air filter assembly.
2.3.	Change cooling system coolant (DEAC).
2.4.	Replace cooling system water temperature regulator.
2.5.	Inspect crankshaft vibration damper.
2.6.	Inspect/adjust electronic unit injector.
2.7.	Clean engine.
2.8.	Inspect engine mounts.
2.9.	Check / clean / calibrate engine speed / timing sensors.
2.10.	Inspect/adjust engine valve lash.
2.11.	Inspect engine valve rotators.
2.12.	Fuel injector Check & replace.
2.13.	Check and inspect Coolant regulator temp.
3.	**HYDRAULIC**
3.1.	Check accumulator pre-charge (Gas pressure). (Pressure 55.2 to 56.5 bar or 800 to 850 PSI)
3.2.	Grease the Hydraulic Pump/ Drive Motors.
4.	**PNEUMATIC**
4.1.	Replace the air compressor oil filter.
4.2.	Inspect and clean the air compressor cooler.
4.3.	Clean the air compressor oil return line (scavenger line) screen.
4.4.	Inspect the air compressor for any air or oil leaks.
4.5.	Air brake pipe leak test.
4.6.	Air brake supply reservoir and air brake cylinder test.
4.7.	Air main reservoir leak test.
5.	**ELECTRICAL**
5.1.	Calibrate sensor heads of rail profile measurement system (RPMS). (KLD Heads)
6.	**BOGIE AND UNDERFRAME**
6.1.	To remove/replace the gearbox air breather filter.
6.2.	Grease the bearings at each end of the auger.
7.	**GRIND**
7.1.	Replace any hoses, if needed.

S.N.	DESCRIPTION
	TO BE DONE AFTER 4000 HOURS OF ENGINE RUNNING (In addition to above)
1.	**MAIN GENERATOR**
1.1.	Replenish grease in generator shaft bearings. See bearing lubrications instructions.
	TO BE DONE AFTER 5000 HOURS OF ENGINE RUNNING (In addition to above)
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Inspect starter, turbocharger and water pump.
2.	**ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Inspect starter, turbocharger and water pump.

SCHEDULE-VI (IOH)
(TO BE DONE AFTER 6000 HOURS OF ENGINE RUNNING)
DURATION 20 DAYS
(TO BE DONE IN ADDITION TO SCHEDULE-I, II, III, IV & V)

S.N.	DESCRIPTION
1.	**HYDRAULIC**
1.1.	Replace hydraulic pressure filters.
1.2.	Replace hydraulic return filters and hydraulic tank breathers.
2.	**PNEUMATIC**
2.1.	Replace the air separator elements.
2.2.	Replace the compressor desiccant dryer cartridges.
2.3.	Replace the compressor desiccant dryer purge valves.
2.4.	Replace the inlet check valve.
2.5.	Change the compressor lubricant.
2.6.	Replace the intake valve.
3.	**ELECTRICAL**
3.1.	Grease air compressor motor.
3.2.	To remove and replace the pressurization air filter.
4.	**GRIND**
4.1.	To remove and replace the RPMS desiccant plugs.
5.	**BOGIE AND UNDERFRAME**
5.1.	Non destructive test of wheel set & axles.
5.2.	Ultrasonic testing of axles of machine shall be done between 40,000 to 45,000 kms of running or three years whichever is earlier.
	TO BE DONE AFTER 8000 HOURS OF ENGINE RUNNING (In addition to above)
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Replace fan drive bearing.
2.	**APU ENGINE (Cat® C4.4, 80 KW, 480 VAC, 60 Hz @ 1800 RPM)**
2.1.	Replace fan drive bearing.
3.	**MAIN GENERATOR**
3.1.	Check insulation resistance on all generator components. Check rotating rectifier connection tightness.
	TO BE DONE YEARLY OF ENGINE RUNNING (In addition to above)
1.	**ENGINE (Caterpillar C27 V-12, 4 Stroke-Cycle Diesel 824 KW (1105 HP) @ 1800 RPM)**
1.1.	Obtain cooling system coolant sample. (Level 2).
2.	**BOGIE AND UNDERFRAME**
2.1.	Change gear box lubricant.
2.2.	Visually inspect the wheel sets for cracks, fractures, overheating of the wheel flanges, damage to the wheel flanges and / or damage to the wheel tread.
2.3.	Measure the wheel profile (A.L.L. Railroad Profile). Measure wheel set back flange dimension. Measure wheel circumference variation.
2.4.	Visually inspect wheel set bearings.
2.5.	Measure side bearings. Measure from top of side bearing to top of bogie frame. Inspect wear surfaces. Repair or replace as needed.

SCHEDULE-VII (POH)
(TO BE DONE AFTER 15000 HOURS OR 60 MONTHS WHICH EVER IS EARLIER OF ENGINE RUNNING)
1st POH 45 DAYS and 2nd POH 60 DAYS
(TO BE DONE IN ADDITION TO SCHEDULE-I, II, III, IV,V & VI)

S.N.	DESCRIPTION
1.	**PNEUMATIC**
1.1.	Inspect the main motor and fan electrical connections.
1.2.	Change air filter element.
2.	**BOGIE AND UNDERFRAME**
2.1.	To drain and clean the HST tank.
2.2.	Non destructive test of wheel set & axles.
2.3.	Ultrasonic testing of axles of machine shall be done between 40,000 to 45,000 kms of running or three years whichever is earlier.
	TO BE DONE AFTER 20,000 HOURS OR THREE YEARS OF ENGINE RUNNING (In addition to above)
1.	**MAIN GENERATOR**
1.1.	Remove end brackets. Visually inspect the generator end windings for oil or dirt contamination. If excessive, clean with compressed air and electrical solvent. Inspect fan and fan hub for damage.
	TO BE DONE AFTER 30,000 HOURS OR FIVE YEARS OF ENGINE RUNNING (In addition to above)
1.	**MAIN GENERATOR**
1.1.	Generator overhaul.
	TO BE DONE EVERY SIX YEAR OF ENGINE RUNNING (In addition to above)
1.	**BOGIE AND UNDERFRAME**
1.1.	Check center pivot for wear or damage. Check center pivot insert. Replace if required.
1.2.	Measure free motion of axle box. Check springs. Check suspension block assembly wear plates. Check wheel set guide wear plates. Replace if necessary.
1.3.	Inspect and measure tappets and for wear and damage. Inspect and measure tappet bushing. Replace if necessary.
1.4.	Inspect shackles and trunnions. Replace if necessary
1.5.	Clean grease, dust and debris from bogie. Remove loose paint. Re-paint bogie where needed.

Annexure – I

S. No.	Description	Quantity
1.	Detonators in a tin case	1 box (10 nos.)
2.	H.S. flag red	2 nos.
3.	H.S. flag green	1 nos.
4.	H.S. Tri colour lamps	2 nos.
5.	Chain & Padlock	1 set.
6.	Clamp with Padlock	2 nos.
7.	Jack 20t capacity with traverse	1 no*.
8.	Crow bars	4 nos.
9.	Wooden blocks off sizes	8 nos.
10.	Gauge cum level	1 no.
11.	Rail thermometer (dial type)	1 no.
12.	Banner flag	2 nos.
13.	Portable Control Phone	1 no
14.	Walkie Talkie	1 set
15.	First Aid Box	1 no each cabin
16.	Skids	2 nos.
17.	Working time table of section where machine working	1 copy
18.	G&SR book with upto date amendment slips	1 copy
19.	4 cell flasher light	1 no.
20.	Petromax /LPG lamps	1 no.
21.	Safety helmets	For each Machine staff
22.	Protective clothing, safety shoes and safety gloves	Foreach Machine staff
23.	Track Machine Manual	1 no.
24.	Accident Manual	1 no.
25.	Fire extinguisher	1 no each cabin
26.	Hooter (manual)	2nos
27.	Hydraulic Hand Pump	1 no.
28.	Emergency pneumatic/Hydraulic hose of sizes suiting to different machines (complete with end fittings)	1 no.

Note:-

1. Inspecting official should wear the safety items 21 to 22 while doing the inspection.
2. * Proposal is sent to Railway board vide letter no. TM/HM/1, VOL-2, dt.22/08/2019 for approval of jack, machine wise.

Annexure-II

GENERAL SAFETY NOTES

1. The machine is to be operated according to existing Indian Railways Rules & Regulations.

2. The safety of yourself and other people is most important consideration in the operation and maintenance of the machine.

3. Remember, the machine is a working unit, carrying delicate instruments. Therefore, the machine should not be driven at excessive speed over bad track or crossing.

4. Always keep your eyes open for other men working close to the machine.

5. Do not forget to look out for signals, switches and track obstructions.

6. Make sure that all protection equipment and safety devices are in place on the machine and in working order especially when it is being driven from site to site.

7. Always keep the machine clean. Excessive oil or grease on the machine can cause you to slip and fall and is also to potential fire hazard.

8. Always lock the machine before you leave. Make sure that the machine is protected in accordance with railway regulations.

9. Whenever you have the opportunity while waiting to get out on a job, do some of the smaller maintenance job, such as tightening loose nuts and bolts and cleaning the machine.

10. Do not permit unauthorized persons to operate the machine.

11. It is prohibited to use fire on or near the machine.

12. Do not tow the machine if the final drive is engaged.

ACKNOWLEDGEMENT

Following officer and staffs have made their valuable contributions in finalization of the Maintenance Schedule Manual for Switch Rail Grinding Machine - 20 Stone (Harsco).

RDSO:

1.	SHRI	KAMAL CHAND	ARE/RGM/TMM
2.	SHRI	SURENDRA KUMAR	SSRE/RGM/TMM
3.	SHRI	PRINCE KUMAR	SSE/RGM/TMM
4.	SHRI	NEERAJ SINGH	JRE/RGM/TMM

RAILWAY:

1.	SHRI	AKHILESH KUMAR GUPTA	JE/TMC/ECR
2.	SHRI	SOUMYA RANJAN ROUT	SUP./HARSCO