उच्च अनुरक्षण प्रौद्योगिकी केन्द्र
रेल मंत्रालय
डी.डी. नगर, महाराजपुर, ग्वालियर–474005
(आई.एस.ओ. 9001–2015 प्रमाणित संस्थान)
CENTRE FOR ADVANCED MAINTENANCE TECHNOLOGY
Ministry of Railways
DD Nagar, Maharajpur, Gwalior - 474005
(ISO 9001-2015 Certified Organisation)

No. IRCAMTECH/GWL/MECH/Train-set/Manual/2.0 **Date: 09.04.2026**

PCMEs

All Zonal Railways & PUs

Sub: Correction Slip-1 for Vande Bharat Express Trainset (V2.0) Maintenance Manual, Volume-II (September 2022).

Ref: (i) Railway Board Letter No. ERB-1/2025/23/15 Dated. 02.04.2025.
(ii) Railway Board Letter No. 2017/M(C)/137/4TrainSet-Part (2) Dated.20.08.2025.
(iii) RDSO Letter No. TS/B&B/Maint.Sch. Dated. 16.03.2026

The Railway Board vide ref.(i) above, constituted a committee for defining maintenance activities in SS-I and SS-II Schedule of Vande Bharat Rakes. The report on the subject matter was finalized by the committee, and the Railway Board vide ref.(ii) above, has approved the committee report and advised all Zonal Railways and nominated workshops to adhere to the maintenance guidelines and ensure compliance.

In the view of the above, Correction Slip-1 for Vande Bharat Express Trainset (V2.0) Maintenance Manual, Volume-II (September 2022) is prepared, incorporating the committee recommendations {reference (ii)}, and RDSO suggestions/comments {reference (iii)}.

The Correction Slip - 1 for Vande Bharat Express Trainset (V2.0) Maintenance Manual, Volume-II (September 2022):

- *Chapter - 3 Maintenance Schedule* revised *and*
- *Chapter - 4 Tools and Equipment,* addition of Tools and Equipment based on the committee recommendations to the existing list.

The Correction Slip - 1 is enclosed herewith for kind information please.

DA: As above

BRIJ MOHAN Digitally signed by BRIJ MOHAN Date: 2026.04.09 17:51:13 +05'30'

(Brij Mohan)
Director/Mechanical
IRCAMTECH/Gwalior

Copy to: PED/CAMTECH : For kind information, please.
PED/RS/RDSO : For kind information, please.
EDME(Coaching)/Railway Board : For kind information, please.

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1. MAINTENANCE ACTIVITIES FOR MECHANICAL EQUIPMENT

Schedule	Abbreviation	Periodicity
Daily Safety Examination	-	Every Day
Trip / Depot Examination	T	Every 6 days or 10,000 KMs, whichever is earlier
Monthly	M	30 days ± 2 days
Quarterly	Q	90 days ± 3 days
Nine Monthly	9M	270 days ± 3 days
Shop Schedule-1	SS1	18 months ± 45 days
Shop Schedule-2	SS2	36 months ± 45 days
Shop Schedule-3	SS3	72 months ± 45 days

Schedule	SS1	SS2	2nd SS1	SS3	3rd SS1	2nd SS2	4th SS1	2nd SS3	5th SS1	3rd SS2
Months	18	36	54	72	90	108	126	144	162	180
Years	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15

The interval to be observed is always the first reached by the vehicle.

Tolerance must not be allowed to exceed.

Annexure to be referred for the Functional Tests under different maintenance schedules.

Note :
Abnormalities/bookings mentioned in the logbook by the escorting staff/loco pilot should be attended on priority.

Warning:
Before carrying out any maintenance work on roof and other required location/ equipment, ensure that the pantograph is lowered and the VCB is earthed by closing the earthing switch.

If the rake/ coach is standing beneath OHE, ensure that the overhead line is isolated, locked and earthed at both ends with earthing rods so that it cannot be energised while maintenance work is being carried out.

SCHEDULE ACTIVITIES FOR MECHANICAL EQUIPMENT

I. DAILY SAFETY EXAMINATION FOR MECHANICAL EQUIPMENT

S.N.	Equipment	Maintenance Activity
1.	General	Carry out detailed checks in regard to any unusual occurrence reported by crew in the logbook.
		Check all fasteners of under-slung equipment for tightness. Check for any loose hanging parts, leakage or damages.
		Check the nosecone for any damage.
		Foot board inspection.
		Check Condition of coach body panel, end walls.
2.	Cleaning	Perform interior cleaning of lavatories, cleaning of coach floor, cleaning of passenger amenities, windows, driver cab etc.
		Clear newspaper from the magazine bag and the waste from the dustbin.
3.	Bogie	Visually inspect the bogie frame and their components for crack, loose, and all equipment are secured.
		The temperature of the axle box to be taken immediately on arrival of rakes at the terminating station.
		Check the CTRB for any sign of overheating, grease oozing or any abnormal sound.
		Visual Inspection of Speed sensors and its cable for any deficiency.
		Check the Primary Suspension - Coil Spring for the following ● Crack/corrosion/pitting marks. ● Foreign bodies between the coils, inside the spring and between the carriage elements and the spring. ● Proper seating of springs on the support surfaces. ● Clearance between active coils shall be approximately the same size.
		Visually check the inflated air spring assembly and rubber bellow for proper fitment, any external damage, cracks, air leakage, bulging, and infringement/rubbing with any fittings.
		It shall be ensured that all isolating cock handles are in the proper position and that there is no damage or leakage in the entire pneumatic suspension system, including pipelines, fittings, and

S.N.	Equipment	Maintenance Activity
		reservoirs
		Visual inspection of wheels and axles for general condition and for cracks, damages and defects.
		Perform a visual check on dampers for the following : ● Damage, cracks/ cracks in the weld parts and oil leakage. ● Fixings for loosening and/or missing components. ● Rubber elements/ silent block for cracks and ageing.
		Clean the damper if dust/dirt is accumulated.
		Visually inspect hardware (bolted joints) for any cracks, damages and corrosion.
		Visually inspect the castings for any cracks and damages.
4.	**Traction Gearbox**	Visual inspection of the traction gearbox and its components for external damage.
		Check for sign of oil leakage from the housing.
5.	**Semi-Permanent Coupler**	Check visually for any damage/ crack/ wear etc.
6.	**EP Brake System**	**Brake System**
		Inspect MR Pressure (8 to 10 bar), BP pressure (5 bar) and BC/AR pressure (8 to 10 bar) from dual pressure gauges in the driver desk.
		Check the brake page on TCMS monitor by visual for Brake cylinder pressure on applying and releasing brake: 1. Service brake through Master controller 2. Emergency brake through Master controller. 3. Emergency brake through Driver’s brake valve.
		Parking brake to be tested by pressing apply and release command from the CRW panel.
		Perform brake pipe continuity test applying brake through DBV for BP drop in other end DTC.
		Perform Self-test of BECU from TCMS (Brake + WSP).
		Check Emergency brake by Assistant Emergency brake handle.
		BP leakage rate should be observed & recorded.
		Brake Control
		Visual Inspection for general condition, any sound of leakage
		Under Frame Brake components
		Visual Inspection for general condition, any sound of leakage.

S.N.	Equipment	Maintenance Activity
		Check operation of automatic drain (correct drainage) of main reservoir.
		Check for noticeable air leakages in compressed air system.
		Visually check Inter-unit air hose couplings for damage or open connection.
		Visually check the hose pipe of the caliper unit for open connection / damage/ missing.
		Visually check the Brake Caliper unit for looseness/damage/missing components .
		Visually check brake disc for the following ● Disc Surface Condition i.e. cracks, scoring, or excessive wear. ● Any debris stuck between the brake disc and pads. ● Mounting integrity.
		Visually check Brake equipment box cover in position.
		Visual check Main air Compressor and Auxiliary Compressor for loose/damage/missing parts or abnormal sound.
		Visual Inspection horns for general condition and check functioning.
7.	**Interior**	Amenities and fittings should be checked for their condition and proper functioning.
		Visual inspection for tears/holes in upholstery & foam sets. For upholstered area, identify unacceptable visible degradation such as: ● Fabric wear ● Act of vandalism cut through the fabric ● Foam visible under the fabric
		Check the coach floor for defects such as peeling off and bulging.
		Check windows for cracks and breakage.
8.	**Fire Extinguishers**	Confirm the fire extinguisher is visible, unobstructed, and available at the designated location.
		Verify the safety pin is intact and the pressure gauge indicator is within green range.
9.	**Driver Cabin**	Check the lookout glass for damage.
		Check the condition of cab doors i.e. condition of glasses, proper opening/closing & locking function.
		Check the driver seat for its condition and proper functioning.
10.	**Gangway**	Visual inspection for tears or holes in bellows fabric.
		Intactness of all inter- coach gangways to be ensured.

S.N.	Equipment	Maintenance Activity
11.	**IC Doors**	Functional and Safety Check: ● Check the working and illumination of push button on both sides of the door leaf. ● Check for smooth opening & closing of the door. ● Check the mechanical movement of the door after pressing the emergency push button switch, i.e. manual operation. ● Check the function of radar for proper working. ● Check the reverse movement. If there is an obstacle during door movement (open / close), the door moves back automatically.
		Check the door leaf and glass for any damage or crack.
		Check visually the completeness of the mechanism, screws, binding cables, loose connections etc.
12.	**Plug Doors**	Check door leaf and glass for any damage.
		Check step for any damage.
		Check the functioning of indication lamps.
		Check the functioning of the emergency button.
		Check for opening/closing of door both manual and automatic.
13.	**Water Supply System & Vacuum Evacuation System**	Check Water supply and drainage system.
		Check the functionality of the flush push button and confirm that the vacuum evacuation system operates according to its designated operational sequence.
		Check for foul smell and clogging of the toilet.
		Check the LCD screen for any fault codes.
		Check on the WC seat, cover, and toilet bowl / seat for damage
14.	**FSDS & FDSS**	Visual inspection of working of FDS system.
		Visual inspection for any abnormality of Aerosol fire suppression devices installed in lavatories.

II. MAINTENANCE SCHEDULE ACTIVITIES FOR MECHANICAL EQUIPMENT

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
1	**Bogie**									
I			Carry out the visual inspection and check for any deviation/ shifting in torque marking of the fasteners of bottom cover of Traction Centre Assembly. <u>Note:</u> Please refer to SMI-2024/B/1: Preventive Checks for CP Pin bottom plate fasteners issued by ICF vide letter no. ICF/QMS/MDM/File/F015 dated.17.07.2024	✓	✓	✓	✓	✓	✓	✓
II			Traction Motor & Gearbox level inspection (9.5 to 10.5 mm) <u>Note:</u> *The measurement should be done when the coach body is resting on the bogie.*			✓	✓	✓	✓	✓
III			Run test of motorized bogies. (Format enclosed at **Annexure E**)					✓	✓	✓
IV			Ensure clearance of center pivot bottom from traction center base plate: 15 (+/- 1) mm. <u>Note:</u> ● *Please refer to SMI-2024/B/1: Preventive Checks for CP Pin bottom plate fasteners issued by ICF vide letter no. ICF/QMS/MDM/File/F015 dated.17.07.2024.*					✓	✓	✓
V			Ejection procedure for traction centre from car body as per ICF letter No. MD/D/Trainset/RB Contract/186-G dt 10-12-2024.					✓	✓	✓
1.1	Bogie Frame (DTC,NDTC,MC,TC)									
		1	Visually inspect the bogie frame and their components for crack, loose, check whether all equipment is secure.	✓	✓	✓	✓	✓	✓	✓
		2	Perform visual check on longitudinal beams, cross beams for cracks, damages and corrosion.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	Perform visual check on brake supports, damper supports, traction center supports and stabilizer assembly supports for cracks, damages and corrosion.	✓	✓	✓	✓	✓	✓	✓
		4	Check bogie brackets visually for cracks, damages and corrosion.	✓	✓	✓	✓	✓	✓	✓
		5	Check safety cables visually for damages, cracks and corrosion.	✓	✓	✓	✓	✓	✓	✓
		6	Clean the bogie frame thoroughly with *High Pressure Air Jet* in washing line. Remove dust, mud & oil deposit in all parts, on the bogie frame by wet wiping.		✓	✓	✓			
		7	Thoroughly check bogie for loose, missing parts and leakage of oil.		✓	✓	✓	✓	✓	✓
		8	Visually inspect the bogie frame components (longitudinal beams, cross beams etc.) for crack, corrosion / damages/ dent, especially at critical locations.			✓	✓	✓	✓	✓
		9	Clean the bogie frame thoroughly with *High Pressure Air / Water Jet* & remove dust, mud & oil deposit in all parts, on the bogie frame. *<u>Caution:</u>* *Make sure the jet is not directed towards electrical / pneumatic connections and axle bearing.*					✓	✓	✓
		10	Visually inspect all the welding joints (CP-B class weld) of bogie frame for crack, paint damage and corrosion. If paint is damaged, clean thoroughly and touch up as below: 1. Clean the identified area with chemical paint stripper. 2. Apply primer high performance anti corrosion epoxy coating (2 pack) having color green with DFT of 125 +20/0 microns to be done as per RDSO spec no. M&C/PCN/123/2018. 3. Intermediate Coat: Fluoropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			4. Top coat : Fluoropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1							
		11	Perform MPI of all the welding joints (CP-B class weld) for crack, and crack and damages of the whole bogie frame which completed 6 years of service.							✓
		12	Examine bogie frame and bracket for cracks, damages & corrosion. Check all welded joints other than CP-B class weld with dye penetration test.							✓
		13	<u>Paint the bogie frame</u> 1. Pretreatment: Shot/Grit blasting according to ISO 8501, Sa 2.5 as per ICF/MD/Spec-299 2. Apply primer high performance anti corrosion epoxy coating (2 pack) having color green with DFT of 125 +20/0 microns to be done as per RDSO spec no. M&C/PCN/123/2018. 3. Intermediate Coat: Fluoropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008 4. Top coat : Fluoropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1							✓
1.2	CTRB & WSP Equipment									
		1.	Visual Inspection of fasteners, sensors & cables and axle box for any deficiency.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the bearing for any sign of overheating or detection of hot bearing.	✓	✓	✓	✓	✓	✓	✓
		3.	Check bearings for grease leakage or any abnormal sound.	✓	✓	✓	✓	✓	✓	✓
		4.	Inspection of WSP equipment to be carried out.		✓	✓	✓	✓	✓	✓
		5.	Mounting of axle speed sensor, condition of phonic wheel and gap between sensor and phonic wheel to be ensured.		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			Recommended gap between sensor and phonic wheel: M/s Knorr Bremse: 0.9 ± 0.5 mm M/s Faiveley Transport: 1.0 ± 0.5 mm							
		6.	All axle box covers should be opened to inspect the earthing device, phonic wheel, and all associated fasteners.				✓			
		7.	Mounting of axle speed sensor, condition of phonic wheel and gap between sensor and phonic wheel to be ensured. Recommended gap between sensor and phonic wheel: M/s Knorr Bremse: 0.9 ± 0.5 mm M/s Faiveley Transport: 1.0 ± 0.5 mm *Note:* ● *Phonic Wheel Centering Device should be used to ensure centering of the phonic wheel.* ● *Assembly procedure for phonic wheel to be followed as per ICF letter no. MD/D/W&A/43 dated 17.05.2024 or latest instructions.* ● *During the 9M schedule, all axle box covers should be opened to inspect the earthing device, phonic wheel, and all associated fasteners. This checkpoint is independent of the Ultrasonic Testing (UST) of axles carried out during the SS-I schedule.*					✓	✓	✓
		8.	● Rotate the bearing assembly to detect any abnormal condition. ● Check the bearing mounted end play. If end play is beyond the permissible limit or if any roughness is detected while rotating the bearing, dismount the bearing and send for reconditioning. *Note:* ● *Whenever a new or reconditioned bearing is fitted, mounting date to be etched on the out-board distance ring.* ● *Control arm bush should be removed to check end play and to check grease*					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			oozing.							
		9.	*Note:* *1. Bearing reconditioning is to be carried out whenever bearing is removed from axle due to wheel-shelling / bearing failure or other reasons.* *2. If the wheel sets are sent for re-profiling without dismounting bearings, lubricate the lathe centers with heavy grease and cover the bearings during re-profiling.* *3. CTRB to be replaced in pairs (for the same axle) even if only one CTRB is found defective.* *4. For reconditioning of bearings, please refer to OEM's instructions.*					✓	✓	✓
		10.	Refurbishment of CTRB and then replacement after two refurbishments.						✓	✓
1.3	Rubber / Rubber Metal Bonded Items (DTC,NDTC,MC,TC)									
	Note: ● *For replacement criteria, instruction of OEMs to be followed.* ● *The bonding test between rubber and metal can be carried out by hand. The rubber can thereby be pressed back with a dull test-iron (edge with radius). In case of cracks / de-bonding, instructions of OEM regarding replacement of item should be followed.*									
1.3.1	Primary Suspension Bump Stop & Primary Spring Pad (Upper)									
		1	Visual Inspection	✓	✓	✓	✓	✓	✓	✓
		2	Examine the condition of Primary Bump Stop, Primary Spring Pad (upper) for ageing / damage / cracks and failure of bonds. Replace, if necessary.					✓		
		3	Check metal parts of primary spring pad and primary bump stop of the Primary suspension for corrosion / damage of coating (paint). Remove signs of corrosion and repaint wherever required					✓		
		4	Bonding test to be ensured.					✓	✓	✓
		5	Replace Primary Suspension Bump Stop and Primary Spring Pad (Upper)						✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
1.3.2	Stabilizer Link									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on rubber joints for cracks, damage and ageing. Stabilizer Link to be checked and replaced if necessary.	✓	✓	✓	✓	✓		
		3	Perform a visual check on metallic bar of stabilizer links for cracks, damages and corrosion.	✓	✓	✓	✓	✓		
		4	Perform a visual check on all fixings / mounting fasteners for loosening (check with paint marks / movement) and / or missing	✓	✓	✓	✓	✓		
		5	Length of stabilizer link to be checked and adjusted (as per drawing) as and when required.		✓	✓	✓	✓		
		6	Visually inspect the metal parts of elastic joint of stabilizer link for rusting on metallic parts. Clean foreign articles/dust.				✓	✓		
		7	Check the rubber surfaces for any damage, foreign article hitting or contact during service or application. If yes, please ensure no external object / article getting contact to rubber surface, in case major damages observed on rubber may need to replace.				✓	✓		
		8	Check the ball joint of stabilizer assembly (rubber to metal bonded) which is assembled at both ends. If any damage in ball joint to be replaced.				✓	✓		
		9	The stabilizer link is assembled at 600 mm, if required it can be adjusted from 590 to 640 mm by opening both ends. To adjust the length, loosen the clamp assembly, one side of end is having LH thread and another side is bearing RH thread. After adjustment to desired length clamp assembly shall be tightened to specified torque (85 Nm) with positioning mark.				✓	✓		
		10	Bonding test to be ensured.					✓	✓	✓
		11	Replace Stabilizer Link *Note:*						✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			Forged components of Stabilizer Link may be reused after necessary inspection and due replacement of damaged rubber-metal bush.							
1.3.3	Traction Rod & Traction Center									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on the traction center housing and bars for cracks, damages and corrosion.	✓	✓	✓	✓	✓	✓	✓
		3	The assembly should be free to move, and not blocked by any foreign objects.	✓	✓	✓	✓	✓	✓	✓
		4	Perform a visual check on all fixings for loosening of the ball joints.	✓	✓	✓	✓	✓		
		5	Perform a visual check on rubber joints for cracks/damages.	✓	✓	✓	✓	✓		
		6	Check the rust on metallic parts and clean foreign articles/dust.				✓	✓		
		7	Check any damage on rubber surfaces foreign article hitting or contact during service or application. If yes, please ensure no external object/article getting contact to rubber surface, in case major damages observed on rubber may need to replace.				✓	✓		
		8	Check the ball joint of traction rod (rubber to metal bonded) which is assembled at both ends. If any damage in ball joint to be replaced.				✓	✓		
		9	Bonding test to be ensured.					✓	✓	✓
		10	Replace Traction Rod <u>Note:</u> *Forged components of Traction Rod may be reused after necessary inspection and due replacement of damaged rubber-metal bush. Rubber-metal bush of traction rods shall be suitably pressed using fixtures for correct orientation.*						✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
1.3.4	Lateral Bump Stop									
		1	Visually inspect the lateral bump stop for general condition i.e. missing, damages etc.	✓	✓	✓	✓	✓	✓	✓
		2	Check the mounting bolts of lateral bump stop for loosening (by paint mark / movement). If found loose fasteners should be tightened correctly (Tightening Torque 188 Nm).		✓	✓	✓	✓		
		3	Check rust on metallic parts, clean foreign articles/dust.				✓	✓		
		4	Check the rubber surfaces for any damage, foreign article hitting or contact during service or application. If yes, please ensure no external object/article getting contact to rubber surface, in case major damages observed on rubber; may need to be replaced.				✓	✓		
		5	Bonding test to be ensured.					✓	✓	✓
		6	Replace Lateral Bump Stop						✓	✓
1.3.5	Control Arm - Primary Suspension Bush									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Visually check control arm parts for damages, cracks or corrosion marks.	✓	✓	✓	✓	✓	✓	✓
		3	Inspect the rubber joint for cracks, damages and ageing. Replace, if necessary.	✓	✓	✓	✓	✓		
		4	Examine the dimension of mating surface of primary suspension bush i.e. housing of upper control arm with respective drawing of supplier / ICF. If values are beyond limit, replace the control arm top & bottom (set).					✓	✓	✓
		5	Visually check mounting holes and machining areas of control arm (top and bottom) for any enlargement and damages.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		6	Bonding test to be ensured.					✓	✓	✓
		7	Replace Primary Suspension Bush						✓	✓
		8	*Note:* *For Control arm bush ejection procedure M/s Medha Letter No. MAE675UV@:ICF:0320:25 dt 23-01-2025 – M/s Medha document No. SD-10038 may be referred.*							
1.3.6	Centre Pivot Bearing									
		1	Check rust on metallic parts of rubber to metal bonded parts.				✓	✓		
		2	Clean foreign particle / dust. In case of any damage observed on rubber, the same should be replaced immediately					✓		
		3	Check any foreign article hitting or contact during service or application. If yes, please ensure no external object/article getting contact to rubber surface, in case major damages observed on rubber may need to replace.					✓		
		4	Bonding test to be ensured.					✓	✓	✓
		5	Replace Centre Pivot Bearing						✓	✓
1.3.7	Motor Suspension Pad									
		1	Visual Inspection for general condition.	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on rubber and rubber/metal bonded parts for ageing / damage / cracks/ peeling / bulging / looseness and failure of bonds. Replace, if necessary.					✓		
		3	Bonding test to be ensured.					✓	✓	✓
		4	Replace Motor Suspension Pad						✓	✓
1.4	Stabilizer Assembly									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on torsion bar and brackets for cracks, damages.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	If cracks and damage found, take necessary action as follows: **For Torsion Bar :** **Step 1 :** Check the identified cracks visually as per per ISO 5817 – Class B. **Step 2 :** If component not passes in visual inspection, Check the component by conducting UT. **Acceptance Criteria for UT:** Any anomaly greater than the one of the reference defect. The reference defect is a hole with a flat bottom and 1,2 mm diameter, drilled into the middle of the reference bar of the same dimension and quality as destined for the fabrication of the torsion bars .Any attenuation of the ground echo greater than 50 %. **Step 1** : If cracks or defects are not with in limit then replace the component with new one. **For Fork and Bearing Housing :** **Step 1 :** Check the identified cracks visually as per per ISO 5817 – Class B. **Step 2 :** If component not passes in visual inspection, Check the component by conducting MPT as per EN10228-1, Severity Level : SM02,LM2/AM2 **Step 3 :** If cracks or defects are not with in limit then replace the component with new one. **For Remaining Items :** If cracks or defects are found then replace the component with new one.							
		4	Visually inspect for grease oozing out of stabilizer assembly bearings, which may result in bearing failure.	✓	✓	✓	✓	✓	✓	✓
		5	Visually inspect all parts for any corrosion and paint damage.	✓	✓	✓	✓	✓	✓	✓
		6	If, paint damage found, take following action: **Step 1** : Clean the identified area with chemical paint stripper. **Step 2** : Pre treatment : Shot/Grit/Sand Blasting According to ISO:8501, Sa 2.5 As per ICF/MD/Spec-299.							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			Step 3 : Apply Primer High Perfomance Anti corrosion Epoxy coating (2 Pack) having colour green with DFT of 125 +20 / 0 microns to be done as per RDSO SPEC NO. M&C/PCN/123/2018. **Step 4** : Intermediate Coat : Fluropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008. **Step 5** : Top coat : Fluropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1.							
		7	Clean the castings thoroughly with high pressure air jet and remove dust, mud & oil deposit in all parts.		✓	✓	✓	✓	✓	✓
		8	Check the mounting fasteners (M12 x 1.5 x 60 - 8.8 or higher) of clamp of stabilizer at both ends for loosening (by paint mark / movement). If found loose fasteners should be tightened correctly (Tightening torque: 85 Nm).		✓	✓	✓	✓	✓	✓
		9	Clean the grease nipples. Replace the damage nipples with new one.			✓	✓			
		10	Refill Bearing grease - SKF LGHB2.			✓	✓	✓	✓	✓
		11	Stabilizer Bearing to be checked & replaced if required					✓		
		12	Visually check mounting holes and machining areas for any enlargement and damages.					✓	✓	✓
		13	Check flat-face alignment of forks: Place a straight edge across the two forks on flat face to check fork alignment. Gap between fork and any forks should be less than 1.5 mm					✓	✓	✓
		14	Perform mandatory MPT of torsion bar (UT may be performed on new torsion bar)					✓	✓	✓
		15	Re-painting of torsion bar.					✓	✓	✓
		16	Grease nipples to be replaced with new one.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		17	Replace stabilizer bearing. *<u>Note:</u>* *While replacing stabiliser bearing, circlip should not be reused*						✓	✓
1.5	Primary Suspension - Coil Spring									
		1	Visually check springs for crack/corrosion/pitting marks.	✓	✓	✓	✓	✓	✓	
		2	Visually check and ensure that there are no foreign bodies between the coils, inside the spring and between the carriage elements and the spring, e.g. sand stones, broken chassis elements.	✓	✓	✓	✓	✓	✓	
		3	Visually check clearance between the active coils and ensure that clearance between active coils shall be approximate same size. If clearance between the active coils is abnormal, mark the same for thorough examination. Visually check for unevenness of clearances between working coils and visible contact between working coils.	✓	✓	✓	✓	✓	✓	
		4	Visually check for proper seating of springs on the support surfaces. The support surfaces of the spring shall be flat against the spring seat.	✓	✓	✓	✓	✓	✓	
		5	Visually check for crack/breakage of spring at the (visible) suspected regions. Replace in case of any crack observed.	✓	✓	✓	✓	✓	✓	
		6	Check for spring breakage at the end station, if found broken, then same need to be replaced before the coach is given fit for the service.	✓	✓	✓	✓	✓	✓	
		7	In case of replacement of any springs, correct primary springs orientation (positioning) to be ensured.	✓	✓	✓	✓	✓	✓	
		8	Check primary spring pads for cracks, damages and ageing.	✓	✓	✓	✓	✓	✓	
		9	The split pin/lift stop pin installed in primary suspension to be checked for any visible damage and may be replaced if required.	✓	✓	✓	✓	✓	✓	
		10	Ensure timely withdrawal / reprofiling of wheels having shelling/wheel tread defects beyond permissible limit.	✓	✓	✓	✓	✓	✓	

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		11	Clean the springs by compressed air blowing. Visually check for any crack/breakage of spring and replace in case of any detection.		✓	✓	✓	✓	✓	
		12	Check for any corrosion/pitting/ paint damage, particularly in the zone of contact between inactive and first active coil.		✓	✓	✓	✓	✓	
		13	In case of corrosion/pitting/ paint damage, paint is to be repaired. <u>Note:</u> *In case, the location of paint damage is inaccessible, the coach to be attended in sick line at first available opportunity.*		✓	✓	✓	✓		
		14	Check rubber parts of primary suspension for cracks and ageing.			✓	✓	✓		
		15	Check primary suspension stops for cracks, damage and corrosion.			✓	✓	✓	✓	
		16	Cleaning of the springs thoroughly with suitable detergent water jet in dis-assembled condition.					✓	✓	
		17	Inspect for cracks/damages and in case found any, the spring may be replaced.					✓	✓	
		18	Cleaning of the contact line on the end coils and repaint the paint damaged areas duly following the proper paint procedure.					✓		
		19	Any damage to coating (paint) in locations other than the contact line is also be repaired.					✓		
		20	Test the springs on load deflection test machine.					✓	✓	
		21	For treatment of lost or unreadable band, check the spring.					✓	✓	
		22	Ensure orientation (positioning) and concentricity of primary springs.					✓	✓	✓
		23	Ensure correct thickness of shims provided on top of primary springs.					✓	✓	✓
		24	In case of welding-services on the bogie, the spring must be protected carefully, make sure that no temperature above 140 degree Celsius can get to the spring as welding beads and heat developed can damage the surface of the spring. The flow of current through the springs due to welding work must be strictly avoided and welding work on the spring is not permitted.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		25	Overhaul and perform Magnaflux testing						✓	
		26	Repaint the coil spring.						✓	
		27	Replacement of coil spring.							✓
1.6	Air Spring System (DTC,NDTC,MC,TC)									
		1	Visually check the air spring rubber bellow in inflated condition for any external damage, cracks, air leakage, bulging infringement/rubbing with any fittings.	✓	✓	✓	✓	✓	✓	✓
		2	Visually check the condition of top plate & emergency spring including the fasteners & mountings of air spring assembly for any damage, crack, bent, corroded and non-functional or deficient.	✓	✓	✓	✓	✓	✓	✓
		3	Deflate the suspension, if any signs of damage are visible and if required carefully probe the damage/crack with a blunt edged instrument.		✓	✓	✓	✓	✓	
		4	● Visually inspect the outer layer; if only the outer layer is marked and the textile reinforcement is not visible then the airbag is serviceable. ● If the textile reinforcement is seen or felt, replace the air spring.		✓	✓	✓	✓	✓	
		5	Check the air spring for oil or organic solvent adhered on the surface of rubber. If found, wipe it off with clean cloth immediately.		✓	✓	✓	✓	✓	
		6	Check the installation lever with inflated air spring for normal function.		✓	✓	✓	✓	✓	✓
		7	Thorough checking of square platform provided on bogie frame for any crack and deformation.			✓	✓	✓	✓	✓
		8	Tightening of air spring bottom plate bolts and nuts with specified torque (64 Nm).			✓	✓	✓	✓	✓
		9	Check the air springs system for leakage. <u>*Note:*</u> 1. *If rake is idle for more than 8 hours same activity to be carried out in monthly schedule also.* 2. *Leakage test to be carried out by PUs and workshops before turning out of the rake.*			✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		10	Air suspension pipe leakage check by using soap water.			✓	✓	✓	✓	✓
		11	Replacement of air filter provided in pneumatic pipeline for air spring assembly system.				✓	✓	✓	✓
		12	Checking securing arrangement of pneumatic pipeline				✓	✓	✓	✓
		13	Tightening of installation lever nuts.				✓	✓	✓	✓
		14	Installation lever adjustment.				✓	✓	✓	✓
		15	Checking of spring height & maintained as per requirement.				✓	✓	✓	✓
		16	Air Spring Deflation Indication Test <u>Note:</u> *Please refer to details of the Test Protocol for Air Spring Deflation Indication issued by RDSO vide letter no. SV.AS.VB dated. 07.08.2024 or latest.*				✓	✓	✓	✓
		17	Thorough visual check of air spring after dismantling from bogie.					✓	✓	
		18	Clean the exhaust port of air spring systems.					✓	✓	
		19	O-Rings of Air Springs to be replaced.					✓	✓	✓
		20	Replace Air Spring System							✓
		21	Leakage test of air springs should be done by pressure drop test: the drop should not be more than 1% of test pressure (6 kgf/cm^2) in 15 minutes.					✓	✓	✓
		22	Inspect air spring seating area and spigot ID on body bolster. Remove corrosion if any and apply a thin layer of grease (IOC-Servogem.RR3 or BPC make RR grade-3 or BL-BALMERAO multi grease LL3)					✓	✓	✓
		23	Measurement of bogie clearances related to air spring. (after assembly)					✓	✓	✓
		24	<u>Note:</u> *Safety Precautions* ● *Use Bottle jack in the bottom of the bogie frame if the trunion gets stuck in the Bogie frame.* ● *Air spring shall not be lifted by the top plate.*							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
1.7	Wheels and Axles (DTC,NDTC,MC,TC)									
		1	Visual inspection of wheels and axles for general condition and for cracks, damages and defects	✓	✓	✓	✓	✓	✓	✓
		2	Visually inspect the axle for cracks and signs of corrosion, if any.	✓	✓	✓	✓	✓	✓	✓
		3	Check the wheel flange thickness and profile by wheel profile / tyre defect gauge. Wheel condition to be checked for spalling, thermal cracks, rolling contact fatigue, root radius, false flange, hollow tyre etc. (Refer RDSO CMI – K003 and EN 15313:2016)	✓	✓	✓	✓	✓	✓	✓
		4	Check tread diameter and wear of wheel profile. If necessary, perform re-profiling.		✓	✓	✓	✓	✓	✓
		5	Check wheel gauge/offset (Back-to-back dimension) <u>Running Schedule : (SR)</u> Min = 1597 mm , Max = 1603 mm (under load) <u>Shop Schedule : (SR)</u> Min = 1599.2 mm , Max = 1600.8 mm (without load)			✓	✓	✓	✓	✓
		6	● Perform Re-profiling of wheel sets of all Vande Bharat coaches after 9 months (+30 days) OR earned 2,00,000 kms, whichever is earlier, from last shop schedule/ commissioning at depots, *RDSO letter No. MC/EMU/WTA dated 28.05.2025 may be referred*. ● Re-profiling of all wheels to be recorded. <u>*Note:*</u> *Priority for execution of Re-profiling of wheelsets of coaches shall be done in case of any WCM critical alert or repeated maintenance alerts (alerts in terms of peak wheel impact load as well as ILF both to be considered) since last shop schedule/commissioning. General / Priority for re-profiling of wheels should be*				✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			given to Motor Coaches (MCs) followed by Trailer Coaches (TCs), Drive trailer Coaches (DTCs) & Non-Drive Trailer Coaches (NDTCs).							
		7	Checking of difference in wheel diameter of the same axle (0.5 mm max.), same bogie (5 mm max.) and different bogies of same coach (10 mm max.)				✓	✓	✓	✓
		8	Perform an ultrasonic test of the axle to verify the absence of internal cracks and damages.					✓	✓	✓
		9	Perform an ultrasonic test on the wheels to verify the absence of internal cracks and damages. <u>*Note:*</u> *Please refer to CODE OF PROCEDURE FOR ULTRASONIC TESTING OF VANDE BHARAT WHEEL IN SERVICE (MC-185) issued by RDSO for details.*					✓	✓	✓
		10	Perform a general overhaul of the axle, remove signs of corrosion, renew corrosion protection and re-paint the axle.					✓	✓	✓
		11	Check wear of wheels, if necessary, replace them.					✓	✓	✓
		12	Ensure that no debris is lodged between the traction motor and powered axle.					✓	✓	✓
		13	Marking on wheel set to be checked for any sign of movement between wheel and axle, for evidence of wheel overheating or derailment damage.					✓	✓	✓
		14	Check Axial and Radial run-out of wheelsets (Axial run-out : 0.5 mm , radial run-out : 0.3 mm)					✓	✓	✓
		15	Perform wheel profiling and wheelset balancing (for speed >= 130 kmph). Refer RCF specn. no. MDTS 168 for balancing procedure. <u>*Note:*</u> *Dynamic wheel balancing of the powered wheelset of motor coaches is not required.*						✓	✓
		16	Check Electrical Resistance (< 0.01 Ω) <u>*Note:*</u>							✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			Check Electrical Resistance in SS3 *and whenever wheel replacement & refurbishment of the contact surfaces of the pressfitted joint (Electrical resistance should be less than 0.01 Ω).*							
1.8	Dampers (DTC,NDTC,MC,TC)									
		1	Perform a visual check on dampers for damage, cracks/ cracks in the weld parts and oil leakage	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on all fixings for loosening and/or missing components	✓	✓	✓	✓	✓	✓	✓
		3	Perform a visual check on rubber elements/ silent block for cracks and ageing	✓	✓	✓	✓	✓	✓	✓
		4	Clean the damper, if dust/dirt is accumulated on dampers	✓	✓	✓	✓			
		5	Damper should be tested for correct functionality after cleaning (or early in case of oil leakages) as per parameters given in respective OEM's drawings/ specification of particular type of damper					✓		
		6	Examine the bogie frame for corrosion at damper bracket and surrounding area.					✓	✓	✓
		7	During installation, ensure proper orientation/ direction of dampers.					✓	✓	✓
		8	Mounting fasteners should be renewed when dampers are removed/ replaced/ dismantled.					✓	✓	✓
		9	***Note:*** *1. Damper fitting misalignment & pre-angular twist in end fasteners due to level difference should not be there, and proper torque should be ensured during the fitment of dampers.* *2. Dampers to be cleaned properly before testing and fitment.*					✓	✓	✓
		10	Replace dampers						✓	✓
1.9	Kit Items									
		1	Visually inspect all kit items for any crack, corrosion and damages.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		2	In case of damage paint corrective action plan is as under: Step 1 : Pre treatment : Shot/Grit/Sand Blasting According to ISO:8501, Sa 2.5 As per ICF/MD/Spec- 299. Step 2 : Apply Primer High Performance Anti corrosion Epoxy coating (2 Pack) with DFT of 125 +20 / 0 microns to be done as per RDSO SPEC NO.M&C/PCN/123/2018. Step 3 : Intermediate Coat : Fluropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008. Step 4 : Top coat : Fluropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1.							
		3	<u>*Note:*</u> *One time replacement of unmodified spring pad with modified spring pad as per RDSO instructions vide letter no. MC/TSBD dated 27.05.2024 to address the issue of primary spring failures should be carried out during the shop schedules / sick attention*							
1.10	Hardware (Bolted Joints)									
		1	Visually inspect hardware for any cracks, damages and corrosion.	✓	✓	✓	✓	✓	✓	✓
		2	For corrective action is taken the following points to be followed. ● Remove the damaged /crack/ corroded hardware. ● Replace with new hardware. ● Apply Molykote ● Apply tightening torque.							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	Check all torque markings (looseness of fasteners). If any torque marking found opened then re-torque and mark with torque seal.	✓	✓	✓	✓	✓	✓	✓
		4	Torqueing of all bolted joints.				✓	✓	✓	✓
		5	*Note:* *1) With Plain washers, FS lock nut shall be used.* *2) With nord lock washers, plain nut shall be used.*							
		6	*3) Replacement of Hardware (Bolted Joints) on condition basis and mandatory replacement whenever equipment is removed/ refitted/ dismantled.* *4) Marking with suitable permanent marker after torque application*					✓	✓	✓
1.11	Castings									
		1	Visually inspect all castings for any crack, corrosion and damages.	✓	✓	✓	✓	✓	✓	✓
		2	Perform a visual check on all fixings for loosening (check with paint marks / movement) and / or missing components.	✓	✓	✓	✓	✓	✓	✓
		3	Clean the castings thoroughly to remove dust mud and oil deposit.		✓	✓	✓	✓	✓	✓
		4	Clean the castings thoroughly with high pressure water jet to remove dust mud and oil deposit.					✓	✓	✓
		5	Visually check mounting holes and machining areas for any enlargement and damages					✓	✓	✓
		6	Visually check the castings for any paint damages and corrosion					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		7	If paint damaged clean thoroughly and touch up as below: 1. Clean the identified area with chemical paint stripper. 2. Apply primer high performance anti corrosion epoxy coating (2 pack) having color green with DFT of 125 +20/0 microns to be done as per RDSO spec no. M&C/PCN/123/2018. 3. Intermediate Coat : Fluropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008 4. Top coat : Fluropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1					✓	✓	✓
		8	MPT of following load bearing casted component to be carried out in shop schedules. i. Control Arm Upper Cover ii. Control Arm Lower Half iii. Control Arm Bush iv. Traction Center Acceptance criteria for MPT for Control Arm Upper Cover, Control Arm Lower Half and Traction Centre shall be **SEVERITY LEVEL 2: SM02, LM2/AM2** in accordance with EN1369 (latest).					✓	✓	✓
		9	Wear limits for control arm bush (Outer Diameter & Inner Diameter) to be verified.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		10	Paint the load bearing casted component 1. Pretreatment: Shot/Grit blasting according to ISO 8501, Sa 2.5 as per ICF/MD/Spec-299 2. Apply primer high performance anti corrosion epoxy coating (2 pack) having color green with DFT of 125 +20/0 microns to be done as per RDSO spec no. M&C/PCN/123/2018. 3. Intermediate Coat : Fluropolymer (FLUOROETHYLENE) with DFT of 30 +10/0 microns to be done as per Japanese Industrial standard JIS K 5659:2008 4. Top coat : Fluropolymer (FLUOROETHYLENE) with DFT of 25 +10/-0 microns with shade to RAL-7012(Basalt Grey) to be done as per Japanese Industrial Standard JIS K 5659:2008-Class-1.					✓	✓	✓
		11	O-Rings of Axle Box - Front End and Rear End Cover to be replaced					✓	✓	✓
2	**Electro-Pneumatic Brake System**									
2.1	System Maintenance (DTC,NDTC,MC,TC)									
	Note: All leakages in shop schedules should be checked by using a leak detector solution made with deionized water and a surfactant (soapy water), and with the system under pressure, apply the solution to suspected areas. If there is a leak, bubbles will form and grow, indicating a leakage.									
2.1.1	MR & BP pressurized system									
		1	Visual inspection for general condition & sound of leakage	✓	✓	✓	✓	✓	✓	✓
		2	MR and BP leakage test to be done (format enclosed at **Annexure-B**)	✓	✓	✓	✓	✓	✓	✓
2.1.2	Brake System									
		1	Inspect MR Pressure (8 to 10 bar), BP pressure (5 bar) and BC/AR pressure (8 to 10 bar) from dual pressure gauges in the driver desk.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		2	Check the brake page on TCMS monitor by visual for Brake cylinder pressure on applying and releasing brake: i. Service brake through Master controller ii. Emergency brake through Master controller. iii. Emergency brake through Driver's brake valve.	✓	✓	✓	✓	✓	✓	✓
		3	Parking brake to be tested by pressing apply and release command from CRW panel.	✓	✓	✓	✓	✓	✓	✓
		4	Perform brake pipe continuity test applying brake through DBV for BP drop in other end DTC.	✓	✓	✓	✓	✓	✓	✓
		5	Perform Self-test of BECU from TCMS (Brake + WSP).	✓	✓	✓	✓	✓	✓	✓
		6	Check Emergency brake by Assistant Emergency brake handle.	✓	✓	✓	✓	✓	✓	✓
		7	Check error free state for all coaches either by self-test or by software provided by the OEM.		✓	✓	✓	✓	✓	✓
2.1.3	Brake Control System									
		1	Visual Inspection for general condition, any sound of leakage	✓	✓	✓	✓	✓	✓	✓
		2	Perform Automatic Load Braking Function Test (Including Suspension Equipment)				✓	✓	✓	✓
		3	Air Spring pressure in empty condition (train is in tare weight) in all coaches.				✓	✓	✓	✓
		4	Move master controller to full service braking position. Check that the BC pressure increases as per OEM recommendation and the BP pressure gauge is about 5.0 bars.				✓	✓	✓	✓
		5	Move master controller to "COAST" position. Ensure that the BC pressure decreases.				✓	✓	✓	✓
		6	Move master controller to emergency brake "EB" position. Check that the BC pressure increases as per OEM recommendation and the BP pressure gauge is about 5.0 bar.				✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			<u>Note:</u> Check/set the BC pressure whenever change in Air Spring bellow.							
		7	Move master controller to “COAST” position. Ensure that the BC pressure decreases.				✓	✓	✓	✓
		8	*<u>Note :</u>* *1. Parking brake application or suitable protection against rolling down to be ensured before any testing.* *2. Status update of isolating cocks and wire connectors may be checked in case of no status update.*							
		9	BC pressure in various brake position like FSB, Holding brake, EB may be recorded (format enclosed at **Annexure C**)					✓	✓	✓
2.1.4	Under Frame Brake components									
		1	Visual Inspection for general condition, any sound of leakage.	✓	✓	✓	✓	✓	✓	✓
		2	Check operation of automatic drain (correct drainage) of main reservoir.	✓	✓	✓	✓	✓	✓	✓
		3	Check for noticeable air leakages in compressed air system.	✓	✓	✓	✓	✓	✓	✓
		4	Visually check Inter-unit air hose couplings for damage or open connection.	✓	✓	✓	✓	✓	✓	✓
		5	Visually check the hose pipe of the caliper unit for open connection / damage/ missing.	✓	✓	✓	✓	✓	✓	✓
		6	Visually check brake caliper, brake disc & brake pad for looseness/ damage/ missing .	✓	✓	✓	✓	✓	✓	✓
		7	Visually check brake equipment box cover in position.	✓	✓	✓	✓	✓	✓	✓
		8	Renew the worn-out brake pad if necessary. *<u>Note:</u>* *Particular attention be paid to the differential rate to wear between motor coaches & other type coaches.*	✓	✓	✓	✓	✓	✓	✓
		9	Visually check the Speed sensor and its cable for any looseness/ damage.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		10	Check the mounting tightness and the integrity/condition/tightness of brackets/covers.					✓	✓	✓
2.2	Auxiliary & Control Equipment Maintenance *(Components of M/s Knorr Bremse and M/s Faiveley Transport scope)*									
2.2.1	Main Air Compressor									
		1	Visual check for loose/damage/missing parts or abnormal sound	✓	✓	✓	✓	✓	✓	✓
		2	Check Main Air Compressor running on TCMS.	✓	✓	✓	✓	✓	✓	✓
		3	Vacuum Indicator Inspection: *(M/s Knorr Bremse Scope)* ● Check the functionality of indicator plunger (red). The red indicator plunger should not be visible. ● The indicator plunger appears entirely and latches once the maximum acceptable negative pressure (OEM recommendation) is reached. The plunger remains fully in view even when the compressors shut down. ● Replace the filter element of dry type air filter if the indicator plunger appears entirely and latches	✓	✓	✓	✓	✓	✓	✓
		4	Check the functioning of compressor for loading/ unloading.	✓	✓	✓	✓	✓	✓	✓
		5	Check the compressor mounting tightness.		✓	✓	✓	✓		
		6	Clean filter element of the dry type air filter. <u>Note:</u> *Avoid applying excessive air pressure when cleaning the filter element. The recommended cleaning pressure is 3 to 4 bars. Alternatively, a blower can be used for effective cleaning.*		✓	✓				
		7	Perform Compressor CUT-IN & CUT-OUT test.			✓	✓	✓	✓	✓
		8	Switch off the compressor set motor, wait until the compressor comes to a standstill.			✓	✓	✓		

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● Sight-check the resilient mounting. ● Visually check the restrainers.							
		9	Clean coolers and cylinder cooling ribs / fins.			✓	✓	✓		
		10	Perform Motor-compressor set inspection, servicing and function test				✓	✓		
		11	Replace the filter element of the dry type air filter and clean the vane ring.				✓	✓	✓	✓
		12	Perform Pneumatic and Air Distribution System Leakage Test: The test run is needed after the unit has been assembled or installed on board to the vehicle. The unit and its downstream components must be tested for leakage and functionality.				✓	✓	✓	✓
		13	Air pressure build up test may be done for individual compressors (format enclosed at **Annexure-A**)					✓	✓	✓
		14	Overhaul motor compressor set. Replace resilient Mounting & restrainers						✓	✓
2.2.2	Air Dryer Unit									
		1	Visual Inspection for general condition, any damage/loose or missing part.	✓	✓	✓	✓	✓	✓	✓
		2	Functional Check: ● Inspect cycle timer. ● Check main reservoir for water accumulation.		✓	✓	✓	✓	✓	✓
		3	Check Pressure Dew Point Measurement using dew point meter.				✓	✓		
		4	Check the drainage port on the silencer for obstructions.				✓	✓		
		5	Test pressure switch for correct operation.				✓	✓		
		6	Overhaul						✓	✓
2.2.3	Micromesh Filter									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Filter element to be changed. After replacement test the pipe connections for leakage at the maximum acceptable working pressure. Air bubbling is unacceptable.				✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
2.2.4	Final Filter									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	Filter element to be changed.				✓	✓	✓	✓
2.2.5	Water Separator									
		1	Functional Testing				✓	✓	✓	✓
		2	Overhaul						✓	✓
2.2.6	Minimum Pressure Valve									
		1	Overhaul						✓	✓
2.2.7	Auxiliary Air Compressor (Pantograph Control)									
		1	Visual check for loose/damage/missing parts or abnormal sound	✓	✓	✓	✓	✓	✓	✓
		2	Clean filter element of dry type air filter.			✓				
		3	Functional check:- When Aux Compressor is running pantograph must raise and touch to OHE.			✓	✓	✓	✓	✓
		4	Clean coolers and cylinder cooling ribs / fins			✓	✓	✓	✓	
		5	Replace the filter element of dry type air filter				✓	✓	✓	✓
		6	Check Carbon brushes of the DC motor for good condition. *<u>Note:</u>* ● *Check the condemning limit of carbon brushes as specified by the OEM* Recommendation ● *<u>M/s Knorr Bremse:</u> 9 mm* ● *<u>M/s Faiveley Transport :</u> 7 mm* ● *Size must not be below the specified condemning limit* ● *Always exchange all carbon brushes in case of replacement*				✓	✓	✓	
		7	Overhaul complete motor compressor set.							✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
2.2.8	Safety Valves									
		1	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function test: ● Safety valve must be detached and mounted on test bench for function test. ● Safety valves to operate as per their desired setting (opening/closing pressure, leakage, freedom of movement etc.)				✓	✓	✓	✓
		3	Replacement							✓
2.2.9	Pneumatic Horn/Tyfon (Low tone / High tone)									
		1	Visual Inspection for general condition.	✓	✓	✓	✓	✓	✓	✓
		2	Check functioning of horns.	✓	✓	✓	✓	✓	✓	✓
		3	*Horn Diaphragm to be checked*					✓		
		4	*Sound intensity (dB) to be checked*					✓	✓	✓
		5	Replacement						✓	✓
2.2.10	Air Reservoirs									
		1	Visual Inspection for general condition, loose fasteners, leaks and damages.	✓	✓	✓	✓	✓	✓	✓
		2	Drain condensate water through drain valve/cock, if any.		✓	✓	✓	✓	✓	✓
		3	Replacement on condition basis.							
2.2.11	Automatic Drain Valve									
		1	Visual Inspection for general condition leaks and other damages.	✓	✓	✓	✓	✓	✓	✓
		2	Check outlet of drain valve for contamination			✓	✓	✓		
		3	Functionality Check			✓	✓	✓	✓	✓
		4	Overhaul						✓	✓
2.2.12	Drain Valves / Drain Cocks									
		1	Visual inspection of abnormality and defects.	✓	✓	✓	✓	✓	✓	✓
		2	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	Replacement						✓	✓
2.2.13	Ballcocks/Isolating cocks/Cutoff angle cocks (with or without switch module or exhaust/vented)									
		1	Visual Inspection for general condition, any sound of leakage.	✓	✓	✓	✓	✓	✓	✓
		2	Fault checking only if appears in TCMS event log.		✓	✓	✓	✓	✓	✓
		3	Function test: 1. Turn the ball cock handle to closed/open position. Make sure that the cock handle is easy to turn without jerking and the venting noise can be heard (Ballcock with exhaust). 2. Magnet valve Coil movement sound on energising and de-energising (Ballcock with switch module). 3. Fault checking based only on TCMS data during train operation (Ballcock with switch module).			✓	✓	✓	✓	✓
		4	Replacement.						✓	✓
2.2.14	Magnet Valves / EP Valves / Impulse Valve									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Fault checking only if appears in TCMS event log.		✓	✓	✓	✓	✓	✓
		3	Function test: 1. Magnet valve Coil movement sound on energising and de-energising. 2. Fault checking based only on TCMS data during train operation / self test diagnostic information			✓	✓	✓	✓	✓
		4	Overhaul						✓	✓
2.2.15	Pressure Sensors / Pressure Transducers									
		1	Visual check for abnormality, noticeable air leakages (sound).		✓	✓	✓	✓	✓	✓
		2	Fault checking only if appears in TCMS event log / self test / train operation.		✓	✓	✓	✓	✓	✓
		3	Replacement on condition basis.							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
2.2.16	Test Points / Test Fittings									
		1	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		2	Functional check as part of the system				✓	✓	✓	✓
		3	Replacement on condition basis							
2.2.17	Pressure Governors / Pressure Switches									
		1	Check for any leakages and external condition.				✓	✓	✓	✓
		2	Functional check as part of the system.				✓	✓	✓	✓
		3	Calibration						✓	
		4	Replacement							✓
2.2.18	Check Valves									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function Check					✓	✓	✓
		3	Overhaul						✓	✓
2.2.19	Air Filters									
		1	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		2	Replace filter element.				✓	✓	✓	✓
2.2.20	Pressure Regulators / Pressure Reducing Valves									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function Check				✓	✓	✓	✓
		3	Overhaul						✓	✓
2.2.21	Mini Distributor Valve or STV									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function Check					✓	✓	✓
		3	Overhaul						✓	✓
2.2.22	Rubber Hose Connections, Hose Pipes & Hose Couplings									
		1	Visual inspection of abnormality and defects.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		2	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		3	Replacement						✓	✓
2.2.23	Pneumatic metal pipes, connectors, clamps, brackets and related items.									
		1	Visual Inspection for general condition, any damage/loose or missing part.	✓	✓	✓	✓	✓	✓	✓
		2	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		3	Replacement on condition basis.							
2.2.24	Driver Brake Valve									
		1	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function test: Check by application and release of brake.		✓	✓	✓	✓	✓	✓
		3	Overhaul						✓	✓
2.2.25	Guard Emergency Brake Valve									
		1	Observe for noticeable air leakages(sound).	✓	✓	✓	✓	✓	✓	✓
		2	Function test: Check by application and release of brake.			✓	✓	✓	✓	✓
		3	Overhaul						✓	✓
2.2.26	Dual/Duplex Pressure Gauge-MR/BP, Dual/Duplex Pressure Gauge-BC/AR, BP Gauge									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Leakage & Function test: ● Use a leak detector solution made with deionized water and a surfactant (soapy water), and with the system under pressure, apply the solution to suspect areas. If there is a leak, bubbles will form and grow, indicating a leakage. ● Check gauges for correct functioning.				✓	✓	✓	✓
		3	Calibrate with reference gauge.				✓	✓	✓	
		4	Replacement							✓
2.2.27	Axle Speed Sensor and Phonic Wheel									
		1	Visual check Axle Speed Sensor for looseness or any damage.	✓	✓	✓	✓	✓	✓	✓
		2	Fault checking only if appears in TCMS event log.		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	Fault checking based on TCMS data during train operation.			✓	✓	✓	✓	✓
		4	Mounting of axle speed sensor, condition of phonic wheel and gap between sensor and phonic wheel to be ensured. Recommended gap between sensor and phonic wheel: M/s Knorr Bremse: 0.9 ± 0.5 mm M/s Faiveley Transport: 1.0 ± 0.5 mm					✓	✓	✓
		5	Replacement on condition basis.							
		6	*Note: Assembly procedure for phonic wheel to be followed as per ICF letter no. MD/D/W&A/43 dated 17.05.2024 or latest instructions.*							
2.2.28	Anti-Skid Valve /Dump valve									
		1	Observe for noticeable air leakages (sound).			✓	✓	✓	✓	✓
		2	Anti-skid valve by brake self-test through TCMS.			✓	✓	✓	✓	✓
		3	Overhaul						✓	✓
2.2.29	Duplex Check Valve									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Overhaul						✓	✓
2.2.30	Piston Valve									
		1	Overhaul						✓	✓
2.2.31	Overflow Valve									
		1	Functional Check				✓	✓	✓	✓
		2	Overhaul						✓	✓
2.2.32	Mean Pressure Valve									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Overhaul						✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
2.2.33	Relay Valves									
		1	Observe for noticeable air leakages (sound).	✓	✓	✓	✓	✓	✓	✓
		2	Overhaul						✓	✓
2.2.34	Levelling Valve									
		1	Observe for noticeable air leakages (sound).			✓	✓	✓	✓	✓
		2	Check air suspension pressures on TCMS.				✓	✓	✓	✓
		3	Functional check as part of the system				✓	✓	✓	✓
		4	Overhaul						✓	✓
2.2.35	Installation Lever Assembly									
		1	Tightening of installation lever nuts.				✓	✓	✓	✓
		2	Installation lever adjustment.				✓	✓	✓	✓
		3	Replacement on condition basis.							
2.2.36	Brake Disc Assembly, Brake Pad and Brake Caliper Unit (with and without parking brake)									
		1	Visual Inspection for general condition, any damage/loose or missing part.	✓	✓	✓	✓	✓	✓	✓
		2	Observe wear of brake pad.	✓	✓	✓	✓	✓	✓	✓
		3	Clean the brake discs and pads with compressed air. Push the breather hole plug provided in caliper assembly to remove the internal air.		✓	✓	✓	✓	✓	✓
		4	Check and verify the clearance between pad and disc surface shall be within permissible limits. Recommendation M/s Knorr Bremse & M/s Faiveley Transport: 2- 4 mm		✓	✓	✓	✓	✓	✓
		5	Check visually all bolted connections of brake disc assembly.		✓	✓	✓	✓	✓	✓
		6	Check for defects such as cracks, scores, hollow wear or excessive wear in the friction ring.		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		7	Check the wear of brake pads and brake discs. If groove depth is reached, it is necessary to replace the brake discs or pads. Recommendation M/s Knorr Bremse & M/s Faiveley Transport: Replace brake pad if thickness ≤ 5mm		✓	✓	✓	✓	✓	✓
		8	Functional Check : Application/Release and slack adjuster functional check.			✓	✓	✓	✓	✓
		9	Standard rejection criteria for thermal crack and other defects as specified by the OEM to be checked for brake disc.					✓	✓	✓
		10	Replace Brake Pads						✓	✓
		11	Overhaul brake caliper unit							✓
		12	Condition based replacement of brake disc assembly.							
2.3	**Panel/Module Maintenance (DTC,NDTC,MC,TC)**									
2.3.1	Brake Control Unit (Electronics)									
		1	Self-test of BECU from TCMS (brake + WSP).	✓	✓	✓	✓	✓	✓	✓
		2	Function check (Fault checking based only on TCMS data during train operation/ self test diagnostic information from TCMS).		✓	✓	✓	✓	✓	✓
		3	Replacement of items on condition basis.							
2.3.2	B01 Panel									
		1	Fault checking only if appears in TCMS event log.		✓	✓	✓	✓	✓	✓
		2	Functional test: ● For B01 panel, check application/release of parking brake through push button. ● Speed sensor check through TCMS if the failure is set because of the speed sensor. ● Fault checking only if appears in TCMS event log.			✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		3	Filter element to be changed. After replacement test the pipe connections for leakage at the maximum acceptable working pressure. Air bubbling is unacceptable.				✓	✓	✓	✓
		4	Overhaul						✓	✓
2.3.3	B02 Panel,BCU-Bogie1&2									
		1	Fault checking based on TCMS data during train operation.			✓	✓	✓	✓	✓
		2	Check B02 /BCU panel by application of direct and indirect brake. Also visual check for any abnormality				✓	✓	✓	✓
		3	Overhaul						✓	✓
2.3.4	Traction Cut-Out Panel									
		1	Traction cut out panel check by indirect braking (DBV) to emergency application.				✓	✓	✓	✓
		2	Overhaul						✓	✓
2.3.5	LB Panel									
		1	LB panel check for pressure governor connections and isolation cock.				✓	✓	✓	✓
		2	Overhaul						✓	✓
2.3.6	Driver Desk Control									
		1	Filter to be replaced				✓	✓	✓	✓
		2	Overhaul						✓	✓
2.3.7	Aux. Air Supply Unit Panel									
		1	Observe for noticeable air leakages (sound).		✓	✓	✓	✓	✓	✓
		2	Overhaul						✓	✓
2.3.8	Horn & Backup Brake Module									
		1	Filter to be replaced				✓	✓	✓	✓
		2	Overhaul							✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
2.3.9	Brake Module									
		1	Overhaul							✓
3	**Shell and Under-Frame**									
3.1	Underframe/Car-body (DTC,NDTC,MC,TC)									
		1	Visual inspection of coach underframe and its components.	✓	✓	✓	✓	✓	✓	✓
		2	Check visually the following for damages/ defects/ deficiencies: Condition of head stock, sole bar, and other underframe members.	✓	✓	✓	✓	✓	✓	✓
		3	● Examine the trough floor and other underframe members from underneath for any sign of damage, cracks, or corrosion. ● If corrosion has just started and is not significant, clean the surface to bare metal and inspect it, if found in order, immediately apply anticorrosive coating and paint the affected area.				✓	✓	✓	✓
		4	Underslung equipment mounting, fixing brackets and fasteners: ● Check for loosening. ● Check for corrosion/cracks/bending/breakage and replace if necessary.					✓	✓	✓
		5	Check handrails, doors, body sides, lavatories for proper functioning.	✓	✓	✓	✓	✓	✓	✓
		6	Amenities and fittings should be checked for proper functioning.	✓	✓	✓	✓	✓	✓	✓
		7	All missing passenger amenity fittings must be replaced, and the rake must be turned out as a '***Zero-Missing-Fittings***' rake. Check visually the following for any damages/ defects/ deficiencies: I. Board and brackets II. Body side/end walls III. Panels & covers IV. Windows, plug doors, lavatory doors, IC doors, etc. for their functioning. V. Fire Extinguishers.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		8	**External Cleaning** Coach cleaning/washing should be done by the Automatic Coach Washing Plant (ACWP).	✓	✓	✓	✓	✓	✓	✓
		9	However, where ACWP is not available, external cleaning/washing of coaches can be done in the following manner: I. Place the rake/coaches on the washing line provided with equipment required for washing and cleaning. It should be ensured that the rake/coach is protected with proper board/signal for the safety of the staff working on the washing/cleaning job to prevent movement/disturbance in the activity. Scotch blocks with locking arrangements should protect lines, and keys should be kept with the Engineer (C&W) till the time the rake is under maintenance. In the electrified section, the C&W supervisor shall, in addition, obtain power block from OHE before commencing work and ensure earthing of OHE with suitable earthing rods at both ends. II. All VCBs may be grounded before commencing washing and isolation keys may be kept securely III. The cleaning solution should be spread/rubbed with a nylon brush or sponge brushes and then rubbed thoroughly to clean the panels. Extra attention should be given to oily and badly stained surfaces. IV. Clean the external surface by high-pressure jet where facilities are available.	✓	✓	✓	✓	✓	✓	✓
		10	All exterior panels, including end panels should be hosed with water and brushed with diluted soft soap (detergent solution).	✓	✓	✓	✓	✓	✓	✓
		11	**Internal Cleaning** I. Clear the newspaper from the magazine bag and the waste from the dustbin. Clean the floor with vacuum cleaner. II. Remove dust from floor, seat, and magazine nylon wire mesh bag. Use of a vacuum cleaner is excellent in such areas.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			III. Also remove dust/dirt from under the seat, luggage racks, IC door, and all corners & crevices of the coach interior with vacuum cleaner. IV. Frames, strips, and other metal fittings, etc. should be cleaned with the recommended cleaning agent. V. The coach flooring should be cleaned with recommended cleaning agent. VI. Perform interior cleaning of lavatories VII. The amenity fittings, windows and toilet fittings should be cleaned with duster. Stains on these items should be removed with the recommended detergent solution. VIII. Spray the recommended air freshener in the coach. <u>Note:</u> *No employee should be allowed to enter the coach for any purpose/work after complete cleaning.* IX. Precaution should be taken to prevent nuisance of cockroaches and rodents in the coaches, especially at the pantry section. X. No repair work should generally be left to be carried out after washing and cleaning of the coach.							
		12	Pest and rodent control should be done as per extant instructions issued by the Railway Board from time to time.	✓	✓	✓	✓	✓	✓	✓
		13	Ceiling panels, wall panels, seats, fittings, table tops, etc. should be cleaned, and stain marks on these should be removed by use of recommended soft detergent.		✓	✓	✓	✓	✓	✓
		14	Perform intensive cleaning and disinfection of coaches.		✓	✓	✓	✓	✓	✓
		15	Perform Advanced Mechanized Intensive Cleaning and Surface Treatment of Underframe						✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
3.2	Roof (DTC,NDTC,MC,TC)									
			<u>Warning :</u> *Necessary precaution to be taken for OHE lines while working on roof*							
			<u>Caution:</u> *Care must be taken that HT cables or jumpers should not be damaged on the roof.*							
		1	Cleaning of rain gutter, drain holes and pipes must be ensured. Condition of pipe traveling from roof till exhaust near bogie to be checked.	✓	✓	✓	✓	✓	✓	✓
		2	The roof of trainset coaches should be checked for corrosion. Special attention should be paid at locations where gutter moldings are welded. Corroded roof should be repaired according to the instructions					✓	✓	✓
		3	Roof leakage test to be done.					✓	✓	✓
		4	Roof painting						✓	✓
3.3	Nosecone (DTC)									
		1	Check nose cone for any damage due to collisions with debris or other objects can cause significant damage.	✓	✓	✓	✓	✓	✓	✓
		2	<u>Condition based repair/replacement :</u> ● Any visible cracks, dents, or deformation in the nosecone that could compromise its structural integrity or safety. ● Over time, the composite materials used in the nosecone may experience fatigue due to repeated stress and environmental exposure .					✓	✓	✓
3.4	Lookout Glasses (Diver Cab -DTC)									
		1	Check for any visible cracks, chips, or other damage.	✓	✓	✓	✓	✓	✓	✓
		2	<u>Condition based replacement :</u> ● Any visible cracks, chips, or other damage that could compromise the structural integrity or safety of the glass.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● If the glass becomes scratched, fogged, or otherwise degraded to the point where it impairs the driver's visibility. ● If the seals around the glass are damaged or deteriorated, leading to water leakage or reduced structural stability, the glass may need to be replaced along with the seal.							
3.5	Exterior Paint (DTC,NDTC,MC,TC)									
		1	Examine the condition of the exterior paint of coaches, if found scratches or minor damages at scattered locations, the paint touch-up should be done as per recommendation.				✓	✓		
		2	Remove the existing exterior paint and apply new paint coating.						✓	✓
4	**Interior and Furnishing Items**									
4.1	Gangway – (DTC,NDTC,MC,TC)									
		1	● Visual inspection for tears or holes in bellows fabric. ● Loosening of connection between Bellows and folding Wall.	✓	✓	✓	✓	✓	✓	✓
		2	Intactness of all inter- coach gangways to be ensured.	✓	✓	✓	✓	✓	✓	✓
		3	**Bellows and folding wall** <u>Visual inspection for:</u> ● Tears or holes in bellows fabric ● Broken aluminum profiles ● Fabric torn out of bellows frames ● Sealing of screw-on frames / couple frame worn/damaged ● No gap-free fit of screw-on frames / couple frame at coach interfaces ● Connection between bellows and folding wall loosen <u>Visual Inspection / Cleaning for:</u> ● Accumulation of dirt/garbage on bellows floor *<u>Note:</u>* *Cleaning as required. Use vacuum cleaner, if necessary.*		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		4	• Dirt and rubbish on the bellows floor area (visual inspection through flipping-up the floor flaps of the bridge plates) *Note :* *Clean if necessary using Vacuum Cleaner*				✓	✓	✓	✓
		5	**Combination bridge** Visual Inspection / Functional Check for: • Damage • Sliding ledges worn/damaged		✓	✓	✓	✓	✓	✓
		6	**Linking ceiling** Visual inspection for damage		✓	✓	✓	✓	✓	✓
		7	**Side wall** Visual Inspection / Functional Check for: • Tears in gap covering • Firm fit		✓	✓	✓	✓	✓	✓
		8	The functionality of the quick release mechanism should be checked to ensure proper working.				✓	✓	✓	✓
		9	Check the tightness of all fasteners of the gangway assembly.					✓	✓	✓
		10	Replace components as recommended by the OEMs						✓	✓
		11	Component replacements: M/s Dellner: • 3 Years (SS-2)/ 6 Years (SS-3): As recommended by the OEM • 7.5 Years (3rd SS-1): As recommended by the OEM for 96 months period. M/s Lince: • 6 Years (SS-3): As recommended by the OEM							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			M/s Ultimate Transportation Equipment: ● 3 Years (SS-2): As recommended by the OEM ● 6 Years (SS-3): As recommended by the OEM M/s CRI: ● 6 Years (SS-3): As recommended by the OEM							
		12	Complete Gangway System Replacement: ● M/s Hubner: 12 Years (2nd SS3) ● M/s Dellner: 15 Years (3rd SS-2) ● M/s Lince: 12 Years (2nd SS3) ● M/s Ultimate Transportation Equipment: 12 Years (2nd SS3) ● M/s CRI: 12 Years (2nd SS3)							
		13	*Note: Lubricate components as per OEM guidelines and condition-based requirements.*							
4.2	Seats (Passenger/ Tip-up / Driver) – (DTC,NDTC,MC,TC)									
		1	Visual inspection for tears/holes in upholstery & foam sets. For upholstered area, identify unacceptable visible degradation of the fabric such as: ● Fabric wear is not acceptable on a visual point of view ● Act of vandalism cut through the fabric ● Foam is visible under the fabric	✓	✓	✓	✓	✓	✓	✓
		2	Clean complete seat assembly.	✓	✓	✓	✓	✓	✓	✓
		3	Inspect seats and check for completeness. **I.** Check magazine pocket and bottle holder. **II.** Check the recline and rotation function of the seat. **III.** Check functioning of foldable snack tray, arm-rest and adjustable foot-rest. **IV.** Check functioning of USB socket and electric outlet of the seat. **V.** For painted area, identify structural damages or deep scratches that:	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● Scratches is not acceptable on a visual point of view ● Metal structure damaged							
		4	Conditional assessment of complete assembly. Repair or replace as needed. *Note :* ● *In case of deterioration of easy-to-exchange parts, proceed with the replacement on the coach.* ● *If the paint surface of the seat frame has significantly deteriorated, rather than applying touch-ups at multiple spots, the entire seat frame should be repainted.* ● *In case of extended deterioration, remove and replace the complete seat assembly.*					✓	✓	✓
		5	Passenger seat upholstery replacement. *Note:* *Passenger seat cushion refurbishment on condition basis*						✓	✓
4.3	Table (DTC,NDTC,MC,TC)									
		1	Clean tables.	✓	✓	✓	✓	✓	✓	✓
		2	Check for loosened hinges and tighten (if required).	✓	✓	✓	✓	✓	✓	✓
		3	Tighten screws/nuts and clean.		✓	✓	✓	✓	✓	✓
		4	Conditional assessment of complete assembly. Repair or replace as needed.					✓	✓	✓
4.4	Flooring and Floor Sheet / Carpet (DTC,NDTC,MC,TC)									
		1	Clean floor sheet / carpet.	✓	✓	✓	✓	✓	✓	✓
		2	Checking for peel-off and repair, as needed (using suitable adhesives/ fasteners).	✓	✓	✓	✓	✓	✓	✓
		3	Conditional assessment. ● Check for worn out/shabby look/ torn/ opened joints. Repair/ clean/ replace as needed.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● Inspect all coaches for floor bulging or unevenness. If water ingress is detected, the entire flooring of the affected coach must be replaced.							
4.5	Window (DTC,NDTC,MC,TC)									
		1	Cleaning to be done.	✓	✓	✓	✓	✓	✓	✓
		2	Intactness of windows to be ensured.	✓	✓	✓	✓	✓	✓	✓
		3	Check for cracks and breakage.	✓	✓	✓	✓	✓	✓	✓
		4	Broken, cracked, defaced or scratched glass should be replaced and the window frame repaired as necessary. The rubber gasket between the glass and the FRP panel should be changed every time the glass is removed.	✓	✓	✓	✓	✓	✓	✓
		5	Check for cracks and breakage, moist, opaque, torn rubber profiles.					✓	✓	✓
		6	The windows glasses to be checked for air tightness.					✓	✓	✓
		7	Check the adhesive used for bonding with the car body. If any crack or broken found, change the window					✓	✓	✓
		8	Replace Lower Trim Rubber Gasket						✓	✓
4.6	Roller Blind (DTC,NDTC,MC,TC)									
		1	Clean roller blind	✓	✓	✓	✓	✓	✓	✓
		2	● Check for any tear in the blind and pull-string. ● Check its proper functioning	✓	✓	✓	✓	✓	✓	✓
		3	Function Check : Roll the blind up or down to cover or uncover the window and ensure the following ● There should be no difficulty to raise or lower due to obstructions or a jammed roller mechanism ● The blind should not hang unevenly, which can be caused by misaligned brackets or an uneven roller. ● The roller mechanism should not be dirty, worn, or lack proper lubrication, making it hard to operate.	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		4	Conditional assessment. Repair or replace as needed					✓	✓	✓
4.7	Luggage Rack (DTC,NDTC,MC,TC)									
		1	Clean the luggage rack.	✓	✓	✓	✓	✓	✓	✓
		2	Check fasteners for looseness and tighten (if any looseness is found).	✓	✓	✓	✓	✓	✓	✓
		3	Conditional Assessment. Repair or replace (if necessary).					✓	✓	✓
		4	Note: *Application of vinyl film on luggage racks should be done conditionally in SS2 & SS3*							
4.8	Interior Panels (DTC,NDTC,MC,TC)									
		1	Visual inspection for general condition	✓	✓	✓	✓	✓	✓	✓
		2	● Check side panels for cracks, damage, condition of paint, and shabby look. ● Replace the panels as needed.					✓	✓	✓
		3	Painting & refurbishment of the interior panels						✓	✓
4.9	Fire Extinguisher (DTC,NDTC,MC,TC)									
		1	Confirm the fire extinguisher is visible, unobstructed, and available at the designated location.	✓	✓	✓	✓	✓	✓	✓
		2	Verify the safety pin is intact and the pressure gauge indicator is within green range.	✓	✓	✓	✓	✓	✓	✓
		3	Check for expiry date in label (Should not be overdue)	✓	✓	✓	✓	✓	✓	✓
			Note : *Maintenance and testing are to be done as per manufacturer's/ Railway Board latest instructions.*							
4.10	Lavatory Items (DTC,NDTC,MC,TC)									
		1	Check the lavatory items (Tap, Soap dispenser, heath faucet, mirror etc.) for any abnormality.	✓	✓	✓	✓	✓	✓	✓
		2	Replace on condition basis.							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
5	**Couplers**									
5.1	CBC (DTC)									
		1	Visual inspection of the coupler head for damage.				✓	✓	✓	✓
		2	Checking of coupler operating mechanism for damage/ loose bolts etc.				✓	✓	✓	✓
		3	Checking of telltale recess, for ensuring proper coupling.				✓	✓	✓	✓
		4	Inspection of coupler carrier/supporting device and its springs for cracks and breakage.				✓	✓	✓	✓
		5	Visual inspection of loose/broken/missing nuts /bolts, split pin & stiffener plate of front carrier plate.				✓	✓	✓	✓
		6	Ensure proper locking of tertiary locking pin, if provided.				✓	✓	✓	✓
		7	Apply grease on wearing/sliding zone of supporting device & manual uncoupling device.				✓	✓	✓	✓
		8	Check thickness & corrosion of stiffener plate of front carrier plate. If thickness is found less than 6 mm, it should be replaced.				✓	✓	✓	✓
		9	Check and maintain the gap between uncoupling hook rod eye and rear rib of rotary lock lift assembly upto 3-6 mm.				✓	✓	✓	✓
		10	Check & ensure that the fully tightened locking screw is locking the uncoupling handle properly, so that no lifting and rotation of uncoupling handle/operating rod is allowed.				✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		11	Inspection of coupler assembly by gauges ● Checking of knuckle contour by contour maintenance gauge. ● Checking of contour by contour condemning limit gauge. ● Checking of distortion of aligning wing pocket and guard arm by aligning wing limit gauge and guard arm distortion gauge. ● Checking of vertical height of aligning wing pocket and guard arm by vertical height aligning wing pocket and guard arm gauge. ● Wear of aligning wing pocket and guard arm to be checked by vertical height condemning limit aligning wing pocket and guard arm gauge. ● Checking of knuckle nose wear and stretch limit by knuckle nose wear and stretch limit gauge.					✓	✓	✓
		12	Visual inspection of tilting of coupler, take corrective action and adjust height of supporting device which should be kept at 187± 2 mm.					✓	✓	✓
		13	Check excessive wear of coupler body wear plate.					✓	✓	✓
		14	Check thickness & corrosion of stiffener plate of front carrier plate, if applicable/provided. If thickness is found less than 6 mm, it should be replaced. <u>Note:</u> *Stiffener plate material should be as per IS 3885 (Part 2, Grade-5) with maximum hardness 190-245 BHN. Therefore, if the stiffener plate material is not confirming to the mentioned specification it should be replaced.*					✓	✓	✓
		15	Inspection of anti-creep protection.					✓	✓	✓
		16	Check additional anti-creep.					✓	✓	✓
		17	Measurement of coupler height 1090 to 1105 mm from rail level- Reference point – Vertical centre of knuckle.					✓	✓	✓
		18	Cleaning of coupler head and its sub-assemblies for rust and dust for its smooth functioning.					✓	✓	✓
		19	Checking of functional operation of coupler & operating rod mechanism.					✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		20	Preferably MPI on knuckle to be done as per ASTM E-709 or AAR-M-220, if MPI facility is not available then DPT as per ASTM E-165 should be carried out. (as per RDSO letter No. MC/BLB/CBC dt. 03.06.2021, 18.08.2021).					✓	✓	✓
		21	Check hardness of knuckle (241 BHN min. & 291 BHN max.)					✓	✓	✓
		22	Make wise Torqueing values of wedge bolt of BDG to be checked as per OEM maintenance manual.					✓	✓	✓
		23	Check excessive wear of uncoupling bar/slide rod-rotary bar with handle, outer support bracket etc. of uncoupling device.					✓	✓	✓
		24	Coat bare steel areas of coupler head body with Molykote D321R (or equivalent) dry spray. *<u>CAUTION:</u> Do not spray Molykote D321R (or equivalent) on the knuckle lock mating surface and internal parts like lock etc.*					✓	✓	✓
		25	Inspection of spherolastic bearing (silent block) has to be done for any damage and replace if applicable.						✓	✓
		26	All parts of CBC and allied accessories to be dismantled and overhauled as per OEM's manual.							✓
		27	Visual inspection to be made for cracks, damages, distortions etc.							✓
		28	Check wear of toggle, lock lift lever assembly by anti-creep test.							✓
		29	Check wear of coupler shank wear plate.							✓
		30	Check wear of lock, knuckle, pivot pin of knuckle and knuckle support pin.							✓
		31	Replace draft gear rubber/ elastomeric pads as per latest OEM recommendation.							✓
		32	Final assembly and checking of functional operation of coupler & operating mechanism.							✓
5.2	Semi-Permanent Coupler (DTC,NDTC,MC,TC)									
		1	Visual Inspection for general condition	✓	✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		2	Check visually for any missing/loose parts.	✓	✓	✓	✓	✓	✓	✓
		3	Check visually for any damage/ crack/ wear etc.	✓	✓	✓	✓	✓	✓	✓
		4	Visual check of torque marks on sleeve and wedges bolts. Torqueing to be done if necessary.	✓	✓	✓	✓			
		5	**Inspection** ● Perform a general visual inspection of the complete coupler. Look for signs of damages and loose or missing parts. ● Check for signs of deformation, rust or damages. Rust has to be removed and the surface repainted. ● Rusty untreated parts have to be cleaned and protected with OEM recommended product.			✓	✓			
		6	**Cleaning** ● Clean coupler thoroughly with water. Dry coupler with clean, lint-free cloth. ● Use a low-aromatic white spirit or equivalent to remove excessive grease from the coupler.			✓	✓			
		7	**Lubrication** Perform external greasing with the OEM recommended grease. Use a brush or similar to apply the grease to visual mounting interfaces on all socket joints.			✓	✓			
		8	Check the condition of draft gear elastomer pad for any crack/wear & preset, replace spring package if necessary.					✓	✓	
		9	**SHOP SCHEDULE ACTIVITIES** ● Inspection of the coupler is to be done as per the *Inspection* instructions mentioned in S.No. 5 above. ● Clean the coupler as per *Cleaning* instruction mentioned in S.No. 6 above.					✓	✓	

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			<u>Inspection & Maintenance:</u> ○ Before opening muff coupling assy./socket joint, inspect the gap between intermediate tube/ spacer and muff coupling assembly, if there is clearance or not touching, then ok. ○ After opening muff assy., Inspect the guide cone and the guide cone interface with regards to excess wear, damages on structure. Its function is to gather the two intermediate tube during coupling. ○ Inspect the socket joint, especially the insides for any wear, crack (by MPI/DPT test) and damages on structure and outer surface painting. If crack is observed, then replace it. Repaint with touch up paint if peel-off observed. ○ Clean and grease the contact surfaces of the flanges on both socket joint halves with the OEM recommended product (Stabyl LT 50 etc.) (for internal/external greasing). Proper greasing of the flanges will guarantee low friction during assembly and a correct performance of the socket joints. ○ After greasing, assemble the muff coupling/socket joints with proper tightening (180 N-m torque in two steps in zig –zag manner) and again ensure that there is gap/clearance between intermediate tube/ spacer and muff coupling assembly provided that top and bottom socket joints halves are at equidistance both side. If clearance is not there, replace the muff coupling assy., even issue is not resolved then replace the intermediate tube/spacer. ● Lubricate the coupler as per *Lubrication* instructions mentioned in S.No. 7 above.							
		10	All parts of semi-permanent coupler and allied accessories to be dismantled and overhauled as per OEM's manual. *<u>Note:</u> Elastomeric pad/spring package to be changed during overhaul.*							✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
6	**Doors**									
6.1	IC Door - (DTC,NDTC,MC,TC)									
		1	Functional Check: ● Check the working and illumination of push button on both sides of the door leaf. ● Check the opening & closing of the door. ● Check the mechanical movement of the door after pressing the emergency push button switch, i.e manual operation. ● Check the function of radar for proper working. ● Check the reverse movement. If there is an obstacle during door movement (open / close), the door should move back automatically.	✓	✓	✓	✓	✓	✓	✓
		2	Check the door leaf and glass for any damage or crack.	✓	✓	✓	✓	✓	✓	✓
		3	Check the completeness of the mechanism visually, adjust the mechanism for smooth operation.	✓	✓	✓	✓	✓	✓	✓
		4	Clean the dust with compressed air.	✓	✓	✓	✓	✓	✓	✓
		5	Check the tightness of cable terminal.	✓	✓	✓	✓	✓	✓	✓
		6	Check the Cable Drag Chain for any damage, replace if required.	✓	✓	✓	✓	✓	✓	✓
		7	Check the function of Relays.	✓	✓	✓	✓	✓	✓	✓
		8	Check the condition of Silent Block.		✓	✓	✓	✓	✓	✓
		9	Lubricate Drive and Carrier Mechanism with OEM recommended lubricant.		✓	✓	✓	✓	✓	✓
		10	Check the condition of Emergency Push Button.		✓	✓	✓	✓	✓	✓
		11	Check the proper functioning of Drive and Carrier Mechanism.		✓	✓	✓	✓	✓	✓
		12	Clean the floor guiding using a lint-free cloth and a suitable cleaning agent.			✓	✓	✓	✓	✓
		13	Checking sensors/limit switches of the doors for proper functioning and secure mounting.			✓	✓	✓	✓	✓
		14	Check the bottom guide rail and replace the slider if required.			✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		15	Check the rubber profile / sealing & replace if required.			✓	✓	✓	✓	✓
		16	Check the bearing play of Drive and Carrier Mechanism .				✓	✓	✓	✓
		17	Check tight seat of all components				✓	✓	✓	✓
		18	Check the motor/actuator for any abnormal noise. Replace if required.				✓	✓	✓	✓
		19	Replacement of components and Overhaul of door assembly: <u>M/s Prag Polymers</u>: SS-1, SS-2 - Replacement of components as per OEM recommendation. SS-3 - Overhaul & Replacement of components as per OEM recommendation. <u>M/s Norgren</u>: SS-3 - Overhaul of door assembly & Conditional Replacement of components as per OEM recommendation					✓	✓	✓
6.2	Plug Doors - (DTC,NDTC,MC,TC)									
		1	Check the plug door glass for any crack and its fixing with frame.	✓	✓	✓	✓	✓	✓	✓
		2	Check door leaf for any damage.	✓	✓	✓	✓	✓	✓	✓
		3	Check step for any damage.	✓	✓	✓	✓	✓	✓	✓
		4	Check the functioning of indication lamps.	✓	✓	✓	✓	✓	✓	✓
		5	Check the functioning of emergency button	✓	✓	✓	✓	✓	✓	✓
		6	Functional & Safety-Checks. ● Check the fitting of the clips. (Clips at roller swing arm/limit switch) ● Check the fastening screws. (Assembly parts screws to find out if they are loose.) ● Check the function of the emergency egress/access (EED/EAD) device. ● Check the lock out device / *out-of-service* function of the door. ● Check obstruction detection. ● Check the pressure supply switch.			✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		7	● Check the condition of the rubber seals of the door. (It should not be torn or cracked.) ● Check the condition of the rubber bump stop /end stop. (It should not be deformed torn, or cracked.) ● Check the condition of the roller of the swing arm. ● Check the correct functioning of the locking fork and hook. ● Check for local opening/closing of the door by push button. ● Check for opening/closing of door (manual/automatic).			✓	✓	✓	✓	✓
		8	Check the function of locking device of step.			✓	✓	✓	✓	✓
		9	Check the paint & corrosion protection.				✓	✓	✓	✓
		10	Visually check for flats at rollers at: ● Swing arm ● Door leaf carrier ● Roller bracket (bottom door leaf area)				✓	✓	✓	✓
		11	Cleaning, greasing and adjustment of components.				✓	✓	✓	✓
		12	Visual check all components for wear and abnormalities.				✓	✓	✓	✓
		13	Clean air filter				✓	✓	✓	✓
		14	Replacement of components and Overhaul of door assembly: M/s Knorr Bremse: ● 4.5 Years (2nd SS-1) - Component replacement & refurbishment as recommended by the OEM for 5-year period. ● 9 Years (2nd SS-2) – Overhaul & Component replacement as recommended by the OEM for a 10-year period. M/s Faiveley Transport: ● 9 Years (2nd SS-2) - Overhaul & Component replacement as recommended by the OEM for a 10-year period.							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● 15 Years (3rd SS-2) - Overhaul & Component replacement as recommended by the OEM							
7	**Water Supply & Vacuum Bio-Toilet System**									
7.1	Water Tank & Supply/Drainage pipelines									
		1	Visual inspection of water tank its mounting arrangement , connections for corrosion, leaks, and structural integrity.	✓	✓	✓	✓	✓	✓	✓
		2	Visual inspection of water pipelines and its connectors , hoses and clamping arrangement for leaks or any abnormality.	✓	✓	✓	✓	✓	✓	✓
		3	Inspect pipelines for blockages, leaks, or damage & verify the condition of joints and fittings.					✓	✓	✓
		4	Examine brackets, clamps, and other securing mechanisms for wear or damage and tightening.					✓	✓	✓
		5	Water tank and water supply pipe line cleaning and descaling.					✓	✓	✓
		6	Pressure testing of water tank.						✓	✓
		7	Replacement of rubber hoses and rubber/flexible pipes.						✓	✓
7.2	Bio Digester Tank (DTC,NDTC,MC,TC)									
		1	Check for foul smell and choking of toilets.	✓	✓	✓	✓	✓	✓	✓
		2	Check all components for deficiencies.	✓	✓	✓	✓	✓	✓	✓
		3	Check for any defect in connections.	✓	✓	✓	✓	✓	✓	✓
		4	Check chlorinator unit for any deficiency.	✓	✓	✓	✓	✓	✓	✓
		5	Visual examination of condition of the brackets/ digester mounting arrangement, safety wire rope, condition of the Bio-digester tank.	✓	✓	✓	✓	✓	✓	✓
		6	Ensure availability of bio-toilet awareness sticker.	✓	✓	✓	✓	✓	✓	✓
		7	Ensure availability of dustbin in bio-toilets.	✓	✓	✓	✓	✓	✓	✓
		8	Clean the bio-tanks externally	✓	✓	✓	✓	✓	✓	✓
		9	Examination of chlorinator unit and topping up of Chlorine tablets.		✓	✓	✓	✓	✓	✓
		10	Check and attend leakage in bio-toilet tank (if any).		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		11	Take the sample of effluent and test all three parameters as per testing procedure and check the result. ● If sample fails, repeat the test two times in interval of 15 days. ● If the sample fails again, change the complete innoculum.		✓	✓	✓	✓	✓	✓
		12	Each Bio-Toilets tank should mandatorily be charged with 10 liters of Anaerobic Microbial Inoculums .			✓	✓	✓	✓	✓
		13	Check for overflow, there should not be any overflow from first chamber/4th chamber.			✓	✓	✓	✓	✓
		14	Evacuation of First chamber of bio-toilet tank & recharging with same effluent with the help of bio-toilet evacuation machine.			✓	✓	✓	✓	✓
		15	Check the leakage from the tank and its welding.				✓	✓	✓	✓
		16	Dismount the bio tanks and check for corrosion in the under frame of the coaches and cross members.					✓	✓	✓
		17	Check for any damage/ leakage/ overflow from Bio-tank. Internal cleaning and repair of bio tanks is to be done and fresh Inoculum to be filled. If no damage/ leakage/ overflow, externally clean and refit the bio-tank.					✓	✓	✓
		18	Replace rubber connectors and gaskets					✓	✓	✓
7.3	Vacuum Evacuation System (DTC,NDTC,MC,TC)									
		1	Check the operation of the flush push button.	✓	✓	✓	✓	✓	✓	✓
		2	Check for foul smell and clogging of the toilet.	✓	✓	✓	✓	✓	✓	✓
		3	Check the LCD screen for any fault codes.	✓	✓	✓	✓	✓	✓	✓
		4	Perform a visual check on the WC seat, cover, and toilet bowl for damages and corrosion.	✓	✓	✓	✓	✓	✓	✓
		5	Check the bolts of fixation and the toilet seat hinge for their looseness/condition.	✓	✓	✓	✓	✓	✓	✓
		6	Clean vacuum toilet.		✓	✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		7	Clean spray nozzle.		✓	✓	✓	✓	✓	✓
		8	Clean liquid level guard.		✓	✓	✓	✓	✓	✓
		9	Check for leakage			✓	✓	✓	✓	✓
		10	Disinfection vacuum toilet			✓	✓	✓	✓	✓
		11	Decalcification vacuum toilet *Note: Decalcification to be done as required (Minimum one time annually)*				✓	✓	✓	✓
		12	Visual inspection of Bio-vacuum toilet system		✓	✓	✓	✓	✓	✓
		13	Proper & leak-free connections in the complete system, including air and water pipelines and interface piping up to the retention tank.					✓	✓	✓
		14	Proper stench trap and no odor passing through to the toilet room from the biodigester tank.					✓	✓	✓
		15	Functional check of the flush cycle.			✓	✓	✓	✓	✓
		16	Proper functioning of the complete system, including cleanability & maintenance of hygiene.			✓	✓	✓	✓	✓
		17	Check for any damage to pinch valve					✓	✓	✓
		18	Check ejectors to ensure that the desired vacuum level is created for proper functioning.					✓	✓	✓
		19	Check the aging condition of the hose and other rubber components under the coach and replace as necessary.					✓		
		20	Check and replace following components							
		A	**Lavatory pan/bowl (Indian squatting/Western design) & underfloor fitted components**							
		i	Overhaul Pinch Valve (Inlet/ Outlet)						✓	✓
		ii	Replace Water Inlet / Rinsing valve						✓	✓
		iii	Replace Vacuum Pump						✓	✓
		iv	Replace Ejector							✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		v	Replacement of liquid level guard (pan/ bowl flood sensor) on condition basis.							
		B	**Pressurized flushing arrangement**							
		i	Replace Water Inlet valve						✓	✓
		ii	Replace Quick Exhaust valve						✓	✓
		C	**Pneumatic/Electro-pneumatic control panel and associated accessories and electrical wiring**							
		i	Replace Air Filter				✓	✓	✓	✓
		ii	Replace Filter Pressure Regulator						✓	✓
		iii	Replace Pressure Guard / Pressure Switch						✓	✓
		iv	Check & Replace Solenoids, controller, push button and other electrical components & wiring on condition basis					✓	✓	✓
		D	**Plumbing pipes & connectors, water hoses, pneumatic pipings.**							
		i	Replace rubber pipes, rubber hoses & rubber connectors						✓	✓
8	**Traction Gearbox (MC)**									
		1	Visual inspection of the traction gearbox and its components for external damage.	✓	✓	✓	✓	✓	✓	✓
		2	Check the mechanical connecting elements.	✓	✓	✓	✓	✓	✓	✓
		3	Check oil level	✓	✓	✓	✓	✓	✓	✓
		4	Initial oil change *(*) - Based on mileage & time* *<u>Note:</u> OEM recommends initial oil change at 5,000 – 25,000 kms or Monthly schedule, whichever comes earlier.*	✓*	✓*					
		5	Perform gearbox oil spectrography. (If any abnormality is noticed then check in every monthly schedule.) *<u>Note:</u>* *Below are the elements to be noted.*			✓	✓	✓	✓	✓

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
			● *Iron (Fe) indicates wear/breakage of teeth of pinion or gear.* ● *Copper (Cu) indicates wear of brass bearing cage.*							
		6	Inspection of oil stick or drain plug for wear ***(*)** - Every six months*			✓*		✓	✓	✓
		7	Oil Change *(*) - Based on mileage & time* *<u>Note:</u> OEM recommends oil change every two years or 3,00,000 km.*				✓ *	✓	✓	✓
		8	Bonding test to be ensured for rubber metal bonded item of reaction rod <u>Note:</u> The bonding test between rubber and metal can be carried out by hand. The rubber can thereby be pressed back with a dull test-iron (edge with radius). In case of cracks / de-bonding, instructions of OEM regarding replacement of item should be followed.					✓	✓	✓
		9	Change elastomer of drive suspension. *<u>Note:</u> Forged components may be reused after necessary inspection and duly replacement of damaged rubber-metal bush.*						✓	✓
		10	Change grease of the gear coupling						✓	✓
		11	Re-greasing the barrier grease						✓	✓
		12	Overhaul and ● Change bearings ● Change barrier grease							✓
9	**FSDS and FDSS**									
9.1	FSDS (Aspiration Type Automatic Smoke / Fire Detection with Alarm System) (DTC,NDTC,MC,TC)									

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		1	Download the data log and check the status of indication LEDs in the Detection Panel for faults. *Note:* ● *The FSDS data log (TCMS data log and Aspirating Smoke Detection Unit data log) must be downloaded in every monthly schedule. One month data must be preserved.*		✓	✓	✓	✓	✓	✓
		2	Check the airflow reading. It should be within the range, i.e. Fn ± 20%, where Fn is the normal airflow value. ● If less than Fn - 20%, clean the filter and re-check. ● If still less than Fn - 20%, flush the pipeline with a vacuum cleaner and check. If the problem persists, seek further guidance from the supplier/OEM. ● If more than Fn + 20%, check the intactness of the pipe & capillary network and seek further guidance from the Supplier/OEM.		✓	✓	✓	✓	✓	✓
		3	Check the intactness of the power supply input voltage from the DC power supply to the detector and output voltage from the detector to other devices. ● Power Supply Input from Coach: 110 ± 30% Volt DC ● Converted Voltage for FSDS: 24 ± 6 Volt DC		✓	✓	✓	✓	✓	✓
		4	Check the backup battery voltage (if available in the system). If the backup battery voltage is less than 18 Volt DC, seek further guidance from the supplier/OEM.		✓	✓	✓	✓	✓	✓
		5	Conduct the smoke test by simulating smoke generation from any source, e.g. smoke generator at the farthest end of the system and verify detector performance. If any discrepancy is observed, investigate with OEMs consultation. * - Every Six Months			✓*		✓		

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
		6	I. Download and inspect the data log and status of the indication LEDs on the Detection Panel for any faults. Pay special attention to any recurring faults in the system. Replace any defective or malfunctioning parts as necessary. II. Clean the sampling points, sampling pipe, and capillaries by vacuum cleaning. III. Perform cleaning of the Detection Panel. IV. Check the functionality of the system using standard test protocol. (format enclosed at **Annexure D**)					✓	✓	✓
		7	I. Check the fitting and clamping arrangement of the sampling pipe/ sampling point and capillaries. II. Service and maintenance of photoelectric smoke detectors (point-type smoke detectors). III. Place an artificial smoke source near each sampling point in the coach. Verify that every aspiration point in the system is functioning correctly and smoke is detected by the system. IV. Perform Over Heated Wire Test.						✓	✓
		8	<u>*Note:*</u> ● *Real-Time Clock battery to be changed in every 36 months.* ● *In addition to the shop schedules, perform cleaning of the Detection Panel as needed (based on condition).* ● *Replacement of components as recommended by OEM in 9M, SS1, SS2 & SS3.*							

S.No	Equipment / Sub-Assy.		Activities	T	M	Q	9M	SS1	SS2	SS3
9.2	FDSS (Aerosol Fire Detection & Suppression System) (DTC,NDTC,MC,TC)									
		1	**Devices Installed In Lavatories** General visual inspection for damaged, loose, or missing parts. I. Activation Heads (whichever is applicable) ● Visually check the BTA bulb for fractures or alcohol leaks. ● Visually check the Thermo Cord / Cable for any cuts or damage. ● Visually check the Manual / Thermal Activation Head and the Pull-Pin. II. Aerosol Generator & Clamping Arrangement ● Check the generator for physical damage, such as cracks, dents, distortion, or corrosion. ● Ensure the generator and bracket/clamp are firmly fastened in place. ● Check the discharge port on the generator, it is to be unobstructed from any objects and free from dirt/ debris or any other material that may tamper the discharge of the extinguishing agent. ● Check that the generator's label is readable and in good condition.	✓	✓	✓	✓	✓	✓	✓
		2	**Devices Installed In Electrical Cabinets** The same activities as mentioned for lavatories. (S.N-1 above)			✓	✓	✓	✓	✓
		3	● Ensure that the position and orientation remain in the designed position. ●Inspect mounting brackets, straps, and associated hardware for loose, damaged, or broken parts. Replace damaged parts and tighten all loose hardware. ●Ensure that no obstacles hinder the proper operation of the aerosol generators or the aerosol distribution during a fire. (*) - Every Six Monthly			✓*		✓	✓	✓
		4	**Replacement** I. STAT-X: 15 years (3rd SS-2) II. FIREPRO: 15 years (3rd SS-2) III. PYROGEN: 9 years (2nd SS-2)							

ANNEXURE - A

AIR PRESSURE BUILT-UP TEST

S. N.	Activity	BU1/ DTC	BU2/ NDTC	BU3/ NDTC	BU4/ DTC	Pressure Built up Time (minutes)	Remarks
A	Cut off all compressor from DDU	Cut Out	Cut Out	Cut Out	Cut Out		
1	Drain MR in whole train-set to zero bar						
2	Cut in BU1 Compressor and all other Compressor shall remain cut out	**Cut In**	Remains Cut Out	Remains Cut Out	Remains Cut Out		
3	Note Down Pressure Build up time from 0 bar to 10 bar MR in whole train-set						
B	Cut off all compressor from DDU	Cut Out	Cut Out	Cut Out	Cut Out		
1	Drain MR in whole train-set to zero bar						
2	Cut in BU2 Compressor and all other Compressor shall remain cut out	Remains Cut Out	**Cut In**	Remains Cut Out	Remains Cut Out		
3	Note Down Pressure Build up time from 0 bar to 10 bar MR in whole train-set						
C	Cut off all compressor from DDU	Cut Out	Cut Out	Cut Out	Cut Out		
1	Drain MR in whole train-set to zero bar						
2	Cut in BU3 Compressor and all other Compressor shall remain cut out	Remains Cut Out	Remains Cut Out	**Cut In**	Remains Cut Out		
3	Note Down Pressure Build up time from 0 bar to 10 bar MR in whole train-set						
D	Cut off all compressor from DDU	Cut Out	Cut Out	Cut Out	Cut Out		
1	Drain MR in whole train-set to zero bar						
2	Cut in BU4 Compressor and all other Compressor shall remain cut out	Remains Cut Out	Remains Cut Out	Remains Cut Out	**Cut In**		
3	Note Down Pressure Build up time from 0 bar to 10 bar MR in whole train-set						

***Note**:*

1. *If pressure build up time is more, then leakage areas to be found out for their rectification. After completing test cut-in all compressors.*
2. *Air pressure built up time shall be <= 30 minutes with one compressor (8 car rake)*
3. *For 16 car rake test will be done making it two 8 car rakes by isolating through Cut-off Angle cock.*

ANNEXURE - B

MR PRESSURE DROP TEST

Train-set: _____

S.No	Pressure Reading		Time		Total Drop per Hour	Remark
	Initial (Bar)	Final (Bar)	Initial	Final		

Note:

Isolate auxiliary air supplies (suspension, toilet etc.)

1. *Charge MR Pressure to 10 Bar and BP pressure to 5 Bar.*
2. *Cut Out all compressors from DDU.*
3. *Leave the train in this condition for one hour. Don't do any other activity on train.*
4. *Note down initial pressure reading and final pressure reading after 5 minutes.*
5. *Leakage in MR line should not be more than 0.2 bar in 5 minutes.*

Remove Isolation of auxiliary air supplies (suspension, toilet etc.)

1. *MR pressure shall not drop below 6.5 ± 0.25 bar in 20 minutes.*

BP Pressure Drop Test

Train-set:_____

S.No	Pressure Reading		Time		Total Drop per Hour	Remark
	Initial (Bar)	Final (Bar)	Initial	Final		

Note:

1. *Charge MR Pressure to 10 Bar and BP pressure to 5 Bar.*
2. *Put the Auto Brake Handle in BP Charging Position*
3. *Cut Out all compressors from DDU.*
4. *Leave the train in this condition for one hour. Don't do any other activity on train.*
5. *Note down initial pressure and final pressure reading within one hour.*
6. *Leakage shall not be more than 0.2 bar / 5 minutes.*

ANNEXURE - C

BC PRESSURE TEST

Brake Type			FSB	Holding Brake	EB	EB by ABH	EB by Push Button
Handle Position			MCH at FSB	MCH at Coast	MCH at EB	Auto Brake Handle at EB ± 0.1	Press Emergency Brake Switch on Control Desk
BU1	DTC	B1					
		B2					
	MC1	B1					
		B2					
	TC	B1					
		B2					
	MC2	B1					
		B2					
BU2	NDTC	B1					
		B2					
	MC1	B1					
		B2					
	TC	B1					
		B2					
	MC2	B1					
		B2					
BU3	NDTC	B1					
		B2					
	MC1	B1					
		B2					
	TC	B1					
		B2					
	MC2	B1					
		B2					
BU4	MC3	B1					
		B2					
	TC	B1					
		B2					
	MC1	B1					
		B2					
	DTC	B1					
		B2					

***Note** :*
Pressure values shall be as per OEMs recommendation.

ANNEXURE - D

STANDARD TEST PROTOCOL FOR VANDE BHARAT COACHES (Automatic Smoke / Fire Detection with Alarm System)

Smoke threshold setting for display on TCMS DDU are as under:

Stage	Alarm	Threshold (%obs/m)	Delay period (sec)
1.	Action	0.6 ± 0.05	30
2.	Fire	1.6 ± 0.05	45

S. No.	Description	Indications	Observations (Passed (Ok) /Failed)	Remarks (if any)
1.	Checking of fire detection system in passenger area, toilet and electrical cabinet/panel	**Stage 1(Action):** 1. LED and Flasher light should get activated on fire detection panel of affected coach. 2. Yellow symbol on TCMS DDU. 3. Corresponding coach diagnostic message on DDU. **Stage 2(Fire):** 1. Red lamp 'ON' on driver desk. 2. Red symbol on TCMS DDU. 3. Corresponding coach diagnostic message on TCMS DDU		
2.	Checking of Smoke detector in electrical cabinet/panel	**Stage (Fire):** 1. Red lamp 'ON' on driver desk. 2. Red symbol on TCMS DDU. 3. Corresponding coach diagnostic message on TCMS DDU		
3.	**Indication of self-diagnostics**			
	(i) Electrical discontinuity in the system	Indication on detection panel of affected coach		
	(ii) Obstruction in air flow (blockage in sampling pipe or breaking/ opening of sampling pipe)	Fault on detection panel of affected coach		
	(iii) System disability (switch off fire detection panel)	Communication failure fault on TCMS DDU		
4.	Buzzer in passenger area	Driver to manually actvate buzzer of passenger area after detection of stage-2(fire) on DDU and stopping of the train.		

ANNEXURE - E

BOGIE RUN TEST FOR VANDE BHARAT COACHES

Motor Coach no:	Traction motor no: TM1 / TM2 / TM3 / TM4
Bogie serial no:	Date of test:
Gear box serial no:	Drive type : GKD 1-52-372C Rating plate : Yes / No
Traction motor serial no:	Traction motor type : TME 49-30-4
Ramping time for ON:	Ramping time for OFF:
Bogie Identification: Driver end / Non Drive end	Motor IR Value: Acceptable limit > 175MΩ
Gear oil –filled in the gear box ? : Yes / No	Oil level at Maximum marking : Yes / No

1. Spin Test at 1500 RPM in forward direction

Input voltage: Input Hz: Wheel RPM: Wheel Dia. : mm

Time	Current(UVW) Digital clamp meter			Motor winding temperature	TM body	Oil sump temperature	HSMS Bearing temp	HSWS bearing temp	LSMS bearing temp	LSWS bearing temp	Coupling gear side temp	Coupling motor side temp	Ambt Temp	Gear box oil leakage?	Abnormal noise ?
Min	A	A	A	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	Visual inspection	Stethoscope
					Max Temp acceptable limit : Ambient+40°C										
0														Yes / No	Yes / No
10														Yes / No	Yes / No
20														Yes / No	Yes / No

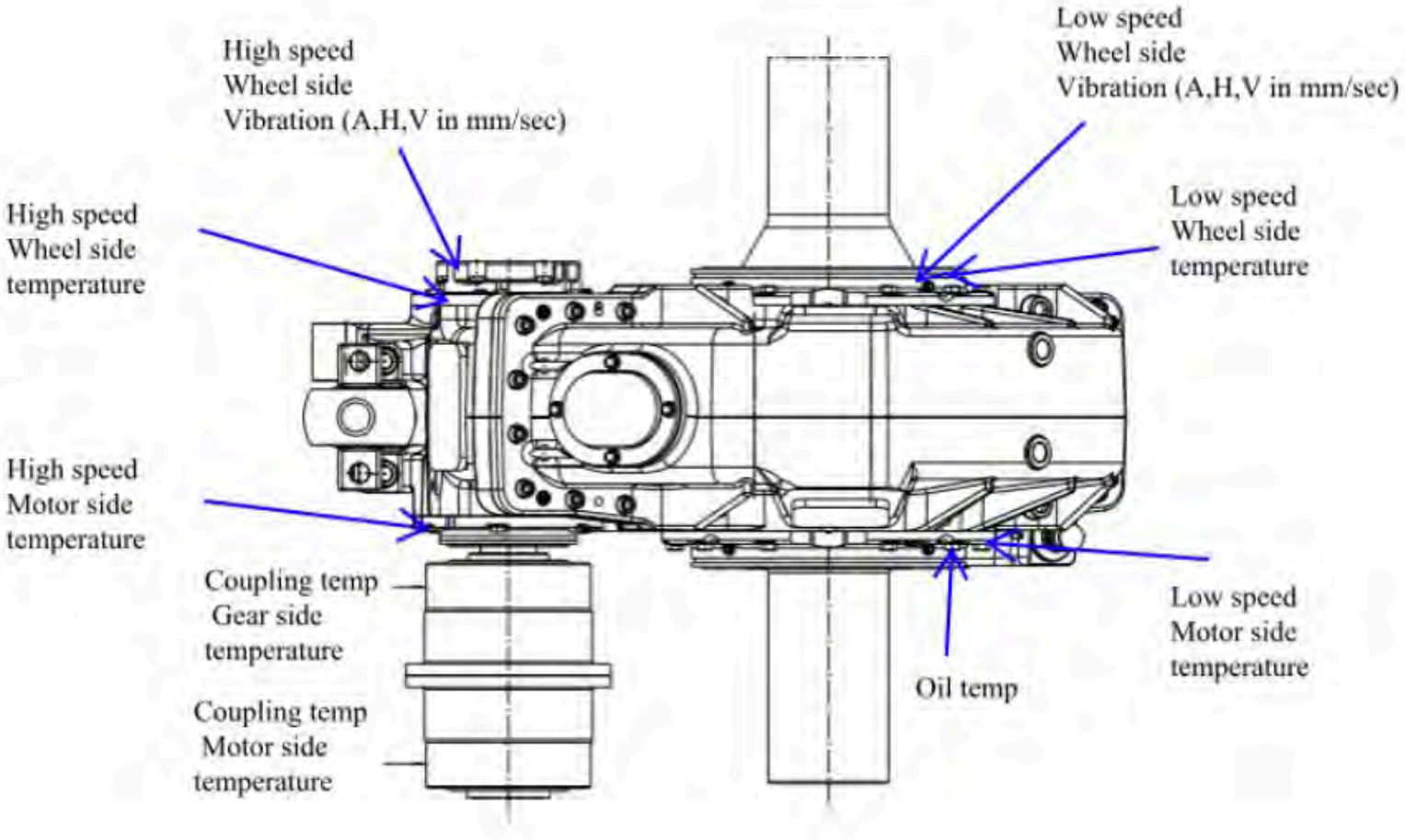
2. Vibration test last 5 min of the test (Forward direction):					
HS-WS bearing shall be ≤7mm/sec			LS-WS bearing shall be ≤7mm/sec		
Axial (mm/sec)	Horizontal (mm/sec)	Vertical (mm/sec)	Axial (mm/sec)	Horizontal (mm/sec)	Vertical (mm/sec)

3. Spin Test at 1500 RPM in reverse direction

Input voltage: Input Hz: Wheel RPM: Wheel Dia. : mm

Time	Current(UVW) Digital clamp meter			Motor winding temperature	TM body	Oil sump temperature	HSMS Bearing temp	HSWS bearing temp	LSMS bearing temp	LSWS bearing temp	Coupling gear side temp	Coupling motor side temp	Ambt Temp	Gear box oil leakage?	Abnormal noise ?
Min	A	A	A	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	Visual inspection	Stethoscope
					Max Temp acceptable limit : Ambient+40°C										
0														Yes / No	Yes / No
10														Yes / No	Yes / No
20														Yes / No	Yes / No

4. Vibration test last 5 min of the test (Forward direction):					
HS-WS bearing shall be ≤7mm/sec			LS-WS bearing shall be ≤7mm/sec		
Axial (mm/sec)	Horizontal (mm/sec)	Vertical (mm/sec)	Axial (mm/sec)	Horizontal (mm/sec)	Vertical (mm/sec)


High speed
Wheel side
Vibration (A,H,V in mm/sec)
Low speed
Wheel side
Vibration (A,H,V in mm/sec)
High speed
Wheel side
temperature
Low speed
Wheel side
temperature
High speed
Motor side
temperature
Coupling temp
Gear side
temperature
Coupling temp
Motor side
temperature
Oil temp
Low speed
Motor side
temperature

2. MAINTENANCE ACTIVITIES FOR ELECTRICAL EQUIPMENT

Schedule	SS1	SS2	2nd SS1	SS3	3rd SS1	2nd SS2	4th SS1	2nd SS3	5th SS1	3rd SS2
Months	18	36	54	72	90	108	126	144	162	180
Years	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15

- Annexure G to L to be referred for the Functional Tests under different maintenance schedules.
- Maintenance schedule of equipment not provided in the document may be done as per details provided by OEMs latest maintenance manual.

Note :
Abnormalities/bookings mentioned in the logbook by the escorting staff/loco pilot should be attended on priority.

Warning:
Before carrying out any maintenance work on roof and other required location/ equipment, ensure that the pantograph is lowered and the VCB is earthed by closing the earthing switch.

If the Rake/ coach is standing beneath OHE, ensure that the overhead line is isolated, locked and earthed at both ends with earthing rods so that it cannot be energised while maintenance work is being carried out.

FREQUENCIES – PERIODIC WORKSCHEDULE ACTIVITIES FOR ELECTRICAL EQUIPMENT

DAILY SCHEDULE MAINTENANCE ACTIVITIES

S.No.	Equipment	Maintenance Activity
1.	**General**	Carry out detailed checks in regard to any unusual occurrence reported by Crew in the logbook.
		Check all fasteners for under-slung equipment for tightness, check for any loose hanging parts.
2.	**Cab Facilities**	Read Driver Display Unit for any active fault and note down.
		Check general appearance of all buttons, indicators, switches, toggles.
		Check the functioning of all buttons by pressing lamp test button.
		Check console Light, Cab Light, Fire Extinguisher, Function of Horn etc.
		Check the condition of LP/ALP seat.
		Check the condition of DDU, MMI & CCTV screen.
		Check the functioning of BAL, ISO, Single unit operation, EOL bypass, EBL bypass, UVISO, ADCR bypass selector switches in normal position and EMY off switch in release position.
3.	**Wiper**	Check wiper blades for damages, torn or missing rubber blades, replace wiper blades as required.
		Do function test of wiper washer system in all positions. Check parking position of the wiper arm. Do not carry out function test on a dry screen.
		Inspect tubing for damage or loose connection on nozzle. Check operation of spray nozzle on windscreen.
		Clean windscreen with methylated spirits (denatured alcohol).
		Ensure wash tank is filled with washer fluid to prevent wipers being used on a dry screen
4.	**TCMS**	Do all the self-tests.
5.	**Speedometer**	Check operation of indicating light of speedometer.
6.	**Power Jumper cables and receptacles**	Check for coupler mounting properly and presence of any corrosion.
		Check Jumper cables are not hanging with one end free, secure them if necessary.
		Check power couplers for the intactness.
7.	**Isolation Transformer**	Ensure that isolation transformer is bolted tightly to the vehicle.
		Check for any external damages.
		Check electrical connections and ground connections for corrosions to resolve and ensure all the connections are tight.
		Check components and cables for any damage.
		Do visual inspection for excessive temperature and arcing (voltage flash over) and resolve it.
8.	**Driver Desk**	Check operation & function of all switches & push buttons with their indications on Driver Desk and their stencilling.

S.No.	Equipment	Maintenance Activity
		Check master controller in each driving cab.
		Check the operations from both the driver's cab and working of cab occupation functionality.
9.	**Pantograph**	Visually inspect the upper and lower arm and their components for any abnormality.
		Visually inspect carbon strips for break and wear.
		Check physically for any damage & loose fasteners.
		Check the Pantograph raising and lowering function.
10.	**ERCU/ Ground Contact**	Visually inspect the ground contact for any damages.
		Check earth cable for proper connection, lug for any looseness and condition of the insulating tape on lug.
11.	**HV Potential Transformer**	Check insulator surface for any sign of damage, crack or chipping/grazing.
		Check the earth cable for damage and loose connection.
12.	**Lightning Arrester**	Visually inspect the Insulator surface for any sign of damage, crack/punctures or chipping/grazing.
		Make sure that the line and ground terminals remain tight.
		Visually inspect and check the earth cable for any damage and ensure it is connected properly.
13.	**Transformer**	Check following visually for any abnormality/ damage:
		• Silica gel breather and silica gel condition.
		• Transformer for any oil leakage from any point, coupling, joints etc.
		• Transformer oil level.
		If required, clean transformer radiator on temperature feedback basis (75°C).
14.	**Line and Traction Converter**	If required, clean line and traction converter filters on temperature feedback basis (75°C).
15.	**Auxiliary Converter unit**	If required, clean Auxiliary converter unit filters on temperature feedback basis (100°C).
16.	**Traction Motor and TM Cable Junction Box**	Visual inspection of TM coupling and gear case etc.
		Check visually mounting bolts for their looseness.
		Ensure that TM Cable Junction Box is bolted tightly to the vehicle and check for any damage.
		Visual inspection of TM JB for all the manufacturing hardware for the doors for any slackness by seeing changes in torque marking.
		Check electrical connections and ground connections for corrosion to resolve and ensure all the connections are tight.
		Check components and cable for damage.

S.No.	Equipment	Maintenance Activity
		Do visual inspection for excessive temperature and arcing (voltage flash over) and resolve it.
		If required, clean traction motor filters on temperature feedback basis. As per Sr. DME/TSD/SSB L. no. 25.2.T-18-1 dt. 20.12.2023-feedback 135°C. As per OEM manual August 2022, warning temperature setting of temperature sensor is 160°C.
17.	**VCB**	Check insulators for crack & flash marks.
		Check for any air leakage in VCB.
		Check the sealing of connectors, flexible pipe, regulator, air tank etc.
		Check contact spring visually.
18.	**Head light**	Head light by operating.
19.	**Flasher light**	Flasher light by operating.
20.	**Marker Light**	Tail lights working by moving mode selector (MS) and TCMS display.
21.	**Cab light and Driver console light**	Working of cab light by operating cab light switch.
		Working of driver console light by operating driving console light switch.
22.	**Saloon & Reading light**	Working of compartment/saloon and reading lights.
23.	**CCTV**	Check operation of all inside and outside cameras on display unit at driver desk.
		Clean outdoor camera dome cover (glass) with microfiber cloth with gentle pressure.
24.	**HVAC System(RMPU)**	Check function of HVAC system.
		Check function of emergency blower by opening VCB after RMPU on command.
		Clean RMPU filters every alternate day.
25.	**CAB Air conditioner**	Check function of cab air conditioner.
26.	**PECU/ ETBU**	Check function of PECU system from minimum two coaches.
27.	**Passenger information system (PIS)**	Clean & check function of head code unit (HCD).
		Clean & check function of in coach display unit (ICD).
		Clean & check function of side destination board unit (SDB).
		Check Functioning of PA/PIS systems
28.	**Pantry Equipment**	Do cavity cleaning of Hot case and check the complete unit visually for any damage or wire cut.
		Do cavity cleaning of refrigerating unit and check the complete unit visually for any damage, wire cut or abnormal sound in the unit.

S.No.	Equipment	Maintenance Activity
		Do cleaning of water boiler and check the complete unit visually for any damage or wire cut.
29.	**Panels**	Check doors/ covers condition of ECC panels, end walls panels, RMPU panels and other panels for proper locking etc.
30.	**On-board Functional Test**	
30.1	**For DTC**	
		Cab Occupation in Key ON Mode-Cab Selector Switch in Normal Mode.
		Cab Occupation in RDM Mode-Cab Selector Switch in Normal Mode.
		Cab Occupation in Key ON Mode-Cab Selector Switch in High Priority Mode.
		Cab Occupation in RDM Mode-Cab Selector Switch in High Priority Mode.
		Check the Panto Rising & Lowering Observe the symbols on TCMS DDU.
		Check the VCB On & OFF Observe the symbols on TCMS DDU.
		Check Emergency Off Functionality by pressing Emergency Off button on Driver Desk.
		Check the Emergency Off Bypass switch functionality during Emergency Off button is in pressed condition.
		Check the TCMS Network Screen for any abnormalities.
		Check the High Voltage Screen for any abnormalities.
		Check the ACU Screen for any abnormalities or any Earth Faults.
		Check the Signal Bell Functionality from both driver and guard panels.
		Check the Emergency Bell Functionality by pressing SB2 button in driver and guard panel.
		Check Emergency bell by pressing EMY Stop button in passenger saloon area and observe the indication on TCMS DDU and also on SB2 Switch.
		Check the Train BN Battery voltage.
30.2	**For all cars**	
		Check the 100 % Saloon Lights. Observe the symbols on TCMS DDU.
		Check the 50 % Saloon Lights Observe the symbols on TCMS DDU.
		Check the Lights functionality by operating DLL Control SW & IDDL Control SW in Auto, OFF & ON modes and observe the symbols on DDU.
		Close all the doors and observe the symbol TCMS DDU.
		Give AC on command and observe the symbol TCMS DDU.

A. MAINTENANCE SCHEDULE ACTIVITIES

General (Applicable to all Schedules)

i. Carry out detailed checks in regard to any unusual occurrence reported by Crew in the logbook.
ii. Check visually all fasteners of under-slung equipment for tightness marking, check for any loose hanging parts.

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
1.	**Line & Traction Converter (MEDHA) – MC1,2**									
		1.	Check that the converter unit is bolted tightly to the vehicle.There should not be any slackness in mounting fasteners and also split pin should be intact with lock nut.	✓	✓	✓	✓	✓	✓	✓
		2.	Check visually the converter unit for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Check that the air inlet and outlet openings are UN- obstructed.	✓	✓	✓	✓	✓		
		4.	If required, clean line and traction converter filters on temperature feedback basis (75°C).	✓	✓	✓	✓	✓		
		5.	Check the healthiness of all the cooling unit, there should not be any abnormal sound.	✓	✓	✓	✓	✓	✓	✓
		6.	Inspect all the manufacturing hardware of the doors for any slackness by seeing changes in torque marking. Add any missed hardware.	✓	✓	✓	✓	✓	✓	✓
		7.	While doing maintenance if any abnormality/ damage found, it should be addressed.	✓	✓	✓	✓	✓	✓	✓
		8.	Check the healthiness of the blowers, there should not be any abnormal sound.	✓	✓	✓	✓	✓	✓	✓
		9.	Download fault log data through laptop/Pen drive from Main Control Unit (MCU) and check for any abnormal messages. (Necessary corrective/preventive action to be taken for abnormal messages.	✓	✓	✓	✓	✓	✓	✓
		10.	Check the communication between Main Control Unit and LTC controller, Traction Inverter Control Computer, Line Converter Control Computer, Redundancy of communication.		✓	✓	✓	✓	✓	✓
		11.	Clean the liquid connections, hoses and its surroundings for any leakage.		✓	✓	✓	✓	✓	✓
		12.	Clean the cooling unit core by blowing oil and acid free compressed air through the fins by vacuum blower, also clean the core by hair brush (dry cleaning).		✓	✓	✓	✓	✓	✓
		13.	Check Coolant level in the tank. If the coolant is below the minimum mark-top up with the specified coolant. Check for any signs of leakage.		✓	✓	✓	✓	✓	

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		14.	Clean information and warning labels on doors.		✓	✓	✓	✓	✓	✓
		15.	Check the healthiness (colour) of silica gel, they should be blue, if found pink replace silica gel with new/ regenerated		✓	✓	✓	✓		
		16.	Remove inlet and outlet doors and clean the inlet and outlet chambers.		✓	✓	✓	✓	✓	✓
		17.	Open and Clean ventilated section filters (inlet and outlet air filters) by compressed air from inside towards outside. Check the condition & replace if required.		✓	✓	✓	✓		
		18.	Open and clean all converter unit doors. Remount properly with all bolts.			✓	✓	✓	✓	✓
		19.	Check all door gaskets for total availability and in good condition. Replace/add any damaged/ missed gasket with new.			✓	✓	✓		
		20.	Inspect all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings.			✓	✓	✓	✓	✓
		21.	Check electrical connections and ground connections for corrosion. Ensure that connections are tight.			✓	✓	✓	✓	✓
		22.	Check components and cables for damage. If found rectify them.			✓	✓	✓	✓	✓
		23.	Inspect for evidence of excessive temperature and arcing (Voltage flash over's) and resolve it.			✓	✓	✓	✓	✓
		24.	Check that all the cable ties are tight and intact.			✓	✓	✓	✓	✓
		25.	Inspect the cubicle with respect to mechanical and electrical integrity. Check all fixings for security and tightness and all wiring are secured and insulations are not damaged, burnt or eroded. Visually inspect all components for physical damage.			✓	✓	✓	✓	✓
		26.	Plug in and plug out the spill proof connectors (connecting the cold plates to the Pump & Radiator Hoses) for cleaning and to avoid clogging and thermal seizing in cooling system. if quick couplings or spill-proof connectors have torn seals, or are damaged, very dirty, clogged, corroded, leaking, replace them.			✓	✓	✓	✓	✓
		27.	Carry out pH test of the coolant (Antifrogen N), the acceptable range is 7.2 to 9.0 every six months. * as per Medha MM para 2.6.4.1.1, once in every 6 months			✓*				
		28.	Carry out extensive coolant analysis (pH test, glycol %test, TDS test). The acceptable limits are as under, take corrective action if required:				✓	✓	✓	

<table>
<tr><th>S.No.</th><th>Equipment/ Sub-Assy.</th><th></th><th>Activities</th><th>Maintenance Periodicity
T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>Instrument</th><th>Parameter</th><th>Acceptable range</th><th>Make</th></tr>
<tr><td>pH meter</td><td>Acidity/ alkalinity of the coolant</td><td>7.2-9.0</td><td>Hanna Instruments with ±0.05 Accuracy or its Equivalent</td></tr>
<tr><td>TDS meter</td><td>Total dissolved solids</td><td>≤ 1900 ppm</td><td>Hanna or its Equivalent</td></tr>
<tr><td>EGW refractometer</td><td>% of glycol in the coolant, freezing point of the coolant</td><td>24-35% v/v</td><td>Hanna/ Atago or its Equivalent</td></tr>
<tr><td>Conductivity meter</td><td>Electrical conductivity in the coolant</td><td>≤4000 μS/cm</td><td>Hanna/ Atago or its Equivalent</td></tr>
<tr><td>----</td><td>Coolant color</td><td>Tinted yellow-Green</td><td>Visual Verification</td></tr>
</table>
</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>29.</td><td>Cleaning of Blower and Fins:
➢ Remove the blower.
➢ Clean the Blower with ISO-propyl alcohol by using lint free cloth and brush.
➢ Suck the air through fins by vacuum blower for removing the dirt from fins.
➢ Clean all dust and dirt deposits with vacuum cleaner and brush.</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>30.</td><td>Replace any jammed hardware by new hardware with anti-seize compound applied by using screw extractor.</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>31.</td><td>Remove all unventilated section doors and clean the equipment sections and components with vacuum cleaner, brush and lint free cloth.</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>32.</td><td>Check thoroughly the cooling system components, connectors, valves and other fittings for any damage, cracks dings, and burrs corrosion, scale, and sedimentation, take corrective action. Check gaskets/coolant seals, if dismantling is required.</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>33.</td><td>Replace silica gel with new/ regenerated</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>34.</td><td>Check the functionality of DSP controller and feedback circuitry.</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>35.</td><td>Check the pulses of Line & Traction control IGBT Gate Drives & gate drive power supply.</td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		36.	Check the functionality of Feedback Current Transformer/ Sensors					✓	✓	✓
		37.	Check both the IGBT heat sink Temperature resistance thermometer (Pt100) sensor for functionality and replace if required.					✓	✓	✓
		38.	Earth Fault Detection Circuit: Measure the resistance branches connected in series R3 and R4 between DC link terminals. R3 and R4 are different resistances each consisting of three equal resistors of values 22 kΩ and 6.8 kΩ respectively.					✓	✓	✓
		39.	Visual checking of all power modules for any abnormalities.					✓	✓	✓
		40.	Inspect pre-charge resistors for defects, change if needed.					✓	✓	✓
		41.	Ensure power module fixing bolts tightness with dc link bus-bar plate.					✓	✓	✓
		42.	Visually inspect the traction converter earthing resistors for signs of overheating.					✓	✓	✓
		43.	Check all earth cables of Traction Converter.					✓	✓	✓
		44.	Replace any resistor of the converter including earthing resistor that is damaged or defective.					✓	✓	✓
		45.	Ensure tightness of all Sub-D connectors mounted on traction converters.					✓	✓	✓
		46.	Visually inspect the pre-charging and main contactors. Replace the rubber parts.					✓	✓	✓
		47.	Visual inspection of functionality of Traction Converter Main Contactor and Pre-charging Contactors.					✓	✓	✓
		48.	Check the FOCs for Traction Converter with DB loss meter, if available.					✓	✓	✓
		49.	Visually inspect Gate drive unit fiber optics.					✓	✓	✓
		50.	Ensure sealing of incoming cable gland of control card rack to avoid dust entry.					✓	✓	✓
		51.	Ensure the cable intactness in wagos. Visually inspect cables of the converter.					✓	✓	✓
		52.	Visually inspect control cards and power supply cards in electronic cubicle and ensure the tightness.					✓	✓	✓
		53.	Examine all electrical equipment of traction converter for signs of dirt, corrosion, damage etc. Remove all dust/dirt deposits from the connection insulators. Tightness of all connections to be checked.					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		54.	Maintenance of all steel braided hoses, rubber hoses and isolating cocks to be done.					✓	✓	✓
		55.	Check the capacitors for any abnormality and measure its Capacitance.					✓	✓	✓
		56.	Visually inspect the traction converter earthing and discharge resistors for signs of overheating.					✓	✓	✓
		57.	Inspect and ensure tightness of DC link voltage sensors.					✓	✓	✓
		58.	Measurement of Insulation Resistance; L and R Value of coolant Pump.					✓	✓	✓
		59.	Checking of pressure sensor and temperature sensor of Air and Coolant.					✓	✓	✓
		60.	Examine doors and its lock and integration of locks with key multiplier system.					✓	✓	✓
		61.	Check fasteners of converter and its cooling circuit.					✓	✓	✓
		62.	Inspection & tightness of foundation & supporting bolts.					✓	✓	✓
		63.	Checking of Power cable for any damaged/ rubbing/ heating.					✓	✓	✓
		64.	All Communication Bus connections and cables to be checked.					✓	✓	✓
		65.	Pump service including flushing of the pump, seal health monitoring, bearing condition monitoring.						✓	✓
		66.	Replace inlet air filters and outlet air filters.						✓	✓
		67.	Check the condition and function of the Electrical contactors.						✓	✓
		68.	Conduct a voltage test and measure the insulation resistance. Isolate fault if not within specification. The circuit and applied voltage for IR test are given below: (i) Power Circuit w.r.t. body @ 1000VDC :> 100 M Ohm (ii) Control Circuit w.r.t. body @ 500VDC : > 100 M Ohm						✓	✓
		69.	Clean the series resonant and DC link capacitors. Measure the values. Replace if not within permissible range.						✓	✓
		70.	Check the secure electrical connections of the DC link and series resonant circuit capacitor bank. Tighten the fasteners if necessary.						✓	✓
		71.	Check the working of voltage indicator and current transducer. Replace, if required.						✓	✓
		72.	Check and clean the isolation slack/blade and spring contacts of earthing switch and lubricate. Check its connections for tightness and intactness.						✓	✓

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td>73.</td><td>Replacement of gasket/O-rings in coolant circuit.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>74.</td><td>Overhaul the blower and replace defective items.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>75.</td><td>Replace all door gaskets.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>76.</td><td>Coolant flushing and replace the 100%quantity of coolant (including the quantity of coolant available in Radiator and in complete coolant circuit).</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td></td><td></td><td>77.</td><td>Replace Pump bearings & “O” rings during pump overhauling.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td></td><td></td><td>78.</td><td>Overhaul and replace Contact tips of Electrical contactors.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td></td><td></td><td>79.</td><td>Replace Blower Motor Bearing and associated component during blower overhauling.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td></td><td></td><td>80.</td><td>Post-inspection Parameters Check:
Line Converter
<table>
<tr><td>Line converter Input Voltage</td><td>950 V AC @ 25 kV OHE</td></tr>
<tr><td>Pre charge Resistor</td><td>25 Ω (12.5 Ω x 2)</td></tr>
<tr><td>DC Link Voltage Nominal</td><td>1800 V DC</td></tr>
<tr><td>Earth Fault Detection Resistances</td><td>Three equal resistors of values 22 kOhms and 6.8 kOhms respectively</td></tr>
<tr><td>Maximum DC Link over voltage</td><td>2250 V DC
(Beyond this IGBT switching is prohibited.)</td></tr>
<tr><td>DC link Capacitor</td><td>880uF</td></tr>
<tr><td>DC Link Discharge Time</td><td>Less than 2 seconds via Brake chopper resistor (VCB open for more than 5 min)

If not discharged by any reason by BCH 50 min through earth leakage resistors</td></tr>
<tr><td>BCH Resistor</td><td>3.5 Ω Nominal</td></tr>
<tr><td>Maximum Secondary RMS</td><td>814 A</td></tr>
</table></td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			current							
			IGBT Switching Frequency — 650 Hz							
			Traction Inverter							
			Maximum line-line RMS voltage — 1430 V AC In Braking 1375 V AC In Motoring							
			Maximum Line-Line RMS current in each phase — 440A							
			Max switching freq — 750 Hz							
			Maxiumum Motor Freq — 175 Hz							
			Continuous power rating — Line Converter:1 X 455 kW Traction Inverter:1 X 443 kW							
			Maximum Rating and duration — Line Converter: 1 X 649kVA (Line Converter Input approximately) in Motoring for 120sec 1 X 696KVA in Braking for 28sec (at PF very close to Unity) Traction Inverter:1 X 703 kVA in Motoring for a duration of 120sec 1 X 793 kVA Braking for a duration of 28 sec (at approximately 0.9PF)							
2.	**Auxiliary Converter Unit (MEDHA) – TC**									
		1.	Inspection of unit mounting hardware. Refer para 3.11.1 of Medha Manual Dec 2024.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the converter unit visually for any damage. Refer para 3.11.2 of Medha Manual Dec 2024.	✓	✓	✓	✓	✓	✓	✓
		3.	Ensure isolation switch box cover is properly closed when accessed.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		4.	Ensure 3-ph shed supply connector cap is properly closed when accessed.	✓	✓	✓	✓	✓	✓	✓
		5.	Check that inlet and outlet air openings are un-obstructed. Refer para 3.11.3 of Medha Manual Dec 2024.	✓	✓	✓	✓			
		6.	Ensure air inlet louver frames snap locks are properly locked. Refer para 3.11.7 of Medha Manual Dec 2024.	✓	✓	✓	✓	✓	✓	✓
		7.	Air blowing for inlet air filter to be done. Change the filter if torn out or damage. After checking secure the filter properly.	✓	✓	✓	✓			
		8.	While doing maintenance if any abnormality/ damage found, it should be rectified.	✓	✓	✓	✓	✓	✓	✓
		9.	Check all door sealing gaskets for any cut mark and physical damage, If found replace with new one. Refer para 3.11.6 of Medha Manual Dec 2024.	✓	✓	✓	✓	✓		
		10.	*In case if any Heat Sink thermal performance degradation is identified through temperature rise or shutdowns in the converter even if the blower motor is running in the right direction, then measure the inlet air velocities as per below: • Check the inlet air velocity at 9 locations on the air inlet-1 door & ensure average velocity should be ≥ 2 m/s • Check the inlet air velocity at 3 locations on the air inlet-2 door & ensure average velocity should be ≥ 1.5 m/s • If average inlet air velocities are less than the specified limit, then clean Heat Sinks.	✓*	✓*	✓*				
		11.	Download fault log data through laptop/Pen drive from Main Control Unit (MCU) and check for any abnormal messages. (Necessary corrective/preventive action to be taken for abnormal messages).	✓	✓	✓	✓	✓	✓	✓
		12.	Remove inlet air filters and clean the filters with compressed air/vacuum cleaner by separating the fins and wire mesh filter. Change the filter if torn out or damage. After checking secure the filter properly. Refer para 3.12.1.1 of Medha Manual Dec 2024.		✓	✓	✓	✓		
		13.	Snap locks to be cleaned. Refer para 3.12.1.3 of Medha Manual Dec 2024.		✓	✓	✓	✓		
		14.	Check the healthiness of all the blowers, there should not be any abnormal sound. Refer para 3.11.11 of Medha Manual Dec 2024.		✓	✓	✓	✓	✓	

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		15.	Clean the Blower Impeller blades, Rotor surface and cone assembly with soft brush, take lint free cloth dipped in isopropyl alcohol & wipe the Impeller blades, Rotor surface and cone assembly. Refer para 3.12.3 of Medha Manual Dec 2024.		✓	✓	✓	✓	✓	
		16.	Check the communication between TCMS and AC1, AC2, DC-DC Converter. Auxiliary load supply redundancy to be verified.		✓	✓	✓	✓	✓	✓
		17.	Check healthiness (color) of Silica gel inside the doors AC modules chamber, AC output contactors chamber, IO cards chamber, DC module chamber & DC link chamber, they should be Blue, if found Pink replace silica gel with new/ regenerated. Refer para 3.11.5 of Medha Manual Dec 2024.			✓	✓			
		18.	Ensure Intumescent seals are free from cut marks and physical damages, If found replace with new one. Refer para 3.11.4 of Medha Manual Dec 2024.			✓	✓	✓	✓	
		19.	Check all unit doors hardware are tight & intact with the unit. If any hardware is missing, assemble new hardware & Apply the torque. Refer para 3.11.10 of Medha Manual Dec 2024.			✓	✓	✓	✓	✓
		20.	Clean all doors, name plates & all external surfaces. Refer para 3.12.4 of Medha Manual Dec 2024.			✓	✓	✓	✓	✓
		21.	Inspect all the internal mounting hardware (mechanical and electrical components) for any slackness by seeing changes in torque markings. Refer para 3.11.8 of Medha Manual Dec 2024			✓	✓	✓	✓	✓
		22.	Check all external electrical connections and ground connections for corrosion to resolve. Check that connections are tight. Refer para 3.11.9 of Medha Manual Dec 2024			✓	✓	✓	✓	✓
		23.	Check internal components and cables for damage. If found address them. Refer para 3.11.12 of Medha Manual Dec 2024			✓	✓	✓	✓	✓
		24.	Inspect for evidence of excessive temperature and arcing (Voltage			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			flashovers) and resolve it. Refer para 3.11.13 of Medha Manual Dec 2024							
		25.	Check that all the cable ties are tight and intact. Refer para 3.11.14 of Medha Manual Dec 2024			✓	✓	✓	✓	✓
		26.	Open and clean all converter unit doors. Remount properly with all bolts.			✓	✓	✓	✓	✓
		27.	Clean the inlet filter with pressurized water, till the filter is free from dirt, dust & other debris. Apply pressurized air on to filter to remove entrapped water particles. Refer para 3.11.1.2 of Medha Manual Dec 2024.			✓	✓	✓		
		28.	Check the gland seals, grommets and other cable sealing accessory for any damages. Replace them for any damage found.			✓	✓	✓	✓	✓
		29.	Check for dust traces present in electronics zone. If found, seal it properly by applying Silicon sealant.			✓	✓	✓	✓	✓
		30.	Ensure all internal electrical connections (Terminals, lugs) are tight & intact. If found, tight them & apply required torque.Refer para 3.11.15 of Medha Manual Dec 2024.			✓	✓	✓	✓	✓
		31.	Clean all magnetics surface (i.e outer surface, terminals and other accessible dust deposited surfaces) with compressed air and soft brush only. Suck the dust with vacuum cleaner. Refer para 3.12.2 of Medha Manual Dec 2024.			✓	✓	✓	✓	✓
		32.	Inspect the cubicle with respect to mechanical and electrical integrity. Check all fixings for security and tightness and all wiring are secured and insulations are not damaged, burnt or eroded. Visually inspect all components for physical damage.			✓	✓	✓	✓	✓
		33.	Cleaning of heat sink fins as per OEM instructions on position. Refer para 3.15 of Medha Manual Dec 2024.				✓			
		34.	Remove the heat sink from AUX-1 and AUX-2 modules and clean using vacuum, pressurized air, and isopropyl alcohol.					✓	✓	✓
		35.	Replace silica gel with new/ regenerated					✓	✓	✓
		36.	Check electrical, earth connections and all components for any abnormality/ damage of AC Modules and rectify or replace on need basis.					✓	✓	✓
		37.	Check mounting of the modules of AC Modules for proper fitment.					✓	✓	✓
		38.	Check electrical, earth connections and all components for any abnormality/ damage of DC-DC Modules and rectify or replace on need basis.					✓	✓	✓
		39.	Check mounting of the module of DC-DC Modules for proper fitment.					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		40.	Check the functionality of Controller Module, DSP controller and feedback circuitry.					✓	✓	✓
		41.	Check the IGBT Gate Drive circuitry and gate drive supply.					✓	✓	✓
		42.	Check the working of Pre-charging circuitry and condition of pre-charging Resistors.					✓	✓	✓
		43.	All electronics cards for corresponding Auxiliary Converter Unit (ACU) to be checked for physical integrity & working. Replace if found faulty.					✓	✓	✓
		44.	Checking of tightness, dust accumulation & overall status of cables, Busbar, MOV, Current and Voltage Sensors and connector of different PCBs.					✓	✓	✓
		45.	Check the security of bolted terminals and mechanical mounting of large modules/components of Line Converter, Inverter and DC-DC Converter modules.					✓	✓	✓
		46.	Check the auxiliary converter base mounting tightness.					✓	✓	✓
		47.	Check the condition of gasket of DC link capacitor bank, if used. Replace if damaged.					✓	✓	✓
		48.	Check the value of DC link capacitance bank, sine-filter capacitance values, battery charger capacitance and snubber capacitance & record it and ensure within permissible range.					✓	✓	✓
		49.	Check the tightness & proper fitment of 3 phase couplers of Aux. Converter.					✓	✓	✓
		50.	Visually inspect the insulators in the Auxiliary Converter Unit for damage. Replace any damaged insulator.					✓	✓	✓
		51.	Replace the seals on the Auxiliary converter cabinets and equipment modules.					✓	✓	✓
		52.	All Contactors, fuses and MOV to be checked and replace, if found defective.					✓	✓	✓
		53.	Check the earth leakage resistor & discharge resistor for evidence of overheating.					✓	✓	✓
		54.	Check the FOCs of Auxiliary Converter with DB loss meter, if available.					✓	✓	✓
		55.	Check and ensure all temperature Sensors functionality.					✓	✓	✓
		56.	Check Tightness of cards.					✓	✓	✓
		57.	Check the tightness of components in modules i.e. Inverter module, Line					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			Converter module, PCB bus station, AC filter assembly, EFD assembly, Output voltage sensing assembly, Output current sensing assembly, DC link voltage sensing assembly.							
		58.	Checking the earthing connections.					✓	✓	✓
		59.	Check all earth cables of Auxiliary Converter, all Modules and electronic cubicles.					✓	✓	✓
		60.	Check the tightness of all Control & Power cable connections and all couplers.					✓	✓	✓
		61.	Checking of fasteners and closing mechanism. Lock fasteners. Replace damaged parts.					✓	✓	✓
		62.	Measurement of resistance of DC link discharge resistor using Digital Multi Meter.					✓	✓	✓
		63.	Checking of Contactor sequence in Aux-Converter Units					✓	✓	✓
		64.	Check Input Voltage, Input Current, DC-Link Voltage, DC-link Current, Output Voltage, Output Current, Load current, Output Frequency.					✓	✓	✓
		65.	Replace air filters.						✓	✓
		66.	Overhaul the contactors in the auxiliary converters 1, 2 & DC-DC Converter and replace the contact tips if required.						✓	✓
		67.	Overhaul the blower and replace defective items.						✓	✓
		68.	Visual inspection of Chokes and Capacitors after removing backside cover of Converter.						✓	✓
		69.	Checking the mounting and connection tightness of chokes & capacitors.						✓	✓
		70.	Clean the sine filter chokes and DC-DC converter transformer in the Auxiliary Converter Unit by blowing with dry air. Remove all traces of dirt, dust and debris. Visually check for any abnormalities and Ensure tightness of same.						✓	✓
		71.	Replace all door gaskets.						✓	✓
		72.	Replace all Intumescent seals of body covers.						✓	✓
		73.	Overhaul and replace contact tips of Electrical Contactors							✓
		74.	Replace Blower Motor Bearing and associated component during blower overhauling.							✓

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td>75.</td><td>Post Inspection Parameter Check:

<table>
<tr><td>Input Voltage AC1 & AC2 :</td><td>285 V AC to 450V AC from Aux winding 1 & 2 of Main Transformer</td></tr>
<tr><td>Control Supply Voltage</td><td>77V to 137.5 V DC from Battery</td></tr>
<tr><td>Power consumption of the control circuit</td><td>AC1: 150W maximum at 110Vdc
AC2: 165W maximum at 110Vdc</td></tr>
<tr><td>Pre charging Resistor</td><td>77 Ohms, 500W</td></tr>
<tr><td>DC Link Capacitor</td><td>2620 µF, 900V</td></tr>
<tr><td>DC Link Discharge Resistor</td><td>6.8k Ohm,150W</td></tr>
<tr><td>Earth leakage limiting Resistor</td><td>50 ohms, 200W</td></tr>
<tr><td>Sine Filter Inductor</td><td>75uH, 278Arms</td></tr>
<tr><td>Load Sharing Inductor</td><td>50uH,278Arms</td></tr>
<tr><td>Sine Filter Capacitor</td><td>75uF, 530Vrms</td></tr>
<tr><td>DCDC Input Capacitor</td><td>340uF, 900V</td></tr>
<tr><td>DC Converter Output Inductor</td><td>37uH, 277A</td></tr>
</table>
</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	T	M	Q	9 M	SS1	SS2	SS3
			DC Converter Output Capacitor: 340uF, 900V Output capacity: **AC1 Output:** 186kVA, 415V +/-5% (L-L), 50Hz +/-3%, 0.8pf, 3Phase, Sine wave (at >19kVac OHE) At <19kVac OHE, output voltage shall drop by maintaining V/F ratio constant. **AC2 Output:** 186kVA, 415V +/-5% (L-L), 50Hz +/-3%, 0.8pf,3Phase, Sine wave (at >19kVac OHE) At <19kVac OHE, output voltage shall drop by maintaining V/F ratio constant. **DC Output:** 110V to 125VDC (It is varying as per DC load sharing current requirement) DC Power: 30.5kW at 110V DC (BN, BD & Battery Charger loading on this). **Auxiliary converter will deliver full power between 19kV to 30kV OHE voltage. From 19kV to 16kV delivers reduced power by maintaining V/F constant. The Minimum power at 16kV is 50%**							✓
3.0	**Battery Box Unit (MEDHA) -DTC, NDTC**									
		1.	Check the Battery Box Unit mounting bolts for the tightness, there should not be any slackness in all the mounting fasteners, Cotter pin should be intact.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the Battery box unit for any external damage.	✓	✓	✓	✓	✓	✓	✓

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td>3.</td><td>Check error log for any abnormal fault</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>4.</td><td>Maintenance of Heat Sinks: No maintenance is required.
*In case if there is any Heat Sink thermal performance degradation is identified through temperature derations or shutdowns in the converter even if the blower motor is running in the right direction,
then remove the Heat Sink module and clean it as per the procedure given below:
➢ Remove the modules from the unit as per procedure mention for removing and replacing LRU's
➢ Clean the Heat sink fins with isopropyl alcohol by using lint free cloth and brush. Suck the air through fins by vacuum blower for removing the dirt from fins</td><td>✓*</td><td>✓*</td><td>✓*</td><td>✓*</td><td>✓*</td><td>✓*</td><td></td></tr>
<tr><td></td><td></td><td>5.</td><td>Clean information and warning labels on doors.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>6.</td><td>Battery Management System Data Logger should be checked for the following parameters:
• Communication with Train system
• Battery Pack Voltage
• Individual Module/Cell voltages
• Current – for detecting over current for charge/ discharge behavior.
• State of Charge.
• State of Health
• Cell Balancing Status
• Internal Resistances
• Temperature

Cell Specification
<table><tr><td>Typical capacity</td><td>228Ah</td></tr><tr><td>Nominal Voltage</td><td>3.22 V</td></tr><tr><td>Operation Voltage</td><td>2.5 ~ 3.65 V</td></tr><tr><td>Maximum current (Charge)</td><td>456A</td></tr></table></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
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<tr><td></td><td></td><td></td><td>
<table>
<tr><td>Maximum current (Discharge)</td><td>684 A</td></tr>
</table>
Module Specification
<table>
<tr><td>Module Type</td><td>228Ah-1P4S</td></tr>
<tr><td>Module nominal capacity</td><td>228Ah</td></tr>
<tr><td>Cell Configuration in Module</td><td>1P4S</td></tr>
<tr><td>Nominal voltage</td><td>12.88 V</td></tr>
<tr><td>Voltage Range</td><td>10.0 V ~ 14.6 V</td></tr>
</table>
Pack specification
<table>
<tr><td>Pack Type</td><td>8S3P-228Ah1P4S</td></tr>
<tr><td>Pack Nominal Capacity</td><td>684Ah</td></tr>
<tr><td>Cell Configuration in Module</td><td>8S3P modules(228Ah1P4S)</td></tr>
<tr><td>Nominal voltage</td><td>103.4 V</td></tr>
<tr><td>Operating voltage range</td><td>80.0V − 116.8V</td></tr>
</table>
</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>7.</td><td>Check the healthiness (colour) of silica gel (inside the door), they should be blue, if found pink replace silica gel with new/ regenerated.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>8.</td><td>Ensure that all door sealing gaskets are free from cut marks and physical damages, If found replace with new one.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td>9.</td><td>Visual Inspection of all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>10.</td><td>Check electrical connections and ground connections for corrosion to resolve. Check connections tightness.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>11.</td><td>Check components and cables for damage. If found, rectify them.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>12.</td><td>Do visual inspections for evidence of excessive temperature and arcing (Voltage flash over’s) and resolve it.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>13.</td><td>Check all the cable ties are tight and intact.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		14.	While doing maintenance if any abnormality /damage found, it should be addressed on need (issue severity) basis			✓	✓	✓	✓	✓
		15.	Replace silica gel with new/ regenerated					✓	✓	✓
		16.	Clean the battery box surfaces and inspect for any abnormality, corrosion etc..						✓	✓
		17.	Replace all door gaskets.						✓	✓
		18.	Cleaning of heat sinks unconditionally as mentioned earlier.							✓
3.1	**Battery Module LFP 228 Ah (CATL)**									
		1.	Check error log for any abnormal faults	✓	✓	✓	✓	✓	✓	✓
		2.	Ensure that the units are bolted tightly in the Battery Box			✓	✓	✓	✓	✓
		3.	Check the units for any physical damage			✓	✓	✓	✓	✓
		4.	Clean information and warning labels on units			✓	✓	✓	✓	✓
		5.	Moisture on the modules if observed, clean with dry cotton cloth.			✓	✓	✓	✓	✓
		6.	Clean the module surface (i.e. outer surface, terminals and other accessible dust deposited surfaces) with soft brush only. Suck the dust with vacuum cleaner & blow the forced air on the batteries.			✓	✓	✓	✓	✓
		7.	Visual Inspection of all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings. Re-torque of all mounting hardware, if required.			✓	✓	✓	✓	✓
		8.	Do visual inspections for evidence of excessive temperature and arcing (Voltage flash overs) and resolve it.			✓	✓	✓	✓	✓
		9.	In case of battery terminal / cable over heating sign, check for loose connection at the cell terminal post / cable end. If required replace the cable immediately.			✓	✓	✓	✓	✓
		10.	Check electrical connections and ground connections for corrosion to resolve. Ensure that connections are tight.			✓	✓	✓	✓	✓
		11.	Check components and cables for damage. If found address them.			✓	✓	✓	✓	✓
		12.	Ensure that all the cable ties are tight and intact.			✓	✓	✓	✓	✓
		13.	While doing maintenance if any abnormality / damage found, it should be addressed on need (issue severity) basis.			✓	✓	✓	✓	✓
3.2	**Battery Charger**									
		1.	Check error log data for any abnormal faults	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		2.	Ensure that the converter unit is bolted tightly			✓	✓	✓	✓	✓
		3.	Check the converter unit for any damage			✓	✓	✓	✓	✓
		4.	Ensure that the air inlet and outlet openings are UN- obstructed.			✓	✓	✓	✓	✓
		5.	Check the healthiness of all the blowers, there should not be any abnormal sound.			✓	✓	✓	✓	✓
		6.	Remove and clean the inlet air filter with forced air. Replace if torn out or damage.			✓	✓	✓		
		7.	Clean information and warning labels on doors			✓	✓	✓	✓	✓
		8.	Clean the magnetics surface (i.e. Outer surface, terminals and other accessible dust deposited surfaces) with soft brush only.			✓	✓	✓	✓	✓
		9.	Remove and clean the inlet air filter with water jet and forced air			✓	✓	✓		
		10.	Open and clean all converter unit doors. Remount properly with all bolts			✓	✓	✓	✓	✓
		11.	Track, monitor and record the capacity of battery modules through BMS, when the capacity of the battery is less than or equal to 70 percent (25 degree C), stop using battery, replace them.			✓	✓	✓	✓	✓

<table>
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<tr><td></td><td></td><td>12.</td><td>Thermal imaging of Battery and Battery Box equipment as per RDSO guidelines issued vide L. No. 1.3.17.1/Train Set dtd 16.12.2024:

Switch OFF VCB of the train for 30 mins on full operating (Auxiliary) battery load, with all electrical equipment's/fittings like lights, water pump, etc. in working condition.

Battery box door to be opened and cradle to be pulled out after isolation (Battery selector off).

Thermal images of all the terminals, Contactors, fuses, rotary switches, relays etc. to be captured properly by scanning the terminals & body temperature.

Acceptance criteria for temperature rise from ambient is as given below:
<table><tr><td>S.N.</td><td>Temp. Rise</td><td>Acceptance Criteria</td></tr><tr><td>1.</td><td>>25°C</td><td>The specific terminal/switchgears need to be properly investigated and attended. Thereafter, Thermal imaging to be repeated. In case,value is still in this range, then same is to be replaced.</td></tr><tr><td>2.</td><td><25 °C</td><td>Acceptable value</td></tr></table></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>13.</td><td>Replace air filters.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>4.</td><td colspan="3">Brake Chopper Resistor (MEDHA) - MC1,2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>1.</td><td>Check that the unit is bolted tightly to the vehicle.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>2.</td><td>Check the Brake Chopper resistor visually for damages and welded joints. If any damages/ cracks found, take corrective action.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>3.</td><td>Before starting any maintenance operations, make sure that Brake chopper resistor is isolated from power supply and manual DC link discharge switch is operated in the basic unit. It is necessary to wait for 30 minutes after power cut off to allow the resistor active parts and the frame to cool.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>4.</td><td>Check the insulators .If any cracks are observed, then replace the same.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		5.	Remove the covers (mesh) and clean/ wipe off the internal insulators using a duster and brush for greasy or sticky contamination.		✓	✓	✓	✓	✓	✓
		6.	Blow compressed air on active parts of the resistor and their own insulation washers. Jet cleaning of brake chopper to be done if required.		✓	✓	✓	✓	✓	✓
		7.	Check that if any foreign bodies are trapped on covers and elements remove them.		✓	✓	✓	✓	✓	✓
		8.	Do visual inspection for evidence of excessive temperature and arcing (voltage flash over).		✓	✓	✓	✓	✓	✓
		9.	Check tightness of all bolts and electrical connections as per torque values mentioned below: Bolt size Torque (N.m) (Stainless steel class A2-70) M6 = 8.8, M8 = 12, M10 = 48, M12 = 73, M16 = 158			✓	✓	✓	✓	✓
		10.	Measure the cold resistance value with LCR meter, corresponds to 20°C ambient temperature shall be in between**3.33 to 3.75Ω.** If the resistance is measured by digital multi meter, then the measurement cable resistance shall be subtracted from the measured value.			✓	✓	✓	✓	✓
5.	**DC Link Earthing Switch (MEDHA) - MC1,2**									
		1.	Check that the unit is bolted tightly to the vehicle.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the unit visually for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Check door mountings for total presence/ availability and in good condition.		✓	✓	✓	✓	✓	✓
		4.	Clean information and warning labels on doors.		✓	✓	✓	✓	✓	✓
		5.	Remove all un-ventilated doors, clean unventilated section Vacuum or brush out the equipment sections and components, lint free cloth may be used if required		✓	✓	✓	✓	✓	✓
		6.	Inspect all the manufacturing hardware of the doors for any slackness by seeing changes in torque marking. Add any missed hardware.		✓	✓	✓	✓	✓	✓
		7.	Check all door gaskets for total presence, availability and in good condition. Add if any missed gasket, further, if found any damaged gasket, replace it with new one.		✓	✓	✓	✓	✓	

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		8.	Check electrical connections and ground connections for corrosion to resolve. Check connections tightness markings.		✓	✓	✓	✓	✓	✓
		9.	Check components and cables for damage. If found, rectify them.		✓	✓	✓	✓	✓	✓
		10.	Check all the cable ties are tight and intact.		✓	✓	✓	✓	✓	✓
		11.	While doing maintenance if any abnormality / damage found, it should rectified.		✓	✓	✓	✓	✓	✓
		12.	Check tightness of electrical connection as per torque values.			✓	✓	✓	✓	✓
		13.	Replace all door gaskets.						✓	✓
6.1	**Pantograph (SCHUNK) – TC** *marked activities to be done six months/ 9 months/ 12 months subject to before running of **2.5 lakh km** as OEM recommends every year or 2.5 lakh km.									
		1.	Visually inspect the upper and lower arm and their components for any abnormality.	✓	✓	✓	✓	✓	✓	✓
		2.	Check pantograph visually for any damage & loose fasteners.	✓	✓	✓	✓	✓	✓	✓
		3.	Check the Pantograph raising and lowering function.	✓	✓	✓	✓	✓	✓	✓
		4.	Clean dirty insulators and insulation hoses with soft, clean & dry cloth. If required clean insulators with cleaning agent Toluene (or cleaning solvent). Only use clean water, with slight additives of neutral washing agents (pH 7).	✓	✓	✓	✓	✓	✓	✓
		5.	Check insulators visually for cracks and flash marks.	✓	✓	✓	✓	✓	✓	✓
		6.	Inspect insulating hoses for any damage. Exchange if necessary.	✓	✓	✓	✓	✓	✓	✓
		7.	Check Air leakage from air tubes and joints, if found take corrective action.	✓	✓	✓	✓	✓	✓	✓
		8.	Inspect sliding (carbon) strips and horns for damages on surface and wear. The wear of both sliding strips should happen evenly. If wear is uneven: • Check adjustment of parallel guide. • Check if pan head suspension or other parts of the pan head are damaged Replace carbon strips if damaged/ break or reached to condemning limit as given below: Condemning limit of Metallised Carbon Strips with Auto Dropping Device shall be as per SKEL-4994 i.e. 25mm from the bottom of Metallised Carbon strips carrier.	✓	✓	✓	✓			

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td></td><td>Check static contact force after replacement.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>9.</td><td>Check static contact force if any component is replaced.</td><td>✓</td><td>✓</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>10.</td><td>Check tightness of fasteners.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>11.</td><td>Check static contact force.
Static contact force shall be 70 ± 10 N.</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>12.</td><td>Check raising and lowering time of pantograph.
Raising time: ≤10 Sec., Lowering time: ≤10 Sec.</td><td></td><td></td><td>✓*</td><td>✓*</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>13.</td><td>Check all screw connections for damage, corrosion and tight fit.
<table>
<tr><th>Thread (mm)</th><th>Fastening torque (Nm)</th><th>Thread (mm)</th><th>Fastening torque (Nm)</th></tr>
<tr><td>M3</td><td>1.0</td><td>M10</td><td>30.0</td></tr>
<tr><td>M4</td><td>1.8</td><td>M12</td><td>70.0</td></tr>
<tr><td>M5</td><td>3.5</td><td>M14</td><td>80.0</td></tr>
<tr><td>M6</td><td>6.0</td><td>M16</td><td>120.0</td></tr>
<tr><td>M8</td><td>15.0</td><td>M20</td><td>250.0</td></tr>
</table></td><td></td><td></td><td>✓*</td><td>✓*</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>14.</td><td>Inspect all the pneumatic connectors for tightness and any air leakages (e.g. with a leak detection spray).
• air connection from vehicle to valve unit ADD.
• air connection from vehicle to pneumatic control
• air connection from pneumatic control to valve unit ADD
• connections from valve unit ADD to sliding strips
• connection from valve unit ADD to air bellow drive</td><td></td><td></td><td>✓*</td><td>✓*</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>15.</td><td>Check correct functioning of ADD (automatic dropping device) valve unit.</td><td></td><td></td><td>✓*</td><td>✓*</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>16.</td><td>Check pan head suspension (leaf springs and parallel guide of rocker boxes) for function, easy motion, deformation and corrosion. Check pan head springs for deformation and corrosion.</td><td></td><td></td><td>✓*</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>17.</td><td>Check rod end of the parallel guide for deformation.</td><td></td><td></td><td>✓*</td><td>✓*</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>18.</td><td>Check shunts for any damage, break of wires and braids. Replace shunts in case more than 5% of the wire are broken, or damaged.</td><td></td><td></td><td>✓*</td><td>✓*</td><td></td><td></td><td></td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			Check contact surfaces (current connections and tubular lugs of shunts) for dirt, corrosion and / or burn-up. Clean dirty contact surfaces and apply Molykote HSC plus Grease on current connections and tubular lugs of shunts.							
		19.	Check cable with terminals for breaks of wires and braids. Replace cable with terminals, if more than ten single wires or one single braid broken/ damaged. Apply Autol Top 2000 grease on Cable with terminals at the contact surface to the cams.			✓*	✓*	✓	✓	✓
		20.	Inspect cam & cable with thread fittings of raising mechanism for any damages.			✓*	✓*	✓	✓	✓
		21.	Clean & apply Autol Top 2000 grease on Cable with terminals at the contact surface to the cams and to the cable guide.			✓*	✓*	✓	✓	✓
		22.	Inspect **shock absorber**for any leakage of fluid. **Liquid leakage is NOT allowed.** Replace leaking shock absorber.			✓*	✓*	✓	✓	✓
		23.	Functional inspection of **shock absorbers**. Detach shock absorber**. Push and pull Shock absorber for several times. The stage between compression and tension may be max. 25 mm.**			✓*	✓*	✓	✓	✓
		24.	**Inspect insulation hoses.**			✓	✓	✓	✓	✓
		25.	Check functioning of Overreach detection (ORD) device. Check lifting height limitation for function and damage. Check the pneumatic cylinder moves in and out without jerking.			✓*	✓*	✓	✓	✓
		26.	Replacement of all shunts. # OEM para no. 11.2.4 @ 5.0 lakh km.				✓#	✓	✓	✓
		27.	Replace Sliding (carbon) strips					✓	✓	✓
		28.	Detach pantograph and pneumatic control from vehicle roof and overhaul complete pantograph assembly as per OEM. Attach pantograph to vehicle roof after overhauling.						✓	✓
		29.	Conduct DPT on all mounting brackets and joints of the Pantograph.						✓	✓
6.2	**Pantograph (FAIVELEY-LX 3600.2HRP VB) – TC**									

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	Visually inspect the entire Pantograph for any missing components and physical damages. Check static contact force if any component is replaced.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the Pantograph raising and lowering function.	✓	✓	✓	✓	✓	✓	✓
		3.	Clean dirty insulators and insulation hoses with soft, clean & dry cloth. Only use clean water, with slight additives of neutral washing agents (pH 7).	✓	✓	✓	✓	✓	✓	✓
		4.	Check insulators visually for cracks and flash marks.	✓	✓	✓	✓	✓	✓	✓
		5.	Check Air leakage from air tubes and joints, if found take corrective action.	✓	✓	✓	✓	✓	✓	✓
		6.	Inspect Collector Head (measurement of Carbon Strip) strips and horns for damages on surface and wear. The wear of both sliding strips should happen evenly. If wear is uneven: • Check adjustment of parallel guide. • Check if pan head suspension or other parts of the pan head are damaged Replace carbon strips if damaged/ break or reached to condemning limit as given below: Condemning limit of Metallised Carbon Strips with Auto Dropping Device shall be as per SKEL-4994 i.e. 25mm from the bottom of Metallised Carbon strips carrier. Check static contact force after replacement.		✓	✓	✓			
		7.	Check raising and lowering time of pantograph. i. Raising time: Not more than 6-15 Second ii. Lowering time: Less than or equal to 15 Second.			✓	✓	✓	✓	✓
		8.	Check static contact force. Static contact force shall be 70 ± 10 N.			✓	✓	✓	✓	✓
		9.	Inspect and clean ADD (automatic dropping device) valve membrane.			✓	✓	✓	✓	✓
		10.	Inspect visually the condition of flexible connections i.e. Shunts for any damage. Replace damaged shunts like frayed, ripped etc. and also replace if the number of broken strands is > 20 per carbon strip. i. Collector Shoe – Upper Arm (2 pcs) ii. Upper Arm – Lower Arm (2 pcs)			✓	✓			

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			iii. Lower Arm – Frame (2 pcs)							
		11.	Inspect visually the Lower Arm, Upper Arm and Collector Head Elastic End Stops for any crack and wear, replace if required. Tightening torque for i. Lower Arm end stop (1 no.): 22 Nm ii. Upper Arm end stops (2 nos.): 22 Nm iii. Collector Head End Stops (2 nos.): press fit			✓	✓	✓	✓	✓
		12.	Clean Aerofoils with wet cloth and dry it. Inspect ADD Valve and clean it.			✓	✓	✓	✓	✓
		13.	Check the horizontal position of the Collector Head with help of Spirit level.				✓	✓	✓	✓
		14.	Check the Pneumatic parts of Pantograph for tightness and performance. Check the tightness of Pneumatic Connections for any air leakage by applying air leak detection spray.				✓	✓	✓	✓
		15.	Perform the Cleaning and Lubrication. Aeroshell Grease 6 is used for lubrication unless specified otherwise. Lubricate the moving parts of the Pantograph which are not supported on the bearings as follows: i. the seating of two Pins of the Upper Rod ii. the Collector Shoe seating iii. the contact surfaces of the Flexible Connections iv. the Chain with "Chain and Rope Lube Spray. Chain must be cleaned before lubrication. v. the Bearings through the lubricating Nipple till the grease starts to leak through the gap vi. the Damper Joints vii. the all visible Screws and Nuts viii. the two Pins of the Connection of Suspension Units and support of the Collector Head ix. the Bellow plate before installing Bellows				✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			In case, when Flexible Connections are mounted, apply conductive Grease HPG Contactal between mating surfaces of Flexible Connection and base of the Pantograph.							
		16.	Replace the Air Filter Insert/ element. And i. Lubricate the sealing ring of Air Filter Cover with Grease Spirel 269. ii. Install the Air Filter Cover and tighten it to a torque of 4.5 Nm.				✓	✓	✓	✓
		17.	Check and calibrate the Pressure Switch Settings on test bench, replace if required. Maximum pressure = 10 bar Minimum pressure = 7 bar				✓	✓	✓	✓
		18.	Replace Sliding (carbon) strips. i. Brush the mating surfaces of the Carbon Strip and Strip support and lubricate them with Conductive Grease before installation. ii. Nuts Tightening torque = 21 Nm iii. Check the static contact force and horizontal position after replacement.					✓	✓	✓
		19.	Replace all items given in TOH/ SS1 kit, these are also mentioned here in maintenance activities.					✓	✓	✓
		20.	Replace Lower Arm Elastic End Stop. (1 no.). Tightening torque 22 Nm					✓	✓	✓
		21.	Replace Upper Arm End Stops (2 nos.). Tightening torque 22 Nm					✓	✓	✓
		22.	Replace Collector Head End Stops (2 nos.). Press Fit					✓	✓	✓
		23.	Replace Pneumatic Tubes. i. Make sure to add Ferrules while replacing the pipes. ii. Check the tightness of the Pneumatic Connections by applying air leak detection spray.					✓	✓	✓
		24.	Replace lower rod/ frame joint					✓	✓	✓
		25.	Replace add membrane					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		26.	Replace Pressure Gauge					✓	✓	✓
		27.	Replace all Flexible connections (shunts)					✓	✓	✓
		28.	Replace all items given in SS2/36 M kit, these are also mentioned in maintenance activities.						✓	✓
		29.	Replace ADD valve						✓	✓
		30.	Replace MED valve						✓	✓
		31.	Conduct DPT on all mounting brackets and joints of the Pantograph.						✓	✓
		32.	Detach pantograph and pneumatic control unit (PCU) from vehicle roof and overhaul complete pantograph assembly and PCU as per OEM guidelines. Attach pantograph and PCU to vehicle after overhauling.							✓
		33.	Replace all items given in SS3/72M kit for pantograph Faiveley part no. E043116-K03, these are also mentioned in maintenance activities.							✓
		34.	Replace Pipe Assembly							✓
		35.	Replace Bellow cover							✓
		36.	Replace Bellows							✓
		37.	Replace Suspension Units (2 nos.).							✓
		38.	Replace Damper Assembly							✓
		39.	Replace Pressure Regulator							✓
		40.	Replace Flow Regulator part no. LT1000C2800							✓
		41.	Replace Flow Regulator part no. FT0052511-076							✓
		42.	Replace 5/2 Solenoid Valve Assembly							✓
		43.	Replace Pressure Switch							✓
		44.	Replace Upper Rod / Lower Arm joint @ 12 years							
		45.	Replace Upper Rod / swaying shaft joint @ 12 years							
		46.	Replace Lower Arm / Frame joint @ 12 years							
		47.	Replace Lower Arm / Upper Arm joint @ 12 years							
		48.	Replace Lower rod joints @ 12 years							
		49.	Replace Upper Arm/ Shaft joint @ 12 years							
7.1	**Vacuum Circuit Breaker (Make: SCHNEIDER) – TC**									
		1.	Clean insulators with soft, clean & dry cloth.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		2.	Check the porcelain insulators for cracks, flash marks and for chips. Minor damage (chips, small cracks & scratches) to the porcelain insulators can be repaired with epoxy resin. If the damage is more severe, fit a new insulator.	✓	✓	✓	✓	✓	✓	✓
		3.	Check the sealing of connectors, flexible pipe, regulator, air tank etc.		✓	✓	✓	✓	✓	✓
		4.	Check contact spring visually.		✓	✓	✓	✓	✓	✓
		5.	Check for any air leakage in VCB.		✓	✓	✓	✓	✓	✓
		6.	Perform IR test between bottom insulator and ground.		✓	✓	✓	✓	✓	✓
		7.	Check the setting of pressure regulator using a calibrated pressure gauge. This should be set at 5.6 – 6 .0 kg/cm^2				✓	✓	✓	✓
		8.	Weigh the air dryer. If increase in weight is more than 0.8 kg from the new weight, regenerate by heating in oven.				✓	✓	✓	✓
		9.	Drain-off condensate from air filter					✓	✓	✓
		10.	Wash air filter porous filter element with denatured alcohol or kerosene.					✓	✓	✓
		11.	Blow-out air filter body with clean compressed air.					✓	✓	✓
		12.	Wash the air filter bowl with household soap					✓	✓	✓
		13.	Change all components of air filter provided in replacement kit.					✓	✓	✓
		14.	Replace items as per AOH replacement kit as per OEM.					✓		
		15.	Perform sealing tests for VCB to check for any leakage between LV and HV chambers					✓	✓	✓
		16.	Check the contact travel: New interrupter contacts = 7.4 - 8.0 mm With eroded contacts = 10.4 - 11.0 mm					✓	✓	✓
		17.	Check the mechanism over travel. This should be between 4.0 mm to 4.9mm, after contacts close.					✓	✓	✓
		18.	Check the soundness of interrupter by applying 40 kV, 50 Hz for one minute across incoming & outgoing terminals, in breaker open condition.					✓	✓	✓
		19.	Check the closing speed / timings with the help of contact travel recorder.					✓	✓	✓
		20.	Measure contact resistance of main circuit.					✓	✓	✓
		21.	Dismantle Pressure Regulator, wipe-clean the parts using lint-free cloth moistened with white spirit and blow out the body with clean compressed air. Reassemble the parts.					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		22.	Check the setting of pressure switch using a calibrated pressure gauge fitted to pressure regulator. Ensure that the switch: Closes between 4.6 – 4.75 kg/cm^2 & Opens between 3.85 - 4.0 kg/cm^2					✓	✓	✓
		23.	Clean the contacts of Auxiliary Switch with CRC626 spray.					✓	✓	
		24.	Check the tightness of all fixing bolts, nuts and connections of Auxiliary Switch					✓	✓	
		25.	Check proper operation of contacts of Auxiliary Switch.					✓	✓	
		26.	Check tightness of all connections and fixing screws of Magnet Valve					✓	✓	✓
		27.	Check air leakage by operating manually of Magnet Valve					✓	✓	✓
		28.	Replace all component recommended in kit of Magnet Valve					✓	✓	✓
		29.	Replace all O-rings & PTFE valve discs.					✓	✓	✓
		30.	Overhaul and lubricate the relay valve.					✓	✓	✓
		31.	Overhaul and lubricate the piston and cylinder bore OF Cylinder Piston Assembly					✓	✓	✓
		32.	Check Air piping for air leakage at all joints					✓	✓	✓
		33.	Check for proper tightness of all electrical connections at terminal strips, magnet valve, pressure switch & auxiliary switch.					✓	✓	✓
		34.	Lubricate the relay valve assembly, cylinder piston assembly and all piston seal rings / O-rings including those of magnet valve assembly with silicone grease (Molykote 55M)					✓	✓	✓
		35.	Replace all rubber / PVC / SRBC items supplied in the replacement kits.					✓	✓	✓
		36.	Measure current value across individual R-C Network at 380 V AC (50Hz). Value should be between 2.5A to 3.5A. Replace if not in range.					✓	✓	✓
		37.	Carry Out water leakage test after fitment of VCB on roof.					✓	✓	✓
		38.	Replace items as per IOH replacement kit as per OEM.						✓	
		39.	Replace old piston seal ring of relay valve with new one						✓	✓
		40.	Replace one no. Damper Assembly of Cylinder- Piston Assembly						✓	✓
		41.	Replace old piston seal ring of Cylinder- Piston Assembly with new one						✓	✓
		42.	Replace old molecular sieves of air dryer						✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		43.	Replace all components of Pressure Regulator provided in replacement kit.						✓	✓
		1.	Replace old poppet valve of relay valve with new one							✓
		2.	Replace items as per POH replacement kit as per OEM.							✓
		3.	Replace complete Auxiliary Switch with new one							✓
		4.	Replace all compression springs supplied in the replacement kits.							✓
7.2	**Vacuum Circuit Breaker (Make: AAL) –TC**									
		1.	Clean insulators with soft, clean & dry cloth. Do not use cleaning products based on fluorated or chlorated compounds or sodium meta-silicate)	✓	✓	✓	✓	✓	✓	✓
		2.	Check insulators for cracks and flash marks for any crack or damage to enamel of the insulator ceramics and their sealing.	✓	✓	✓	✓	✓	✓	✓
		3.	Check for damage to connection of the earthing isolator.		✓	✓	✓	✓	✓	✓
		4.	Cleaning & greasing earthing isolator if necessary.		✓	✓	✓	✓	✓	✓
		5.	Drain the pressure regulator. (To be done before each winter period strictly.)		✓	✓	✓	✓	✓	✓
		6.	Drain the air tank. (To be done before each winter period strictly.)		✓	✓	✓	✓	✓	✓
		7.	Check for any air leakage in VCB.		✓	✓	✓	✓	✓	✓
		8.	Check the sealing of connectors, flexible pipe, regulator, air tank etc. in pneumatic circuit (To be done before each winter period strictly.)		✓	✓	✓	✓	✓	✓
		9.	Check contact spring for any damage to connections of contact spring of earthing switch.		✓	✓	✓	✓	✓	✓
		10.	Check the tightening torque 70Nm of H.V. connection.			✓	✓	✓	✓	✓
		11.	Check the torque of VCB fixing screws, tightening torque 70 Nm.			✓	✓	✓	✓	✓
		12.	Check the earthing connection, tightening torque 70 Nm.			✓	✓	✓	✓	✓
		13.	Check and set valve of the pressure regulator to maximum 4.5±0.1 kg/cm².				✓	✓	✓	✓
		14.	Check the cables and lugs of auxiliary switch for broken cables, lugs looseness				✓	✓	✓	✓
		15.	Weigh the air dryer. If increase in weight is more than 0.8 kg from new weight, regenerate molecular sieves by heating and replace, if required.				✓	✓		
		16.	Check the tightness of pneumatic connection of pressure switch.				✓	✓	✓	✓
		17.	Replace all items given in AOH kit of VCB (AAL part no. (4300007100/61).					✓		

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			These are also mentioned in activities.							
		18.	Change the filter cartridge of pressure regulator with O-Ring.					✓	✓	✓
		19.	Check screw of auxiliary switch for breakage or other damage.					✓	✓	✓
		20.	Check the moving contacts of auxiliary switch for its continuity.					✓	✓	✓
		21.	Check securing of auxiliary switches and support plate (Tightening torque-10Nm)					✓	✓	✓
		22.	Check the working order of each auxiliary contact.					✓	✓	✓
		23.	Check the healthiness of Vacuum Switch Tube (VST) by Di-electric test at 40 kV for 10sec. There shall be no tripping of the HV tester.					✓	✓	✓
		24.	Check closing & opening speed (First after 3 years on new breaker & then every major schedule).					✓	✓	✓
		25.	Inspections of main contacts wear in vacuum switch tube as per OEM guidelines.					✓	✓	✓
		26.	Check for any damages, cut & tightness of the connectors, connections, pins etc. Including pressure switch, EP valve solenoid coil and connector.					✓	✓	✓
		27.	Check proper fixing/ sticking of shock absorber plate of cylinder mounting plate.					✓	✓	✓
		28.	Check for any air leakage from piston assembly.					✓	✓	✓
		29.	Change the kit of O-ring of side cover.					✓	✓	✓
		30.	Check the healthiness of EP valve coil resistance1510 Ω ± 8% at 20°C.						✓	✓
		31.	Check the setting of pressure switch. P_{Upper} & P_{Lower} limits (3.6±0.1 kg/cm² & 3.3±0.1 kg/cm²)					✓	✓	✓
		32.	Lubricate driving plate assembly, auxiliary switch, Auxiliary cam					✓	✓	✓
		33.	Lubricate shafting head bearing guides, vertical springs, flexible braids, bearings, operating cam.					✓	✓	✓
		34.	Check Torque Tightening: i. Rear flange- 19.3Nm ii. Shafting head – 67Nm iii. Vertical insulator -67Nm iv. Bolts of cover for holding cylinder -39.4 Nm. v. Check air tank mounting nuts -- 15Nm					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		35.	RC network – Measure individual resistance and capacitance value 4.7Ω ± 10 % and 25 µF ± 10 %. Replace abnormal components.					✓	✓	✓
		36.	Carry Out water leakage test after fitment of VCB on roof.					✓	✓	✓
		37.	Replace all items given in IOH kit of VCB (AAL part no. (4300007100/62). These are also mentioned in activities.						✓	
		38.	Change the compression springs of Piston Assy.						✓	✓
		39.	Lubricate piston seal, piston rod and EP valve						✓	✓
		40.	Check tightness of nuts of base plate -- 15Nm						✓	✓
		41.	Replace molecular sieves						✓	✓
		42.	Replace all items given in POH kit of VCB (AAL part no. (4300007100/63). These are also mentioned in activities.							✓
		43.	Replace the pressure regulator							✓
		44.	Replace the Auxiliary Switch							✓
		45.	Replace the shock absorber plate							✓
		46.	Replace the piston seal							✓
		47.	Replace pressure switch.							✓
7.3	**Earthing Switch for VCB (Patra & Chanda)**									
		1.	Check the connections of the earthing switch for VCB for any damage.	✓	✓	✓	✓	✓	✓	✓
		2.	Check for smooth operation and intactness.	✓	✓	✓	✓	✓	✓	✓
		3.	Clean the isolator blades and fixed contacts.			✓	✓	✓	✓	✓
		4.	Apply grease on the isolator blades and fixed contacts.			✓	✓	✓	✓	✓
		5.	Ensure tightness of all connections.			✓	✓	✓	✓	✓
		6.	Overhaul the Earthing switch and replace defective components.						✓	✓
		7.	Replace Seal/ rubber gasket with new one.						✓	✓
		8.	Replace following in 4th SS1 (10.5 Years) • Replace Scrapper (Seals) for Main Shaft with new one and clean the same inside of the cover and apply grease • Replace blade (moving contact) with new one • Replace contact spring with new one • Replace key-A (Blue) and Key-B (Yellow) with new keys							
8.	**Transformer Down lead/ High Voltage Cable Assembly (TE)**									

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	**Securing the Ungrounded End of the HT cable Shield:** It is crucial that one side of the HT cable shield remains open to prevent electrical hazards, while the opposite ungrounded end should be securely fastened with cable ties to maintain the integrity of the cable assembly.	✓	✓	✓	✓	✓	✓	✓
		2.	**Check for Discoloration of the Black Conductive Paint: I**nspect T Connector as well as its end cap for any signs of paint erosion or discoloration to detect early signs of degradation.	✓	✓	✓	✓	✓	✓	✓
		3.	**Ensure the Presence of the End Cap:** Verify the presence of the end cap on the T Connector to maintain proper electrical isolation and to prevent unintended voltage inductions.	✓	✓	✓	✓	✓	✓	✓
		4.	**Verify Proper Earthing:** Ensure the earthing connections are intact and properly configured to prevent electrical hazards and operational safety. Note: Verify that, for any cable assembly earthing is done only at one point.	✓	✓	✓	✓	✓	✓	✓
		5.	Visually check the insulator sheds of roof bushing termination for any damage, rubbing marks or white patches. If any abnormality found take corrective action as OEM guidelines.	✓	✓	✓	✓	✓	✓	✓
		6.	Visually check the termination lugs for any corrosion. Note: if any corrosion found, do not clean and investigate.	✓	✓	✓	✓	✓	✓	✓
		7.	Cable Jacket Inspection: Visually inspect the exposed sections of cable jacket to check for possible abrasion damage due to foreign objects. Replace cable assembly if any holes or splits are found in the cable jacket. Immediate replace cable assembly if damaged screen wires are found. Clean if required as mentioned below in termination cleaning.			✓	✓	✓	✓	✓
		8.	Termination sheds cleaning: Clean the roof bushing housings with a soft, lint free, cleaning cloth to prevent excessive build-up of pollution deposits that can eventually lead to increased risk of electrical flash-over. Water with mild detergent can be used warm (up to 45°C) for cleaning. Recommended Citrus based cleaning products: TE EPPA-004 cable cleaning tissue, 3M NOVEC Contact Cleaner & Isopropyl Alcohol (for removal of localized sticky residues).			✓	✓	✓	✓	✓
		9.	T-Connector Boot Inspection: Visually inspect for any damage. Replace T-connector boot if found to have			✓	✓	✓	✓	✓

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td></td><td>tears or cuts to the rubber.
T-connector body is highly resistant to dirt and it is recommended not to clean unless necessary to do so (e.g. for inspection or replacement purposes) in which case light use of a non-abrasive cleaning cloth with warm water and mild detergent is the recommended cleaning method.
Replace EPDM rubber T-connector boots if exposed to oil contamination from a leaking transformer bushing.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9.</td><td colspan="3">25 kV Roof-Line Inter-Car Curly Jumper Cables (TE)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>1.</td><td>Inspect visually the coils for signs of underlying physical deformation (kinks etc.) Replace the jumper if any deformation observed.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>2.</td><td>Inspect visually jumper insulation surface for any discharge marks and any mechanical damage. Replace the jumper if any such damage is found.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>3.</td><td>Fastenings:
Direct visual inspection (if no boot fitted):
➢ Inspect the torque stripes. If required Re-torque loose nuts according to below recommended torque values and reapply torque stripes.
<table><tr><td>Thread size</td><td>Torque – half nut</td></tr><tr><td>M16</td><td>35 Nm</td></tr><tr><td>M20</td><td>45 Nm</td></tr></table><table><tr><td>Thread size</td><td>Torque – full nut</td></tr><tr><td>M16</td><td>51 Nm</td></tr><tr><td>M20</td><td>65 Nm</td></tr></table>➢ Inspect fasteners for mechanical damage or corrosion. Replace damaged/corroded fasteners with equivalent parts.
Hand looseness check (if boot fitted):
➢ Grasp boot stem and check for movement to hand applied force. If loose connection suspected pull the boot off the termination and slide it down the curly to enable direct visual inspection of the fastener.
➢ Do not disturb boot unless further investigation required.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			NOTE: degrease end of termination and apply new grease when moving the boot back into position. To degrease use a citrus based cleaning agent or a lint free cloth moistened with IPA. Do not pour IPA onto the components.							
		4.	Check the boot for splits in the rubber or impact damage. Replace a damaged boot as per OEM guidelines.							
10.	**AC Surge Arresters Primary and Secondary (SIEMENS) - TC**									
		1.	Visually inspect the Insulator surface for any sign of damage, crack/punctures or chipping/grazing.	✓	✓	✓	✓	✓	✓	✓
		2.	Make sure that the line and ground terminals remain tight.	✓	✓	✓	✓	✓	✓	✓
		3.	Visually inspect and check the earth cable for any damage and ensure it is connected properly.	✓	✓	✓	✓	✓	✓	✓
		4.	Check the arrester for any overloading (blackening or areas of burning on the flanges, torn plastic composite housing). If overloading has occurred, replace the arrester. Any existing monitoring accessories must then also be replaced.	✓	✓	✓	✓	✓	✓	✓
		5.	Clean the dust and dirt from the Insulator surface with cotton cloth. Use only clean water or soapy water and soft cloths or sponges for cleaning.		✓	✓	✓	✓	✓	✓
		6.	Reading the response counter (if present)		✓	✓	✓	✓	✓	✓
		7.	Check the TELLTALE spark gap, if installed.		✓	✓	✓	✓	✓	✓
		8.	Check the earth cable for any damage and ensure it is connected properly.		✓	✓	✓	✓	✓	✓
		9.	Check the high tension line connection and earthing connection for tightness.			✓	✓	✓	✓	✓
		10.	Check the foundation screws for tightness If any screw joint found loose, apply the torque value as given below: M8 18 ± 2 Nm M10 35 ± 5 Nm M12 60 ± 5 Nm M16 90 ± 10 Nm M20 105 ± 10 Nm			✓	✓	✓	✓	✓
		11.	Remove surge arrester for i. Insulation resistance testing by 2.5kV megger and value shall be more than 1000 Mega Ohm.					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			ii. Third harmonic resistive leakage current (THRC) testing Ref : RDSO TC No. RDSO/ 2016/EL/TC/0136 Rev – 0 dtd. 08.08.2016							
11.	**Main Transformer (JST) -TC**									
11.1	**Cooling System**									
		1.	Cooling System dry cleaning: • Clean the cooler surface by soft brush and remove deposits with industrial vacuum cleaner. • Clean the fan housing. • Clean the three-phase motor with a vacuum cleaner. • Clean the Top and Bottom cooler grid with a vacuum cleaner and the cooler with a vacuum cleaner. • Check the state of contamination of the radiator. • In case of oily and greasy contaminations, do "Wet cleaning" as per procedure.	✓	✓	✓	✓	✓		
		2.	Cooling System wet cleaning: • Remove the Top and Bottom cooler grid. Clean them. • Clean the cooler and the other external components with a wash station. • Add if required the cleaner TRAINCARE Heavy Duty (1) or another gentle cleaner (pH value 5 to 8) which does not attack the materials and coatings to the water. • Oily and greasy contaminations can be washed off with a steam or hot water jet. • Wash aluminum radiator by a pressure equipment, pressure must not exceed 50bar. • Dry the cooler by passing pressurized air (it must not exceed 6bar). Refer OEM manual for more details.		✓	✓	✓	✓	✓	✓
		3.	Carry out Megger test of motors and oil pump of cooling system by a 500 V DC megger. It should be more than or equal to 10 M-ohm.				✓	✓	✓	✓
11.2	**Transformer – General check**									
		1.	Check following visually for any abnormality/ damage: • Silica gel breather and silica gel condition. • Transformer for any oil leakage from any point, coupling, joints etc.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			• Transformer oil level							
		2.	If required, clean transformer radiator on temperature feedback basis (75°C).	✓	✓	✓	✓	✓	✓	✓
		3.	Check for any apparent damage, oil leakage or rust on the transformer and all the equipment.		✓	✓	✓	✓	✓	✓
		4.	Check the Transformer oil level as per below procedure: • Transformer should be perfectly horizontal to get correct value. • Use a laser thermometer on the tank to get temperature of oil. • Compare oil level with oil temperature (or ambient temperature if not available and Transformer at rest). • If the temperature differs by more than **10 °C**, look for leaks: visually check the Transformer appearance (weld accessories, connections). • If leakage found take corrective action.		✓	✓	✓	✓	✓	✓
		5.	Check if all screws are well tightened.			✓	✓	✓	✓	✓
		6.	Check if all warning signs are not damaged, change it, if needed.			✓	✓	✓	✓	✓
		7.	Clean the surface of the oil level indicator a clean rag.			✓	✓	✓	✓	✓
		8.	Check color change of the desiccant (silica gel) through air dryer window. If color has switched from brown/amber to aquamarine/ green or if oil is present in the Air dryer, replace the desiccant with new/ regenerated.			✓	✓	✓		
		9.	Visually inspect the electrical connections, earthing cables, LV bushings, gaskets and insulators on the main transformer for cracks, chips and evidence of impact damage. Renew if defective. Clean the connectors and replace any damaged gasket, chipped or cracked insulators.					✓	✓	✓
		10.	Replace all earthing shunts.						✓	✓
11.3	**PT100 Sensors**									
		1.	• Unscrew the PT100 cover earthing strap, unscrew the PT100 cover and open cover of sensor.				✓	✓	✓	✓

<table>
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<tr><td></td><td></td><td></td><td>

Check the condition of the connection head gasket (cut, porosity) and pollution inside the housing (water or dust ingress). In case of pollution or gasket damage, replace the PT100.
Disconnect wires.
Measure the temperature of the tank wall in a small area around
PT100 sensor with a laser thermometer. Take 4 measurements and note the average value "Tref".
Measure the resistance of each individual sensor (2 by PT100 unit), R1, R2 by the mean of a multimeter.
Example: if you measure 124.6 Ohm, closest value in the table is 124.77 Ohm. Equivalent temperature is 64°C.
Connect the wires on the terminals and close the cover of sensor.
Screw back the PT100 cover with 16 N.m torque and screw back the PT100 cover earthing strap with 10 Nm torque.

<table>
<tr><th>t/°C</th><th>0</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th></tr>
<tr><td>0</td><td>100.00</td><td>100.39</td><td>100.78</td><td>101.17</td><td>101.56</td><td>101.95</td><td>102.34</td><td>102.73</td><td>103.12</td><td>103.51</td></tr>
<tr><td>10</td><td>103.90</td><td>104.29</td><td>104.68</td><td>105.07</td><td>105.46</td><td>105.85</td><td>106.24</td><td>106.63</td><td>107.02</td><td>107.40</td></tr>
<tr><td>20</td><td>107.79</td><td>108.18</td><td>108.57</td><td>108.96</td><td>109.35</td><td>109.73</td><td>110.12</td><td>110.51</td><td>110.90</td><td>111.28</td></tr>
<tr><td>30</td><td>111.67</td><td>112.06</td><td>112.45</td><td>112.83</td><td>113.22</td><td>113.61</td><td>113.99</td><td>114.38</td><td>114.77</td><td>115.15</td></tr>
<tr><td>40</td><td>115.54</td><td>115.93</td><td>116.31</td><td>116.70</td><td>117.08</td><td>117.47</td><td>117.85</td><td>118.24</td><td>118.62</td><td>119.01</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>50</td><td>119.40</td><td>119.78</td><td>120.16</td><td>120.55</td><td>120.93</td><td>121.32</td><td>121.70</td><td>122.09</td><td>122.47</td><td>122.86</td></tr>
<tr><td>60</td><td>123.24</td><td>123.62</td><td>124.01</td><td>124.39</td><td>124.77</td><td>125.16</td><td>125.54</td><td>125.92</td><td>126.31</td><td>126.69</td></tr>
<tr><td>70</td><td>127.07</td><td>127.45</td><td>127.84</td><td>128.22</td><td>128.60</td><td>128.98</td><td>129.37</td><td>129.75</td><td>130.13</td><td>130.51</td></tr>
<tr><td>80</td><td>130.89</td><td>131.27</td><td>131.66</td><td>132.04</td><td>132.42</td><td>132.80</td><td>133.18</td><td>133.56</td><td>133.94</td><td>134.32</td></tr>
<tr><td>90</td><td>134.70</td><td>135.08</td><td>135.46</td><td>135.84</td><td>136.22</td><td>136.60</td><td>136.98</td><td>137.36</td><td>137.74</td><td>138.12</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>100</td><td>138.5</td><td>138.88</td><td>139.26</td><td>139.64</td><td>140.02</td><td>140.39</td><td>140.77</td><td>141.15</td><td>141.53</td><td>141.91</td></tr>
<tr><td>110</td><td>142.29</td><td>142.66</td><td>143.04</td><td>143.42</td><td>143.80</td><td>144.17</td><td>144.55</td><td>144.93</td><td>145.31</td><td>145.68</td></tr>
<tr><td>120</td><td>146.06</td><td>146.44</td><td>146.81</td><td>147.19</td><td>147.57</td><td>147.94</td><td>148.32</td><td>148.70</td><td>149.07</td><td>149.45</td></tr>
<tr><td>130</td><td>149.82</td><td>150.20</td><td>150.57</td><td>150.95</td><td>151.33</td><td>151.70</td><td>152.08</td><td>152.45</td><td>152.83</td><td>153.20</td></tr>
<tr><td>140</td><td>153.58</td><td>153.95</td><td>154.32</td><td>154.70</td><td>155.07</td><td>155.45</td><td>155.82</td><td>156.19</td><td>156.57</td><td>156.94</td></tr>
</table>
</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
11.4	**Air Dryers - Dehydrating Agent**									
		1.	Check colour change of the desiccant through Air dryer window. If colour has switched from brown/amber to aquamarine/green or if oil is present in the Air dryer, replace the desiccant with new/ regenerated as given below: (A) For Air dryer without flange (LV bushings box) i. Remove air dryer from LV bushing box. ii. Empty silica gel from the air dryers body. iii. Clean inside the air dryer body by blowing compressed air. iv. Slowly put a charge of Silica gel with new or regenerated through top opening. v. Screw back the air dryer on the air dryer pipe and screw it with a 50 Nm torque. (B) Air dryer with flange (conservator) i. Unscrew the air dryer collar and Unscrew Air dryer. Slowly separate the Air dryer from the flange. ii. Empty silica gel from the air dryer body. iii. Clean inside the air dryer body by blowing compressed air. iv. Slowly put a charge of Silica gel with new or regenerated through top opening. v. Check the condition of the gasket. Change it if necessary. Screw back the Air dryer on the flange with 60 N.m. torque. vi. Mount back the air dryer collar.			✓	✓			
		2.	Replace the desiccant (silica gel) with new one/ regenerated.					✓	✓	✓
		3.	Replace all sealing gaskets of air dryers.							✓
11.5	**Damper**									
		1.	Inspect visually the rubber of the damper and check that there is no cracks, no missing material, no shock and no marking etc.				✓	✓	✓	
		2.	Inspect visually the damper and check that there is no shock, no missing bolt.				✓	✓	✓	
		3.	Check Transformer foundation bolts and damper nuts tightness with proper torque. (3 phase loco during IOH)						✓	✓
		4.	Replace dampers (All) Every six years							✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
11.6	**Oil Sampling (Synthetic Ester oil conform to IEC 61099 type T1)**									
		1.	Collect oil sample of transformer oil as per procedure and send to the lab for BDV, acidity, and moisture content. Take corrective action as required. Acceptance criteria: i. Breakdown voltage > 30 kV (measured according IEC 60156 with fig. 1 spherical electrodes shape, 12.5mm diameter and 2.5mm gap). ➢ If breakdown voltage < 30 kV, Transformer should be stopped, and measurement confirmed with a second sample. Oil treatment could be performed to restore correct value. ii. Water content < 400 ppm (measured according IEC 60814 with Karl Fischer method). ➢ If 400 ppm < water content <= 700 ppm and breakdown voltage is ok, perform a new sampling for result confirmation. And later on, check general evolution by additional samples. ➢ If water content > 700 ppm, contact JST for recommendation. In case breakdown voltage is additionally < 30 kV, Transformer should be stopped. ➢ In any case, confirm result with a second sample. Oil treatment could be performed to restore correct value. iii. Acidity < 1.5 mgKOH/gOil (measured according IEC 62021). If acidity > 1.5 mgKOH/gOil, recommendation is to plan for an oil replacement with new oil (in a shorter delay if acidity >2 mgKOH/gOil).			✓	✓	✓	✓	✓
		2.	DGA test to be done.				✓	✓	✓	✓
			NOTE: For DGA analysis, do not compare results with values given in RDSO SMI 138 for Mineral Insulating Oil. DGA results of Synthetic Ester oil shall be shared with ICF and OEM (Medha/ JST India) for Expert Diagnostic.							
		3.	Oil centrifuging to be done if required.				✓	✓	✓	
		4.	Oil centrifuging to be done.							✓
		5.	Replace the transformer oil in 3rd SS2 (15 Years)							
11.7	**Pressure Relief Device**									

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	• Unscrew the 4 electrical cover screws. • Remove the cover and check the connection tightening. • Clean the micro switch contact, remove any dust or particle. Check that the contact operates correctly. • Mount back the PRD electrical cover.				✓	✓	✓	✓
11.8	**Cooling System Vibration Checking**									
		1.	Check motor fan group fixation. **(*Every six month)** • Disconnect the motor electrical supply and dismount the bottom grids. • Check impeller: • Clean the impeller (blade by blade) with a cleaning rag or by air blasting. • Turn the impeller over by hand and check that there is no friction and/or interference with the rotating elements. Also check that no suspect noise occurs. • Check the inlet cone positioning (see cooling system maintenance manual) and clean it. • Reconnect the motor supply.			✓*		✓	✓	
			• Check level of vibration: ○ Energize the motor fan. ○ Make 2 different vibration measurements on the motor body close to the bearings. Follow the procedure delivered with vibration meter. ○ If this level reach 1.3mm/s, it is recommended to proceed as soon as possible with bearing replacement. ○ For safety reasons, shut-down and lock-out the ventilator if the vibration levels on any one of the bearings exceeds 9mm/s • Mount back the bottom grids.			✓*		✓	✓	
		2.	Analyze the vibration of oil pump while it's powered.					✓	✓	✓
		3.	Replace Oil pump Bearings.							✓
		4.	Replace Motor fan bearings of Cooling system.							✓
11.9	**Main Bushing**									

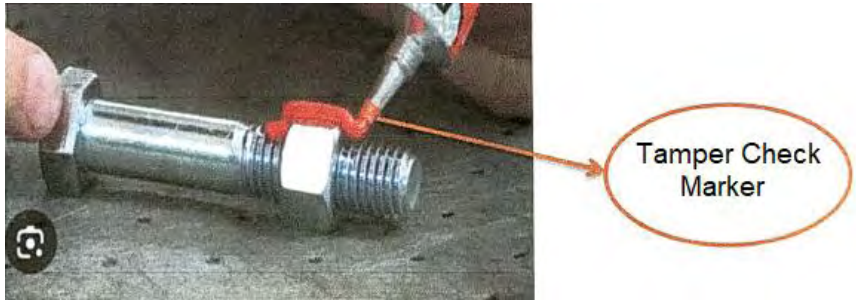
S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	Clean the main bushing thoroughly.						✓	✓
		2.	Check for any damage or defect.						✓	✓
		3.	Check tightness of all connections including earthing and roof bushing connections.						✓	✓
11.10	**Windings**									
		1.	Check Insulation Resistance of primary and secondary windings.						✓	✓
		2.	Check Insulation Resistance and Tan delta test of primary and secondary windings.							✓
12.	**Traction Motor (TSA/Medha) – MC1,2**									
		1.	Visual inspection of TM coupling and gear case etc.	✓	✓	✓	✓	✓	✓	✓
		2.	Check visually mounting bolts tightness marking for their looseness.	✓	✓	✓	✓	✓	✓	✓
		3.	Check visually and clean the air outlet openings on the bearing shield DE from the outside with a cloth, round brush and vacuum cleaner. Replace them if necessary.	✓	✓	✓	✓	✓	✓	
		4.	Clean the dirt from bearing cover drain hole with round brush and cloth.	✓	✓	✓	✓	✓	✓	
		5.	Clean the cyclonic filters of traction motors fitted on motor coach body on both sides as under: i. Filter can be cleaned with water spray of 10-20 lpm from a distance of 1 meter from filter. ii. Do not spray the water jet directly onto Cyclonic filter of more than 10-20 lpm water. iii. Do not spray water at a point for not more than 5 seconds.	✓	✓	✓	✓	✓		
		6.	Visually inspect the cyclonic filters of traction motors fitted on motor coach body on both sides as under: i. Check mounting hardware for any missing screws, replace if any. ii. Assure the unobstructed access and exit of the air, remove if any foreign object is there.	✓	✓	✓	✓	✓		
			iii. There should be no deposits in the lower drain holes, remove deposits using an adequate and soft brush. If required, use pressurized air and wet cloth to clean.							

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			iv. If dust is accumulated on Cyclonic filter and it is sticky, use Isopropanol 50-70% and clean the filter with a cloth. Do not use the cleaning agent in water jet. v. There should be no external damages, retouch/ renew paint, replace the filter if required.							
		7.	If required, clean traction motor filters on temperature feedback basis. As per Sr. DME/TSD/SSB L. no. 25.2.T-18-1 dt. 20.12.2023-feedback 135°C. As per OEM manual August 2022, warning temperature setting of temperature sensor is 160°C.	✓	✓	✓	✓	✓	✓	✓
		8.	Check visually traction motor for external damage due to mechanical causes (e.g. stone impact). Dismantle damaged attachments and suspension elements, repair damage or replace attachments. If necessary, the corrosion protection must be renewed at damaged points.		✓	✓	✓	✓	✓	
		9.	Check the mechanical connecting elements, coupling, external screws for tightness by visual inspection of the marked screws.		✓	✓	✓	✓	✓	
		10.	Check the electrical connection lines of the traction motor for external damage and bare spots. In the process of checking the motor connection lines, the terminal box cover sealing and the sealing for bushing plate must also be checked for damage (e.g., cracks, porous spots). If necessary, replace them.		✓	✓	✓	✓	✓	
		11.	Check earthing cable connection, speed sensor cable & temperature sensor cable with connector for any external/ mechanical damage like stone hitting etc.		✓	✓	✓	✓	✓	
		12.	Remove side wall duct cover & air filters of all the traction motors and clean them as under:		✓	✓	✓			
			i. Clean air filter with Air jet pressure of 1-2 kg/cm² in the reverse Airflow direction. ii. Once cleaned with air the same has to be repeated with surf water, plain water and again with Air. iii. The air filters should be used only after it is completely dry. Any moisture left in the filter will attract dust and filter may choke quickly.							

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			iv. If the air filters are heavy polluted and cannot be cleaned, replace with a new one.							
		13.	Check Traction motor and traction gear box level (i.e. checking height of Traction Gearbox to Traction Motor). It shall be within 9.5 to 10.5 mm as per instructions given in para no. 8.7.11 of Operating Manual Traction Gearbox GKD 1-52-372C, Nov-2023. See Mechanical Sch. Activities on Gear Box for more details.			✓	✓	✓	✓	✓
		14.	Re-grease the cylindrical roller bearing in the end shield NDE with 9 g and the deep groove ball bearing in the end shield DE with 21 g roller bearing grease SHELL GADUS S3 V220C 2 by Lever grease gun as per OEM guidelines. Clean off excess grease. Collect and dispose of contaminated clothes.				✓	✓	✓	
		15.	Check for signs of overheating, presence of bad odor.					✓	✓	
		16.	Clean the traction motor & its accessories thoroughly.					✓	✓	
		17.	Check attachment points of traction motor to bogie for cracks on the motor nose and lower mounting points.					✓	✓	✓
		18.	Check the tightness/ torque marking of TM cable connections, connector connection of speed sensor and temperature sensor.					✓	✓	
		19.	Check resistance thermometer (Pt100) function and replace if required.					✓	✓	✓
		20.	Check speed sensor function and replace if required.					✓	✓	✓
		21.	Replace air filters of all the traction motors.					✓	✓	✓
		22.	Remove and thoroughly check the cyclonic filters of traction motors for any damage, corrosion etc. i. Clean them thoroughly with Isopropanol 50-70%. ii. There should be no external damages, retouch/ renew paint, replace the filter if required.					✓	✓	✓
		23.	Check outlet protection grids of traction motors for any damages & Replace if required.						✓	✓
		24.	Check the condition of coupling TM side and change the grease.						✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		25.	Replace Terminal box cover sealing gasket and Air Bellow of Traction Motor.						✓	✓
		26.	Remove Traction Motor from vehicle and Overhaul as per OEM instructions @ 8 years or 30 lakh km whichever is earlier. Following major activities shall be carried out: a. Removing the rotor. Cleaning and checking the bearing shield DE. i. Check that the mating surfaces with the stator are clean. ii. Check that the grease is completely removed from used grease channel and lubricating channel. iii. Clean the speed sensor hole and the protective grids holes. iv. Clean the labyrinth ring surfaces. b. Disassembling the bearing from stator c. Cleaning of cooling holes in stator and rotor. Use vacuum cleaner round brush to clean. Check the cooling holes in the rotor and stator for free passage. Clean dirty cooling holes. d. TM Bearing replacement (Deep groove ball bearing 6217 M/HC5C4HS0 at the drive end (DE) and with a cylindrical roller bearing NU 1012 MR/HC5C4 at the non-drive end (NDE).								✓
			e. Cleaning the stator windings and checking for damage. (using Flash light). After the cleaning process, check the coating paint of the coils (impregnation) for cracks and flaws. If a defect is found, send the stator to the manufacturer for inspection. f. Checking and fine balancing of Rotor g. Replace Sealing of bushing plate, Sealing rings and O rings.							
		27.	Check insulation value of the winding by 1000 V DC megger. IR shall be minimum 100 M-Ohm when cold. The measurements shall be carried out as described above between: ➢W1 and earth ➢V1 and earth ➢U1 and earth							✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		28.	Measure winding resistance after repairs are carried out on the winding. The measurements for the winding resistance shall be carried out between: ➢U and V ➢U and W ➢V and W Read the measured value. At 20 °C this should be in the range of 107.49 mili-Ohm to 114.14 mili-Ohm.							✓
13.	**TM Cable Junction Box-MC**									
		1.	Check that the TM cables junction box bolted tightly to the vehicle.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the junction box for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Inspect all the manufacturing hardware of the doors for any slackness by seeing changes in torque marking.	✓	✓	✓	✓	✓	✓	✓
		4.	Do visual inspection for excessive temperature and arcing (voltage flash over) and resolve it.	✓	✓	✓	✓	✓	✓	✓
		5.	Check electrical connections and ground connections for corrosion to resolve. Ensure the connections are tight.	✓	✓	✓	✓	✓	✓	✓
		6.	Check components and cables for damage. If found address them.	✓	✓	✓	✓	✓	✓	✓
		7.	Inspect visually for evidence of excessive temperature and arcing (voltage flash overs) and resolve it.		✓	✓	✓	✓	✓	✓
		8.	Clean information and warning labels on doors.		✓	✓	✓	✓	✓	✓
		9.	Open and clean junction box doors. Remount properly with all bolts.		✓	✓	✓	✓	✓	✓
		10.	Check that the door sealing gaskets are free from cut marks and physical damages.		✓	✓	✓	✓		
		11.	Inspect all the mounting hardware (mechanical and electrical components) for any slackness by seeing changes in torque markings.		✓	✓	✓	✓	✓	✓
		12.	Replace all door sealing gaskets.						✓	✓
14.	**Power Cable Connections of High power Traction circuit**									
		1.	To detect heat generation due to loose connections, tamper check markers for power cables shall be used. For this: i. Power cables should be properly tightened. ii. After tightening of these cables, it should always be provided with tamper check marker provided with special paste as indicated below:					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			 iii. Only breakage of these markings indicates loosening of nut bolts at terminal. And so, tightness of cable to be checked only in case of overheating and condition of tamper check marker provided with special paste. **iv.** In case if re-tightening is required, these terminals shall invariably be re-provided with tamper check marker.							
15.	**Power Couplers (Underfloor)- (Harting) - MC, TC**									
		1.	Check for power coupler mounting properly and presence of any corrosion.	✓	✓	✓	✓	✓	✓	✓
		2.	Check Power Jumper cables are not hanging with one end free, secure them if necessary.	✓	✓	✓	✓	✓	✓	✓
		3.	Check power couplers for the intactness.	✓	✓	✓	✓	✓	✓	✓
		4.	Clean & check the power coupler junction box, HARTING connector plate, and cable holding plate for damages and welded joints. If any damages/ cracks are found, rectify them.	✓	✓	✓	✓	✓	✓	✓
		5.	Check the insulators. If any cracks are observed, they are to be replaced.		✓	✓	✓	✓	✓	✓
		6.	Check for corrosion in the electrical contacts.			✓	✓	✓	✓	✓
		7.	Check circumferential profile seal for proper positioning and damage.			✓	✓	✓	✓	✓
		8.	Check the tightening torque of all bolts, cable glands, HARTING connectors and electrical connections. Torque areas under as per OEM's instructions. a. M8 External hex head screw = 12 Nm b. M6 cover fixing hexagon socket screw SW5 = 10 Nm			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			c. M 10 hex screw for Han HC modular 350A = 14 Nm d. M6 screw for base panel Assembly = 10 +/- 1 Nm e. M4 Screw for Frame assembly = 1.5 +/- 0.2 Nm f. M8 x160mm length screw for Conduit Adapter assembly torque = 10Nm g. cable gland assembly torque = 20 Nm h. M12 bolt for mounting box to assemble at train side = 73 Nm i. M5x50mm length screw for Siemens Limit switch mounting = 5.5 Nm							
		9.	Inspect the unit visually for any cracks.		✓	✓	✓	✓	✓	✓
		10.	Inspect hardware and unit mounting frame for cracks.		✓	✓	✓	✓	✓	✓
		11.	Replace Jumper head gasket						✓	✓
		12.	Carry out Insulation resistance and continuity checking.						✓	✓
16.	**Power Coupler Junction Box-MC, TC**									
		1.	Check that the Power Coupler JB & Plates are bolted tightly to the vehicle.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the Power Coupler JB & Plates for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Open and clean all Power Coupler JB doors. Remount properly with all bolts.			✓	✓	✓	✓	✓
		4.	Clean information and warning labels on doors.			✓	✓	✓	✓	✓
		5.	Inspect all the manufacturing hardware of the doors for any slackness by seeing changes in torque marking.			✓	✓	✓	✓	✓
		6.	Check door sealing gaskets for any cut mark and physical damage.			✓	✓	✓		
		7.	Inspect all the mounting hardware (mechanical and electrical components) for any slackness by seeing changes in torque markings.			✓	✓	✓	✓	✓
		8.	Check electrical connections and ground connections for corrosion to resolve. Ensure that connections are tight.			✓	✓	✓	✓	✓
		9.	Check components and cables for damage. If found address them.			✓	✓	✓	✓	✓
		10.	Inspect for evidence of excessive temperature and arcing (Voltage flash overs) and resolve it.			✓	✓	✓	✓	✓
		11.	The cables located in the inner and outer positions have to be controlled with more intensity, since they have is a higher risk to be damaged and to be hit by a rock.				✓	✓	✓	✓
		12.	Replace sealing gaskets						✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
17.	**Inter Vehicular Jumper Coupler-All Coaches**									
		1.	Visual inspection: • Mechanical damage • Tightness of the fixing bolts (controlling the safety marks)			✓	✓	✓	✓	✓
		2.	Visual inspection of the cable jacket / sheath and grommets: • Cracks and scratches. • Damage caused by a hitting rocks. • Damage on the cable jacket. • Grommets shouldn't be pulled from the cable glands. • Safety marks of cable glands.			✓	✓	✓	✓	✓
		3.	Once IV coupler assemblies are disconnected from the coach, secure the jumper cable assemblies by using cable tie to avoid any damage to the cables. It shall also be ensured thatwater does not enter the socket and hood by using Dummy covers / polythene covers or any other suitable method.				✓	✓	✓	✓
		4.	Intensive visual inspection for mechanical damage.				✓	✓	✓	✓
		5.	Visual check that all screws are tight. (controlling the safety marks)				✓	✓	✓	✓
		6.	Check for tightness of the fixing screws.(controlling the safety marks)				✓	✓	✓	✓
		7.	Tightness testing by opening the plugs and check for corrosion in the electrical contacts.				✓	✓	✓	✓
		8.	Clean & check the IV coupler for damages and welded joints. If any damages/ cracks are found, rectify them.				✓	✓	✓	✓
		9.	Check that all the coupler sockets and jumpers are bolted and fitted correctly to the vehicle. The recommended torque as per OEM are as under: ➢ for M10x40 mm bolt, washer, and spring washer along with EPDM gasket - 35 Nm					✓	✓	✓
		10.	Check the condition of the Nylon washer, M6 screw on hood side and gasket/ Rubber-Ring condition at base panel side. If any damage/abnormality is observed replace the Nylon Washer/M6 Screw/gaskets/Rubber O-Rings to avoid slackness and subsequent					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			electrical failure. This shall be ensured during every decoupling and coupling. Tightness of the screws to 4Nm torque shall be ensured.							
		11.	Inspect hardware and unit mounting frame for cracks.					✓	✓	✓
		12.	Visually inspect all the mounting hardware for corrosion.					✓	✓	✓
		13.	Inspect the unit visually for any cracks.					✓	✓	✓
		14.	Do visual inspection for evidence of excessive temperature and arcing (voltage flash overs) and resolve it.					✓	✓	✓
18.	**Isolation Transformer (Medha) -All Coaches**									
		1.	Ensure that the isolation transformer is bolted tightly to the vehicle.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the Isolation Transformer visually for any external damages.	✓	✓	✓	✓	✓	✓	✓
		3.	Check that heat sink guard is not clogged (any foreign material should be removed by hand).	✓	✓	✓	✓	✓	✓	✓
		4.	Check electrical connections and ground connections for corrosion to resolve.	✓	✓	✓	✓	✓	✓	✓
		5.	Check components and cables for any damage. If found address them.	✓	✓	✓	✓	✓	✓	✓
		6.	Do visual inspection for evidence of excessive temperature and arcing (voltage flash over's) and resolve it.	✓	✓	✓	✓	✓	✓	✓
		7.	Blow compressed air over the Transformer (especially on heat sink guard) to remove the dust on mesh).		✓	✓	✓	✓	✓	✓
		8.	Check the visual aspect and the tightening torque of **102** N-m on transformer mounting frame at 4 locations.		✓	✓	✓	✓	✓	✓
		9.	Insulation Resistance testing of both windings.					✓	✓	✓
		10.	Replace door gaskets						✓	✓
19.	**Master Controller (SCHALTBAU) - DTC**									
		1.	Check the function of master controller in each driving cab.	✓	✓	✓	✓	✓	✓	✓
		2.	Check that master controller handle is not loose and there is no excessive play.	✓	✓	✓	✓	✓	✓	✓
		3.	Visually check master controller handle and mode selector handle for signs of damage such as cracking, excessive wearing etc.			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		4.	Confirm that the master controller and mode selector handle can be operated smoothly and without excessive force.			✓	✓	✓	✓	✓
		5.	Check the interlocking between MSH and MCH.			✓	✓	✓	✓	✓
		6.	Check multiple pin connectors for damage or loosening.			✓	✓	✓	✓	✓
		7.	Check all screws and nuts for loosening.			✓	✓	✓	✓	✓
		8.	Clean all parts with dry compressed air					✓	✓	✓
		9.	Visually check all electrical/ mechanical connections and springs with regard to visible damages.					✓	✓	✓
		10.	Check notch roll, if necessary replace. Grease by using high performance grease.					✓	✓	✓
		11.	Check snap-action switches of the complete Master Controller					✓	✓	✓
		12.	Lubricate bearings with the special lubricating oil as per OEM guidelines.					✓	✓	✓
		13.	Grease toothed wheels and notch disks with high- performance lubricating grease as per OEM guidelines.					✓	✓	✓
		14.	Check the condition of insulation papers pasted inside the MCH cover and replaced if found damaged.					✓	✓	✓
		15.	Overhauling & testing of master controller as per OEM's instructions.						✓	✓
20.	**Driver Console - DTC**									
		1.	Check the operations from both the driver's cab and working of cab occupation functionality.	✓	✓	✓	✓	✓	✓	✓
		2.	Clean driver console externally with soft brush and lint free cloth soaked with tap water.	✓	✓	✓	✓	✓	✓	✓
		3.	Check DDU for any active fault and note down.	✓	✓	✓	✓	✓	✓	✓
		4.	Check general appearance& function of all switches & push button with their indications on Driver Desk and their stenciling.	✓	✓	✓	✓	✓	✓	✓
		5.	Check the functioning of all buttons by pressing lamp test button	✓	✓	✓	✓	✓	✓	✓
		6.	Working of driver console light by operating driving console light switch.	✓	✓	✓	✓	✓	✓	✓
		7.	Check console light, cab light, fire extinguisher, function of horn etc.	✓	✓	✓	✓	✓	✓	✓
		8.	Check function of all pressure gauges.	✓	✓	✓	✓	✓	✓	✓
		9.	Check the condition of DDU, MMI (HMI) & CCTV screen for any damage.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		10.	Ensure the intactness of USB port, Ether Net Connector & power supply connector.	✓	✓	✓	✓	✓	✓	✓
		11.	Check the healthiness of touch function and its response time.	✓	✓	✓	✓	✓	✓	✓
		12.	Ensure the healthy and working status of all equipment at train level (entire rake).	✓	✓	✓	✓	✓	✓	✓
		13.	Ensure the healthy and working status of all equipment at unit level.	✓	✓	✓	✓	✓	✓	✓
		14.	Check for any active failure on events screen.	✓	✓	✓	✓	✓	✓	✓
		15.	Ensure healthy status of equipment/functions on train level and unit level of various screens of Main System.	✓	✓	✓	✓	✓	✓	✓
		16.	Check the functioning of BAL, ISO, Single unit operation, EOL bypass, EBL bypass, UVISO, ADCR bypass selector switches in normal position and EMY off switch in release position.	✓	✓	✓	✓	✓	✓	✓
		17.	Check the healthiness of all Door Proving Loop on DDU.	✓	✓	✓	✓	✓	✓	✓
		18.	Check the healthiness of all EBL on DDU.	✓	✓	✓	✓	✓	✓	✓
		19.	Check working of Flasher light in both normal and standby mode.	✓	✓	✓	✓	✓	✓	✓
		20.	Focus setting of Main head light.	✓	✓	✓	✓	✓	✓	✓
		21.	Check working of Dim/Full function of Main head light.	✓	✓	✓	✓	✓	✓	✓
		22.	Working of Marker light Red and white.	✓	✓	✓	✓	✓	✓	✓
		23.	Check working of Frequency Generator Unit.	✓	✓	✓	✓	✓	✓	✓
		24.	Cab Light (Driver/ Asst Driver side) – Inspection	✓	✓	✓	✓	✓	✓	✓
		25.	Spot Light (Driver/ Asst Driver side) – Inspection	✓	✓	✓	✓	✓	✓	✓
		26.	Check Compartment/saloon light by operating.	✓	✓	✓	✓	✓	✓	✓
		27.	Check function of Signal Bell.	✓	✓	✓	✓	✓	✓	✓
		28.	Do all the self-tests of TCMS	✓	✓	✓	✓	✓	✓	✓
		29.	Check the condition of LP/ALP seat.	✓	✓	✓	✓	✓	✓	✓
		30.	Clean the entire internal housing and the equipment with the vacuum cleaner.		✓	✓	✓	✓	✓	✓
		31.	Visually inspect the entire box, enclosure walls, covers, and welds for any damage or cracks.		✓	✓	✓	✓	✓	✓
		32.	Visually inspect all internal and external cable connections of the Driver console for damage.		✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		33.	Ensure that all glands and connectors are in good condition.		✓	✓	✓	✓	✓	✓
		34.	Ensure that all terminal blocks, HARTING connectors are in good condition.		✓	✓	✓	✓	✓	✓
		35.	Visually inspect the screws securing the Driver console to the supporting beams. Ensure that all screws are present and tightened.		✓	✓	✓	✓	✓	✓
		36.	Check the condition of hinges/brackets for the hinged assembly, if any defect found, rectify the same.		✓	✓	✓	✓	✓	✓
		37.	Check The Network screen for communication healthiness of all the nodes.		✓	✓	✓	✓	✓	✓
		38.	Check The Communication screen for communication healthiness of TCMS various interfaces.		✓	✓	✓	✓	✓	✓
		39.	Check the version number screen for various modules s/w details.		✓	✓	✓	✓	✓	✓
		40.	Ensure healthy status of all Auxiliary Convertor on DDU.		✓	✓	✓	✓	✓	✓
		41.	Ensure healthy status of Cab occupation on DDU in Regular & High Priority mode.		✓	✓	✓	✓	✓	✓
		42.	Check the Door screen for status of each door.		✓	✓	✓	✓	✓	✓
		43.	Check the RMPU screen for status of each RMPU.		✓	✓	✓	✓	✓	✓
		44.	Check door gasket is in good condition without holes and cracks. If the gasket is damaged, replace it with a new gasket.		✓	✓	✓	✓		
		45.	Calibrate all pressure gauges.					✓	✓	✓
20.1	**General**									
		46.	Replace all cable ties (straps), removed during the maintenance work by new ones of the same type and size.	✓	✓	✓	✓	✓	✓	✓
		47.	Replace door sealing gaskets/ beadings.						✓	✓
21.	**ECC, CRW, RMPU Panel, TCAS, , EWP, Pantry switchgear – All coaches**									
21.1	**MPCBs, MCBs, Contactors, TBs & relays**									
		1.	Check doors/ covers condition of ECC panels, end walls panels, RMPU panels and other panels for proper locking etc.	✓	✓	✓	✓	✓	✓	✓
		2.	Open the doors of the unit by unlocking with a square key.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		3.	Check MCBs, contactors for any loose mounting and also visually inspect for any abnormality.	✓	✓	✓	✓	✓	✓	✓
		4.	Visually inspect for any abnormality.	✓	✓	✓	✓	✓	✓	✓
		5.	Check the connection intactness for main and auxiliary contact.	✓	✓	✓	✓	✓	✓	✓
		6.	Check for any loose contact block or burn mark at cable connections.	✓	✓	✓	✓	✓	✓	✓
		7.	Check the operation of all MCBs.	✓	✓	✓	✓	✓	✓	✓
		8.	If there is any faulty component, they are to be replaced by taking proper precautions	✓	✓	✓	✓	✓	✓	✓
		9.	Ensure all the doors of the unit are tightly closed and locked during cleaning/ water wash of coach.	✓	✓	✓	✓	✓	✓	✓
		10.	Check intactness of all Ethernet & IP connectors.	✓	✓	✓	✓	✓	✓	✓
		11.	Check & ensure intactness of earthing shunts at all earthing points.	✓	✓	✓	✓	✓	✓	✓
		12.	Clean the entire internal housing and the equipment with the vacuum cleaner.		✓	✓	✓	✓	✓	✓
		13.	Visually inspect the entire box, enclosure walls, covers, and welds for any damage or cracks.		✓	✓	✓	✓	✓	✓
		14.	Visually inspect all internal and external cable connections for damage.		✓	✓	✓	✓	✓	✓
		15.	Check all glands and connectors are in good condition.		✓	✓	✓	✓	✓	✓
		16.	Clean & check all other electronics equipment & their accessories/ connectors for their healthiness.		✓	✓	✓	✓	✓	✓
		17.	Thermal imaging of end wall panels/ electrical cabinets (CRW, GCRW, ECC), RMPU Panels, Pantry switchgear shall be carried out as per RDSO guidelines issued vide L. No. 1.3.17.1/Train Set dtd 16.12.2024: i. Switch ON the power supply of the train for 30 mins on full operating (Auxiliary) load, with all electrical equipment's/fittings like lights, water pump, both Roof Mounted AC Package Units (RMPU), pantry etc. in working condition. ii. Thermal images of all the MPCBs, MCBs, Contactors, fuses, rotary switches, relays etc. to be captured properly by scanning the terminals & body temperature. iii. Acceptance criteria for temperature rise from ambient is as given below:		✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			S.N. / Temperature Rise / Acceptance Criteria 1. / >25°C / The specific switchgears need to be properly investigated and attended. Thereafter, Thermal imaging to be repeated. In case, value is still in this range, then same is to be replaced. 2. / <25 °C / Acceptable value							
		18.	Inspect the bolts, used for mounting the unit to bottom and top mounting frames. Ensure that all bolts are available and tightened.		✓	✓	✓	✓	✓	✓
		19.	Check door gasket/ beadings of panels are in good condition without holes and cracks. If found damaged, replace it with a new.		✓	✓	✓	✓		
		20.	Check the condition of hinges.		✓	✓	✓	✓	✓	✓
		21.	Clean & check availability of labels on all cabinets and their equipment.		✓	✓	✓	✓	✓	✓
		22.	Close the doors of the unit after compressing the gasket properly.		✓	✓	✓	✓	✓	✓
		23.	Lock the doors with the square key.		✓	✓	✓	✓	✓	✓
		24.	Replace all door sealing gaskets/ beadings.						✓	✓
22.	**Passenger information System (PIS) - All coaches**									
		1.	Check functioning of all PIS sub systems & ensure health status in driver display unit.	✓	✓	✓	✓	✓	✓	✓
		2.	Do the display test from MMI unit. Verify the LED displays (In coach display, Head code displays, Side Destination board display) functionality.	✓	✓	✓	✓	✓	✓	✓
		3.	Enable PA communication by pressing PA button in the MMI keypad and verify the audio.	✓	✓	✓	✓	✓	✓	✓
		4.	Do the audio test listen jingle sound from each speaker.	✓	✓	✓	✓	✓	✓	✓
		5.	Enable IC communication by pressing IC button in the MMI keypad and verify the audio.	✓	✓	✓	✓	✓	✓	✓
		6.	Clean the speaker units and check for any damages.	✓	✓	✓	✓	✓	✓	✓
		7.	Clean & check the ambient noise measurement modules for any damages.	✓	✓	✓	✓	✓	✓	✓
		8.	Clean and visual inspection of Car Control Unit (CCU).	✓	✓	✓	✓	✓	✓	✓
		9.	Clean and visual inspection of MIC.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		10.	Download fault log data of Main Communication Panel (MCP) Module through laptop/Pen drive from TCMS and check for any abnormal messages. (Necessary corrective/preventive action to be taken for abnormal messages).	✓	✓	✓	✓	✓	✓	✓
		11.	Diagnostics mode will be used off-line to test the individual modules Displays and Audio. Display and audio test can be done in coach level and train level.	✓	✓	✓	✓	✓	✓	✓
		12.	By Simulation mode, ensure the functionality of all the sub modules of PIS system. In this mode it will receive the GPS co-ordinates from the laptop for simulating the entire route.	✓	✓	✓	✓	✓	✓	✓
22.1	**Head Code Unit- DTC only**									
		1.	Check the status of LED's in the HCD at the outside of the cab.	✓	✓	✓	✓	✓	✓	✓
		2.	Clean the dust particle settled on the screen glass with a cloth from outside.	✓	✓	✓	✓	✓	✓	✓
		3.	Open the cover (Nose cone) for HCD accessing.			✓	✓	✓	✓	✓
		4.	Check the power Connections, Ensure they are tightly connected.			✓	✓	✓	✓	✓
		5.	Clean the dust particle if settled on the screen with a cloth.			✓	✓	✓	✓	✓
		6.	Check the damage of HCD. If found any damage such as Cracking, distortion, deformation replace the HCD.			✓	✓	✓	✓	✓
		7.	Check the fasteners for tightness. If loosened, tighten the fasteners to the torque of **8.5** Nm.			✓	✓	✓	✓	✓
		8.	Close the cover (Nose cone) for HCD.			✓	✓	✓	✓	✓
22.2	**In Coach Display Unit – All Coaches**									
		1.	Clean & Check the status of LED's in the ICD.	✓	✓	✓	✓	✓	✓	✓
		2.	Open the ICD mounting panel.			✓	✓	✓	✓	✓
		3.	Check the power Connections, Ensure they are tightly connected.			✓	✓	✓	✓	✓
		4.	Clean the dust particle settled on the screen with a cloth.			✓	✓	✓	✓	✓
		5.	Check the damage of ICD. If found any damage such as Cracking, distortion, deformation replace the HCD.			✓	✓	✓	✓	✓
		6.	Check the fasteners for tightness. If loosened, tighten the fasteners to the torque of 4.4Nm.			✓	✓	✓	✓	✓
		7.	Close the ICD panel after inspection of ICD.			✓	✓	✓	✓	✓
22.3	**Side Destination Board Unit – All Coaches**									

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	Check the status of LED's in the SDB at the outside of the Cab.	✓	✓	✓	✓	✓	✓	✓
		2.	Check and clean the glass covering of SDB. Replace, if found broken.	✓	✓	✓	✓	✓	✓	✓
		3.	Open the side panel for SDBU accessing			✓	✓	✓	✓	✓
		4.	Check the power Connections, Ensure they are tightly connected			✓	✓	✓	✓	✓
		5.	Clean the dust particle settled on the Screen with a cloth			✓	✓	✓	✓	✓
		6.	Check the damage of SDB, If found any damage such as Cracking, distortion, deformation replace the SDB.			✓	✓	✓	✓	✓
		7.	Check the fasteners for tightness. If loosened, tighten the fasteners to the torque of **5.0** Nm.			✓	✓	✓	✓	✓
		8.	Close the side panel for SDB.			✓	✓	✓	✓	✓
22.4	**Main Communication panel (MCP)**									
		1.	Visually inspect the damage LCD of MCP	✓	✓	✓	✓	✓	✓	✓
		2.	Remove MCP from installed location.			✓	✓	✓	✓	✓
		3.	Visually inspect the damage on the connector and cable.			✓	✓	✓	✓	✓
		4.	Remove the foreign substance and dirt.			✓	✓	✓	✓	✓
		5.	Install MCP.			✓	✓	✓	✓	✓
		6.	Check the fasteners for tightness. If loosened, tighten the fasteners to the torque of 5.0 Nm.			✓	✓	✓	✓	✓
		7.	Clean the relevant components, after careful inspection.			✓	✓	✓	✓	✓
		8.	If found any damage such as Cracking, distortion, deformation replace the MMI.			✓	✓	✓	✓	✓
22.5	**Emergency Talk Back Unit (PECU/ ETBU)**									
		1.	Check function of PECU/ ETBU system from minimum two coaches.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the status of LED's & LCD in the ETBU from out side	✓	✓	✓	✓	✓	✓	✓
		3.	Loosen and remove four M5X25LG (4no's) Screws of ETBU			✓	✓	✓	✓	✓
		4.	Check whether there is dust particle settled on the gland area Clean the dust particle with a cloth (if required).			✓	✓	✓	✓	✓
		5.	Check the damage of ETBU			✓	✓	✓	✓	✓
		6.	If found any damage such as Cracking, distortion, deformation replace the ETB			✓	✓	✓	✓	✓
		7.	Check the fasteners for tightness. If loosened, tighten the fasteners to the torque of 5.0 Nm.			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
22.6	GPS Module									
		1.	Cleaning and visual inspection of GPS module/ Antenna.			✓	✓	✓	✓	✓
		2.	Check the power Connections and communication connections, Ensure they are tightly connected			✓	✓	✓	✓	✓
23.	**CCTV System – All Coaches**									
		1.	Blow off the loose dirt and dust from the camera with compressed air carefully.	✓	✓	✓	✓	✓	✓	✓
		2.	Clean camera dome cover (glass) with microfiber cloth with gentle pressure.	✓	✓	✓	✓	✓	✓	✓
		3.	Check operation of all inside and outside cameras on display unit at driver desk.	✓	✓	✓	✓	✓	✓	✓
		4.	Sampling check 1 minute CCTV recording to be carried out.		✓	✓	✓	✓	✓	✓
		5.	Check the connections and fitment for any abnormality.		✓	✓	✓	✓	✓	✓
		6.	Check feed of all CCTV cameras on specified display unit.					✓	✓	✓
		7.	Check the system functionality and hardware for any malfunction / damage. If damaged replace the same.					✓	✓	✓
24.	**Saloon, Reading & Gangway Lights - All Coaches**									
		1.	Clean all saloon, reading& gangway lights.	✓	✓	✓	✓	✓	✓	✓
		2.	Check saloon, reading& gangway lights and their diffusers for any crack or mechanical damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Check mounting hardware position and intactness.	✓	✓	✓	✓	✓	✓	✓
		4.	Check the working of all lights and replace the defective part.	✓	✓	✓	✓	✓	✓	✓
		5.	The LED array/ light should be replaced if it is found burnt or fused or open circuit.	✓	✓	✓	✓	✓	✓	✓
25.	**Head Lights (LED)-DTC**									
		1.	Clean head light thoroughly with soft cloth and powder.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the mounting fitment and electrical connection for intactness	✓	✓	✓	✓	✓	✓	✓
		3.	Ensure proper working of head light.	✓	✓	✓	✓	✓	✓	✓
		4.	Ensure proper focus of head light		✓	✓	✓	✓	✓	✓
		5.	Check for crack or breakage of the aluminium casing of headlight beams		✓	✓	✓	✓	✓	✓
		6.	Ensure that there is no entry of water through head light lamps			✓	✓	✓	✓	✓
		7.	Apply silicon sealant if required to ensure there is no water leakage from possible entry points of head light			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		8.	Replace Head light gasket, head light seals (between headlight retaining ring & head light housing).						✓	✓
		9.	Check lighting units for physical damage, tightness of fixing & connections, particularly look for signs of overheating or burning						✓	✓
26.	**LED Marker Lights-DTC**									
		1.	Clean and check marker light glass for any damages.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the mounting fitment and electrical connection for intactness	✓	✓	✓	✓	✓	✓	✓
		3.	Check the proper functioning of marker lights. Check Tail lights working by moving mode selector (MS) and TCMS display.	✓	✓	✓	✓	✓	✓	✓
		4.	Check the electrical connections and fitment for healthiness.		✓	✓	✓	✓	✓	✓
		5.	Ensure that there is no entry of water through marker light lamps			✓	✓	✓	✓	✓
		6.	Apply silicon sealant if required to ensure there is no water leakage from possible entry points of marker light			✓	✓	✓	✓	✓
		7.	Replace Marker Light rubber gasket and its “O” rings						✓	✓
		8.	Check lighting units for physical damage, tightness of fixing & connections, particularly look for signs of overheating or burning						✓	✓
27.	**LED Flasher Lights-DTC**									
27.1	**Control Box**									
		1.	Clean and check the flasher light control box, toggle switches, fuses etc.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the availability of spare fuses.	✓	✓	✓	✓	✓	✓	✓
		3.	Check the mounting fitment and electrical connection for intactness.		✓	✓	✓	✓	✓	✓
27.2	**Flasher Light**									
		1.	Check the flasher light and its protection net and hood for any damages.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the mounting fitment and electrical connection for intactness	✓	✓	✓	✓	✓	✓	✓
		3.	Check the function of LED flasher light in both normal and standby mode.	✓	✓	✓	✓	✓	✓	✓
		4.	Remove the protection net and clean the glass with soft cloth and soft cleaner.		✓	✓	✓	✓	✓	✓
		5.	Ensure that there is no entry of water through flasher light lamps			✓	✓	✓	✓	✓
		6.	Apply silicon sealant if required to ensure there is no water leakage from possible entry points of head light			✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		7.	Replace flasher light gasket						✓	✓
		8.	Check lighting units for physical damage, tightness of fixing & connections, particularly look for signs of overheating or burning						✓	✓
28.	**PAIL Light**									
		1.	Clean diffuser lense.		✓	✓	✓	✓	✓	✓
		2.	Check visually for any damage etc.		✓	✓	✓	✓	✓	✓
		3.	Replace LED array if it is found burnt or fused or open circuit.		✓	✓	✓	✓	✓	✓
29.	**Emergency Light Unit**									
		1.	Clean light unit.		✓	✓	✓	✓	✓	✓
		2.	Check visually for any damage etc.		✓	✓	✓	✓	✓	✓
		3.	Replace if it is found defective.		✓	✓	✓	✓	✓	✓
30.	**Wiper - DTC**									
		1.	Check wiper blades for damages, torn or missing rubber blades. Replace wiper blades as required.	✓	✓	✓	✓			
		2.	Clean windscreen with methylated spirits (denatured alcohol).	✓	✓	✓	✓	✓		
		3.	Do function test of wiper washer system in all positions. Do not carry out function test on a dry screen. **Check for proper parking position of the wiper arm.**	✓	✓	✓	✓	✓		
		4.	Inspect tubing for damage or loose connection on nozzle. Check operation of spray nozzle on windscreen.	✓	✓	✓	✓	✓		
		5.	Ensure wash tank is filled with washer fluid to prevent wipers being used on a dry screen	✓	✓	✓	✓	✓		
		6.	Check fixing nut tightness of wiper arm to wiper spindle with torque wrench as per torque table given below.			✓	✓	✓		
		7.	Replace the wiper blades with new one.					✓	✓	✓
		8.	Check complete system for wear, Replace/ overhaul parts if necessary.				✓	✓	✓	✓

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td>9.</td><td colspan="3">Check all torque settings for complete wiper system as per OEM.
<table><tr><th>Where used (*May not be fitted on this)</th><th>Description</th><th>Size</th><th>Torque</th></tr><tr><td>Arm- Swivel Plate/ Blade Clip</td><td>Nut & Bolt</td><td>M5</td><td>4.5Nm</td></tr><tr><td>Earth Boss (*)</td><td>Nut</td><td>M6</td><td>12Nm</td></tr><tr><td>Wiper Motor</td><td>Bolt</td><td>M8</td><td>25Nm</td></tr><tr><td>SS Bulkhead Connector (*) – Stainless steel</td><td>Nut</td><td>M8</td><td>20Nm</td></tr><tr><td>Spindle Drive Crank</td><td>Nut & Bolt</td><td>M8</td><td>25Nm</td></tr><tr><td>∅16 Spindle</td><td>Nut</td><td>M10</td><td>38Nm</td></tr><tr><td>Threaded Bearing Pin</td><td>Nut</td><td>M16</td><td>25Nm</td></tr><tr><td>SS Liner-Metal Structure</td><td>Nut</td><td>M26</td><td>80Nm</td></tr></table></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>10.</td><td colspan="3">Carryout visual check for wear in rod end as per OEM.</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>11.</td><td colspan="3">Ensure all electrical connections in good condition.</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>12.</td><td colspan="3">Overhaul the complete Wiper system as per OEM guidelines given in para 22.30 of Medha Maint. Manual Dec 2024:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>i. Motors</td><td>Replace motor carbon brushes and bearings as well as all fixings..</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td>ii. Linkage Assembly</td><td>• Service the linkage assembly. It will get stripped down, cleaned and reassembled.
• Replace linkage bearings as well as all fixings.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td>iii. Wiper Arms</td><td>Replace Wipers arms.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td>iv. Wash Pump</td><td>Replace Wash pump</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td>v. Control Unit</td><td>Replace all relay contacts & power convertors and check connections.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td></td><td>vi. Tank</td><td>Carry put de-silting and leak test.</td><td></td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td colspan="3">31. Roof Mounted AC Package Unit (Amit Engineers) – All Coaches
*As per OEM Six monthly schedule is given, same incorporated as alternate quarter.</td><td colspan="3"></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>31.1</td><td>General</td><td>1.</td><td colspan="3">Download fault log data through laptop/Pen drive from Main Control Unit (MCU) and check for any abnormal messages. (Necessary</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			corrective/preventive action to be taken for abnormal messages)							
		2.	Maintenance Staff should continuously monitor Information/Alerts available in Remote Monitoring and Management of Locomotives and Trains.	✓	✓	✓	✓	✓	✓	✓
		3.	Check the log sheet maintained in each AC coach and attend the defects recorded by escorting staff during run.	✓	✓	✓	✓	✓	✓	✓
		4.	Check function of HVAC system.	✓	✓	✓	✓	✓	✓	✓
		5.	Check function of emergency blower by opening VCB after RMPU on command.	✓	✓	✓	✓	✓	✓	✓
		6.	Clean all dust by vacuum cleaner or by compressed air from the switch board cabinet and tighten the cable terminals, if found loose.	✓	✓	✓	✓	✓	✓	✓
		7.	Replace/ reconnect defective/ bypassed components.	✓	✓	✓	✓	✓	✓	✓
		8.	Verify that return air filters are not worn/ damaged.	✓	✓	✓	✓			
		9.	Remove fresh and return air filters by opening the access doors of the unit. Clean these filters with compressed air after taking out the filters and place them gently in their places or replace with pre-cleaned/ new filter/ filter media and close the doors properly. *Note: After this activity, the service doors shall be latched properly in case of return air and fresh air filter. Similarly, the fresh air grill shall be positioned and locked properly.*	✓	✓	✓	✓			
		10.	Check working of rotary switches by rotating forward and backward, provided on switch panel for temperature selection and Air. Co. ON. Replace if required	✓	✓	✓	✓	✓	✓	✓
		11.	Check working of set point generator rotary switch provided for temperature setting.	✓	✓	✓	✓	✓	✓	✓
		12.	If less cooling is noticed, check the leakage of refrigerant from the system by using soap solution or leak detector. If leak is detected, it should be attended and recharging of refrigerant in the system shall be made as per RDSO SMI No. ELPS/AC/SMI/14. Filter drier must be replaced during this activity.	✓	✓	✓	✓	✓	✓	✓
		13.	Ensure that latches to lock the service doors are not defective/ damaged.	✓	✓	✓	✓	✓	✓	✓
		14.	Ensure that covers of HP/LP/OHP cutouts switches are properly screwed.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		15.	Check visually condenser fan blade and ensure that there is no crack on the blade or hub.		✓	✓	✓	✓	✓	✓
		16.	Ensure that no capillary tubes are in hanging position.		✓	✓	✓	✓	✓	✓
		17.	Check capillary tubes provided for HP/LP cutout for proper support/clamping. Their nuts should be properly tightened.		✓	✓	✓	✓	✓	✓
		18.	Ensure cover (canopy) on top HP/LP switch (provided with capillary tubes) to prevent water entry.		✓	✓	✓	✓	✓	✓
		19.	Ensure that the expansion bulb is mounted in the suction line just after evaporator coil and in a position corresponding to between 1 O'clock and 4 O'clock. Ensure that it is properly insulated		✓	✓	✓	✓	✓	✓
		20.	Ensure that bulb/equalizing line/capillary tubes are not chocked.		✓	✓	✓	✓	✓	✓
		21.	Ensure free flow of condensate water.		✓	✓	✓	✓	✓	✓
		22.	Clean the condenser coil from inside with compressed air/water jet after opening the cover of condenser area.		✓	✓	✓	✓	✓	✓
		23.	Check the tripping of Heaters i.e., OHP. The OHP setting is 65℃. The testing of OHP setting shall be done by switching off the blower. During testing, the probe of digital thermometer shall be placed near the sensor of OHP & the display shall be kept outside. NOTE: In addition, it shall also be checked as a pre-winter precaution before the onset of winter season. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		24.	Run the HVAC for half an hour and then check the current drawn by various equipment's with the help of clamp tester (tongue tester) duly calibrated. Normal currents for various equipment's and mode of operation are as under: • Cooling mode • Heating Mode NOTE: The current also depends on the ambient temperature *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		25.	Check for proper tightening of cover provided over evaporator compartment. *to be done alternate quarter (every six month)			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		26.	Check the earthing shunts in HVAC are provided. Earthing shunts should be earthed with coach body. *to be done alternate quarter (every six month)			✓*		✓		
		27.	Check and tighten mountings of blower, compressor and blower motors and ensure that they are in good condition *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		28.	Replace fresh and return air filters.					✓	✓	✓
		29.	Clean & check supply and return air bellow duct for any torn out or damages and replace if required.					✓	✓	
		30.	Ensure that there is a provision to avoid wrong fitment in the return air filter					✓	✓	✓
		31.	Check insulation resistance of all the motors & compressors by the duly calibrated 1000 V megger, Attend the motors, if insulation resistance of motor is found less than 2 M ohm. IMPORTANT: Disconnect control devices during this activity.					✓	✓	✓
		32.	Check for physically damaged/jointed cables. Replace if needed.					✓	✓	✓
		33.	Cleaning of Harting connectors					✓	✓	✓
		34.	Check for the physically damaged conduits. Replace them, if needed.					✓		
		35.	Replace cable conduits.						✓	✓
		36.	Replace Anti Vibration mountings.						✓	✓
		37.	Intensive cleaning of return air and supply air ducts to be carried out.						✓	✓
		38.	Replace supply and return air bellow duct made of Meta/ para Aramid Fabric.							✓
31.2	**Refrigerant pipe line/capillary**									
		1.	Leakage from the flare nut of HP/LP conduits with soap solution *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Check for proper clamping/support					✓	✓	✓
		3.	Rubbing of capillary with SS sheet/channel or other parts of Train set					✓	✓	✓
		4.	Leakage from Feeler tube of OHP					✓	✓	✓
31.3	**Compressors**									
		1.	Check holding clamps from top are properly tightened.			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			*to be done alternate quarter (every six month)							
		2.	Check compressor mounting fasteners are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Check leakage from suction and discharge port. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		4.	Check Accumulators holding/mounting, if provided *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		5.	Condensing area covers are properly tightened & not touching top of compressor body. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		6.	Electrical terminal box is properly tightened & cables are terminated with lugs. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
31.4	**Condenser fans motor/ blades and Blower motor/ impeller**									
		1.	Verify all mounting fasteners are properly tightened. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Verify Electrical terminal box of motors is properly tightened & cables are terminated with lugs. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Verify that all motors have two earth leads. *to be done alternate quarter (every six month)			✓*		✓		
		4.	Replace all earthing shunts						✓	✓
		5.	Check condition of blade for its fixing/cracking/damage or touching with its cover. Rectify/replace, if needed. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		6.	Ensure proper clamping of cable conduits. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		7.	Ensure that impellers are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		8.	Electrical terminal box is properly tightened & cables are terminated with lugs.*to be done alternate quarter (every six month)			✓*		✓	✓	✓
		9.								

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			Overhauling of Blower and condenser fan motors shall include the following during POH. • The incoming motors shall be checked for abnormal noise and vibration. • Replace Bearings of blower motors and condenser fan motors. • The IR value of Motor stator shall be measured between motor terminal and frame before and after overhauling. The value of IR shall not be less than 10 M ohm, when measured with 1000-volt megger. • Winding resistance of motors shall be measured between RY, YB & BR phases. The winding resistance shall be ±10% of resistance declared by OEM in cold condition.						✓	✓
			• Check closely terminal block and connecting lead for any physical damage or any flash mark over it. Replace the same, if not satisfactory. • Perform HV (Di-electric test) on stator by applying 1.5 kV ac supply for one minute. During test the leakage current shall not be more than 1.0 mA. • Run motor on no load for 15 minutes and check for following: ➢ Bearing noise – Normal noise ➢ Bearing temperature rise above ambient - 10℃ ➢ SPM reading - 20 dBN max. (Green zone)						✓	✓
		10.	Measure starting current of motors on no load. It shall not be more than 10 times of normal running current. Similarly, the running current of motors shall be measured and it shall not be more than 1.1 A.						✓	✓
31.5	**HP/LP/OHP cut-out switch**									
		1.	Check that the mounting fasteners are properly tightened. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure proper clamping/support of capillary tube connected to HP/LP/OHP cut-out switch *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Ensure that flare nuts are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		4.	Ensure that control wires to HP/LP/OHP cut-out switches are properly clamped. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		5.	Remove the accumulated dust over feeler tube of OHP switch. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		6.	Ensure proper clamping of feeler tube of OHP switch.					✓	✓	✓
		7.	Check LP/ HP and OHP cut-out switches					✓	✓	✓
31.6	**Heaters**									
		1.	Ensure proper mounting of heater *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure proper clamping of electrical wires to heater. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Check dust accumulation on heating element. Remove gently, if required *to be done alternate quarter (every six month)			✓*		✓	✓	✓
31.7	**NTC Sensors**									
		1.	Ensure that the sensors provided at return air path and supply air are firmly mounted. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure sensor wires are properly clamped *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Remove the dust accumulated over sensor gently *to be done alternate quarter (every six month)			✓*		✓	✓	✓
31.8	**Expansion Valve/capillary tubes**									
		1.	Ensure that the equalizing line is connected in the suction line immediately after the bulb. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure that the bulb is not connected at the bottom of the pipe line. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
31.9	**Evaporator coil**									
		1.	Ensure that there is no damage to fins.					✓	✓	✓
		2.	Ensure that capillaries of distributors to evaporator coil are not having any sharp bend or kinks. They should also be clamped					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			properly.							
		3.	Ensure that air passes only through evaporator coils and no air is by passed directly to blower chamber.					✓	✓	✓
		4.	Clean the coil, if found dirty.					✓	✓	✓
		5.	Check that the mounting fasteners are properly tightened.					✓	✓	✓
31.10	**Filter Driers & Sight Glass**									
		1.	Ensure that drier is installed with flow in the direction of the arrow marked on the filter drier label. ***to be done alternate quarter (every six month)**			✓*		✓	✓	✓
			NOTE: 1) Never use 'antifreeze liquids' like methyl alcohol together with a filter drier. Such liquid can damage the filter. 2) Never re-use a filter drier. 3) To avoid chances of moisture ingress in the system. Filter drier & compressor should be installed immediately after evacuation and charging the system.							
31.11	**Access Doors**									
		1.	Insulate service doors, lower portion and side wall from inside of the evaporator compartment.					✓	✓	✓
31.12	**Drip tray**									
		1.	Ensure that there is no leakage of condensate water from drip tray to electrical box & blower housing area. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
31.13	**Condenser area**									
		1.	Ensure that there is no damage to fins. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Check that the mounting fasteners are properly tightened					✓	✓	✓
		3.	Provide fire retardant thermal insulation over suction line.					✓	✓	✓
		4.	Ensure that there is no damage/crack in structure frame of RMPU.					✓	✓	✓
		5.	Ensure proper clamping of electrical conduit.					✓	✓	✓
31.14	**Microprocessor Controller**									

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		1.	Check control logic of microprocessor controller on simulating kit.					✓	✓	✓
31.15	VFD Drive for Compressor & Emergency Blower									
		1.	Check the intactness of Power and control connectors					✓	✓	✓
		2.	Cooling equipment of VFDs					✓	✓	✓
		3.	Functional tests of VFDs					✓	✓	✓
32. CAB AC (RMPU) – Amit – Driver's Cab *As per OEM six monthly schedule is given, same incorporated as alternate quarter.										
32.1	**General**	1.	Check the log sheet maintained in driver's cab, attend the defects recorded by escorting staff during run.	✓	✓	✓	✓	✓	✓	✓
		2.	Check function of cab air conditioner.	✓	✓	✓	✓	✓	✓	✓
		3.	Clean all dust by vacuum cleaner or by compressed air from the switch board cabinet and tighten the cable terminals, if found loose.	✓	✓	✓	✓	✓	✓	✓
		4.	Replace/ reconnect defective/ bypassed components.	✓	✓	✓	✓	✓	✓	✓
		5.	Verify that return air filters are not worn/ damaged.	✓	✓	✓	✓			
		6.	Remove fresh and return air filters by opening the access doors of the unit. Clean these filters with compressed air after taking out the filters and place them gently in their places or replace with pre-cleaned/ new filter/ filter media and close the doors properly. *Note: After this activity, the service doors shall be latched properly in case of return air and fresh air filter. Similarly, the fresh air grill shall be positioned and locked properly.*	✓	✓	✓	✓			
		7.	Check working of rotary switches by rotating forward and backward, provided on switch panel for temperature selection and Air. Co. ON. Replace if required	✓	✓	✓	✓	✓	✓	✓
		8.	Check working of set point generator rotary switch provided for temperature setting.	✓	✓	✓	✓	✓	✓	✓
		9.	Check the tripping of Heaters i.e., OHP. The OHP setting is 65℃. The testing of OHP setting shall be done by switching off the blower. During testing, the probe of digital thermometer shall be placed near the sensor of OHP & the display shall be kept outside. NOTE: In addition, it shall also be checked as a pre-winter precaution before the onset of winter season.			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			*to be done alternate quarter (every six month)							
		10.	Run the HVAC for half an hour and then check the current drawn by various equipment's with the help of clamp tester (tongue tester) duly calibrated. Normal currents for various equipment's and mode of operation are as under: • CAB AC in Cooling mode – 8.5 Amp. Max. • Compressor 7Amp. Max. • Condenser Fan motor – 1.1Amp. max. • Blower Motor – 1.1Amp. max. • Cab AC in heating mode – 1.4 Amp. max. NOTE: The current also depends on the ambient temperature *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		11.	If less cooling is noticed, check the leakage of refrigerant from the system by using soap solution or leak detector. If leak is detected, it should be attended and recharging of refrigerant in the system shall be made as per RDSO SMI No. ELPS/AC/SMI/14. Filter drier must be replaced during this activity.	✓	✓	✓	✓	✓	✓	✓
		12.	Ensure that latches to lock the service doors are not defective/ damaged.	✓	✓	✓	✓	✓	✓	✓
		13.	Check visually condenser fan blade and ensure that there is no crack on the blade or hub.		✓	✓	✓	✓	✓	✓
		14.	Ensure that no capillary tubes are in hanging position.		✓	✓	✓	✓	✓	✓
		15.	Check capillary tubes provided for HP/LP cutout for proper support/clamping. Their nuts should be properly tightened.		✓	✓	✓	✓	✓	✓
		16.	Ensure that covers of HP/LP/OHP cutouts switches are properly screwed.	✓	✓	✓	✓	✓	✓	✓
		17.	Ensure cover (canopy) on top HP/LP switch (provided with capillary tubes) to prevent water entry.		✓	✓	✓	✓	✓	✓
		18.	Ensure that the expansion bulb is mounted in the suction line just after evaporator coil and in a position corresponding to between 1 O'clock and 4 O'clock. Ensure that it is properly insulated		✓	✓	✓	✓	✓	✓
		19.	Ensure that bulb/equalizing line/capillary tubes are not chocked.		✓	✓	✓	✓	✓	✓
		20.	Ensure free flow of condensate water.		✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		21.	Clean the condenser coil from inside with compressed air/water jet after opening the cover of condenser area.		✓	✓	✓	✓	✓	✓
		22.	Check for proper tightening of cover provided over evaporator compartment. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		23.	Check the earthing shunts in HVAC are provided. Earthing shunts should be earthed with coach body. *to be done alternate quarter (every six month)			✓*		✓		
		24.	Check and tighten mountings of blower, compressor and blower motors and ensure that they are in good condition *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		25.	Replace fresh and return air filters.					✓	✓	✓
		26.	Ensure that there is a provision to avoid wrong fitment in the return air filter					✓	✓	✓
		27.	Check insulation resistance of all the motors & compressors by the duly calibrated 1000 V megger, Attend the motors, if insulation resistance of motor is found less than 2 M ohm. IMPORTANT: Disconnect control devices during this activity.					✓	✓	✓
		28.	Check for physically damaged/jointed cables. Replace if needed.					✓	✓	✓
		29.	Cleaning of Harting connectors					✓	✓	✓
		30.	Check for the physically damaged conduits. Replace them, if needed.					✓		
		31.	Replace conduits.						✓	✓
		32.	Replace Anti Vibration mountings						✓	✓
32.2	**Refrigerant pipe line/capillary**									
		1.	Leakage from the flare nut of HP/LP conduits with soap solution *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Check for proper clamping/support					✓	✓	✓
		3.	Rubbing of capillary with SS sheet/channel or other parts of Train set					✓	✓	✓
		4.	Leakage from Feeler tube of OHP					✓	✓	✓
32.3	**Compressors**									
		1.	Check holding clamps from top are properly tightened. *to be done alternate quarter (every six month)			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		2.	Check compressor mounting fasteners are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Check leakage from suction and discharge port. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		4.	Check Accumulators holding/mounting, if provided *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		5.	Condensing area covers are properly tightened & not touching top of compressor body. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		6.	Electrical terminal box is properly tightened & cables are terminated with lugs. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
32.4	**Condenser fans motor/ blades and Blower motor/ impeller**									
		1.	Verify all mounting fasteners are properly tightened. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Verify Electrical terminal box of motors is properly tightened & cables are terminated with lugs. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Verify that all motors have two earth leads. *to be done alternate quarter (every six month)			✓*		✓		
		4.	Replace all earthing shunts						✓	✓
		5.	Check condition of blade for its fixing/cracking/damage or touching with its cover. Rectify/replace, if needed. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		6.	Ensure proper clamping of cable conduits. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		7.	Ensure that impellers are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		8.	Electrical terminal box is properly tightened & cables are terminated with lugs.*to be done alternate quarter (every six month)			✓*		✓	✓	✓
		9.	Overhauling of Blower and condenser fan motors shall include the following during POH. • The incoming motors shall be checked for abnormal noise and vibration.			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			• Replace Bearings of blower motors and condenser fan motors.							
			• The IR value of Motor stator shall be measured between motor terminal and frame before and after overhauling. The value of IR shall not be less than 10 M ohm, when measured with 1000-volt megger. • Winding resistance of motors shall be measured between RY, YB & BR phases. The winding resistance shall be ±10% of resistance declared by OEM in cold condition. • Check closely terminal block and connecting lead for any physical damage or any flash mark over it. Replace the same, if not satisfactory.			✓*		✓	✓	✓
			• Perform HV (Di-electric test) on stator by applying 1.5 kV ac supply for one minute. During test the leakage current shall not be more than 1.0 mA. • Run motor on no load for 15 minutes and check for following: ➢ Bearing noise – Normal noise ➢ Bearing temperature rise above ambient - 10℃ ➢ SPM reading - 20 dBN max. (Green zone)						✓	✓
		10.	Measure starting current of motors on no load. It shall not be more than 10 times of normal running current. Similarly, the running current of motors shall be measured and it shall not be more than 1.1 A.						✓	✓
32.5	HP/LP/OHP cut-out switch									
		1.	Check that the mounting fasteners are properly tightened. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure proper clamping/support of capillary tube connected to HP/LP/OHP cut-out switch *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Ensure that flare nuts are properly tightened *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		4.	Ensure that control wires to HP/LP/OHP cutout switches are properly clamped. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		5.	Remove the accumulated dust over feeler tube of OHP switch.			✓*		✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			*to be done alternate quarter (every six month)							
		6.	Ensure proper clamping of feeler tube of OHP switch.					✓	✓	✓
		7.	Check HP/ LP and OHP switches					✓	✓	✓
32.6	Heater									
		1.	Ensure proper mounting of heater *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure proper clamping of electrical wires to heater. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Check dust accumulation on heating element. Remove gently, if required *to be done alternate quarter (every six month)			✓*		✓	✓	✓
32.7	NTC Sensors									
		1.	Ensure that the sensors provided at return air path and supply air are firmly mounted. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure sensor wires are properly clamped *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		3.	Remove the dust accumulated over sensor gently *to be done alternate quarter (every six month)			✓*		✓	✓	✓
32.8	Expansion Valve/capillary tubes									
		1.	Ensure that the equalizing line is connected in the suction line immediately after the bulb. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Ensure that the bulb is not connected at the bottom of the pipe line. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
32.9	Evaporator coil									
		1.	Ensure that there is no damage to fins.					✓	✓	✓
		2.	Ensure that capillaries of distributors to evaporator coil are not having any sharp bend or kinks. They should also be clamped properly.					✓	✓	✓
		3.	Ensure that air passes only through evaporator coils and no air is bypassed directly to blower chamber.					✓	✓	✓
		4.	Clean the coil, if found dirty.					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		5.	Check that the mounting fasteners are properly tightened.					✓	✓	✓
32.10	Filter Driers & Sight Glass									
		1.	Ensure that drier is installed with flow in the direction of the arrow marked on the filter drier label. *to be done alternate quarter (every six month) NOTE: 1) Never use 'antifreeze liquids' like methyl alcohol together with a filter drier. Such liquid can damage the filter. 2) Never re-use a filter drier. 3) To avoid chances of moisture ingress in the system. Filter drier & compressor should be installed immediately after evacuation and charging the system.			✓*		✓	✓	✓
32.11	Access Doors									
		1.	Insulate service doors, lower portion and side wall from inside of the evaporator compartment.					✓	✓	✓
32.12	Drip tray									
		1.	Ensure that there is no leakage of condensate water from drip tray to electrical box & blower housing area. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
32.13	Condenser area									
		1.	Ensure that there is no damage to fins. *to be done alternate quarter (every six month)			✓*		✓	✓	✓
		2.	Check that the mounting fasteners are properly tightened					✓	✓	✓
		3.	Provide fire retardant thermal insulation over suction line.					✓	✓	✓
		4.	Ensure that there is no damage/crack in structure frame of RMPU.					✓	✓	✓
		5.	Ensure proper clamping of electrical conduit.					✓	✓	✓
32.14	**Microprocessor Controller**									
		1.	Check control logic of microprocessor controller on simulating kit.					✓	✓	✓
33.	**Earth Return JB and Return CT JB – TC**									
		1.	Check that the CT Box is bolted tight to the vehicle.	✓	✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		2.	Check the CT Box for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Clean information and warning labels on doors.	✓	✓	✓	✓	✓	✓	✓
		4.	Visual inspection of all manufacturing hardware for the doors for any slackness by seeing changes in the torque markings.	✓	✓	✓	✓	✓	✓	✓
		5.	Check electrical connections and ground connections for corrosion to resolve. Ensure that connections are tight.	✓	✓	✓	✓	✓	✓	✓
		6.	Check components and cables for damage. If found address them.	✓	✓	✓	✓	✓	✓	✓
		7.	Do visual inspection for evidence of excessive temperature and arcing (Voltage flash overs) and resolve it.	✓	✓	✓	✓	✓	✓	✓
		8.	Clean thoroughly the external surface of the current transformer and its accessories.		✓	✓	✓	✓	✓	✓
		9.	Check the external aspect of the current transformer for any damage.		✓	✓	✓	✓	✓	✓
		10.	Check the tightness of the screws or the tie rods of the fixing structure			✓	✓	✓	✓	✓
		11.	Check tightness of the screw of the fixing screws of the two parts.			✓	✓	✓	✓	✓
		12.	Check the tightness of terminals and connections.			✓	✓	✓	✓	✓
		13.	Open and clean all CT box doors. Remount properly with all bolts.			✓	✓	✓	✓	✓
		14.	Check that the door sealing gaskets are free from cut marks and physical damages.			✓	✓	✓		
		15.	Visual inspection of all the mounting and electrical connection hardware for the mechanical and electrical for any slackness by seeing changes in torque markings.			✓	✓	✓	✓	✓
		16.	Replace all cover gaskets.						✓	✓
33A.	**Split Core Ring Current Transformers (Roof CT) – STE – TC**									
		1.	Check the external aspects of Current Transformer for any damage.				✓	✓	✓	✓
		2.	Check tightness of the screws or the tie rods of the fixing structure				✓	✓	✓	✓
		3.	Check tightness of the screw of the fixing screws of the two parts.				✓	✓	✓	✓
		4.	Check the tightness of the terminals and connections.				✓	✓	✓	✓
		5.	Clean the external surface of Current Transformer.				✓	✓	✓	✓
33B.	**Ring Current Transformers (Outdoor CT/ Onboard CT)– STE – TC**									
		1.	Check the external aspects of Current Transformer for any damage.				✓	✓	✓	✓
		2.	Check the tightness of the terminals and connections.				✓	✓	✓	✓
		3.	Clean the external surface of Current Transformer.				✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
34.	**Potential Transformer (Outdoor PT) - STE-TC**									
		1.	Check the external aspects of voltage transformer for any damage.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the earth cable for damage and loose connection.	✓	✓	✓	✓	✓	✓	✓
		3.	Check the tightness of the terminals and connections.				✓	✓	✓	✓
		4.	Clean the external surface of PT.				✓	✓	✓	✓
35.	**ERCU -Ground Contact – Schunk- All Coaches**									
		1	Check visually ground contact for any external damage. In case of damages found, replace the ground contact parts.	✓	✓	✓	✓	✓		
		2	Check earth cable for proper connection, lug for any looseness and condition of the insulating tape on lug	✓	✓	✓	✓	✓		
		3.	Carry out a visual inspection of the ground contact. Basically damaged parts of the carbon brush have to be replaced with new ones.				✓	✓		
		4.	Remove the cover and the sealing from the brush holder, spring support and the carbon brushes out of the shafts of the brush holder.				✓	✓		
		5.	Remove the abrasion of the brushes the brushes. Clean the brush guide slots and restore the ease of movement of the brushes.				✓	✓		
		6.	Clean the electrical contact surfaces. Electrical contact surfaces must be metallically bright. Clean contaminations from the insulating parts to avoid electrical creepage. Thoroughly clean the sealing surfaces before assembly. Smooth out damaged sealing surfaces. If necessary, replace components with a damaged sealing surface.				✓	✓		
		7.	Measure the height of the carbon brushes with a slide gauge. A new brush has a height of approx. 52 mm and a wear height of approx. 32 mm. A worn brush has a remaining height of approx. 20 mm. Optically, a worn-out brush can be recognized when the wear line is reached. The brush must be checked in accordance with the following criteria: • Brush wear, • Oblique or spherical brush contact surface, • Scoring on the brush contact surface, • Chipping on corners and edges, • Traces of grease or oil on the brush contact surface, • Discoloration on the brush or cable lugs. If the brush is worn or damaged, replace the brush.				✓	✓		

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Equipment/ Sub-Assy.</th><th rowspan="2"></th><th rowspan="2">Activities</th><th colspan="7">Maintenance Periodicity</th></tr>
<tr><th>T</th><th>M</th><th>Q</th><th>9 M</th><th>SS1</th><th>SS2</th><th>SS3</th></tr>
<tr><td></td><td></td><td></td><td>If the brush or contact disc wear exceeds the stated wear of 2 - 3 mm /100,000 km then check and rectify.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>8.</td><td>All disassembled lock washers, lock rings, gasket and sealing must be replaced during each maintenance.</td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td></td><td></td><td>9.</td><td>Thoroughly inspect the complete ERCU components, cleaning and replacement of the brushes and other worn out components with new ones as per procedure mentioned in OEM’s manual.</td><td></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>36.</td><td colspan="3">Mini Pantry Items-All Coaches</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>1.</td><td>Check all the items and complete unit visually for any damage or any wire cut.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>2.</td><td>Clean all the pantry equipment thoroughly as per OEM’s instructions.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>3.</td><td>Check the working of indication lamps.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>4.</td><td>Check earthling of each equipment.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>5.</td><td>Replenish the item if found deficient.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>6.</td><td>Check and test working of all mini-pantry equipment.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>7.</td><td>Check the insulation resistance of live terminals to body. It should be more than as specified in below table:
<table>
<tr><th>Sr. No.</th><th>Circuit Voltage</th><th>Capacity of Megger used</th><th>Min. value of IR required</th></tr>
<tr><td>1.</td><td>750V</td><td>1000V</td><td>05 M ohms</td></tr>
<tr><td>2.</td><td>415V</td><td>500V</td><td>03 M ohms</td></tr>
<tr><td>3.</td><td>230V</td><td>500V</td><td>02 M ohms</td></tr>
<tr><td>4.</td><td>190V</td><td>500V</td><td>02 M ohms</td></tr>
<tr><td>5.</td><td>110V</td><td>500V</td><td>02 M ohms</td></tr>
</table></td><td></td><td></td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>36.1</td><td colspan="3">Hot Case</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>1.</td><td>Do cavity cleaning of Hot case and check the complete unit visually for any damage or wire cut.</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td>2.</td><td>Inspect door gasket for any damage, proper fitment.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td>3.</td><td>Inspect door window gasket of Hot case for any damage, proper fitment.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td>4.</td><td>Clean out cooling fan intake and exhaust vents of Hot Case.</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
<tr><td></td><td></td><td>5.</td><td>Inspect cavity door vent slides for proper operation</td><td></td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td></td></tr>
</table>

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		6.	Open control area and inspect/tighten all wiring.				✓	✓		
		7.	Inspect all electrical components.				✓	✓		
		8.	Test elements for electrical short to ground. Replace/repair as needed.				✓	✓		
		9.	Visually inspect the cavity for structural integrity.				✓	✓		
		10.	Inspect door gasket. Replace if needed.				✓	✓		
		11.	Visually inspect any door handles and hinges. Replace/repair as needed.				✓	✓		
		12.	Remove any loose handle and hinge screws. Loctite and then properly secure the screws.				✓	✓		
		13.	Inspect and test control and control functions.				✓	✓		
		14.	Inspect temperature or thermostat control knobs. Replace if needed.				✓	✓		
		15.	Inspect power cord. Tighten cord connection inside the appliance control area.				✓	✓		
		16.	Test/Replace independent indicator lights (where applicable).				✓	✓		
		17.	Inspect Heating element.				✓	✓		
		18.	Confirm proper current draw of heating elements.				✓	✓		
		19.	Overhauling, replacement of gaskets and testing of the Hot Case.						✓	
		20.	Replace the Hot Case unit.							✓
36.2	**Refrigerating Unit**									
		1.	Do cavity cleaning of refrigerating unit and check the complete unit visually for any damage, wire cut or abnormal sound in the unit.	✓	✓	✓	✓	✓		
		2.	Inspect door gasket for any damage and proper fitment.		✓	✓	✓	✓		
		3.	Inspect Electrical Component& Wiring.		✓	✓	✓	✓		
		4.	Clean drainage Pipe.		✓	✓	✓	✓		
		5.	Open control area and inspect/tighten all wiring.				✓	✓		
		6.	Inspect all electrical components.				✓	✓		
		7.	Test elements for electrical short to ground. Replace/repair as needed.				✓	✓		
		8.	Visually inspect the cavity for structural integrity.				✓	✓		
		9.	Inspect door gasket. Replace if needed.				✓	✓		
		10.	Visually inspect any door handles and hinges. Replace/repair as needed.				✓	✓		
		11.	Remove any loose handle and hinge screws. Loctite and then properly secure the screws.				✓	✓		

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
		12.	Inspect temperature or thermostat control knobs. Replace if needed.				✓	✓		
		13.	Inspect power cord. Tighten cord connection inside the appliance control area.				✓	✓		
		14.	Test/Replace independent indicator lights (where applicable).				✓	✓		
		15.	Overhauling, replacement of gaskets and testing of the Refrigerating unit.						✓	
		16.	Replace the Refrigerating Unit.							✓
36.3	**Water Boiler**									
		1.	Do cleaning of water boiler and check the complete unit visually for any damage or wire cut.	✓	✓	✓	✓	✓		
		2.	Clean the water tank and tap as per OEM guidelines.		✓	✓	✓	✓		
		3.	Inspect and test control and control functions.		✓	✓	✓	✓		
		4.	Confirm proper current draw of heating elements.		✓	✓	✓	✓		
		5.	Inspect Wiring connection, tight if any loose connection.		✓	✓	✓	✓		
		6.	Open control area and inspect/tighten all wiring.				✓	✓		
		7.	Inspect all electrical components, replace / repair if required.				✓	✓		
		8.	Inspect Wiring connection, tight if any loose connection.				✓	✓		
		9.	Inspect Heating element.				✓	✓		
		10.	Inspect and test control and control functions.				✓	✓		
		11.	Confirm proper current draw of heating elements.				✓	✓		
		12.	Perform De-scaling of the equipment without affecting or damaging the heating elements, thermostat probe…etc.				✓	✓		
		13.	Overhauling, replacement of gaskets and testing of the Water boiler. Replace if required on condition basis.						✓	
		14.	Replace Water boiler.							✓
37.	**Power supply socket junction box for external 415 V AC-All Coaches**									
		1.	Check that the Power Supply Socket Junction Box is bolted tightly to the vehicle.	✓	✓	✓	✓	✓	✓	✓
		2.	Check the Power Supply Socket Junction Box for any damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Open and clean all Power Supply Socket Junction Box doors. Remount properly with all doors.		✓	✓	✓	✓	✓	✓
		4.	Clean information and warning labels on doors.		✓	✓	✓	✓	✓	✓
		5.	Visual inspection of all the manufacturing hardware of the doors for any		✓	✓	✓	✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			slackness by seeing changes in torque marking.							
		6.	Ensure that the door sealing gaskets are free from cut marks and physical damages.		✓	✓	✓	✓		
		7.	Visual inspection of all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings.		✓	✓	✓	✓	✓	✓
		8.	Check electrical connections and ground connections for corrosion to resolve. Ensure the connections are tight.		✓	✓	✓	✓	✓	✓
		9.	Check components and cables for damage. If found address them.		✓	✓	✓	✓	✓	✓
		10.	Do visual inspection for evidence of excessive temperature and arcing (Voltage flash overs) and resolve it.		✓	✓	✓	✓	✓	✓
		11.	Replacement of sealing gaskets						✓	✓
38.	**Speedometer - DTC**									
		1.	Visually inspect for any abnormality.	✓	✓	✓	✓	✓		
		2.	Check the intactness of all connector.	✓	✓	✓	✓	✓		
		3.	Check for any loose contact block or burn mark at cable connections.	✓	✓	✓	✓	✓		
		4.	Ensure that the indicating light for speedometer is in operation.	✓	✓	✓	✓	✓		
		5.	Clean & check the function of speedometer.	✓	✓	✓	✓	✓		
		6.	Ensure the closing of all plate and door lock	✓	✓	✓	✓	✓		
		7.	Check mechanical speedometer flexible drive and lubricate if necessary.			✓	✓	✓		
		8.	Overhaul speedometer, gear unit and flexible drive.				✓	✓	✓	✓
		9.	Calibration and testing of speedometer/speed recorder and techo-generator to be done.				✓	✓	✓	✓
39.	**Water supply system – All Coaches**									
		1.	Check functioning of water pumping arrangement in test mode/pump controller.	✓	✓	✓	✓	✓		
		2.	Visual check the mounting arrangement for proper fitment.	✓	✓	✓	✓	✓		
		3.	Check the mono-block pump set for any damage.	✓	✓	✓	✓	✓		
		4.	Check the insulation resistance motor windings.					✓	✓	✓
		5.	Check functionality of inverters and controllers of the mono-block pump and components should be replaced based on condition.						✓	✓
		6.	Replace the Mono-block pump. (As per feedback, recommended as must change in SS-2 and same is also						✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			being followed in LHB coaches)							
40.	**Lavatory equipment – All Coaches**									
		1.	Check and ensure working of lavatory exhaust fans and saving razor socket.	✓	✓	✓	✓	✓	✓	✓
		2.	Ensure cleaning and availability of sealing of covers/grills.		✓	✓	✓	✓	✓	✓
		3.	Cleaning the impellers of the exhaust items					✓	✓	✓
		4.	Remove saving razor socket, if available.					✓	✓	✓
		4.	Check condition of attachment points of all under-slung equipment with car body.	✓	✓	✓	✓	✓	✓	✓
		5.	Check for tightness of all mounting hardware, terminal hardware of each equipment.		✓	✓	✓	✓	✓	✓
		6.	IR values of power and control cables shall be checked.					✓	✓	✓
41.	**Automatic Power Control (APC)**									
		1.	Clean the outside surface of the APC Receiver mechanical enclosure. A water jet (of less than 70 bars at a distance of at least 1 meter), or brush and mild detergent can be used to clean the unit from the outside. Pressurized air or vacuum system can also be utilized if necessary. Note: Never use chemical solvents for cleaning and never open the enclosure.			✓	✓	✓	✓	✓
		2.	Inspect visually for proper mounting, fasteners and for any mechanical damages to the following parts: • APC Receiver • APC Receiver conduit • Cable connectors • Cable clamp If the visual inspection identifies any damage, which is considered to have an adverse effect on the APC System functionality and Safety, then the unit shall be replaced. The APC Receiver shall not be disassembled; a damaged unit (including the cable harness) should be replaced completely.			✓	✓	✓	✓	✓
42.	**Cabling and Wiring**									
		1.	Visual inspection of the cables and wires layout mounting arrangement for any missing hardware and external damages.		✓	✓	✓	✓	✓	
		2.	Inspection of the cabling and wiring for any damage to insulation, any crack					✓	✓	✓

S.No.	Equipment/ Sub-Assy.		Activities	Maintenance Periodicity						
				T	M	Q	9 M	SS1	SS2	SS3
			or any other type of abnormality.							
43.	**Other Miscellaneous items like switches, charging sockets, toilet indicators, limit switches etc.**									
		1.	Clean all switches, charging sockets etc.	✓	✓	✓	✓	✓	✓	✓
		2.	Check for any crack or mechanical damage.	✓	✓	✓	✓	✓	✓	✓
		3.	Check mounting position and intactness.	✓	✓	✓	✓	✓	✓	✓
		4.	Check the working of switches, charging sockets, toilet indicators, limit switches etc. and replace the defective part.	✓	✓	✓	✓	✓	✓	✓

ANNEXURE- G

FUNCTIONAL TEST UNDER TRIP SCHEDULE

TASK 1: FUNCTIONAL TEST I (WITH ONLY DC POWER)

Work Preparation

1. Turn on the Switch for DC power.
2. Examine that all the switches are in normal position in the cab.

S.No.	System/ Equipment	Functional Test	Remark
1.	**Pantograph**	Check the lifting and lowering times of the pantograph • Lifting time-should be within ≤10 Sec • Lowering time-should be within ≤10 Sec.	

TASK 2: FUNCTIONAL TEST II (WITH AC & DC POWER)

Work Preparation

1. Safety Inspection and energizing the overhead supply line.
2. Make sure that all switches are in normal position.
3. Raise the Pantograph and Close the VCB.

S.No.	System/ Equipment	Functional Test	Remark
1.	**Driver Display Unit**	• Ensure the intactness of USB port, Ether Net Connector & power supply connector. • Check the healthiness of touch function and its response time. • **Train Overview:** Ensure the healthy and working status of all equipment. • **Unit Level:** Ensure the healthy and working status of all Equipment. • **Events Screen:** Check for any active failure on events screen.	

S.No.	System/ Equipment	Functional Test	Remark
		• Ensure healthy status of equipment /functions on train level and unit level of various screens of Main System. • Check the healthiness of all Door Proving Loop on DDU. • Check the healthiness of all EBL on DDU. • Check The Network screen for communication healthiness of all the nodes. • Check The Communication screen for communication healthiness of TCMS various interfaces. • Check the version number screen for various modules s/w details. • Ensure healthy status of all Auxiliary Convertor on DDU. • Ensure healthy status of Cab occupation on DDU in Regular & High Priority mode. • Check the Door screen for status of each door. • Check the RMPU screen for status of each RMPU.	
2.	**Cab light**	• Check Cab driver/guard light by operating respective Switch	
3.	**Cab Spot light**	• Check Cab driver/guard Spot light by operating respective Switch	
4.	**Cab Emergency Light**	• Check Cab Emergency light by operating Cab Emergency Light Switch	
5.	**Cab Fans**	• Check Cab Fans by operating Cab Fan Switch	
6.	**Head light** **Marker light** **Flasher light**	• Check head light by operating Head Light Switch. • Check marker lights by operating marker light switch. • Check Flasher lights by operating Flasher Light Switch.	
7.	**CCTV**	• Check and ensure all cameras live views are showing in CCTV display unit.	
8.	**Cab AC**	• Turn on the Cab AC system and check the cooling states. • Correct working of 'Fan speed selector switch' in all positions.	

S.No.	System/ Equipment	Functional Test	Remark
9.	**Wiper**	• Check the wiper function in low/ high & wash mode from wiper switch	
10.	**Saloon Light**	• Check all saloon lights (50%, 100%) Emergency lights, Gangway lights are glowing by giving command from driving cab.	
11.	**Lights**	• Check the Lights functionality by operating DLL Control Switch& IDLL Control Switch in Auto, OFF & ON modes and observe the symbols on DDU.	
12.	**RMPU**	• Turn on the RMPU system and check the cooling states. • Check the RMPU unit from inside & outside of the train. • Examine that refrigerant is full with green color. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. • Check for proper function of inverter by running the RMPU in emergency mode through TCMS and air duct in the saloon. • Check for proper function RMPU through TCMS.	
13.	**Passenger Saloon Door**	• Open/ close the Passenger Saloon doors in standby mode by pressing two push buttons from both Cabs. • Check the results while opening and closing door, check that doors open and close without obstruction on TCMS Display. • After opening of door, check all outside and inside lamp should glow. • After closing of door check the DPL Left, DPL Right in both cab and LDSLR, LDSRR of all coach status on TCMS. It should be energizes. • After closing all doors, check ADCR status on TCMS, it should be in energize.	
14.	**PA & PIS**	**Ensure all the units working condition by Switching ON Power supply:** • MMI should boot up and display the default screen as “Cab Not Active” up-to Cab Occupied Key enable. • ICDs, HCDs& SDBDs should display default message “Indian Railways”. • Coach Control should “announce Jingle” through Speakers at Power ON.	

S.No.	System/ Equipment	Functional Test	Remark
		• Indication LED of all the PECU units should blink continuously. After Completion of all above units power ON to be verified all units health status for Selecting the “PIS Health” from TCMS DDU screen.	
		Ensure all the units working condition by Train Route Selection: • Select the Train Route from MMI unit. • Check End to End when route is selected, MMI unit on other side shall become Slave. • Check the HCD display for displaying the Destination of the selected route in both DTC's HCD Displays • Check the SDBD display for displaying the Source & Destination with Via station name of the selected route in All coaches SDBD Displays. • Check the selected train route is displayed properly in ICDs of each coach. • Check the selected train route is announced properly in Coach Control through speakers of each coach.	
15.	**Log book**	• Check the Crew remarks.	
16.	**Data download**	• Download Data Through MAE675U Application Software.	
17.	**Reading Note Down**	• Note Down the Energy Consumption. • Note Down the Regeneration Energy. • Note Down the Kilometer Reading.	

ANNEXURE- H

FUNCTIONAL TEST UNDER MONTHLY SCHEDULE

TASK 1: FUNCTIONAL TEST I (WITH ONLY DC POWER)

Work Preparation

1. Turn ON the Switch for DC power.
2. Examine that all the switches are in normal position in the cab.

S.No.	System/ Equipment	Functional Test	Remark
1.	**DC/ LT Test**	• Check the TCMS DDU for any abnormality indications. • Check the TCMS Network Screen for any abnormalities. • Check the High Voltage Screen for any abnormalities. • Check the ACU Screen for any abnormalities or any Earth Faults. • Cab Occupation in Key ON Mode-Cab Selector Switch in Normal Mode. • Cab Occupation in RDM Mode-Cab Selector Switch in Normal Mode. • Cab Occupation in Key ON Mode-Cab Selector Switch in High Priority Mode. • Cab Occupation in RDM Mode-Cab Selector Switch in High Priority Mode. • Check the Signal Bell Functionality from both driver and guard panels. • Check the Emergency Bell Functionality by pressing SB2 button from both driver and guard panel. • Check Emergency bell by pressing emergency stop button in passenger saloon area and observe the indication on TCMS DDU and also on SB2 Switch. • Check the Train BN Battery voltage.	
2.	**Pantograph**	• Check the lifting and lowering times of the pantograph - Lifting time-should be within ≤10 Sec - Lowering time-should be within ≤10 Sec	

TASK 2: FUNCTIONAL TEST II (WITH AC & DC POWER)

Work Preparation

1. Safety Inspection and Energizing the overhead supply line.
2. Make sure that all switches are in normal position.
3. Raise the Pantograph and Close the VCB.

S.No.	System/ Equipment	Functional Test	Remark
1.	**Cab light**	• Check Cab driver/guard light by operating respective Switch.	
2.	**Cab Spot light**	• Check Cab driver/guard Spot light by operating respective Switch.	
3.	**Cab Emergency Light**	• Check Cab Emergency light by operating Cab Emergency Light Switch.	
4.	**Cab Fans**	• Check Cab Fans by operating Cab Fan Switch.	
5.	**Head light**	• Check head light by operating Head Light Switch.	
6.	**Marker light**	• Check marker lights by operating marker light switch.	
7.	**Flasher light**	• Check Flasher lights by operating Flasher Light Switch.	
8.	**CCTV**	• Check and ensure all cameras live views are showing in CCTV display unit.	
9.	**Cab AC**	• Turn on the Cab AC system and check the cooling states. • Correct working of 'Fan speed selector switch' in all positions.	
10.	**Wiper**	• Check the wiper function in low / high & wash mode from wiper switch	
11.	**Saloon Light**	• Check all saloon lights (50%, 100%) Emergency lights, Gangway lights are glowing by giving command from driving cab. • Check the lights by operating DLL/IDLL control Switch in Auto, ON and OFF modes.	
12.	**RMPU**	• Turn on the RMPU system and check the cooling states. • Check the RMPU unit from inside & outside of the train.	

S.No.	System/ Equipment	Functional Test	Remark
		• Examine that refrigerant is full with green color. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. • Check for proper function of inverter by running the RMPU in emergency mode through TCMS and air duct in the saloon. • Check for proper function RMPU through TCMS.	
13.	**Passenger Saloon Door**	• Open/close the Passenger Saloon doors in standby mode by pressing two push buttons from both Cabs. • Check the results while opening and closing door, Check that doors open and close without obstruction on TCMS Display. • After opening of door check all outside and inside lamp should glow. • After closing of door check the DPL Left, DPL Right in both cab and LDSLR, LDSRR of all coach status on TCMS. It should be energizes. • After closing all the doors and check the status of ADCR relay, it should energize.	
14.	**PA & PIS**	**Ensure all the units working condition by Switching ON Power supply:** • MMI should boot up and display the default screen as “Cab Not Active” up-to Cab Occupied Key enable. • ICDs, HCDs & SDBDs should display default message “Indian Railways”. • Coach Control should “announce Jingle” through Speakers at Power ON. • Indication LED of all the PECU units should blink continuously. After Completion of all above units power ON to be verified all units health status for Selecting the “PIS Health” from TCMS DDU screen. **Ensure all the units working condition by Train Route Selection:** • Select the Train Route from MMI unit. • Check End to End when route is selected, MMI unit on other side shall become Slave • Check the HCD display for displaying the Destination of the selected route in both DTC's HCD Displays	

S.No.	System/ Equipment	Functional Test	Remark
		• Check the SDBD display for displaying the Source & Destination with Via station name of the selected route in All coaches SDBD Displays • Check the selected train route is displayed properly in ICDs of each coach • Check the selected train route is announced properly in Coach Control through speakers of each coach **Ensure HCD units working condition by Manual Route Selection(In case of Emergency condition)** • Select the train route in TCMS DDU • Check the HCD display for displaying the Destination of the selected route **Display Test:** The purpose of this test is to ensure all the display units status. • Select the “Display Test” from 'Diagnostics' option in MMI then all the ICD, SDBD and HCD displays should displays the Test Pattern screen	
		Speaker Test: The purpose of this test is to ensure all the display units status. • Select the “Loud Speaker Test” from 'Diagnostics' option in MMI then all Coach Control units should “announce Jingle” through Speakers in all coaches **Inter-Com (IC) Test:** • Press 'IC' Button on the MMI – Non Active Cab. • MMI should display the “Inter Communication Enabled” message on both sides of MMI display. • IC Indication LEDs shall be blink on both MMI’s & Jingle Sound shall be played from both Cab Loudspeakers • Press IC button on the MMI Keypad of Active cab then both MMI IC Indication LEDs should be ON continuously. • Speak through Microphone then voice should be heard from other cab speaker and Vise-Versa. • After that again Press 'IC' Button on the MMI – Non Active Cab • MMI should display the “IC” Disabled” message on both sides of MMI display.	

S.No.	System/ Equipment	Functional Test	Remark
		• IC indication LED should OFF at both sides of MMI. Repeat the above case from other side MMI. **Passenger Announcement (PA) Test:** • Press 'PA' Button on the MMI – Non Active Cab • MMI should display the “PA Enabled” message on both sides of MMI display. • PA indication LED should ON at both sides of MMI. • Speak through Microphone and Listen the voice from all the speakers in coach area. • After that again Press 'PA' Button on the MMI –Non Active Cab • MMI should display the “PA Disabled” message on both sides of MMI display and PA indication LED should OFF mode. • PA indication LED should OFF mode at both sides of MMI. • Speak through Microphone then observe, No voice shall be heard from any of the speaker. Repeat the above case from other side MMI. **Passenger Emergency Communication Unit (PECU) Test:** • Power On Health check PECU indication LED should blink in Red color continuously.	
		• Then Press the PECU Push Button of any of the PECU from any of the coach.(Example: PECU1 from CC1) • PECU indication LED should stop blinking and glow in Red color constantly. • MMI should get and display the PECU information. • PAS buzzer in driver cab should be ON continuously until PAS acknowledgement button is pressed. • Select “CC1” to enable the PECU communication establishment. MMI should display the PECU request menu to Accept/Reject. • Press “Accept” button to enable the PECU.	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the PECU communication establishment screen. • PECU Indication LED should glow constantly in Green color and Push button LED should continuously ON. • Speak through Cab Microphone Voice should be heard from PECU speaker. • Speak through PECU microphone Voice should be heard from Cab loud speaker. • Press “Call End” button on MMI then changed to normal operation mode automatically and PECU call should be disconnected, in PECU indication LED shall start blinking and Push button LED should be in OFF mode. *Note: During One PECU call other call will be maintained in queue.* **Same procedure can be applicable for other PECU units testing.**	
15.	**Log book**	• Check the Crew remarks	
16.	**Data download**	• Download Data Through MAE675U Application Software	
17.	**Reading Note Down**	• Note Down the Energy Consumption • Note Down the Regeneration Energy • Note Down the Kilometer Reading	

ANNEXURE- I

FUNCTIONAL TEST UNDER QUARTERLY SCHEDULE

TASK 1: FUNCTIONAL TEST I (WITH ONLY DC POWER)

Work Preparation

1. Turn on the Switch for DC power
2. Examine that all the switches are in normal position in the cab.

S.No.	System/ Equipment	Functional Test	Remark
1.	**DC/ LT Test**	• Check the TCMS DDU for any abnormality indications. • Check the TCMS Network Screen for any abnormalities • Check the High Voltage Screen for any abnormalities • Check the ACU Screen for any abnormalities or any Earth Faults • Cab Occupation in Key ON Mode-Cab Selector Switch in Normal Mode. • Cab Occupation in RDM Mode-Cab Selector Switch in Normal Mode. • Cab Occupation in Key ON Mode-Cab Selector Switch in High Priority Mode. • Cab Occupation in RDM Mode-Cab Selector Switch in High Priority Mode. • Check the Signal Bell Functionality from both driver and guard panels. • Check the Emergency Bell Functionality by pressing SB2 button from both driver and guard panel. • Check Emergency bell by pressing Emergency stop button in passenger saloon area and observe the indication on TCMS DDU and also on SB2 Switch. • Check the Train BN Battery voltage	
2.	**Pantograph**	• Check the lifting and lowering times of the pantograph - Lifting time-should be within ≤10 Sec - Lowering time-should be within ≤10 Sec	

TASK 2 : FUNCTIONAL TEST II (WITH AC & DC POWER)

Work Preparation

1. Safety Inspection and Energizing the overhead supply line
2. Make sure that all switches are in normal position
3. Raise the Pantograph and close the VCB

S.No.	System/ Equipment	Functional Test	Remark
1.	**Cab light**	• Check Cab driver/guard light by operating respective Switch	
2.	**Cab Spot light**	• Check Cab driver/guard Spot light by operating respective Switch	
3.	**Cab Emergency Light**	• Check Cab Emergency light by operating Cab Emergency Light Switch	
4.	**Cab Fans**	• Check Cab Fans by operating Cab Fan Switch	
5.	**Head light**	• Check head light by operating Head Light Switch. • Check Aux head lights by operating Head Light Switch.	
6.	**Marker light**	• Check tail/ marker lights by operating tail/ marker light switch.	
7.	**Flasher light**	• Check Flasher lights by operating Flasher Light Switch.	
8.	**CCTV**	Check and ensure all cameras live views are showing in CCTV display unit.	
9.	**Cab AC**	• Turn on the Cab HVAC system and check the cooling states. • Correct working of 'Selector switch' in all positions. • Check the operation of CAB HVAC in 'Back Up' Mode.	
10.	**Wiper**	• Check the wiper function in low / high & wash mode from wiper switch	
11.	**Saloon Light**	• Check all saloon lights (50%, 100%) Emergency lights, Gangway lights are glowing by giving command from driving cab. • Check the lights by operating DLL/IDLL control Switch in Auto, ON and OFF modes	
12.	**Saloon RMPU**	• Turn on the RMPU system and check the functioning. • Check the RMPU unit from inside & outside of the train	

S.No.	System/ Equipment	Functional Test	Remark
		• Examine that refrigerant is full with green color. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. • Check for proper function of inverter through TCMS by 'ON BOARD' test.	
13.	**Saloon RMPU functional check**	• Check for proper function of inverter by running the RMPU in emergency mode through TCMS and feel air by hand in duct in the saloon. • Function check using Laptop or other device(DDU). • Check for proper function through TCMS by on board test during testing.	
14.	**Passenger Saloon Door**	• Open/close the Passenger Saloon doors in standby mode by pressing two push buttons from both Cabs. • Check the results while opening and closing door, Check that doors open and close without obstruction on TCMS Display. • After opening of door check all outside and inside lamp should glow. • After closing of door check the DPL Left, DPL Right in both cab and LDSLR, LDSRR of all coaches status on TCMS. It should be energizes. • After closing all the doors and check the status of ADCR relay, it should energize.	
15.	**PA & PIS**	**Ensure all the units working condition by Switching ON Power supply:** • MMI should boot up and display the default screen as "Cab Not Active" up-to Cab Occupied Key enable. • ICDs, HCDs & SDBDs should display default message "Indian Railways" • CC should "announce Jingle" through Speakers at Power ON • Indication LED of all the PECU units should blink continuously. After Completion of all above units power ON to be verified all units health status for Selecting the "PIS Health" from TCMS DDU screen. **Ensure all the units working condition by Train Route Selection:** • Select the Train Route from MMI unit • Check End to End when route is selected, MMI unit on other side shall become Slave	

S.No.	System/ Equipment	Functional Test	Remark
		• Check the HCD display for displaying the Destination of the selected route in both DTC's HCD Displays • Check the SDBD display for displaying the Source & Destination with Via station name of the selected route in All coaches SDBD Displays • Check the selected train route is displayed properly in ICDs of each coach • Check the selected train route is announced properly in CC through speakers of each coach **Ensure HCD units working condition by Manual Route Selection (In case of Emergency condition)**	
		• Select the train route in TCMS DDU • Check the HCD display for displaying the Destination of the selected route **Display Test**: The purpose of this test is to ensure all the display units status. • Select the “Display Test” from 'Diagnostics' option in MMI then all the ICD, SDBD and HCD displays should displays the Test Pattern screen **Speaker Test**: The purpose of this test is to ensure all the display units status. • Select the “Loud Speaker Test” from 'Diagnostics' option in MMI then all CC units should “announce Jingle” through Speakers in all coaches **Inter-Com (IC) Test:** • Press 'IC' Button on the MMI – Non Active Cab. • MMI should display the “Inter Communication Enabled” message on both sides of MMI display. • IC Indication LEDs shall be blink on both MMI’s & Jingle Sound shall be played from both Cab Loudspeakers • Press IC button on the MMI Keypad of Active cab then both MMI IC Indication LEDs should be ON continuously. • Speak through Microphone then voice should be heard from other cab speaker and vise-versa. • After that again Press 'IC' Button on the MMI – Non Active Cab	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the “IC” Disabled” message on both sides of MMI display. • IC indication LED should OFF at both sides of MMI. Repeat the above case from other side MMI. **Passenger Announcement (PA) Test:** • Press 'PA' Button on the MMI – Non Active Cab • MMI should display the “PA Enabled” message on both sides of MMI display. • PA indication LED should ON at both sides of MMI. • Speak through Microphone and Listen the voice from all the speakers in coach area. • After that again Press 'PA' Button on the MMI –Non Active Cab • MMI should display the “PA Disabled” message on both sides of MMI display and PA indication LED should OFF mode. • PA indication LED should OFF mode at both sides of MMI. • Speak through Microphone then observe No voice shall be heard from any of the speaker.	
		Repeat the above case from other side MMI. **Passenger Emergency Communication Unit (PECU) Test:** • Power on Health check PECU indication LED should blink in Red color continuously. • Then Press the PECU Push Button of any of the PECU from any of the coach.(Example: PECU1 from CC1) • PECU indication LED should stop blinking and glow in Red color constantly. • MMI should get and display the PECU information. • PAS buzzer in driver cab should be ON continuously until PAS acknowledgement button is pressed. • Select “CC1” to enable the PECU communication establishment. MMI should display the PECU request menu to Accept/Reject. • Press “Accept” button to enable the PECU.	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the PECU communication establishment screen. • PECU Indication LED should glow constantly in Green color and Push button LED should continuously ON. • Speak through Cab Microphone Voice should be heard from PECU speaker. • Speak through PECU microphone Voice should be heard from Cab loud speaker. • Press “Call End” button on MMI then changed to normal operation mode automatically and PECU call should be disconnected, in PECU indication LED shall start blinking and Push button LED should be in OFF mode. *Note: During One PECU call other call will be maintained in queue.* **Same procedure can be applicable for other PECU units testing.**	
16.	**Log book**	• Check the Crew remarks	
17.	**Data download**	• Download Data Through MAE675U Application Software	
18.	**Reading Note Down**	• Note Down the Energy Consumption • Note Down the Regeneration Energy • Note Down the Kilometer Reading	

ANNEXURE-J

FUNCTIONAL TEST UNDER NINE MONTHLY SCHEDULE

TASK 1: FUNCTIONAL TEST I (WITH ONLY DC POWER)

Work Preparation

1. Turn on the Switch for DC power.
2. Examine that all the switches are in normal position in the cab.

S.No.	System/ Equipment	Functional Test	Remark
1.	**DC/LT Test**	• Ensure the intactness of USB port, Ether Net Connector &power supply connector. • Check the healthiness of touch function and its response time. • Train Overview: Ensure the healthy and working status of all equipment. • Unit Level: Ensure the healthy and working status of all Equipment. • Events Screen: Check for any active failure on events screen. • Ensure healthy status of equipment /functions on train level and unit level of various screens of Main System. • Check the healthiness of all Door Proving Loop on DDU. • Check the healthiness of all EBL on DDU. • Check The Network screen for communication healthiness of all the nodes. • Check The Communication screen for communication healthiness of TCMS various interfaces. • Check the version number screen for various modules s/w details • Ensure healthy status of all Auxiliary Convertor on DDU. • Ensure healthy status of Cab occupation on DDU in Regular & High Priority mode. • Check the Door screen for status of each door. • Check the RMPU screen for status of each RMPU.	
2.	**Pantograph**	• Check the lifting and lowering times of the pantograph - Lifting time should be within ≤10 Sec - Lowering time should be within ≤10 Sec • Check pantograph raises/ lowers smoothly.	

TASK 2: FUNCTIONAL TEST II (WITH AC & DC POWER)

Work Preparation

1. Safety Inspection and Energizing the overhead supply line
2. Make sure that all S/W are in normal position
3. Raise the Pantograph and close the VCB

S.No.	System/ Equipment	Functional Test	Remark
1.	**Cab light**	• Check Cab driver/guard light by operating respective Switch	
2.	**Cab Spot light**	• Check Cab driver/guard Spot light by operating respective Switch	
3.	**Cab Emergency Light**	• Check Cab Emergency light by operating Cab Emergency Light Switch	
4.	**Cab Fans**	• Check Cab Fans by operating Cab Fan Switch	
5.	**Head light**	• Check head light by operating Head Light Switch. • Check Aux head lights by operating Head Light Switch.	
6.	**Marker light**	• Check tail/ marker lights by operating tail/ marker light switch.	
7.	**Flasher light**	• Check Flasher lights by operating Flasher Light Switch.	
8.	**CCTV**	Check and ensure all cameras live views are showing in CCTV display unit.	
9.	**Cab AC**	• Turn on the Cab HVAC system and check the cooling states. • Correct working of 'Selector switch' in all positions. • Check the operation of CAB HVAC in 'Back Up' Mode.	
10.	**Wiper**	• Check the wiper function in low / high & wash mode from wiper switch	
11.	**Saloon Light**	• Check all saloon lights (50%, 100%) Emergency lights, Gangway lights are glowing by giving command from driving cab. • Check the lights by operating DLL/IDLL control Switch in Auto, ON and OFF modes	
12.	**Saloon RMPU**	• Turn on the RMPU system and check the functioning. • Check the RMPU unit from inside & outside of the train	

S.No.	System/ Equipment	Functional Test	Remark
		• Examine that refrigerant is full with green color. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. • Check for proper function of inverter through TCMS by 'ON BOARD' test.	
13.	**Saloon RMPU functional check**	• Check for proper function of inverter by running the RMPU in emergency mode through TCMS and feel air by hand in duct in the saloon. • Function check using Laptop or other device(DDU). • Check for proper function through TCMS by on board test during testing.	
14.	**Passenger Saloon Door**	• Open/close the Passenger Saloon doors in standby mode by pressing two push buttons from both Cabs. • Check the results while opening and closing door, Check that doors open and close without obstruction on TCMS Display. • After opening of door check all outside and inside lamp should glow. • After closing of door check the DPL Left, DPL Right in both cab and LDSLR, LDSRR of all coaches status on TCMS. It should be energizes. • After closing all the doors and check the status of ADCR relay, it should energize.	
15.	**PA & PIS**	**Ensure all the units working condition by Switching ON Power supply:** • MMI should boot up and display the default screen as "Cab Not Active" up-to Cab Occupied Key enable. • ICDs, HCDs & SDBDs should display default message "Indian Railways" • CC should "announce Jingle" through Speakers at Power ON • Indication LED of all the PECU units should blink continuously. After Completion of all above units power ON to be verified all units health status for Selecting the "PIS Health" from TCMS DDU screen. **Ensure all the units working condition by Train Route Selection:** • Select the Train Route from MMI unit • Check End to End when route is selected, MMI unit on other side shall become Slave	

S.No.	System/ Equipment	Functional Test	Remark
		• Check the HCD display for displaying the Destination of the selected route in both DTC's HCD Displays • Check the SDBD display for displaying the Source & Destination with Via station name of the selected route in All coaches SDBD Displays • Check the selected train route is displayed properly in ICDs of each coach • Check the selected train route is announced properly in CC through speakers of each coach **Ensure HCD units working condition by Manual Route Selection (In case of Emergency condition)**	
		• Select the train route in TCMS DDU • Check the HCD display for displaying the Destination of the selected route **Display Test**: The purpose of this test is to ensure all the display units status. • Select the “Display Test” from 'Diagnostics' option in MMI then all the ICD, SDBD and HCD displays should displays the Test Pattern screen **Speaker Test**: The purpose of this test is to ensure all the display units status. • Select the “Loud Speaker Test” from 'Diagnostics' option in MMI then all CC units should “announce Jingle” through Speakers in all coaches **Inter-Com (IC) Test:** • Press 'IC' Button on the MMI – Non Active Cab. • MMI should display the “Inter Communication Enabled” message on both sides of MMI display. • IC Indication LEDs shall be blink on both MMI’s & Jingle Sound shall be played from both Cab Loudspeakers • Press IC button on the MMI Keypad of Active cab then both MMI IC Indication LEDs should be ON continuously. • Speak through Microphone then voice should be heard from other cab speaker and vise-versa. • After that again Press 'IC' Button on the MMI – Non Active Cab	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the “IC” Disabled” message on both sides of MMI display. • IC indication LED should OFF at both sides of MMI. Repeat the above case from other side MMI. **Passenger Announcement (PA) Test:** • Press 'PA' Button on the MMI – Non Active Cab • MMI should display the “PA Enabled” message on both sides of MMI display. • PA indication LED should ON at both sides of MMI. • Speak through Microphone and Listen the voice from all the speakers in coach area. • After that again Press 'PA' Button on the MMI –Non Active Cab • MMI should display the “PA Disabled” message on both sides of MMI display and PA indication LED should OFF mode. • PA indication LED should OFF mode at both sides of MMI. • Speak through Microphone then observe No voice shall be heard from any of the speaker.	
		Repeat the above case from other side MMI. **Passenger Emergency Communication Unit (PECU) Test:** • Power on Health check PECU indication LED should blink in Red color continuously. • Then Press the PECU Push Button of any of the PECU from any of the coach.(Example: PECU1 from CC1) • PECU indication LED should stop blinking and glow in Red color constantly. • MMI should get and display the PECU information. • PAS buzzer in driver cab should be ON continuously until PAS acknowledgement button is pressed. • Select “CC1” to enable the PECU communication establishment. MMI should display the PECU request menu to Accept/Reject. • Press “Accept” button to enable the PECU.	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the PECU communication establishment screen. • PECU Indication LED should glow constantly in Green color and Push button LED should continuously ON. • Speak through Cab Microphone Voice should be heard from PECU speaker. • Speak through PECU microphone Voice should be heard from Cab loud speaker. • Press “Call End” button on MMI then changed to normal operation mode automatically and PECU call should be disconnected, in PECU indication LED shall start blinking and Push button LED should be in OFF mode. *Note: During One PECU call other call will be maintained in queue.* **Same procedure can be applicable for other PECU units testing.**	
16.	**Log book**	• Check the Crew remarks	
17.	**Data download**	• Download Data Through MAE675U Application Software	
18.	**Reading Note Down**	• Note Down the Energy Consumption • Note Down the Regeneration Energy • Note Down the Kilometer Reading	

ANNEXURE-L

FUNCTIONAL TEST UNDER SHOP SCHEDULE- 1 & 2

TASK 1: FUNCTIONAL TEST I (WITH ONLY DC POWER)

Work Preparation

1. Turn on the Switch for DC power.
2. Examine that all the switches are in normal position in the cab.

S.No.	System/ Equipment	Functional Test	Remark
1.	**DC/LT Test**	• Ensure the intactness of USB port, Ether Net Connector &power supply connector. • Check the healthiness of touch function and its response time. • Train Overview: Ensure the healthy and working status of all equipment. • Unit Level: Ensure the healthy and working status of all Equipment. • Events Screen: Check for any active failure on events screen. • Ensure healthy status of equipment /functions on train level and unit level of various screens of Main System. • Check the healthiness of all Door Proving Loop on DDU. • Check the healthiness of all EBL on DDU. • Check The Network screen for communication healthiness of all the nodes. • Check The Communication screen for communication healthiness of TCMS various interfaces. • Check the version number screen for various modules s/w details • Ensure healthy status of all Auxiliary Convertor on DDU. • Ensure healthy status of Cab occupation on DDU in Regular & High Priority mode. • Check the Door screen for status of each door. • Check the RMPU screen for status of each RMPU.	
2.	**Pantograph**	• Check the lifting and lowering times of the pantograph - Lifting time should be within ≤10 Sec - Lowering time should be within ≤10 Sec • Check pantograph raises/ lowers smoothly.	

TASK 2: FUNCTIONAL TEST II (WITH AC & DC POWER)

Work Preparation

4. Safety Inspection and Energizing the overhead supply line
5. Make sure that all S/W are in normal position
6. Raise the Pantograph and close the VCB

S.No.	System/ Equipment	Functional Test	Remark
1.	**Cab light**	• Check Cab driver/guard light by operating respective Switch	
2.	**Cab Spot light**	• Check Cab driver/guard Spot light by operating respective Switch	
3.	**Cab Emergency Light**	• Check Cab Emergency light by operating Cab Emergency Light Switch	
4.	**Cab Fans**	• Check Cab Fans by operating Cab Fan Switch	
5.	**Head light**	• Check head light by operating Head Light Switch. • Check Aux head lights by operating Head Light Switch.	
6.	**Marker light**	• Check tail/ marker lights by operating tail/ marker light switch.	
7.	**Flasher light**	• Check Flasher lights by operating Flasher Light Switch.	
8.	**CCTV**	Check and ensure all cameras live views are showing in CCTV display unit.	
9.	**Cab AC**	• Turn on the Cab HVAC system and check the cooling states. • Correct working of 'Selector switch' in all positions. • Check the operation of CAB HVAC in 'Back Up' Mode.	
10.	**Wiper**	• Check the wiper function in low / high & wash mode from wiper switch	
11.	**Saloon Light**	• Check all saloon lights (50%, 100%) Emergency lights, Gangway lights are glowing by giving command from driving cab. • Check the lights by operating DLL/IDLL control Switch in Auto, ON and OFF modes	
12.	**Saloon RMPU**	• Turn on the RMPU system and check the functioning. • Check the RMPU unit from inside & outside of the train	

S.No.	System/ Equipment	Functional Test	Remark
		• Examine that refrigerant is full with green color. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. • Check for proper function of inverter through TCMS by 'ON BOARD' test.	
13.	**Saloon RMPU functional check**	• Check for proper function of inverter by running the RMPU in emergency mode through TCMS and feel air by hand in duct in the saloon. • Function check using Laptop or other device(DDU). • Check for proper function through TCMS by on board test during testing.	
14.	**Passenger Saloon Door**	• Open/close the Passenger Saloon doors in standby mode by pressing two push buttons from both Cabs. • Check the results while opening and closing door, Check that doors open and close without obstruction on TCMS Display. • After opening of door check all outside and inside lamp should glow. • After closing of door check the DPL Left, DPL Right in both cab and LDSLR, LDSRR of all coaches status on TCMS. It should be energizes. • After closing all the doors and check the status of ADCR relay, it should energize.	
15.	**PA & PIS**	**Ensure all the units working condition by Switching ON Power supply:** • MMI should boot up and display the default screen as "Cab Not Active" up-to Cab Occupied Key enable. • ICDs, HCDs & SDBDs should display default message "Indian Railways" • CC should "announce Jingle" through Speakers at Power ON • Indication LED of all the PECU units should blink continuously. After Completion of all above units power ON to be verified all units health status for Selecting the "PIS Health" from TCMS DDU screen. **Ensure all the units working condition by Train Route Selection:** • Select the Train Route from MMI unit • Check End to End when route is selected, MMI unit on other side shall become Slave	

S.No.	System/ Equipment	Functional Test	Remark
		• Check the HCD display for displaying the Destination of the selected route in both DTC's HCD Displays • Check the SDBD display for displaying the Source & Destination with Via station name of the selected route in All coaches SDBD Displays • Check the selected train route is displayed properly in ICDs of each coach • Check the selected train route is announced properly in CC through speakers of each coach **Ensure HCD units working condition by Manual Route Selection (In case of Emergency condition)**	
		• Select the train route in TCMS DDU • Check the HCD display for displaying the Destination of the selected route **Display Test**: The purpose of this test is to ensure all the display units status. • Select the “Display Test” from 'Diagnostics' option in MMI then all the ICD, SDBD and HCD displays should displays the Test Pattern screen **Speaker Test**: The purpose of this test is to ensure all the display units status. • Select the “Loud Speaker Test” from 'Diagnostics' option in MMI then all CC units should “announce Jingle” through Speakers in all coaches **Inter-Com (IC) Test:** • Press 'IC' Button on the MMI – Non Active Cab. • MMI should display the “Inter Communication Enabled” message on both sides of MMI display. • IC Indication LEDs shall be blink on both MMI’s & Jingle Sound shall be played from both Cab Loudspeakers • Press IC button on the MMI Keypad of Active cab then both MMI IC Indication LEDs should be ON continuously. • Speak through Microphone then voice should be heard from other cab speaker and vise-versa. • After that again Press 'IC' Button on the MMI – Non Active Cab	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the “IC” Disabled” message on both sides of MMI display. • IC indication LED should OFF at both sides of MMI. Repeat the above case from other side MMI. **Passenger Announcement (PA) Test:** • Press 'PA' Button on the MMI – Non Active Cab • MMI should display the “PA Enabled” message on both sides of MMI display. • PA indication LED should ON at both sides of MMI. • Speak through Microphone and Listen the voice from all the speakers in coach area. • After that again Press 'PA' Button on the MMI –Non Active Cab • MMI should display the “PA Disabled” message on both sides of MMI display and PA indication LED should OFF mode. • PA indication LED should OFF mode at both sides of MMI. • Speak through Microphone then observe No voice shall be heard from any of the speaker.	
		Repeat the above case from other side MMI. **Passenger Emergency Communication Unit (PECU) Test:** • Power on Health check PECU indication LED should blink in Red color continuously. • Then Press the PECU Push Button of any of the PECU from any of the coach.(Example: PECU1 from CC1) • PECU indication LED should stop blinking and glow in Red color constantly. • MMI should get and display the PECU information. • PAS buzzer in driver cab should be ON continuously until PAS acknowledgement button is pressed. • Select “CC1” to enable the PECU communication establishment. MMI should display the PECU request menu to Accept/Reject. • Press “Accept” button to enable the PECU.	

S.No.	System/ Equipment	Functional Test	Remark
		• MMI should display the PECU communication establishment screen. • PECU Indication LED should glow constantly in Green color and Push button LED should continuously ON. • Speak through Cab Microphone Voice should be heard from PECU speaker. • Speak through PECU microphone Voice should be heard from Cab loud speaker. • Press “Call End” button on MMI then changed to normal operation mode automatically and PECU call should be disconnected, in PECU indication LED shall start blinking and Push button LED should be in OFF mode. *Note: During One PECU call other call will be maintained in queue.* **Same procedure can be applicable for other PECU units testing.**	
16.	**Log book**	• Check the Crew remarks	
17.	**Data download**	• Download Data Through MAE675U Application Software	
18.	**Reading Note Down**	• Note Down the Energy Consumption • Note Down the Regeneration Energy • Note Down the Kilometer Reading	

3. MUST CHANGE ITEMS IN SHOP SCHEDULES

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	MECHANICAL				
BOGIE	**I. CTRB**	--	✓	✓	Refurbishment & Replacement after two refurbishments.
	II. Rubber / Rubber Metal Bonded Items *(Rubber Metal Bonded Item of Reaction Rod included in Traction Gearbox)*				
	i. Primary Suspension Primary Bump Stop	--	✓	✓	
	ii. Primary Spring Pad (upper)	--	✓	✓	
	iii. Traction rod	--	✓	✓	
	iv. Lateral Bump Stop	--	✓	✓	
	v. Control Arm - Primary suspension bush	--	✓	✓	
	vi. Center Pivot Bearing	--	✓	✓	
	vii. Motor suspension pad and Motor suspension bush	--	✓	✓	
	viii. Stabilizer Link	--	✓	✓	
	III. Stabilizer Assembly				
	i. Spherical Bearing	--	✓	✓	
	ii. Grease Nipples	✓	✓	✓	
	IV. Primary Suspension Coil Spring	--	--	✓	
	V. Air Spring System				
	i. O-Rings of Air Spring System	✓	✓	✓	
	ii. Air Filter	✓	✓	✓	
	iii. Air Spring	--	--	✓	
	VI. Dampers				
	i. Primary Vertical Damper	--	✓	✓	
	ii. Secondary Vertical Damper	--	✓	✓	
	iii. Yaw Damper	--	✓	✓	
	iv. Lateral Damper	--	✓	✓	
	VII. Castings				
	i. O-Rings of Axle Box - Front End and Rear End Cover	✓	✓	✓	
Coupler	**I. Semi-Permanent Coupler**				
	i. Elastomer pad/spring package	--	--	✓	
	II. CBC				
	i. Draft gear rubber/elastomeric pads	--	--	✓	

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
Electro - Pneumatic Brake System	**I. Main Air Compressor (Main Air Supply)**				
	i. Air Filter	✓	✓	✓	
	ii. Resilient Mounting & Restrainers	--	✓	✓	
	II. Micromesh Filter				
	i. Filter Element	✓	✓	✓	
	III. Final Filter				
	i. Filter Element	✓	✓	✓	
	IV. Auxiliary Air Compressor (Pantograph Control)				
	i. Air Filter	✓	✓	✓	
	V. Safety Valves	--	--	✓	
	VI. Pneumatic Horn/Tyfon (Low tone / High tone)	--	✓	✓	
	VII. Drain Valves / Drain Cocks	--	✓	✓	
	VIII. Ballcocks/Isolating cocks/Cutoff angle cocks (with or without switch module or exhaust/vented)	--	✓	✓	
	IX. Pressure Governors / Pressure Switches	--	--	✓	
	X. Air Filters	✓	✓	✓	
	XI. Rubber Hose Connections, Hose Pipes & Hose Coupling	--	✓	✓	
	XII. Dual/Duplex Pressure Gauge-MR/BP, Dual/Duplex Pressure Gauge-BC/AR, BP Gauge	--	--	✓	
	XIII. Brake Pad	--	✓	✓	
Shell and Under-Frame	**I. Exterior Paint**	--	✓	✓	
Interior and Furnishing Items	**I. Gangway**				Complete Gangway System Replacement: ● M/s Hubner: 12 Years (2nd SS3) ● M/s Dellner: 15 Years (3rd SS-2) ● M/s Lince: 12 Years (2nd SS3) ● M/s Ultimate Transportation Equipment: 12 Years (2nd SS3) ● M/s CRI: 12 Years (2nd SS3)

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	i. Gangway Components	--	✓	✓	Components replacement: M/s Dellner 3 Years (SS-2) 6 Years (SS-3) 7.5 Years (3rd SS-1) M/s Lince 6 Years (SS-3) M/s Ultimate Transportation Equipment 3 Years (SS-2) 6 Years (SS-3) (M/s CRI) 6 Years (SS-3)
	II. Passenger Seats				
	i. Seat Upholstery	--	✓	✓	
	III. Window				
	i. Lower Trim Rubber Gasket	--	✓	✓	
Doors	**I. IC Door**				
	i. IC Door Components	✓	✓	✓	M/s Prag Polymers: 18 Months (SS-1) 3 Years (SS-2) 6 Years (SS-3)
	II. Plug Doors				
	i. Plug Door Components	--	--	--	Components replacement: M/s Knorr Bremse: 4.5 Years (2nd SS-1) 9 Years (2nd SS-2) M/s Faiveley Transport: ● 9 Years (2nd SS-2) 15 Years (3rd SS-2)
Water tank and Supply/ Drain pipelines	**I. Rubber hoses and rubber/flexible pipes**	--	✓	✓	
Vacuum Bio-Toilet System	**I. Vacuum Evacuation System**				
	i. Lavatory pan/bowl (Indian squatting/Western design) & underfloor fitted components				
	a) Water Inlet / Rinsing valve	--	✓	✓	
	b) Vacuum Pump	--	✓	✓	
	c) Ejector	--	--	✓	
	ii. Pressurized flushing arrangement				
	a) Water Inlet valve	--	✓	✓	

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	b) Quick Exhaust valve	--	✓	✓	
	iii. Pneumatic/Electro-pneumatic control panel and associated accessories and electrical wiring				
	a) Air Filter	✓	✓	✓	
	b) Pressure Regulator	--	✓	✓	
	c) Pressure Guard / Pressure Switch	--	✓	✓	
	iv. All rubber/flexible—plumbing pipes & connectors, water hoses, pneumatic pipings.	--	✓	✓	
	II. Bio Digester Tank				
	i. Rubber connectors and gaskets	✓	✓	✓	
Traction Gearbox	**I. Traction Gearbox**				
	i. Gearbox Oil (KLÜBER GE 4 75 W 90)	✓	✓	✓	
	ii. Elastomer of Drive Suspension (Reaction Rod)	--	✓	✓	
	iii. Gear Coupling				
	a) Grease	--	✓	✓	
	iv. Housing Assembly				
	a) Barrier grease	--	--	✓	
	b) Bearings	--	--	✓	
FSDS and FDSS	**I. Aspiration Type Automatic Smoke / Fire Detection with Alarm System**				
	i. Aspirating Smoke Detection Unit				
	a) Air Filter	✓	✓	✓	
	b) Motherboard Ni-Cad Battery (3V DC)	–	✓	✓	
	c) Airflow Suction Fan	–	✓	✓	
	ii. Control Panel / Detection Panel				
	a) End of Line Resistance (4.7k Ohm)	✓	✓	✓	
	b) Shorting Link for Power Terminal Board	✓	✓	✓	
	c) Cable tie & markers	--	✓	✓	
	d) Wago Terminal	--	✓	✓	
	e) Real Time Clock (RTC) Battery (3V DC)	--	✓	✓	
	iii. Sampling, Pipe Network & Detection Points				
	a) Smoke Chamber of Photoelectric Smoke Detectors	--	✓	✓	

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	II. Aerosol Fire Detection & Suppression System	--	--	--	Replacements : M/s STAT-X: 15 years (3rd SS-2) M/s FIREPRO: 15 years (3rd SS-2) M/s PYROGEN: 9 years (2nd SS-2)
ELECTRICAL					
Propulsion system	**Line and Traction Converter (LTC)**				
	Silica gel	✓	✓	✓	
	Inlet and outlet air filters	--	✓	✓	
	Gasket/O-rings in coolant circuit	--	✓	✓	
	Door gaskets	--	✓	✓	
	Coolant	--	--	✓	
	Pump bearings & “O” rings	--	--	✓	
	Blower Motor Bearings and associated component	--	--	✓	
	Contact tips of Electrical contactors	--	--	✓	
	Auxiliary Converter Unit (ACU)				
	Silica gel	✓	✓	✓	
	Air filters	--	✓	✓	
	Door gaskets	--	✓	✓	
	Intumescent rubber seals of covers	--	✓	✓	
	Blower Motor Bearings and associated component	--	--	✓	
	Contact tips of Electrical contactors	--	--	✓	
	Battery box unit (BBU)				
	Silica gel	✓	✓	✓	
	Inlet air filter of battery charger	--	✓	✓	
	Door gaskets	--	✓	✓	
	DC Link Earthing Switch				
	Door sealing gaskets	--	✓	✓	
	Pantograph (Schunk Bahn)				
	All Shunts	✓	✓	✓	
	Sliding (carbon) strips	✓	✓	✓	
	Pantograph (Faiveley-LX 3600)				

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	Sliding (carbon) strips	✓	✓	✓	
	Flexible connections (shunts)	✓	✓	✓	
	TOH/ SS1 kit	✓	--	--	
	SS2/36 M kit	--	✓	--	
	SS3/72 M kit	--	--	✓	
	Vacuum Circuit Breaker (AAL & Schneider)				
	AOH replacement kits of respective OEM	✓	--	--	
	IOH replacement kits respective OEM	--	✓	--	
	POH replacement kits respective OEM	--	--	✓	
	Earthing switch for VCB (Roof)				
	Seal/ rubber gasket	--	✓	✓	
	Scrapper (Seals) for Main Shaft	--	--	--	in 4th SS1 (10.5 Years)
	Blade (moving contact)	--	--	--	in 4th SS1 (10.5 Years)
	Contact spring	--	--	--	in 4th SS1 (10.5 Years)
	Key-A (Blue) and Key-B (Yellow)	--	--	--	in 4th SS1 (10.5 Years)
	Main transformer				
	Silica gel	✓	✓	✓	
	Sealing gaskets of air dryers	--	✓	✓	
	Transformer shunts	--	✓	✓	
	Oil pump Bearings	--	--	✓	
	Motor fan bearings of Cooling system	--	--	✓	
	All dampers	--	--	✓	
	Synthetic Ester oil	--	--	--	in 3rd SS2 (15 Years)
	Traction Motors				
	Air Filters fitted on ducts	✓	✓	✓	
	Terminal cover sealing	--	✓	✓	
	TM duct Air bellows		✓	✓	
	Deep groove ball bearing 6217 M/HC5C4HS0 at DE	--	--	✓	
	Cylindrical roller bearing NU 1012 MR/HC5C4 at NDE	--	--	✓	
	Sealing of bushing plate, Sealing rings and O rings	--	--	✓	
	TM Cable Junction Box				
	Door sealing gaskets	--	✓	✓	

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	Power Coupler				
	Jumper head gaskets	--	✓	✓	
	Power Coupler Junction Box				
	Sealing gaskets	--	✓	✓	
	Driver console and driver's cab				
	Door sealing gaskets	--	✓	✓	
	Electric panels (CRW, EEC, EWP, RMPU etc.)				
	Door sealing gaskets	--	✓	✓	
	Earth Return JB and Return CT JB				
	Door sealing gaskets	--	✓	✓	
	Earth return ground contact (ERCU)				
	Carbon brushes	--	✓	✓	
Air Conditioning & Train Lighting	**Wiper assembly**				
	Wiper blades	✓	✓	✓	
	Motor carbon brushes	✓	✓	✓	
	Motor bearings	✓	✓	✓	
	Linkage bearings	✓	✓	✓	
	Wash pump	--	✓	✓	
	All relay contacts & power convertors	--	✓	✓	
	Head Lights (LED)				
	Headlight gasket and seal	--	✓	✓	
	Marker Lights (LED)				
	Rubber gasket and "O" rings	--	✓	✓	
	Flasher Light (LED)				
	Rubber gasket	--	✓	✓	
	Roof Mounted AC Package Unit (RMPU)				
	Fresh and return air filters	✓	✓	✓	
	Cable Conduits	--	✓	✓	
	Earthing shunts	--	✓	✓	
	Anti vibration mountings	--	✓	✓	
	Bearings of blower and condenser fan motors	--	✓	✓	
	Supply and return air Bellow duct of Meta/ Para Aramid fabric	--	--	✓	
	Driver's Cab Air Conditioning Unit				
	Fresh and return air filters	✓	✓	✓	
	Cable Conduits	--	✓	✓	

Main Assy.	Sub-Assembly / Component	Schedule			Remarks
		SS 1	SS2	SS3	
	Earthing shunts	--	✓	✓	
	Mini Pantry Items				
	Hot Case	--	--	✓	
	Refrigerating Unit	--	--	✓	
	Water Boiler	--	--	✓	
	Mono-block pump set (WRA)	--	✓	✓	

I. SCHEDULE WISE LIST OF MUST CHANGE ITEMS: MECHANICAL

Sch.	SS1	SS2	2nd SS1	SS3	3rd SS1	2nd SS2	4th SS1	2nd SS3	5th SS1	3rd SS2
Months	18	36	54	72	90	108	126	144	162	180
Years	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15

A. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 1

BOGIE

1. **Stabilizer Assembly**
   i. Grease Nipples
2. **Air Spring System**
   i. Air Filter
   ii. O-Rings of Air Spring System
3. **Castings**
   i. O-Rings of Axle Box - Front End and Rear End Covers

ELECTRO - PNEUMATIC BRAKE SYSTEM

1. **Main Air Compressor (Main Air Supply)**
   i. Air Filter
2. **Micromesh Filter**
   i. Filter Element
3. **Final Filter**
   i. Filter Element
4. **Auxiliary Air Compressor (Pantograph Control)**
   i. Air Filter
5. **Air Filters in the brake system**
   i. Filters

DOORS

1. **IC Doors**
   i. Silent Block (M/s Prag Polymers**)**

VACUUM BIO-TOILET SYSTEM

1. **Vacuum Evacuation System**
   i. Air Filter of Electro Pneumatic Panel
2. **Bio Digester Tank**
   i. Rubber connectors and gaskets

TRACTION GEARBOX

1. **Traction Gearbox**
   i. Gearbox oil

FSDS and FDSS

1. **Aspiration Type Automatic Smoke / Fire Detection with Alarm System**
   i. Air Filter of Aspirating Smoke Detection Unit
   ii. End of Line Resistance (4.7k Ohm) of Control Panel / Detection Panel
   iii. Shorting Link for Power Terminal Board of Control Panel / Detection Panel

B. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 2

BOGIE

1. **CTRB**
   i. Refurbishment (Replacement after two refurbishments)

2. **Rubber Metal Bonded Items**
   i. All Rubber Metal Bonded Items *(Rubber Metal Bonded Item of Reaction Rod is included in Traction Gearbox)*

3. **Stabilizer Assembly**
   i. Spherical Bearing
   ii. Grease Nipples

4. **Air Spring System**
   i. Air Filter
   ii. O-Rings of Air Spring System

5. **Dampers**
   i. All Dampers

6. **Castings**
   i. O-Rings of Axle Box - Front End and Rear End Covers

ELECTRO - PNEUMATIC BRAKE SYSTEM

1. **Main Air Compressor (Main Air Supply)**
   i. Air Filter
   ii. Resilient Mounting & Restrainers

2. **Micromesh Filter**
   i. Filter Element

3. **Final Filter**
   i. Filter Element

4. **Auxiliary Air Compressor (Pantograph Control)**
   i. Air Filter

5. **Pneumatic Horn/Tyfon (Low tone / High tone)**
    i. Complete Horn/Tyfon Assembly (Low tone / High tone)

6. **Drain Valves / Drain Cocks**
    i. Drain Valves / Drain Cocks

7. **Ballcocks/Isolating cocks/Cutoff angle cocks (with or without switch module or exhaust/vented)**
    i. Ballcocks /Isolating cocks /Cutoff angle cocks (with or without switch module or exhaust/vented)

8. **Air Filters in the brake system**
    i. Filters

9. **Rubber Hose Connections, Hose Pipes & Hose Couplings**
    i. Rubber Hose Connections, Hose Pipes & Hose Couplings

10. **Brake Pad**
    i. Brake Pad

SHELL AND UNDERFRAME

1. **Exterior Paint**
    i. Exterior Paint

INTERIOR AND FURNISHING ITEMS

1. **Gangway**

    (M/s Dellner)
    i. Sleeve bearings of Floor system
    ii. Thrust washers of Floor system
    iii. Spacers of Floor system
    iv. Bearing pads of Floor system
    v. All washers of Floor system
    vi. Compression springs of Roof system
    vii. Thrust washers of Roof system
    viii. Spacers of Roof system
    ix. Spring bushes of Roof system
    x. All washers of Roof system

    (M/s Ultimate Transportation Equipment)
    i. Bridge plate wearing strip
    ii. Skirt
    iii. Sealing Rubber
    iv. Side Panel Brush
    v. Joint Bearing of Ceiling Panel

2. **Passenger Seats**
    i. Upholstery

3. **Windows**
    i. Lower Trim Rubber Gasket

DOORS

1. **IC Doors**

(M/s Prag Polymers)

i. Silent Block
ii. Plastic Nut of Drive Screw System
iii. Rubber Sealing
iv. Bearing (Rear Side of Motor)
v. Linear Bearing (Inside Screw Block)

WATER TANK AND SUPPLY/ DRAIN PIPELINES

1. **Supply Pipelines**
   i. Rubber hoses and rubber/flexible pipes

VACUUM BIO-TOILET SYSTEM

1. **Vacuum Evacuation System**
   i. Water Inlet / Rinsing valve of Lavatory pan/ bowl
   ii. Vacuum Pump
   iii. Water Inlet Valve of Pressurized flushing arrangement
   iv. Quick Exhaust valve
   v. Air Filter of Electro Pneumatic Panel
   vi. Pressure Regulator
   vii. Pressure Guard / Pressure Switch
   viii. Rubber pipes, rubber hoses & rubber connectors

2. **Bio Digester Tank**
   i. Rubber connectors and gaskets

TRACTION GEARBOX

1. **Traction Gearbox**
   i. Gearbox oil
   ii. Elastomer of Drive Suspension (Reaction Rod)
   iii. Grease of Gear Coupling

FSDS and FDSS

1. **Aspiration Type Automatic Smoke / Fire Detection with Alarm System**
   i. Air Filter of Aspirating Smoke Detection Unit
   ii. Motherboard Ni-Cad Battery (3V DC) of Aspirating Smoke Detection Unit
   iii. Airflow Suction Fan of Aspirating Smoke Detection Unit
   iv. End of Line Resistance (4.7k Ohm) of Control Panel / Detection Panel
   v. Shorting Link for Power Terminal Board of Control Panel / Detection Panel
   vi. Cable tie & markers of Control Panel / Detection Panel
   vii. Wago Terminal & Connector of Control Panel / Detection Panel
   viii. Real Time Clock (RTC) Battery 3V DC
   ix. Smoke Chamber of Photoelectric Smoke Detectors

C. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 3

BOGIE

1. **CTRB**
   i. Refurbishment (Replacement after two refurbishment)

2. **Rubber Metal Bonded Items**
   i. All Rubber Metal Bonded Items (Rubber Metal Bonded Item of Reaction Rod is included in Traction Gearbox)

3. **Stabilizer Assembly**
   i. Spherical Bearing
   ii. Grease Nipples

4. **Primary Suspension Coil Spring**
   i. Primary Suspension Coil Spring

5. **Air Spring System**
   i. Air Filter
   ii. O-Rings of Air Spring System
   iii. Air Spring

6. **Dampers**
   i. All Dampers

7. **Castings**
   i. O-Rings of Axle Box - Front End and Rear End Covers

COUPLER

1. **Semi Permanent Coupler**
   i. Elastomer pad/spring package

2. **CBC**
   i. Draft gear rubber/elastomeric pads

ELECTRO - PNEUMATIC BRAKE SYSTEM

1. **Main Air Compressor (Main Air Supply)**
   i. Air Filter
   ii. Resilient Mounting & Restrainers

2. **Micromesh Filter**
   i. Filter Element

3. **Final Filter**
   i. Filter Element

4. **Auxiliary Air Compressor (Pantograph Control)**
   i. Air Filter

5. **Safety Valves**
   i. Safety Valves

6. **Pneumatic Horn/Tyfon (Low tone / High tone)**
   i. Complete Horn/Tyfon Assembly (Low tone / High tone)

7. **Drain Valves / Drain Cocks**
   i. Drain Valves / Drain Cocks

8. **Ballcocks/Isolating cocks/Cutoff angle cocks (with or without switch module or exhaust/vented)**
   i. Ballcocks/Isolating cocks/Cutoff angle cocks (with or without switch module or exhaust/vented)

9. **Pressure Governors / Pressure Switches**
   i. Pressure Governors / Pressure Switches

10. **Air Filters in the brake system**
    i. Filters

11. **Rubber Hose Connections, Hose Pipes & Hose Coupling**
    i. Rubber Hose Connections, Hose Pipes & Hose Coupling

12. **Dual/Duplex Pressure Gauge-MR/BP, Dual/Duplex Pressure Gauge-BC/AR, BP Gauge**
    i. All Gauges at driver desk

13. **Brake Pad**
    i. Brake Pad

SHELL AND UNDERFRAME

1. **Exterior Paint**
   i. Exterior Paint

INTERIOR AND FURNISHING ITEMS

1. **Gangway**

(M/s Dellner)

i. Sleeve bearings of Floor system
ii. Thrust washers of Floor system
iii. Spacers of Floor system
iv. Bearing pads of Floor system
v. All washers of Floor system
vi. Compression springs of Roof system
vii. Thrust washers of Roof system
viii. Spacers of Roof system
ix. Spring bushes of Roof system A
x. All washers of Roof system

(M/s Lince)

i. Wearing strips of bridge plate assembly
ii. Skirt of side protecting plate assembly
iii. Sealing strips
iv. Wearing plate of coupler

(M/s Ultimate Transportation Equipment)

i. Bridge Plate Wearing Strip
ii. Skirt
iii. Sealing Rubber
iv. Side Panel Brush
v. Joint Bearing of Ceiling Panel

vi. Bridge plate Assembly
vii. Step Plate Assembly

(M/s CRI)

i. Wear strip of bridge plate.
ii. Roller, Torsion Bar Holder, and Bearing of Guide Beam.
iii. Rubber Seal and Brush Strip.
iv. PTFE Film of Ceiling Plate.
v. Side Wall Brush.

2. Passenger Seats

i. Upholstery

3. Windows

i. Lower Trim Rubber Gasket

DOORS

1. IC Doors

(M/s Prag Polymers)

i. Silent Block
ii. Plastic Nut of Drive Screw System
iii. Rubber Sealing
iv. Bearing (Rear Side of Motor)
v. Linear Bearing (Inside Screw Block)
vi. Contact bar on the Door Leaf
vii. NC Contact Block of Emergency Push Button
viii. Door Leaf Push Button
ix. Motion Screw
x. Cable Drag Chain
xi. Relay

WATER TANK AND SUPPLY/DRAIN PIPELINES

1. SUPPLY PIPELINES

i. Rubber hoses and rubber/flexible pipes

VACUUM BIO-TOILET SYSTEM

1. Vacuum Evacuation System

i. Water Inlet / Rinsing valve of Lavatory pan/ bowl
ii. Vacuum Pump
iii. Ejector
iv. Water Inlet Valve of Pressurized flushing arrangement
v. Quick Exhaust valve
vi. Air Filter of Electro Pneumatic Panel
vii. Pressure Regulator
viii. Pressure Guard / Pressure Switch
ix. Rubber pipes, rubber hoses & rubber connectors

2. Bio Digester Tank

i. Rubber connectors and gaskets

TRACTION GEARBOX

1. **Traction Gearbox**
   i. Gearbox oil
   ii. Elastomer of Drive Suspension (Reaction Rod)
   iii. Grease of Gear Coupling
   iv. Bearings
   v. Barrier Grease

FSDS and FDSS

1. **Aspiration Type Automatic Smoke / Fire Detection with Alarm System**
   i. Air Filter of Aspirating Smoke Detection Unit
   ii. Motherboard Ni-Cad Battery (3V DC) of Aspirating Smoke Detection Unit
   iii. Airflow Suction Fan of Aspirating Smoke Detection Unit
   iv. End of Line Resistance (4.7k Ohm) of Control Panel / Detection Panel
   v. Shorting Link for Power Terminal Board of Control Panel / Detection Panel
   vi. Cable tie & markers of Control Panel / Detection Panel
   vii. Wago Terminal & Connector of Control Panel / Detection Panel
   viii. Real Time Clock (RTC) Battery 3V DC
   ix. Smoke Chamber of Photoelectric Smoke Detectors

D. LIST OF MUST CHANGE ITEMS FOR OTHER SCHEDULES

INTERIOR AND FURNISHING ITEMS

1. **Gangway**

(M/s Hubner)

i. Complete Gangway System - 2nd SS-3 (12 Years)

(M/s Dellner)

3rd SS-1 (7.5 Years)

i. Felt kit
ii. Side Panel Shock Cord
iii. GA-cover
iv. Flexible tread plate bearing pads

3rd SS-2 (15 Years)

i. Complete Gangway System

(M/s Lince)

i. Complete Gangway System - 2nd SS-3 (12 Years)

(M/s Ultimate Transportation Equipment)

i. Complete Gangway System - 2nd SS-3 (12 Years)

(M/s CRI)

i. Complete Gangway System - 2nd SS-3 (12 Years)

DOORS

1. Plug Doors

(M/s Knorr Bremse)

2nd SS-1 (4.5 Years)

i. Cylinder in the lock housing mechanism

2nd SS-2 (9 Years)

i. Solenoid valve Y1, Y2, Y3, mounted on pneumatic control board
ii. Pressure switch S15, mounted on pneumatic control board
iii. Rollers of roller swing arm, Roller on the door leaf carrier and roller at the holding bracket on the door leaf
iv. Toothed belt onto linear spindle drive unit
v. Drive motor
vi. Spindle in spindle drive unit
vii. Door closed limit switch S7 at lock housing mechanism
viii. Door closed and locked limit switch S1 at isolating lock mechanism
ix. NOVRAM of the door control unit
x. Torsion spring of the lock housing mechanism
xi. Spring of the isolating lock mechanism
xii. Buzzer H1 on top of the header gear
xiii. Limit switch "emergency device inside" S3 at emergency egress device
xiv. Magnet onto emergency egress device
xv. Limit switch "emergency device outside" S8 at emergency access device
xvi. Door seals
xvii. Portal seal
xviii. Rubber bump stop at door leaf carrier
xix. Interior and exterior Bowden cables

(M/s Faiveley Transport)

2nd SS-2 (9 Years)

i. Operator - Driving screw assembly
ii. Operator - Coordinate bar bearing
iii. Operator - Rod bearing
iv. Operator - Roller kit
v. Operator - Open end stop
vi. Operator - Close end stop
vii. Operator - Extremity bearing
viii. Operator - Synchronous belt
ix. Operator - Flexible chain assembly
x. Door leaf- Peripheral seal
xi. Door leaf - Retention roller
xii. Lower swing arm - Rollers
xiii. Front rubber seal assembly - Female front seal

3rd SS-2 (15 Years)

i. Operator - EDCU
ii. Operator - Motor
iii. Operator - Loudspeaker
iv. Master lock device - Unlocking cylinder
v. Master lock device - Locking cylinder
vi. Master lock device - Fork spring

vii. Master lock device - Latch spring
viii. Master lock device - Emergency spring
ix. Master lock device - Electro-magnet
x. Master lock device - EMS
xi. Master lock device - DLS1 wire layout
xii. Master lock device - DLS2 wire layout
xiii. Master lock device - EDS wire layout
xiv. Master lock device - DCS wire layout
xv. Door leaf - Push button wiring
xvi. Lockout switch assembly - LOS wire layout
xvii. PCU assembly - PCU
xviii. PCU assembly - EAD
xix. PCU assembly - Bowden cable (EAD)
xx. EED
xxi. Bowden cable (EED)
xxii. Push button kit (opening)
xxiii. Push button kit (closing)
xxiv. Indication lamp (external)
xxv. Indication lamp (internal)

FSDS AND FDSS

1. **Aerosol Fire Detection & Suppression System**
   i. Complete Unit (M/s PYROGEN) - 2nd SS-2 (9 Years)
   ii. Complete Unit (M/s STAT-X) - 3rd SS-2 (15 Years)
   iii. Complete Unit (M/s FIREPRO) - 3rd SS-2 (15 Years)

II. SCHEDULE WISE LIST OF MUST CHANGE ITEMS: ELECTRICAL

Sch.	SS1	SS2	2nd SS1	SS3	3rd SS1	2nd SS2	4th SS1	2nd SS3	5th SS1	3rd SS2
Months	18	36	54	72	90	108	126	144	162	180
Years	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15

A. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 1

1. **Line and Traction Converter (LTC)**
   i. Silica gel
2. **Auxiliary Converter Unit (ACU)**
   i. Silica gel
3. **Battery box unit (BBU)**
   i. Silica gel
4. **Pantograph (Schunk Bahn)**
   i. All Shunts
   ii. Sliding (carbon) strips
5. **Pantograph (Faiveley-LX 3600)**
   i. Sliding (carbon) strips
   ii. Flexible connections (shunts)

iii. TOH/ SS1 kit

6. **Vacuum Circuit Breaker (AAL & Schneider)**
   i. AOH replacement kits as per OEM
7. **Main transformer**
   i. Silica gel
8. **Traction Motors**
   i. Air Filters fitted on ducts
9. **Wiper assembly**
   i. Wiper blades
   ii. Motor carbon brushes
   iii. Motor bearings
   iv. Linkage bearings
10. **Roof Mounted AC Package Unit (RMPU)**
    i. Fresh & return air filter
11. **Driver's Cab Air Conditioning Unit**
    i. Fresh and return air filters

B. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 2

1. **Line and Traction Converter (LTC)**
   i. Silica gel
   ii. Inlet and outlet air filters
   iii. Gasket/O-rings in coolant circuit
   iv. Door gaskets
2. **Auxiliary Converter Unit (ACU)**
   i. Silica gel
   ii. Air filters
   iii. Door gaskets
   iv. Intumescent rubber seals of covers
3. **Battery box unit (BBU)**
   i. Silica gel
   ii. Inlet air filter of battery charger
   iii. Door gaskets
4. **DC Link Earthing Switch**
   i. Door sealing gaskets
5. **Pantograph (Schunk Bahn)**
   i. All Shunts
   ii. Sliding (carbon) strips
6. **Pantograph (Faiveley-LX 3600)**
   i. Sliding (carbon) strips
   ii. Flexible connections (shunts)
   iii. SS2/36 M kit
7. **Vacuum Circuit Breaker (AAL & Schneider)**
   i. IOH replacement kits as per OEM

8. **Earthing switch for VCB (Roof)**
    i. Seal/ rubber gasket
9. **Main transformer**
    i. Silica gel
    ii. Sealing gaskets of air dryers
    iii. Transformer shunts
10. **Traction Motors**
    i. Air Filters fitted on ducts
    ii. Terminal cover sealing
    iii. TM duct air bellows
11. **TM Cable Junction Box**
    i. Door sealing gaskets
12. **Power Coupler**
    i. Jumper head gasket
13. **Power Coupler Junction Box**
    i. Sealing gaskets
14. **Driver console and driver's cab**
    i. Door sealing gaskets
15. **Electric panels (CRW, EEC, EWP, RMPU etc.)**
    i. Door sealing gaskets
16. **Earth Return JB and Return CT JB**
    i. Door sealing gaskets
17. **Earth return ground contact (ERCU)**
    i. Carbon brushes
18. **Wiper assembly**
    i. Wiper blades
    ii. Motor carbon brushes
    iii. Motor bearings
    iv. Linkage bearings
    v. Wash pumps
    vi. All relay contacts & power convertors
19. **Head Lights (LED)**
    i. Headlight gasket & seal
20. **Marker Lights (LED)**
    i. Rubber gasket & 'O' rings
21. **Flasher Light (LED)**
    i. Rubber gasket
22. **Roof Mounted AC Package Unit (RMPU)**
    i. Fresh & return air filters
    ii. Cable Conduits
    iii. Earth shunts
    iv. Anti vibration mountings
    v. Bearings of blower and condenser fan motors

23. Driver's Cab Air Conditioning Unit

i. Fresh and return air filters
ii. Cable Conduits
iii. Earthing shunts

24. Mono-block pump set (WRA)

i. Complete set

C. LIST OF MUST CHANGE ITEMS FOR SHOP SCHEDULE - 3

1. Line and Traction Converter (LTC)

i. Silica gel
ii. Inlet and outlet air filters
iii. Gasket/O-rings in coolant circuit
iv. Coolant
v. Door gaskets
vi. Pump bearings & "O" rings
vii. Blower Motor Bearing and associated component
viii. Contact tips of Electrical contactors

2. Auxiliary Converter Unit (ACU)

i. Silica gel
ii. Air filters
iii. Door gaskets
iv. Intumescent rubber seals of covers
v. Contact tips of Electrical contactors
vi. Blower Motor Bearing and associated component

3. Battery box unit (BBU)

i. Silica gel
ii. Inlet air filter of battery charger
iii. Door gaskets

4. DC Link Earthing Switch

i. Door sealing gaskets

5. Pantograph (Schunk Bahn)

i. All Shunts
ii. Sliding (carbon) strips

6. Pantograph (Faiveley-LX 3600)

i. Sliding (carbon) strips
ii. Flexible connections (shunts)
iii. SS3/72 M k**it**

7. Vacuum Circuit Breaker (AAL & Schneider)

i. POH replacement kits as per OEM

8. Earthing switch for VCB (Roof)

i. Seal/ rubber gasket

9. Main transformer

i. Silica gel
ii. Sealing gaskets of air dryers

iii. Transformer shunts
iv. All dampers
v. Oil pump bearings
vi. Motor fan bearings of Cooling system

10. Traction Motors

i. Air Filters fitted on ducts
ii. Terminal cover sealing
iii. TM duct air bellow
iv. Deep groove ball bearing 6217 M/HC5C4HS0 at DE
v. Cylindrical roller bearing NU 1012 MR/HC5C4 at NDE
vi. Sealing of bushing plate, Sealing rings and O rings

11. TM Cable Junction Box

i. Door sealing gaskets

12. Power Coupler

i. Jumper head gasket

13. Power Coupler Junction Box

i. Sealing gaskets

14. Driver console and driver's cab

i. Door sealing gaskets

15. Electric panels (CRW, EEC, EWP, RMPU etc.)

i. Door sealing gaskets

16. Earth Return JB and Return CT JB

i. Door sealing gaskets

17. Earth return ground contact (ERCU)

i. Carbon brushes

18. Wiper assembly

i. Wiper blades
ii. Motor carbon brushes
iii. Motor bearings
iv. Linkage bearings
v. Wash pumps
vi. All relay contacts & power convertors

19. Head Lights (LED)

i. Headlight gasket & seal

20. Marker Lights (LED)

i. Rubber gasket & 'O' rings

21. Flasher Light (LED)

i. Rubber gasket

22. Roof Mounted AC Package Unit (RMPU)

i. Fresh & Return air filters
ii. Cable Conduits
iii. Supply and return air Bellow duct of Meta/ Para Aramid fabric
iv. Earth shunts
v. Anti vibration mountings

vi. Bearings of blower and condenser fan motors

23. Driver's Cab Air Conditioning Unit

i. Fresh and return air filters
ii. Cable Conduits
iii. Earthing shunts

24. Mini Pantry Item

i. Hot Case
ii. Refrigerating Unit
iii. Water Boiler

25. Mono-block pump set (WRA)

i. Complete set

D. <u>LIST OF MUST CHANGE ITEMS FOR OTHER SCHEDULES</u>

1. Earthing switch for VCB (Roof) - 4th SS1 (10.5 Years)

i. Scrapper (Seals) for Main Shaft
ii. Blade (moving contact)
iii. Contact spring
iv. Key-A (Blue) and Key-B (Yellow)

2. Pantograph (Faiveley-LX 3600)- 2nd SS3 (12Years)

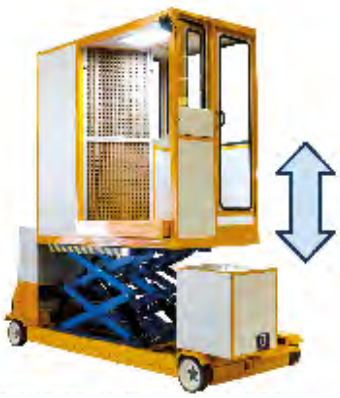
i. Upper Rod / Lower Arm joint
ii. Upper Rod / swaying shaft joint
iii. Lower Arm / Frame joint
iv. Lower Arm / Upper Arm joint
v. Lower rod joints
vi. Upper Arm/ Shaft joint

3. Main Transformer - 3rd SS2 (15 Years)

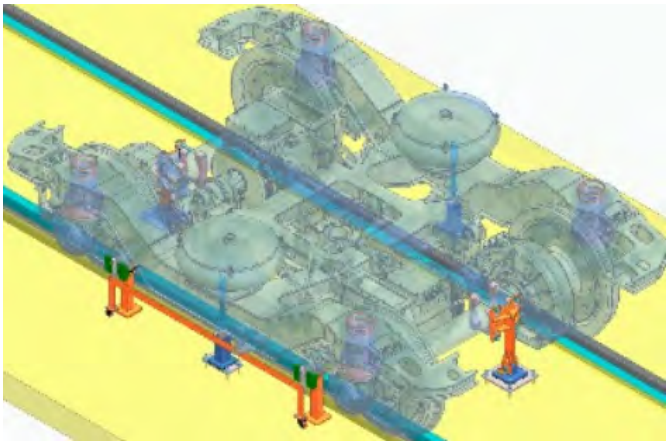
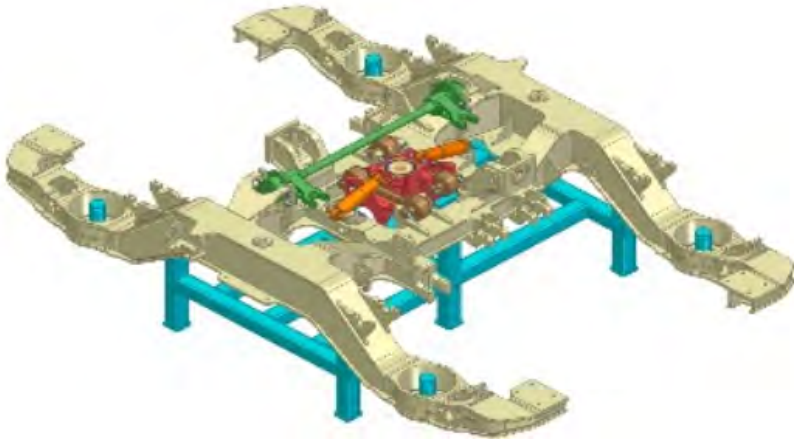
i. Synthetic Ester oil

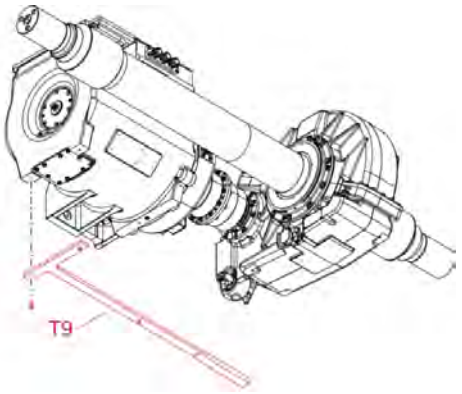
<u>NOTE:</u> The above mentioned lists are subject to revision based on the experience of SS2 schedule of Ver. 2 rakes and induction of other OEMS.

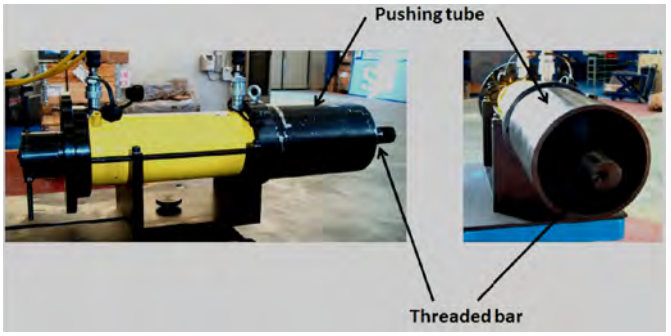
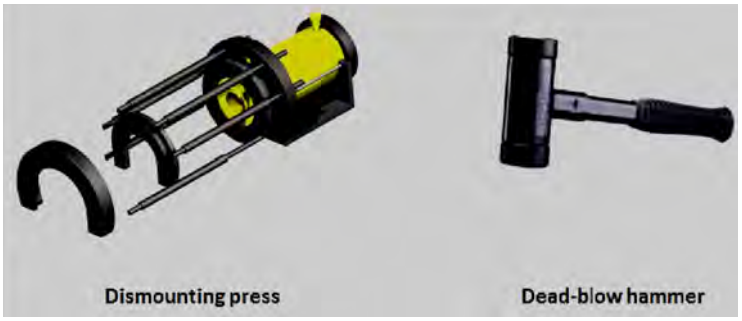
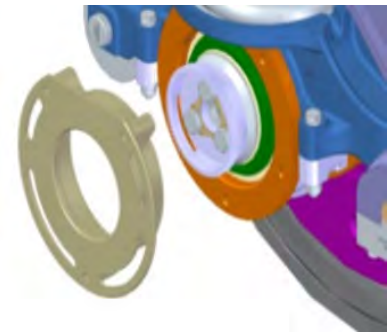
4. LIST OF M&Ps, TOOLS, JIGS & FIXTURES REQUIRED FOR SHOP SCHEDULES

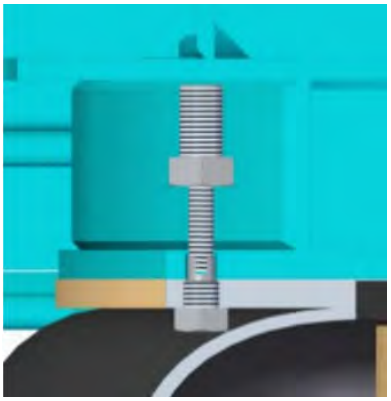
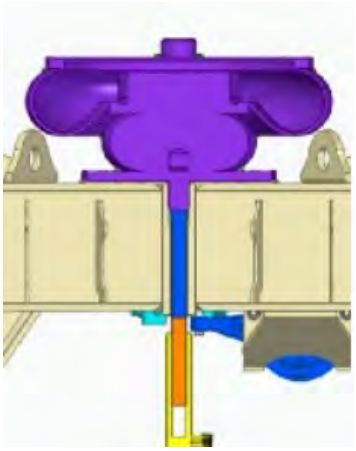
S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
	Mechanical		
1.	Rail-cum-Road Shunter		For Rake/BU/Coach shunting
			
2.	CBC to Semi-Permanent Coupler Attachment		For Rake/BU/Coach shunting throughout the shops
			
3.	Mobile Painting Equipment (Sky Trotter)		Painting of coaches
	 		

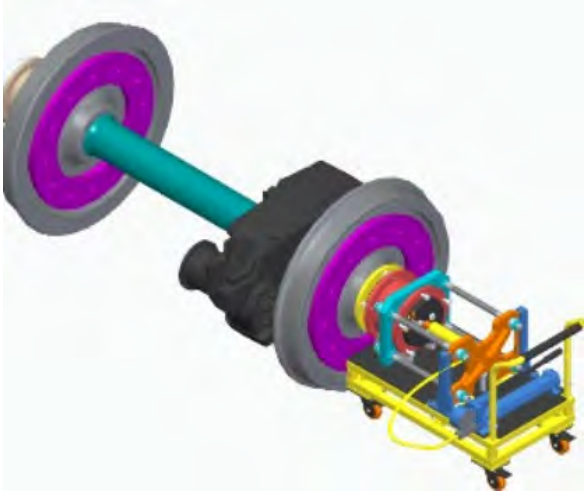
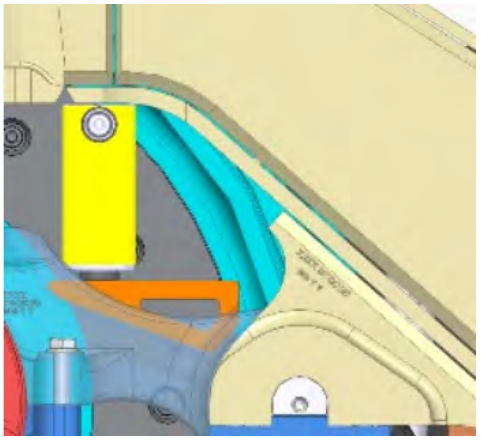
S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
4.	Forklift	15 tons	
			
5.	Battery-Operated Scissor Lift Table		
			
6.	Battery-operated Lister (Platform Trucks)	4-wheeler, 3 ton	
			
7.	Bogie Load Testing Machine	50 T	
8.	Synchronized Pit Jack System	Inverter/VFD/VVF incorporated (for smooth operations and energy saving)	Min. 4-car Synchronized Pit Jack System with flexibility to cater to varying lifting pad locations of different coaches should be preferred.

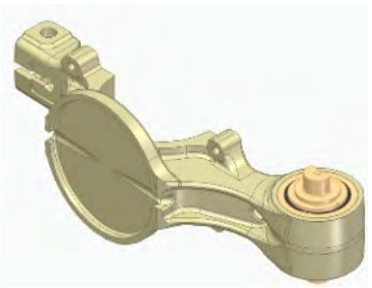
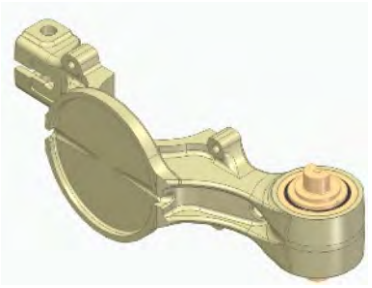
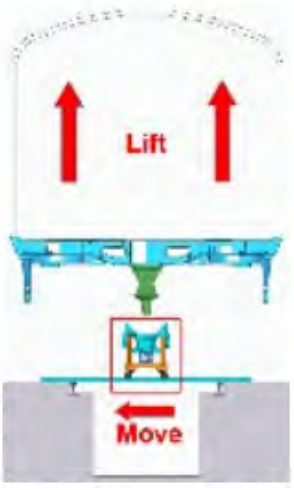
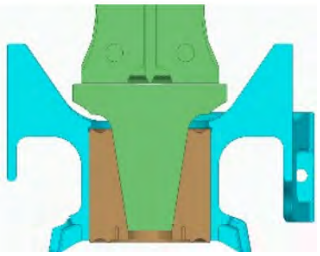
S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
			
9.	Set of (4+1) synchronized lifting jacks (25 t)	COFMOW Comp. 2023-24 item sl.no. 262	Lifting of coaches
10.	Complete Bogie Assembly Fixture	SPMAET18BOGIE1141 Ref: Jigs & Fixture List by Medha Bogie Private Limited	Including Axles Positioning and Coil Spring Centering & Bogie Lowering
			
11.	Bogie Subassembly in Inverted Position Fixture	SPMAET18BOGIE1139 Ref: Jigs & Fixture List by Medha Bogie Private Limited	Traction Center, ARB etc.
			

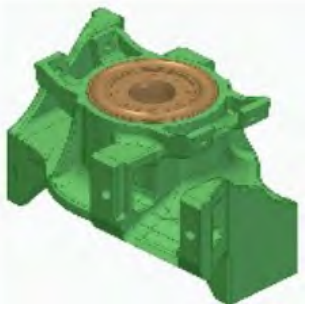
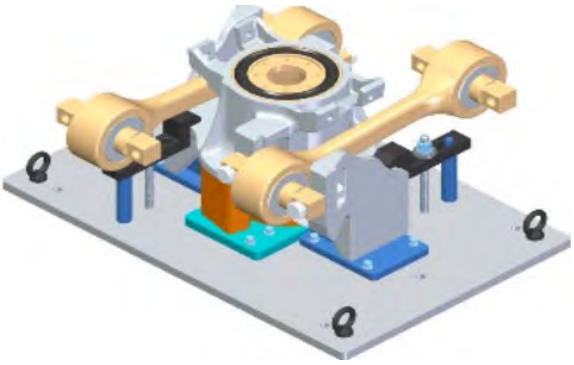
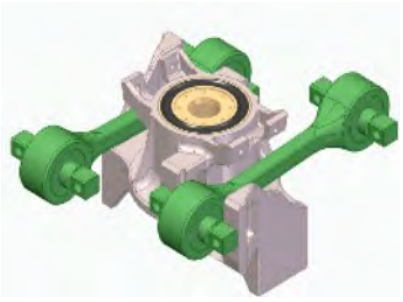
S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
12.	Lift and Turn device (Bogie Frame Manipulator)		Holding and rotating bogie frame for various shop schedule activities
	 		
13.	Surface Table		Bogie frame trammeling
14.	Portable wheel profile measurement device	Rly Board letter no. 2023/M(C)/60/1 dated. 4.12.2024	
			
15.	Height Control Device (T9)		Height adjustment of traction gearbox after installing to bogie
			
16.	Spectro Analyser		Traction gearbox oil analysis
17.	Portable Digital Ultrasonic Flaw Detector		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
18.	Press		Bearing Installation and Removal
	 Press		
	 Mounting Press		
	 Dismounting Press & Dead Blow Hammer		
19.	Axle and Equipment Assembly Fixture (Phonic Wheel Centering)	SPMAET18BOGIE1140 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	  		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
20.	Air Spring Ejection From Carbody Fixture	SPMAET18BOGIE1142 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
			
21.	Air Spring Ejection From Bogie Fixture	SPMAET18BOGIE1145 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
			
22.	High-Pressurized Grease Gun	Pneumatic or Electrically Operated	Greasing for Stabiliser Assembly (Anti-Roll Bar), Traction Motor,
23.	Anti-Roll Bar Assembly Fixture	SPMAET18BOGIE1138 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
24.	Anti-Roll Bar Bearing Ejection Fixture	SPMAET18BOGIE1149 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
25.	Control Arm Bearing Bush ejection Fixture	SPMAET18BOGIE1146 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
26.	Bogie Disassembly Fixture	SPMAET18BOGIE1144 Ref: Jigs & Fixture List by Medha Bogie Private Limited	Control Arm Disassembly From Bogie
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
27.	Control Arm Bush Ejection Fixture	SPMAET18BOGIE1147 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
28.	Control Arm Assembly Fixture	SPMAET18BOGIE1136 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
29.	Traction Center Assembly Fixture	SPMAET18BOGIE1143 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
30.	Traction Center CP Bush Ejection Fixture	SPMAET18BOGIE1148 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
31.	Traction Center Assembly Fixture	SPMAET18BOGIE1137 Ref: Jigs & Fixture List by Medha Bogie Private Limited	
	 		
32.	Load deflection test machine		Testing of coil springs
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
33.	Damper Testing Machine		Testing of dampers
			
34.	Industrial Acoustic Imager		To identify leaks in the pneumatic system.
			
35.	Borescope Camera		Inspection of restricted access locations.
			
36.	Dew point meter		Dew point measurement in air dryer
37.	USB Serial RS232 converter		For data download from aspiration smoke detection unit

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
			
38.	Flowmeter/Anemometer		Flow rate measurement for FSDS
39.	Handheld programmer		For checking point-type smoke detector
	 **Handheld Programmer**		
40.	Sensor Removal Tool		For replacement of smoke chamber in point-type smoke detector.
	 **Sensor Removal Tool**		
41.	All-in-one tester (smoke & heat)		Smoke & Heat testing
42.	Functional Tester—Aspiration Smoke		Smoke testing in aspiration smoke detector
	 **Smoke Detector Electronic Tester**		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
43.	Heat-Activated Wire Test Jig		Hot-wire test
44.	**All type of welding & cutting equipment :** ● Air Plasma Cutting Equipment, ● Inverter-based MIG/MAG Synergic and MMA Inverter-Based Welding Plant with air-cooled torch ● MIG/MAG Synergic pulse portable welding plant with air-cooled torch ● Portable Rectifier Inverter Based (IGBT) 200A (Single Phase), etc.		
45.	**All types of hand tool's :** hammer, mallets, screwdrivers, spanners, Allen keys, impact wrenches, digital torque wrenches, etc.		
46.	**All types of measurement instruments:** stopwatch, filler gauge, measuring tape, digital air pressure gauge, etc.		
47.	**All types of material handling and stacking equipment**: trolleys, pallets, mat bins, store stackable bins, hand trolleys, nylon belts, hooks, suction pads etc.		
48.	**All types of cleaning & collecting equipment:** ● Industrial Vacuum Cleaner ● High-pressure jet cleaning machine ● Component cleaning benches ● Trolley-Mounted Mobile Sewage Evacuation Machine ● Waste oil collectors, etc.		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
	Electrical		
49.	HV Test Bench	0 - 100 KV output, leakage current measurement	High - voltage testing for VCBs
			
50.	Pantograph Test Bench	Automated test cycles, IEC EN 50206-1 compliant, report generation, visual/audible alerts	Automated pantograph testing (mechanical & electrical)
51.	Transformer oil filtration plant	1000-1500 LPH capacity	For Main Transformer Oil Filtration
			
52.	Fully Automatic Oil BDV Tester	Capacity up to 100 kV	For main Transformer Oil BDV measurement
	 		

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
53.	DGA oil Analysis equipment	Three column gas chromatograph latest model available in the market as per IS:10593:2023 & 9434:2019 and other associated equipment as per RDSO/ELRS/SMI/138, Rev.1.-2024	for transformer oil DGA analysis
			
54.	Thermal Imaging Camera / scanner	Detection temperature anomalies, IR camera, 160 X 120 pixels or higher image storage	Hotspot detection, electrical inspection
			
55.	Light load run test facilities for traction motor (VVVF drive)	For run test of single motor	
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
56.	VVVF Drive for Bogie Run Test with Bogie Fixture for Bogie placement	3-Phase 415 Volt, 37 kW(50HP), 72 Amp Drive	For motorized Bogie Run Test
			
57.	Industrial vacuum cleaner wet and Dry Duty Cleaning	for dry and wet cleaning	
			
58.	Digital Anemometer	B-201 or similar	for measuring air velocity at filters of LTC
	 		

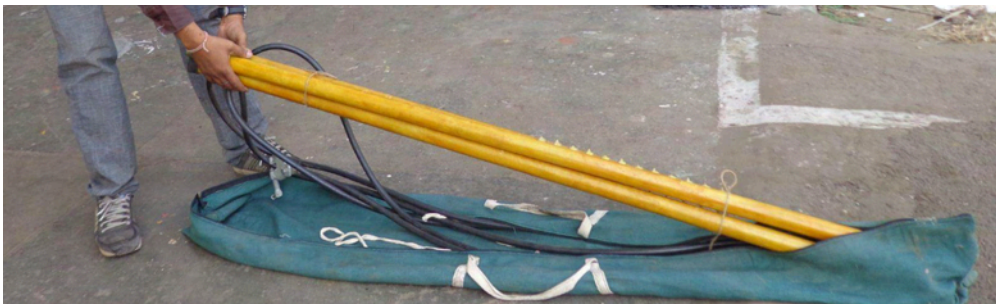
S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
59.	THRC test kit (Leakage Current Meter)	For testing of Residual Life Assessment of Surge Arresters	
			
60.	LCR meter	for precise measurement of winding resistance, capacitors and inductors.	
			
61.	Digital Insulation Tester	250V(Min), 5000V(Max)	For various Meggering of electrical equipment like TM, PT, etc.
			
62.	Pressure jet cleaner	For cleaning of air filters, radiators etc.	
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
63.	Static Baking Oven	Three phase of suitable size, Max temperature 200 degree C	For drying traction motors and other equipment
			
64.	Electric oven, small	three-phase, 415 V, 50 Hz, Max temperature 200 degree	For heating silica gel, welding rods, etc.
			
65.	Shock Pulse Meter with software	BVT-111 or similar	For TM Bogie Run Test
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
66.	Infrared Thermometer	-50°C to 550°C	For Temp recording in TM testing
	 		
67.	Digital Clamp Meter	400 A 600 V	For ETL work
	 		
68.	Digital Multimeter	1000 Volt	For ETL work
	 		
69.	Digital Lux Meter	400 k Lux with Data Logger	For Electrical Train Lighting work

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
	 		
70.	Sound Level Meter	30 to 130 dB with Data Logger	For noise measurement
	 		
71.	Digital tachometer with totalizer/counter	2 to 99,999 RPM, 5-digit LCD display sampling time 0.5 sec	For RPM measurement during the drive run test of TM
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
72.	Variable Speed Heat Gun	2000 Watt , 90-600 C	For cable sleeve work
			
73.	Arm Extractor Tool		Wiper arm extraction
			
74.	Air Blower	500-1000W	for cleaning purpose
			
75.	Hydraulic Crimping Tool	25 to 400 sq mm	For cable lug crimping
			

S.N	M&Ps, Tools, Jigs & Fixtures	Specifications	Remarks
76.	Discharge Rod	FRP telescopic, 11Kv - 400 KV, clamp type, 6m+ length, 10 -20m earthing cable, IEC 1230/1235 compliant.	Safely discharging residual voltage from OHE/ equipment
			

Note: ***The above list and images of M&P, tools and fixtures are only indicative. Railways may procure any other tools/equipment/M&Ps/fixtures as per requirement.***

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