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7 Section 2.4: Maintenance Checklists for "B4" Service Check

7.1 Sub-Section: 2.4.1 "B4" Service Checklist


Title : B4 Service Check list		Checklist No: 3C-02-04-01	
Note: This Checklist for 'B4' Service Checks should be applied to the running distance or service time period elapsed, since the last Car Overhaul.		Running Distance	Service Time
Maintenance Interval:		Approx. 72K km	180 days
Maintenance Tolerance:		± 2.0 kkm	Approx. ±7 days
Downtime	Man Power	Skill Requirements	
16 hours	16 persons per train	Mechanical & Electrical	
Train No.		Date and Time	
Checked by		Approved by	
1 Tools and Equipments Torque Wrench (120N) Markers Multi tester Torches Spanners Dust clothes Radio (3EA) Sandpapers			

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<p>Safety Helmet</p> <p>Safety Vest</p> <p>Paint Brush (for VVVF Arc Shoot Clean)</p> <p>Hand gloves</p>								
Task No	Equipment	Maintenance Actions	MWI No.	Car Applicability			Result	Remark
				DM	T	M		
Inspection (Without DC & AC Power)								
Work Preparation								
1. Wear the Safety Helmet For U/F Working 2. Wear the Safety Vest 3. Switch off all Units 4. Isolate and earth the third rail power supply line 5. Ensure that MR pressure is normal(8 to 10 bar)								
Task 1. Underfloor								
1	Low Tension Junction Box	1 Visually check if the component is damaged or deteriorated. 2 Inspect that bolts of Terminal Block and Receptacle have not loosened. 3 Inspect that the component labelling are existing. 4 Check the cable connection state.	3C-80131-01	X	X	X		

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2	High Tension Junction Box	1. Visually check if the component is damaged or deteriorated. 2. Inspect that bolts of Terminal Block and Receptacle have not loosened. 3. Inspect that the component labelling are existing. 4. Check the cable connection state.	3C-80132-01	X	X	X		
3	Traction Motor Junction Box	1. Visually check if the component is damaged or deteriorated. 2. Check if Receptacle is fastened. 3. Inspect that the component labelling are existing.	3C-80133-01	X		X		
4	Bogie	1 Visually check the following for damage and safety a. All earth cables (body/bogie and journal box/frame). b. Axle end earth cables. 2 Visually check the Journal box for sign of overheating (eg. discoloration, paint blisters, any grease leakage from the rear of the	3C-KM310-01	X	X	X		

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		<p>journal box)</p> <p>3 Visually Check Journal box for mechanical damage or cracks</p> <p>4 Visually Check the safety of front covers and the integrity of the cover seal, fixations with torque mark</p> <p>5 To ensure torque mark in all Bogie mounted equipment</p>						
5	Brake Calliper Unit	<p>1. Visual Inspection of brake calliper unit for damage, safety, fixations with torque marks</p> <p>2. Poke out the breather hole with a rod-like tool.</p> <p>3. Inspect the brake calliper unit, especially the bellows, for damage.</p>	3C-KM316-01	X	X	X		
6	Centre pivot	<p>1. Visually Check fixations with its torque marks</p> <p>2. Casting defects and cracks</p>		X	X	X		
7	Mono link	<p>1. Visually check for cracks and spherical bush for damage.</p> <p>2. Visually Check fixation and its torque mark</p>	3C-KM313-02	X	X	X		
8	Anti-roll bar system	<ul style="list-style-type: none"> Visually check for 	3C-KM335-01	X	X	X		

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		any damage <ul style="list-style-type: none"> Check all fixings are present and secure with torque mark 						
9	Lateral Buffer Stop	1. Visually check each rubber buffer stop for crack or any de-bonding of the rubber. 2. Check fixation and torque mark	3C-KM313-04	X	X	X		
10	Lateral and Vertical Damper	1. Visual check for any damage & oil leakage and clean 2. Check rubber bushes for de-bonding 3. Check fixation and torque mark	3C-KM313-06, KM333-01,02	X	X	X		
11	Driving Gear	Visual Inspection 1. The axle gearbox oil leakage and check oil level 2. The axle gearbox for visible damage. 3. The spherical bearings of the torque arm for cracks 4. Check Flexible coupling 5. Cleaning of Gear Box	3C-KM315-01,02	X		X		
12	Brake Pad	1. Inspect pads worn irregularly. 2. Check that no pad may be thinner than 5mm at any point.	3C-KM316-03	X	X	X		

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13	BC Hose Pipes (hose to brake cylinder)	1. Inspect visually the hose pipe connection for outward damage and cracking.	3C-KM316-07	X	X	X		
14	BC Hose Pipes (Flexible hose to brake cylinder)	1. Inspect the hose pipe connection for outward damage and cracking.	3C-KM611-25	X	X	X		
15	Air Reservoir – Visual Inspection	1. Inspect the air reservoir for outward damage. 2. Exchange the air reservoir immediately if the inspection of the circumferential and longitudinal welds reveal any cracking. 3. Check the reservoir connections. The fittings screwed into the reservoir connections must be either stainless steel or galvanised steel. No other kind of fitting is allowed. 4. Check any air leakage from the fittings connected to the reservoir by using soap water. Tighten the fittings immediately if there is air leak. 5. The fasteners holding the air reservoir on board	3C-KM613-06	X	X	X		

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		<p>the vehicle must fit tightly. The strap holding the air reservoir must fit tightly.</p> <p>6. The water collected must be drained from the air reservoir by its water drain after specified time periods.</p>						
16	Hose Pipe – Visual Inspection	<p>1. Inspect the hose pipes for outward damage and cracking.</p> <p>2. Exchange any hose pipe found to be damaged.</p> <p>3. Test the hose pipes for leakage at their points of connection.</p>	3C-KM615-04	X	X			
17	Wheel set	<p>[Axle] Visual Inspection</p> <p>1. The axles for any signs of corrosion, surface damage, poor paint adherence, blistered paint.</p> <p>2. There is no debris lodged between the traction motors and motor axles.</p> <p>3. Rust on axles</p> <p>[Wheel] Inspect</p> <p>4. Measure Wheel diameter and Deviation from true running (New</p>	3C-KM320-01	X	X	X		

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		diameter 860mm (+0.5 / -0) condemn 780mm) 5. Measure wheel profile i. Flange Thickness, new – 32.5mm condemn 22mm ii. Flange Height – min 28 mm, max – 36 mm iii. Gradient not less than 6.5 mm 6. Visual check wheel profile for crack, grooves, skid, metal out on tread						
18	Conical Spring (Primary Spring)	1. Visual Inspection for bonding failure & any mechanical damage 2. Visual Inspection of fixations and torque mark 3. Check the crown height(H) 45 ± 5 mm. Check if the height difference(A) in a bogie is within 3mm 4. Check to see if it has cracks of size more than about 10% of adhesion area 5. Check to see if a crack have grown	3C-KM331-01	X	X	X		

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		deeper than 3 mm throughout						
19	Air Spring	Inspect 1. The external rubber surface for damage and cracks. 2. Clean dirt or oil deposits from the air spring using clean water. 3. Check for any audible sound	3C-KM332-02	X	X	X		
20	Flange Lubricator System	1. Check the position of wheel flange lubricator. 2. Check the free movement of sticks in the applicator case. 3. Inspect the wheel flange lubricator system for wear and crack. 4. Measure the amount of the stick.	3C-KM336-01	X	X	X		
21	Flange Lubricator System	1. The angle that is made between the applicator and the flat on the back of the wheel should be: $\Theta = 55^\circ$ 2. The distance between the dispensing end of the applicator and the wheel flange should be as per dimension "F" and "T" shown in Fig. MM-03-03-06-02,	3C-KM336-02	X	X	X		

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		where: F = 13.5 mm -0+2 T = 6.5 mm -0+2						
22	Gangway half	Check the following. 1. Gap free fit of adjacent couple frames 2. Gap free fit of screw-on frame 3. Outer seal (transparent Elastosil Eplus) between couple frame and screw-on profile of outer corrugated bellows is existing 4. Free movement of floor flaps of bridge plates 5. Velcro correctly and accurately attached 6. Car floor level levelled with gangway floor level	3C-80410-01	X	X	X		
23	Levelling Valve and Installation rod	1. Ensure that MR pressure is normal (8 to 10 bar). 2. Close the concerned cock L05.1 and L05.2 (marked as ASCO) at both bogies. 3. Discharge both air springs by operating the drain cocks (L09.1) mounted at the bottom of surge reservoirs (L09) at both bogies.	3C-KM334-01	X	X	X		

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		<p>4. Close the drain cocks (L09.1) and open the concerned cock L05.1 and L05.2</p> <p>5. Check if the lever of levelling valve is moving upward and stops when the lever is parallel to axis "x"</p> <p>6. Measure Installation rod Height (300±3mm)</p>						
24	Front Automatic Coupler	<p>1. Rough cleaning</p> <p>2. Visual check for damage</p> <p>3. Check the coupler head for damages, rust or sign of wear.</p> <p>4. Visual check of tension spring,</p> <p>5. Grease coupler head according to greasing plan</p> <p>6. Visual and audible check for Air pipe connection: Clean mouth pieces (socket and gasket)</p> <p>7. Inspect supporting device for any defect</p> <p>8. Visually check draft gear housing for any damages</p>	3C-80421-01	X				
25	Front Automatic Coupler	<p>1. Check coupler height (790mm) and inclination of coupler(±0.5°)according to the Fig.</p>	3C-80421-02	X				

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		MM-04-02-01-02 2. Inclination of coupler head is checked by placing spirit level on coupler head. 3. For adjustment of the couplers vertical position, turn the screw-nuts (Figure MM-04-02-01-02/ 1) of the spring supporting devices, till to the adjustment of $\pm 0.5^\circ$.						
26	Front Automatic Coupler	1. Check horizontal and vertical alignment of coupler by means of a level indicator and adjust by turning the screw nuts	3C-80421-03	X				
27	Intermediate Automatic Coupler(MC-MC)	1. Rough cleaning with rag for visual check 2. Visual check for damage, without uncoupling 3. Visual check of tension spring, 4. Visual and audible check for Air pipe connection: If leakage found then Clean mouth pieces (socket and gasket) 5. Inspect supporting device for any defect	3C-80422-01		X			

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		6. Visually check draft gear housing for any damages						
28	Intermediate Automatic Coupler (MC-MC)	1. Check coupler height (790mm) and inclination of coupler($\pm 0.5^\circ$) according to the Fig. MM-04-02-02-02 2. Inclination of coupler head is checked by placing spirit level on coupler head. 3. For adjustment of the couplers vertical position, turn the screw-nuts (Figure MM-04-02-02-02/ 1) of the spring supporting devices, till to the adjustment of $\pm 0.5^\circ$.	3C-80422-02			X		
29	Intermediate Automatic Coupler (MC-MC)	Check horizontal and vertical alignment of coupler by means of a level indicator and adjust by turning the screw nuts	3C-80422-03			X		
30	Semi-permanent Coupler (Muff Coupler)	1. Visual check for damage without uncoupling. 2. Visual and audible check for the air connections. 3. Check the supporting device for its position and any damage, if any.	3C-80423-01	X	X			

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		4. Visually check draft gear for any defect/damage 5. Check visually, if bores of muff are filled with grease						
31	MS Box	1. Check each part visually. 2. Loose bolts and screws. 3. Check that cover opens and closes normally. 4. There must not be loose or damage, the stain, and the installation screw in the box. 5. Wipe off with the moist cloth when the dirt of the cover is awful. 6. Retighten bolts and screws with proper Torque.	3C-152300A-02	X		X		
32	MS Box -2	1. Check each part visually. 2. Loose bolts and screws. 3. Check that cover opens and closes normally. 7. There must not be loose or damage, the stain, and the installation screw in the box. 8. Wipe off with the moist cloth when the dirt of the cover is awful.	3C-152300B-02	X		X		

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		9. Re-tighten bolts and screws with proper Torque.						
33	DC arrestor	1. Check for any sign of damage or looseness of the DC Arrestor Box. 2. Remove the bolts of the covers of DC Arrestor 3. Clean the porcelain surface with a damp cloth to remove any dirt. 4. Check visually the porcelain surface for any cracks. Replace if found. 5. Check by hand all high tension connections (Terminal lugs) for looseness. Torque if necessary. 6. Check by hand earth Connections (Terminal lugs) for looseness. Torque if necessary. 7. Measure the Insulation Resistance between the line terminal and earth terminal using a 500 Volt Megger .Confirm that the measured value is more than 100 mega ohms	3C-152200-01, 02	X		X		

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34	Filter Inductor	1. Check the mounting bolts and torque (343.35 Nm) 2. Check the mounting points for cracks or deformation. If there is any crack or deformation, repair it. 3. Check the main circuit cables HV512(L1), HV514(LL1), HV522(L2) and HV524(LL2) having any sign of insulation damage, deformation or bend. 4. Check the safety earth cables having any sign of insulation damage. 5. Check the terminal covers for cracks or deformation. If there is any crack or deformation, repair it. 6. Check the side covers for cracks or deformation. If there is any crack or deformation, repair it. 7. Check the frame covers for cracks or deformation. If there is any crack or deformation, repair it.	3C-152400-02	X		X		
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		8. Check the side covers for blockages or clogging of foreign materials. If there is any blockage or clogging of foreign materials, remove it.						
35	HSCB	1. Check the High Speed Circuit Breaker box for damage to the box, the covers, the fasteners and the FRP cover(Bolting torque value: 15N·m, M10 which is the torque value of FRP cover fixation bolt). 2. Check the connector is securely fitted. 3. Check the earth strap mounting point for signs of damage. 4. Check the earth strap for signs of damage. 5. If any damage is found, repair or replace the damaged part. 6. Checking of the mounting brackets (M12x 30L) and check the Torque (73.58 Nm)	3C-152100-02	X		X		
36	VVVF Inverter	1. Visually check condition of C/I box exterior,	3C-152500-03	X		X		

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		<p>covers ,rubber gasket of covers and locks for signs of damage, cracks or deformation</p> <p>2. Ensure that covers are correctly fitted and secured by the key locks</p> <p>3. Check mounting and safety brackets for signs of damage or cracks</p> <p>4. Check that the Interior condition of VVVF box is free from dirt and dust.</p> <p>5. Check that cooling fins with guide rods of VVVF power units are free from dust and dirt. Clean if required by a stiff brush.</p> <p>6. Check earth cables/straps for damage and ensure these are connected properly.</p> <p>7. Check connectors and pins for any sign of damage and ensure that no cable/wire is touching the body.</p>					
37	Brake Resistor	<p>a. Check that no bolts are evide</p>	3C-152600-03	X		X	

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		<p>ntly (visually) loose and no mechanical parts are damaged. If damages are noted, replace damaged parts on Work Instruction and tighten the bolts.</p> <p>b. Check that ceramic spacers and insulators are not visibly cracked. If a suspect</p>						
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		crack exists, check the insulation resistance and replace always damaged insulating materials according to Work Instruction. c. Check that no foreign bodies are present between resistor elements and inside resistor frame. If						
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		noted, remove them immediately.						
38	APS	1. Visually check condition of APS box exterior, covers, rubber gasket of covers and locks for signs of damage, cracks or deformation. 2. Ensure that covers are correctly fitted and secured by the key locks. 3. Check mounting and safety brackets for signs of damage or cracks. 4. Check that the Interior condition of APS box is free from dirt and dust. 5. Check earth cables/straps for damage and ensure these are connected properly. 6. Check connectors and pins for any sign of damage and ensure that no cable/wire is touching the body. 7. APS Filter cleaning	3C-171100-03		X			
39	Battery Control Box	1. Check to see if any of the components	3C-80721-01		X			

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	(BIS, Relay, contactor, Diode)	<p>are damaged or have deteriorated.</p> <p>2. Inspect the component mounting bolts to see if any have become loosened.</p> <p>3. Check if any label lettering is damaged or missing.</p> <p>4. Check that all cable connections are secure.</p> <p>5. Check that the component does not make any abnormal noises.</p>						
40	Battery Control Box	Low tension – Visual Inspection / Replace terminal block, Diode block, contatcor, Battery switch, current sensor, power supply and Interface PCB, Relay MCB.	3C-80721-02		X			
41	Main Air Compressor VV120	<p>Check if,</p> <p>1. The level has fallen below the bottom mark on the oil sight glass</p> <p>2. The level is so low that it may be expected by past experience to reach the bottom mark before the next maintenance appointment.</p>	3C-KM1011-01-01		X			
42	Main Air Compressor VV-120	1. Top up the oil if the level has fallen below the bottom	3C-KM1011-01-03		X			

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		mark on the oil sight glass. Or the level is so low that it may be expected by past experience to reach the bottom mark before the next maintenance appointment.						
43	Main Air Compressor VV-120	Check vacuum indicator to see if the air filter is dirty; Once a negative pressure of about 50 mbar is reached, the indicator plunger latches and still remains fully visible when the compressor is turned off. The air filter element must be exchanged in this case	3C-KM1011-01-02		X			
44	Hose pipe	Visually check for any damages, Replace if found defective	3C-KM10114-02		X			
45	Current Collector Device	1 Visual inspection of all components for damage and dirt 2 Check the right height of the Current Collector: H1=120mm (+0/-2) H2=201mm (±2) H3=221.5mm (±2) 3 Wear inspection of the collector shoe	3C-KM511-01	X		X		
46	Current Collector Device	1. Cleaning and inspection the Current Collector, Fuse box and	3C-KM511-02	X		X		

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		Connection box.						
		2. Inspect all components for proper seating.						
		3. Check the function of the latching mechanism.						

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Task 2. Cab									
47	DC-DC Converter Panel	1. Check to see if the component is damaged or deteriorated. 2. Inspect the bolts of the DC-DC converter to see if any have loosened. 3. Inspect that the component labelling are existing. 4. Check the cable connection state. 5. Check to see if the dc-dc converter makes a noise.	3C-117000-01	X		X			
48	Relay Panel	1. Check to see if the component is damaged or deteriorated. 2. Inspect the bolts of the relay and contactor to see if any have loosened. 3. Inspect that the component labelling are existing. 4. Check the cable connection state. 5. Check to see if the relay and contactor make a noise.	3C-114000-01	X					

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49	Footrest Ass'y	Inspect 1. The safety of the footrest fixings. 2. The footrest functions normally.	3C-80242-03	X				
50	Miniature Circuit Breaker Panel	Inspect 1. The component is damaged or deteriorated 2. The MCB is secured in the DIN rail 3. The letters of any label are missing 4. The condition of the cable connection	3C-KM243-01	X				
51	Driver's Seat	Inspect the safety of the seat frame fastenings and the seat mounted equipment fastenings Test 1. Unfolding/folding 2. Horizontal sliding 3. Vertical height adjustment 4. Arm rest rotation	3C-80244-01	X				
52	Auxiliary Seat	Inspect the safety of the seat frame fastenings and the brackets fastenings Test unfolding/folding	3C-80245-01	X				
53	Cab-Accessories Inspection	The fire extinguisher is clamped to a stainless steel bracket, which is secured to the driver's desk by hex. head screws. The Sun-Blind	3C-80246-01	X				

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		assembly is secured to cab front upper panel by the hexagon bolts. Examination of the accessories is limited to a visual inspection and checking the safety of all fastenings.						
54	Wiper Arm	<p>Check wiper arm connecting rod assembly for proper position and damage.</p> <p>Lubricate all moving parts with universal grease</p> <ol style="list-style-type: none"> 1. The cone boring between the wiper arm and wiper bearing or bearing pin. 2. The moving surfaces between the wiper arm and wiper blade, and also on the mating surfaces of the tension spring.. 	3C-80247-02	X				
55	Wiper Blade	<p>Swing back the wiper arm from the windscreen</p> <p>Inspect</p> <ol style="list-style-type: none"> 1. Wiper blade for wear and external damage 2. Rubber lip for damage 3. The joints of wiper blade for free movement 4. The joint bolt used to fasten wiper blade to the wiper 	3C-80247-05	X				

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		arm must be correctly fastened.						
56	Washer tank	1. Unscrew cap, and fill washer tank to the very top mark with the washing liquid (R/O water) 2. Screw on cap tight again by hand	3C-80247-08	X				
57	Traction Motor	1. Clean wire net filter of air Inlet box by stiff Nylon brush or blowing compressed air (4 bar) over it. 2. Check lead wire for damage, Inspection cover and motor exterior. 3. Visually Check grease leakage from bearing surface. 4. Check all fixing bolts are loose or missing	3C-80523-01	X		X		
58	PWM generator	1. Visually check the PWM Generator unit for signs of damage. 2. Check Connector and cable for any sign of damage or loose connection. 3. Check PWM box cover and fasteners for proper fitment. 4. Check for provision of earthing connection.	3C-153100-01	X				

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58	PA & PIS	1. TFT Display walk through test TFT Display – 18.5" – Functional test v. Go to the PAPIS HMI and select 'START TFT TEST' button in the 'TESTING ADVANCED FUNCTIONS' tab. vi. Check if TFT Display is emitting the test pattern. 2. Check PA/PIS, CCTV healthiness from PAPIS HMI by selecting 'DEVICE OVERVIEW ADVANCED FUNCTIONS' and by selecting one by one every individual subsystem of PAPIS/CCTV showing in the screen for every coach. If showing Green, it implies healthy, if showing Red, implies unhealthy and should be got attended.	3C-KM-12-01-01	X	X	X		
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59	PA & PIS	1. Activate self-test through MCP and check any failures on MCP display . 2. Checking of manual announcement by MCP a. Press INT button on master MCP and check PA mode enable during PTT switch pressing b. Check announcement is executed from all loudspeakers (Internal and external) clearly 3. Check on manual announcement by ACP a. Push PTT to speak to the microphone of ACP. b. Check announcement is executed from all internal loudspeakers at clearly. 4. Check on Cab - Cab intercommunication by MCP a. Check that MCP becomes to CAB mode when the	3C-KM-12-01-02,03	X	X	X		
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		<p>CREW CALL (C-C) button is pressed.</p> <p>b. CREW CALL button is blinking on MCP in leading (Occupied) and slave (that is non occupied) side</p> <p>c. Check that audible alarm is sounding in slave MCP.</p> <p>d. Press blinking button when the CREW CALL button is lit.</p> <p>e. Check that CAB/CAB intercommunication can be made.</p> <p>5. Check on Cab - Cab intercommunication by ACP</p> <p>a. Press CREW CALL (C-C) button on leading cab..</p> <p>b. C-C button is blinking on ACP in master and slave (non occupied) side.</p> <p>c. Check that audible alarm is sounding in slave (non occupied cab).</p> <p>d. Press blinking</p>						
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		button when the C-C button is lit. e. Check that CAB/CAB intercommunication can be made.						
60	PA & PIS	PEAU, PAD push button – Functional test Perform intercom from every PEAU	3C-KM-12-01-04,05	X	X	X		
61	PA & PIS	Interior Speaker - Audio walk through test – 1. Go to the HMI and select 'START PRM TEST' button in the 'TESTING ADVANCED FUNCTIONS' tab. 2. Walk through the complete train interior and check if every audio device is emitting the test tone in interior speakers.	3C-KM-12-01-06	X				
62	PA & PIS	Exterior Speaker - Audio walk through test – 1. Go to the HMI and select 'START test PRM' button in the 'TESTING .. ADVANCED FUNCTIONS' tab 2. Walk left & right outside (left & right) the complete train and check if every audio device is emitting the test	3C-KM-12-01-07	X	X	X		

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		tone in exterior speakers (left & right)						
63	PA & PIS	<p>iCom & FDI</p> <p>Function check through PIS HMI by selecting any one route from 'List of Journeys' for Manual Announcement in train. Check if this is launched in the system and also check if station announcement is happening.</p> <p>Check if Front destination indicator is emitting the Destination Station.</p>	3C-KM-12-01-09	X				
64	PA & PIS	<p>PIS HMI Functional test - Network Check:</p> <p>Use the TGUT to check if all devices are online</p> <p>a. One single device not discovered could mean a failure of the devices itself of a rupture in the cable between the switch and the device or a switch port not working.</p> <p>b. Multiple devices that are on the same IP cable in failure could mean that one of the</p>	3C-KM-12-01-10	X				

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		<p>devices is blocking the communication or a rupture in the cable between the switch and the first device or a switch port not working.</p> <p>c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.</p>						
65	PA & PIS	<p>Microphone + PTT – Functional test</p> <p>Audio function test:</p> <ol style="list-style-type: none"> 1. Perform a PA from every ACP 2. Perform a PA from every microphone 3. Perform a PA from OCC / BCC 4. Perform cab-to-cab intercom 5. Perform intercom from every ACP 6. Perform intercom from every PEAU 	3C-KM-12-01-13	X				
66	PA & PIS	<p>Switch 28 ports – Functional test</p> <p>Network Check:</p> <p>Use the TGUT to check if all devices are online</p> <p>a. One single device not discovered could mean a failure of the devices itself of a rupture in the cable</p>	3C-KM-12-02-01	X		X		

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		<p>between the switch and the device or a switch port not working.</p> <p>b. Multiple devices that are on the same ip cable in failure could mean that one of the devices is blocking the communication or a rupture in the cable between the switch and the first device or a switch port not working.</p> <p>c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.</p>						
67	PA & PIS	<p>Switch 16 ports – Functional test</p> <p>Network Check:</p> <p>Use the TGUT to check if all devices are online</p> <p>a. One single device not discovered could mean a failure of the devices itself of a rupture in the cable between the switch and the device or a switch port not working.</p> <p>b. Multiple devices that are on the same ip cable in failure could mean</p>	3C-KM-12-02-02		X			

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		<p>that one of the devices is blocking the communication or a rupture in the cable between the switch and the first device or a switch port not working.</p> <p>c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.</p>						
68	PA & PIS	<p>Coupler box – Functional test</p> <p>Network Check:</p> <p>Use the TGUT to check if all devices are online</p> <p>a. One single device not discovered could mean a failure of the devices itself of a rupture in the cable between the switch and the device or a switch port not working.</p> <p>b. Multiple devices that are on the same ip cable in failure could mean that one of the devices is blocking the communication or a rupture in the cable between the switch and the first device or a switch port not working.</p>	3C-KM-12-02-03	X				

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		c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.						
69	PA & PIS	DVR, CCTV HMI Functional Test – CCTV test 1. Go to the HMI and check the view on few cameras.	3C-KM-12-03-01,04	X				
70	PA & PIS	Saloon camera Functional Test – CCTV test 1. Go to the HMI and check the view on each camera.	3C-KM-12-03-02	X	X	X		
71	PA & PIS	Exterior camera Functional Test – CCTV test 1. Go to the HMI and check the view on each camera.	3C-KM-12-03-03	X		X		
72	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. TFT Display 18.5” 2. PEAU 3. PAD push button 4. Saloon camera	3C-KM-12-01-01, 04, 05 3C-KM-12-03-02	X	X	X		
73	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. ACP 2. PIS HMI 3. Microphone + PTT 4. Digital Video	3C-KM-12-01-02, 10,13 3C-KM-12-03-01,04	X				

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		Recorder (DVR)						
		5. CCTV HMI						
74	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. External camera	3C-KM-12-03-03	X		X		
75	Cab Side Door	1. Check for mounting of cab door limit switch 2. With the cab side door closed and from inside the cab, check rotation the main lock handle on the cab side door between in and out. 3. Check that the door unlocks and can be opened into the cab. 4. Check that the main lock springs back when the handle is released in the door open position. 5. Close the door and check that it closes correctly. 6. Check the door is manually operated door type. 7. Check the Two rollers connected with panel and those operate on the upper track rail. 8. Check the The bottom guides are operated on bottom rail simultaneously with the action of the two rollers.	3C-80820-01	X				

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		<p>9. Check the door can withstand rough handling including slam-open and slam close by operation and maintenance personnel.</p> <p>10. Check the stoppers are possible to completely buff for opening power.</p> <p>11. Check the Auto-Locking mechanism</p> <p>12. Check for play in doors</p> <p>13. Visually check if there are any damaged areas on the access panel.</p> <p>14. Check door status on TCMS</p>						
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Task 3. Interior								
76	Electrical Distribution Board (EDB)	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of Relay and Contactor have loosened 3. Check if MCB and Diode fasten in DIN Rail. 4. Check that the letter of label is removed. 5. Check the cable connection state. 6. Check if Relay and Contactor make a noise.	3C-80140-01		X	X		
77	Passenger Seat	Inspect 1. Outer surfaces for damage or scratching 2. Seat pans, seat lower covers and seat brackets to ensure safety of mountings 3. Major scratches or cracks of the rubber seal between the seat back and the window panel, and also between the seat edge and the draught screen glazing panel	3C-80238-01	X	X	X		
78	Grab pole & Rail	Inspect	3C-80239-01	X	X	X		

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		1. The grab pole and grabrail outer surfaces for damage or scratching 2. Any tube or parts shows a major permanent deformation 3. Any slack fixing screws or bolts 4. A fracture over 3 mm in length						
79	Doorway Gangway & grab handle	Inspect 1. The doorway grab handle outer surfaces for damage or scratching 2. Any tube or parts shows a major permanent deformation 3. Any slack fixing screws or bolts 4. A fracture over 3 mm in length	3C-80239-07	X	X	X		
82	Strap hanger	Inspect the joint between the strap hanger and grabrail for any slack fixing bolts.	3C-80239-10	X	X	X		
83	Draught screen Glasses	Inspect 1. The condition of the draught screen glass. 2. The condition of the fixing of the upper and lower parts of the draught screen	3C-80239-12	X	X	X		

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		glass for any slack fixing bolts and/or rubber packing						
84	Bulkhead panels	Inspect 1. The condition of the bulkhead panel paint of the surface for any scratches 2. The condition of the bulkhead panel fixings for any slack fixing	3C-80239-14	X	X	X		
85	Fire Extinguisher	1. Ensure the extinguisher is properly located in plain view and its access is unobstructed. 2. Visually check unit for any signs of corrosion, leakage or physical damage. 3. Ensure the nameplate is secure and legible and that operating instructions face outward. 4. Ensure visual inspection safety clip is in place and intact. 5. Visually check the discharge hose to ensure it is not damaged or obstructed. 6. Date and initial the inspection tag and keep a record. 7. Check for expire date.	3C-8023B-01	X	X	X		

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86	Fire Extinguisher	1. Clean the exterior of the Fire Extinguisher, polish the painted portion with wax polish, the brass/gun metal parts with metal polish, chromium parts with silver polish and plastic parts to be thoroughly washed with soap solution and dried in sun. 2. Check the nozzle outlets and vent holes as well as threaded portion of the valve for clogging and check the valve is clean and moving freely. 3. Ensure the cap washer is intact and also grease the threads of the valve, etc and wipe clean. 4. Make sure that the extinguisher is in proper condition and is not accidentally discharged. 5. Ensure that the pointer in the pressure gauge are in green zone, if not send it for refilling. 6. Maintenance shall be carried out by professional firemen. 7. Keep a record of	3C-8023B-02	X	X	X		
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		last maintenance check and expire date.						
87	Double corrugated bellows, compl.	Inspect 1. Damages, cuts or tears in the fabric 2. Broken bellows frames 3. Worn sealing profiles 4. Evenly fitting on couple frames and screw-on frame	3C-80411-01, 02	X	X			
88	Bridge plate, compl.Car side	Inspect 1. Sluggishness of rod hinge by carefully moving the floor flap up and down 2. Bridge plates resting correctly on couple frame sided bridge plate 3. Sliding ledge worn	3C-80412-01	X	X			
89	Passenger Saloon Door	1. Open/close the Passenger Saloon doors by pressing push buttons 2. Check the results on TMS Display 3. While Opening and closing door, check that doors open and close without obstruction.	3C-80810-01	X	X	X		
90	Passenger Saloon Door	1. Check function of obstruction detection. 2. Check the indication of	3C-80810-02	X	X	X		

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		obstruction detection. 3. Check the door movement monitor in opening direction. 4. Check, if all securing elements of drive and limit switches are intact 5. Check, if sealing wax(torque marking) at mounting screws is intact. 6. Check the pull arms for mechanical damage. 7. Check drive unit. 8. Check the wiring and electrical attachments. 9. Check emergency access device manually. 10. Check emergency egress device manually 11. Check the mechanical door cut out.						
91	Saloon to Cab Door (Partition door)	1. With the partition door closed, Check the hinged single leaf is located on right side of walkway from saloon side. 2. Check that the door unlocks and	3C-80830-01	X				

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		<p>can be opened into the saloon.</p> <p>3. Check that this leaf consists of a door handle located on cab side</p> <p>4. Close the door and check that it met correctly between tongue of locking door and limit switch.</p> <p>5. With the partition door closed, Check the door leaf is opened into the saloon by a square key form the saloon side.</p> <p>6. Check that the door can be locked, bolted or wedged from either side of the door to prevent opening.</p> <p>7. Check that the visual and audible alarm is turned on automatically when Saloon to cab door in the unoccupied cab is opened.</p> <p>8. Check the door leaf is normally kept closed with the partition wall.</p> <p>9. Check the door is mounted on a vertical structure in back wall cubicle by full piano hinge</p> <p>10. Visually check if there are any</p>						
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		damaged areas on the access panel. 11. Check the partition door status of TMS 12. Check the Partition door lock / open / close function and status on TCMS.						
Task 4. Exterior								
92	Windows	Check if the window glasses (Windscreen and Body side windows glasses) are broken or cracked, or the glazing sealing is damaged	3C-80221-01	X	X	X		
93	Bridge plate, compl. couple frame side	Visually check 1. For tears and holes in fabric 2. To see if couple frames do not evenly fit 3. Sliding ledge worn/damaged	3C-80413-01	X	X			

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Task 5. Roof								
94	VAC 3 phase 415V AC & 110V DC Power Plug (Saloon and Cab)	1. Inspect the 110V connector located on the panel. Check that it is locked in position. 2. Ensure no force has been used to connector in 110 V DC power cable and there is no existing physical or structural damage. 3. After visual inspection turn ON main control switch, and start the unit. Ensure the unit is operable. 4. Inspect the three-phase connector located on the panel. Check that it is locked in position. 5. Check that there are no loose pins in the insert module. 6. After visual inspection turn ON main control switch, and start the unit. Ensure the unit is operable.	3C-191130-01 3C-192127-01	X X	X	X		
95	VAC (Saloon and Cab)	1. With power applied to the electrical cubicle, check that there are NO faults are available in TCMS	3C-191110-03 3C-192110-01	X X	X	X		

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		2. Check that the sight glass is full (colour change). 3. Run the VAC in Normal AUTO mode and observe any unusual noise in any VAC 4. Operate VAC in Normal AUTO mode and physically check whether air conditioning appears to be normal. Also, check and record the temperature readings corresponding to each VAC from TCMS VDU. 5. Check CAB VAC operations in all modes by operating Rotary switch						
96	VAC (Saloon and Cab)	1. Check the tray and drain under evaporator coil to see if any debris is found clean the tray and drain. 2. Check and clean if necessary drains in the condenser coil compartment	3C-191110-04 3C-192110-02	X X	X X	X X		
97	VAC- Saloon	Fresh air filter cleaning	3C-191120-01	X	X	X		
98	VAC- Saloon	Return air filter cleaning	3C-191121-01	X	X	X		
99	VAC- Cab	Mixed air filter	3C-192120-01	X				

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		cleaning						
100	Evaporator Coil (Saloon & Cab)	Inspection and Cleaning 1. Inspect the evaporator compartment for any damage. 2. Inspect the evaporator coil for any damage to the fins or copper tube 3. Clean the evaporator coil by using industrial cleaner BEML recommends (3M - Evaporator cleaner & Disinfectant) / shiny coil cleaner	3C-191113-01 3C-192113-01	X X	X	X		
101	Condenser Coil (Saloon & Cab)	Inspection and Cleaning 1. Inspect the condenser compartment for any damage. 2. Inspect the condenser coil for any damage to the fins or copper tube 3. Clean the condenser coil by using industrial cleaner. (BEML recommends (3M - Evaporator cleaner & Disinfectant) / shiny coil cleaner	3C-191112-01,02 3C-192112-01	X X	X	X		

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Task 6. Functional Checks								
102	Brake System	1. Check the Brake page on TCMS monitor 2. Inspect MR Pressure (8 to 10 bar) and BP pressure (5 bar) from gauges in the Cab.	3C-KM610-01	X				
103	Brake System	1. Check that brake equipment is working without any abnormal noise 2. Check that each isolation cock is working properly. 3. Check that air hose (BC hose, Parking hose etc) is not detect any damage. 4. Check that EBCU is not display any fault. 5. Check that pressure gauge in the cab working properly.	3C-KM610-02	X	X	X	.	
104	Brake System	1. Parking Brake test a. Press Parking Brake Apply push button, on operation panel. b. Ensure the Parking Brake Apply push button illuminate. c. Press Parking	3C-KM610-03	X				

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		<p>Brake Release push button, on operation panel.</p> <p>d. Ensure that Parking Brake Apply push button goes off.</p> <p>2. Service Brake test</p> <p>a. Ensure that main reservoir pressure gauge in the cab indicates between 7.5 bar and 10 bars.</p> <p>b. Move MASCON to brake position. Check that brake cylinder (BC) pressure gauge in the cab increase around 2.5 bar (+/- 0.25bar) and Brake Pipe (BP) pressure gauge in the Cab read 5.0 bars.</p> <p>c. Move MASCON to COAST position. Ensure that BC gauge indication in the cab decreases.</p>						
105	Brake System	<p>1. Emergency brake test</p> <p>a.Ensure that main reservoir pressure gauge in the cab indicates between 7.5 bar and 10 bars</p> <p>b.Move MASCON to</p>	3C-KM610-04	X				

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		<p>emergency brake position. Check that brake cylinder (BC) pressure gauge in the cab increase around 3.0 bar (+/- 0.25bar) and Brake Pipe (BP) pressure gauge in the Cab read 5.0 bars</p> <p>c. Move MASCON to COAST position. Ensure that BC gauge indication in the cab decreases.</p> <p>2. Back up brake test</p> <p>a. Move pneumatic controller is intermediate position. Ensure that Brake Pipe (BP) pressure gauge in the cab indicate and maintain 5.0 bars.</p> <p>b. Move pneumatic controller in vent position. Ensure that Brake Pipe (BP) pressure gauge in the cab decreases below 3.0bar and BC gauge indication in the cab 3.0bar (\pm 0.2 bar).</p> <p>c. Move pneumatic controller to charging position. Ensure that Brake Pipe (BP) pressure gauge in the cab indicate and maintain 5.0 bar</p>						
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		and BC gauge indication in the cab decreases.						
106	Leakage test	KBI Test for leakage checking 1. Check that pressure in MR (through gauge in DM car) does not fall below 0.2 bar in 5min.	3C-KM610-02	X	X	X		
107	FDS – Smoke Toxicity (STD) and Smoke & Heat detectors (SHD)	Functional Check Check train FDS status in FDS HMI 1. Go to the cockpit (1-Fig.1); 2. Find the monitor HMI (Fig.2); 3. Turn on the monitor HMI (Fig.3); 4. Check that the alarm status is all "ok". 5. Go into the various carriages and find the STD and SHD sensors (Fig.5 and Fig.6). 6. Use the tester for smoke detectors for the on-site testing of the detectors by means of a spray designed to simulate smoke particles (1-Fig.4 for STD and 2-Fig.4 for SHD). Do not remove the test device from the detector; the optical smoke sensor	MR1-01A-TC001	X	X	X		

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		<p>activates approximately 60 seconds after the application of the test aerosol</p> <p>7. Return to the cockpit and check that alarms are reported on the monitor and reset the alarms (Fig.2).</p>						
108	TCMS-Central Control Unit-CCU	<p>a. Turn OFF control power to the Central Control Unit.</p> <p>b. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary.</p> <p>c. Check the condition of the pins and sockets for defect and damage. Replace if necessary.</p>	3C-1A1100-01	X				
109	TCMS-Communication Node	<p>a. Turn OFF control power to the Communication Node.</p> <p>b. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary.</p> <p>c. Check the condition of the pins and sockets for defect</p>	3C-1A1200-01	X	X	X		

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		and damage. Replace if necessary.						
110	TCMS- Remote I/O	<p>a. Turn OFF control power to the Remote I/O Unit and inputted/outputted signal source powers.</p> <p>b. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary.</p> <p>c. Check the condition of the pins and sockets for defect and damage. Replace if necessary.</p>	3C-1A1400-01	X	X	X		
111	TCMS- Video display Unit	<p>5. Check connector insulating materials for defect, damage and contamination. Replace if necessary.</p> <p>6. Check the condition of the pins and sockets for defect and damage. Replace if necessary</p> <p>7. Check frame for damage, defect and contamination, clean with a vacuum cleaner, alcohol and a dry cloth if required.</p> <p>8. Check connecting cables for signs of</p>	3C-1A1300-021	X				

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		damage. Repair if necessary.						
112	Inspection of earth brush assembly (Ground contact assembly)	Carry out a visual inspection of the ground contact. Basically damaged parts have to be replaced against new ones. Replace the carbon brush if the remaining height is equal or smaller than 27 mm	3C-010800-01	X	X	X		
113	BCB Panel	1. AUX OFF the train. 2. Turn the Battery Isolation Switch (BIS) to off position. 3. Unlock and open the inspection cover of end cubicle with maintenance key. 4. Disconnect the connectors connected 5. Unlock and open the front cover of BCB with maintenance key. 6. Visually inspect the inside component in upper area of BCB. 7. If found any obstacle or dust, remove the obstacle and clean the dust with low compressed air (2 bar). Direct the air jet in the opposite direction of the airflow or absorb dust from the component.	3C-119000-01		X			

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		<p>8. Check the cable connection on the terminal for any damage and rectify if found damage.</p> <p>9. Check the fixing fasteners of inside components. If found looseness, tighten the loosened bolts.</p> <p>10. Close and lock the box cover of BCB with maintenance key.</p> <p>11. Connect the connectors & cables disconnected.</p> <p>12. Close the inspection cover of end cubicle and lock.</p> <p>13. Turn ON the power supply to the BCB by restoring the BIS to on position and AUX ON.</p>						
114	Signages & Stickers	<p>Inspection of Marking and Labelling</p> <p>If the marking / labelling is stained, has colour fading, is stretched, and shrunk, blistered or peeling off, replace in accordance within Maintenance Work Instruction 3C-80237-02 "Replacement of Marking and Labelling".</p>	3C-80237-01	X	X	X		
115	TCMS	1. Check from TCMS display that there is no faulty equipment	-	X				

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		on the train. 2. Check door screen for faults and cutout switch position. 3. Check brake screens for brake controller and cutout switch. 4. Check powering screen for position of VVVF. 5. Check Auxiliary screen for APS position. 6. Perform on-board test for VVVF, APS, BECU, VAC, DCU, etc 7. Function test through TCMS for Interior Saloon light.						
116	Electrical Jumper	Visually check for any abnormalities	-	X	X	X		
117	Exterior	Visually check for any abnormalities	-	X	X	X		
118	Interior end wall panel	Check end wall panel fixing and its locking arrangement		X	X	X		
119	Under frame equipment	Visually check all under frame equipment cover and their fixation	-	X	X	X		
120	Cab light & Console light	Check driving console light by operating Driving Console Light Switch	-	X				
121	Head light and Tail light	1. Check head lights by operating Head Light Switch (HLS).	-	X				

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		2. Check tail lights functionality						
122	Exterior Indicator	Check the function of Train Number Indicator(TNI) & Destination Indicator Front(DIF), Door Indicator Lamps	-	X	X	X		
123	Flasher Light	Check the flasher light function in MS FOR/REV & SCS cut-out mode.	-	X				
124	Air Horn	Check the operation (Dual tone)	-	X				
125	Sun Visor	Check functionality of sun visor	-	X				
126	Battery box	Visual check of Cells: 1. Check if fuses are damaged or have deteriorated. 2. Check to see if the fuse holder bolts have loosened. 3. Check if any label lettering is damaged or missing. 4. Check that all cable connections are secure. 5. Check that the component does not make any abnormal noises. 6. Ensure assembled cells are clean and dust free. 7. Ensure no signs of leakage of electrolyte, cracks / damage. If minor	3C-172200-01		X			

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		<p>traces of leakage of electrolyte is found, wipe it with soft cloth. If major leakage is observed, replace the cell with new one.</p> <p>8. If any white crystals found on the cell around the vent cap, clean with wet cloth first, later with dry cloth.</p> <p>9. Visual check of condition of CWS vent plugs:</p> <p>10. Visual check of condition of water pipes, water inlet & outlet connector and connector covers.</p> <p>11. Check all the water pipes, L-bends, U-bends, Water inlet & outlet connectors for free from fraying or cracks. If found, replace with new one.</p> <p>12. Ensure all the cable ties are firmly tightened.</p> <p>13. Ensure connector covers free from any damages or melting or heat affected marks. If found, replace with new one.</p> <p>14. Visual check of condition of cable&</p>						
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		<p>Lug:</p> <p>15.Ensure cables are free from damages, fraying of strands at lug crimping area and overheating.</p> <p>16.Ensure lug is free from defects like peeling of electroplating, over heating</p> <p>If found any defects in cable & lug, replace with new one.</p> <p>Individual cell voltage</p> <p>17.Keep HSCB Off position.</p> <p>18.Keep BCB in OFF position.</p> <p>19.Pull the battery tray out and remove connector covers to access polarity terminals</p> <p>20.Check individual cell voltage with the help of Digital Multimeter. Open circuit voltage of fully charged cells should be 1.30±0.03 volts.</p> <p>21.If any cell is found below 1 volt, it should be removed and follow O&M manual for the corrective maintenance.</p> <p>Charger Output:</p> <p>28.Keep BCB in ON</p>						
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		position. 29.Keep train in auxiliary ON position. 30.Check output voltage of charger in float mode. it should be 110.4 min- 114.4 max volts. 31.Aux OFF train for a while and discharge the battery for 5~10 minutes. Aux ON and check the boost voltage. it should be 117.6 max to 112.8 min volts. Check drawing current with the help of clamp meter. Charging current should not be more than 18 amps (float mode).						
127	Coach floor	Check for any damages	-	X	X	X		