9 -Section 2.6: Maintenance Checklists for "C1" Car Overhaul list

9.1 Sub-Section 2.6.1: "C1" Car Overhaul list

Title : C1 Car Overhaul List			**Checklist No: 3B-02-06-01**
Note: This Checklist for 'C1' Car Overhauls should be applied every odd times of overhaul at intervals of 520kkm, e.g. first after '520kkm' distance-run, second after '1560kkm', and so on.		**Running Distance**	**Service Time**
Maintenance Interval:		**Approx. 520 kkm**	**42 months**
Maintenance Tolerance:		**± 18 kkm**	**Approx. ± 45 days**
Downtime	**Man Power**	**Skill Requirements**	
12 days (3 shifts)	6 person per car	Mechanical & Electrical	
Train No.		**Date and Time**	
Checked by		**Approved by**	

1 Tools and Equipment

Torque Wrench (120N)

Markers

Multi-tester

Torches

Spanners

Dust clothes

Radio

Sandpapers

Safety Helmet

Safety Vest

Paint Brush (for VVVF Arc Shoot Clean)

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	Bogie	1. Dismount bogies from car body after electrical and mechanical connection open 2. Remove all equipment from Bogie except Gear box. 3. Remove air springs off the bogie frame 4. Fitment of all equipment on to the Bogies after IOH 5. Bogie Brake pipe Air Leakage Test 6. Mount bogies to car body 7. Ensure proper tightness of bolts with torque marking in all Bogie mounted equipment	3C-KM310-02,03	X	X	X		
2	Bogie	1. Visually check the following for damage and safety a. Safety 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 journal box) 3. Visual Check Journal box for mechanical damage or fractures 4. Visual Check the safety of front covers and the	3C-KM310-01	X	X	X		

		integrity of the cover seal.						
3	Motor Bogie	- Clean the frame and under frame equipment with clean water or neutral detergent. - Visually check the bogie frame for crack and paint condition If paint coating is not good condition on the whole, remove chemically all paint coating. If Any cracks are found, conduct the MPI checking, Short-blast and Paint the bogie frame	3C-KM311-01	X		X		
4	Trailer Bogie	- Clean the frame and under frame equipment with clean water or neutral detergent. - Visually check the bogie frame for crack and paint condition If paint coating is not good condition on the whole, remove chemically all paint coating. If Any cracks are found, conduct the MPI checking, Short-blast and Paint the bogie frame	3C-KM312-01		X			
5	Centre Pivot	Inspect visually 1. The safety of bolts and nuts between centre pivot and car body bolster. 2. The safety of interface between centre pivot and centre pivot lower casting. 3. Casting of centre pivot and centre pivot lower casting about crack and paint condition	3C-KM313-01	X	X	X		

		4. NDT test(DPT)						
6	Mono link	1. Visually check for cracks, bents and Spherical bush damage 2. Visually check fixations and its torque mark 3. Visually check each mono-link for straightness	3C-KM313-02	X	X	X		
7	Lateral Buffer Stop	Visually check each rubber buffer stop for cracking or any de-bonding of the rubber.	3C-KM313-04	X	X	X		
8	Lateral and Vertical Damper	1. Thoroughly clean and degrease the outer surface 2. Disassembly 3. Check all components for wear and oil leakage 4. Exchange rubber components (7 years) and mandatory replacement items 5. Measure damping forces and function.	3C-KM313-06, KM333-01,02	X	X	X		
9	Driving Gear	Inspect 1. The axle gearbox for oil leakage. 2. The axle gearbox for visible damage or any unusual features 3. The spherical bearings of the torque arm for cracks	3C-KM315-01	X		X		
10	Driving Gear	1. Remove wire 13/010. 2. Unscrew plug screw 12/010 and drain oil. Check the deposits adhering to the magnet:	3C-KM315-03	X		X		

		i. Silty deposits on the magnet are normal and no cause for concern. ii. Notify Voith if larger metal chips or pieces of metal adhere to the magnetic dipstick. 3. Insert plug screw 12/010 with new seal 19/010 (tightening torque). 4. Secure plug screw with wire 13/010. 5. Unscrew plug screw 18/010. 6. Fill the axle gearbox with filtered oil via the filler opening up to the top mark. 7. Screw in plug screw 18/010 with a new seal ring 19/010. 8. Clean the gear box assembly						
11	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		
12	Wheel set	[Axle] Inspect 1. The axles for any signs of corrosion, surface damage, poor paint adherence, blistered paint. 2. The axle surface is protected by paint. 3. UST of axle	3C-KM320-01	X	X	X		

		[Wheel] Inspect 4. Measure Wheel diameter and Deviation from true running (New 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 7. Measure wheel back to back distance – 1358 (+2 / -0)mm						
13	Wheel set (Brake Disc)	1. Inspect hair cracks, incipient cracks, and through-cracks 2. Inspect scorch marks, material deposits and flaking 3. Inspect the bolted fasteners 4. Check the wear limit "T" 5. Measure the concave wear "H" 6. Measure the slanting wear "S"	3C-KM320-02	X	X	X		
14	Wheel set – Bearing	1. Disassembly 2. External Cleaning 3. Inspection and Replacement (if defective	3C-KM320-03	X	X	X		

		found) 4. Assembly						
15	Wheel set (Journal box)	1. Removal from wheel set 2. Clean the journal box by steaming 3. Check the Journal box for crack and paint condition 4. Paint the journal box, if required 5. Assembly	3C-KM320-04	X	X	X		
16	Primary spring (conical spring)	1. Removal from bogie frame 2. Check the free height(H) 3. Check to see if it has a crack or cracks of size more than about 10% of adhesion area 5. Check to see if a crack have grown deeper than 3 mm throughout	3C-KM331-01	X	X	X		
17	Primary spring (conical spring)	1. Check the axle box height “A” from journal box to bogie frame at all journal box areas. (Used: 45±5mm, New: 50~52 mm) 2. Check if the difference of the height per bogie is within 3mm	3C-KM331-03	X	X	X		
18	Secondary Suspension	1. Wheel wear packers should be inserted for every wheel wear of 5 mm 2. Levelling valve link should be moved for every wheel wear of 5 mm 3. Wheel wear packer should be inserted between link bush and	3C-KM332-01	X	X	X		

		anti-roll bar arm at half wheel wear 20 mm						
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.	3C-KM332-02	X	X	X		
20	Air Spring	1. Disassembly 2. Visual inspection of diaphragm, outer cylinder, stopper assembly and rubber seat on the basis of replacement criteria 3. Assembly 4. Air leakage test	3C-KM332-03	X	X	X		
19	Anti-Roll System	1. Check for any damages, corrosion and paint peeling 2. Check all the fixings are present and secure	3C-KM335-01	X	X	X		
20	Anti-Roll System	1. Removal from vehicle 2. Disassembly 3. Inspection 4. Replace damaged items and mandatory replacement items. 5. Assembly 6. Mount it to vehicle	3C-KM335-04	X	X	X		
21	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	3C-KM336-01	X	X	X		

		lubricator system for wear and crack. 4. Measure the amount of the stick.						
22	Flange Lubricator System	1. The angle that is made between the applicator and the flat on the back of the wheel should be: Θ = 55° 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, where: F = 13.5 mm −0+2 T = 6.5 mm −0+2	3C-KM336-02	X	X	X		
23	Front Automatic Coupler	1. Rough cleaning 2. Visual check for damage 3. Repair defects in paint work (anti-corrosion measure). 4. Check the coupler head for damages, rust or sign of wear. 5. Visual check of tension spring, 6. Grease coupler head according to greasing plan 7. Visual and audible check for Air pipe connection: Clean mouth pieces (socket and gasket) 8. Inspect supporting device for any defect 9. Visually check draft gear	3C-80421-01	X				

		housing for any damages 10. Muff coupling: Check visually, if bores of lower muff are filled with grease						
24	Front Automatic Coupler	1. Check coupler height (790mm) and inclination of coupler(±0.5°)according to the Fig. 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 ±0.5°.	3C-80421-02	X				
25	Front Automatic Coupler	Check horizontal and vertical alignment of coupler by means of a level indicator and adjust by turning the screw nuts	3C-80421-03	X				
26	Front Automatic Coupler	1. Check hoses for porosity 2. Coupler Head a. Measure play of coupler lock. b. Check if coupler lock turns readily. c. Actuate manual uncouple device/lever several times 3. Air pipe connection a. Check tightness of all pressurised parts. b. Replace gaskets in	3C-80421-04	X				

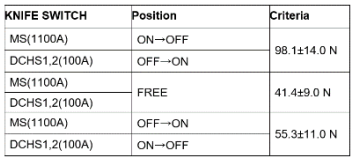
		mouth pieces 4. Coupler Shank a. Check coupler shank for longitudinal play b. Grease visible parts of buffers 5. Bearing bracket a. Visual inspection of the supporting spring b. Check fastening screws to the car underframe for tight seat 6. Centring device a. Check locking screws for tight seat b. Check horizontal position of the coupler c. Swivel coupler horizontally and vertically 7. Coupler control / Coupler head, electric parts a. Check all screws for tight seat of proximity of sensors b. Clean sensor area. 8. Muff coupling a. Check screw and nuts for correct torque b. Open drain holes 9. Pull earth wire to check for tight seat						
27	Front Automatic Coupler	1. Preventive maintenance 2. Functional check 3. Coupler Inspection	3C-80421-05	X				

		4. Function of the coupler 5. Sensor position checking inside (inside coupler head, in coupling face) 6. Pipe connection inspection and replacement						
28	Intermediate Automatic Coupler (MC-MC)	1. Rough cleaning with rag for visual check 2. Visual check for damage, without uncoupling 3. Repair defects in paint work (anti-corrosion measure). 4. Visual check of tension spring, 5. Greasing of intermediate automatic coupler shall carried out during uncoupling of train for other schedule/unscheduled maintenance as per MWI. 6. Visual and audible check for Air pipe connection: if leakage found then Clean mouth pieces (socket and gasket) 7. Inspect supporting device for any defect 8. Visually check draft gear housing for damages	3C-80422-01			X		
29	Intermediate Automatic Coupler (MC-MC)	1. Check coupler height (790mm) and inclination of coupler(±0.5°)according to the Fig. MM-04-02-02-02 2. Inclination of coupler head is checked by placing spirit level on coupler head.	3C-80422-02			X		

		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 ±0.5°.						
30	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		
31	Intermediate Automatic Coupler	1. Check hoses for porosity 2. Coupler Head a. Measure play of coupler lock. b. Check if coupler lock turns readily. c. Actuate manual uncouple device/lever several times 3. Air pipe connection a. Check tightness of all pressurised parts. b. Replace gaskets in mouth pieces 4. Coupler Shank a. Check coupler shank for longitudinal play b. Grease visible parts of buffers 5. Bearing bracket a. Visual inspection of the supporting spring b. Check fastening screws to the car underframe for tight seat	3C-80422-04			X		

		6. Centring device a. Check locking screws for tight seat b. Check horizontal position of the coupler c. Swivel coupler horizontally and vertically 7. Coupler control / Coupler head, electric parts a. Check all screws for tight seat of proximity of sensors b. Clean sensor area. 8. Muff coupling a. Check screw and nuts for correct torque b. Open drain holes 9. Pull earth wire to check for tight seat						
32	Intermediate Automatic Coupler	Check Sensor position inside coupler head and coupling face, and carry out the following: 1. Measure the clearance between sensor and coupler coupling face using depth vernier. 2. Adjust the sensor for required clearance(2mm) to sense with opposite part. 3. Ensure that sensor face should not project outside the coupler coupling face	3C-80422-05			X		
33	Semi-permanent Coupler	1. Visual check for damage without uncoupling.	3C-80423-01	X	X			

		2. Visual and audible check for the air connections. 3. Check the supporting device for its position and any damage, if any. 4. Visually check draft gear for any defect/damage 5. Muff coupling: Check visually, if bores of muffs are filled with grease						
34	Semi-permanent Coupler	1. Rough cleaning with rag for visual check. 2. Visual check for damage. 3. Repair defects in paint work (anti-corrosion measure) 4. Air pipe connection: 2. Clean mouth piece (socket and gasket). 3. Check tightness of all pressurised parts. 4. Replace gasket in socket 5. Muff coupling: 5. Check screws and nuts for correct torque . 180-200 Nm(+10 ~ -10%) 6. Check visually, if bores of muffs are filled with grease. 6. Earthing: Pull earth wire to check for tight seat.	3C-80423-02	X	X			
35	Digital Pressure Regulator DCL1 (BCU)	Replacement of Digital Pressure Regulator DCL1	3C-KM611-04	X	X	X		

36	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		
37	MS Box	1. Check each part watching. 2. Check that cover opens and closes normally. 3. Loose bolts and screws. 4. Measure the switch operating force. If measurement is not within values, grease it with indicated following procedure in order to arrange the operating force. 	3C-152300A-03	X		X		
38	MS Box	1. Replace if packing lost elasticity and deformed permanently by 2mm or greater. 2. Presence of crack, loss of elasticity. (To be cleaned during periodical inspection)	3C-152300A-04	X		X		

KNIFE SWITCH	Position	Criteria
MS(1100A)	ON→OFF	98.1±14.0 N
DCHS1,2(100A)	OFF→ON	
MS(1100A)	FREE	41.4±9.0 N
DCHS1,2(100A)		
MS(1100A)	OFF→ON	55.3±11.0 N
DCHS1,2(100A)	ON→OFF	

39	MS Box	Replace Knife switch if broken or missing	3C-152300A-05	X		X		
40	MS Box 2	1. Check each part visually. 2. Check that cover opens and closes normally. 3. Loose bolts and screws. 4. Measure the switch operating force. If measurement is not within values grease it with indicated following procedure in order to arrange the operating force. KNIFE SWITCH / ON→OFF / FREE MS2(1100A) / 78.5±10.0 N / 34.5±5.0 N	3C152300 B-03	X		X		
41	MS Box 2	1. Check each part watching. 2. Check that cover opens and closes normally. 3. Loose bolts and screws. 4. Measure the switch operating force. If measurement is not within values shown in—table below (Fig. 3C-05-02-03-03), grease it with indicated following procedure in order to arrange the operating force. ※Don't disassemble the switch ever.	3C-152300B-03	X		X		
42	MS Box 2	1. Replace if packing lost elasticity and deformed permanently by 2mm or greater. 2. Presence of crack, loss of elasticity. (To be cleaned	3C-152300B-04	X		X		

		during periodical inspection)						
43	Low Tension Junction Box	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of Terminal Block and Receptacle have not loosened. 3. Check if Receptacle and Terminal Block fasten in DIN Rail. 4. Inspect that the component labelling are existing. 5. Check the cable connection state.	3C-80131-01	X	X	X		
44	High Tension Junction Box	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of Terminal Block and Receptacle have not loosened. 3. Check if Receptacle and Terminal Block fasten in DIN Rail. 4. Inspect that the component labelling are existing. 5. Check the cable connection state.	3C-80132-01	X	X	X		
45	Traction Motor Junction Box	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of Receptacle have not loosened 3. Check if Receptacle is fastened. 4. Inspect that the component labelling are	3C-80133-01	X		X		

		existing.						
46	Collector Shoe Junction Box	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of busbar have not loosened. Retighten the bolts if necessary. 3. Inspect that the component labelling are existing.	3C-KM512-01	X		X		
47	Stinger Box	1. Check if the component is damaged or deteriorated. 2. Inspect that bolts of Terminal Block and Receptacle have not loosened Retighten the bolts if loose. 3. Inspect that the component labelling are existing. 4. Check the cable connection state.	3C-KM513-01	X		X		
48	Brake Pipes & fittings	Cleaning and damage check, Air Leakage Test	3C-KM314-01	X	X	X		
49	MS Box 2	Replace Knife switch if found broken or missing	3C-152300B-05	X		X		
50	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	3C-152400-02	X		X		

		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. 8. Check the side covers for blockages or clogging of foreign materials. If there is any blockage or clogging of foreign materials, remove it.						
51	Filter Inductor	Check the mounting bolts of the filter inductor	3C-152400-03	X		X		
52	VVVF Inverter	1. Visually check condition of Converter/ Inverter 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 VVVF box is free from dirt and dust.	3C-152500-03	X		X		

		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. 6. Check earth cables/straps for damage and ensure these are connected properly. 7. Check connectors and pins for any sign of damage and ensure that no cable/wire is touching the body. 8. Check bus bars, terminal and cable, insulating material for any damage, discoloring, peeling, crack, etc.						
53	VVVF Inverter	Check as per MWI 3C-152500-03 and Check bus bars, terminal and cable, insulating material for any damage, discoloring, peeling, crack, etc.	3C-152500-04	X		X		
54	Brake Resistor	1. Check that no bolts are evidently (visually) loose and no mechanical parts are damaged. If damages are noted, replace damaged parts on Work Instruction and tighten the bolts. 2. Check that ceramic spacers and insulators are not visibly cracked. If a suspect crack exists, check the insulation resistance and replace always damaged insulating materials according to Work	3C-152600-03	X		X		

		Instruction 3. Check that no foreign bodies are present between resistor elements and inside resistor frame. If noted, remove them immediately. If necessary, proceed with a cleaning operation according to point "e" and Work Instruction 4. Check that resistor elements and connections are not warped, twisted or otherwise distorted and do not show signs of overheating (dark blue colour) or possible touching points. If problems appear, measure the resistance value and insulation resistance. Replace defective components according to Work Instruction (resistor banks). 5. Check that resistor elements and insulating materials are sufficiently clean. If not, proceed with cleaning according to Work Instruction. A possible criteria to define if the brake resistor is clean or not, it is to measure the insulation resistance. (if < 50 M ohm → clean) Insulation resistance < 50 M ohm clean the brake resistor						

55	Brake Resistor	1. Cleaning 2. Uninstall brake resistor(Procedure). 3. Disassemble the upper heat shield panel. 4. Clean thoroughly with high pressure water steam (about 80°C, 8 to 10 bar) without any detergent. 5. Check the resistance value with a digital Ohm-meter (0.77 Ohm ± 5%). 6. Insulation Test 7. Check insulation resistance with a 1000V Megger in dray condition should be above 50 MOhm. 8. Check the tightening torque of bolts and nuts.	3C-152600-03	X		X		
56	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. Check temperature sticker for any sign of overheating and presence of bad odour. 4. Visually Check grease leakage from bearing surface.	3C-80523-01	X		X		
57	Traction Motor	1. Check all fixing bolts are loose or missing 2. Tighten Traction Motor lead cable to 22.6 N/m.	3C-80523-02		X			

		(Junction box) 3. Check Bearing Box and Bearing Cap for signs of oil leakage 4. Recoup the lost quantity of grease (COSMO LIMAX HS No. 2) in Roller and Ball Bearings by using High pressure Grease Gun. 5. Dust Blowing						
58	Traction Motor	1. Cleaning the air inlet cover 2. Cleaning the inside of traction motor 3. Checking the traction motor exterior 4. Checking the connections 5. Checking the terminal box 6. Checking the speed sensor	3C-80523-03,04	X		X		
59	Remote Control	Check the parking brake release function by emergency release gear of the brake cylinder when MR pressure <4 bar.	3C-KM316-05	X	X	X		
60	BC Hose Pipes (Flexible hose to brake cylinder)	Inspect the hose pipes for outward damage and cracking. Replace the hose pipe if found damaged	3C-KM316-07	X	X	X		
61	Journal box Assy(WSP)	1. Check the gap between pole wheel and end of speed sensor prove by using the filler gauge through the hole of front cover. Value is 0.9± 0.5 mm 2. Check the Speed sensor	3C-KM317-02	X	X	X		

		(WSP) probe is tight						
62	Brake Calliper Unit	1. Visual Inspection of brake calliper unit for damage, safety, fixations with torque marks 2. Poke out the breather hole with a rod-like tool. 3. Inspect the brake calliper unit, especially the bellows, for damage.	3C-KM316-01	X	X	X		
63	Isolation Cock (1/2") with electric switch B01.1-SR B01.2A-EPIC B01.2B-EPIC B01.3A-BIC B01.3B-BIC	1. Turn the cock handle to open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking. 4. Inspect the isolating cock, and its cable connections and insulation for outward damage and wear. 5. The electric switch must be heard to operator when the isolating cock is changed over from open to close. 6. If found faulty, replace the isolation cock	3C-KM611-16, 17	X	X	X		
64	Levelling valve	Check air suspension levelling valves and links for safety, damage and signs of air leakage.	3C-KM310-01	x	x	x		

65	Pressure Governor	Check to see if pressure governor reacts when the upper and lower pressure threshold are reached. If necessary, adjust or replace.	3C-KM611-20	X	X	X		
66	Impulse Magnet Valve	1. Disassembly 2. Cleaning and inspection 3. Exchange damaged parts and mandatory replacement parts 4. Assembly 5. Test	3C-KM611-22	X	X	X		
67	Air Hose	1. Inspect the hose pipes for outward damage and cracking. 2. Test the hose pipes for leakage at their points of connection.	3C-KM611-25	X	X	X		
68	Ballcock (1/2") with electric switch D05-BPIC	1. Turn the cock handle to open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking. 4. Inspect the isolating cock, and its cable connections and insulation for outward damage and wear. 5. The electric switch must be heard to operator when the isolating cock is	3C-KM612-12	X				

		changed over from open to close.						
69	Double Pressure Gauge	1. Check the unions A and B for leakage 2. Check the dial lighting and the surrounding illumination	3C-KM612-02	X				
70	Ballcock (1/2") D06-BPCON	1. Turn the cock handle to open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking.	3C-KM612-07	X				
71	Cut-out cock (3/4")	Replacement of Cut-out cock (3/4"), if found defective	3C-KM612-08	X				
72	Check Valve	Removal, Overhaul and Installation	3C-KM612-09, 10	X				
73	Pipeline filter (MR line)	Blow the sieve element with the compressed air (3-4 bar). If necessary, first clean the sieve element with light-grade petrol.	3C-KM613-01	X	X	X		
74	Air Reservoir – Visual Inspection	1. Inspect the air reservoir for outward damage. 2. Replace the air reservoir immediately if the inspection of the circumferential and longitudinal welds reveal	3C-KM613-06	X	X	X		

		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 the vehicle must fit tightly. The strap holding the air reservoir must fit tightly. 6. The water collected must be drained from the air reservoir by its water drain after specified time periods.						
75	Isolation Cock (drain cock-L04.1,L09.1)	1. Turn the cock handle to open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking.	3C-KM613-08	X	X	X		
76	Isolation	1. Turn the cock handle to	3C-	X	X	X		

	Cock (1/2") with elecric switch(L05.1, L05.2)	open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking. 4. Inspect the isolating cock, and its cable connections and insulation for outward damage and wear. 5. The electric switch must be heard to operate when the isolating cock is changed over from open to close	KM613-10					
77	Levelling Valve	1. Ensure that MR pressure is normal (8 to 10 bar). 2. Close the concerned cock L05.1 and L05.2 (marked as ASIC) 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. 4. Close the drain cocks (L09.1) and open the concerned cock L05.1 and L05.2 5. Check if the lever of levelling valve is moving upward and stops when the lever is parallel to axis	3C-KM334-01	X	X	X		

		"x"						
78	Levelling Valve	1. Removal from vehicle 2. Disassembly 3. Clean all metal components 4. Inspection 5. Replace damaged items and mandatory replacement items. 6. Greasing components 7. Assembly 8. Test (dead stroke, leakage, function) and mount it to vehicle	3C-KM334-02	X	X	X		
79	Auxiliary Inverter box(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 3. correctly fitted and secured by the key locks. 4. Check mounting and safety brackets for signs of damage or cracks. 5. Check that the Interior condition of APS box is free from dirt and dust. 6. Check earth cables/straps for damage and ensure these are connected properly. 7. Check connectors and pins for any sign of damage and ensure that no cable/wire is touching	3C-171100-03		X			

		the body. 8. Visually check following parts of Auxiliary static Inverter for damage or deterioration a. Input contactor(IVK) b. Transformer(TR1) c. Reactor d. Resistance e. Control Unit. f. Con / Inv Unit g. APS K Contactors h. Knife switch.						
80	Auxiliary Inverter box(APS)	1. Check of box covers and fasteners, for damage, dirt, etc 2. Check visually that the exterior of APS box does not have any signs of corrosion, deformation, or other damage 3. Check visually that the box-mounting brackets do not have any cracks or damage. Repair the box-mounting bracket(s) if necessary. 4. Check visually that the box welds do not have any signs of cracks. Repair the box weld(s) if necessary 5. Confirm that the earth strap does not have any signs of damage 6. Check visually that the surface of the bus bars does not have any signs	3C-171100-04		X			

		of damage such as discolouring, cracking, peeling, etc. Replace the bus bar(s) if necessary 7. Check visually that the cable insulation and the terminals do not have any signs of damage such as discolouring, cracking, peeling, etc. Replace the cable(s) and/or the terminal(s) if necessary. 8. Check by hand that the terminations are tight. Tighten the termination(s) if necessary. 9. Check visually that the insulated mounting panels, the terminals, and the posts do not have any signs of damage such as discoloring, cracking, peeling, delaminating, etc. Replace damaged part(s) if necessary. 10. Check visually that the air filter does not have any signs of damage, dust, dirt, etc. Replace the air filter if necessary. 11. Clean the air filter with compressed air or water.						
81	Auxiliary Inverter box(APS)	1. Check of box covers and fasteners, for damage, dirt, etc 2. Check visually that the exterior of APS box does not have any signs of corrosion, deformation, or other damage 3. Check visually that the	3C-171100-05		X			

		box-mounting brackets do not have any cracks or damage. Repair the box-mounting bracket(s) if necessary. 4. Check visually that the box welds do not have any signs of cracks. Repair the box weld(s) if necessary 5. Confirm that the earth strap does not have any signs of damage 6. Check visually that the surface of the bus bars does not have any signs of damage such as discolouring, cracking, peeling, etc. Replace the bus bar(s) if necessary 7. Check visually that the cable insulation and the terminals do not have any signs of damage such as discolouring, cracking, peeling, etc. Replace the cable(s) and/or the terminal(s) if necessary. 8. Check by hand that the terminations are tight. Tighten the termination(s) if necessary. 9. Check visually that the insulated mounting panels, the terminals, and the posts do not have any signs of damage such as discoloring, cracking, peeling, delaminating, etc. Replace damaged part(s) if necessary. 10. Check visually that the air						

		filter does not have any signs of damage, dust, dirt, etc. Replace the air filter if necessary. 11. Clean the air filter with compressed air or water. 12. Check visually that the cable insulation and the terminals do not have any signs of damage such as discolouring, cracking, peeling, etc. Replace the Power unit if found damaged. 13. Check by hand that the terminations are tight. Tighten the termination(s) if necessary. 14. Confirm that the cooling fins are free from contamination. Clean the cooling fins with a stiff brush and compressed air if necessary by opening the Down Inspection covers. Vacuum the intake fin using a vacuum cleaner (commercial product) to remove dirt and then blow air supplied from the factory (10kg/mm2 or below). 15. Check of arc chute of IVK for damage, burnt and discoloration. 16. Check of main contact of IVK for any signs of excessive burns in tip 17. Check visually that surfaces of resistors do not have any signs of damage such as						

		discoloring, cracking, peeling, etc. Replace the resistor(s) if damage is found. 18. Check of Charging contactor - For LTC250, if damage or defect are found on this contactor, replacing whole unit is recommended.						
82	Battery Control Box (BIS, Relay, contactor, Diode)	1. Check to see if any of the components are damaged or have deteriorated. 2. Inspect the component mounting bolts to see if any have become 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.	3C-80721-01		X			
83	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			
84	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	3C-172200-01		X			

		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 traces of leakage of electrolyte is found, wipe it with soft cloth. If major leakage is observed, replace the cell with new one. 8. If any white crystals found on the cell around the vent cap, clean with wet cloth first, later with dry cloth. 9. Visual check of condition of CWS vent plugs: 10. Ensure for no cracks or no blockage of flow of water. If found, replace with new one. 11. Ensure no abnormality in the gasket used for CWS vent cap fixing to the cell. If found, replace with new one. 12. Visual check of condition of water pipes, water inlet & outlet connector and connector covers: 13. 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. 14. Ensure all the cable ties are firmly tightened. 15. Ensure connector covers free from any damages or melting or heat affected marks. If found, replace with new one. 16. Visual check of condition of cable& Lug: 17. Ensure cables are free from damages, fraying of strands at lug crimping area and overheating. 18. Ensure lug is free from defects like peeling of electroplating, over heating If found any defects in cable & lug, repalce with new one. Individual cell voltage 19. Keep HSCB Off position. 20. Keep BCB in OFF position. 21. Pull the battery tray out and remove connector covers to access polarity terminals 22. Check individual cell voltage with the help of Digital Multimeter. Open circuit voltage of fully charged cells should be 1.30±0.03 volts. 23. If any cell is found below 1 volt, it should be removed and follow O&M manual for the corrective						

		maintenance. Charger Output: 24. Keep BCB in ON position. 25. Keep train in auxilliary ON position. 26. Check output voltage of charger in float mode. it should be 110.4 min-114.4 max volts. 27. 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. 28. Charging current should not be more than 18 amps (float mode).						
85	Battery	1. Topping up can be performed by gravity or by using a water filling station provided by SAFT with a flow rate of 0.7 L/min at a relative pressure of 0.3 bar maximum. 2. Check that all hydraulic connectors are clean to prevent contaminating the electrolyte. Check the tightness of all hoses connections of the central filling system. 3. **If topping up is not**	3C-172200-03		X			

		performed using the automatic water filling station: connect a distilled water tank to the hydraulic connector and place the tank 1.5 meter above the filling circuit inlet. Then connect a container to the coupling without shutoff of the filling circuit. 4. **If topping up is performed using the automatic water filling station:** connect the filling station hose to the hydraulic connector and the hose for return water to the coupling without shutoff of the filling circuit. 5. Topping up is completed when an excess of 1 litre is measured at the outlet of the water filling circuit. The filling operation stops automatically when using the automatic water filling station. 6. Record the total quantity of water introduced in the battery in order to adjust the topping up frequency. 7. Disconnect the water tank or the filling station hose from the hydraulic connector and the container or the hose for return water from the filling circuit outlet. 8. Perform this operation on all water filling systems of the battery.						

		9. Reconnect the cables to the positive and negative terminals.						
86	Battery	1. Cleaning of cells 2. Cell blocks must be cleaned with Soft wet cloth and then wiped with dry soft cloth to remove any dirt or deposits. The terminals and surrounding area of vent plugs are to be checked thoroughly and remove traces of electrolyte deposits (white crystals) if found. 3. Cleaning of Inter cell connection (ICC's) / Terminal bolts 4. Battery terminals and integration hardware (ICC's, Bolts etc.) are protected with a thin layer of neutral Vaseline (Petroleum jelly) before leaving the factory. After some time in service or during removal and installation, it is necessary to clean the surfaces with dry soft cloth and re-apply a fresh thin coat on all battery terminal and rigid connections. 5. Clean Vent Assembly and free from obstacles. Inspect visually Battery Box for: 6. Ingress of Dirt. 7. Ingress of Water. 8. Clean as required.	3C-172200-04		X			

		9. For damage. 10. All locks operate. 11. The cover sealing gasket 12. The roller movement of try.						
87	Battery	1. Remove the cell terminal covers after having recorded their position in order to place them back to the same location. 2. Check that all screws on inter-block connections are correctly tightened using a torque wrench. 3. Tightening torque for rigid connections should comply with the SAFT standard: 10 ± 2 N.m. 4. Look for hot spots showing bad contacts. A loose connection can cause erratic performance and / or damage to the battery. Moreover, it creates a risk of gas explosion. 5. Install the cell terminal covers on top of all connections. 6. Reconnect the cables to the positive and negative terminals.	3C-172200-05		X			

88	Battery	1. Remove the cell terminal covers after having recorded their position in order to place them back to the same location. 2. Connect the battery to external battery charge/discharge equipment. 3. Discharge at 0.2 C5A (26 A) down to 1V per cell (80 V). 4. During discharge, record individual cell voltage every 30 minutes until it reaches 1.15V, and then record it every 15 minutes or less. 5. Record the time required for each cell to reach 1V. 6. Disconnect the battery from the external battery charge/discharge equipment. 7. Let the battery rest for 8 hours or until its temperature drops below 30°C. 8. Connect the battery to the external battery charge/discharge equipment. 9. Charge the battery at 0.2C5A ± 2% (26 A ± 0.52 A) for 8 hours (the battery voltage	3C-172200-06		X			

		can reach 1.89V per cell). 10. Disconnect the battery from the external battery charge/discharge equipment. 11. Before installing the battery on the vehicle (wait at least two hours after electrical reconditioning), adjust the quantity of electrolyte by adding distilled or de-ionised water. 12. Place the cell terminal covers on top of all connections. 13. Reconnect the cables to the positive and negative terminals.						
89	Main Air Compressor VV120	Check if, 1. The level has fallen below the bottom mark on the oil sight glass 2. The level is so low that it may be expected by past experience to reach the bottom mark before the next maintenance appointment.	3C-KM1011-01-01		X			
90	Main Air Compressor VV-120	Top up the oil if the level has fallen below the bottom 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	3C-KM1011-01-03		X			

		before the next maintenance appointment.						
91	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			
92	Hose pipe	Visual Inspection 1. Take the covers off the ports of the unit and onboard air pipes. 2. Thoroughly clean the ports. Screw the onboard air pipes into the unit, taking care to observe the correct direction of flow. 3. Connect the supply of compressed air to the unit. 4. Perform Leakage and Function testing of the hose pipe	3C-KM10114-02		X			
93	Main Air Compressor VV120	1. Check the air filter and replace if required 2. Cleaning cooler with compressed air or steam jet 3. Check safety valve for re-usability	3C-KM1011-01-04		X			
94	Main Air Compressor VV120	1. Change oil and replace the oil filter cartridge 2. Servicing the oil scavenge pipe filter	3C-KM1011-01-05		X			

95	Main Air Compressor VV120	1. Testing controls and monitoring elements 2. Inspection resilient mounts 3. Replace filter 4. Check valve 5. Checking the oil control unit 6. Test run	3C-KM1011-06		X			
96	Oil Separator	1. Disassembly 2. Cleaning and inspection 3. Replace damaged parts and mandatory replacement parts 4. Assembly 5. Test	3C-KM1012-01,02		X			
97	Micromesh Oil filter	1. Remove Micromesh oil filter 2. Drain the accumulating oil off the filter 3. Record and compare the amount with the average 4. Check the oil filter for good external condition, especially for leakage around its body and connections. 5. If not found OK, replace the micromesh oil filter	3C-KM1013-01,02		X			
98	Safety Valve SV10, 12 bar	1. Entirely vent the compressed air pipes and unscrew the safety valve before removal. 2. Remove the safety valve 3. Install new safety valve by Sight-check the marking (component test)	3C-KM1014-01		X			

		for the relevant service conditions and response pressure. 4. Sight-check the unit for external damage. Do not install damaged safety valves. 5. Remove any protective caps that are fitted to the safety valve inlet unions. 6. Prior to installation, thoroughly clean the supply pipe and pipe work, and remove all traces of dust and dirt. 7. Seal the fitting with suitable sealing rings. Apply the tightening torque from the installation drawing. 8. Perform Leakage and Function testing after installation of new safety valve						
99	Safety Valve SV10, 12 bar Main comp.	Universal test bench (UTB) is required to test. 1. Check the valve for freedom of movement, 2. Unscrew the hand discharge screw to remove any dirt lodged in the valve seat with the air. 3. Detach and mount the safety valve on a special test bench Check follows; a) Opening pressure difference above pressure setting,	3C-KM1014-02		X			

		b) Closing pressure difference below pressure setting, c) Difference between response pressure and pressure setting, d) Discharge capacity						
100	Pressure Governor	Check to see if pressure governor reacts when the upper and lower pressure threshold are reached. If necessary, adjust or replace.	3C-KM1017-01, 02		X			
101	Pressure sensor with current outputs	1. The unit can be removed with standard tools. 2. Turn off the supply of compressed air and vent all the reservoirs and air pipes connected to the unit. Do not allow any more compressed air to reach the unit. 3. Switch off the power supply and prevent it from being restored. Do not allow electric power to reach the unit any longer. 4. Release the union nut holding the onboard connecting cable, or unlock the bayonet fastener and remove the connecting cable. 5. Unscrew the unit from the onboard port. 6. Cover up the pneumatic and electric connections on the unit. 7. Cover up the onboard port and secure the	3C-KM1018-01		X			

		connecting cable unless a replacement unit is going to be fitted immediately after removal. 8. For installation 9. Take the covers off the unit's port and off the on-board port. 10. Thoroughly clean the ports. 11. Only for units with enhanced resistance to low temperatures (letter "K" at the end of the type designation): 12. Lubricate sealing ring (b) with a thin film of RENOLIT KBS 1 grease. 13. For all other units: 14. Lubricate sealing ring (b) with a thin film of RENOLIT HLT2-KB grease. 15. Place the greased sealing ring (b) on the unit. 16. Screw the unit into the onboard port. Tightening torque: See installation drawing 17. Plug in the onboard connecting cable, and screw the union nut tight or plug in and secure the bayonet connector. 18. Connect the supply of compressed air. 19. Connect the power						

		supply. 20. Perform Leakage and Function testing after installation						
102	Ball cock without exhaust valve – Function test	1. Turn the cock handle to open position. Compressed air freely passes through the isolating cock. 2. Turn the cock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The cock handle must be easy to turn without jerking.	3C-KM1019-02		X			
103	Drain Valve	1. Start compressor. 2. The Drain Valve must automatically be vented through the drain port	3C-KM10110-02		X			
104	Silencer	Check the silencer for obstructions at the annular gap	3C-KM10111-02		X			
105	Silencer	1. Disassembly 2. Cleaning and inspection 3. Exchange damaged parts and mandatory replacement parts 4. Assembly 5. Test	3C-KM10111-01		X			
106	Three way cock – Function test	Check if a) Three-way cock stiff to operate. b) Air discharging constantly from housing. c) When the path is	3C-KM10113-02		X			

		open from A1 to A2 and from A1 to A3, air flows to A3 and to A2, respectively.						
107	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. The wear limit of the collector shoe is 10.5 mm	3C-KM511-01	X		X		
108	Current Collector Device	1. Cleaning and inspection the Current Collector, Fuse box and Connection box. 2. Inspect all components for proper seating. 3. Check the function of the latching mechanism.	3C-KM511-02	X		X		
109	Current Collector Device	1. Measurement of insulation value on insulator 2. Setting of the Insulation tester: 3.9 kV DC 3. Measurement time: 1 minute 4. Value to reach (target): R ≥ 100 MΩ 5. Check of the contact force 130N±10 N.	3C-KM511-01	X		X		
110	HSCB	1. Check the High Speed Circuit Breaker box for damage to the box, the covers, the fasteners and the FRP cover(Bolting	3C-152100-02	X		X		

		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)						
111	HSCB	1. Check condition of box cover, mounting brackets and fasteners as per 3C-152100-02 2. Check damage or deterioration of electrical cables 3. Check main car body cable appearance within HSCB enclosure	3C-152100-03	X		X		
112	HSCB	1. Measure of the main contact wear 2. Inspection of the arc chute 3. Cleaning and horns inspection a. Remove the arc chute b. Operations c. Assemble the arc chute	3C-152100-04	X		X		

113	HSCB	1. Check condition of box cover, mounting brackets and fasteners 2. Check damage or deterioration of electrical cables 3. Check damage or deterioration of Arc chute 4. Check damage or deterioration of Arc chute and Contact	3C-152100-05	X		X		
114	DC Arrester	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.	3C-152200-01	X		X		
115	DC arrester	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.	3C-152200-02	X		X		

		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						
Task 2. Cab								
116	DC-DC Converter Panel	1. Visually 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 Visually that the component labelling are existing. 4. Check Visually the cable connection state. 5. Check to see if the dc-dc converter makes a noise.	3C-117000-01	X				
117	Relay Panel	1. Visually 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.	3C-114000-01	X				

		3. Inspect Visually that the component labelling are existing. 4. Visually Check the cable connection state. 5. Check to see if the relay and contactor make a noise.						
118	Cab Front Panels	Inspect 1. The surface painting and touch-up paint on any small damaged areas 2. The edge sealing around the consoles; any cracks 3. The safety of the front walls and the equipment fittings	3C-80241-01	X				
119	Cab Side Panels	Inspect 1. The surface painting and touch-up paint on any small damaged areas 2. The edge sealing around the consoles; any cracks 3. The safety of the side walls and the equipment fittings	3C-80241-03	X				
120	Cab Ceiling Panels	Inspect 1. The surface painting and touch-up paint on any small damaged areas 2. The edge sealing around the consoles; any cracks 3. The safety of the ceiling and the equipment fittings	3C-80241-05	X				
121	Driver's Console	Inspect 1. The surface painting and	3C-80242-01	X				

		touch-up paint on any small damaged areas 2. The edge sealing around the console; any cracks 3. The safety of the console and equipment fastenings						
122	Footrest Assy	Inspect 1. The safety of the footrest fixings. 2. The footrest functions normally.	3C-80242-03	X				
123	Driver's Console Covers	Inspect 1. The surface painting and touch-up paint on any small damaged areas 2. The edge sealing around the console; any cracks 3. The safety of the console covers and equipment fastenings	3C-80242-05	X				
124	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				
125	Back Wall	Inspect 1. The surface painting and touch-up paint on any small damaged areas. 2. The edge sealing around the single back wall base for any cracks 3. The safety of the back	3C-80243-05	X				

		wall body and internal and external equipment fastenings						
126	Cab Back Wall Covers	Inspect 1. The surface painting and touch-up paint on any small damaged areas 2. The edge sealing around the back wall base; any cracks 3. The safety of the back wall cover and internal and external equipment fastenings	3C-80243-09	X				
127	Driver's Seat	Inspect the safety of the seat frame fastenings and the seat mounted equipment fastenings Test 1. Unfolding/folding 2. Forward/Backward sliding 3. Vertical height adjustment 4. Armrest rotation	3C-80244-01	X				
128	Auxiliary Seat	Inspect the safety of the seat frame fastenings and the brackets fastenings Test unfolding/folding	3C-80245-01	X				
129	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 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.	3C-80246-01	X				

130	Wiper Arm	Lubricate all moving parts with universal grease 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				
131	Wiper Blade	Swing back the wiper arm from the windscreen Inspect 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 arm must be correctly fastened.	3C-80247-05	X				
132	Wiper Blade	Remove the Old Wiper Blade and Install new Wiper Blade as per instruction	3C-80247-06	X				
133	Washer tank	1. Unscrew cap, and fill washer tank to the very top mark with the washing liquid 2. Screw on cap tight again by hand	3C-80247-08	X				
134	Ball cock-Replacement	1. Take the covers off the ports of the unit and onboard air pipes. 2. Thoroughly clean the ports. 3. Screw the onboard air pipes into the unit, taking	3C-KM614-01	X	X	X		

		care to observe the correct direction of flow. 4. Connect the supply of compressed air to the unit. 5. Test the pipe connections for leakage at the maximum acceptable working pressure. Air bubbling is unacceptable. 6. Leak testing substances and all traces of soap must be removed immediately after the test. 7. Perform function test 8. If not found ok, replace with new ball cock						
135	Ball Cock-Function Test	1. Turn the ballcock handle to open position. Compressed air freely passes through the ballcock. 2. Turn the ballcock handle to closed position. The supply of compressed air will be cut off and the venting noise can be heard. 3. The ballcock handle must be easy to turn without jerking.	3C-KM614-02	X	X	X		
136	Ball Cock-Function Test	1. Turn the ballcock handle to open position. Compressed air freely passes through the ballcock. 2. Turn the ballcock handle to closed position. The supply of compressed air will be cut off and the	3C-KM615-02	X	X			

		venting noise can be heard. 3. The ballcock handle must be easy to turn without jerking.						
137	Hose Pipe – Visual Inspection	1. Inspect the hose pipes for outward damage and cracking. 2. Exchange any hose pipe found to be damaged. 3. Test the hose pipes for leakage at their points of connection.	3C-KM615-04	X	X			
138	Speed Sensor	1. Removal and Installation 2.Check the Speed sensor (WSP) probe is tight	3C-KM616-02	X	X	X		
139	Hose Pipe - Replacement	1. Exchange any hose pipe found to be defective or damaged. To do so, undo the cap nuts at the consumer ports, and remove the defective hose pipe. 2. Attach the new hose pipe to the consumer ports with new bite rings. 3. Test for leakage after completing replacement.	3C-KM615-05	X	X			
140	Master controller	1. Check visually cable insulation and terminal lugs for signs of damage such as cracking, rubbing, etc 2. Check Master Controller Handle and Mode Selector handle for signs of damage such as cracking, excessive	3C-153200-01	X				

		wearing, etc 3. Visually check springs, gears, cams, etc for signs of wear or damage 4. Confirm that with the Key switch in the Lock position, the Master Controller Handle is in the maximum brake position and Mode selector handle is in OFF positioned 5. Insert the Drivers key into the key switch and confirm that the key switch can be turned to the Unlock Position. Confirm that the Drivers key can not be removed in the Unlocked position. 6. Confirm that with the Master Controller Handle in the maximum brake position the Mode Selector handle can freely moved to all positions 7. Confirm that the Master Controller Handle can be moved from the maximum brake position through to maximum powering position only with the Mode Selector handle in the positions of “REV”, “FOR” and ATP. 8. When Mode Selector Handle is a STANBY position, Master Controller Handle can be operated only from minimum brake to emergency brake. 9. Master Controller cannot						

		be moved from Bmax when mode selector is on the position of ATO. 10. Confirm that the Master Controller handle can be operated smoothly and without excessive force.						
141	Master controller	1. Clean up the dust by compressed air 2. Check visually the potentiometer for any signs of discolouration, cracking or arcing 3. Check visually the resistor element for signs of arcing 4. Check Potentiometer Output Voltage. 5. Confirm the function of the auxiliary contacts (Deadman switch) by using a resistance meter 6. Apply Alvania Grease slightly on Main Cam shaft, Drum assembly, Potentiometer and Potentiometer gear. Remove old grease before applying	3C-153200-02	X				
142	PWM generator	1. Visually check the PWM Generator unit for signs of damage 2. Check Connector for damage or loosening 3. Check all screws and nuts for loosening	3C-153100-01	X				

143	PWM generator	1. Visually check PCB board for any signs of discolouration 2. Confirm output voltage of power supply unit is 15 volts ±5% 3. Confirm the output waveform of PWM generator using an oscilloscope	3C-153100-02	X				
144	PA & PIS	1. TFT Display walk through test TFT Display – 18.5" – Functional test i. Go to the PAPIS HMI and select 'START TFT TEST' button in the 'TESTING ADVANCED FUNCTIONS' tab. ii. 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		

145	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 CREW CALL (C-C) button is pressed. b. CREW CALL button is blinking on MCP in leading (Occupied) and slave (that is non occupied) side c. Check that audible alarm is sounding in slave MCP. d. Press blinking button	3C-KM-12-01-02,03	X	X	X		

		when the CREW CALL button is lit. e. Check that CAB/CAB intercommunication can be made. 5. Check on Cab - Cab intercommunication by ACP a. Press CREW CALL (C-C) button on leading cab.. b. C-C button is blinking on ACP in master and slave (non occupied) side. c. Check that audible alarm is sounding in slave (non occupied cab). d. Press blinking button when the C-C button is lit. e. Check that CAB/CAB intercommunication can be made.						
146	PA & PIS	PEAU, PAD push button – Functional test Perform intercom from every PEAU	3C-KM-12-01-04,05	X	X	X		
147	PA & PIS	Cab Speaker - Audio walk through test – 1. Go to the HMI and select 'START PRM TEST' in the 'TESTING ADVANCED FUNCTIONS' tab. 2. Check if Cab speaker is emitting the test tone.	3C-KM-12-01-06	X				

148	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-12-01-07	X	X	X		
149	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 tone in exterior speakers (left & right)	3C-KM-12-01-08	X		X		
150	PA & PIS	iCom & FDI – Functional test Go to the HMI a. Select a PRM and check it is launched on the system. b. Check the distance to next stations and the automatic announcement. c. Check if Front destination indicator is emitting the test pattern.	3C-KM-12-01-09, 12	X				
151	PA & PIS	PIS HMI Functional test - Network Check: Use the TGUT to check if all	3C-KM-12-01-10	X				

		devices are online a. One single device not discovered could mean a failure of the devices itself or a rupture in the cable between the switch and the device or a switch port not working. 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. c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.						
152	PA & PIS	Microphone + PTT – Functional test Audio function test: 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				

153	PA & PIS	Switch 28 ports – Functional test Network Check: Use the TGUT to check if all devices are online 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. 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. c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.	3C-KM-12-02-01	X		X		
154	PA & PIS	Switch 16 ports – Functional test Network Check: Use the TGUT to check if all devices are online 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.	3C-KM-12-02-02		X			

		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. c. All devices in a car not working could mean that the local switch is not powered or is not connected to the backbone.						
155	PA & PIS	Coupler box – Functional test Network Check: Use the TGUT to check if all devices are online 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. 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. c. All devices in a car not working could mean that the local switch is not powered or is not connected to the	3C-KM-12-02-03	X				

		backbone.						
156	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				
157	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		
158	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		
159	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. TFT Display 18.5” 2. CCU 3. PEAU 4. PAD push button 5. Saloon camera 6. I Com 7. Switch ports 28 8. Switch ports 16	3C-KM-12-01-01, 03, 04, 05, 09 3C-KM-12-02-01,02 3C-KM-12-03-02	X	X	X		
160	PAPIS – Cleaning	Clean the following equipment by blow out the dust, max 1 bar 1. Cab speaker 2. Interior Speaker	3C-KM-12-01-06,07,08					

		3. Exterior Speaker						
161	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. ACP 2. PIS HMI 3. Microphone + PTT 4. Digital Video Recorder (DVR) 5. CCTV HMI	3C-KM-12-01-02, 10,13 3C-KM-12-03-01,04	X				
162	PAPIS-Cleaning	Clean with damp cloth the following PAPIS equipment 1. External camera	3C-KM-12-03-03	X		X		
163	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	3C-80820-01	X				

		type. 7. Check the Two rollers connected with panel and those operate on the upper track rail. 8. Check the bottom guides are operated on bottom rail simultaneously with the action of the two rollers. 9. Check the door can withstand rough handling including slam-open and slam close by operation and maintenance personnel. 10. Check the stoppers are possible to completely buff for opening power. 11. Check the Auto-Locking mechanism 12. Check for play in doors 13. Visually check if there are any damaged areas on the access panel. 14. Check door status on TCMS						
Task 3. Interior								
164	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.	3C-80140-01		X	X		

		6. Check if Relay and Contactor make a noise.						
165	Floor Covering	Inspect any damaged areas on the floor covering	3C-KM234-01	X	X	X		
166	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		
167	Grab pole & Rail	Inspect 1. The grab pole and grab rail 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-80239-01	X	X	X		
168	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	3C-80239-07	X	X	X		

		bolts 4. A fracture over 3 mm in length						
169	Strap hanger	Inspect the joint between the strap hanger and grab rail for any slack fixing bolts.	3C-80239-10	X	X	X		
170	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 glass for any slack fixing bolts and/or rubber packing	3C-80239-12	X	X	X		
171	Bulkhead panels	Inspect 1. The condition of the draught screen 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		
172	Interior Panels	Inspect 1. The safety of all fixings, joint bolts, nuts, screws and pins 2. The painting condition; any of damages and scratches 3. The condition of the semi-sandwich Nomex honeycomb composition; any cracks and/or delimitations 4. The metal inserts of the Nomex Honeycomb panels; any damage	3C-8023A-01	X	X	X		

173	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		
174	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	3C-8023B-02	X	X	X		

		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 last maintenance check and expire date.						
175	Fire Extinguisher	1. Empty the contents of the extinguisher in clean buckets and remove all the components. If there are visible rust marks, wash the cylinder thoroughly with clean water. 2. Visually check the external surface of the fire extinguisher in respect of painting and if there is damage to the painting, the surface should be re-painted with the same color shade. 3. Check up the condition of the label and if it is not in order, ensure to replace with correct label. Visually check the cylinder and its components in detail apart from functional point of view for any physical damage, cracks, dents etc. In case of any doubt, such components if those are	3C-8023B-03	X	X	X		

		pressure parts (like hose, body) should be subjected to hydraulic pressure test. If the damage is beyond repair, the part should be replaced by the correct component. 4. The extinguisher after inspection should be refilled immediately & pressure in the pressure gauge shall be maintained by checking the pointer in green zone. The date of inspection and refilling should be indelibly marked on the extinguisher and record in the register of the fire extinguishers.						
176	Fire Extinguisher	Perform discharge test after ensuring that the valve and components are fully tightened, nozzles and vent holes are free of any dust or dirt, operate the extinguisher for testing the performance.	3C-8023B-04	X	X	X		*Sample only
177	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	3C-80410-01	X	X	X		

		6. Car floor level levelled with gangway floor level						
178	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	X		
179	Double corrugated bellows, compl.	Clean bottom area [inner corrugated bellows and bridge plates	3C-80411-01,02	X	X	X		
180	Bridge plate, compl.	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	X		
181	Bridge plate, compl. wagon side	Replace sliding ledge under wagon-sided bridge plate [end position]	3C-80412-02	X	X	X		
182	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		
183	Passenger Saloon Door	1. Check function of obstruction detection. 2. Check the indication of	3C-80810-02	X	X	X		

		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.						
184	Passenger Saloon Door	Check the painting surface for damage or corrosion	3C-80810-03	X	X	X		
185	Passenger Saloon Door	Inspect sealing joints of windows for damage	3C-80810-04	X	X	X		
186	Door leaf RH&LH	1. Clean top and rear edge, finger protection rubber from old grease and dirt before applying any new lubricant 2. Apply Silikon paste P4 to all circumferential door seals 3. Clean finger protection rubber afterwards with a dry cloth	3C-80811-01	X	X	X		
187	Door leaf RH&LH	Inspect	3C-80811-02	X	X	X		

		1. The brushes at the bottom of the door leaf for wear 2. The brushes on portal on top of the door leaf for wear						
188	Door leaf RH&LH	Inspect the guide profile on the bottom edge of the door leaf for wear. Wear limit: Measure reciprocally < 1mm.	3C-80811-03	X	X	X		
189	Door leaf RH&LH	Inspect the rollers of the door leaf for flats and damages	3C-80811-04	X	X	X		
190	Upper guide rail (complete right & left)	Inspect the stop buffers for the door open end position for wear. If necessary, replace.	3C-80812-02	X	X	X		
191	Drive unit	1. Clean and re-grease spindle (Klüber Isoflex LDS 18 Spezial A) 2. Check the surface of the spindle to see if any anodising is missing (bare aluminium visible),	3C-80813-01	X	X	X		
192	Drive mechanism	Clean and re- grease the locking & release lever on the locking unit of the drive (Isoflex Topas NB 52)	3C-80813-02	X	X	X		
193	Drive mechanism	Inspect ring gear in drive for wear. Wear limit: 1-2 mm. If necessary, replace ring gear.	3C-80813-03	X	X	X		
194	Door Limit Switch	Replace Door Limit Switch	3C-80822-01	X				

195	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 can be opened into the saloon. 3. Check that this leaf consists of a door handle located on cab side 4. Close the door and check that it met correctly between tongue of locking door and limit switch. 5. With the partition door closed, Check the door leaf is opened into the saloon by a square key form the saloon side. 6. Check that the door can be locked, bolted or wedged from either side of the door to prevent opening. 7. Check that the visual and audible alarm is turned on automatically when Saloon to cab door in the unoccupied cab is opened. 8. Check the door leaf is normally kept closed with the partition wall. 9. Check the door is mounted on a vertical structure in back wall cubicle by full piano hinge 10. Visually check if there are any damaged areas on the access panel.	3C-80830-01	X				

		11. Check the partition door status of TMS 12. Check the Partition door lock / open / close function and status on TMS.						
196	Upper Limit Switch(Open/ Close) – Partition door	Replace Limit Switch(Open/Close)	3C-80833-01	X				
197	Side Limit Switch(Lock/ Unlock) – Partition door	Replace Limit Switch(Lock/Unlock)	3C-80832-01	X				
198	VAC (Cab ceiling & Ceiling)	1. Turn on the VAC system and check the cooling status. 2. Visual check the VAC unit from interior and exterior for any damage. 3. Visually check that refrigerant is full with green colour. If the sight glass is not full and bubbles appear, the refrigeration system may have a less refrigerant. 4. Check for proper function of inverter through TCMS by On Board Test	3C-191100-01 3C-192100-01	X X	X	X		
199	VAC	1. Check that the plugs are locked into the position. 2. Check that the wiring is undamaged and is clear of the fan wheel.	3C-191110-03 3C-192110-01	X X	X	X		

		3. Check that the wiring is not touching the evaporator coil fins. 4. Check that the wiring looms clear the condenser fan blades. 5. Check that the cable glands throughout the unit are tight.						
200	VAC	1. Open VAC service hatch 2. Clean FAT, SAT and RAT sensor 3. Close service hatch	3C-191117-01 3C-192117-01	X X	X	X		
201	VAC – Condenser fan motor check	1. Open the maintenance grill of compressor-condenser chamber. 2. Open the cover of terminal box on the condenser fan motor. 3. Check whether all the wires are tight in the terminal box, If not, re-tighten. 4. Open the maintenance cover of air handling chamber. 5. Connect the laptop to the controller FPC24-2 6. Run the condenser fan via Mona software 7. Check whether the rotating direction is the same as indicated on the label. If not the same, interchange any two of three wires of the condenser fan. 8. Check screw and bolt connections, retighten	3C-191118-01 3C-192118-01	X X	X	X		

		with tightening torque 16±1 Nm.						
202	VAC – Supply air fan motor – check and clean	1. Open the maintenance cover of air handling chamber. 2. Open the cover of terminal box on the supply air fans' motor. 3. Check whether all the wires are tight in the terminal box, If not, re-tighten. 4. Connect the laptop to the controller FPC24-2. 5. Run the supply air fans via Mona software. 6. Check whether the rotation direction is the same as indicated on the housing of supply air fans. 7. If the rotation direction is not right, interchange any two of three wires of the supply air fans. 8. Check screw and bolt connections. 9. Remove the dust with vacuum cleaner.	3C-191119-01 3C-192119-01	X X	X	X		
203	VAC – Hygrostat Check	1 Open the related maintenance cover and find the location of the hygrostat, please refer Fig. 51. 2 Check the wire connection between hygrostat and controller. 3 Uninstall the hygrostat . 4 Clean the hygrostat as following:	3C-191122-01	X	X	X		

		• dip the sensor tube in clean water 20°C (only the tube, not the housing) • rotate gently till dirt disperse (only several seconds, approx. 15 sec), avoid any water contact to the inertial parts of the housing • in case of dirt contains grease a detergent can be used. (Commercial available detergent with concentration requested from the original supplier of the detergent, OEM supplier. • example : Henkel Pril Classic • after using detergent, the tube to be cleaned again with clear water 20°C by 15 sec. • air drying (not use hot air gun etc.) 5. Install the hygrostat, please refer to WI No.3C-191122-02. 6. Check at service software Mona the signal DI_22 (saloon) and DI08 (cab) for feedback when you turn the set point scale (please note in case the relative humidity is lower than 35% no signal will be generated). 7. Set the set point scale to 60%.						

204	VAC- Saloon	Fresh air filter cleaning	3C-191120-01	X	X	X		
205	VAC- Saloon	Return air filter cleaning	3C-191121-01	X	X	X		
206	VAC- Cab	Mixed air filter cleaning	3C-192120-01	X				
Task 4. Exterior								
207	Side Structure	Inspection 1. A major damage (a kind of cavity, cracks) 2. The high stress areas (door corner outside)	3C-80211-01	X	X	X		
208	End Structure	Visual Inspection a major damage (a kind of cavity, cracks)	3C-80212-01	X	X	X		
209	Cab Structure	Visual Inspection a major damage (a kind of cavity, cracks)	3C-80213-01	X				
210	Roof Structure	Visual Inspection a major damage (a kind of cavity, cracks)	3C-80214-01	X	X	X		
211	Under frame Structure	Inspection 1. A major damage (a kind of cavity, cracks) 2. The high stress areas (Center sill & Coupler Pad, Bolster)	3C-80215-01	X	X	X		
212	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		
213	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	3C-80413-01	X	X			

		3. Sliding ledge worn/damaged						
214	Bridge plate, compl. couple frame side	1. Attachment and detachment of the Bridge plate compl. Couple frame side 2. Replace the sliding edge of the couple frame sided Bridge plate	3C-80413-02	X	X	X		
Task 5. Roof								
215	VAC (Saloon & 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		
216	VAC (Saloon & Cab)	1. Inspect the seal for any damage 2. Inspect the covers for any dust trails	3C-191110-05 3C-192110-03	X X	X	X		
217	Refrigeration Equipment	1. Check all sheet metal parts for any crack-ins in welding assembled parts. 2. Check stability of all refrigerant pipe connections to equipment. 3. Check stability of all wiring in electrical cubicle and a/c unit in general.	3C-191110-06 3C-192110-04	X X	X	X		

218	Refrigeration Compressor (Saloon & Cab)	1. Check if there is any leak around compressor. 2. Observe compressor functionality in different operating modes. 3. Observe if there is any unusual sounds during compressor operation, stops and start-ups 4. Check the discharge pressure according to ambient temperature.	3C-191111-01 3C-192111-01	X X	X	X		
219	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		
220	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		

221	High Pressure Switch (incl. low pressure switch & sensor) (Saloon & Cab)	1. Fault message will be trigger on TCMS 2. If found fault, check the HP switch	3C-191115-01,02,03 3C-192115-01,02	X X	X	X		
222	Refrigerant Sight Glass ((Saloon & Cab)	Check the refrigerant condition and moisture content through sight glass.	3C-191116-01 3C-192116-01	X X	X	X		
223	Pipe work (Saloon & Cab)	Ensure all piping is on place and are fully gas tight with no signs of leak.	3C-191126-01 3C-192124-01 .	X X	X	X		
Task 6. Functional Checks								
224	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				
225	Brake System	1. Check any leakage in the brake pipe line and equipment. 2. Check that brake equipment is working without any abnormal noise 3. Check that each isolation cock is working properly. 4. Check that air hose (BC hose, Parking hose etc) is not detect any damage. 5. Check that EBCU is not	3C-KM610-02	X	X	X		

		display any fault. 6. Check that pressure gauge in the cab working properly.						
226	Brake System	1. Parking Brake test Press Parking Brake Apply push button, on operation panel. Ensure the Parking Brake Apply push button illuminate. Press Parking Brake Release push button, on operation panel. Ensure that Parking Brake Apply push button goes off. 2. Service Brake test Ensure that main reservoir pressure gauge in the cab indicates between 7.5 bar and 10 bars. 3. 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. 4. Move MASCON to COAST position. Ensure that BC gauge indication in the cab decreases.	3C-KM610-03	X				
227	Brake System	1. Emergency brake test Ensure that main reservoir	3C-KM610-04	X				

		pressure gauge in the cab indicates between 7.5 bar and 10 bars Move MASCON to 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 Move MASCON to COAST position. Ensure that BC gauge indication in the cab decreases. 2. Back up brake test Move pneumatic controller to intermediate position. Ensure that Brake Pipe (BP) pressure gauge in the cab indicate and maintain 5.0 bars. Move pneumatic controller to vent position. Ensure that Brake Pipe (BP) pressure gauge in the cab decreases blow 3.0bar and BC gauge indication in the cab 3.0bar (± 0.2 bar). Move pneumatic controller to intermediate position. Ensure that Brake Pipe (BP) pressure gauge in the cab indicate and maintain 5.0 bars and BC gauge indication in the cab decreases.						

228	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		
229	VAC 3 phase 415V AC& 110V DC Power Plug (Saloon and Cab)	1. Inspect the 110V plug located on the panel. Check that it is locked in position. 2. Ensure no force has been used to plug 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 plug located on the panel. Check that it is locked in position. 5. Check that there are no loose pins in the insert module. 6. Ensure no force has been used to plug in 110 V DC power cable and there is no existing physical or structural damage. 7. 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		
230	Contactor – Compressor	Run unit in the AUTO Mode	3C-191129-01	X	X	X		

	((Saloon & Cab)		3C-192126-01	X				
231	Circuit Breaker – Compressor (Saloon & Cab)	1. Run unit in the COOL Mode 2. Observe the equipment are operating 3. Trip manually the circuit breakers and observe individual equipment stops.	3C-191129-03 3C-192126-04	X X	X	X		
232	TCMS-Central Control Unit-CCU	1. Turn OFF control power to the Central Control Unit. 2. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary. 3. Check the condition of the pins and sockets for defect and damage. Replace if necessary.	3C-1A1100-01	X				
233	Central Control Unit-General Inspection	1. Check PCB Status 2. Check connector condition 3. Check connecting cables	3C-1A1100-02	X				
234	TCMS-Communication Node	1. Turn OFF control power to the Communication Node. 2. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary. 3. Check the condition of the pins and sockets for defect and damage. Replace if necessary.	3C-1A1200-01	X	X	X		
235	Communication Node-	1. Check PCB Status 2. Check connector condition	3C-1A1200-02	X				

	General Inspection	3. Check connecting cables						
236	TCMS- Remote I/O	1. Turn OFF control power to the Remote I/O Unit and inputted/outputted signal source powers. 2. Check the connector insulating materials for any defects, damage and contamination. Replace if necessary. 3. Check the condition of the pins and sockets for defect and damage. Replace if necessary.	3C-1A1400-01	X	X	X		
237	RIO Unit - General Inspection	1. Check PCB Status 2. Check connector condition 3. Check connecting cables	3C-1A1400-02	X				
238	TCMS- Video display Unit	1. Check connector insulating materials for defect, damage and contamination. Replace if necessary. 2. Check the condition of the pins and sockets for defect and damage. Replace if necessary 3. Check frame for damage, defect and contamination, clean with a vacuum cleaner, alcohol and a dry cloth if required. 4. Check connecting cables for signs of damage. Repair if necessary.	3C-1A1300-021	X				
239	TCMS VDU – General Inspection	5. Check screen condition 6. Check connector condition	3C-1A1300-02					

		7. Check frame condition 8. Check connecting cables						
240	TCMS	1. Check from TCMS display that there is no faulty equipment 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.	-	X				
241	BCB Panel	1. AUX OFF the train. 1. Turn the Battery Isolation Switch (BIS) to off position. 2. Unlock and open the inspection cover of end cubicle with maintenance key. 3. Disconnect the connectors connected. 4. Unlock and open the front cover of BCB with maintenance key. 2. Visually inspect the inside component in upper area of BCB.	3C-119000-01		X			

		3. 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. 4. Check the cable connection on the terminal for any damage and rectify if found damage. 5. Check the fixing fasteners of inside components. If found looseness, tighten the loosened bolts. 6. Close and lock the box cover of BCB with maintenance key. 7. Connect the connectors & cables disconnected. 8. Close the inspection cover of end cubicle and lock. 9. Turn ON the power supply to the BCB by restoring the BIS to on position and AUX ON.						
242	Signage & Stickers	Inspection of Marking and Labelling 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".	3C-80237-01	X	X	X		

243	FDS – Smoke Toxicity (STD) and Smoke & Heat detectors (SHD)	Functional Check 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 activates approximately 60 seconds after the application of the test aerosol 7. Return to the cockpit and check that alarms are reported on the monitor and reset the alarms (Fig.2).	MR1-01A-TC001	X	X	X		
244	FDS – Smoke Toxicity (STD) and Smoke & Heat detectors	Cleaning The cleaning of smoke sensors must be performed in order to remove the eventual dirt accumulated externally during the first months of life of the carriage	MR1-01A-TC002	X	X	X		

	(SHD)	and operation of the system. The execution does not include the disassembly of the unit from its installation position. Perform the operations described below with the unit not powered. Access the sensor and perform the following operations: 1. Vacuum the dust on the outside of the unit, especially that deposited on the grid. 2. Once the external dust has been sucked in, use compressed air (MAX 4BAR) from blow inside the grill, performing several full turns of the same. 3. If necessary, vacuum the dust coming out of the sensor again.						
245	FDS – Remote Modules MR-LHD for Interfacing with LHD Detectors	1. Go into the technical area DMC-Car-1, DMC Car-6 (1-Fig.1) and TC-Car 2, MC-Car3, MC-Car4, TC-Car5 (Fig.2). 2. Check that the temperature sensitive cables are correctly connected (1-Fig.3). 3. Go to theDMC-Car1 and DMC Car-6 (1-Fig4). 4. Locate the HMI monitor (1-Fig.5). 5. Check that each MR-LHD has its own IP address (different from the others) and that they are read correctly	MR1-01A-TC007	X	X	X		