

PROJECT	CUSTOMER	VEHICLE
Xtrapolis-PRASA	PRASA	258 – M2 – VFT

RTR Vehicle Functional Static Testing TS258 M2 Report  
 GIB0000007424



	CREATED	VERIFIED	APPROVED	DISTRIBUTION
<b>Name</b>	Neliswa MABUNDA	Sifiso LUKHELE	Kgomotso NKOANA	Confidentiality Category <i>Restricted</i> <i>Project</i> <i>Normal</i> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
<b>Date</b>	21/11/2024	21/11/2024	21/11/2024	Control Category <i>Controlled</i> <i>Not Controlled</i> <input checked="" type="checkbox"/> <input type="checkbox"/>
<b>Signature</b>				Language <b>EN</b>

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### Table of modifications

Rev	Date	Modifications Content	Writer
A0	21/11/2024	Creation	Neliswa MABUNDA

### Internal validations

	Name	Function	Date	Signature
<b>Creator</b>	Neliswa MABUNDA	EPU Manager	21/11/2024	X  Neliswa MABUNDA EPU Manager
<b>Verifier</b>	Sifiso LUKHELE	Serial Test Manager	21/11/2024	X  Sifiso LUKHELE Serial Test Manager
<b>Approver</b>	Kgomotso NKOANA	Test Expert	21/11/2024	X  Kgomotso NKOANA Test Expert

### Execution Plan

<b>Start Date</b>	15/11/2024
<b>End Date</b>	15/11/2024

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## Section 1 – Purpose / Objectives

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### 1. Energy Distribution

Ensure the distribution of 110Vdc and 400Vac through the vehicle from the battery and Auxiliary converter

### 2. TCMS Network

Verify the working of the TCMS network and its core elements, i.e TRS, CRS.

### 3. Cabin Control

Verify the cabin control functions in both normal and backup modes, their commanding of the train lines, and the TCMS response to each function.

### 4. Internal Lighting

Verify the working of all internal lighting functions.

### 5. PACIS System

Verify power supply to all PACIS network equipment.

### 6. Train-Ground Communication

Setup the Train-to-ground systems, and verify correct installation of the antennas by VSWR test.

### 7. Pantograph

The objective of this procedure is to ensure the correct control and operation of the pantograph.

### 8. Rescue Mode and Emergency Disconnection

The objective of this procedure is to verify the correct operation of the emergency disconnection function, as well as the correct activation of the Back-Up mode.

### 10. Emergency Brake

The objective of this procedure is to verify all electrical components of the Emergency braking system.

### 11. Service Brake

The objective of this procedure is to verify all electrical components of the Service brake system.

### 12. Holding and Parking Brake

The objective of this procedure is to verify all electrical components of the Parking/holding brake system.

### 13. Passenger Doors

The objective of this procedure is to ensure the proper operation of the train doors.

### 14. Air Conditioning

Verify the voltage distribution to and correct operation of the HVAC system

### 15. Fire protection

The objective of this procedure is to verify the configuration of the fire detection units, as well as the presence of the safety resistor in the auxiliary converter.

### 16. Traction and Electric Brake

Verify all the train lines associated with the traction and electric brake systems of the train

### 18. Vehicle Normalization

The objective of this procedure is to ensure that all connectors, panels and covers are normalized.



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## Section 2 – Energy Distribution

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### 2.1 Instructions list

### 2.1.1 015\_NRG-Energy Distribution

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Energy Distribution (SPP=015)		OK		Goitsemodimo Kgatitswe - 526511	M2
10002	I	Initial Conditions		OK		Goitsemodimo Kgatitswe - 526511	M2
10003	I	All the Circuit Breakers should be OPEN		OK		Goitsemodimo Kgatitswe - 526511	M2
10004	I	Test bench should be connected but with no power supply		OK		Goitsemodimo Kgatitswe - 526511	M2
10005	I	NO 400Vac should be connected to the car		OK		Goitsemodimo Kgatitswe - 526511	M2
10006	I	Voltage Isolation 230Vac and 400Vac		OK		Goitsemodimo Kgatitswe - 526511	M2
10007	A	Close Circuit breaker 14Q2		OK		Goitsemodimo Kgatitswe - 526511	M2
10008	I	230Vac and 400Vac Circuit breakers		OK		Goitsemodimo Kgatitswe - 526511	M2
10009	A	Close Circuit Breaker 13Q1		OK		Goitsemodimo Kgatitswe - 526511	M2
10010	I	Normal and Permanent Power Supply		OK		Goitsemodimo Kgatitswe - 526511	M2
10011	I	110Vdc Permanent Train Line Dev2/78 = END1 90XR24 pin 29 Dev4/78 = END2 90XR34 pin 29		OK		Goitsemodimo Kgatitswe - 526511	M2
10012	A	Force [NI] Dev4/40 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10013	R	Read Defined Variable [NI] Dev2/40 = 1.0		OK	1	Goitsemodimo Kgatitswe - 526511	M2
10014	A	Apply 110Vdc on the Normal Line using the external power supply		OK		Goitsemodimo Kgatitswe - 526511	M2
10015	A	Close Circuit Breaker 15Q3 (Normal Line)		OK		Goitsemodimo Kgatitswe - 526511	M2
10016	A	Measure 110Vdc between 90XR50_2.X2 (+) and 90XR50_2.X1 (-) (inter-car connector). [Normal line].		OK		Goitsemodimo Kgatitswe - 526511	M2
10017	I	Permanent Line Circuit Breakers		OK		Goitsemodimo Kgatitswe - 526511	M2
10018	A	Check Circuit Breaker 15Q4 for battery voltage (above 80V dc) and close it (permanent Line)		OK		Goitsemodimo Kgatitswe - 526511	M2

10019	I	230Vac Circuit Breakers		OK		Goitsemodimo Kgatitswe - 526511	M2
10020	A	Close Circuit Breaker 13Q3 and 13Q2		OK		Goitsemodimo Kgatitswe - 526511	M2
10021	I	230Vac and 400Vac Voltage Supply		OK		Goitsemodimo Kgatitswe - 526511	M2
10022	A	Apply 400Vac to the Vehicle, either on End1 or End 2		OK		Goitsemodimo Kgatitswe - 526511	M2
10023	A	Perform a phase rotation measurement on Connector 90XR62 between phases U(X3), V(X2), W(X1) and ensure the rotation is in the correct direction.		OK		Goitsemodimo Kgatitswe - 526511	M2
10024	R	Phase rotation between U, V, W is correct.		OK		Goitsemodimo Kgatitswe - 526511	M2
10025	A	Perform a phase rotation measurement on Connector 90XR52_2 between phases U(X3), V(X2), W(X1) and ensure the rotation is in the correct direction.		OK		Goitsemodimo Kgatitswe - 526511	M2
10026	R	Phase rotation between U,V,W is correct		OK		Goitsemodimo Kgatitswe - 526511	M2
10027	A	Check 230Vac between points L and N of socket -13XT1		OK		Goitsemodimo Kgatitswe - 526511	M2
10028	R	230Vac present		OK		Goitsemodimo Kgatitswe - 526511	M2
10029	A	Check 230Vac between points L and N of socket -13XT2		OK		Goitsemodimo Kgatitswe - 526511	M2
10030	R	230Vac present		OK		Goitsemodimo Kgatitswe - 526511	M2
10031	A	Remove connector 93XP150		OK		Goitsemodimo Kgatitswe - 526511	M2
10032	A	Remove connector 57XP1-10		OK		Goitsemodimo Kgatitswe - 526511	M2
10033	A	Close Circuit Breaker 34Q1 and 57Q1		OK		Goitsemodimo Kgatitswe - 526511	M2
10034	A	Check 400Vac +-5% tolerance between Phases (W, V, U) on connector 57XP1_10 (10.b1, 10.a2, 10.a1).		OK		Goitsemodimo Kgatitswe - 526511	M2
10035	R	400Vac +- 5% tolerance is measured between all three phases on connector 57XP1_10		OK		Goitsemodimo Kgatitswe - 526511	M2
10036	A	Check 400Vac +-5% tolerance between Phases (W, V, U) on connector 93XP150 (pin E3, E2 and E1).		OK		Goitsemodimo Kgatitswe - 526511	M2
10037	R	400Vac +- 5% tolerance is measured between all three phases on connector		OK		Goitsemodimo Kgatitswe - 526511	M2

		93XP150					
10038	A	Open Circuit Breaker 34Q1 and 57Q1		OK		Goitsemodimo Kgatitswe - 526511	M2
10039	A	Put back connector 57XP1-10		OK		Goitsemodimo Kgatitswe - 526511	M2
10040	A	Put back connector 93XP150		OK		Goitsemodimo Kgatitswe - 526511	M2
10041	I	Auxiliary Converter Command		OK		Goitsemodimo Kgatitswe - 526511	M2
10042	I	Battery Connection Train Lines Dev2/79 = END 1 90XR24 pin 30 Dev4/79 = END 2 90XR34 pin 30		OK		Goitsemodimo Kgatitswe - 526511	M2
10043	A	Force [NI] Dev4/79 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10044	R	Read Defined Variable [NI] Dev2/79 = 1.0		OK	1	Goitsemodimo Kgatitswe - 526511	M2
10045	A	Force [NI] Dev4/79 = 0.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10046	R	Read Defined Variable [NI] Dev2/79 = 0.0		OK	0	Goitsemodimo Kgatitswe - 526511	M2
10047	I	Battery Disconnection Train Lines Dev2/75 = END 1 90XR24 pin 31 Dev4/75 = END 2 90XR34 pin 31		OK		Goitsemodimo Kgatitswe - 526511	M2
10048	A	Force [NI] Dev4/75 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10049	R	Read Defined Variable [NI] Dev2/75 = 1.0		OK	1	Goitsemodimo Kgatitswe - 526511	M2
10050	A	Force [NI] Dev4/75 = 0.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10051	R	Read Defined Variable [NI] Dev2/75 = 0.0		OK	0	Goitsemodimo Kgatitswe - 526511	M2
10052	I	IES Status Train Lines Dev1/86 = END 1 90XR25 pin 61 Dev2/87 = END 1 90XR25 pin 62		OK		Goitsemodimo Kgatitswe - 526511	M2
10053	A	Force [NI] Dev1/86 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10054	R	Read Defined Variable [NI] Dev2/87 = 1.0		OK	1	Goitsemodimo Kgatitswe - 526511	M2
10055	A	Force [NI] Dev1/86 = 0.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10056	R	Read Defined Variable [NI] Dev2/87 = 0.0		OK	0	Goitsemodimo Kgatitswe - 526511	M2
10057	I	Switch off the 400Vac power supply at the socket		OK		Goitsemodimo Kgatitswe - 526511	M2
10058	I	END OF TEST		OK		Goitsemodimo Kgatitswe - 526511	M2



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## Section 3 – TCMS Network

### 3.1 Instructions list

#### 3.1.1 025\_NET-TCMS Network

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	TCMS Network (SPP=25)		OK		Paseka Ditlhakanyane - 491468	M2
10002	I	Initial conditions		OK		Paseka Ditlhakanyane - 491468	M2
10003	I	Vehicle test bench should be configured as TC1: 1. TC1 Data plugs 2. MCE switch set to TC1		OK		Paseka Ditlhakanyane - 491468	M2
10004	A	110Vdc supply to the Normal Train line is ON		OK		Paseka Ditlhakanyane - 491468	M2
10005	I	Power Supply to the Router Switches		OK		Paseka Ditlhakanyane - 491468	M2
10006	I	Power supply to the 25A10 SWITCH ETHERNET (CRS1)		OK		Paseka Ditlhakanyane - 491468	M2
10007	A	Close Circuit Breaker 25Q10		OK		Paseka Ditlhakanyane - 491468	M2
10008	R	CRS1 25A10 is ON		OK		Paseka Ditlhakanyane - 491468	M2
10009	I	Power supply to the 25A11 SWITCH ETHERNET (CRS2)		OK		Paseka Ditlhakanyane - 491468	M2
10010	A	Close Circuit Breaker 25Q11		OK		Paseka Ditlhakanyane - 491468	M2
10011	R	CRS2 25A11 is ON		OK		Paseka Ditlhakanyane - 491468	M2
10012	I	Power supply to the 25A14 ETHERNET REPEATER (TBR)		OK		Paseka Ditlhakanyane - 491468	M2
10013	A	Close Circuit Breaker 25Q14		OK		Paseka Ditlhakanyane - 491468	M2
10014	R	TBR 25A14 is ON		OK		Paseka Ditlhakanyane - 491468	M2
10015	A	Close Circuit Breaker 25Q6		OK		Paseka Ditlhakanyane - 491468	M2

10016	A	Close Circuit Breaker 25Q7		OK		Paseka Ditlhakanyane - 491468	M2
10017	I	Ethernet Loop		OK		Paseka Ditlhakanyane - 491468	M2
10018	A	For each CRS, check that the Ethernet Loop LEDs are flashing		OK		Paseka Ditlhakanyane - 491468	M2
10019	R	CRS1 has LEDs on ports X3 and X4 flashing		OK		Paseka Ditlhakanyane - 491468	M2
10020	R	CRS2 has LEDs on ports X3 and X4 flashing		OK		Paseka Ditlhakanyane - 491468	M2
10021	R	Check on the Test Bench DDU that all Router Switches are available on the network		OK		Paseka Ditlhakanyane - 491468	M2
10022	I	Power Supply to the BRIOMS		OK		Paseka Ditlhakanyane - 491468	M2
10023	R	BRIOM 25A6 is ON		OK		Paseka Ditlhakanyane - 491468	M2
10024	A	Check visually that ground braid is connected to BRIOM		OK		Paseka Ditlhakanyane - 491468	M2
10025	R	BRIOM 25A7 is ON		OK		Paseka Ditlhakanyane - 491468	M2
10026	A	Check visually that ground braid is connected to BRIOM		OK		Paseka Ditlhakanyane - 491468	M2
10027	I	END OF TEST		OK		Paseka Ditlhakanyane - 491468	M2

## Section 4 – Cabin Control

### 4.1 Instructions list

#### 4.1.1 020\_CAB-Cabin Control

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Cabin Control (SPP=020)		OK		Alleta Sekgololo - 417407	M2
10002	I	Train Lines		OK		Alleta Sekgololo - 417407	M2
10003	I	Cab Selected on Train, Train Lines Dev2/1 = END1 90XR24 pin 3 Dev4/1 = END2 90XR34 pin 3		OK		Alleta Sekgololo - 417407	M2
10004	A	Force [NI] Dev4/1 = 1.0		OK		Alleta Sekgololo - 417407	M2
10005	R	Read Defined Variable [NI] Dev2/1 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10006	A	Force [NI] Dev4/1 = 0.0		OK		Alleta Sekgololo - 417407	M2
10007	R	Read Defined Variable [NI] Dev2/1 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10008	I	Cab Active TC1 Train Lines Dev2/3 = END1 90XR24 pin 5 Dev4/2 = END2 90XR34 pin 4		OK		Alleta Sekgololo - 417407	M2
10009	A	Force [NI] Dev4/2 = 1.0		OK		Alleta Sekgololo - 417407	M2
10010	R	Read Defined Variable [NI] Dev2/3 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10011	A	Force [NI] Dev4/2 = 0.0		OK		Alleta Sekgololo - 417407	M2
10012	R	Read Defined Variable [NI] Dev2/3 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10013	I	END OF TEST		OK		Alleta Sekgololo - 417407	M2



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## Section 5 – Internal Lighting

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### 5.1 Instructions list

### 5.1.1 052\_LGT-Internal Lighting

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Internal Lighting (SPP=052)		OK		Goitsemodimo Kgatitswe - 526511	M2
10002	I	Initial Conditions		OK		Goitsemodimo Kgatitswe - 526511	M2
10003	I	110Vdc Normal line is ON		OK		Goitsemodimo Kgatitswe - 526511	M2
10004	I	Cleaning Light Command		OK		Goitsemodimo Kgatitswe - 526511	M2
10005	I	110Vdc Permanent Train Line Dev4/40 = END2 90XR24 pin 29		OK		Goitsemodimo Kgatitswe - 526511	M2
10006	A	Force [NI] Dev4/40 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10007	A	Close Circuit Breaker 52Q5		OK		Goitsemodimo Kgatitswe - 526511	M2
10008	A	Close Circuit Breaker 52Q3		OK		Goitsemodimo Kgatitswe - 526511	M2
10009	A	Close Circuit Breaker 52Q4		OK		Goitsemodimo Kgatitswe - 526511	M2
10010	I	Light 33% Train Line Dev4/8 = END2 90XP25 pin 27		OK		Goitsemodimo Kgatitswe - 526511	M2
10011	A	Force [NI] Dev4/8 = 1.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10012	R	The saloon RIGHT side emergency lights (low intensity) are "ON" on all light modules		OK		Goitsemodimo Kgatitswe - 526511	M2
10013	R	The saloon LEFT side emergency lights (low intensity) are "ON" on all light modules		OK		Goitsemodimo Kgatitswe - 526511	M2
10014	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27		OK		Goitsemodimo Kgatitswe - 526511	M2
10015	R	Read Defined Variable [NI] Dev2/8 = 1.0		OK	1	Goitsemodimo Kgatitswe - 526511	M2
10016	I	Light 33% Train Line Dev4/8 = END2 90XP35 pin 27		OK		Goitsemodimo Kgatitswe - 526511	M2
10017	A	Force [NI] Dev4/8 = 0.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10018	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27		OK		Goitsemodimo Kgatitswe - 526511	M2

10019	R	Read Defined Variable [NI] Dev2/8 = 0.0	OK	0	Goitsemodimo Kgatitswe - 526511	M2
10020	R	All saloon emergency lights (low intensity) are OFF on all light modules (Left + Right)	OK		Goitsemodimo Kgatitswe - 526511	M2
10021	A	Turn Cleaning Staff Lights Switch 52S6 to ON position	OK		Goitsemodimo Kgatitswe - 526511	M2
10022	I	Light 33% Train Line Dev2/8 = END1 90XR15 pin 27	OK		Goitsemodimo Kgatitswe - 526511	M2
10023	R	Read Defined Variable [NI] Dev2/8 = 1.0	OK	1	Goitsemodimo Kgatitswe - 526511	M2
10024	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)	OK		Goitsemodimo Kgatitswe - 526511	M2
10025	A	Reset Circuit Breaker 52Q5 (Open and Close)	OK		Goitsemodimo Kgatitswe - 526511	M2
10026	R	Read Defined Variable [NI] Dev2/8 = 0.0	OK	0	Goitsemodimo Kgatitswe - 526511	M2
10027	I	Main Light Command	OK		Goitsemodimo Kgatitswe - 526511	M2
10028	A	Close Circuit Breaker 52Q1	OK		Goitsemodimo Kgatitswe - 526511	M2
10029	A	Close Circuit Breaker 52Q2	OK		Goitsemodimo Kgatitswe - 526511	M2
10030	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)	OK		Goitsemodimo Kgatitswe - 526511	M2
10031	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27	OK		Goitsemodimo Kgatitswe - 526511	M2
10032	R	Read Defined Variable [NI] Dev2/8 = 0.0	OK	0	Goitsemodimo Kgatitswe - 526511	M2
10033	I	Main Light Command Train Line Dev4/24 = END2 90XP35 pin 26	OK		Goitsemodimo Kgatitswe - 526511	M2
10034	A	Force [NI] Dev4/24 = 1.0	OK		Goitsemodimo Kgatitswe - 526511	M2
10035	I	Main Light Command Train Line Dev2/32 = END1 90XR25 pin 26	OK		Goitsemodimo Kgatitswe - 526511	M2
10036	R	Read Defined Variable [NI] Dev2/32 = 1.0	OK	1	Goitsemodimo Kgatitswe - 526511	M2
10037	R	The saloon RIGHT side main lighting (high intensity) is "ON" on all light modules	OK		Goitsemodimo Kgatitswe - 526511	M2
10038	R	The saloon LEFT side main lighting (high intensity) is "ON" on all light modules	OK		Goitsemodimo Kgatitswe - 526511	M2

10039	I	Main Light Command Train Line Dev4/24 = END2 90XP35 pin 26		OK		Goitsemodimo Kgatitswe - 526511	M2
10040	A	Force [N] Dev4/24 = 0.0		OK		Goitsemodimo Kgatitswe - 526511	M2
10041	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)		OK		Goitsemodimo Kgatitswe - 526511	M2
10042	I	END OF TEST		OK		Goitsemodimo Kgatitswe - 526511	M2



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## Section 6 – Train-Ground Communication

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### 6.1 Instructions list

### 6.1.1 062\_ETS-ERTMS

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	ERTMS (SPP=062)		OK		Alleta Sekgololo - 417407	M2
10002	I	Ensure that ALL the circuit breaker in the ERTMS cubicle are in OFF position		OK		Alleta Sekgololo - 417407	M2
10003	I	ELECTRICAL CHECK <a href="#">[9-41-20-335686_113116_Electrical Check_M2.pdf]</a>		OK		Alleta Sekgololo - 417407	M2
10004	R	All the ERTMS Circuit Breakers were checked		OK		Alleta Sekgololo - 417407	M2
10005	A	Close Circuit Breaker 62Q2		OK		Alleta Sekgololo - 417407	M2
10006	A	Close Circuit Breaker 62Q3		OK		Alleta Sekgololo - 417407	M2
10007	A	Close Circuit Breaker 62Q4		OK		Alleta Sekgololo - 417407	M2
10008	R	Check that the ERTMS module is OFF		OK		Alleta Sekgololo - 417407	M2
10009	I	ERTMS Bypass Train Line Dev4/37 = END2 90XP34 pin 11 Dev2/33 = END1 90XP24 pin 11		OK		Alleta Sekgololo - 417407	M2
10010	A	Force [NI] Dev4/37 = 1.0		OK		Alleta Sekgololo - 417407	M2
10011	R	Read Defined Variable [NI] Dev2/33 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10012	R	Using the dc voltage detector, check that the relay 62K3 is energized.		OK		Alleta Sekgololo - 417407	M2
10013	A	Force [NI] Dev4/37 = 0.0		OK		Alleta Sekgololo - 417407	M2
10014	R	Read Defined Variable [NI] Dev2/33 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10015	R	Using the dc voltage detector, check that the relay 62K3 is de-energized.		OK		Alleta Sekgololo - 417407	M2
10016	I	Emergency Brake ERTMS 1 Train Line Dev4/88 = END2 90XP34 pin 18 Dev2/88 = END1 90XP24 pin 18		OK		Alleta Sekgololo - 417407	M2
10017	A	Force [NI] Dev4/88 = 1.0		OK		Alleta Sekgololo - 417407	M2
10018	R	Read Defined Variable [NI] Dev2/88 = 1.0		OK	1	Alleta Sekgololo - 417407	M2

10019	A	Force [NI] Dev4/88 = 0.0		OK		Alleta Sekgololo - 417407	M2
10020	R	Read Defined Variable [NI] Dev2/88 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10021	I	Emergency Brake ERTMS 2 Train Line Dev4/80 = END2 90XP34 pin 20 Dev2/80 = END1 90XP24 pin 20		OK		Alleta Sekgololo - 417407	M2
10022	A	Force [NI] Dev4/80 = 1.0		OK		Alleta Sekgololo - 417407	M2
10023	R	Read Defined Variable [NI] Dev2/80 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10024	A	Force [NI] Dev4/80 = 0.0		OK		Alleta Sekgololo - 417407	M2
10025	R	Read Defined Variable [NI] Dev2/80 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10026	I	Master Key TC2 Train Line Dev1/73 = END1 90XP24 pin 17		OK		Alleta Sekgololo - 417407	M2
10027	A	Force [NI] Dev1/73 = 1.0		OK		Alleta Sekgololo - 417407	M2
10028	R	Using the dc voltage detector, check that the relay 62K5 is energized.		OK		Alleta Sekgololo - 417407	M2
10029	A	Force [NI] Dev1/73 = 0.0		OK		Alleta Sekgololo - 417407	M2
10030	R	Using the dc voltage detector, check that the relay 62K5 is de-energized.		OK		Alleta Sekgololo - 417407	M2
10031	I	Master Key TC1 Train Line Dev4/73 = END2 90XP34 pin 14		OK		Alleta Sekgololo - 417407	M2
10032	A	Force [NI] Dev4/73 = 1.0		OK		Alleta Sekgololo - 417407	M2
10033	R	Using the dc voltage detector, check that the relay 62K4 is energized		OK		Alleta Sekgololo - 417407	M2
10034	A	Force [NI] Dev4/73 = 0.0		OK		Alleta Sekgololo - 417407	M2
10035	R	Using the dc voltage detector, check that the relay 62K4 is de-energized.		OK		Alleta Sekgololo - 417407	M2
10036	I	Direction		OK		Alleta Sekgololo - 417407	M2
10037	I	Forward Train Line Dev4/35 = END2 90XP35 pin 25		OK		Alleta Sekgololo - 417407	M2
10038	A	Force [NI] Dev4/35 = 1.0		OK		Alleta Sekgololo - 417407	M2
10039	R	Using the dc voltage detector, check that the relay 62K9 is energized		OK		Alleta Sekgololo - 417407	M2
10040	A	Force [NI] Dev4/35 = 0.0		OK		Alleta Sekgololo - 417407	M2

10041	R	Using the dc voltage detector, check that the relay 62K9 is de-energized		OK	Alleta Sekgololo - 417407	M2
10042	I	Reverse Train Line Dev4/78 = END2 90XP35 pin 30		OK	Alleta Sekgololo - 417407	M2
10043	A	Force [NI] Dev4/78 = 1.0		OK	Alleta Sekgololo - 417407	M2
10044	R	Using the dc voltage detector, check that the relay 62K8 is energized		OK	Alleta Sekgololo - 417407	M2
10045	A	Force [NI] Dev4/78 = 0.0		OK	Alleta Sekgololo - 417407	M2
10046	R	Using the dc voltage detector, check that the relay 62K8 is de-energized		OK	Alleta Sekgololo - 417407	M2
10047	I	Wheel Sensor Continuity Test <a href="#">[9-42-13-335687_Wheel Sensor Mech Check.pdf]</a>		OK	Alleta Sekgololo - 417407	M2
10048	R	Wheel sensor mechanical check completed.		OK	Alleta Sekgololo - 417407	M2
10049	I	Use the multimeter to test the continuity		OK	Alleta Sekgololo - 417407	M2
10050	A	Check continuity between [62B2 WHEEL SENSOR (Local:+MB2; Connector 62XP2_1) and 62A1 ERTMS (Local:+LV4; connector 62XP1_X02.c )]		OK	Alleta Sekgololo - 417407	M2
10051	R	There is a continuity between: pin B & pin 12, pin A & pin 6, pin C & pin 11, pin D & pin 5		OK	Alleta Sekgololo - 417407	M2
10052	R	There is a continuity between: pin F & pin 10, pin E & pin 4, pin G & pin 9, pin H & pin 3		OK	Alleta Sekgololo - 417407	M2
10053	R	There is a continuity between: pin L & pin 8, pin K & pin 2, pin M & pin 7, pin N & pin 1		OK	Alleta Sekgololo - 417407	M2
10054	R	Cable shield is continuous		OK	Alleta Sekgololo - 417407	M2
10055	A	Check continuity between [Inter-car (Local: +END2; Connector 90XR33.C) and 62A1 ERTMS (Local:+LV4; connector 62XP1_X02.d )]		OK	Alleta Sekgololo - 417407	M2
10056	R	There is a continuity between: pin 2 & pin 12, pin 1 & pin 6, pin 7 & pin 11, pin 8 & pin 5		OK	Alleta Sekgololo - 417407	M2
10057	R	There is a continuity between: pin 4 & pin 10, pin 3 & pin 4, pin 9 & pin 9, pin 10 &		OK	Alleta Sekgololo - 417407	M2

		pin 3				
10058	R	There is a continuity between: pin 6 & pin 8, pin 5 & pin 2, pin 11 & pin 7, pin 12 & pin 1		OK	Alleta Sekgololo - 417407	M2
10059	R	Wheel Sensor cable bending radius is at least 10 times its diameter.		OK	Alleta Sekgololo - 417407	M2
10060	I	Radar Continuity Test <a href="#">[9-43-21-335688_Radar Mechanical Check.pdf]</a>		OK	Alleta Sekgololo - 417407	M2
10061	R	Radar mechanical check completed.		OK	Alleta Sekgololo - 417407	M2
10062	A	Check continuity between [62A4 RADAR (Local:+UND; Connector 62XP4_1) and 62A1 ERTMS (Local:+LV4; Connector 62XP1_X02.b)]		OK	Alleta Sekgololo - 417407	M2
10063	R	There is good continuity between Radar and the ERTMS connector.		OK	Alleta Sekgololo - 417407	M2
10064	I	Eurobalise Antenna Cable		OK	Alleta Sekgololo - 417407	M2
10065	A	Check continuity between [62A1(LOCAL:+LV4; Connector - 62XP1_X01) and Intercar (LOCAL:+END2; connector -90XR30)] according to the image below		OK	Alleta Sekgololo - 417407	M2
10066	R	Eurobalise Antenna cable is correctly configured from END2		OK	Alleta Sekgololo - 417407	M2
10067	A	Check continuity between [62A1(LOCAL:+LV4; Connector - 62XP1_X07) and Intercar (LOCAL:+END1; connector -90XR20)] according to the image below		OK	Alleta Sekgololo - 417407	M2
10068	R	Eurobalise Antenna cable is correctly configured from END1		OK	Alleta Sekgololo - 417407	M2
10069	I	END OF TEST		OK	Alleta Sekgololo - 417407	M2

### 6.1.2 064\_COM-Train-Ground Communication

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Train-Ground Communication (SPP=064)		OK		Siphehile Mchunu - 491465	M2
10002	A	Using the tool list on the side of your screen, note the serial number of the antenna cable tester used in this procedure		OK		Siphehile Mchunu - 491465	M2
10003	I	Antenna cable tester Calibration		OK		Siphehile Mchunu - 491465	M2
10004	A	Connect the Validation Antenna(from Warehouse) to connector 64XR3		OK		Siphehile Mchunu - 491465	M2
10005	I	PERFORM THIS CALIBRATION BEFORE TESTING EACH CABLE		OK		Siphehile Mchunu - 491465	M2
10006	A	Select "preset", then Set the test frequency by selecting "FREQ/DIST" then setting the start and stop frequency, select "calibrate", then "Full 1-port" then Calibrate the Antenna cable tester using the 0.5m extension cable and the T-calibration unit.		OK		Siphehile Mchunu - 491465	M2
10007	I	GSM Cable (64XP2_X12)		OK		Siphehile Mchunu - 491465	M2
10008	A	Ensure the frequency range is 876MHz - 961.34MHz; Connect the GSM cable(64XP2_X12) of the maintenance box to the measuring cable and note the resulting waveform		OK		Siphehile Mchunu - 491465	M2
10009	R	The maximum peak of the waveform is Result Max : $x \leq 2.13$ ()		OK	2.03	Siphehile Mchunu - 491465	M2
10010	A	Save the waveform result with the following name: TS#(-Train number)_MBX_GSM1		OK		Siphehile Mchunu - 491465	M2
10011	A	Recalibrate the tester. Ensure the frequency range is 1.71GHz - 1.88Ghz; Connect the GSM cable of the maintenance box to the measuring cable and note the resulting waveform		OK		Siphehile Mchunu - 491465	M2
10012	R	The maximum peak of the waveform is Result Max : $x \leq 2.13$ ()		OK	1.53	Siphehile Mchunu - 491465	M2
10013	A	Save the waveform result with the following name:		OK		Siphehile Mchunu - 491465	M2

		TS#(#-Train number)_MBX_GSM2					
10014	I	GPS Cable (64XP2_X13)		OK		Siphesihle Mchunu - 491465	M2
10015	A	Recalibrate the tester. Ensure the frequency range is 1200MHz - 1600MHz; Connect the GPS cable (64XP2_X13) of the maintenance box to the measuring cable and note the resulting waveform		OK		Siphesihle Mchunu - 491465	M2
10016	A	On the cable tester, select "MEAS" and select F1 "Distance to Fault"		OK		Siphesihle Mchunu - 491465	M2
10017	I	Ensure that the resulting waveform is such as in the picture below. The peak of the graph should be at a point >8m; before that, the graph should be flat. Maximum value before the peak should be 1.2		OK		Siphesihle Mchunu - 491465	M2
10018	R	The maximum peak of the waveform is Result Max : x <= 1.2 ()		OK	1.191	Siphesihle Mchunu - 491465	M2
10019	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_GPS		OK		Siphesihle Mchunu - 491465	M2
10020	I	Wifi Cable(64XP2_X14)		OK		Siphesihle Mchunu - 491465	M2
10021	A	Recalibrate the tester. Ensure the frequency range is 1710MHz - 2700MHz; Connect the WiFi cable (64XP2_X14) of the maintenance box to the measuring cable and note the resulting waveform		OK		Siphesihle Mchunu - 491465	M2
10022	R	The maximum peak of the waveform is Result Max : x <= 2.45 ()		OK	1.73	Siphesihle Mchunu - 491465	M2
10023	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_WiFi1		OK		Siphesihle Mchunu - 491465	M2
10024	A	Recalibrate the tester. Ensure the frequency range is 4.9GHz - 5.935GHz;		OK		Siphesihle Mchunu - 491465	M2
10025	R	The maximum peak of the waveform is Result Max : x <= 2.45 ()		OK	1.57	Siphesihle Mchunu - 491465	M2
10026	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_WiFi2		OK		Siphesihle Mchunu - 491465	M2
10027	A	Close Circuit Breaker 64Q2		OK		Siphesihle Mchunu - 491465	M2
10028	A	Check the voltage on connector 64XP2_X4		OK		Siphesihle Mchunu - 491465	M2

10029	R	+110V between pin 1(+) and 3(-) +110V between pin 2(+) and 4(-)		OK		Siphesihle Mchunu - 491465	M2
10030	A	Open Circuit Breaker 64Q2		OK		Siphesihle Mchunu - 491465	M2
10031	I	ERTMS		OK		Siphesihle Mchunu - 491465	M2
10032	A	Recalibrate the tester. Ensure the frequency range is 876MHz - 960MHz; Connect the GSM-R Cable 62XP1_A1X1_1 cable of the ERTMS to the measuring cable and note the resulting waveform		OK		Siphesihle Mchunu - 491465	M2
10033	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	1.87	Siphesihle Mchunu - 491465	M2
10034	A	Save the waveform result with the following name: TS#(#-Train number)_ERTMS_ 1		OK		Siphesihle Mchunu - 491465	M2
10035	A	Ensure the frequency range is 876MHz - 960MHz; Connect the GSM-R Cable 62XP1_A1X2_1 cable of the ERTMS to the measuring cable and note the resulting waveform		OK		Siphesihle Mchunu - 491465	M2
10036	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	1.55	Siphesihle Mchunu - 491465	M2
10037	A	Save the waveform result with the following name: TS#(#-Train number)_ERTMS_ 2		OK		Siphesihle Mchunu - 491465	M2
10038	I	END OF TEST		OK		Siphesihle Mchunu - 491465	M2

## Section 7 – Pantograph

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### 7.1 Instructions list

### 7.1.1 021\_PNT-Pantograph

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Pantograph (SPP = 021)		OK		Sicelo Mtolo - 525130	M2
10002	I	There should be no air in the main pipe		OK		Sicelo Mtolo - 525130	M2
10003	R	Measure 0 Bar at point K2.8 using the pressure gauge		OK		Sicelo Mtolo - 525130	M2
10004	A	Ensure that the pantograph isolation valve K2.5 is normalized (not isolated)		OK		Sicelo Mtolo - 525130	M2
10005	I	Initial Conditions		OK		Sicelo Mtolo - 525130	M2
10006	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10007	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10008	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10009	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10010	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxpressswitchr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10011	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxpressswitchr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10012	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10013	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10014	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10015	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10016	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sicelo Mtolo - 525130	M2

10017	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10018	I	Auxiliary Compressor		OK		Sicelo Mtolo - 525130	M2
10019	A	Close Circuit Breaker 21Q3		OK		Sicelo Mtolo - 525130	M2
10020	A	Close Circuit Breaker 21Q1		OK		Sicelo Mtolo - 525130	M2
10021	A	Close Circuit Breaker 21Q2		OK		Sicelo Mtolo - 525130	M2
10022	R	The Auxiliary compressor 21M1 turns ON		OK		Sicelo Mtolo - 525130	M2
10023	R	Read Defined Variable [TT] (MPU1)lo_pnt_m2startauxiliarcompr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10024	R	Read Defined Variable [TT] (MPU1)lo_pnt_m2startauxiliarcompr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10025	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10026	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10027	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sicelo Mtolo - 525130	M2
10028	I	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 > 3.8Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)		OK		Sicelo Mtolo - 525130	M2
10029	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10030	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10031	R	The pantograph is raised		OK		Sicelo Mtolo - 525130	M2
10032	I	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 is between 6 - 7Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)		OK		Sicelo Mtolo - 525130	M2
10033	R	The Auxiliary compressor 21M1 turns OFF		OK		Sicelo Mtolo - 525130	M2
10034	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 1.0		OK	1	Sicelo Mtolo - 525130	M2

10035	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 1.0	OK	1	Sicelo Mtolo - 525130	M2
10036	A	Turn the pantograph isolation valve K2.5 to isolated position	OK		Sicelo Mtolo - 525130	M2
10037	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr1 = 0.0	OK	0	Sicelo Mtolo - 525130	M2
10038	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr2 = 0.0	OK	0	Sicelo Mtolo - 525130	M2
10039	A	Force [TT] (MPU1)lo_pnt_m2startauxiliarcompr1 = 0.0	OK		Sicelo Mtolo - 525130	M2
10040	A	Force [TT] (MPU1)lo_pnt_m2startauxiliarcompr2 = 0.0	OK		Sicelo Mtolo - 525130	M2
10041	A	Drain the air by putting the isolation valve K2.5 in half way position	OK		Sicelo Mtolo - 525130	M2
10042	R	Using the pressure gauge, check that the Pantograph drops at 3.3 Bar	OK		Sicelo Mtolo - 525130	M2
10043	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0	OK	0	Sicelo Mtolo - 525130	M2
10044	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0	OK	0	Sicelo Mtolo - 525130	M2
10045	A	Turn the pantograph isolation valve K2.5 to normal position	OK		Sicelo Mtolo - 525130	M2
10046	A	Release [TT] (MPU1)lo_pnt_m2startauxiliarcompr1	OK		Sicelo Mtolo - 525130	M2
10047	A	Release [TT] (MPU1)lo_pnt_m2startauxiliarcompr2	OK		Sicelo Mtolo - 525130	M2
10048	R	The Auxiliary compressor 21M1 turns ON	OK		Sicelo Mtolo - 525130	M2
10049	I	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 is between 6 - 7Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)	OK		Sicelo Mtolo - 525130	M2
10050	R	The Auxiliary compressor 21M1 turns OFF	OK		Sicelo Mtolo - 525130	M2
10051	I	Isolation and Earthing	OK		Sicelo Mtolo - 525130	M2
10052	A	In the HV Box , set the HVB1 valve to Isolated position - to isolate the	OK		Sicelo Mtolo - 525130	M2

		pantograph					
10053	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 0.0	OK	0	Sicelo Mtolo - 525130	M2	
10054	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 0.0	OK	0	Sicelo Mtolo - 525130	M2	
10055	A	Turn the Earthing Switch to grounded position	OK		Sicelo Mtolo - 525130	M2	
10056	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 0.0	OK	0	Sicelo Mtolo - 525130	M2	
10057	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 0.0	OK	0	Sicelo Mtolo - 525130	M2	
10058	A	Turn the Earthing Switch to back to Normal position	OK		Sicelo Mtolo - 525130	M2	
10059	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 1.0	OK	1	Sicelo Mtolo - 525130	M2	
10060	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 1.0	OK	1	Sicelo Mtolo - 525130	M2	
10061	A	Set the HVB1 valve to Normal position	OK		Sicelo Mtolo - 525130	M2	
10062	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 1.0	OK	1	Sicelo Mtolo - 525130	M2	
10063	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 1.0	OK	1	Sicelo Mtolo - 525130	M2	
10064	A	Normalize the HV box and remove all spare/duplicate keys (green/yellow/blue)	OK		Sicelo Mtolo - 525130	M2	
10065	I	Pantograph Mechanical test	OK		Sicelo Mtolo - 525130	M2	
10066	I	Housed Height Measurement, Pantograph Over-Height Measurement, Automatic Drop Device and Control Force Test	OK		Sicelo Mtolo - 525130	M2	
10067	I	Initial Conditions	OK		Sicelo Mtolo - 525130	M2	
10068	I	There should be no air in the main pipe	OK		Sicelo Mtolo - 525130	M2	
10069	R	Measure 0 Bar at point K2.8 using the pressure gauge	OK		Sicelo Mtolo - 525130	M2	
10070	A	Ensure that the pantograph isolation valve K2.5 is normalized (not isolated)	OK		Sicelo Mtolo - 525130	M2	
10071	I	Circuit Breakers	OK		Sicelo Mtolo - 525130	M2	

10072	A	Close Circuit Breaker 21Q3		OK		Sicelo Mtolo - 525130	M2
10073	A	Close Circuit Breaker 21Q1		OK		Sicelo Mtolo - 525130	M2
10074	A	Close Circuit Breaker 21Q2		OK		Sicelo Mtolo - 525130	M2
10075	I	Housed Height Measurement		OK		Sicelo Mtolo - 525130	M2
10076	I	The purpose of this test is to ensure that the housed height of the pantograph complies with the specified dimensions  The train must be positioned on a levelled track without any overhead catenary		OK		Sicelo Mtolo - 525130	M2
10077	A	Measure the perpendicular height (using a measuring tape and ruler extended from points A, B and C of the pantohead) of the pantograph on natural housed position (between the roof of the train and the pantograph collector head at points A, B, C)		OK		Sicelo Mtolo - 525130	M2
10078	A	Ensure that no part of the pantograph is higher than 486mm above the roof		OK		Sicelo Mtolo - 525130	M2
10079	R	A Result Max : $x \leq 486$ (mm)		OK	485	Sicelo Mtolo - 525130	M2
10080	R	B Result Max : $x \leq 486$ (mm)		OK	486	Sicelo Mtolo - 525130	M2
10081	R	C Result Max : $x \leq 486$ (mm)		OK	485	Sicelo Mtolo - 525130	M2
10082	A	Check that the center of the pantograph head corresponds with the track center line in the housed position (Use marked ruler to compare)		OK		Sicelo Mtolo - 525130	M2
10083	R	Pantograph aligned with the track center line in housed position.		OK		Sicelo Mtolo - 525130	M2
10084	I	Automatic Drop Device		OK		Sicelo Mtolo - 525130	M2
10085	I	The purpose of this test is to verify the correct operation of the automatic drop device (ADD) and will be performed by simulating the activation of the ADD pressure switch.		OK		Sicelo Mtolo - 525130	M2
10086	A	Tie a cable on the pantograph head collector		OK		Sicelo Mtolo - 525130	M2
10087	A	Close Circuit Breaker 21Q3		OK		Sicelo Mtolo - 525130	M2

10088	A	Close Circuit Breaker 21Q1		OK		Sicelo Mtolo - 525130	M2
10089	A	Close Circuit Breaker 21Q2		OK		Sicelo Mtolo - 525130	M2
10090	R	The Auxiliary compressor 21M1 turns ON		OK		Sicelo Mtolo - 525130	M2
10091	A	Force [TT] (MPU1)lo_pnt_m2raiseantor1 = 1.0		OK		Sicelo Mtolo - 525130	M2
10092	I	Allow the pressure to rise, and the pantograph to raise		OK		Sicelo Mtolo - 525130	M2
10093	R	The pantograph is raised		OK		Sicelo Mtolo - 525130	M2
10094	A	Activate the ADD manually on the roof by operating the bleeding screw (PT3) on the pan head to simulate a loss of air supply		OK		Sicelo Mtolo - 525130	M2
10095	R	The pressure of the test point PT12 drops to 0 bar		OK		Sicelo Mtolo - 525130	M2
10096	A	On the roof, close the bleeding screw (PT3) to reset the ADD		OK		Sicelo Mtolo - 525130	M2
10097	R	Fault reset and equipment normalized		OK		Sicelo Mtolo - 525130	M2
10098	A	Release [TT] (MPU1)lo_pnt_m2raiseantor1		OK		Sicelo Mtolo - 525130	M2
10099	R	Pantograph is lowered		OK		Sicelo Mtolo - 525130	M2
10100	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10101	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10102	I	Pantograph Over-Height Measurement		OK		Sicelo Mtolo - 525130	M2
10103	I	The purpose of the next test is to verify that the pantograph over-height detection and auto dropping functions are calibrated and work correctly. This test simulates the condition when a pantograph is incorrectly raised in an area without any overhead line		OK		Sicelo Mtolo - 525130	M2
10104	I	You will be required to time the rising and dropping of the pantograph using a stopwatch. measure the time from the moment the pantograph starts to rise until the pantograph reaches maximum raised position; then time from the moment the pantograph starts dropping at over height		OK		Sicelo Mtolo - 525130	M2

		detection till it reaches housed position					
10105	A	Use the rope to hook the Pantograph and place the marked ruler perpendicular to the roof of the car.		OK		Sicelo Mtolo - 525130	M2
10106	A	Force [TT] (MPU1)lo_pnt_m2raiseantor1 = 1.0		OK		Sicelo Mtolo - 525130	M2
10107	A	Whilst holding the end of the rope, allow the pressure to rise, and the pantograph to rise until it reaches the maximum height marked on the ruler.		OK		Sicelo Mtolo - 525130	M2
10108	R	Rising time Result Max : x <= 10 (s)		OK	7.6	Sicelo Mtolo - 525130	M2
10109	A	By adjusting the rope, ensure that the Pantograph Panhead is aligned with the marking on the ruler.		OK		Sicelo Mtolo - 525130	M2
10110	A	Adjust the Over-height valve such that when the Pantograph goes above the marking on the ruler, the over height must be detected.		OK		Sicelo Mtolo - 525130	M2
10111	R	The over-height valve is adjusted correctly.		OK		Sicelo Mtolo - 525130	M2
10112	A	Release [TT] (MPU1)lo_pnt_m2raiseantor1		OK		Sicelo Mtolo - 525130	M2
10113	R	Pantograph is lowered		OK		Sicelo Mtolo - 525130	M2
10114	A	Force [TT] (MPU1)lo_pnt_m2raiseantor1 = 1.0		OK		Sicelo Mtolo - 525130	M2
10115	A	Allow the Pantograph to rise freely until it reaches Over-height		OK		Sicelo Mtolo - 525130	M2
10116	R	Over-height is detected immediately after passing the marked area on the ruler and Pantograph begins to drop		OK		Sicelo Mtolo - 525130	M2
10117	R	Lowering time Result Max : x <= 7 (s)		OK	5.9	Sicelo Mtolo - 525130	M2
10118	A	Release [TT] (MPU1)lo_pnt_m2raiseantor1		OK		Sicelo Mtolo - 525130	M2
10119	A	Reset over-height valve (PT2) on the roof		OK		Sicelo Mtolo - 525130	M2
10120	R	Equipment normalized. (Only after resetting the PT2 valve, can the pantograph be raised)		OK		Sicelo Mtolo - 525130	M2
10121	I	Control Force Test		OK		Sicelo Mtolo - 525130	M2

10122	I	The purpose of this test is to ensure that the pantograph maintains an acceptable force against the catenary wire overall operating heights		OK		Sicelo Mtolo - 525130	M2
10123	A	Attach the dynamometer to the pantograph's head collector		OK		Sicelo Mtolo - 525130	M2
10124	A	Raise the pantograph and measure the static force when the pantograph begins to rise after pulling the dynamometer up (lifting force on housed position)		OK		Sicelo Mtolo - 525130	M2
10125	A	Force [TT] (MPU1)lo_pnt_m2raiseantor1 = 1.0		OK		Sicelo Mtolo - 525130	M2
10126	I	Allow the pressure to rise, and the pantograph to raise		OK		Sicelo Mtolo - 525130	M2
10127	R	The pantograph is raised		OK		Sicelo Mtolo - 525130	M2
10128	R	F>150N		OK		Sicelo Mtolo - 525130	M2
10129	A	Attach the 8.5kg (one 7.5kg and one 1kg) dead weight to the Panto head to apply an 85N force whilst the Panto is in the raised position.		OK		Sicelo Mtolo - 525130	M2
10130	R	The pantographs should remain in the neutral position		OK		Sicelo Mtolo - 525130	M2
10131	A	Check that the center of the pantograph head corresponds with the track center line on maximum raised position.		OK		Sicelo Mtolo - 525130	M2
10132	R	Pantograph aligned with the track centreline in maximum raised position (Use marked ruler to compare)		OK		Sicelo Mtolo - 525130	M2
10133	A	Remove 1kg dead weight		OK		Sicelo Mtolo - 525130	M2
10134	R	Pantograph continues to rise to over height condition		OK		Sicelo Mtolo - 525130	M2
10135	A	Remove the dynamometer and dead weights from the pantograph's head-collector		OK		Sicelo Mtolo - 525130	M2
10136	A	Release [TT] (MPU1)lo_pnt_m2raiseantor1		OK		Sicelo Mtolo - 525130	M2
10137	R	Pantograph is lowered		OK		Sicelo Mtolo - 525130	M2



10138	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10139	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10140	I	END OF TEST		OK		Sicelo Mtolo - 525130	M2



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## Section 8 – Rescue Mode and Emergency Disconnection

### 8.1 Instructions list

#### 8.1.1 027\_ERM-Rescue Mode and Emergency Disconnection

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Rescue Mode and Emergency Disconnection (SPP=027)		OK		TIVANI Angel - 542257	M2
10002	I	Initial Conditions		OK		TIVANI Angel - 542257	M2
10003	I	110Vdc Normal power supply is connected to the vehicle, and switched ON		OK		TIVANI Angel - 542257	M2
10004	I	Backup Mode		OK		TIVANI Angel - 542257	M2
10005	I	Backup Mode Train Lines Dev2/29 = END1 90XR25 pin23 Dev4/33 = END2 90XP35 pin 23		OK		TIVANI Angel - 542257	M2
10006	A	Force [NI] Dev4/33 = 1.0		OK		TIVANI Angel - 542257	M2
10007	R	Read Defined Variable [NI] Dev2/29 = 1.0		OK	1	TIVANI Angel - 542257	M2
10008	R	Relay 27K1 is energized.		OK		TIVANI Angel - 542257	M2
10009	R	Relay 27K2 is de-energized.		OK		TIVANI Angel - 542257	M2
10010	A	Timer 30.0 S		OK		TIVANI Angel - 542257	M2
10011	R	Relay 27K2 is de-energized.		OK		TIVANI Angel - 542257	M2
10012	A	Timer 30.0 S		OK		TIVANI Angel - 542257	M2
10013	R	Relay 27K2 is energized.		OK		TIVANI Angel - 542257	M2
10014	I	Backup Mode Train Lines Dev2/29 = END1 90XR25 pin23 Dev4/33 = END2 90XP35 pin 23		OK		TIVANI Angel - 542257	M2
10015	A	Force [NI] Dev4/33 = 0.0		OK		TIVANI Angel - 542257	M2

10016	R	Read Defined Variable [NI] Dev2/29 = 0.0		OK	0	TIVANI Angel - 542257	M2
10017	R	Relay 27K1 is de-energized.		OK		TIVANI Angel - 542257	M2
10018	R	Relay 27K2 is de-energized.		OK		TIVANI Angel - 542257	M2
10019	I	Emergency Disconnection		OK		TIVANI Angel - 542257	M2
10020	I	Emergency Disconnection Train Lines Dev2/30 = END1 90XR25 pin24 Dev4/34 = END2 90XP35 pin 24		OK		TIVANI Angel - 542257	M2
10021	A	Force [NI] Dev4/34 = 1.0		OK		TIVANI Angel - 542257	M2
10022	R	Read Defined Variable [NI] Dev2/30 = 1.0		OK	1	TIVANI Angel - 542257	M2
10023	R	Relay 27K5 is energized		OK		TIVANI Angel - 542257	M2
10024	I	Emergency Disconnection Train Lines Dev2/30 = END1 90XR25 pin24 Dev4/34 = END2 90XP35 pin 24		OK		TIVANI Angel - 542257	M2
10025	A	Force [NI] Dev4/34 = 0.0		OK		TIVANI Angel - 542257	M2
10026	R	Read Defined Variable [NI] Dev2/30 = 0.0		OK	0	TIVANI Angel - 542257	M2
10027	R	Relay 27K5 is de-energized.		OK		TIVANI Angel - 542257	M2
10028	I	END OF TEST		OK		TIVANI Angel - 542257	M2



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Document Reference  
GIB0000007424  
Version: A0

Emission date  
21/11/2024

## Section 9 – Emergency Brake

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### 9.1 Instructions list

### 9.1.1 044\_UBK-Emergency Brake

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Emergency Brake (SPP=044)		OK		Alleta Sekgololo - 417407	M2
10002	I	Initial Conditions		OK		Alleta Sekgololo - 417407	M2
10003	I	No PEAs are activated		OK		Alleta Sekgololo - 417407	M2
10004	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Alleta Sekgololo - 417407	M2
10005	I	Visual Inspection		OK		Alleta Sekgololo - 417407	M2
10006	A	Physically and visually inspect all the Disk Break Units (DBU) and brake pads, to ensure they are securely fitted		OK		Alleta Sekgololo - 417407	M2
10007	R	All the brake DBUs are correctly installed, and all the brake pads are correctly installed and locked		OK		Alleta Sekgololo - 417407	M2
10008	A	Check the pipe installation.		OK		Alleta Sekgololo - 417407	M2
10009	R	All the pipes are installed on the vehicle		OK		Alleta Sekgololo - 417407	M2
10010	A	Check all the Passenger Emergency Alarm handles, and ensure they are connected to their respective connectors		OK		Alleta Sekgololo - 417407	M2
10011	R	All the PEAs are installed and connected		OK		Alleta Sekgololo - 417407	M2
10012	I	Train Lines		OK		Alleta Sekgololo - 417407	M2
10013	I	Emergency Brake Loop Train Lines Dev2/5 = END1 90XR24 pin 8 Dev4/5 = END2 90XP34 pin 8		OK		Alleta Sekgololo - 417407	M2
10014	A	Force [NI] Dev4/5 = 1.0		OK		Alleta Sekgololo - 417407	M2
10015	R	Read Defined Variable [NI] Dev2/5 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10016	A	Force [NI] Dev4/5 = 0.0		OK		Alleta Sekgololo - 417407	M2
10017	R	Read Defined Variable [NI] Dev2/5 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10018	I	Emergency Brake Loop Override Train Lines Dev2/6 = END1 90XR24 pin 9		OK		Alleta Sekgololo - 417407	M2

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		Dev4/6 = END2 90XP34 pin 9					
10019	A	Force [NI] Dev4/6 = 1.0	OK			Alleta Sekgololo - 417407	M2
10020	R	Read Defined Variable [NI] Dev2/6 = 1.0	OK	1		Alleta Sekgololo - 417407	M2
10021	A	Force [NI] Dev4/6 = 0.0	OK			Alleta Sekgololo - 417407	M2
10022	R	Read Defined Variable [NI] Dev2/6 = 0.0	OK	0		Alleta Sekgololo - 417407	M2
10023	I	Emergency Brake Train Line Train Lines Dev2/50 = END1 90XR25 pin 67 Dev4/61 = END2 90XP35 pin 67	OK			Alleta Sekgololo - 417407	M2
10024	A	Force [NI] Dev4/61 = 1.0	OK			Alleta Sekgololo - 417407	M2
10025	R	Read Defined Variable [NI] Dev2/50 = 1.0	OK	1		Alleta Sekgololo - 417407	M2
10026	A	Force [NI] Dev4/61 = 0.0	OK			Alleta Sekgololo - 417407	M2
10027	R	Read Defined Variable [NI] Dev2/50 = 0.0	OK	0		Alleta Sekgololo - 417407	M2
10028	I	PEA Loop OTDR Train Lines Dev2/7 = END1 90XR24 pin 10 Dev4/7 = END2 90XP34 pin 10	OK			Alleta Sekgololo - 417407	M2
10029	A	Force [NI] Dev4/7 = 1.0	OK			Alleta Sekgololo - 417407	M2
10030	R	Read Defined Variable [NI] Dev2/7 = 1.0	OK	1		Alleta Sekgololo - 417407	M2
10031	A	Force [NI] Dev4/7 = 0.0	OK			Alleta Sekgololo - 417407	M2
10032	R	Read Defined Variable [NI] Dev2/7 = 0.0	OK	0		Alleta Sekgololo - 417407	M2
10033	I	PEA Reset	OK			Alleta Sekgololo - 417407	M2
10034	A	Close Circuit Breaker 44Q1	OK			Alleta Sekgololo - 417407	M2
10035	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95 Dev4/62 = END2 90XP35 pin 95	OK			Alleta Sekgololo - 417407	M2
10036	A	Force [NI] Dev4/62 = 1.0	OK			Alleta Sekgololo - 417407	M2
10037	R	Read Defined Variable [NI] Dev2/58 = 1.0	OK	1		Alleta Sekgololo - 417407	M2
10038	A	Activate the PEA on door 5 (44S15)	OK			Alleta Sekgololo - 417407	M2
10039	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95	OK			Alleta Sekgololo - 417407	M2
10040	R	Read Defined Variable [NI] Dev2/58 = 0.0	OK	0		Alleta Sekgololo - 417407	M2

10041	A	Reset the PEA using square key		OK		Alleta Sekgololo - 417407	M2
10042	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10043	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10044	A	Activate the PEA on door 3 (44S13)		OK		Alleta Sekgololo - 417407	M2
10045	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10046	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10047	A	Reset the PEA using square key		OK		Alleta Sekgololo - 417407	M2
10048	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10049	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10050	A	Activate the PEA on door 1 (44S11)		OK		Alleta Sekgololo - 417407	M2
10051	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10052	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10053	A	Reset the PEA using square key		OK		Alleta Sekgololo - 417407	M2
10054	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10055	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10056	A	Activate the PEA on door 2 (44S12)		OK		Alleta Sekgololo - 417407	M2
10057	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2
10058	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10059	A	Reset the PEA using square key		OK		Alleta Sekgololo - 417407	M2
10060	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Alleta Sekgololo - 417407	M2

10061	R	Read Defined Variable [NI] Dev2/58 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10062	A	Activate the PEA on door 4 (44S14)	OK		Alleta Sekgololo - 417407	M2
10063	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95	OK		Alleta Sekgololo - 417407	M2
10064	R	Read Defined Variable [NI] Dev2/58 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10065	A	Reset the PEA using square key	OK		Alleta Sekgololo - 417407	M2
10066	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95	OK		Alleta Sekgololo - 417407	M2
10067	R	Read Defined Variable [NI] Dev2/58 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10068	A	Activate the PEA on door 6 (44S16)	OK		Alleta Sekgololo - 417407	M2
10069	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95	OK		Alleta Sekgololo - 417407	M2
10070	R	Read Defined Variable [NI] Dev2/58 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10071	A	Reset the PEA using square key	OK		Alleta Sekgololo - 417407	M2
10072	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95	OK		Alleta Sekgololo - 417407	M2
10073	R	Read Defined Variable [NI] Dev2/58 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10074	I	PEA Loop Train Lines Dev4/64 = END2 90XP35 pin 95	OK		Alleta Sekgololo - 417407	M2
10075	A	Force [NI] Dev4/62 = 0.0	OK		Alleta Sekgololo - 417407	M2
10076	I	END OF TEST	OK		Alleta Sekgololo - 417407	M2



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GIB0000007424  
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Emission date  
21/11/2024

## Section 10 – Service Brake

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### 10.1 Instructions list

### 10.1.1 040\_SBK-Service Brake

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Service Brake (SPP=040)		OK		TIVANI Angel - 542257	M2
10002	I	Initial Conditions		OK		TIVANI Angel - 542257	M2
10003	I	No air supply to the vehicle		OK		TIVANI Angel - 542257	M2
10004	I	All brake panel cocks are in normal position (not isolated)		OK		TIVANI Angel - 542257	M2
10005	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		TIVANI Angel - 542257	M2
10006	I	Follow the procedure in the document below to upload software onto the TBCU electronic <a href="#">[10-21-6-335717_TBCU Software Upload.pdf]</a>		OK		TIVANI Angel - 542257	M2
10007	I	Power Supply		OK		TIVANI Angel - 542257	M2
10008	A	Remove the connector 10XR12_XCB2 from the propulsion box		OK		TIVANI Angel - 542257	M2
10009	A	Close Circuit Breaker 33Q1, 33Q3 and 33Q5		OK		TIVANI Angel - 542257	M2
10010	A	Check the voltage on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and 67(-); and 5(+) and 68(-)		OK		TIVANI Angel - 542257	M2
10011	R	Battery voltage (above 80Vdc) is measured on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and 67(-); and 5(+) and 68(-)		OK		TIVANI Angel - 542257	M2
10012	A	Open Circuit Breaker 33Q1 and 33Q3, Replace connector 10XR12_XCB2 on the propulsion box, and Close Circuit breaker 33Q1 and 33Q3		OK		TIVANI Angel - 542257	M2
10013	A	Remove the connector -40XP2_C2_16 from pneumatic brake panel		OK		TIVANI Angel - 542257	M2
10014	A	Close Circuit Breaker 40Q1		OK		TIVANI Angel - 542257	M2
10015	A	Check the voltage on connector 40XP2_C2_16 between pins 13 (+) and		OK		TIVANI Angel - 542257	M2

		31 (-)					
10016	R	Battery voltage (above 80Vdc) is measured on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		TIVANI Angel - 542257	M2
10017	A	Open Circuit Breaker 40Q1, Replace connector -40XP2_C2_16 on the pneumatic brake panel, and Close Circuit breaker -40Q1		OK		TIVANI Angel - 542257	M2
10018	R	The pneumatic brake panel 40A2 is ON		OK		TIVANI Angel - 542257	M2
10019	I	Brake Air Supply and Brake Application		OK		TIVANI Angel - 542257	M2
10020	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60		OK		TIVANI Angel - 542257	M2
10021	R	Read Defined Variable [NI] Dev2/85 = 1.0		OK	1	TIVANI Angel - 542257	M2
10022	R	Read Defined Variable [NI] Dev5/51 = 1.0		OK	1	TIVANI Angel - 542257	M2
10023	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XR35 pin 50		OK		TIVANI Angel - 542257	M2
10024	R	Read Defined Variable [NI] Dev2/83 = 0.0		OK	0	TIVANI Angel - 542257	M2
10025	R	Read Defined Variable [NI] Dev5/49 = 0.0		OK	0	TIVANI Angel - 542257	M2
10026	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr1 = 0.0		OK	0	TIVANI Angel - 542257	M2
10027	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr2 = 0.0		OK	0	TIVANI Angel - 542257	M2
10028	R	Read Defined Variable [TT] (TBCU2)LI_BRPS_NOK = 1.0		OK	1	TIVANI Angel - 542257	M2
10029	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_NOT_APPLIED = 1.0		OK	1	TIVANI Angel - 542257	M2
10030	A	Close/Isolate the Isolation cock F2.1/3		OK		TIVANI Angel - 542257	M2
10031	A	Open the Isolation cock F2.2/3		OK		TIVANI Angel - 542257	M2
10032	A	Connect the air supply to the vehicle main pipe coupling flexible hose F3/5, and switch the supply ON		OK		TIVANI Angel - 542257	M2

10033	I	Take note of any air leaks in the pipes or valves		OK		TIVANI Angel - 542257	M2
10034	A	Allow the pressure to go above 6 bar. The pressure can be checked at the BRTP test point		OK		TIVANI Angel - 542257	M2
10035	R	BRTP pressure is measured >=6 Bar		OK		TIVANI Angel - 542257	M2
10036	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XR35 pin 50		OK		TIVANI Angel - 542257	M2
10037	R	Read Defined Variable [NI] Dev2/83 = 1.0		OK	1	TIVANI Angel - 542257	M2
10038	R	Read Defined Variable [NI] Dev5/49 = 1.0		OK	1	TIVANI Angel - 542257	M2
10039	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr1 = 1.0		OK	1	TIVANI Angel - 542257	M2
10040	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr2 = 1.0		OK	1	TIVANI Angel - 542257	M2
10041	R	Read Defined Variable [TT] (TBCU2)LI_BRPS_NOK = 0.0		OK	0	TIVANI Angel - 542257	M2
10042	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_NOT_APPLIED = 0.0		OK	0	TIVANI Angel - 542257	M2
10043	I	Remote Isolation		OK		TIVANI Angel - 542257	M2
10044	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59 Dev4/50 = END2 90XR35 pin 59		OK		TIVANI Angel - 542257	M2
10045	A	Force [NI] Dev4/50 = 1.0		OK		TIVANI Angel - 542257	M2
10046	R	Read Defined Variable [NI] Dev2/84 = 1.0		OK	1	TIVANI Angel - 542257	M2
10047	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 1.0		OK	1	TIVANI Angel - 542257	M2
10048	A	Force [TT] (MPU1)lo_sbk_m2isobrake = 1.0		OK		TIVANI Angel - 542257	M2
10049	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 0.0		OK	0	TIVANI Angel - 542257	M2
10050	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59		OK		TIVANI Angel - 542257	M2

10051	R	Read Defined Variable [NI] Dev2/84 = 0.0	OK	0	TIVANI Angel - 542257	M2
10052	A	Release [TT] (MPU1)lo_sbk_m2isobrake	OK		TIVANI Angel - 542257	M2
10053	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59	OK		TIVANI Angel - 542257	M2
10054	R	Read Defined Variable [NI] Dev2/84 = 1.0	OK	1	TIVANI Angel - 542257	M2
10055	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 1.0	OK	1	TIVANI Angel - 542257	M2
10056	I	Remote Isolation Train Lines Dev4/50 = END2 90XR35 pin 59	OK		TIVANI Angel - 542257	M2
10057	A	Force [NI] Dev4/50 = 0.0	OK		TIVANI Angel - 542257	M2
10058	I	Manual Isolation	OK		TIVANI Angel - 542257	M2
10059	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60	OK		TIVANI Angel - 542257	M2
10060	R	Read Defined Variable [NI] Dev2/85 = 0.0	OK	0	TIVANI Angel - 542257	M2
10061	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60	OK		TIVANI Angel - 542257	M2
10062	R	Read Defined Variable [NI] Dev5/51 = 0.0	OK	0	Mphato Mphahlele - 480716	M2
10063	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 0.0	OK	0	TIVANI Angel - 542257	M2
10064	R	Read Defined Variable [TT] (TBCU2)Li_ServiceBrakeDC = 0.0	OK	0	TIVANI Angel - 542257	M2
10065	A	Close the Isolation cock C2.3.1	OK		TIVANI Angel - 542257	M2
10066	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60	OK		TIVANI Angel - 542257	M2
10067	R	Read Defined Variable [NI] Dev2/85 = 1.0	OK	1	TIVANI Angel - 542257	M2
10068	R	Read Defined Variable [NI] Dev5/51 = 1.0	OK	1	TIVANI Angel - 542257	M2
10069	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 1.0	OK	1	TIVANI Angel - 542257	M2
10070	R	Read Defined Variable [TT] (TBCU2)Li_ServiceBrakeDC = 1.0	OK	1	TIVANI Angel - 542257	M2
10071	A	Re-open the Isolation cock C2.3.1	OK		TIVANI Angel - 542257	M2

10072	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 0.0		OK	0	TIVANI Angel - 542257	M2
10073	I	Switch OFF 400V before reading the bcufault variable		OK		TIVANI Angel - 542257	M2
10074	R	Read Defined Variable [TT] (MPU1)li_sbk_m2bcufault = 0.0		OK	0	TIVANI Angel - 542257	M2
10075	A	Force [TT] (TBCU2)LO_BRK_FLT = 1.0		OK		TIVANI Angel - 542257	M2
10076	R	Read Defined Variable [TT] (MPU1)li_sbk_m2bcufault = 1.0		OK	1	TIVANI Angel - 542257	M2
10077	A	Release [TT] (TBCU2)LO_BRK_FLT		OK		TIVANI Angel - 542257	M2
10078	I	END OF TEST		OK		TIVANI Angel - 542257	M2



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GIB0000007424  
Version: A0

Emission date  
21/11/2024

## Section 11 – Holding and Parking Brake

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### 11.1 Instructions list

### 11.1.1 045\_PBK-Holding and Parking Brake

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Holding and Parking Brake (SPP_045)		OK		Alleta Sekgololo - 417407	M2
10002	I	Initial Conditions		OK		Alleta Sekgololo - 417407	M2
10003	I	Using the tools list on the side of your screen, record the serial number of the manometer used during this test		OK		Alleta Sekgololo - 417407	M2
10004	I	Check that the pressure on Test point C2.11/1 is >5bar		OK		Alleta Sekgololo - 417407	M2
10005	I	Visual Inspection		OK		Alleta Sekgololo - 417407	M2
10006	A	Check the installation of the manual parking brake release components (lever + cable)		OK		Alleta Sekgololo - 417407	M2
10007	R	The lever is securely fixed (tight) and the cable is correctly attached to the bogie (there is no excess cable, and all clamps are installed)		OK		Alleta Sekgololo - 417407	M2
10008	I	Circuit Breaker		OK		Alleta Sekgololo - 417407	M2
10009	I	Ensure that the Circuit Breaker 33Q3 is closed		OK		Alleta Sekgololo - 417407	M2
10010	A	Close Circuit Breaker 33Q5		OK		Alleta Sekgololo - 417407	M2
10011	I	Parking Brake Pressure Switch		OK		Alleta Sekgololo - 417407	M2
10012	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_RELEASE = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10013	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10014	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakerelease = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10015	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10016	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Alleta Sekgololo - 417407	M2

10017	R	Read Defined Variable [NI] Dev2/52 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10018	R	Read Defined Variable [NI] Dev5/58 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10019	I	Parking Brake Applied		OK		Alleta Sekgololo - 417407	M2
10020	I	For this section of the test, ensure that the pressure on test point C2.11/1 is ALWAYS BELOW 4.8 Bar. if it goes above, turn the Isolation cock C2.3.2 to CLOSE position to drain the air		OK		Alleta Sekgololo - 417407	M2
10021	A	Position the Isolation cock C2.3.2 in CLOSE position. Allow the parking brake air pressure to drain to below 4.5 Bar. Use the test point C2.11/1 to verify the air pressure <4.5 Bar		OK		Alleta Sekgololo - 417407	M2
10022	R	Pressure at test point C2.11/1 <4.5 Bar		OK		Alleta Sekgololo - 417407	M2
10023	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_RELEASE = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10024	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakerelease = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10025	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Alleta Sekgololo - 417407	M2
10026	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10027	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10028	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_DC = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10029	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakeisoldc = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10030	R	Read Defined Variable [TT] (MPU1)li_pbk_m2parkbrakeisol = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10031	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Alleta Sekgololo - 417407	M2
10032	R	Read Defined Variable [NI] Dev2/52 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10033	R	Read Defined Variable [NI] Dev5/58 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10034	A	Position the Isolation cock C2.3.2 in CLOSE position		OK		Alleta Sekgololo - 417407	M2

10035	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10036	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10037	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_DC = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10038	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakeisoldc = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10039	R	Read Defined Variable [TT] (MPU1)li_pbk_m2parkbrakeisol = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10040	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP25 pin 77	OK		Alleta Sekgololo - 417407	M2
10041	R	Read Defined Variable [NI] Dev2/52 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10042	R	Read Defined Variable [NI] Dev5/58 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10043	A	Return the Isolation cock C2.3.2 to OPEN position	OK		Alleta Sekgololo - 417407	M2
10044	I	Remote Parking Brake Command	OK		Alleta Sekgololo - 417407	M2
10045	I	Remote Parking Brake Command Train Lines Dev2/51 = END1 90XR25 pin 68 Dev4/57 = END2 90XR35 pin 68	OK		Alleta Sekgololo - 417407	M2
10046	A	Force [NI] Dev4/57 = 1.0	OK		Alleta Sekgololo - 417407	M2
10047	R	Read Defined Variable [NI] Dev2/51 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10048	R	Confirm that the parking brake is applied, and air is released from electro valve C2.5	OK		Alleta Sekgololo - 417407	M2
10049	I	Remote Parking Brake Command Train Lines Dev2/51 = END1 90XR25 pin 68 Dev4/57 = END2 90XR35 pin 68	OK		Alleta Sekgololo - 417407	M2
10050	A	Force [NI] Dev4/57 = 0.0	OK		Alleta Sekgololo - 417407	M2
10051	R	Read Defined Variable [NI] Dev2/51 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10052	R	Confirm that electro valve C2.5 has stopped emitting air	OK		Alleta Sekgololo - 417407	M2
10053	I	END OF TEST	OK		Alleta Sekgololo - 417407	M2



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Document Reference  
GIB0000007424  
Version: A0

Emission date  
21/11/2024

## Section 12 – Passenger Doors

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### 12.1 Instructions list

### 12.1.1 050\_DOR-Passenger Doors

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Passenger Doors (SPP=050)		OK		Paseka Ditlhakanyane - 491468	M2
10002	I	Initial conditions		OK		Paseka Ditlhakanyane - 491468	M2
10003	I	110Vdc Normal power supply is connected to the vehicle and ON		OK		Paseka Ditlhakanyane - 491468	M2
10004	I	Ensure that the TCMS network is functional		OK		Paseka Ditlhakanyane - 491468	M2
10005	I	Circuit Breaker		OK		Paseka Ditlhakanyane - 491468	M2
10006	A	Close Circuit Breaker 50Q1		OK		Paseka Ditlhakanyane - 491468	M2
10007	R	DCU 1 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10008	R	Check on the DDU that DCU1 is online		OK		Paseka Ditlhakanyane - 491468	M2
10009	A	Close Circuit Breaker 50Q2		OK		Paseka Ditlhakanyane - 491468	M2
10010	R	DCU 2 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10011	R	Check on the DDU that DCU2 is online		OK		Paseka Ditlhakanyane - 491468	M2
10012	A	Close Circuit Breaker 50Q3		OK		Paseka Ditlhakanyane - 491468	M2
10013	R	DCU 3 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10014	R	Check on the DDU that DCU3 is online		OK		Paseka Ditlhakanyane - 491468	M2
10015	A	Close Circuit Breaker 50Q4		OK		Paseka Ditlhakanyane - 491468	M2
10016	R	DCU 4 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10017	R	Check on the DDU that DCU4 is online		OK		Paseka Ditlhakanyane - 491468	M2
10018	A	Close Circuit Breaker 50Q5		OK		Paseka Ditlhakanyane - 491468	M2
10019	R	DCU 5 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10020	R	Check on the DDU that DCU5 is online		OK		Paseka Ditlhakanyane - 491468	M2
10021	A	Close Circuit Breaker 50Q6		OK		Paseka Ditlhakanyane - 491468	M2

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10022	R	DCU 6 is powered ON		OK		Paseka Ditlhakanyane - 491468	M2
10023	R	Check on the DDU that DCU6 is online		OK		Paseka Ditlhakanyane - 491468	M2
10024	A	Close Circuit Breaker 50Q7		OK		Paseka Ditlhakanyane - 491468	M2
10025	I	Car ID Code		OK		Paseka Ditlhakanyane - 491468	M2
10026	A	Using the DDU on the test bench, check that all the doors on M2 are available - as in the picture		OK		Paseka Ditlhakanyane - 491468	M2
10027	R	All doors are available		OK		Paseka Ditlhakanyane - 491468	M2
10028	I	Door Open and Close - Safety Loop		OK		Paseka Ditlhakanyane - 491468	M2
10029	I	ERTMS Auth Left Train Lines Dev4/87 = END2 90XR35 pin 47 Dev2/81 = END1 90XR25 pin 44		OK		Paseka Ditlhakanyane - 491468	M2
10030	A	Force [NI] Dev4/87 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10031	R	Read Defined Variable [NI] Dev2/81 = 1.0		OK	1	Paseka Ditlhakanyane - 491468	M2
10032	A	Force [NI] Dev4/87 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10033	R	Read Defined Variable [NI] Dev2/81 = 0.0		OK	0	Paseka Ditlhakanyane - 491468	M2
10034	I	ERTMS Auth Right Train Lines Dev2/82 = END1 90XR15 pin 47 Dev4/86 = END2 90XP25 pin 44		OK		Paseka Ditlhakanyane - 491468	M2
10035	A	Force [NI] Dev4/86 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10036	R	Read Defined Variable [NI] Dev2/82 = 1.0		OK	1	Paseka Ditlhakanyane - 491468	M2
10037	A	Force [NI] Dev4/86 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10038	R	Read Defined Variable [NI] Dev2/82 = 0.0		OK	0	Paseka Ditlhakanyane - 491468	M2
10039	I	Doors Open Train Lines Dev2/49 = END1 90XR15 pin 66 Dev4/55 = END2 90XP25 pin 66		OK		Paseka Ditlhakanyane - 491468	M2
10040	A	Force [NI] Dev4/55 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10041	R	Read Defined Variable [NI] Dev2/49 = 1.0		OK	1	Paseka Ditlhakanyane - 491468	M2
10042	A	Force [NI] Dev4/55 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10043	R	Read Defined Variable [NI] Dev2/49 = 0.0		OK	0	Paseka Ditlhakanyane - 491468	M2

10044	I	Door Close Right Train Lines Dev2/53 = END1 90XR15 pin 78 Dev4/60 = END2 90XP25 pin 79	OK		Paseka Ditlhakanyane - 491468	M2
10045	A	Force [NI] Dev4/60 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10046	R	Read Defined Variable [NI] Dev2/53 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10047	A	Force [NI] Dev4/60 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2
10048	R	Read Defined Variable [NI] Dev2/53 = 0.0	OK	0	Paseka Ditlhakanyane - 491468	M2
10049	I	Door Close Left Train Lines Dev2/54 = END1 90XR15 pin 79 Dev4/59 = END2 90XP25 pin 78	OK		Paseka Ditlhakanyane - 491468	M2
10050	A	Force [NI] Dev4/59 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10051	R	Read Defined Variable [NI] Dev2/54 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10052	A	Force [NI] Dev4/59 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2
10053	R	Read Defined Variable [NI] Dev2/54 = 0.0	OK	0	Paseka Ditlhakanyane - 491468	M2
10054	I	V<3km/h Train Lines Dev2/35 = END1 90XR15 pin 29 Dev4/39 = END2 90XP25 pin 29	OK		Paseka Ditlhakanyane - 491468	M2
10055	A	Force [NI] Dev4/39 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10056	R	Read Defined Variable [NI] Dev2/35 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10057	I	Door Auth Right Train Lines Dev2/64 = END1 90XR15 pin 85 Dev4/64 = END2 90XP25 pin 84	OK		Paseka Ditlhakanyane - 491468	M2
10058	A	Force [NI] Dev4/64 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10059	R	Read Defined Variable [NI] Dev2/64 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10060	I	Door Auth Left Train Lines Dev2/56 = END1 90XR15 pin 84 Dev4/56 = END2 90XP25 pin 85	OK		Paseka Ditlhakanyane - 491468	M2
10061	A	Force [NI] Dev4/56 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10062	R	Read Defined Variable [NI] Dev2/56 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10063	A	Force [TT] (MPU1)lo_dor_m2opendoorleft = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10064	A	Force [TT] (MPU1)lo_dor_m2opendoorright = 1.0	OK		Paseka Ditlhakanyane - 491468	M2

10065	R	Check that doors 1, 3 and 5 (LEFT SIDE) open	OK		Paseka Ditlhakanyane - 491468	M2
10066	R	Check that doors 2, 4 and 6 (RIGHT SIDE) open	OK		Paseka Ditlhakanyane - 491468	M2
10067	I	Door Auth Right Train Lines Dev2/64 = END1 90XR15 pin 85 Dev4/64 = END2 90XP25 pin 84	OK		Paseka Ditlhakanyane - 491468	M2
10068	A	Force [NI] Dev4/64 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2
10069	R	Read Defined Variable [NI] Dev2/64 = 0.0	OK	0	Paseka Ditlhakanyane - 491468	M2
10070	I	Door Auth Left Train Lines Dev2/56 = END1 90XR15 pin 84 Dev4/56 = END2 90XP25 pin 85	OK		Paseka Ditlhakanyane - 491468	M2
10071	A	Force [NI] Dev4/56 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2
10072	R	Read Defined Variable [NI] Dev2/56 = 0.0	OK	0	Paseka Ditlhakanyane - 491468	M2
10073	R	Check that doors 1, 3 and 5 (LEFT SIDE) close	OK		Paseka Ditlhakanyane - 491468	M2
10074	R	Check that doors 2, 4 and 6 (RIGHT SIDE) close	OK		Paseka Ditlhakanyane - 491468	M2
10075	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96 Dev4/89 = END2 90XP25 pin 96	OK		Paseka Ditlhakanyane - 491468	M2
10076	A	Force [NI] Dev4/89 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10077	R	Read Defined Variable [NI] Dev2/59 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10078	I	Left Side Doors	OK		Paseka Ditlhakanyane - 491468	M2
10079	I	Door 1	OK		Paseka Ditlhakanyane - 491468	M2
10080	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85	OK		Paseka Ditlhakanyane - 491468	M2
10081	A	Force [NI] Dev4/64 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10082	R	Check if ALL Left doors opens in 3 sec (+1/-0)	OK		Paseka Ditlhakanyane - 491468	M2
10083	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]	OK		Paseka Ditlhakanyane - 491468	M2
10084	I	Door Opening Gap	OK		Paseka Ditlhakanyane - 491468	M2

10085	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10086	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1399	Paseka Ditlhakanyane - 491468	M2
10087	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10088	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1404	Paseka Ditlhakanyane - 491468	M2
10089	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10090	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1402	Paseka Ditlhakanyane - 491468	M2
10091	I	Door 3		OK		Paseka Ditlhakanyane - 491468	M2
10092	I	Door Opening Gap		OK		Paseka Ditlhakanyane - 491468	M2
10093	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10094	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1398	Paseka Ditlhakanyane - 491468	M2
10095	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10096	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1403	Paseka Ditlhakanyane - 491468	M2
10097	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Paseka Ditlhakanyane - 491468	M2
10098	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1401	Paseka Ditlhakanyane - 491468	M2
10099	I	Door 5		OK		Paseka Ditlhakanyane - 491468	M2
10100	I	Door Opening Gap		OK		Paseka Ditlhakanyane - 491468	M2
10101	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Paseka Ditlhakanyane - 491468	M2

10102	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1399	Paseka Ditlhakanyane - 491468	M2
10103	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10104	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1403	Paseka Ditlhakanyane - 491468	M2
10105	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10106	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1401	Paseka Ditlhakanyane - 491468	M2
10107	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85	OK		Paseka Ditlhakanyane - 491468	M2
10108	A	Force [NI] Dev4/64 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2
10109	R	Check that ALL Left door closes in 3 sec (+1/-0)	OK		Paseka Ditlhakanyane - 491468	M2
10110	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]	OK		Paseka Ditlhakanyane - 491468	M2
10111	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96	OK		Paseka Ditlhakanyane - 491468	M2
10112	R	Read Defined Variable [NI] Dev2/59 = 1.0	OK	1	Paseka Ditlhakanyane - 491468	M2
10113	I	Right Side Doors	OK		Paseka Ditlhakanyane - 491468	M2
10114	I	Door 2	OK		Paseka Ditlhakanyane - 491468	M2
10115	I	Door Auth Left Train Lines Dev4/56 = END2 90XP25 pin 84	OK		Paseka Ditlhakanyane - 491468	M2
10116	A	Force [NI] Dev4/56 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2
10117	R	Check that the door opens in 3 sec (+1/-0)	OK		Paseka Ditlhakanyane - 491468	M2
10118	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]	OK		Paseka Ditlhakanyane - 491468	M2
10119	I	Door Opening Gap	OK		Paseka Ditlhakanyane - 491468	M2
10120	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)	OK		Paseka Ditlhakanyane - 491468	M2

10121	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1398	Paseka Ditlhakanyane - 491468	M2
10122	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10123	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1403	Paseka Ditlhakanyane - 491468	M2
10124	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10125	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1400	Paseka Ditlhakanyane - 491468	M2
10126	I	Door 4	OK		Paseka Ditlhakanyane - 491468	M2
10127	I	Door Opening Gap	OK		Paseka Ditlhakanyane - 491468	M2
10128	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10129	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1397	Paseka Ditlhakanyane - 491468	M2
10130	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10131	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1402	Paseka Ditlhakanyane - 491468	M2
10132	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10133	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1399	Paseka Ditlhakanyane - 491468	M2
10134	I	Door 6	OK		Paseka Ditlhakanyane - 491468	M2
10135	I	Door Opening Gap	OK		Paseka Ditlhakanyane - 491468	M2
10136	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)	OK		Paseka Ditlhakanyane - 491468	M2
10137	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1398	Paseka Ditlhakanyane - 491468	M2
10138	A	Measure the opening gap of the door. (This measurement must be done at the	OK		Paseka Ditlhakanyane - 491468	M2

		top of the door)					
10139	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1404	Paseka Ditlhakanyane - 491468	M2	
10140	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)	OK		Paseka Ditlhakanyane - 491468	M2	
10141	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)	OK	1400	Paseka Ditlhakanyane - 491468	M2	
10142	I	Obstacle Detection	OK		Paseka Ditlhakanyane - 491468	M2	
10143	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85	OK		Paseka Ditlhakanyane - 491468	M2	
10144	A	Force [NI] Dev4/64 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2	
10145	R	Check if ALL Left doors opens in 3 sec (+1/-0)	OK		Paseka Ditlhakanyane - 491468	M2	
10146	A	Position an obstacle on the floor in the centre of each and every door closing line	OK		Paseka Ditlhakanyane - 491468	M2	
10147	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)	OK		Paseka Ditlhakanyane - 491468	M2	
10148	A	Force [NI] Dev4/56 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2	
10149	A	Force [NI] Dev4/64 = 0.0	OK		Paseka Ditlhakanyane - 491468	M2	
10150	R	All doors will hit the obstacles, reopen, and try to close again 3 times. On the third attempt ALL doors will stop and stand ajar - free to be opened manually	OK		Paseka Ditlhakanyane - 491468	M2	
10151	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96	OK		Paseka Ditlhakanyane - 491468	M2	
10152	R	Read Defined Variable [NI] Dev2/59 = 0.0	OK	0	Paseka Ditlhakanyane - 491468	M2	
10153	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)	OK		Paseka Ditlhakanyane - 491468	M2	
10154	A	Force [NI] Dev4/56 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2	
10155	A	Force [NI] Dev4/64 = 1.0	OK		Paseka Ditlhakanyane - 491468	M2	

10156	R	ALL doors opens fully		OK		Paseka Ditlhakanyane - 491468	M2
10157	A	Remove the obstacle		OK		Paseka Ditlhakanyane - 491468	M2
10158	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Paseka Ditlhakanyane - 491468	M2
10159	A	Force [NI] Dev4/56 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10160	A	Force [NI] Dev4/64 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10161	R	Check if ALL door closes in 3 sec (+1/-0)		OK		Paseka Ditlhakanyane - 491468	M2
10162	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]		OK		Paseka Ditlhakanyane - 491468	M2
10163	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96		OK		Paseka Ditlhakanyane - 491468	M2
10164	R	Read Defined Variable [NI] Dev2/59 = 1.0		OK	1	Paseka Ditlhakanyane - 491468	M2
10165	I	Speed Detection		OK		Paseka Ditlhakanyane - 491468	M2
10166	I	Door Auth Left Train Lines Dev4/56 = END2 90XP25 pin 84		OK		Paseka Ditlhakanyane - 491468	M2
10167	A	Force [NI] Dev4/56 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10168	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85		OK		Paseka Ditlhakanyane - 491468	M2
10169	A	Force [NI] Dev4/64 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10170	R	All doors open		OK		Paseka Ditlhakanyane - 491468	M2
10171	I	V>5km/h Train Lines Dev2/34 = END1 90XR15 pin 28 Dev4/38 = END2 90XP25 pin 28		OK		Paseka Ditlhakanyane - 491468	M2
10172	A	Force [NI] Dev4/38 = 1.0		OK		Paseka Ditlhakanyane - 491468	M2
10173	R	Read Defined Variable [NI] Dev2/34 = 1.0		OK	1	Paseka Ditlhakanyane - 491468	M2
10174	R	All doors close due to the invalid state of the DCU		OK		Paseka Ditlhakanyane - 491468	M2
10175	A	Release [TT] (MPU1)lo_dor_m2opendoorleft		OK		Paseka Ditlhakanyane - 491468	M2

10176	A	Release [TT] (MPU1)lo_dor_m2opendoorright		OK		Paseka Ditlhakanyane - 491468	M2
10177	I	V>5km/h Train Lines Dev2/34 = END1 90XR15 pin 28 Dev4/38 = END2 90XP25 pin 28		OK		Paseka Ditlhakanyane - 491468	M2
10178	A	Force [NI] Dev4/38 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10179	R	Read Defined Variable [NI] Dev2/34 = 0.0		OK	0	Paseka Ditlhakanyane - 491468	M2
10180	I	V<3km/h Train Lines Dev4/39 = END2 90XP25 pin 29		OK		Paseka Ditlhakanyane - 491468	M2
10181	A	Force [NI] Dev4/39 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10182	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Paseka Ditlhakanyane - 491468	M2
10183	A	Force [NI] Dev4/64 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10184	A	Force [NI] Dev4/56 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10185	I	Safety Doors Loop Train Lines Dev4/89 = END2 90XP25 pin 96		OK		Paseka Ditlhakanyane - 491468	M2
10186	A	Force [NI] Dev4/89 = 0.0		OK		Paseka Ditlhakanyane - 491468	M2
10187	I	END OF TEST		OK		Paseka Ditlhakanyane - 491468	M2



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Serial Tests Report  
TS258 – M2 – VFT  
RTR Vehicle Functional Static Testing Report

Document Reference  
GIB0000007424  
Version: A0

Emission date  
21/11/2024

## Section 13 – HVAC Air Conditioning

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### 13.1 Instructions list

### 13.1.2 057\_HVA\_SME-HVAC\_SME

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	HVA_057 Air Conditioning		NE			M2
10002	I	Initial conditions		NE			M2
10003	A	Car Should be Prepared with CVS running and 400V ac available in the car		NE			M2
10004	I	HVAC AC Power Supply		NE			M2
10005	A	Close Circuit Breaker 13Q1 and 13Q5		NE			M2
10006	A	Check on the DDU if the HVAC is offline		NE			M2
10007	I	Checking 400Vac		NE			M2
10008	A	Close Circuit Breaker 57Q1		NE			M2
10009	A	Disconnect connector 57XP4_X5 and use a multimeter to check 400Vac between each phases a1, a2 and b1		NE			M2
10010	R	400Vac measured between all phases		NE			M2
10011	A	On the same connector 57XP4_X5, with a phasemeter, check the phase rotation of all 3 phases which are a1- phase L1, a2- Phase L2 and b1- phase L3		NE			M2
10012	R	The phase rotation is correct between all three phases		NE			M2
10013	A	Normalize connector 57XP4_X5.		NE			M2
10014	I	HVAC controller power supply		NE			M2
10015	A	Close Circuit Breaker 57Q2		NE			M2
10016	A	Allow the HVAC to initialize and check on the DDU if the HVAC is online		NE			M2
10017	R	HVAC unit turns ON and starts to work		NE			M2
10018	I	HVAC inhib		NE			M2

10019	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1___1 = 1.0		NE		M2
10020	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 1.0		NE		M2
10021	I	50% HVAC restriction		NE		M2
10022	A	Force [TT] NRG_HvacM250Cmd = 0		NE		M2
10023	I	saloon HVAC		NE		M2
10024	I	HVAC web portal		NE		M2
10025	I	The attached document is a procedure on how to navigate around the maintenance software		NE		M2
10026	I	Connect the laptop to the HVAC maintenance software using web browser. Enter the following IP address on the web browser 10.136.xxx30 xxx represents the train number Login: maint Password: maint		NE		M2
10027	I	Full "Self test" saloon		NE		M2
10028	R	On status tab, Active mode is off for both cab and saloon		NE		M2
10029	A	Go to Alarms tab and clear all the alarms for saloon and cabin		NE		M2
10030	I	For the following tests make sure on the webHMI tab you change controller to be controlled by webHMI and not MPU		NE		M2
10031	A	Before running the full test, please click on reset test to reset the previous results.		NE		M2
10032	A	Select Full-Test on the Saloon HVAC		NE		M2
10033	R	All saloon HVAC units work according to the mode described in the "ACTIVE MODE" on the status tab		NE		M2
10034	R	When the test is complete, please check if the status is showing as "TEST PASS" and the test took 3 mins +/- 2 seconds for each mode.		NE		M2

10035	I	Forced Mode (Saloon HVAC)		NE		M2
10036	I	During all tests Walk through the whole car and physically check (feel) that the HVAC is functioning as desired		NE		M2
10037	I	Go to maintenance tab to force the following modes		NE		M2
10038	I	Cooling Mode		NE		M2
10039	A	Select forced Cooling mode on the Saloon HVAC and let it run for 5 mins		NE		M2
10040	R	All HVAC units are cooling		NE		M2
10041	I	Heating Mode		NE		M2
10042	A	Select forced Heating mode on the Saloon HVAC and let it run for 5 mins		NE		M2
10043	R	All HVAC units are heating		NE		M2
10044	I	HVAC Faults		NE		M2
10045	A	In the maintenance software, select the "Alarms" tab		NE		M2
10046	A	Ensure there are no active faults on the HVAC for Cabin and Saloon. Use the highlighted drop down to navigate between saloon and cabin.		NE		M2
10047	R	No active faults identified on the HVAC unit		NE		M2
10048	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr1__1		NE		M2
10049	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr2__1		NE		M2
10050	A	Release [TT] NRG_HvacM250Cmd		NE		M2
10051	R	Cabin HVAC turned OFF		NE		M2
10052	I	End of test		NE		M2

### 13.1.1 057\_HVA-Air Conditioning

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Air Conditioning (SPP=057)		OK		Siphehile Mchunu - 491465	M2
10002	I	Initial conditions		OK		Siphehile Mchunu - 491465	M2
10003	A	Car Should be Prepared		OK		Siphehile Mchunu - 491465	M2
10004	I	Power Supply		OK		Siphehile Mchunu - 491465	M2
10005	A	Close Circuit Breaker 57Q1		OK		Siphehile Mchunu - 491465	M2
10006	A	Close Circuit Breaker 57Q2		OK		Siphehile Mchunu - 491465	M2
10007	I	HVAC Electronic Power Supply		OK		Siphehile Mchunu - 491465	M2
10008	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Siphehile Mchunu - 491465	M2
10009	I	The HVAC electronic is ON		OK		Siphehile Mchunu - 491465	M2
10010	A	Turn the control switch to AUTO position on the HVAC Panel		OK		Siphehile Mchunu - 491465	M2
10011	I	Software Upload		OK		Siphehile Mchunu - 491465	M2
10012	I	Follow the procedure in the document below to upload software onto the HVAC electronic		OK		Siphehile Mchunu - 491465	M2
10013	A			OK		Siphehile Mchunu - 491465	M2
10014	I	Checking 400Vac		OK		Siphehile Mchunu - 491465	M2
10015	A	Ensure that the 400Vac Shore Supply is connected to the vehicle, else connect it		OK		Siphehile Mchunu - 491465	M2
10016	A	Disconnect connector 57XP4_X5 and use a multimeter to measure 400Vac between phases a1, a2 and b1		OK		Siphehile Mchunu - 491465	M2
10017	R	400Vac (+-5%) measured		OK		Siphehile Mchunu - 491465	M2
10018	A	On the same connector, with a phasemeter, check the correct Phase Rotation between points L1- Phase a1, L2- Phase a2 and L3- Phase b1.		OK		Siphehile Mchunu - 491465	M2

10019	R	The phase rotation is correct between all three phases		OK		Siphehile Mchunu - 491465	M2
10020	A	Normalize connector 57XP4_X5		OK		Siphehile Mchunu - 491465	M2
10021	I	HVAC 50% restriction		OK		Siphehile Mchunu - 491465	M2
10022	A	Force [TT] NRG_HvacM250Cmd = 0		OK		Siphehile Mchunu - 491465	M2
10023	I	HVAC inhib		OK		Siphehile Mchunu - 491465	M2
10024	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1__1 = 1		OK		Siphehile Mchunu - 491465	M2
10025	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2__1 = 1		OK		Siphehile Mchunu - 491465	M2
10026	R	HVAC unit turns ON and starts to work		OK		Siphehile Mchunu - 491465	M2
10027	I	Emergency Ventilation		OK		Siphehile Mchunu - 491465	M2
10028	A	Force [TT] (MPU1)lo_hva_m2emergventil__1 = 1		OK		Siphehile Mchunu - 491465	M2
10029	I	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		Siphehile Mchunu - 491465	M2
10030	A	Connect the laptop to the HVAC maintenance software using HCU Finder and check the actual working mode of HVAC		OK		Siphehile Mchunu - 491465	M2
10031	R	Read Undefined Variable [TT] (MPU1)lo_hva_m2emergventil__1		OK	1	Siphehile Mchunu - 491465	M2
10032	I	Forced Mode (Saloon HVAC)		OK		Siphehile Mchunu - 491465	M2
10033	I	In the maintenance software, select the 'Forced' tab, and use the "Required working mode" drop down box to force the following modes:		OK		Siphehile Mchunu - 491465	M2
10034	I	For the next sections, walk through the whole car and physically check (feel) that the HVAC is functioning as desired		OK		Siphehile Mchunu - 491465	M2
10035	A	Force Ventilation mode on the Saloon HVAC		OK		Siphehile Mchunu - 491465	M2
10036	I	Ventilation Mode		OK		Siphehile Mchunu - 491465	M2
10037	R	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		Siphehile Mchunu - 491465	M2

10038	I	Cooling Mode		OK		Siphehile Mchunu - 491465	M2
10039	A	Force Cooling mode on the Saloon HVAC		OK		Siphehile Mchunu - 491465	M2
10040	R	All saloon HVAC units work in Cooling mode		OK		Siphehile Mchunu - 491465	M2
10041	I	Heating Mode		OK		Siphehile Mchunu - 491465	M2
10042	A	Force Heating mode on the Saloon HVAC		OK		Siphehile Mchunu - 491465	M2
10043	R	All saloon HVAC units work in Heating mode		OK		Siphehile Mchunu - 491465	M2
10044	I	Self-Test		OK		Siphehile Mchunu - 491465	M2
10045	A	Force Self-Test on the Saloon HVAC		OK		Siphehile Mchunu - 491465	M2
10046	R	All saloon HVAC units work according to the mode described in the "Actual working mode"		OK		Siphehile Mchunu - 491465	M2
10047	R	The Exhaust fans are Turned OFF		OK		Siphehile Mchunu - 491465	M2
10048	I	HVAC Faults		OK		Siphehile Mchunu - 491465	M2
10049	A	In the maintenance software, select the "Alarms / Warnings" tab		OK		Siphehile Mchunu - 491465	M2
10050	A	Ensure there are no active faults on the HVAC		OK		Siphehile Mchunu - 491465	M2
10051	R	No active faults identified on the HVAC unit		OK		Siphehile Mchunu - 491465	M2
10052	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr1__1		OK		Siphehile Mchunu - 491465	M2
10053	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr2__1		OK		Siphehile Mchunu - 491465	M2
10054	A	Release [TT] NRG_HvacM250Cmd		OK		Siphehile Mchunu - 491465	M2
10055	I	End of Test		OK		Siphehile Mchunu - 491465	M2



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## Section 14 – Fire protection

### 14.1 Instructions list

#### 14.1.1 067\_FSD-Fire Protection

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Fire Protection System (SPP=067)		OK		Sicelo Mtolo - 525130	M2
10002	I	Fire Detection Train Lines		OK		Sicelo Mtolo - 525130	M2
10003	I	Fire Detection Train Lines Dev2/76 = END1 90XR24 pin 21 Dev4/76 = END2 90XP34 pin 21		OK		Sicelo Mtolo - 525130	M2
10004	A	Force [NI] Dev4/76 = 1.0		OK		Sicelo Mtolo - 525130	M2
10005	R	Read Defined Variable [NI] Dev2/76 = 1.0		OK	1	Sicelo Mtolo - 525130	M2
10006	A	Force [NI] Dev4/76 = 0.0		OK		Sicelo Mtolo - 525130	M2
10007	R	Read Defined Variable [NI] Dev2/76 = 0.0		OK	0	Sicelo Mtolo - 525130	M2
10008	I	Continuity Test		OK		Sicelo Mtolo - 525130	M2
10009	A	The following steps are continuity tests between the two points described in each step. Use a multimeter for this test.		OK		Sicelo Mtolo - 525130	M2
10010	A	From : [(local: +END1 -90XR23.B (pin 4))] to : [(local: +END2 -90XP33.B pin 4)]		OK		Sicelo Mtolo - 525130	M2
10011	A	From : [(local: +END1 -90XR23.B (pin 5))] to : [(local: +END2 -90XP33.B pin 5)]		OK		Sicelo Mtolo - 525130	M2
10012	I	END OF TEST		OK		Sicelo Mtolo - 525130	M2



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## Section 15 – Traction and Electric Brake

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### 15.1 Instructions list

### 15.1.1 033\_TRC-Traction and Electric Brake

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Traction and Electric Brake (SPP=033)		OK		Alleta Sekgololo - 417407	M2
10002	I	Circuit Breakers and Configuration		OK		Alleta Sekgololo - 417407	M2
10003	A	Close Circuit Breaker 33Q1		OK		Alleta Sekgololo - 417407	M2
10004	A	Close Circuit Breaker 33Q2		OK		Alleta Sekgololo - 417407	M2
10005	A	Close Circuit Breaker 33Q3		OK		Alleta Sekgololo - 417407	M2
10006	A	Close Circuit Breaker 33Q4		OK		Alleta Sekgololo - 417407	M2
10007	A	Close Circuit Breaker 33Q5		OK		Alleta Sekgololo - 417407	M2
10008	R	Read Defined Variable [TT] (TBCU2)LI_CAR_ID2 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10009	I	Train Lines		OK		Alleta Sekgololo - 417407	M2
10010	I	110Vdc Normal Traction EL Train Line Dev1/65 = END1 90XP25 pin 42 Dev2/28 = END1 90XP35 pin 14		OK		Alleta Sekgololo - 417407	M2
10011	A	Force [NI] Dev1/65 = 1.0		OK		Alleta Sekgololo - 417407	M2
10012	R	Read Defined Variable [NI] Dev2/28 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10013	A	Force [NI] Dev1/65 = 0.0		OK		Alleta Sekgololo - 417407	M2
10014	R	Read Defined Variable [NI] Dev2/28 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10015	I	Forward Train Lines: Dev2/31 : END1 90XR25 pin 25 Dev4/35 : END2 90XP35 pin 25		OK		Alleta Sekgololo - 417407	M2
10016	A	Force [NI] Dev4/35 = 1.0		OK		Alleta Sekgololo - 417407	M2
10017	R	Read Defined Variable [TT] (TBCU2)LI_FORWARD = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10018	R	Read Defined Variable [NI] Dev2/31 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10019	I	Forward Train Lines: Dev2/31 : END1 90XR25 pin 25 Dev4/35 : END2 90XP35 pin 25		OK		Alleta Sekgololo - 417407	M2

10020	A	Force [NI] Dev4/35 = 0.0		OK		Alleta Sekgololo - 417407	M2
10021	R	Read Defined Variable [TT] (TBCU2)LI_FORWARD = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10022	R	Read Defined Variable [NI] Dev2/31 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10023	I	Reverse Train Lines: Dev2/36 : END1 90XR25 pin 30 Dev4/78 : END2 90XP35 pin 30		OK		Alleta Sekgololo - 417407	M2
10024	A	Force [NI] Dev4/78 = 1.0		OK		Alleta Sekgololo - 417407	M2
10025	R	Read Defined Variable [TT] (TBCU2)LI_REVERSE = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10026	R	Read Defined Variable [NI] Dev2/36 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10027	I	Reverse Train Lines: Dev2/36 : END1 90XR25 pin 30 Dev4/78 : END2 90XP35 pin 30		OK		Alleta Sekgololo - 417407	M2
10028	A	Force [NI] Dev4/78 = 0.0		OK		Alleta Sekgololo - 417407	M2
10029	R	Read Defined Variable [TT] (TBCU2)LI_REVERSE = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10030	R	Read Defined Variable [NI] Dev2/36 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10031	I	Traction Train Lines: Dev2/37 : END1 90XR25 pin 31 Dev4/81 : END2 90XP35 pin 31		OK		Alleta Sekgololo - 417407	M2
10032	A	Force [NI] Dev4/81 = 1.0		OK		Alleta Sekgololo - 417407	M2
10033	R	Read Defined Variable [TT] (TBCU2)LI_TRACTION = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10034	R	Read Defined Variable [NI] Dev2/37 = 1.0		OK	1	Alleta Sekgololo - 417407	M2
10035	I	Traction Train Lines: Dev2/37 : END1 90XR25 pin 31 Dev4/81 : END2 90XP35 pin 31		OK		Alleta Sekgololo - 417407	M2
10036	A	Force [NI] Dev4/81 = 0.0		OK		Alleta Sekgololo - 417407	M2
10037	R	Read Defined Variable [TT] (TBCU2)LI_TRACTION = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10038	R	Read Defined Variable [NI] Dev2/37 = 0.0		OK	0	Alleta Sekgololo - 417407	M2
10039	I	No Brake Train Lines: Dev2/38 : END1 90XR25 pin 32 Dev4/82 : END2 90XP35 pin 32		OK		Alleta Sekgololo - 417407	M2

10040	A	Force [NI] Dev4/82 = 1.0	OK		Alleta Sekgololo - 417407	M2
10041	R	Read Defined Variable [TT] (TBCU2)LI_NOBRAKE = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10042	R	Read Defined Variable [NI] Dev2/38 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10043	I	No Brake Train Lines: Dev2/38 : END1 90XR25 pin 32 Dev4/82 : END2 90XP35 pin 32	OK		Alleta Sekgololo - 417407	M2
10044	A	Force [NI] Dev4/82 = 0.0	OK		Alleta Sekgololo - 417407	M2
10045	R	Read Defined Variable [TT] (TBCU2)LI_NOBRAKE = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10046	R	Read Defined Variable [NI] Dev2/38 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10047	I	Traction Interlock Bypass Train Lines Dev2/4 : END1 90XR24 pin 6 Dev4/4 : END2 90XP34 pin 6	OK		Alleta Sekgololo - 417407	M2
10048	A	Force [NI] Dev4/4 = 1.0	OK		Alleta Sekgololo - 417407	M2
10049	R	Read Defined Variable [NI] Dev2/4 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10050	A	Force [NI] Dev4/4 = 0.0	OK		Alleta Sekgololo - 417407	M2
10051	R	Read Defined Variable [NI] Dev2/4 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10052	I	Traction Interlock Train Lines Dev2/39 : END1 90XR25 pin 41 Dev4/83 : END2 90XP35 pin 41	OK		Alleta Sekgololo - 417407	M2
10053	A	Force [NI] Dev4/83 = 1.0	OK		Alleta Sekgololo - 417407	M2
10054	R	Read Defined Variable [TT] (TBCU2)LI_NOT_INHIB = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10055	R	Read Defined Variable [NI] Dev2/39 = 1.0	OK	1	Alleta Sekgololo - 417407	M2
10056	I	Traction Interlock Train Lines Dev2/39 : END1 90XR25 pin 41 Dev4/83 : END2 90XP35 pin 41	OK		Alleta Sekgololo - 417407	M2
10057	A	Force [NI] Dev4/83 = 0.0	OK		Alleta Sekgololo - 417407	M2
10058	R	Read Defined Variable [TT] (TBCU2)LI_NOT_INHIB = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10059	R	Read Defined Variable [NI] Dev2/39 = 0.0	OK	0	Alleta Sekgololo - 417407	M2
10060	I	Coolant Liquid	OK		Alleta Sekgololo - 417407	M2

10061	A	Check that the coolant level is at least 1/2 of the sight glass level indicator <a href="#">[10-48-31-335748_Coolant Level Check.pdf]</a>		OK		Alleta Sekgololo - 417407	M2
10062	R	Coolant Liquid Level is OK		OK		Alleta Sekgololo - 417407	M2
10063	I	End of Test		OK		Alleta Sekgololo - 417407	M2



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## Section 16 – Vehicle Normalization

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### 16.1 Instructions list

### 16.1.1 NORM-Vehicle Normalization

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Initial Conditions		OK		Siphesihle Mchunu - 491465	M2
10002	I	This inspection must be performed by the EPU/Acting EPU Manager on shift		OK		Siphesihle Mchunu - 491465	M2
10003	I	The VFT procedures are all completed		OK		Siphesihle Mchunu - 491465	M2
10004	I	Vehicle Normalization Check		OK		Siphesihle Mchunu - 491465	M2
10005	R	On LV3 all Circuit Breakers are installed and secured		OK		Siphesihle Mchunu - 491465	M2
10006	R	On LV3 all Dataplugs are installed, tightened and earth braids are fastened		OK		Siphesihle Mchunu - 491465	M2
10007	R	On LV3 all Connectors are tightened		OK		Siphesihle Mchunu - 491465	M2
10008	R	On LV3 there are no missing components, device, wiring or connectors.		OK		Siphesihle Mchunu - 491465	M2
10009	A	ON LV3, make sure that both bolts on 93XT300 terminal 4 are tightened and torque marked.		OK		Siphesihle Mchunu - 491465	M2
10010	R	On LV6 all Dataplugs are installed, tightened and earth braids are fastened		OK		Siphesihle Mchunu - 491465	M2
10011	R	On LV6 all Connectors are tightened		OK		Siphesihle Mchunu - 491465	M2
10012	R	On LV6 there are no missing components, device, wiring or connectors.		OK		Siphesihle Mchunu - 491465	M2
10013	R	On LV4 all Connectors are tightened		OK		Siphesihle Mchunu - 491465	M2
10014	R	On LV4 there are no missing components, device, wiring or connectors.		OK		Siphesihle Mchunu - 491465	M2
10015	R	On HC Cubicle the Controller is installed and properly tightened and its connectors are tightened		OK		Siphesihle Mchunu - 491465	M2
10016	R	All DCUs are properly installed and secured		OK		Siphesihle Mchunu - 491465	M2

10017	R	All Internal Displays are properly installed and secured		OK		Siphesihle Mchunu - 491465	M2
10018	R	All Light Covers are properly installed		OK		Siphesihle Mchunu - 491465	M2
10019	R	All Saloon Fire Detectors are properly installed and secured		OK		Siphesihle Mchunu - 491465	M2
10020	R	All covers are normalised inside the car		OK		Siphesihle Mchunu - 491465	M2
10021	R	On the Underframe, TBCU Agate is installed and properly tightened		OK		Siphesihle Mchunu - 491465	M2
10022	R	On the Underframe, Auxiliary Compressor cover is normalized		OK		Siphesihle Mchunu - 491465	M2
10023	R	On the Underframe, Panto panel cover is normalized		OK		Siphesihle Mchunu - 491465	M2
10024	R	On the Underframe, Speed Sensors are installed and properly tightened		OK		Siphesihle Mchunu - 491465	M2
10025	R	On the LVB, all Circuit Breakers are installed and properly tightened		OK		Siphesihle Mchunu - 491465	M2
10026	R	On the LVB, all Relays and Timers are installed and properly tightened		OK		Siphesihle Mchunu - 491465	M2
10027	R	On the LVB, BRIOMs are installed and properly tightened		OK		Siphesihle Mchunu - 491465	M2
10028	R	On the LVB there are no missing components, device, wiring or connectors.		OK		Siphesihle Mchunu - 491465	M2
10029	R	On the Underframe, all Connectors are tightened		OK		Siphesihle Mchunu - 491465	M2
10030	R	All underframe covers are normalised		OK		Siphesihle Mchunu - 491465	M2
10031	R	On END1 the Octopus cables are disconnected from the car and properly stored.		OK		Siphesihle Mchunu - 491465	M2
10032	R	On END2 the Octopus cables are disconnected from the car and properly stored.		OK		Siphesihle Mchunu - 491465	M2
10033	R	On the roof, there is no Strap connected to the Pantograph		OK		Siphesihle Mchunu - 491465	M2
10034	R	The Test Bench is switched OFF and the Octopus cables are disconnected and properly stored		OK		Siphesihle Mchunu - 491465	M2

10035	I	Ethernet Cables Normalization		OK		Siphesihle Mchunu - 491465	M2
10036	A	On LV3 fasten all ethernet cables and ensure that they connected to the right port.		OK		Siphesihle Mchunu - 491465	M2
10037	A	On LV6 fasten all ethernet cables and ensure that they connected to the right port.		OK		Siphesihle Mchunu - 491465	M2
10038	A	Fasten all ethernet cables terminating on devices outside LV3 and LV6 and ensure that they connected to the right port.		OK		Siphesihle Mchunu - 491465	M2
10039	R	ALL P.Os of this car are closed		OK		Siphesihle Mchunu - 491465	M2



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## Section 17 – PACIS Network

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### 17.1 Instructions list

### 17.1.1 054\_PIS-PACIS Network

I - Information      A - Action      R - Result      NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	PACIS System (SPP=054)		OK		TIVANI Angel - 542257	M2
10002	I	Initial conditions		OK		TIVANI Angel - 542257	M2
10003	I	110Vdc Normal line is connected and ON		OK		TIVANI Angel - 542257	M2
10004	I	Circuit Breaker		OK		TIVANI Angel - 542257	M2
10005	A	Close Circuit Breaker 54Q1		OK		TIVANI Angel - 542257	M2
10006	A	Close Circuit Breaker 54Q2		OK		TIVANI Angel - 542257	M2
10007	A	Close Circuit Breaker 54Q10		OK		TIVANI Angel - 542257	M2
10008	A	Close Circuit Breaker 54Q11		OK		TIVANI Angel - 542257	M2
10009	A	Close Circuit Breaker 55Q2		OK		TIVANI Angel - 542257	M2
10010	A	Close Circuit Breaker 55Q3		OK		TIVANI Angel - 542257	M2
10011	R	All 'Pacis System' circuit breakers are closed		OK		TIVANI Angel - 542257	M2
10012	I	Power Supply of Router Switches		OK		TIVANI Angel - 542257	M2
10013	I	Ethernet Switch CRS1		OK		TIVANI Angel - 542257	M2
10014	R	CRS1 is ON		OK		TIVANI Angel - 542257	M2
10015	I	Ethernet Switch CRS2		OK		TIVANI Angel - 542257	M2
10016	R	CRS2 is ON		OK		TIVANI Angel - 542257	M2
10017	I	DPAI-1		OK		TIVANI Angel - 542257	M2
10018	R	DPAI-1 is ON		OK		TIVANI Angel - 542257	M2
10019	I	DPAI-2		OK		TIVANI Angel - 542257	M2
10020	R	DPAI-2 is ON		OK		TIVANI Angel - 542257	M2
10021	I	Lateral Display 'LAT1'		OK		TIVANI Angel - 542257	M2

10022	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT1'		OK		TIVANI Angel - 542257	M2
10023	I	Lateral Display 'LAT2'		OK		TIVANI Angel - 542257	M2
10024	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT2'		OK		TIVANI Angel - 542257	M2
10025	I	Interior Display 'INT1'		OK		TIVANI Angel - 542257	M2
10026	R	The PWR (power) LED is "ON" on the Interior Display 'INT1'		OK		TIVANI Angel - 542257	M2
10027	I	Interior Display 'INT2'		OK		TIVANI Angel - 542257	M2
10028	R	The PWR (power) LED is "ON" on the Interior Display 'INT2'		OK		TIVANI Angel - 542257	M2
10029	I	Impedance of Loudspeaker		OK		TIVANI Angel - 542257	M2
10030	I	Saloon Speakers Commanded by DPAI-1		OK		TIVANI Angel - 542257	M2
10031	A	Measure the impedance connector '54XP1_X4' between pins: z32(+) and z30 (-)		OK		TIVANI Angel - 542257	M2
10032	R	Impedance Result Max : $x \leq 32$ (Ohms)		OK	30.3	TIVANI Angel - 542257	M2
10033	I	Saloon Speakers Commanded by DPAI-2		OK		TIVANI Angel - 542257	M2
10034	A	Measure the impedance connector '54XP2_X4' between pins: z32(+) and z30 (-)		OK		TIVANI Angel - 542257	M2
10035	R	Impedance Result Max : $x \leq 32$ (Ohms)		OK	30.9	TIVANI Angel - 542257	M2
10036	I	Data plugs		OK		TIVANI Angel - 542257	M2
10037	A	Insert and secure data plugs in the CRS		OK		TIVANI Angel - 542257	M2
10038	I	END OF TEST		OK		TIVANI Angel - 542257	M2



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## Section 18 – Report summaries

### 18.2 Results status

Test Instruction Sheet	Compliant	Incomplete	Non-compliant
Vehicle Normalization	X		
Train-Ground Communication	X		
Traction and Electric Brake	X		
TCMS Network	X		
Service Brake	X		
Rescue Mode and Emergency Disconnection	X		
Passenger Doors	X		
Pantograph	X		
PACIS Network	X		
Internal Lighting	X		
HVAC Air Conditioning	X		
Holding and Parking Brake	X		
Fire protection	X		
Energy Distribution	X		
Emergency Brake	X		
Cabin Control	X		

### 18.1 Tools used

Function	Tool name	Tool number	Next Calibration date
015_NRG	NPhasemètre	Phasemeter	9/30/2025
021_PNT	Manometro	Manometer	8/30/2025
040_SBK	Manometro	Manometer	8/30/2025
045_PBK	Manometro	Manometer	8/30/2025
057_HVA	NPhasemètre	Phasemeter	9/30/2025
062_ETS	Multimetro	Multimeter 5	9/30/2024



Serial Tests Report  
TS258 – M2 – VFT  
RTR Vehicle Functional Static Testing Report

Document Reference  
GIB0000007424  
Version: A0

Emission date  
21/11/2024

064_COM	N	Radio Analyser	11/30/2024
067_FSD	Multimetro	Meter 1	8/31/2025

Vehicle	Equipment	Expected version	Version loaded
M2			