PROJECT	CUSTOMER	VEHICLE
Xtrapolis-PRASA	**PRASA**	**237 – M4 – VFT**

RTR Vehicle Functional Static Testing TS203 M4 Report

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	CREATED	VERIFIED	APPROVED	DISTRIBUTION
Name	Lindani NGUBANE	Sifiso LUKHELE	Kgomotso NKOANA	Confidentiality Category *Restricted* ☐ *Project* ☐ *Normal* ☑
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Table of modifications

Rev	Date	Modifications Content	Writer
A0	29/07/2024	Creation	Lindani NGUBANE

Internal validations

	Name	Function	Date	Signature
Creator	Lindani NGUBANE	EPU Manager	29/07/2024	X Lindani NGUBANE EPU Manager
Verifier	Sifiso LUKHELE	Serial Test Manager	29/07/2024	X Sifiso LUKHELE Serial Test Manager
Approver	Kgomotso NKOANA	Test Expert	29/07/2024	X Kgomotso NKOANA Test Expert

Execution Plan

Start Date	20/07/2024
End Date	21/07/2024

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Verify the cabin control functions in both normal and backup modes, their commanding of the train lines, and the TCMS response to each function.
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Verify the working of all internal lighting functions.
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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
The objective of this procedure is to 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 a8nd covers are normalized.

Section 2 – Energy Distribution

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		Sizwe Sibanyoni - 484647	M4
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M4
10003	I	All the Circuit Breakers should be OPEN		OK		Sizwe Sibanyoni - 484647	M4
10004	I	Test bench should be connected but with no power supply		OK		Sizwe Sibanyoni - 484647	M4
10005	I	NO 400Vac should be connected to the car		OK		Sizwe Sibanyoni - 484647	M4
10006	A	Close Circuit Breaker 15Q3 (Normal Line)		OK		Sizwe Sibanyoni - 484647	M4
10007	I	Voltage Isolation 110Vdc		OK		Sizwe Sibanyoni - 484647	M4
10008	I	230Vac and 400Vac Circuit breakers		OK		Sizwe Sibanyoni - 484647	M4
10009	A	Close Circuit Breaker 13Q1		OK		Sizwe Sibanyoni - 484647	M4
10010	A	Close the circuit breaker 13Q3		OK		Sizwe Sibanyoni - 484647	M4
10011	I	Normal and Permanent Power Supply		OK		Sizwe Sibanyoni - 484647	M4
10012	I	110Vdc Permanent Train Line Apply 110Vdc on - 93XT304_1 pin 4 to simulate Permanent Train Line		OK		Sizwe Sibanyoni - 484647	M4
10013	A	Apply 110Vdc on the Normal Line using the external power supply		OK		Sizwe Sibanyoni - 484647	M4

10014	A	Measure 110Vdc between 90XR50.X1/1 (+) and 90XR50.X2/1 (-) (intercar connector). [Normal line]		OK		Sizwe Sibanyoni - 484647	M4
10015	I	Permanent Line Circuit Breakers		OK		Sizwe Sibanyoni - 484647	M4
10016	A	Close Circuit Breaker 15Q4 for battery voltage above 80Vdc and close it(permanent Line)		OK		Sizwe Sibanyoni - 484647	M4
10017	I	230Vac Circuit Breakers		OK		Sizwe Sibanyoni - 484647	M4
10018	A	Close Circuit Breaker 13Q2		OK		Sizwe Sibanyoni - 484647	M4
10019	A	Close Circuit Breaker 13Q3		OK		Sizwe Sibanyoni - 484647	M4
10020	I	230Vac and 400Vac Voltage Supply		OK		Sizwe Sibanyoni - 484647	M4
10021	A	Apply 400Vac to the Vehicle, either on End1 or End2		OK		Sizwe Sibanyoni - 484647	M4
10022	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		Sizwe Sibanyoni - 484647	M4
10023	R	Phase rotation between U,V,W is correct		OK		Sizwe Sibanyoni - 484647	M4
10024	A	Perform a phase rotation measurement on Connector 90XR52 between phases U(X1),V(X2),W(X3) and ensure the rotation is in the correct direction		OK		Sizwe Sibanyoni - 484647	M4
10025	R	Phase rotation between U,V,W is correct		OK		Sizwe Sibanyoni - 484647	M4
10026	A	Check 230Vac between points L and N of socket -13XT1		OK		Sizwe Sibanyoni - 484647	M4

10027	R	230Vac present		OK		Sizwe Sibanyoni - 484647	M4
10028	A	Check 230Vac between points L and N of socket -13XT2		OK		Sizwe Sibanyoni - 484647	M4
10029	R	230Vac present		OK		Sizwe Sibanyoni - 484647	M4
10030	A	Remove connector 57XP1_10		OK		Sizwe Sibanyoni - 484647	M4
10031	A	Remove connector 93XP150		OK		Sizwe Sibanyoni - 484647	M4
10032	A	Close circuit breaker 34Q1 and 57Q1		OK		Sizwe Sibanyoni - 484647	M4
10033	A	Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 57XP1_10 (10.b1,10a2,10a1)		OK		Sizwe Sibanyoni - 484647	M4
10034	R	400Vac +- 5% tolerance is measured between all three phases of 57XP1_10		OK		Sizwe Sibanyoni - 484647	M4
10035	A	Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 93XP150 (E2,E3,E1)		OK		Sizwe Sibanyoni - 484647	M4
10036	R	400Vac +- 5% tolerance is measured between all three phases on connector 93XP150		OK		Sizwe Sibanyoni - 484647	M4
10037	A	Put back connector 57XP1_10		OK		Sizwe Sibanyoni - 484647	M4
10038	A	Put back connector 93XP150		OK		Sizwe Sibanyoni - 484647	M4
10039	A	Switch off the 400Vac power supply from the socket		OK		Sizwe Sibanyoni - 484647	M4
10040	I	Auxiliary Converters Command		OK		Sizwe Sibanyoni - 484647	M4

10041	A	Battery Connection Train Lines Measure continuity between END 1 90XR14 pin 30 END 2 90XP24 pin 30		OK		Sizwe Sibanyoni - 484647	M4
10042	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10043	A	Battery Disconnection Train Lines Measure continuity between END 1 90XR14 pin 31 END 2 90XP24 pin 31		OK		Sizwe Sibanyoni - 484647	M4
10044	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10045	A	IES StatusTrain Lines Measure continuity between END 1 90XR15 pin 61 END 2 90XP25 pin 61 and END 1 90XR15 pin 62 END 2 90XP25 pin 62		OK		Sizwe Sibanyoni - 484647	M4
10046	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4

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		Impi Tsela - 435647	M4
10002	I	Initial conditions		OK		Impi Tsela - 435647	M4
10003	I	Vehicle test bench should be configured as TC1: 1. TC1 Dataplugs 2. MCE switch set to TC1		OK		Impi Tsela - 435647	M4
10004	A	110Vdc supply to the Normal Train line is ON		OK		Impi Tsela - 435647	M4
10005	I	Power Supply to the Router Switches		OK		Impi Tsela - 435647	M4
10006	I	Power supply to the 25A10 SWITCH ETHERNET (CRS1)		OK		Impi Tsela - 435647	M4
10007	A	Close Circuit Breaker 25Q10		OK		Impi Tsela - 435647	M4
10008	R	CRS1 25A10 is ON		OK		Impi Tsela - 435647	M4
10009	I	Power supply to the 25A11 SWITCH ETHERNET (CRS2)		OK		Impi Tsela - 435647	M4
10010	A	Close Circuit Breaker 25Q11		OK		Impi Tsela - 435647	M4
10011	R	CRS2 25A11 is ON		OK		Impi Tsela - 435647	M4

10012	I	Power supply to the 25A14 ETHERNET REPEATER (TBR)		OK		Impi Tsela - 435647	M4
10013	A	Close Circuit Breaker 25Q14		OK		Impi Tsela - 435647	M4
10014	R	TBR 25A14 is ON		OK		Impi Tsela - 435647	M4
10015	A	Close Circuit Breaker 25Q6		OK		Impi Tsela - 435647	M4
10016	A	Close Circuit Breaker 25Q7		OK		Impi Tsela - 435647	M4
10017	I	Ethernet Loop		OK		Impi Tsela - 435647	M4
10018	A	For each CRS, check that the Ethernet Loop LEDs are flashing		OK		Impi Tsela - 435647	M4
10019	R	CRS1 has LEDs on ports X3 and X4 flashing		OK		Impi Tsela - 435647	M4
10020	R	CRS2 has ONLY LED on port X4 flashing		OK		Impi Tsela - 435647	M4
10021	R	Check on the Test Bench DDU that all Router Switches are available on the network		OK		Impi Tsela - 435647	M4
10022	I	Power Supply to the BRIOMS		OK		Impi Tsela - 435647	M4
10023	I	Power supply to the 25A6 BRIOM 40/10 ETH 6		OK		Impi Tsela - 435647	M4
10024	R	BRIOM 25A6 is ON		OK		Impi Tsela - 435647	M4
10025	A	Check visually that ground braid is connected to BRIOM		OK		Impi Tsela - 435647	M4
10026	I	Power supply to the 25A7 BRIOM 40/10 ETH 7		OK		Impi Tsela - 435647	M4
10027	R	BRIOM 25A7 is ON		OK		Impi Tsela - 435647	M4

10028	A	Check visually that ground braid is connected to BRIOM		OK		Impi Tsela - 435647	M4

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		Sizwe Sibanyoni - 484647	M4
10002	I	Train Lines		OK		Sizwe Sibanyoni - 484647	M4
10003	A	Cab Selected On Train - Train Lines Measure continuity between END1 90XR14 pin 3 END2 90XP24 pin 3		OK		Sizwe Sibanyoni - 484647	M4
10004	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4
10005	A	Cab Active TC1 Train Lines Measure continuity between END1 90XR14 pin 4 END2 90XP24 pin 4		OK		Sizwe Sibanyoni - 484647	M4
10006	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4
10007	A	Cab Active TC2 Train Lines Measure continuity between END1 90XR14 pin 5 END2 90XP24 pin 5		OK		Sizwe Sibanyoni - 484647	M4
10008	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4

10009	A	Master Key TC1 Train Lines Measure continuity between END1 90XR14 pin 17 END2 90XP24 pin 17		OK		Sizwe Sibanyoni - 484647	M4
10010	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4

Section 5 – Internal Lighting

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=52)		OK		Sizwe Sibanyoni - 484647	M4
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M4
10003	I	110Vdc Normal line is ON		OK		Sizwe Sibanyoni - 484647	M4
10004	I	Cleaning Lighting Command		OK		Sizwe Sibanyoni - 484647	M4
10005	A	110Vdc Permanent Train Line Apply 110V on 93XT304_1 pin 4 to simulate permanent supply		OK		Sizwe Sibanyoni - 484647	M4
10006	A	Close Circuit Breaker 52Q3		OK		Sizwe Sibanyoni - 484647	M4
10007	A	Close Circuit Breaker 52Q4		OK		Sizwe Sibanyoni - 484647	M4
10008	A	Close Circuit Breaker 52Q5		OK		Sizwe Sibanyoni - 484647	M4
10009	R	All saloon emergency lights (low intensity) are OFF on all light modules (Left + Right).		OK		Sizwe Sibanyoni - 484647	M4
10010	A	Turn Cleaning Staff Lights Switch 52S6 to ON position		OK		Sizwe Sibanyoni - 484647	M4

10011	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right).		OK		Sizwe Sibanyoni - 484647	M4
10012	A	Reset Circuit Breaker 52Q5 (Open and Close)		OK		Sizwe Sibanyoni - 484647	M4
10013	A	Close Circuit Breaker 52Q1		OK		Sizwe Sibanyoni - 484647	M4
10014	A	Close Circuit Breaker 52Q2		OK		Sizwe Sibanyoni - 484647	M4
10015	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right).		OK		Sizwe Sibanyoni - 484647	M4

Section 6 – PACIS System

6.1 Instructions list

6.1.1 054_PIS-PACIS System

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	PACIS System I0 (SPP=054)		OK		Impi Tsela - 435647	M4
10002	I	Initial conditions		OK		Impi Tsela - 435647	M4
10003	I	110Vdc Normal line is connected and ON		OK		Impi Tsela - 435647	M4
10004	I	Circuit Breakers		OK		Impi Tsela - 435647	M4
10005	A	Close Circuit Breaker 54Q1		OK		Impi Tsela - 435647	M4
10006	A	Close Circuit Breaker 54Q2		OK		Impi Tsela - 435647	M4
10007	A	Close Circuit Breaker 54Q10		OK		Impi Tsela - 435647	M4
10008	A	Close Circuit Breaker 54Q11		OK		Impi Tsela - 435647	M4
10009	A	Close Circuit Breaker 55Q2		OK		Impi Tsela - 435647	M4
10010	A	Close Circuit Breaker 55Q3		OK		Impi Tsela - 435647	M4
10011	R	All 'Pacis System' circuit breakers are closed		OK		Impi Tsela - 435647	M4
10012	I	Power Supply of Router Switches		OK		Impi Tsela - 435647	M4
10013	I	Ethernet Switch CRS1		OK		Impi Tsela - 435647	M4
10014	R	CRS1 is ON		OK		Impi Tsela - 435647	M4
10015	I	Ethernet Switch CRS2		OK		Impi Tsela - 435647	M4
10016	R	CRS2 is ON		OK		Impi Tsela - 435647	M4
10017	I	DPAI-1		OK		Impi Tsela - 435647	M4

10018	R	DPAI-1 is ON		OK		Impi Tsela - 435647	M4
10019	I	DPAI-2		OK		Impi Tsela - 435647	M4
10020	R	DPAI-2 is ON		OK		Impi Tsela - 435647	M4
10021	I	Lateral Display 'LAT1'		OK		Impi Tsela - 435647	M4
10022	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT1'.		OK		Impi Tsela - 435647	M4
10023	I	Lateral Display 'LAT2'		OK		Impi Tsela - 435647	M4
10024	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT2'.		OK		Impi Tsela - 435647	M4
10025	I	Interior Display 'INT1'		OK		Impi Tsela - 435647	M4
10026	R	The PWR (power) LED is "ON" on the Interior Display 'INT1'.		OK		Impi Tsela - 435647	M4
10027	I	Interior Display 'INT2'		OK		Impi Tsela - 435647	M4
10028	R	The PWR (power) LED is "ON" on the Interior Display 'INT2' is ON.		OK		Impi Tsela - 435647	M4
10029	I	Impedance of Loudspeaker		OK		Impi Tsela - 435647	M4
10030	I	Saloon Speakers Commanded by DPAI-1		OK		Impi Tsela - 435647	M4
10031	A	Measure the impedance connector '54XP1_X4' between pins: z32(+) and z30 (-).		OK		Impi Tsela - 435647	M4
10032	R	Impedance Result Max : x <= 32.00 (Ohm)		OK	30.4	Impi Tsela - 435647	M4
10033	I	Saloon Speakers Commanded by DPAI-2		OK		Impi Tsela - 435647	M4
10034	A	Measure the impedance connector '54XP2_X4' between		OK		Impi Tsela - 435647	M4

		pins: z32(+) and z30 (-).					
10035	R	Impedance Result Max : x <= 32.00 (Ohm)		OK	30.5	Impi Tsela - 435647	M4

Section 7 – Train Ground Communication

7.1 Instructions list

7.1.1 062_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		Sizwe Sibanyoni - 484647	M4
10002	A	ERTMS Bypass Train Lines Check continuity between END1 90XR14 pin 11 END2 90XP24 pin 11		OK		Sizwe Sibanyoni - 484647	M4
10003	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4
10004	A	Emergency Brake ERTMS 1 Train Lines Check continuity between END1 90XR14 pin 18 END2 90XP24 pin 18		OK		Sizwe Sibanyoni - 484647	M4
10005	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4
10006	I	Emergency Brake ERTMS 2 Train Lines Check continuity between END1 90XR14 pin 20 END2 90XP24 pin 20		OK		Sizwe Sibanyoni - 484647	M4
10007	R	Both pins are continuous		OK		Sizwe Sibanyoni - 484647	M4

10008	I	Eurobalise Antenna Cable		OK		Sizwe Sibanyoni - 484647	M4
10009	A	Check continuity between [Inter-car (LOCAL: +END1; Connector -90XR10) and Inter-car (LOCAL: +END2; connector -90XP20)] according to the image below.		OK		Sizwe Sibanyoni - 484647	M4
10010	R	Eurobalise Antenna cable is correctly configured		OK		Sizwe Sibanyoni - 484647	M4

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		Impi Tsela - 435647	M4
10002	I	Backup Mode		OK		Impi Tsela - 435647	M4
10003	R	Points are continuous		OK		Impi Tsela - 435647	M4
10004	A	Check continuity on Timer 27D1 between points A4 and B3		OK		Impi Tsela - 435647	M4
10005	A	Backup Mode Train Lines Check continuity between END1 90XR15 pin23 END2 90XP25 pin 23 and 27K1 A1		OK		Impi Tsela - 435647	M4
10006	R	All points are continuous		OK		Impi Tsela - 435647	M4
10007	A	Check continuity between 27K1 A2 and Ground		OK		Impi Tsela - 435647	M4
10008	R	The points are continuous		OK		Impi Tsela - 435647	M4
10009	I	Emergency Disconnection		OK		Impi Tsela - 435647	M4
10010	A	Emergency Disconnection Train Lines		OK		Impi Tsela - 435647	M4

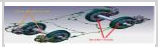
		Check continuity between END1 90XR15 pin24 END2 90XP25 pin 24					
10011	R	All points are continuous		OK		Impi Tsela - 435647	M4

Section 9 – Emergency Brake

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		Sizwe Sibanyoni - 484647	M4
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M4
10003	I	No PEAs are activated		OK		Sizwe Sibanyoni - 484647	M4
10004	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Sizwe Sibanyoni - 484647	M4
10005	I	Visual Inspection		OK		Sizwe Sibanyoni - 484647	M4
10006	A	Physically and visually inspect all the Disk Break Units (DBU) and brake pads, to ensure they are securely fitted.		OK		Sizwe Sibanyoni - 484647	M4
10007	R	All the brake DBUs are correctly installed, and all the brake pads are correctly installed and locked.		OK		Sizwe Sibanyoni - 484647	M4
10008	A	Check the piping installation		OK		Sizwe Sibanyoni - 484647	M4
10009	R	All the pipes are installed on the vehicle		OK		Sizwe Sibanyoni - 484647	M4

10010	A	Check all the Passenger Emergency Alarm handles, and ensure they are connected to their respective connectors		OK		Sizwe Sibanyoni - 484647	M4
10011	R	All the PEAs are installed and connected		OK		Sizwe Sibanyoni - 484647	M4
10012	I	Train Lines		OK		Sizwe Sibanyoni - 484647	M4
10013	A	Emergency Brake Loop Train Lines Check continuity between END1 90XR24 pin 8 END2 90XP34 pin 8		OK		Sizwe Sibanyoni - 484647	M4
10014	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10015	A	Emergency Brake Loop Override Train Lines Check continuity between END1 90XR24 pin 9 END2 90XP34 pin 9		OK		Sizwe Sibanyoni - 484647	M4
10016	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10017	I	Emergency Brake Train Line Check continuity between END1 90XR25 pin 67 END2 90XP35 pin 67		OK		Sizwe Sibanyoni - 484647	M4
10018	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10019	A	PEA Loop OTDR Train Lines Check continuity between END1 90XR24 pin 10 END2 90XP34 pin 10		OK		Sizwe Sibanyoni - 484647	M4

10020	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10021	A	PEA Loop Train Lines Check continuity between END1 90XR25 pin 95 END2 90XP35 pin95		OK		Sizwe Sibanyoni - 484647	M4
10022	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10023	A	Close Circuit breaker 44Q1		OK		Sizwe Sibanyoni - 484647	M4

Section 10 – Service Brake

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		Sizwe Sibanyoni - 484647	M4
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M4
10003	I	No air supply to the vehicle		OK		Sizwe Sibanyoni - 484647	M4
10004	I	All brake panel cocks are in normal position (not isolated)		OK		Sizwe Sibanyoni - 484647	M4
10005	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Sizwe Sibanyoni - 484647	M4
10006	I	Follow the procedure in the document below to upload software onto the TBCU electronic.		OK		Sizwe Sibanyoni - 484647	M4
10007	I	Power Supply		OK		Sizwe Sibanyoni - 484647	M4
10008	A	Remove the connector 10XR12_XCB2 from the propulsion box		OK		Sizwe Sibanyoni - 484647	M4
10009	A	Close Circuit Breaker 33Q1, 33Q3 and 33Q5		OK		Sizwe Sibanyoni - 484647	M4
10010	A	Check the voltage on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and		OK		Sizwe Sibanyoni - 484647	M4

		67(-); and 5(+) and 68(-)					
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		Sizwe Sibanyoni - 484647	M4
10012	A	Open Circuit Breaker 33Q1 and 33Q3, Replace connector 10XR12_XCB2 on the propulsion box, and Close Circuit breaker 33Q1 and 33Q3		OK		Sizwe Sibanyoni - 484647	M4
10013	A	Remove the connector -40XP2_C2_16 from pneumatic brake panel		OK		Sizwe Sibanyoni - 484647	M4
10014	A	Close Circuit Breaker 40Q1		OK		Sizwe Sibanyoni - 484647	M4
10015	A	Check the voltage on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		Sizwe Sibanyoni - 484647	M4
10016	R	Battery Voltage (above 80Vdc) is measured on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		Sizwe Sibanyoni - 484647	M4
10017	A	Open Circuit Breaker 40Q1, Replace connector -40XP2_C2_16 on the pneumatic brake panel, and Close Circuit breaker -40Q1		OK		Sizwe Sibanyoni - 484647	M4
10018	R	The pneumatic brake panel 40A2 is ON		OK		Sizwe Sibanyoni - 484647	M4
10019	I	Train Lines		OK		Sizwe Sibanyoni - 484647	M4
10020	A	EB Reduced Train Lines		OK		Sizwe Sibanyoni - 484647	M4

		Check continuity between END1 90XR15 pin 60 END2 90XP25 pin 60					
10021	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10022	A	Brake Applied Train Lines Check continuity between END1 90XR15 pin 50 END2 90XP25 pin 50		OK		Sizwe Sibanyoni - 484647	M4
10023	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10024	A	Remote Isolation Train Lines Check continuity between END1 90XR15 pin 59 END2 90XP25 pin 59		OK		Sizwe Sibanyoni - 484647	M4
10025	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4

Section 11 – Holding and Parking Brake

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		Sizwe Sibanyoni - 484647	M4
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M4
10003	A	Using the tools list on the side of your screen, record the serial number of the manometer that will be used during this test.		OK		Sizwe Sibanyoni - 484647	M4
10004	A	Check that the pressure on Test point C2.11/1 is >5bar		OK		Sizwe Sibanyoni - 484647	M4
10005	I	Visual Inspection		OK		Sizwe Sibanyoni - 484647	M4
10006	A	Check the installation of the manual parking brake release components (lever + cable)		OK		Sizwe Sibanyoni - 484647	M4
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		Sizwe Sibanyoni - 484647	M4
10008	I	Circuit Breakers		OK		Sizwe Sibanyoni - 484647	M4
10009	A	Close Circuit Breaker 33Q3		OK		Sizwe Sibanyoni - 484647	M4
10010	A	Close Circuit Breaker 33Q5		OK		Sizwe Sibanyoni - 484647	M4
10011	I	Parking Brake Pressure Switch		OK		Sizwe Sibanyoni - 484647	M4
10012	R	Read Defined Variable [TT] (TBCU4)LI_PARK_BR_RELEASE = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10013	R	Read Defined Variable [TT] (TBCU4)LI_BRAKE_STAT = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10014	R	Read Defined Variable [TT]		OK	1	Sizwe Sibanyoni - 484647	M4

		(MPU1)tbcu4_parkbrakerelease = 1.0					
10015	R	Read Defined Variable [TT] (MPU1)tbcu4_li_pbrake_stat = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10016	A	Parking Brake Applied Train Lines Check continuity between END1 90XR15 pin 77 END2 90XP25 pin 77		OK		Sizwe Sibanyoni - 484647	M4
10017	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10018	A	Remote Parking Command Train Lines Check continuity between END1 90XR15 pin 68 END2 90XP25 pin 68		OK		Sizwe Sibanyoni - 484647	M4
10019	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10020	I	Parking Brake Applied		OK		Sizwe Sibanyoni - 484647	M4
10021	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		Sizwe Sibanyoni - 484647	M4
10022	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		Sizwe Sibanyoni - 484647	M4
10023	R	Pressure at test point C2.11/1 <4.5 Bar		OK		Sizwe Sibanyoni - 484647	M4
10024	R	Read Defined Variable [TT] (TBCU4)LI_PARK_BR_RELEASE = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10025	R	Read Defined Variable [TT] (MPU1)tbcu4_parkbrakerelease = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10026	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Sizwe Sibanyoni - 484647	M4

10027	R	Read Defined Variable [TT] (TBCU4)LI_BRAKE_STAT = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10028	R	Read Defined Variable [TT] (MPU1)tbcu4_li_pbrake_stat = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10029	R	Read Defined Variable [TT] (TBCU4)LI_PARK_BR_DC = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10030	R	Read Defined Variable [TT] (MPU1)tbcu4_parkbrakeisoldc = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10031	R	Read Defined Variable [TT] (MPU1)li_pbk_m4parkbrakeisol = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10032	A	Position the Isolation cock C2.3.2 in CLOSE position		OK		Sizwe Sibanyoni - 484647	M4
10033	R	Read Defined Variable [TT] (MPU1)li_pbk_m4parkbrakeisol = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10034	R	Read Defined Variable [TT] (TBCU4)LI_BRAKE_STAT = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10035	R	Read Defined Variable [TT] (MPU1)tbcu4_li_pbrake_stat = 0.0		OK	0	Sizwe Sibanyoni - 484647	M4
10036	R	Read Defined Variable [TT] (TBCU4)LI_PARK_BR_DC = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10037	R	Read Defined Variable [TT] (MPU1)tbcu4_parkbrakeisoldc = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4
10038	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Sizwe Sibanyoni - 484647	M4

Section 12 – Air Condition

12.1 Instructions list

12.1.2 057_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			M4
10002	I	Initial conditions		NE			M4
10003	A	Car Should be Prepared with CVS running and 400V ac available in the car		NE			M4
10004	I	HVAC AC Power Supply		NE			M4
10005	A	Close Circuit Breaker 13Q1 and 13Q5		NE			M4
10006	A	Check on the DDU if the HVAC is offline		NE			M4
10007	I	Checking 400Vac		NE			M4
10008	A	Close Circuit Breaker 57Q1		NE			M4
10009	A	Disconnect connector 57XP4_X5 and Measure 400Vac between all 3 phases which are a1- phase R, a2- Phase S and b1- phase T of connector 57XP4_X5		NE			M4
10010	R	400Vac measured between all phases		NE			M4
10011	A	On same connector 57XP4_X5, with a phasemeter, check the correct Phase Rotation between points a1- Phase R, a2- Phase S and b1- Phase T.		NE			M4
10012	R	The phase rotation is correct between all three phases		NE			M4
10013	I	Saloon HVAC		NE			M4
10014	A	Close Circuit Breaker 57Q2		NE			M4
10015	A	Allow the HVAC to initialize and check on the DDU if the HVAC is online		NE			M4

10016	R	HVAC unit is online and starts to work		NE			M4
10017	I	HVAC web portal		NE			M4
10018	A	The attached document is a procedure on how to navigate around the maintenance software.		NE			M4
10019	I	Connect the laptop to the HVAC maintenance software using web browser. Enter the following IP address on the web browser 10.136.xxx.32 xxx represents the train number Login: maint Password: maint		NE			M4
10020	R	On status tab, Active mode is off for both cab and saloon		NE			M4
10021	A	Go to Alarms tab and clear all the alarms for saloon and cabin		NE			M4
10022	I	HVAC inhib		NE			M4
10023	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr1___1 = 1.0		NE			M4
10024	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr2___1 = 1.0		NE			M4
10025	I	HVAC 50% restriction		NE			M4
10026	A	Force [TT] NRG_HvacM450Cmd = 0		NE			M4
10027	I	Full "Self test" saloon		NE			M4
10028	I	For the following tests make sure on the webHMI tab you change contoller to be controlled by webHMI and not MPU		NE			M4
10029	A	Before running the full test, please click on reset test to reset the previous results.		NE			M4
10030	A	Select Full-Test on the Saloon HVAC		NE			M4
10031	R	All saloon HVAC units work according to the mode described in the "ACTIVE MODE" on the status		NE			M4

		tab					
10032	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			M4
10033	I	Forced Mode (Saloon HVAC)		NE			M4
10034	I	During all tests Walk through the whole car and physically check (feel) that the HVAC is functioning as desired		NE			M4
10035	I	Go to maintenance tab to force the following modes		NE			M4
10036	I	Cooling Mode		NE			M4
10037	A	Select forced Cooling mode on the Saloon HVAC and let it run for 5 mins		NE			M4
10038	R	All HVAC units are cooling		NE			M4
10039	I	Heating Mode		NE			M4
10040	A	Select forced Heating mode on the Saloon HVAC and let it run for 5 mins		NE			M4
10041	R	All HVAC units are heating		NE			M4
10042	I	HVAC Faults		NE			M4
10043	A	In the maintenance software, select the "Alarms" tab		NE			M4
10044	A	Ensure there are no active faults on the HVAC for the Saloon. Use the highlighted drop down to navigate between saloon and cabin.		NE			M4
10045	R	No active faults identified on the HVAC unit		NE			M4
10046	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr1__1		NE			M4
10047	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr2__1		NE			M4
10048	A	Release [TT] NRG_HvacM450Cmd		NE			M4

10049	I	End of test		NE			M4

12.1.1 057_HVA-HVAC_TK

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		Impi Tsela - 435647	M4
10002	I	Power Supply		OK		Impi Tsela - 435647	M4
10003	A	Close Circuit Breaker 57Q2		OK		Impi Tsela - 435647	M4
10004	A	Remove Connector 57XP1_5 from HVAC Panel		OK		Impi Tsela - 435647	M4
10005	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr1___1 = 0.0		OK		Impi Tsela - 435647	M4
10006	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr2___1 = 0.0		OK		Impi Tsela - 435647	M4
10007	R	Check battery voltage (above 80Vdc) between points 11 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10008	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr2___1 = 1.0		OK		Impi Tsela - 435647	M4
10009	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10010	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr1___1 = 1.0		OK		Impi Tsela - 435647	M4
10011	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10012	R	Check 0Vdc between points 10 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10013	A	Force [TT] (MPU1)lo_hva_m4hvacinhibr2___1 = 0.0		OK		Impi Tsela - 435647	M4
10014	A	Force [TT] (MPU1)lo_hva_m4emergventil___1 = 1.0		OK		Impi Tsela - 435647	M4

10015	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10016	R	Check battery voltage (above 80Vdc) between points 10 and 9 of the connector 57XP1_5		OK		Impi Tsela - 435647	M4
10017	A	Release [TT] (MPU1)lo_hva_m4emergventil___1		OK		Impi Tsela - 435647	M4
10018	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr1___1		OK		Impi Tsela - 435647	M4
10019	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr2___1		OK		Impi Tsela - 435647	M4
10020	A	Put back the connector 57XP1_5 on the HVAC panel		OK		Impi Tsela - 435647	M4
10021	I	HVAC Electronic Power Supply		OK		Impi Tsela - 435647	M4
10022	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Impi Tsela - 435647	M4
10023	A	Turn the control switch to AUTO position on the HVAC Panel		OK		Impi Tsela - 435647	M4
10024	R	The HVAC electronic is ON		OK		Impi Tsela - 435647	M4
10025	A	Open Circuit Breaker F1 on the HVAC Panel		OK		Impi Tsela - 435647	M4
10026	R	The HVAC electronic is OFF		OK		Impi Tsela - 435647	M4
10027	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Impi Tsela - 435647	M4
10028	I	Software Upload		OK		Impi Tsela - 435647	M4
10029	I	Follow the procedure in the document below to upload software onto the HVAC electronic		OK		Impi Tsela - 435647	M4
10030	A			OK		Impi Tsela - 435647	M4
10031	A			OK		Impi Tsela - 435647	M4
10032	I	Sensor's Grade		OK		Impi Tsela - 435647	M4
10033	I	Each temperature sensor has calibrated grade information. The sensor must be setup with this information.		OK		Impi Tsela - 435647	M4

10034	A	The label with sensor grade information is found inside the HVAC frame, near the filter. Inside the train, open the ceiling filter access, rotate a damper and read the label.		OK		Impi Tsela - 435647	M4
10035	R	Sensor grade for HVAC Return Air (RAS) is:		OK	2	Impi Tsela - 435647	M4
10036	R	Sensor grade for HVAC Duct Air (DAS) is:		OK	6	Impi Tsela - 435647	M4
10037	R	Sensor grade for HVAC Fresh Air (FAS) is:		OK	4L	Impi Tsela - 435647	M4
10038	R	Sensor grade for HVAC Duct Air 2 (DAS2) is:		OK	2L	Impi Tsela - 435647	M4
10039	A	In the maintenance software, select the "Application settings" page and click the "Sensors" tab		OK		Impi Tsela - 435647	M4
10040	A	Enter the data found on the label for each grade. Then, click "Save settings".		OK		Impi Tsela - 435647	M4
10041	A	Open Circuit Breaker F1 on the HVAC Panel		OK		Impi Tsela - 435647	M4
10042	I	Checking 400Vac		OK		Impi Tsela - 435647	M4
10043	A	Ensure that the 400Vac Shore Supply is connected to the vehicle, else connect it		OK		Impi Tsela - 435647	M4
10044	A	Close Circuit Breaker 57Q1		OK		Impi Tsela - 435647	M4
10045	A	Measure 400Vac (+-5%) in the Terminal Block next to the connector '57XP1_10.A / '57XP1_10.B' on the HVAC Panel		OK		Impi Tsela - 435647	M4
10046	R	400Vac (+-5%) is measured between each of the phases		OK		Impi Tsela - 435647	M4
10047	A	On the HVAC Panel, with a phasemeter, check the correct Phase Rotation between points L1- Phase R, L2- Phase S and L3- Phase T.		OK		Impi Tsela - 435647	M4
10048	R	The phase rotation is correct between all three phases		OK		Impi Tsela - 435647	M4
10049	I	Saloon HVAC		OK		Impi Tsela - 435647	M4

10050	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Impi Tsela - 435647	M4
10051	A	Force [TT] (MPU1)Io_hva_m4hvacinhibr2___1 = 1		OK		Impi Tsela - 435647	M4
10052	A	Force [TT] (MPU1)Io_hva_m4hvacinhibr1___1 = 1		OK		Impi Tsela - 435647	M4
10053	A	Force [TT] NRG_HvacM450Cmd = 0		OK		Impi Tsela - 435647	M4
10054	R	HVAC unit turns ON and starts to work		OK		Impi Tsela - 435647	M4
10055	I	Reconnect the laptop to the HVAC maintenance software using HCU Finder		OK		Impi Tsela - 435647	M4
10056	R	The Exhaust fans are Turned Off (Confirm on Forced tab that Actual exhauster speed is OFF)		OK		Impi Tsela - 435647	M4
10057	I	Forced Mode (Saloon HVAC)		OK		Impi Tsela - 435647	M4
10058	I	To force any mode on HVAC, please follow the manual below to open the communication channel with the HVAC. Connection should be through the HVAC Electronic Device in the HC cubicle.		OK		Impi Tsela - 435647	M4
10059	I	In the maintenance software, select the 'Forced' tab, and use the "Required working mode" drop down box to force the following modes:		OK		Impi Tsela - 435647	M4
10060	I	Ventilation Mode		OK		Impi Tsela - 435647	M4
10061	A	Force Ventilation mode on the Saloon HVAC		OK		Impi Tsela - 435647	M4
10062	R	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		Impi Tsela - 435647	M4
10063	R	The Exhaust fans are Turned OFF		OK		Impi Tsela - 435647	M4
10064	I	Cooling Mode		OK		Impi Tsela - 435647	M4
10065	A	Force Cooling mode on the Saloon HVAC		OK		Impi Tsela - 435647	M4

10066	R	All saloon HVAC units work in Cooling mode		OK		Impi Tsela - 435647	M4
10067	R	The Exhaust fans are Turned OFF		OK		Impi Tsela - 435647	M4
10068	I	Heating Mode		OK		Impi Tsela - 435647	M4
10069	A	Force Heating mode on the Saloon HVAC		OK		Impi Tsela - 435647	M4
10070	R	All saloon HVAC units work in Heating mode		OK		Impi Tsela - 435647	M4
10071	R	The Exhaust fans are Turned OFF		OK		Impi Tsela - 435647	M4
10072	I	Automatic Mode		OK		Impi Tsela - 435647	M4
10073	A	Force Self-Test on the Saloon HVAC		OK		Impi Tsela - 435647	M4
10074	R	All saloon HVAC units work according to the mode described in the "Actual working mode"		OK		Impi Tsela - 435647	M4
10075	R	The Exhaust fans are Turned OFF		OK		Impi Tsela - 435647	M4
10076	I	HVAC Faults		OK		Impi Tsela - 435647	M4
10077	A	Open Circuit Breaker 57Q1		OK		Impi Tsela - 435647	M4
10078	R	All saloon HVAC units STOP working		OK		Impi Tsela - 435647	M4
10079	A	Close Circuit Breaker 57Q1		OK		Impi Tsela - 435647	M4
10080	R	All saloon HVAC units START working		OK		Impi Tsela - 435647	M4
10081	A	In the maintenance software, select the "Alarms / Warnings" tab		OK		Impi Tsela - 435647	M4
10082	A	Ensure there are no active faults on the HVAC		OK		Impi Tsela - 435647	M4
10083	I	For the next sections, walk through the whole car and physically check (feel) that the HVAC is functioning as desired		OK		Impi Tsela - 435647	M4
10084	R	No active faults identified on the HVAC unit		OK		Impi Tsela - 435647	M4
10085	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr1__1		OK		Impi Tsela - 435647	M4

10086	A	Release [TT] (MPU1)lo_hva_m4hvacinhibr2__1		OK		Impi Tsela - 435647	M4
10087	A	Release [TT] NRG_HvacM450Cmd		OK		Impi Tsela - 435647	M4
10088	I	END TEST		OK		Impi Tsela - 435647	M4

Section 13 – Fire Protection

13.1 Instructions list

13.1.1 067_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		Sizwe Sibanyoni - 484647	M4
10002	I	Fire Detection Train Lines		OK		Sizwe Sibanyoni - 484647	M4
10003	A	Fire Detection Train Lines Check continuity between END1 90XR14 pin 21 END2 90XP24 pin 21		OK		Sizwe Sibanyoni - 484647	M4
10004	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10005	I	Continuity Test		OK		Sizwe Sibanyoni - 484647	M4
10006	I	The following steps are continuity tests between the two points described in each step. Use a multimeter for this test.		OK		Sizwe Sibanyoni - 484647	M4
10007	A	From : [(local: +END1 -90XR13.B (pin 4))] to: [-Inter-connector (local: +END2 - 90XP23.b pin 4)]		OK		Sizwe Sibanyoni - 484647	M4
10008	A	From : [(local: +END1 -90XR13.B (pin 5))] to: [-Inter-connector (local: +END2 -		OK		Sizwe Sibanyoni - 484647	M4

		90XP23.b pin 5)]					
10009	A	From : [(local: +END1 -90XR13.A (pin 7))] to: [-Inter-connector (local: +END2 -90XP23.a pin 7)]		OK		Sizwe Sibanyoni - 484647	M4
10010	A	From : [(local: +END1 -90XR13.A (pin 8))] to: [-Inter-connector (local: +END2 -90XP23.a pin 8)]		OK		Sizwe Sibanyoni - 484647	M4

Section 14 – Traction and Electric Brake

14.1 Instructions list

14.1.1 033_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		Sizwe Sibanyoni - 484647	M4
10002	I	Circuit Breakers and Configuration		OK		Sizwe Sibanyoni - 484647	M4
10003	A	Close Circuit Breaker 33Q2		OK		Sizwe Sibanyoni - 484647	M4
10004	A	Close Circuit Breaker 33Q4		OK		Sizwe Sibanyoni - 484647	M4
10005	A	Close Circuit Breaker 33Q5		OK		Sizwe Sibanyoni - 484647	M4
10006	I	Circuit Breaker 33Q1 and 33Q3 must be Opened		OK		Sizwe Sibanyoni - 484647	M4
10007	I	110Vdc Normal Traction EL Train Line Apply bridge piece between END2 90XP25 pin 49 and pin 42		OK		Sizwe Sibanyoni - 484647	M4
10008	A	Close Circuit Breaker 33Q1		OK		Sizwe Sibanyoni - 484647	M4
10009	A	Close Circuit Breaker 33Q3		OK		Sizwe Sibanyoni - 484647	M4
10010	R	Read Defined Variable [TT] (TBCU4)LI_CAR_ID4 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M4

10011	I	The TBCU should appear on TCMS network on DDU screen		OK		Sizwe Sibanyoni - 484647	M4
10012	I	Train Lines		OK		Sizwe Sibanyoni - 484647	M4
10013	A	Forward Train Lines Check continuity between END1 90XR15 pin 25 END2 90XP25 pin 25		OK		Sizwe Sibanyoni - 484647	M4
10014	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10015	A	Reverse Train Lines Check continuity between END1 90XR15 pin 30 END2 90XP25 pin 30		OK		Sizwe Sibanyoni - 484647	M4
10016	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10017	A	Traction Train Lines Check continuity between END1 90XR15 pin 31 END2 90XP25 pin 31		OK		Sizwe Sibanyoni - 484647	M4
10018	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10019	A	No Brake Train Lines Check continuity between END1 90XR15 pin 32 END2 90XP25 pin 32		OK		Sizwe Sibanyoni - 484647	M4
10020	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10021	A	Traction Interlock Bypass Train Lines Check continuity between END1 90XR14 pin 6 END2 90XP24 pin 6		OK		Sizwe Sibanyoni - 484647	M4
10022	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10023	A	Traction Interlock Train Lines Check continuity between		OK		Sizwe Sibanyoni - 484647	M4

		END1 90XR15 pin 41 END2 90XP25 pin 41 and -10XP12_XCB2 pin 8					
10024	R	All pins are continuous		OK		Sizwe Sibanyoni - 484647	M4
10025	I	110Vdc Normal Traction EL Train Line Remove bridge piece on END2 90XP25 pin 49 and pin 42		OK		Sizwe Sibanyoni - 484647	M4
10026	I	Coolant Liquid		OK		Sizwe Sibanyoni - 484647	M4
10027	A	Check that the coolant level is at least 1/2 of the sight glass level indicator		OK		Sizwe Sibanyoni - 484647	M4
10028	R	Coolant Liquid Level is OK		OK		Sizwe Sibanyoni - 484647	M4
10029	I	End of Test		OK		Sizwe Sibanyoni - 484647	M4

Section 15 – Passenger Doors

15.1 Instructions list

15.1.1 050_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		Impi Tsela - 435647	M4
10002	I	Initial conditions		OK		Impi Tsela - 435647	M4
10003	I	110Vdc Normal power supply is connected to the vehicle and ON		OK		Impi Tsela - 435647	M4
10004	I	Circuit Breakers		OK		Impi Tsela - 435647	M4
10005	A	Close Circuit Breaker 50Q1		OK		Impi Tsela - 435647	M4
10006	R	DCU 1 is powered ON		OK		Impi Tsela - 435647	M4
10007	R	Check on the DDU that DCU1 is online		OK		Impi Tsela - 435647	M4
10008	A	Close Circuit Breaker 50Q2		OK		Impi Tsela - 435647	M4
10009	R	DCU 2 is powered ON		OK		Impi Tsela - 435647	M4
10010	R	Check on the DDU that DCU2 is online		OK		Impi Tsela - 435647	M4
10011	A	Close Circuit Breaker 50Q3		OK		Impi Tsela - 435647	M4
10012	R	DCU 3 is powered ON		OK		Impi Tsela - 435647	M4
10013	R	Check on the DDU that DCU3 is online		OK		Impi Tsela - 435647	M4
10014	A	Close Circuit Breaker 50Q4		OK		Impi Tsela - 435647	M4
10015	R	DCU 4 is powered ON		OK		Impi Tsela - 435647	M4
10016	R	Check on the DDU that DCU4 is online		OK		Impi Tsela - 435647	M4
10017	A	Close Circuit Breaker 50Q5		OK		Impi Tsela - 435647	M4
10018	R	DCU 5 is powered ON		OK		Impi Tsela - 435647	M4
10019	R	Check on the DDU that DCU5 is online		OK		Impi Tsela - 435647	M4

10020	A	Close Circuit Breaker 50Q6		OK		Impi Tsela - 435647	M4
10021	R	DCU 6 is powered ON		OK		Impi Tsela - 435647	M4
10022	R	Check on the DDU that DCU6 is online		OK		Impi Tsela - 435647	M4
10023	A	Close Circuit Breaker 50Q7		OK		Impi Tsela - 435647	M4
10024	I	Car ID Code		OK		Impi Tsela - 435647	M4
10025	A	Using the DDU on the test bench, check that all the doors on M4 are available - as in the picture below		OK		Impi Tsela - 435647	M4
10026	R	All doors are available		OK		Impi Tsela - 435647	M4
10027	I	Train Lines and Safety Loop		OK		Impi Tsela - 435647	M4
10028	A	ERTMS Auth Left Train Lines Check continuity between END1 90XR15 pin 44 END2 90XP25 pin 44		OK		Impi Tsela - 435647	M4
10029	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10030	A	ERTMS Auth Right Train Lines Check continuity between END1 90XR15 pin 47 END2 90XP25 pin 47		OK		Impi Tsela - 435647	M4
10031	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10032	A	Doors Open Train Lines Check continuity between END1 90XR15 pin 66 END2 90XP25 pin 66		OK		Impi Tsela - 435647	M4
10033	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10034	A	Door Close Right Train Lines Check continuity between END1 90XR15 pin 78 END2 90XP25 pin 78		OK		Impi Tsela - 435647	M4
10035	A	Both points are continuous		OK		Impi Tsela - 435647	M4
10036	A	Door Close Left Train Lines Check continuity between END1 90XR15 pin 79		OK		Impi Tsela - 435647	M4

		END2 90XP25 pin 79					
10037	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10038	A	Door Auth Left Train Lines Check continuity between END1 90XR15 pin 85 END2 90XP25 pin 85		OK		Impi Tsela - 435647	M4
10039	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10040	A	Door Auth Right Train Lines Check continuity between END1 90XR15 pin 84 END2 90XP25 pin 84		OK		Impi Tsela - 435647	M4
10041	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10042	A	V<3km/h Train Lines Check continuity between END1 90XR15 pin 29 END2 90XP25 pin 29		OK		Impi Tsela - 435647	M4
10043	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10044	A	Door Auth Left Train Lines Check continuity between END1 90XR15 pin 85 END2 90XP25 pin 85		OK		Impi Tsela - 435647	M4
10045	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10046	A	Door Auth Right Train Lines Check continuity between END1 90XR15 pin 84 END2 90XP25 pin 84		OK		Impi Tsela - 435647	M4
10047	R	Both points are continuous		OK		Impi Tsela - 435647	M4
10048	A	Safety Doors Loop Train Lines Check continuity between END1 90XR15 pin 96 END2 90XP25 pin 96		OK		Sizwe Sibanyoni - 484647	M4
10049	R	Both points are continuous		OK		Sizwe Sibanyoni - 484647	M4
10050	I	Left Side Doors		OK		Impi Tsela - 435647	M4

10051	I	Door 1		OK		Impi Tsela - 435647	M4
10052	I	Use bridge pieces to apply voltage on the passenger door mechanism to simulate the following signals: - Door Auth Left - V<3km/h		OK		Impi Tsela - 435647	M4
10053	A	Apply bridge pieces on 50XP1_X11 between slot 2,3 and 15.		OK		Impi Tsela - 435647	M4
10054	A	Force [TT] (MPU1)lo_dor_m4opendoorleft = 1.0		OK		Sizwe Sibanyoni - 484647	M4
10055	R	Check that the door opens in 3 sec (+1/-0)		OK		Sizwe Sibanyoni - 484647	M4
10056	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		Sizwe Sibanyoni - 484647	M4
10057	I	Door Opening Gap		OK		Sizwe Sibanyoni - 484647	M4
10058	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Sizwe Sibanyoni - 484647	M4
10059	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1396	Sizwe Sibanyoni - 484647	M4
10060	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10061	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Sizwe Sibanyoni - 484647	M4
10062	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10063	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1400	Sizwe Sibanyoni - 484647	M4
10064	I	Door 3		OK		Sizwe Sibanyoni - 484647	M4

10065	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Sizwe Sibanyoni - 484647	M4
10066	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1392	Sizwe Sibanyoni - 484647	M4
10067	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10068	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1410	Sizwe Sibanyoni - 484647	M4
10069	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10070	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1402	Sizwe Sibanyoni - 484647	M4
10071	I	Door 5		OK		Sizwe Sibanyoni - 484647	M4
10072	I	Door Opening Gap		OK		Sizwe Sibanyoni - 484647	M4
10073	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Sizwe Sibanyoni - 484647	M4
10074	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1398	Sizwe Sibanyoni - 484647	M4
10075	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10076	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1410	Sizwe Sibanyoni - 484647	M4
10077	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10078	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1402	Sizwe Sibanyoni - 484647	M4
10079	I	Right Side Doors		OK		Sizwe Sibanyoni - 484647	M4

10080	I	Door 2		OK		Sizwe Sibanyoni - 484647	M4
10081	A	Use bridge pieces to apply voltage on the passenger door mechanism to simulate the following signals: - Door Auth Right - V<3km/h		OK		Sizwe Sibanyoni - 484647	M4
10082	A	Apply bridge pieces on 50XP2__X11 between slot 2,3, and 15.		OK		Sizwe Sibanyoni - 484647	M4
10083	A	Force [TT] (MPU1)lo_dor_m4opendoorright = 1.0		OK		Sizwe Sibanyoni - 484647	M4
10084	R	Check that the door opens in 3 sec (+1/-0)		OK		Sizwe Sibanyoni - 484647	M4
10085	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		Sizwe Sibanyoni - 484647	M4
10086	I	Door Opening Gap		OK		Sizwe Sibanyoni - 484647	M4
10087	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door).		OK		Sizwe Sibanyoni - 484647	M4
10088	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1390	Sizwe Sibanyoni - 484647	M4
10089	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10090	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1402	Sizwe Sibanyoni - 484647	M4
10091	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10092	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1396	Sizwe Sibanyoni - 484647	M4
10093	I	Door 4		OK		Sizwe Sibanyoni - 484647	M4

10094	I	Door Opening Gap		OK		Sizwe Sibanyoni - 484647	M4
10095	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Sizwe Sibanyoni - 484647	M4
10096	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1390	Sizwe Sibanyoni - 484647	M4
10097	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10098	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1398	Sizwe Sibanyoni - 484647	M4
10099	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10100	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1396	Sizwe Sibanyoni - 484647	M4
10101	I	Door 6		OK		Sizwe Sibanyoni - 484647	M4
10102	I	Door Opening Gap		OK		Sizwe Sibanyoni - 484647	M4
10103	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Sizwe Sibanyoni - 484647	M4
10104	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1394	Sizwe Sibanyoni - 484647	M4
10105	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Sizwe Sibanyoni - 484647	M4
10106	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Sizwe Sibanyoni - 484647	M4
10107	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Sizwe Sibanyoni - 484647	M4
10108	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1400	Sizwe Sibanyoni - 484647	M4

10109	I	Obstacle Detection		OK		Sizwe Sibanyoni - 484647	M4
10110	A	Position an obstacle on the floor in the centre of the door closing line for all the doors		OK		Sizwe Sibanyoni - 484647	M4
10111	A	Force [TT] (MPU1)lo_dor_m4opendoorright = 0		OK		Sizwe Sibanyoni - 484647	M4
10112	A	Force [TT] (MPU1)lo_dor_m4opendoorleft = 0		OK		Sizwe Sibanyoni - 484647	M4
10113	R	The doors will hit the obstacle, reopen and try to close again 3 times. On the third attempt it will stop and stand ajar - free to be opened manually		OK		Sizwe Sibanyoni - 484647	M4
10114	A	Safety Doors Loop Train Lines Check continuity between END1 90XR15 pin 96 END2 90XP25 pin 96		OK		Sizwe Sibanyoni - 484647	M4
10115	R	There is no continuity between the two points		OK		Sizwe Sibanyoni - 484647	M4
10116	A	Force [TT] (MPU1)lo_dor_m4opendoorright = 1		OK		Sizwe Sibanyoni - 484647	M4
10117	A	Force [TT] (MPU1)lo_dor_m4opendoorleft = 1		OK		Sizwe Sibanyoni - 484647	M4
10118	R	The door opens fully		OK		Sizwe Sibanyoni - 484647	M4
10119	A	Remove the obstacle		OK		Sizwe Sibanyoni - 484647	M4
10120	A	Release [TT] (MPU1)lo_dor_m4opendoorleft		OK		Sizwe Sibanyoni - 484647	M4
10121	A	Release [TT] (MPU1)lo_dor_m4opendoorright		OK		Sizwe Sibanyoni - 484647	M4
10122	A	Remove the bridge pieces on connector 50XP1_X11		OK		Sizwe Sibanyoni - 484647	M4
10123	A	Remove the bridge pieces on connector 50XP2_X11		OK		Sizwe Sibanyoni - 484647	M4

10124	I	End of Test		OK		Sizwe Sibanyoni - 484647	M4

Section 16 – Vehicle Normalization

16.1 Instructions list

16.1.1 093_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		Impi Tsela - 435647	M4
10002	I	The VFT procedures are all completed		OK		Impi Tsela - 435647	M4
10003	I	Vehicle Normalization Check		OK		Impi Tsela - 435647	M4
10004	R	On LV3 all Circuit Breakers are installed and secured		OK		Impi Tsela - 435647	M4
10005	R	On LV3 all Dataplugs are installed, tightened and earth braids are fastened		OK		Impi Tsela - 435647	M4
10006	R	On LV3 all Connectors are tightened		OK		Impi Tsela - 435647	M4
10007	R	On LV3 there are no missing components, device, wiring or connectors.		OK		Impi Tsela - 435647	M4
10008	R	On LV6 all Dataplugs are installed, tightened and earth braids are fastened		OK		Impi Tsela - 435647	M4
10009	R	On LV6 all Connectors are tightened		OK		Impi Tsela - 435647	M4
10010	R	On LV6 there are no missing components, device, wiring or connectors.		OK		Impi Tsela - 435647	M4

10011	R	On HC Cubicle the Controller is installed and properly tightened and its connectors are tightened		OK		Impi Tsela - 435647	M4
10012	R	All DCUs are properly installed and secured		OK		Impi Tsela - 435647	M4
10013	R	All Internal Displays are properly installed and secured		OK		Impi Tsela - 435647	M4
10014	R	All Light Covers are properly installed		OK		Impi Tsela - 435647	M4
10015	R	All Saloon Fire Detectors are properly installed and secured		OK		Impi Tsela - 435647	M4
10016	R	All covers are normalised inside the car		OK		Impi Tsela - 435647	M4
10017	R	On the Underframe, TBCU Agate is installed and properly tightened		OK		Impi Tsela - 435647	M4
10018	R	On the Underframe, Speed Sensors are installed and properly tightened		OK		Impi Tsela - 435647	M4
10019	R	On the LVB, all Circuit Breakers are installed and properly tightened		OK		Impi Tsela - 435647	M4
10020	R	On the LVB, all Relays and Timers are installed and properly tightened		OK		Impi Tsela - 435647	M4
10021	R	On the LVB, BRIOMs are installed and properly tightened		OK		Impi Tsela - 435647	M4
10022	R	On the LVB there are no missing components, device, wiring or connectors.		OK		Impi Tsela - 435647	M4
10023	R	On the Underframe, all Connectors are		OK		Impi Tsela - 435647	M4

		tightened					
10024	R	All underframe covers are normalised		OK		Impi Tsela - 435647	M4
10025	R	On END1 the Octopus cables are disconnected from the car and properly stored.		OK		Sizwe Sibanyoni - 484647	M4
10026	R	On END2 the Octopus cables are disconnected from the car and properly stored.		OK		Sizwe Sibanyoni - 484647	M4
10027	R	The Test Bench is switched OFF and the Octopus cables are disconnected and properly stored		OK		Impi Tsela - 435647	M4
10028	R	ALL P.Os of this car are closed		OK		Nhlakanipho Masondo - 447208	M4
10029	I	End Of Test		OK		Sizwe Sibanyoni - 484647	M4

Section 17 – Report summaries

17.1 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		
PACIS System	X		
Internal Lighting	X		
Holding and Parking Brake	X		
Fire Protection	X		
Energy Distribution	X		
Emergency Brake	X		
Cabin Control	X		
Air Condition	X		

17.2 Tools used

Function	Tool name	Tool number	Next Calibration date
015_NRG	Phasemeter	Phasemeter	8/25/2024
027_ERM	Multimeter	Meter 1	8/25/2024
033_TRC	Multimeter	Meter 1	8/25/2024
040_SBK	Manometer	Manometer	7/31/2024

045_PBK	Manometer	Manometer	7/31/2024
057_HVA	Phasemeter	Phasemeter	8/25/2024
057_HVA_SME	Phasemeter	Phasemeter	8/25/2024
067_FSD	Multimeter	Meter 1	8/25/2024

Vehicle	Equipment	Expected version	Version loaded
M4			