PROJECT	CUSTOMER	VEHICLE
Xtrapolis-PRASA	**PRASA**	**231 – M2 – VFT**

RTR Vehicle Functional Static Testing TS231 M2 Report

GIB0000006888

	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	27/06/2024	Creation	Lindani NGUBANE

Internal validations

	Name	Function	Date	Signature
Creator	Lindani NGUBANE	EPU Manager	27/06/2024	X Lindani NGUBANE EPU Manager
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Approver	Kgomotso NKOANA	Test Expert	27/06/2024	X Kgomotso NKOANA Test Expert

Execution Plan

Start Date	23/06/2024
End Date	23/06/2024

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The objective of this procedure is to ensure the proper operation of the train doors.
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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		Nqobile Chirwa - 484648	M2
10002	I	Initial Conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	All the Circuit Breakers should be OPEN		OK		Nqobile Chirwa - 484648	M2
10004	I	Test bench should be connected but with no power supply		OK		Nqobile Chirwa - 484648	M2
10005	I	NO 400Vac should be connected to the car		OK		Nqobile Chirwa - 484648	M2
10006	I	Voltage Isolation 230Vac and 400Vac		OK		Nqobile Chirwa - 484648	M2
10007	A	Close Circuit breaker 14Q2		OK		Nqobile Chirwa - 484648	M2
10008	I	230Vac and 400Vac Circuit breakers		OK		Nqobile Chirwa - 484648	M2
10009	A	Close Circuit Breaker 13Q1		OK		Nqobile Chirwa - 484648	M2
10010	I	Normal and Permanent Power Supply		OK		Nqobile Chirwa - 484648	M2
10011	I	110Vdc Permanent Train Line Dev2/78 = END1 90XR24 pin 29 Dev4/78 = END2 90XR34 pin 29		OK		Nqobile Chirwa - 484648	M2
10012	A	Force [NI] Dev4/40 = 1.0		OK		Nqobile Chirwa - 484648	M2
10013	R	Read Defined Variable [NI] Dev2/40 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10014	A	Apply 110Vdc on the Normal Line using the external power supply		OK		Nqobile Chirwa - 484648	M2
10015	A	Close Circuit Breaker 15Q3 (Normal Line)		OK		Nqobile Chirwa - 484648	M2
10016	A	Measure 110Vdc between 90XR50_2.X2 (+) and 90XR50_2.X1 (-) (inter-car connector). [Normal line].		OK		Nqobile Chirwa - 484648	M2
10017	I	Permanent Line Circuit Breakers		OK		Nqobile Chirwa - 484648	M2
10018	A	Check Circuit Breaker 15Q4 for battery voltage (above 80V dc) and close it (permanent Line)		OK		Nqobile Chirwa - 484648	M2

10019	I	230Vac Circuit Breakers		OK		Nqobile Chirwa - 484648	M2
10020	A	Close Circuit Breaker 13Q3 and 13Q2		OK		Nqobile Chirwa - 484648	M2
10021	I	230Vac and 400Vac Voltage Supply		OK		Nqobile Chirwa - 484648	M2
10022	A	Apply 400Vac to the Vehicle, either on End1 or End 2		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10024	R	Phase rotation between U, V, W is correct.		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10026	R	Phase rotation between U,V,W is correct		OK		Nqobile Chirwa - 484648	M2
10027	A	Check 230Vac between points L and N of socket -13XT1		OK		Nqobile Chirwa - 484648	M2
10028	R	230Vac present		OK		Nqobile Chirwa - 484648	M2
10029	A	Check 230Vac between points L and N of socket -13XT2		OK		Nqobile Chirwa - 484648	M2
10030	R	230Vac present		OK		Nqobile Chirwa - 484648	M2
10031	A	Remove connector 93XP150		OK		Nqobile Chirwa - 484648	M2
10032	A	Remove connector 57XP1-10		OK		Nqobile Chirwa - 484648	M2
10033	A	Close Circuit Breaker 34Q1 and 57Q1		OK		Nqobile Chirwa - 484648	M2
10034	A	Check 400Vac +-5% tolerance between Phases (W, V, U) on connector 57XP1_10 (10.b1, 10.a2, 10.a1).		OK		Nqobile Chirwa - 484648	M2
10035	R	400Vac +- 5% tolerance is measured between all three phases on connector 57XP1_10		OK		Nqobile Chirwa - 484648	M2
10036	A	Check 400Vac +-5% tolerance between Phases (W, V, U) on connector 93XP150 (pin E3, E2 and E1).		OK		Nqobile Chirwa - 484648	M2
10037	R	400Vac +- 5% tolerance is measured between all three phases on connector		OK		Nqobile Chirwa - 484648	M2

		93XP150					
10038	A	Open Circuit Breaker 34Q1 and 57Q1		OK		Nqobile Chirwa - 484648	M2
10039	A	Put back connector 57XP1-10		OK		Nqobile Chirwa - 484648	M2
10040	A	Put back connector 93XP150		OK		Nqobile Chirwa - 484648	M2
10041	I	Auxiliary Converter Command		OK		Nqobile Chirwa - 484648	M2
10042	I	Battery Connection Train Lines Dev2/79 = END 1 90XR24 pin 30 Dev4/79 = END 2 90XR34 pin 30		OK		Nqobile Chirwa - 484648	M2
10043	A	Force [NI] Dev4/79 = 1.0		OK		Nqobile Chirwa - 484648	M2
10044	R	Read Defined Variable [NI] Dev2/79 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10045	A	Force [NI] Dev4/79 = 0.0		OK		Nqobile Chirwa - 484648	M2
10046	R	Read Defined Variable [NI] Dev2/79 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10047	I	Battery Disconnection Train Lines Dev2/75 = END 1 90XR24 pin 31 Dev4/75 = END 2 90XR34 pin 31		OK		Nqobile Chirwa - 484648	M2
10048	A	Force [NI] Dev4/75 = 1.0		OK		Nqobile Chirwa - 484648	M2
10049	R	Read Defined Variable [NI] Dev2/75 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10050	A	Force [NI] Dev4/75 = 0.0		OK		Nqobile Chirwa - 484648	M2
10051	R	Read Defined Variable [NI] Dev2/75 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10052	I	IES Status Train Lines Dev1/86 = END 1 90XR25 pin 61 Dev2/87 = END 1 90XR25 pin 62		OK		Nqobile Chirwa - 484648	M2
10053	A	Force [NI] Dev1/86 = 1.0		OK		Nqobile Chirwa - 484648	M2
10054	R	Read Defined Variable [NI] Dev2/87 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10055	A	Force [NI] Dev1/86 = 0.0		OK		Nqobile Chirwa - 484648	M2
10056	R	Read Defined Variable [NI] Dev2/87 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10057	I	Switch off the 400Vac power supply at the socket		OK		Nqobile Chirwa - 484648	M2

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		Nqobile Chirwa - 484648	M2
10002	I	Initial conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	Vehicle test bench should be configured as TC1: 1. TC1 Data plugs 2. MCE switch set to TC1		OK		Nqobile Chirwa - 484648	M2
10004	A	110Vdc supply to the Normal Train line is ON		OK		Nqobile Chirwa - 484648	M2
10005	I	Power Supply to the Router Switches		OK		Nqobile Chirwa - 484648	M2
10006	I	Power supply to the 25A10 SWITCH ETHERNET (CRS1)		OK		Nqobile Chirwa - 484648	M2
10007	A	Close Circuit Breaker 25Q10		OK		Nqobile Chirwa - 484648	M2
10008	R	CRS1 25A10 is ON		OK		Nqobile Chirwa - 484648	M2
10009	I	Power supply to the 25A11 SWITCH ETHERNET (CRS2)		OK		Nqobile Chirwa - 484648	M2
10010	A	Close Circuit Breaker 25Q11		OK		Nqobile Chirwa - 484648	M2
10011	R	CRS2 25A11 is ON		OK		Nqobile Chirwa - 484648	M2
10012	I	Power supply to the 25A14 ETHERNET REPEATER (TBR)		OK		Nqobile Chirwa - 484648	M2
10013	A	Close Circuit Breaker 25Q14		OK		Nqobile Chirwa - 484648	M2
10014	R	TBR 25A14 is ON		OK		Nqobile Chirwa - 484648	M2
10015	A	Close Circuit Breaker 25Q6		OK		Nqobile Chirwa - 484648	M2

10016	A	Close Circuit Breaker 25Q7		OK		Nqobile Chirwa - 484648	M2
10017	I	Ethernet Loop		OK		Nqobile Chirwa - 484648	M2
10018	A	For each CRS, check that the Ethernet Loop LEDs are flashing		OK		Nqobile Chirwa - 484648	M2
10019	R	CRS1 has LEDs on ports X3 and X4 flashing		OK		Nqobile Chirwa - 484648	M2
10020	R	CRS2 has LEDs on ports X3 and X4 flashing		OK		Nqobile Chirwa - 484648	M2
10021	R	Check on the Test Bench DDU that all Router Switches are available on the network		OK		Nqobile Chirwa - 484648	M2
10022	I	Power Supply to the BRIOMS		OK		Nqobile Chirwa - 484648	M2
10023	R	BRIOM 25A6 is ON		OK		Nqobile Chirwa - 484648	M2
10024	A	Check visually that ground braid is connected to BRIOM		OK		Nqobile Chirwa - 484648	M2
10025	R	BRIOM 25A7 is ON		OK		Nqobile Chirwa - 484648	M2
10026	A	Check visually that ground braid is connected to BRIOM		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10002	I	Train Lines		OK		Nqobile Chirwa - 484648	M2
10003	I	Cab Selected on Train, Train Lines Dev2/1 = END1 90XR24 pin 3 Dev4/1 = END2 90XR34 pin 3		OK		Nqobile Chirwa - 484648	M2
10004	A	Force [NI] Dev4/1 = 1.0		OK		Nqobile Chirwa - 484648	M2
10005	R	Read Defined Variable [NI] Dev2/1 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10006	A	Force [NI] Dev4/1 = 0.0		OK		Nqobile Chirwa - 484648	M2
10007	R	Read Defined Variable [NI] Dev2/1 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10008	I	Cab Active TC1 Train Lines Dev2/3 = END1 90XR24 pin 5 Dev4/2 = END2 90XR34 pin 4		OK		Nqobile Chirwa - 484648	M2
10009	A	Force [NI] Dev4/2 = 1.0		OK		Nqobile Chirwa - 484648	M2
10010	R	Read Defined Variable [NI] Dev2/3 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10011	A	Force [NI] Dev4/2 = 0.0		OK		Nqobile Chirwa - 484648	M2
10012	R	Read Defined Variable [NI] Dev2/3 = 0.0		OK	0	Nqobile Chirwa - 484648	M2

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=052)		OK		Nqobile Chirwa - 484648	M2
10002	I	Initial Conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	110Vdc Normal line is ON		OK		Nqobile Chirwa - 484648	M2
10004	I	Cleaning Light Command		OK		Nqobile Chirwa - 484648	M2
10005	I	110Vdc Permanent Train Line Dev4/40 = END2 90XR24 pin 29		OK		Nqobile Chirwa - 484648	M2
10006	A	Force [NI] Dev4/40 = 1.0		OK		Nqobile Chirwa - 484648	M2
10007	A	Close Circuit Breaker 52Q5		OK		Nqobile Chirwa - 484648	M2
10008	A	Close Circuit Breaker 52Q3		OK		Nqobile Chirwa - 484648	M2
10009	A	Close Circuit Breaker 52Q4		OK		Nqobile Chirwa - 484648	M2
10010	I	Light 33% Train Line Dev4/8 = END2 90XP25 pin 27		OK		Nqobile Chirwa - 484648	M2
10011	A	Force [NI] Dev4/8 = 1.0		OK		Nqobile Chirwa - 484648	M2
10012	R	The saloon RIGHT side emergency lights (low intensity) are "ON" on all light modules		OK		Nqobile Chirwa - 484648	M2
10013	R	The saloon LEFT side emergency lights (low intensity) are "ON" on all light modules		OK		Nqobile Chirwa - 484648	M2
10014	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27		OK		Nqobile Chirwa - 484648	M2
10015	R	Read Defined Variable [NI] Dev2/8 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10016	I	Light 33% Train Line Dev4/8 = END2 90XP35 pin 27		OK		Nqobile Chirwa - 484648	M2
10017	A	Force [NI] Dev4/8 = 0.0		OK		Nqobile Chirwa - 484648	M2
10018	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27		OK		Nqobile Chirwa - 484648	M2

10019	R	Read Defined Variable [NI] Dev2/8 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10020	R	All saloon emergency lights (low intensity) are OFF on all light modules (Left + Right)		OK		Nqobile Chirwa - 484648	M2
10021	A	Turn Cleaning Staff Lights Switch 52S6 to ON position		OK		Nqobile Chirwa - 484648	M2
10022	I	Light 33% Train Line Dev2/8 = END1 90XR15 pin 27		OK		Nqobile Chirwa - 484648	M2
10023	R	Read Defined Variable [NI] Dev2/8 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10024	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)		OK		Nqobile Chirwa - 484648	M2
10025	A	Reset Circuit Breaker 52Q5 (Open and Close)		OK		Nqobile Chirwa - 484648	M2
10026	R	Read Defined Variable [NI] Dev2/8 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10027	I	Main Light Command		OK		Nqobile Chirwa - 484648	M2
10028	A	Close Circuit Breaker 52Q1		OK		Nqobile Chirwa - 484648	M2
10029	A	Close Circuit Breaker 52Q2		OK		Nqobile Chirwa - 484648	M2
10030	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)		OK		Nqobile Chirwa - 484648	M2
10031	I	Light 33% Train Line Dev2/8 = END1 90XR25 pin 27		OK		Nqobile Chirwa - 484648	M2
10032	R	Read Defined Variable [NI] Dev2/8 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10033	I	Main Light Command Train Line Dev4/24 = END2 90XP35 pin 26		OK		Nqobile Chirwa - 484648	M2
10034	A	Force [NI] Dev4/24 = 1.0		OK		Nqobile Chirwa - 484648	M2
10035	I	Main Light Command Train Line Dev2/32 = END1 90XR25 pin 26		OK		Nqobile Chirwa - 484648	M2
10036	R	Read Defined Variable [NI] Dev2/32 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10037	R	The saloon RIGHT side main lighting (high intensity) is "ON" on all light modules		OK		Nqobile Chirwa - 484648	M2
10038	R	The saloon LEFT side main lighting (high intensity) is "ON" on all light modules		OK		Nqobile Chirwa - 484648	M2

10039	I	Main Light Command Train Line Dev4/24 = END2 90XP35 pin 26		OK		Nqobile Chirwa - 484648	M2
10040	A	Force [NI] Dev4/24 = 0.0		OK		Nqobile Chirwa - 484648	M2
10041	R	All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right)		OK		Nqobile Chirwa - 484648	M2

Section 6 – Train-Ground Communication

6.1 Instructions list

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		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10003	I	Antenna cable tester Calibration		OK		Nqobile Chirwa - 484648	M2
10004	A	Connect the Validation Antenna(from Warehouse) to connector 64XR3		OK		Nqobile Chirwa - 484648	M2
10005	I	PERFORM THIS CALIBRATION BEFORE TESTING EACH CABLE		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10007	I	GSM Cable (64XP2_X12)		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10009	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	2.11	Nqobile Chirwa - 484648	M2
10010	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_ GSM1		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10012	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	1.58	Nqobile Chirwa - 484648	M2
10013	A	Save the waveform result with the following name:		OK		Nqobile Chirwa - 484648	M2

		TS#(#-Train number)_MBX_ GSM2					
10014	I	GPS Cable (64XP2_X13)		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10016	A	On the cable tester, select "MEAS" and select F1 "Distance to Fault"		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10018	R	The maximum peak of the waveform is Result Max : x <= 1.2 ()		OK	1	Nqobile Chirwa - 484648	M2
10019	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_ GPS		OK		Nqobile Chirwa - 484648	M2
10020	I	Wifi Cable(64XP2_X14)		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10022	R	The maximum peak of the waveform is Result Max : x <= 2.45 ()		OK	1.02	Nqobile Chirwa - 484648	M2
10023	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_ WiFi1		OK		Nqobile Chirwa - 484648	M2
10024	A	Recalibrate the tester. Ensure the frequency range is 4.9GHz - 5.935GHz;		OK		Nqobile Chirwa - 484648	M2
10025	R	The maximum peak of the waveform is Result Max : x <= 2.45 ()		OK	1.01	Nqobile Chirwa - 484648	M2
10026	A	Save the waveform result with the following name: TS#(#-Train number)_MBX_ WiFi2		OK		Nqobile Chirwa - 484648	M2
10027	A	Close Circuit Breaker 64Q2		OK		Nqobile Chirwa - 484648	M2
10028	A	Check the voltage on connector 64XP2_X4		OK		Nqobile Chirwa - 484648	M2

10029	R	+110V between pin 1(+) and 3(-) +110V between pin 2(+) and 4(-)		OK		Nqobile Chirwa - 484648	M2
10030	A	Open Circuit Breaker 64Q2		OK		Nqobile Chirwa - 484648	M2
10031	I	ERTMS		OK		Nqobile Chirwa - 484648	M2
10032	A	Recalibrate the tester. Ensure the frequency range is 876MHz - 960MHz; Connect the GSM-R Cable 62XP1_A1X1_1 cable of the ERMTS to the measuring cable and note the resulting waveform		OK		Nqobile Chirwa - 484648	M2
10033	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	1.51	Nqobile Chirwa - 484648	M2
10034	A	Save the waveform result with the following name: TS#(#-Train number)_ERTMS_ 1		OK		Nqobile Chirwa - 484648	M2
10035	A	Ensure the frequency range is 876MHz - 960MHz; Connect the GSM-R Cable 62XP1_A1X2_1 cable of the ERMTS to the measuring cable and note the resulting waveform		OK		Nqobile Chirwa - 484648	M2
10036	R	The maximum peak of the waveform is Result Max : x <= 2.13 ()		OK	1.01	Nqobile Chirwa - 484648	M2
10037	A	Save the waveform result with the following name: TS#(#-Train number)_ERTMS_ 2		OK		Nqobile Chirwa - 484648	M2
10038	I	END OF TEST		OK		Nqobile Chirwa - 484648	M2

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		Sizwe Sibanyoni - 484647	M2
10002	I	Ensure that ALL the circuit breaker in the ERTMS cubicle are in OFF position		OK		Sizwe Sibanyoni - 484647	M2
10003	I	ELECTRICAL CHECK		OK		Sizwe Sibanyoni - 484647	M2
10004	R	All the ERTMS Circuit Breakers were checked		OK		Sizwe Sibanyoni - 484647	M2
10005	A	Close Circuit Breaker 62Q2		OK		Sizwe Sibanyoni - 484647	M2
10006	A	Close Circuit Breaker 62Q3		OK		Sizwe Sibanyoni - 484647	M2
10007	A	Close Circuit Breaker 62Q4		OK		Sizwe Sibanyoni - 484647	M2
10008	R	Check that the ERTMS module is OFF		OK		Sizwe Sibanyoni - 484647	M2
10009	I	ERTMS Bypass Train Line Dev4/37 = END2 90XP34 pin 11 Dev2/33 = END1 90XP24 pin 11		OK		Sizwe Sibanyoni - 484647	M2
10010	A	Force [NI] Dev4/37 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10011	R	Read Defined Variable [NI] Dev2/33 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10012	R	Using the dc voltage detector, check that the relay 62K3 is energized.		OK		Sizwe Sibanyoni - 484647	M2
10013	A	Force [NI] Dev4/37 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10014	R	Read Defined Variable [NI] Dev2/33 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10015	R	Using the dc voltage detector, check that the relay 62K3 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10016	I	Emergency Brake ERTMS 1 Train Line Dev4/88 = END2 90XP34 pin 18 Dev2/88 = END1 90XP24 pin 18		OK		Sizwe Sibanyoni - 484647	M2
10017	A	Force [NI] Dev4/88 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10018	R	Read Defined Variable [NI] Dev2/88 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10019	A	Force [NI] Dev4/88 = 0.0		OK		Sizwe Sibanyoni - 484647	M2

10020	R	Read Defined Variable [NI] Dev2/88 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10021	I	Emergency Brake ERTMS 2 Train Line Dev4/80 = END2 90XP34 pin 20 Dev2/80 = END1 90XP24 pin 20		OK		Sizwe Sibanyoni - 484647	M2
10022	A	Force [NI] Dev4/80 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10023	R	Read Defined Variable [NI] Dev2/80 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10024	A	Force [NI] Dev4/80 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10025	R	Read Defined Variable [NI] Dev2/80 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10026	I	Master Key TC2 Train Line Dev1/73 = END1 90XP24 pin 17		OK		Sizwe Sibanyoni - 484647	M2
10027	A	Force [NI] Dev1/73 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10028	R	Using the dc voltage detector, check that the relay 62K5 is energized.		OK		Sizwe Sibanyoni - 484647	M2
10029	A	Force [NI] Dev1/73 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10030	R	Using the dc voltage detector, check that the relay 62K5 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10031	I	Master Key TC1 Train Line Dev4/73 = END2 90XP34 pin 14		OK		Sizwe Sibanyoni - 484647	M2
10032	A	Force [NI] Dev4/73 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10033	R	Using the dc voltage detector, check that the relay 62K4 is energized		OK		Sizwe Sibanyoni - 484647	M2
10034	A	Force [NI] Dev4/73 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10035	R	Using the dc voltage detector, check that the relay 62K4 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10036	I	Direction		OK		Sizwe Sibanyoni - 484647	M2
10037	I	Forward Train Line Dev4/35 = END2 90XP35 pin 25		OK		Sizwe Sibanyoni - 484647	M2
10038	A	Force [NI] Dev4/35 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10039	R	Using the dc voltage detector, check that the relay 62K9 is energized		OK		Sizwe Sibanyoni - 484647	M2
10040	A	Force [NI] Dev4/35 = 0.0		OK		Sizwe Sibanyoni - 484647	M2

10041	R	Using the dc voltage detector, check that the relay 62K9 is de-energized		OK		Sizwe Sibanyoni - 484647	M2
10042	I	Reverse Train Line Dev4/78 = END2 90XP35 pin 30		OK		Sizwe Sibanyoni - 484647	M2
10043	A	Force [NI] Dev4/78 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10044	R	Using the dc voltage detector, check that the relay 62K8 is energized		OK		Sizwe Sibanyoni - 484647	M2
10045	A	Force [NI] Dev4/78 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10046	R	Using the dc voltage detector, check that the relay 62K8 is de-energized		OK		Sizwe Sibanyoni - 484647	M2
10047	I	Wheel Sensor Continuity Test		OK		Sizwe Sibanyoni - 484647	M2
10048	R	Wheel sensor mechanical check completed.		OK		Sizwe Sibanyoni - 484647	M2
10049	I	Use the multimeter to test the continuity		OK		Sizwe Sibanyoni - 484647	M2
10050	A	Check continuity between [62B2 WHEEL SENSOR (Local:+MB2; Connector 62XP2_1) and 62A1 ERTMS (Local:+LV4; connector 62XP1_X02.c)]		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10054	R	Cable shield is continuous		OK		Sizwe Sibanyoni - 484647	M2
10055	A	Check continuity between [Intercar (Local: +END2; Connector 90XR33.C) and 62A1 ERTMS (Local:+LV4; connector 62XP1_X02.d)]		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10057	R	There is a continuity between: pin 4 & pin 10, pin 3 & pin 4, pin 9 & pin 9, pin 10 & pin 3		OK		Sizwe Sibanyoni - 484647	M2

10058	R	There is a continuity between: pin 6 & pin 8, pin 5 & pin 2, pin 11 & pin 7, pin 12 & pin 1		OK		Sizwe Sibanyoni - 484647	M2
10059	R	Wheel Sensor cable bending radius is at least 10 times its diameter.		OK		Sizwe Sibanyoni - 484647	M2
10060	I	Radar Continuity Test		OK		Sizwe Sibanyoni - 484647	M2
10061	R	Radar mechanical check completed.		OK		Sizwe Sibanyoni - 484647	M2
10062	A	Check continuity between [62A4 RADAR (Local:+UND; Connector 62XP4_1) and 62A1 ERTMS (Local:+LV4; Connector 62XP1_X02.b)]		OK		Sizwe Sibanyoni - 484647	M2
10063	R	There is good continuity between Radar and the ERTMS connector.		OK		Sizwe Sibanyoni - 484647	M2
10064	I	Eurobalise Antenna Cable		OK		Sizwe Sibanyoni - 484647	M2
10065	A	Check continuity between [62A1(LOCAL:+LV4; Connector - 62XP1_X01) and Intercar (LOCAL:+END2; connector -90XR30)] according to the image below		OK		Sizwe Sibanyoni - 484647	M2
10066	R	Eurobalise Antenna cable is correctly configured from END2		OK		Sizwe Sibanyoni - 484647	M2
10067	A	Check continuity between [62A1(LOCAL:+LV4; Connector - 62XP1_X07) and Intercar (LOCAL:+END1; connector -90XR20)] according to the image below		OK		Sizwe Sibanyoni - 484647	M2
10068	R	Eurobalise Antenna cable is correctly configured from END1		OK		Sizwe Sibanyoni - 484647	M2
10069	I	EVC Mechanical Check + Software Upload		OK		Sizwe Sibanyoni - 484647	M2
10070	I	Upload the ODE software using the following procedure:		OK		Walter Sigudla - 486333	M2
10071	I	Upload the COMET software using the following procedure:		OK		Walter Sigudla - 486333	M2
10072	A	Insert the Sim Cards inside the GSM-R modules MT1 and MT2:		OK		Walter Sigudla - 486333	M2
10073	I	END OF TEST		OK		Walter Sigudla - 486333	M2

Section 7 – Pantograph

7.1 Instructions list

7.1.1 021_PNT-Pantograph

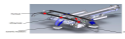
I - Information A - Action R - Result NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Pantograph (SPP = 021)		OK		Sizwe Sibanyoni - 484647	M2
10002	I	There should be no air in the main pipe		OK		Sizwe Sibanyoni - 484647	M2
10003	R	Measure 0 Bar at point K2.8 using the pressure gauge		OK		Sizwe Sibanyoni - 484647	M2
10004	A	Ensure that the pantograph isolation valve K2.5 is normalized (not isolated)		OK		Sizwe Sibanyoni - 484647	M2
10005	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M2
10006	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10007	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10008	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10009	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10010	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxpressswitchr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10011	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxpressswitchr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10012	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10013	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10014	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10015	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10016	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2

10017	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10018	I	Auxiliary Compressor		OK		Sizwe Sibanyoni - 484647	M2
10019	A	Close Circuit Breaker 21Q3		OK		Sizwe Sibanyoni - 484647	M2
10020	A	Close Circuit Breaker 21Q1		OK		Sizwe Sibanyoni - 484647	M2
10021	A	Close Circuit Breaker 21Q2		OK		Sizwe Sibanyoni - 484647	M2
10022	R	The Auxiliary compressor 21M1 turns ON		OK		Sizwe Sibanyoni - 484647	M2
10023	R	Read Defined Variable [TT] (MPU1)lo_pnt_m2startauxiliarcompr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10024	R	Read Defined Variable [TT] (MPU1)lo_pnt_m2startauxiliarcompr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10025	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10026	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10027	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10029	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10030	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10031	R	The pantograph is raised		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10033	R	The Auxiliary compressor 21M1 turns OFF		OK		Sizwe Sibanyoni - 484647	M2
10034	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2

10035	R	Read Defined Variable [TT] (MPU1)li_pnt_m2auxcpcontactorr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10036	A	Turn the pantograph isolation valve K2.5 to isolated position		OK		Sizwe Sibanyoni - 484647	M2
10037	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10038	R	Read Defined Variable [TT] (MPU1)li_pnt_m2drainingcockr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10039	A	Force [TT] (MPU1)lo_pnt_m2startauxiliarcompr1 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10040	A	Force [TT] (MPU1)lo_pnt_m2startauxiliarcompr2 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10041	A	Drain the air by putting the isolation valve K2.5 in half way position		OK		Sizwe Sibanyoni - 484647	M2
10042	R	Using the pressure gauge, check that the Pantograph drops at 3.3 Bar		OK		Sizwe Sibanyoni - 484647	M2
10043	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10044	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10045	A	Turn the pantograph isolation valve K2.5 to normal position		OK		Sizwe Sibanyoni - 484647	M2
10046	A	Release [TT] (MPU1)lo_pnt_m2startauxiliarcompr1		OK		Sizwe Sibanyoni - 484647	M2
10047	A	Release [TT] (MPU1)lo_pnt_m2startauxiliarcompr2		OK		Sizwe Sibanyoni - 484647	M2
10048	R	The Auxiliary compressor 21M1 turns ON		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10050	R	The Auxiliary compressor 21M1 turns OFF		OK		Sizwe Sibanyoni - 484647	M2
10051	I	Isolation and Earthing		OK		Sizwe Sibanyoni - 484647	M2
10052	A	In the HV Box , set the HVB1 valve to Isolated position - to isolate the		OK		Sizwe Sibanyoni - 484647	M2

		pantograph					
10053	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10054	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10055	A	Turn the Earthing Switch to grounded position		OK		Sizwe Sibanyoni - 484647	M2
10056	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10057	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10058	A	Turn the Earthing Switch to back to Normal position		OK		Sizwe Sibanyoni - 484647	M2
10059	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10060	R	Read Defined Variable [TT] (MPU1)li_pnt_m2earthpantor2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10061	A	Set the HVB1 valve to Normal position		OK		Sizwe Sibanyoni - 484647	M2
10062	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr1 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10063	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantoisolatedr2 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10064	A	Normalize the HV box and remove all spare/duplicate keys (green/yellow/blue)		OK		Sizwe Sibanyoni - 484647	M2
10065	I	Pantograph Mechanical test		OK		Sizwe Sibanyoni - 484647	M2
10066	I	Housed Height Measurement, Pantograph Over-Height Measurement, Automatic Drop Device and Control Force Test		OK		Sizwe Sibanyoni - 484647	M2
10067	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M2
10068	I	There should be no air in the main pipe		OK		Sizwe Sibanyoni - 484647	M2
10069	R	Measure 0 Bar at point K2.8 using the pressure gauge		OK		Sizwe Sibanyoni - 484647	M2
10070	A	Ensure that the pantograph isolation valve K2.5 is normalized (not isolated)		OK		Sizwe Sibanyoni - 484647	M2
10071	I	Circuit Breakers		OK		Sizwe Sibanyoni - 484647	M2

10072	A	Close Circuit Breaker 21Q3		OK		Sizwe Sibanyoni - 484647	M2
10073	A	Close Circuit Breaker 21Q1		OK		Sizwe Sibanyoni - 484647	M2
10074	A	Close Circuit Breaker 21Q2		OK		Sizwe Sibanyoni - 484647	M2
10075	I	Housed Height Measurement		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10078	A	Ensure that no part of the pantograph is higher than 486mm above the roof		OK		Sizwe Sibanyoni - 484647	M2
10079	R	A Result Max : x <= 486 (mm)		OK	485	Sizwe Sibanyoni - 484647	M2
10080	R	B Result Max : x <= 486 (mm)		OK	485	Sizwe Sibanyoni - 484647	M2
10081	R	C Result Max : x <= 486 (mm)		OK	485	Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10083	R	Pantograph aligned with the track center line in housed position.		OK		Sizwe Sibanyoni - 484647	M2
10084	I	Automatic Drop Device		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10086	A	Tie a cable on the pantograph head collector		OK		Sizwe Sibanyoni - 484647	M2
10087	A	Close Circuit Breaker 21Q3		OK		Sizwe Sibanyoni - 484647	M2

10088	A	Close Circuit Breaker 21Q1		OK		Sizwe Sibanyoni - 484647	M2
10089	A	Close Circuit Breaker 21Q2		OK		Sizwe Sibanyoni - 484647	M2
10090	R	The Auxiliary compressor 21M1 turns ON		OK		Sizwe Sibanyoni - 484647	M2
10091	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10092	I	Allow the pressure to rise, and the pantograph to raise		OK		Sizwe Sibanyoni - 484647	M2
10093	R	The pantograph is raised		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10095	R	The pressure of the test point PT12 drops to 0 bar		OK		Sizwe Sibanyoni - 484647	M2
10096	A	On the roof, close the bleeding screw (PT3) to reset the ADD		OK		Sizwe Sibanyoni - 484647	M2
10097	R	Fault reset and equipment normalized		OK		Sizwe Sibanyoni - 484647	M2
10098	A	Release [TT] (MPU1)lo_pnt_m2raisepantor1		OK		Sizwe Sibanyoni - 484647	M2
10099	R	Pantograph is lowered		OK		Sizwe Sibanyoni - 484647	M2
10100	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10101	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10102	I	Pantograph Over-Height Measurement		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10106	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10108	R	Rising time Result Max : x <= 10 (s)		OK	4	Sizwe Sibanyoni - 484647	M2
10109	A	By adjusting the rope, ensure that the Pantograph Panhead is aligned with the marking on the ruler.		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10111	R	The over-height valve is adjusted correctly.		OK		Sizwe Sibanyoni - 484647	M2
10112	A	Release [TT] (MPU1)lo_pnt_m2raisepantor1		OK		Sizwe Sibanyoni - 484647	M2
10113	R	Pantograph is lowered		OK		Sizwe Sibanyoni - 484647	M2
10114	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10115	A	Allow the Pantograph to rise freely until it reaches Over-height		OK		Sizwe Sibanyoni - 484647	M2
10116	R	Over-height is detected immediately after passing the marked area on the ruler and Pantograph begins to drop		OK		Sizwe Sibanyoni - 484647	M2
10117	R	Lowering time Result Max : x <= 7 (s)		OK	5	Sizwe Sibanyoni - 484647	M2
10118	A	Release [TT] (MPU1)lo_pnt_m2raisepantor1		OK		Sizwe Sibanyoni - 484647	M2
10119	A	Reset over-height valve (PT2) on the roof		OK		Sizwe Sibanyoni - 484647	M2
10120	R	Equipment normalized. (Only after resetting the PT2 valve, can the pantograph be raised)		OK		Sizwe Sibanyoni - 484647	M2
10121	I	Control Force Test		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10123	A	Attach the dynamometer to the pantograph's head collector		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10125	A	Force [TT] (MPU1)lo_pnt_m2raisepantor1 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10126	I	Allow the pressure to rise, and the pantograph to raise		OK		Sizwe Sibanyoni - 484647	M2
10127	R	The pantograph is raised		OK		Sizwe Sibanyoni - 484647	M2
10128	R	F>150N		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10130	R	The pantographs should remain in the neutral position		OK		Sizwe Sibanyoni - 484647	M2
10131	A	Check that the center of the pantograph head corresponds with the track center line on maximum raised position.		OK		Sizwe Sibanyoni - 484647	M2
10132	R	Pantograph aligned with the track centreline in maximum raised position (Use marked ruler to compare)		OK		Sizwe Sibanyoni - 484647	M2
10133	A	Remove 1kg dead weight		OK		Sizwe Sibanyoni - 484647	M2
10134	R	Pantograph continues to rise to over height condition		OK		Sizwe Sibanyoni - 484647	M2
10135	A	Remove the dynamometer and dead weights from the pantograph's head-collector		OK		Sizwe Sibanyoni - 484647	M2
10136	A	Release [TT] (MPU1)lo_pnt_m2raisepantor1		OK		Sizwe Sibanyoni - 484647	M2
10137	R	Pantograph is lowered		OK		Sizwe Sibanyoni - 484647	M2

10138	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr1 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10139	R	Read Defined Variable [TT] (MPU1)li_pnt_m2pantorisedr2 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2

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		Sizwe Sibanyoni - 484647	M2
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M2
10003	I	110Vdc Normal power supply is connected to the vehicle, and switched ON		OK		Sizwe Sibanyoni - 484647	M2
10004	I	Backup Mode		OK		Sizwe Sibanyoni - 484647	M2
10005	I	Backup Mode Train Lines Dev2/29 = END1 90XR25 pin23 Dev4/33 = END2 90XP35 pin 23		OK		Sizwe Sibanyoni - 484647	M2
10006	A	Force [NI] Dev4/33 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10007	R	Read Defined Variable [NI] Dev2/29 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10008	R	Relay 27K1 is energized.		OK		Sizwe Sibanyoni - 484647	M2
10009	R	Relay 27K2 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10010	A	Timer 30.0 S		OK		Sizwe Sibanyoni - 484647	M2
10011	R	Relay 27K2 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10012	A	Timer 30.0 S		OK		Sizwe Sibanyoni - 484647	M2
10013	R	Relay 27K2 is energized.		OK		Sizwe Sibanyoni - 484647	M2
10014	I	Backup Mode Train Lines Dev2/29 = END1 90XR25 pin23 Dev4/33 = END2 90XP35 pin 23		OK		Sizwe Sibanyoni - 484647	M2
10015	A	Force [NI] Dev4/33 = 0.0		OK		Sizwe Sibanyoni - 484647	M2

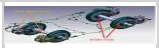
10016	R	Read Defined Variable [NI] Dev2/29 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10017	R	Relay 27K1 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10018	R	Relay 27K2 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2
10019	I	Emergency Disconnection		OK		Sizwe Sibanyoni - 484647	M2
10020	I	Emergency Disconnection Train Lines Dev2/30 = END1 90XR25 pin24 Dev4/34 = END2 90XP35 pin 24		OK		Sizwe Sibanyoni - 484647	M2
10021	A	Force [NI] Dev4/34 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10022	R	Read Defined Variable [NI] Dev2/30 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10023	R	Relay 27K5 is energized		OK		Sizwe Sibanyoni - 484647	M2
10024	I	Emergency Disconnection Train Lines Dev2/30 = END1 90XR25 pin24 Dev4/34 = END2 90XP35 pin 24		OK		Sizwe Sibanyoni - 484647	M2
10025	A	Force [NI] Dev4/34 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10026	R	Read Defined Variable [NI] Dev2/30 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10027	R	Relay 27K5 is de-energized.		OK		Sizwe Sibanyoni - 484647	M2

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	M2
10002	I	Initial Conditions		OK		Sizwe Sibanyoni - 484647	M2
10003	I	No PEAs are activated		OK		Sizwe Sibanyoni - 484647	M2
10004	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Sizwe Sibanyoni - 484647	M2
10005	I	Visual Inspection		OK		Sizwe Sibanyoni - 484647	M2
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	M2
10007	R	All the brake DBUs are correctly installed, and all the brake pads are correctly installed and locked		OK		Sizwe Sibanyoni - 484647	M2
10008	A	Check the pipe installation.		OK		Sizwe Sibanyoni - 484647	M2
10009	R	All the pipes are installed on the vehicle		OK		Sizwe Sibanyoni - 484647	M2
10010	A	Check all the Passenger Emergency Alarm handles, and ensure they are connected to their respective connectors		OK		Sizwe Sibanyoni - 484647	M2
10011	R	All the PEAs are installed and connected		OK		Sizwe Sibanyoni - 484647	M2
10012	I	Train Lines		OK		Sizwe Sibanyoni - 484647	M2
10013	I	Emergency Brake Loop Train Lines Dev2/5 = END1 90XR24 pin 8 Dev4/5 = END2 90XP34 pin 8		OK		Sizwe Sibanyoni - 484647	M2
10014	A	Force [NI] Dev4/5 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10015	R	Read Defined Variable [NI] Dev2/5 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10016	A	Force [NI] Dev4/5 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10017	R	Read Defined Variable [NI] Dev2/5 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10018	I	Emergency Brake Loop Override Train Lines Dev2/6 = END1 90XR24 pin 9		OK		Sizwe Sibanyoni - 484647	M2

		Dev4/6 = END2 90XP34 pin 9					
10019	A	Force [NI] Dev4/6 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10020	R	Read Defined Variable [NI] Dev2/6 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10021	A	Force [NI] Dev4/6 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10022	R	Read Defined Variable [NI] Dev2/6 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10023	I	Emergency Brake Train Line Train Lines Dev2/50 = END1 90XR25 pin 67 Dev4/61 = END2 90XP35 pin 67		OK		Sizwe Sibanyoni - 484647	M2
10024	A	Force [NI] Dev4/61 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10025	R	Read Defined Variable [NI] Dev2/50 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10026	A	Force [NI] Dev4/61 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10027	R	Read Defined Variable [NI] Dev2/50 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10028	I	PEA Loop OTDR Train Lines Dev2/7 = END1 90XR24 pin 10 Dev4/7 = END2 90XP34 pin 10		OK		Sizwe Sibanyoni - 484647	M2
10029	A	Force [NI] Dev4/7 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10030	R	Read Defined Variable [NI] Dev2/7 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10031	A	Force [NI] Dev4/7 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10032	R	Read Defined Variable [NI] Dev2/7 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10033	I	PEA Reset		OK		Sizwe Sibanyoni - 484647	M2
10034	A	Close Circuit Breaker 44Q1		OK		Sizwe Sibanyoni - 484647	M2
10035	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95 Dev4/62 = END2 90XP35 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10036	A	Force [NI] Dev4/62 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10037	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10038	A	Activate the PEA on door 5 (44S15)		OK		Sizwe Sibanyoni - 484647	M2
10039	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10040	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2

10041	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10042	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10043	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10044	A	Activate the PEA on door 3 (44S13)		OK		Sizwe Sibanyoni - 484647	M2
10045	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10046	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10047	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10048	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10049	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10050	A	Activate the PEA on door 1 (44S11)		OK		Sizwe Sibanyoni - 484647	M2
10051	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10052	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10053	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10054	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10055	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10056	A	Activate the PEA on door 2 (44S12)		OK		Sizwe Sibanyoni - 484647	M2
10057	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10058	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10059	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10060	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2

10061	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10062	A	Activate the PEA on door 4 (44S14)		OK		Sizwe Sibanyoni - 484647	M2
10063	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10064	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10065	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10066	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10067	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10068	A	Activate the PEA on door 6 (44S16)		OK		Sizwe Sibanyoni - 484647	M2
10069	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10070	R	Read Defined Variable [NI] Dev2/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10071	A	Reset the PEA using square key		OK		Sizwe Sibanyoni - 484647	M2
10072	I	PEA Loop Train Lines Dev2/58 = END1 90XR25 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10073	R	Read Defined Variable [NI] Dev2/58 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10074	I	PEA Loop Train Lines Dev4/64 = END2 90XP35 pin 95		OK		Sizwe Sibanyoni - 484647	M2
10075	A	Force [NI] Dev4/62 = 0.0		OK		Sizwe Sibanyoni - 484647	M2

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		Nqobile Chirwa - 484648	M2
10002	I	Initial Conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	No air supply to the vehicle		OK		Nqobile Chirwa - 484648	M2
10004	I	All brake panel cocks are in normal position (not isolated)		OK		Nqobile Chirwa - 484648	M2
10005	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Nqobile Chirwa - 484648	M2
10006	I	Follow the procedure in the document below to upload software onto the TBCU electronic		OK		Nqobile Chirwa - 484648	M2
10007	I	Power Supply		OK		Nqobile Chirwa - 484648	M2
10008	A	Remove the connector 10XR12_XCB2 from the propulsion box		OK		Nqobile Chirwa - 484648	M2
10009	A	Close Circuit Breaker 33Q1, 33Q3 and 33Q5		OK		Nqobile Chirwa - 484648	M2
10010	A	Check the voltage on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and 67(-); and 5(+) and 68(-)		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10013	A	Remove the connector -40XP2_C2_16 from pneumatic brake panel		OK		Nqobile Chirwa - 484648	M2
10014	A	Close Circuit Breaker 40Q1		OK		Nqobile Chirwa - 484648	M2
10015	A	Check the voltage on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		Nqobile Chirwa - 484648	M2

10016	R	Battery voltage (above 80Vdc) is measured on connector 40XP2__C2__16 between pins 13 (+) and 31 (-)		OK		Nqobile Chirwa - 484648	M2
10017	A	Open Circuit Breaker 40Q1, Replace connector -40XP2__C2__16 on the pneumatic brake panel, and Close Circuit breaker -40Q1		OK		Nqobile Chirwa - 484648	M2
10018	R	The pneumatic brake panel 40A2 is ON		OK		Nqobile Chirwa - 484648	M2
10019	I	Brake Air Supply and Brake Application		OK		Nqobile Chirwa - 484648	M2
10020	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60		OK		Nqobile Chirwa - 484648	M2
10021	R	Read Defined Variable [NI] Dev2/85 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10022	R	Read Defined Variable [NI] Dev5/51 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10023	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XR35 pin 50		OK		Nqobile Chirwa - 484648	M2
10024	R	Read Defined Variable [NI] Dev2/83 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10025	R	Read Defined Variable [NI] Dev5/49 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10026	R	Read Defined Variable [TT] (MPU1)li__sbk__m2brakeairsuppokr1 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10027	R	Read Defined Variable [TT] (MPU1)li__sbk__m2brakeairsuppokr2 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10028	R	Read Defined Variable [TT] (TBCU2)LI__BRPS__NOK = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10029	R	Read Defined Variable [TT] (TBCU2)LI__BRAKE__NOT__APPLED = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10030	A	Close/Isolate the Isolation cock F2.1/3		OK		Nqobile Chirwa - 484648	M2
10031	A	Open the Isolation cock F2.2/3		OK		Nqobile Chirwa - 484648	M2
10032	A	Connect the air supply to the vehicle main pipe coupling flexible hose F3/5, and switch the supply ON		OK		Nqobile Chirwa - 484648	M2
10033	I	Take note of any air leaks in the pipes or valves		OK		Nqobile Chirwa - 484648	M2

10034	A	Allow the pressure to go above 6 bar. The pressure can be checked at the BRTP test point		OK		Nqobile Chirwa - 484648	M2
10035	R	BRTP pressure is measured >=6 Bar		OK		Nqobile Chirwa - 484648	M2
10036	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XR35 pin 50		OK		Nqobile Chirwa - 484648	M2
10037	R	Read Defined Variable [NI] Dev2/83 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10038	R	Read Defined Variable [NI] Dev5/49 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10039	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr1 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10040	R	Read Defined Variable [TT] (MPU1)li_sbk_m2brakeairsuppokr2 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10041	R	Read Defined Variable [TT] (TBCU2)LI_BRPS_NOK = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10042	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_NOT_APPLED = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10043	I	Remote Isolation		OK		Nqobile Chirwa - 484648	M2
10044	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59 Dev4/50 = END2 90XR35 pin 59		OK		Nqobile Chirwa - 484648	M2
10045	A	Force [NI] Dev4/50 = 1.0		OK		Nqobile Chirwa - 484648	M2
10046	R	Read Defined Variable [NI] Dev2/84 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10047	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10048	A	Force [TT] (MPU1)lo_sbk_m2isobrake = 1.0		OK		Nqobile Chirwa - 484648	M2
10049	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10050	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59		OK		Nqobile Chirwa - 484648	M2
10051	R	Read Defined Variable [NI] Dev2/84 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10052	A	Release [TT] (MPU1)lo_sbk_m2isobrake		OK		Nqobile Chirwa - 484648	M2

10053	I	Remote Isolation Train Lines Dev2/84 = END1 90XR25 pin 59		OK		Nqobile Chirwa - 484648	M2
10054	R	Read Defined Variable [NI] Dev2/84 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10055	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_ISO = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10056	I	Remote Isolation Train Lines Dev4/50 = END2 90XR35 pin 59		OK		Nqobile Chirwa - 484648	M2
10057	A	Force [NI] Dev4/50 = 0.0		OK		Nqobile Chirwa - 484648	M2
10058	I	Manual Isolation		OK		Nqobile Chirwa - 484648	M2
10059	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60		OK		Nqobile Chirwa - 484648	M2
10060	R	Read Defined Variable [NI] Dev2/85 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10061	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60		OK		Nqobile Chirwa - 484648	M2
10062	R	Read Defined Variable [NI] Dev5/51 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10063	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10064	R	Read Defined Variable [TT] (TBCU2)Li_ServiceBrakeDC = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10065	A	Close the Isolation cock C2.3.1		OK		Nqobile Chirwa - 484648	M2
10066	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XR35 pin 60		OK		Nqobile Chirwa - 484648	M2
10067	R	Read Defined Variable [NI] Dev2/85 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10068	R	Read Defined Variable [NI] Dev5/51 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10069	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10070	R	Read Defined Variable [TT] (TBCU2)Li_ServiceBrakeDC = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10071	A	Re-open the Isolation cock C2.3.1		OK		Nqobile Chirwa - 484648	M2
10072	R	Read Defined Variable [TT] (MPU1)li_sbk_m2servicebrakedc = 0.0		OK	0	Nqobile Chirwa - 484648	M2

10073	I	Switch OFF 400V before reading the bcufault variable		OK		Nqobile Chirwa - 484648	M2
10074	R	Read Defined Variable [TT] (MPU1)li_sbk_m2bcufault = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10075	A	Force [TT] (TBCU2)LO_BRK_FLT = 1.0		OK		Nqobile Chirwa - 484648	M2
10076	R	Read Defined Variable [TT] (MPU1)li_sbk_m2bcufault = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10077	A	Release [TT] (TBCU2)LO_BRK_FLT		OK		Nqobile Chirwa - 484648	M2

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	M2
10002	I	Initial Conditions		OK		Mpumelelo Sithole - 529980	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		Mpumelelo Sithole - 529980	M2
10004	I	Check that the pressure on Test point C2.11/1 is >5bar		OK		Mpumelelo Sithole - 529980	M2
10005	I	Visual Inspection		OK		Mpumelelo Sithole - 529980	M2
10006	A	Check the installation of the manual parking brake release components (lever + cable)		OK		Mpumelelo Sithole - 529980	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		Mpumelelo Sithole - 529980	M2
10008	I	Circuit Breaker		OK		Mpumelelo Sithole - 529980	M2
10009	I	Ensure that the Circuit Breaker 33Q3 is closed		OK		Mpumelelo Sithole - 529980	M2
10010	A	Close Circuit Breaker 33Q5		OK		Mpumelelo Sithole - 529980	M2
10011	I	Parking Brake Pressure Switch		OK		Mpumelelo Sithole - 529980	M2
10012	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_RELEASE = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10013	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10014	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakerelease = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10015	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10016	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Sizwe Sibanyoni - 484647	M2

10017	R	Read Defined Variable [NI] Dev2/52 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10018	R	Read Defined Variable [NI] Dev5/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10019	I	Parking Brake Applied		OK		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	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		Sizwe Sibanyoni - 484647	M2
10022	R	Pressure at test point C2.11/1 <4.5 Bar		OK		Sizwe Sibanyoni - 484647	M2
10023	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_RELEASE = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10024	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakerelease = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10025	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Sizwe Sibanyoni - 484647	M2
10026	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10027	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10028	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_DC = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10029	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakeisoldc = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10030	R	Read Defined Variable [TT] (MPU1)li_pbk_m2parkbrakeisol = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10031	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Sizwe Sibanyoni - 484647	M2
10032	R	Read Defined Variable [NI] Dev2/52 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10033	R	Read Defined Variable [NI] Dev5/58 = 1.0		OK	1	Nokuzola Mdluli - 491469	M2
10034	A	Position the Isolation cock C2.3.2 in CLOSE position		OK		Sizwe Sibanyoni - 484647	M2

10035	R	Read Defined Variable [TT] (TBCU2)LI_BRAKE_STAT = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10036	R	Read Defined Variable [TT] (MPU1)tbcu2_li_pbrake_stat = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10037	R	Read Defined Variable [TT] (TBCU2)LI_PARK_BR_DC = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10038	R	Read Defined Variable [TT] (MPU1)tbcu2_parkbrakeisoldc = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10039	R	Read Defined Variable [TT] (MPU1)li_pbk_m2parkbrakeisol = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10040	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP25 pin 77		OK		Sizwe Sibanyoni - 484647	M2
10041	R	Read Defined Variable [NI] Dev2/52 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10042	R	Read Defined Variable [NI] Dev5/58 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10043	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Sizwe Sibanyoni - 484647	M2
10044	I	Remote Parking Brake Command		OK		Sizwe Sibanyoni - 484647	M2
10045	I	Remote Parking Brake Command Train Lines Dev2/51 = END1 90XR25 pin 68 Dev4/57 = END2 90XR35 pin 68		OK		Sizwe Sibanyoni - 484647	M2
10046	A	Force [NI] Dev4/57 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10047	R	Read Defined Variable [NI] Dev2/51 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10048	R	Confirm that the parking brake is applied, and air is released from electro valve C2.5		OK		Sizwe Sibanyoni - 484647	M2
10049	I	Remote Parking Brake Command Train Lines Dev2/51 = END1 90XR25 pin 68 Dev4/57 = END2 90XR35 pin 68		OK		Sizwe Sibanyoni - 484647	M2
10050	A	Force [NI] Dev4/57 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10051	R	Read Defined Variable [NI] Dev2/51 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10052	R	Confirm that electro valve C2.5 has stopped emitting air		OK		Sizwe Sibanyoni - 484647	M2

Section 12 – Passenger Doors

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		Nqobile Chirwa - 484648	M2
10002	I	Initial conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	110Vdc Normal power supply is connected to the vehicle and ON		OK		Nqobile Chirwa - 484648	M2
10004	I	Ensure that the TCMS network is functional		OK		Nqobile Chirwa - 484648	M2
10005	I	Circuit Breaker		OK		Nqobile Chirwa - 484648	M2
10006	A	Close Circuit Breaker 50Q1		OK		Nqobile Chirwa - 484648	M2
10007	R	DCU 1 is powered ON		OK		Nqobile Chirwa - 484648	M2
10008	R	Check on the DDU that DCU1 is online		OK		Nqobile Chirwa - 484648	M2
10009	A	Close Circuit Breaker 50Q2		OK		Nqobile Chirwa - 484648	M2
10010	R	DCU 2 is powered ON		OK		Nqobile Chirwa - 484648	M2
10011	R	Check on the DDU that DCU2 is online		OK		Nqobile Chirwa - 484648	M2
10012	A	Close Circuit Breaker 50Q3		OK		Nqobile Chirwa - 484648	M2
10013	R	DCU 3 is powered ON		OK		Nqobile Chirwa - 484648	M2
10014	R	Check on the DDU that DCU3 is online		OK		Nqobile Chirwa - 484648	M2
10015	A	Close Circuit Breaker 50Q4		OK		Nqobile Chirwa - 484648	M2
10016	R	DCU 4 is powered ON		OK		Nqobile Chirwa - 484648	M2
10017	R	Check on the DDU that DCU4 is online		OK		Nqobile Chirwa - 484648	M2
10018	A	Close Circuit Breaker 50Q5		OK		Nqobile Chirwa - 484648	M2
10019	R	DCU 5 is powered ON		OK		Nqobile Chirwa - 484648	M2
10020	R	Check on the DDU that DCU5 is online		OK		Nqobile Chirwa - 484648	M2
10021	A	Close Circuit Breaker 50Q6		OK		Nqobile Chirwa - 484648	M2

10022	R	DCU 6 is powered ON		OK		Nqobile Chirwa - 484648	M2
10023	R	Check on the DDU that DCU6 is online		OK		Nqobile Chirwa - 484648	M2
10024	A	Close Circuit Breaker 50Q7		OK		Nqobile Chirwa - 484648	M2
10025	I	Car ID Code		OK		Nqobile Chirwa - 484648	M2
10026	A	Using the DDU on the test bench, check that all the doors on M2 are available - as in the picture		OK		Nqobile Chirwa - 484648	M2
10027	R	All doors are available		OK		Nqobile Chirwa - 484648	M2
10028	I	Door Open and Close - Safety Loop		OK		Nqobile Chirwa - 484648	M2
10029	I	ERTMS Auth Left Train Lines Dev4/87 = END2 90XR35 pin 47 Dev2/81 = END1 90XR25 pin 44		OK		Nqobile Chirwa - 484648	M2
10030	A	Force [NI] Dev4/87 = 1.0		OK		Nqobile Chirwa - 484648	M2
10031	R	Read Defined Variable [NI] Dev2/81 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10032	A	Force [NI] Dev4/87 = 0.0		OK		Nqobile Chirwa - 484648	M2
10033	R	Read Defined Variable [NI] Dev2/81 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10034	I	ERTMS Auth Right Train Lines Dev2/82 = END1 90XR15 pin 47 Dev4/86 = END2 90XP25 pin 44		OK		Nqobile Chirwa - 484648	M2
10035	A	Force [NI] Dev4/86 = 1.0		OK		Nqobile Chirwa - 484648	M2
10036	R	Read Defined Variable [NI] Dev2/82 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10037	A	Force [NI] Dev4/86 = 0.0		OK		Nqobile Chirwa - 484648	M2
10038	R	Read Defined Variable [NI] Dev2/82 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10039	I	Doors Open Train Lines Dev2/49 = END1 90XR15 pin 66 Dev4/55 = END2 90XP25 pin 66		OK		Nqobile Chirwa - 484648	M2
10040	A	Force [NI] Dev4/55 = 1.0		OK		Nqobile Chirwa - 484648	M2
10041	R	Read Defined Variable [NI] Dev2/49 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10042	A	Force [NI] Dev4/55 = 0.0		OK		Nqobile Chirwa - 484648	M2
10043	R	Read Defined Variable [NI] Dev2/49 = 0.0		OK	0	Nqobile Chirwa - 484648	M2

10044	I	Door Close Right Train Lines Dev2/53 = END1 90XR15 pin 78 Dev4/60 = END2 90XP25 pin 79		OK		Nqobile Chirwa - 484648	M2
10045	A	Force [NI] Dev4/60 = 1.0		OK		Nqobile Chirwa - 484648	M2
10046	R	Read Defined Variable [NI] Dev2/53 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10047	A	Force [NI] Dev4/60 = 0.0		OK		Nqobile Chirwa - 484648	M2
10048	R	Read Defined Variable [NI] Dev2/53 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10049	I	Door Close Left Train Lines Dev2/54 = END1 90XR15 pin 79 Dev4/59 = END2 90XP25 pin 78		OK		Nqobile Chirwa - 484648	M2
10050	A	Force [NI] Dev4/59 = 1.0		OK		Nqobile Chirwa - 484648	M2
10051	R	Read Defined Variable [NI] Dev2/54 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10052	A	Force [NI] Dev4/59 = 0.0		OK		Nqobile Chirwa - 484648	M2
10053	R	Read Defined Variable [NI] Dev2/54 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10054	I	V<3km/h Train Lines Dev2/35 = END1 90XR15 pin 29 Dev4/39 = END2 90XP25 pin 29		OK		Nqobile Chirwa - 484648	M2
10055	A	Force [NI] Dev4/39 = 1.0		OK		Nqobile Chirwa - 484648	M2
10056	R	Read Defined Variable [NI] Dev2/35 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10057	I	Door Auth Right Train Lines Dev2/64 = END1 90XR15 pin 85 Dev4/64 = END2 90XP25 pin 84		OK		Nqobile Chirwa - 484648	M2
10058	A	Force [NI] Dev4/64 = 1.0		OK		Nqobile Chirwa - 484648	M2
10059	R	Read Defined Variable [NI] Dev2/64 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10060	I	Door Auth Left Train Lines Dev2/56 = END1 90XR15 pin 84 Dev4/56 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10061	A	Force [NI] Dev4/56 = 1.0		OK		Nqobile Chirwa - 484648	M2
10062	R	Read Defined Variable [NI] Dev2/56 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10063	A	Force [TT] (MPU1)lo_dor_m2opendoorleft = 1.0		OK		Nqobile Chirwa - 484648	M2
10064	A	Force [TT] (MPU1)lo_dor_m2opendoorright = 1.0		OK		Nqobile Chirwa - 484648	M2

10065	R	Check that doors 1, 3 and 5 (LEFT SIDE) open		OK		Nqobile Chirwa - 484648	M2
10066	R	Check that doors 2, 4 and 6 (RIGHT SIDE) open		OK		Nqobile Chirwa - 484648	M2
10067	I	Door Auth Right Train Lines Dev2/64 = END1 90XR15 pin 85 Dev4/64 = END2 90XP25 pin 84		OK		Nqobile Chirwa - 484648	M2
10068	A	Force [NI] Dev4/64 = 0.0		OK		Nqobile Chirwa - 484648	M2
10069	R	Read Defined Variable [NI] Dev2/64 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10070	I	Door Auth Left Train Lines Dev2/56 = END1 90XR15 pin 84 Dev4/56 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10071	A	Force [NI] Dev4/56 = 0.0		OK		Nqobile Chirwa - 484648	M2
10072	R	Read Defined Variable [NI] Dev2/56 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10073	R	Check that doors 1, 3 and 5 (LEFT SIDE) close		OK		Nqobile Chirwa - 484648	M2
10074	R	Check that doors 2, 4 and 6 (RIGHT SIDE) close		OK		Nqobile Chirwa - 484648	M2
10075	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96 Dev4/89 = END2 90XP25 pin 96		OK		Nqobile Chirwa - 484648	M2
10076	A	Force [NI] Dev4/89 = 1.0		OK		Nqobile Chirwa - 484648	M2
10077	R	Read Defined Variable [NI] Dev2/59 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10078	I	Left Side Doors		OK		Nqobile Chirwa - 484648	M2
10079	I	Door 1		OK		Nqobile Chirwa - 484648	M2
10080	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10081	A	Force [NI] Dev4/64 = 1.0		OK		Nqobile Chirwa - 484648	M2
10082	R	Check if ALL Left doors opens in 3 sec (+1/-0)		OK		Nqobile Chirwa - 484648	M2
10083	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		Nqobile Chirwa - 484648	M2
10084	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2

10085	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Nqobile Chirwa - 484648	M2
10086	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1406	Nqobile Chirwa - 484648	M2
10087	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2
10088	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1405	Nqobile Chirwa - 484648	M2
10089	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10090	R	Door 1 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1406	Nqobile Chirwa - 484648	M2
10091	I	Door 3		OK		Nqobile Chirwa - 484648	M2
10092	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2
10093	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2
10094	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Nqobile Chirwa - 484648	M2
10095	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Nqobile Chirwa - 484648	M2
10096	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1405	Nqobile Chirwa - 484648	M2
10097	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10098	R	Door 3 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Nqobile Chirwa - 484648	M2
10099	I	Door 5		OK		Nqobile Chirwa - 484648	M2
10100	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2
10101	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2

10102	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1409	Nqobile Chirwa - 484648	M2
10103	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Nqobile Chirwa - 484648	M2
10104	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1407	Nqobile Chirwa - 484648	M2
10105	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10106	R	Door 5 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1409	Nqobile Chirwa - 484648	M2
10107	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10108	A	Force [NI] Dev4/64 = 0.0		OK		Nqobile Chirwa - 484648	M2
10109	R	Check that ALL Left door closes in 3 sec (+1/-0)		OK		Nqobile Chirwa - 484648	M2
10110	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]		OK		Nqobile Chirwa - 484648	M2
10111	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96		OK		Nqobile Chirwa - 484648	M2
10112	R	Read Defined Variable [NI] Dev2/59 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10113	I	Right Side Doors		OK		Nqobile Chirwa - 484648	M2
10114	I	Door 2		OK		Nqobile Chirwa - 484648	M2
10115	I	Door Auth Left Train Lines Dev4/56 = END2 90XP25 pin 84		OK		Nqobile Chirwa - 484648	M2
10116	A	Force [NI] Dev4/56 = 1.0		OK		Nqobile Chirwa - 484648	M2
10117	R	Check that the door opens in 3 sec (+1/-0)		OK		Nqobile Chirwa - 484648	M2
10118	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		Nqobile Chirwa - 484648	M2
10119	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2
10120	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2

10121	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1406	Nqobile Chirwa - 484648	M2
10122	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Nqobile Chirwa - 484648	M2
10123	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1407	Nqobile Chirwa - 484648	M2
10124	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10125	R	Door 2 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1406	Nqobile Chirwa - 484648	M2
10126	I	Door 4		OK		Nqobile Chirwa - 484648	M2
10127	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2
10128	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2
10129	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Nqobile Chirwa - 484648	M2
10130	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		Nqobile Chirwa - 484648	M2
10131	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1407	Nqobile Chirwa - 484648	M2
10132	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10133	R	Door 4 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Nqobile Chirwa - 484648	M2
10134	I	Door 6		OK		Nqobile Chirwa - 484648	M2
10135	I	Door Opening Gap		OK		Nqobile Chirwa - 484648	M2
10136	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		Nqobile Chirwa - 484648	M2
10137	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1408	Nqobile Chirwa - 484648	M2
10138	A	Measure the opening gap of the door. (This measurement must be done at the		OK		Nqobile Chirwa - 484648	M2

		top of the door)					
10139	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1410	Nqobile Chirwa - 484648	M2
10140	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		Nqobile Chirwa - 484648	M2
10141	R	Door 6 gap Result Min/Max : 1390<= x <= 1410 (mm)		OK	1410	Nqobile Chirwa - 484648	M2
10142	I	Obstacle Detection		OK		Nqobile Chirwa - 484648	M2
10143	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10144	A	Force [NI] Dev4/64 = 1.0		OK		Nqobile Chirwa - 484648	M2
10145	R	Check if ALL Left doors opens in 3 sec (+1/-0)		OK		Nqobile Chirwa - 484648	M2
10146	A	Position an obstacle on the floor in the centre of each and every door closing line		OK		Nqobile Chirwa - 484648	M2
10147	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Nqobile Chirwa - 484648	M2
10148	A	Force [NI] Dev4/56 = 0.0		OK		Nqobile Chirwa - 484648	M2
10149	A	Force [NI] Dev4/64 = 0.0		OK		Nqobile Chirwa - 484648	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		Nqobile Chirwa - 484648	M2
10151	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96		OK		Nqobile Chirwa - 484648	M2
10152	R	Read Defined Variable [NI] Dev2/59 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10153	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Nqobile Chirwa - 484648	M2
10154	A	Force [NI] Dev4/56 = 1.0		OK		Nqobile Chirwa - 484648	M2
10155	A	Force [NI] Dev4/64 = 1.0		OK		Nqobile Chirwa - 484648	M2

10156	R	ALL doors opens fully		OK		Nqobile Chirwa - 484648	M2
10157	A	Remove the obstacle		OK		Nqobile Chirwa - 484648	M2
10158	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Nqobile Chirwa - 484648	M2
10159	A	Force [NI] Dev4/56 = 0.0		OK		Nqobile Chirwa - 484648	M2
10160	A	Force [NI] Dev4/64 = 0.0		OK		Nqobile Chirwa - 484648	M2
10161	R	Check if ALL door closes in 3 sec (+1/-0)		OK		Nqobile Chirwa - 484648	M2
10162	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]		OK		Nqobile Chirwa - 484648	M2
10163	I	Safety Doors Loop Train Lines Dev2/59 = END1 90XR15 pin 96		OK		Nqobile Chirwa - 484648	M2
10164	R	Read Defined Variable [NI] Dev2/59 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10165	I	Speed Detection		OK		Nqobile Chirwa - 484648	M2
10166	I	Door Auth Left Train Lines Dev4/56 = END2 90XP25 pin 84		OK		Nqobile Chirwa - 484648	M2
10167	A	Force [NI] Dev4/56 = 1.0		OK		Nqobile Chirwa - 484648	M2
10168	I	Door Auth Right Train Lines Dev4/64 = END2 90XP25 pin 85		OK		Nqobile Chirwa - 484648	M2
10169	A	Force [NI] Dev4/64 = 1.0		OK		Nqobile Chirwa - 484648	M2
10170	R	All doors open		OK		Nqobile Chirwa - 484648	M2
10171	I	V>5km/h Train Lines Dev2/34 = END1 90XR15 pin 28 Dev4/38 = END2 90XP25 pin 28		OK		Nqobile Chirwa - 484648	M2
10172	A	Force [NI] Dev4/38 = 1.0		OK		Nqobile Chirwa - 484648	M2
10173	R	Read Defined Variable [NI] Dev2/34 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10174	R	All doors close due to the invalid state of the DCU		OK		Nqobile Chirwa - 484648	M2
10175	A	Release [TT] (MPU1)Io_dor_m2opendoorleft		OK		Nqobile Chirwa - 484648	M2

10176	A	Release [TT] (MPU1)lo_dor_m2opendoorright		OK		Nqobile Chirwa - 484648	M2
10177	I	V>5km/h Train Lines Dev2/34 = END1 90XR15 pin 28 Dev4/38 = END2 90XP25 pin 28		OK		Nqobile Chirwa - 484648	M2
10178	A	Force [NI] Dev4/38 = 0.0		OK		Nqobile Chirwa - 484648	M2
10179	R	Read Defined Variable [NI] Dev2/34 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10180	I	V<3km/h Train Lines Dev4/39 = END2 90XP25 pin 29		OK		Nqobile Chirwa - 484648	M2
10181	A	Force [NI] Dev4/39 = 0.0		OK		Nqobile Chirwa - 484648	M2
10182	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		Nqobile Chirwa - 484648	M2
10183	A	Force [NI] Dev4/64 = 0.0		OK		Nqobile Chirwa - 484648	M2
10184	A	Force [NI] Dev4/56 = 0.0		OK		Nqobile Chirwa - 484648	M2
10185	I	Safety Doors Loop Train Lines Dev4/89 = END2 90XP25 pin 96		OK		Nqobile Chirwa - 484648	M2
10186	A	Force [NI] Dev4/89 = 0.0		OK		Nqobile Chirwa - 484648	M2

Section 13 – HVAC Air Conditioning

13.1 Instructions list

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		Sizwe Sibanyoni - 484647	M2
10002	I	Initial conditions		OK		Sizwe Sibanyoni - 484647	M2
10003	A	Car Should be Prepared		OK		Sizwe Sibanyoni - 484647	M2
10004	I	Power Supply		OK		Sizwe Sibanyoni - 484647	M2
10005	A	Remove Connector 57XP1_5 from HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10006	A	Close Circuit Breaker 57Q2		OK		Sizwe Sibanyoni - 484647	M2
10007	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1___1 = 0		OK		Sizwe Sibanyoni - 484647	M2
10008	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 0		OK		Sizwe Sibanyoni - 484647	M2
10009	R	Check battery voltage (above 80Vdc) between points 11 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2
10010	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 1		OK		Sizwe Sibanyoni - 484647	M2
10011	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2
10012	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1___1 = 1		OK		Sizwe Sibanyoni - 484647	M2
10013	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2
10014	R	Check 0Vdc between points 10 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2
10015	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 0		OK		Sizwe Sibanyoni - 484647	M2
10016	A	Force [TT] (MPU1)lo_hva_m2emergventil___1 = 1		OK		Sizwe Sibanyoni - 484647	M2
10017	R	Check 0Vdc between points 11 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2

10018	R	Check battery voltage (above 80Vdc) between points 10 and 9 of the connector 57XP1_5		OK		Sizwe Sibanyoni - 484647	M2
10019	A	Release [TT] (MPU1)lo_hva_m2emergventil___1		OK		Sizwe Sibanyoni - 484647	M2
10020	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr1___1		OK		Sizwe Sibanyoni - 484647	M2
10021	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr2___1		OK		Sizwe Sibanyoni - 484647	M2
10022	A	Return back the connector 57XP1_5 on the HVAC panel		OK		Sizwe Sibanyoni - 484647	M2
10023	I	HVAC Electronic Power Supply		OK		Sizwe Sibanyoni - 484647	M2
10024	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10025	A	Turn the control switch to AUTO position on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10026	R	The HVAC electronic is ON		OK		Sizwe Sibanyoni - 484647	M2
10027	A	Open Circuit Breaker F1 on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10028	R	The HVAC electronic is OFF		OK		Sizwe Sibanyoni - 484647	M2
10029	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10030	I	Software Upload		OK		Sizwe Sibanyoni - 484647	M2
10031	I	Follow the procedure in the document below to upload software onto the HVAC electronic		OK		Sizwe Sibanyoni - 484647	M2
10032	A			OK		Sizwe Sibanyoni - 484647	M2
10033	I	Sensor Grade		OK		Sizwe Sibanyoni - 484647	M2
10034	I	Each temperature sensor has calibrated grade information. The sensor must be setup with this information.		OK		Sizwe Sibanyoni - 484647	M2
10035	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		Sizwe Sibanyoni - 484647	M2

10036	R	Sensor grade for HVAC Return Air (RAS) is :		OK	6	Sizwe Sibanyoni - 484647	M2
10037	R	Sensor grade for HVAC Duct Air (DAS) is :		OK	5L	Sizwe Sibanyoni - 484647	M2
10038	R	Sensor grade for HVAC Fresh Air (FAS) is :		OK	4L	Sizwe Sibanyoni - 484647	M2
10039	R	Sensor grade for HVAC Duct Air 2 (DAS2) is :		OK	7	Sizwe Sibanyoni - 484647	M2
10040	A	In the maintenance software, select the "Application settings" page and click the "Sensors" tab		OK		Sizwe Sibanyoni - 484647	M2
10041	A	Enter the data found on the label for each grade. Then, click "Save settings"		OK		Sizwe Sibanyoni - 484647	M2
10042	A	Open Circuit Breaker F1 on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10043	I	Checking 400Vac		OK		Sizwe Sibanyoni - 484647	M2
10044	A	Ensure that the 400Vac Shore Supply is connected to the vehicle, else connect it		OK		Sizwe Sibanyoni - 484647	M2
10045	A	Close Circuit Breaker 57Q1		OK		Sizwe Sibanyoni - 484647	M2
10046	A	On the HVAC Panel check 400Vac (+-5%) between points L1- Phase R, L2- Phase S, L3- Phase T		OK		Sizwe Sibanyoni - 484647	M2
10047	R	400Vac (+-5%) is measured between each of the phases		OK		Sizwe Sibanyoni - 484647	M2
10048	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		Sizwe Sibanyoni - 484647	M2
10049	R	The phase rotation is correct between all three phases		OK		Sizwe Sibanyoni - 484647	M2
10050	I	Saloon HVAC		OK		Sizwe Sibanyoni - 484647	M2
10051	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1___1 = 1		OK		Sizwe Sibanyoni - 484647	M2
10052	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 0		OK		Sizwe Sibanyoni - 484647	M2
10053	A	Force [TT] NRG_HvacM250Cmd = 0		OK		Sizwe Sibanyoni - 484647	M2

10054	A	Close Circuit Breaker F1 on the HVAC Panel		OK		Sizwe Sibanyoni - 484647	M2
10055	R	HVAC unit turns ON and starts to work		OK		Sizwe Sibanyoni - 484647	M2
10056	I	Reconnect the laptop to the HVAC maintenance software using HCU Finder		OK		Sizwe Sibanyoni - 484647	M2
10057	R	The Exhaust fans are Turned Off (Confirm on Forced tab that Actual exhauster speed is OFF)		OK		Sizwe Sibanyoni - 484647	M2
10058	I	Forced Mode (Saloon HVAC)		OK		Sizwe Sibanyoni - 484647	M2
10059	I	For the next sections, walk through the whole car and physically check (feel) that the HVAC is functioning as desired		OK		Sizwe Sibanyoni - 484647	M2
10060	I	In the maintenance software, select the 'Forced' tab, and use the "Required working mode" drop down box to force the following modes:		OK		Sizwe Sibanyoni - 484647	M2
10061	I	Ventilation Mode		OK		Sizwe Sibanyoni - 484647	M2
10062	A	Force Ventilation mode on the Saloon HVAC		OK		Sizwe Sibanyoni - 484647	M2
10063	R	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		Sizwe Sibanyoni - 484647	M2
10064	R	The Exhaust fans are Turned OFF		OK		Sizwe Sibanyoni - 484647	M2
10065	I	Cooling Mode		OK		Sizwe Sibanyoni - 484647	M2
10066	A	Force Cooling mode on the Saloon HVAC		OK		Sizwe Sibanyoni - 484647	M2
10067	R	All saloon HVAC units work in Cooling mode		OK		Sizwe Sibanyoni - 484647	M2
10068	R	The Exhaust fans are Turned OFF		OK		Sizwe Sibanyoni - 484647	M2
10069	I	Heating Mode		OK		Sizwe Sibanyoni - 484647	M2
10070	A	Force Heating mode on the Saloon HVAC		OK		Sizwe Sibanyoni - 484647	M2
10071	R	All saloon HVAC units work in Heating mode		OK		Sizwe Sibanyoni - 484647	M2
10072	R	The Exhaust fans are Turned OFF		OK		Sizwe Sibanyoni - 484647	M2
10073	I	Self-Test		OK		Sizwe Sibanyoni - 484647	M2

10074	A	Force Self-Test on the Saloon HVAC		OK		Sizwe Sibanyoni - 484647	M2
10075	R	All saloon HVAC units work according to the mode described in the "Actual working mode"		OK		Sizwe Sibanyoni - 484647	M2
10076	R	The Exhaust fans are Turned OFF		OK		Sizwe Sibanyoni - 484647	M2
10077	I	HVAC Faults		OK		Sizwe Sibanyoni - 484647	M2
10078	A	Open Circuit Breaker 57Q1		OK		Sizwe Sibanyoni - 484647	M2
10079	R	All saloon HVAC units STOP working		OK		Sizwe Sibanyoni - 484647	M2
10080	A	Close Circuit Breaker 57Q1		OK		Sizwe Sibanyoni - 484647	M2
10081	R	All saloon HVAC units START working		OK		Sizwe Sibanyoni - 484647	M2
10082	A	In the maintenance software, select the "Alarms / Warnings" tab		OK		Sizwe Sibanyoni - 484647	M2
10083	A	Ensure there are no active faults on the HVAC		OK		Sizwe Sibanyoni - 484647	M2
10084	R	No active faults identified on the HVAC unit		OK		Sizwe Sibanyoni - 484647	M2
10085	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr1___1		OK		Sizwe Sibanyoni - 484647	M2
10086	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr2___1		OK		Sizwe Sibanyoni - 484647	M2
10087	A	Release [TT] NRG_HvacM250Cmd		OK		Sizwe Sibanyoni - 484647	M2
10088	I	End of test		OK		Sizwe Sibanyoni - 484647	M2

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 inhib		NE			M2
10015	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr1___1 = 1.0		NE			M2
10016	A	Force [TT] (MPU1)lo_hva_m2hvacinhibr2___1 = 1.0		NE			M2
10017	I	50% HVAC restriction		NE			M2

10018	A	Force [TT] NRG_HvacM250Cmd = 0		NE			M2
10019	I	Saloon HVAC		NE			M2
10020	A	Close Circuit Breaker 57Q2		NE			M2
10021	A	Allow the HVAC to initialize and check on the DDU if the HVAC is online		NE			M2
10022	R	HVAC unit turns ON and starts to work		NE			M2
10023	I	Full "Self test" saloon		NE			M2
10024	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
10025	I	HVAC web portal		NE			M2
10026	R	On status tab, Active mode is off for both cab and saloon		NE			M2
10027	A	Go to Alarms tab and clear all the alarms for saloon and cabin		NE			M2
10028	I	For the following tests make sure on the webHMI tab you change contoller to be controlled by webHMI and not MPU		NE			M2
10029	A	Before running the full test, please click on reset test to reset the previous results.		NE			M2
10030	A	Select Full-Test on the Saloon HVAC		NE			M2
10031	R	All saloon HVAC units work according to the mode described in the "ACTIVE MODE" on the status tab		NE			M2
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			M2
10033	I	Forced Mode (Saloon HVAC)		NE			M2
10034	I	During all tests Walk through the whole car and physically check (feel) that the HVAC is functioning as desired		NE			M2

10035	I	Go to maintenance tab to force the following modes		NE			M2
10036	I	Cooling Mode		NE			M2
10037	A	Select forced Cooling mode on the Saloon HVAC and let it run for 5 mins		NE			M2
10038	R	All HVAC units are cooling		NE			M2
10039	I	Heating Mode		NE			M2
10040	A	Select forced Heating mode on the Saloon HVAC and let it run for 5 mins		NE			M2
10041	R	All HVAC units are heating		NE			M2
10042	I	HVAC Faults		NE			M2
10043	A	In the maintenance software, select the "Alarms" tab		NE			M2
10044	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
10045	R	No active faults identified on the HVAC unit		NE			M2
10046	R	Cabin HVAC turned OFF		NE			M2
10047	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr1___1		NE			M2
10048	A	Release [TT] (MPU1)lo_hva_m2hvacinhibr2___1		NE			M2
10049	A	Release [TT] NRG_HvacM250Cmd		NE			M2
10050	I	End of test		NE			M2

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		Sizwe Sibanyoni - 484647	M2
10002	I	Fire Detection Train Lines		OK		Sizwe Sibanyoni - 484647	M2
10003	I	Fire Detection Train Lines Dev2/76 = END1 90XR24 pin 21 Dev4/76 = END2 90XP34 pin 21		OK		Sizwe Sibanyoni - 484647	M2
10004	A	Force [NI] Dev4/76 = 1.0		OK		Sizwe Sibanyoni - 484647	M2
10005	R	Read Defined Variable [NI] Dev2/76 = 1.0		OK	1	Sizwe Sibanyoni - 484647	M2
10006	A	Force [NI] Dev4/76 = 0.0		OK		Sizwe Sibanyoni - 484647	M2
10007	R	Read Defined Variable [NI] Dev2/76 = 0.0		OK	0	Sizwe Sibanyoni - 484647	M2
10008	I	Continuity Test		OK		Sizwe Sibanyoni - 484647	M2
10009	A	The following steps are continuity tests between the two points described in each step. Use a multimeter for this test.		OK		Sizwe Sibanyoni - 484647	M2
10010	A	From : [(local: +END1 -90XR23.B (pin 4))] to: [(local: +END2 -90XP33.B pin 4)]		OK		Sizwe Sibanyoni - 484647	M2
10011	A	From : [(local: +END1 -90XR23.B (pin 5))] to: [(local: +END2 -90XP33.B pin 5)]		OK		Sizwe Sibanyoni - 484647	M2

Section 15 – Traction and Electric Brake

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		Nqobile Chirwa - 484648	M2
10002	I	Circuit Breakers and Configuration		OK		Nqobile Chirwa - 484648	M2
10003	A	Close Circuit Breaker 33Q1		OK		Nqobile Chirwa - 484648	M2
10004	A	Close Circuit Breaker 33Q2		OK		Nqobile Chirwa - 484648	M2
10005	A	Close Circuit Breaker 33Q3		OK		Nqobile Chirwa - 484648	M2
10006	A	Close Circuit Breaker 33Q4		OK		Nqobile Chirwa - 484648	M2
10007	A	Close Circuit Breaker 33Q5		OK		Nqobile Chirwa - 484648	M2
10008	R	Read Defined Variable [TT] (TBCU2)LI_CAR_ID2 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10009	I	Train Lines		OK		Nqobile Chirwa - 484648	M2
10010	I	110Vdc Normal Traction EL Train Line Dev1/65 = END1 90XP25 pin 42 Dev2/28 = END1 90XP35 pin 14		OK		Nqobile Chirwa - 484648	M2
10011	A	Force [NI] Dev1/65 = 1.0		OK		Nqobile Chirwa - 484648	M2
10012	R	Read Defined Variable [NI] Dev2/28 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10013	A	Force [NI] Dev1/65 = 0.0		OK		Nqobile Chirwa - 484648	M2
10014	R	Read Defined Variable [NI] Dev2/28 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10015	I	Forward Train Lines: Dev2/31 : END1 90XR25 pin 25 Dev4/35 : END2 90XP35 pin 25		OK		Nqobile Chirwa - 484648	M2
10016	A	Force [NI] Dev4/35 = 1.0		OK		Nqobile Chirwa - 484648	M2
10017	R	Read Defined Variable [TT] (TBCU2)LI_FORWARD = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10018	R	Read Defined Variable [NI] Dev2/31 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10019	I	Forward Train Lines: Dev2/31 : END1 90XR25 pin 25 Dev4/35 : END2 90XP35 pin 25		OK		Nqobile Chirwa - 484648	M2

10020	A	Force [NI] Dev4/35 = 0.0		OK		Nqobile Chirwa - 484648	M2
10021	R	Read Defined Variable [TT] (TBCU2)LI_FORWARD = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10022	R	Read Defined Variable [NI] Dev2/31 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10023	I	Reverse Train Lines: Dev2/36 : END1 90XR25 pin 30 Dev4/78 : END2 90XP35 pin 30		OK		Nqobile Chirwa - 484648	M2
10024	A	Force [NI] Dev4/78 = 1.0		OK		Nqobile Chirwa - 484648	M2
10025	R	Read Defined Variable [TT] (TBCU2)LI_REVERSE = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10026	R	Read Defined Variable [NI] Dev2/36 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10027	I	Reverse Train Lines: Dev2/36 : END1 90XR25 pin 30 Dev4/78 : END2 90XP35 pin 30		OK		Nqobile Chirwa - 484648	M2
10028	A	Force [NI] Dev4/78 = 0.0		OK		Nqobile Chirwa - 484648	M2
10029	R	Read Defined Variable [TT] (TBCU2)LI_REVERSE = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10030	R	Read Defined Variable [NI] Dev2/36 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10031	I	Traction Train Lines: Dev2/37 : END1 90XR25 pin 31 Dev4/81 : END2 90XP35 pin 31		OK		Nqobile Chirwa - 484648	M2
10032	A	Force [NI] Dev4/81 = 1.0		OK		Nqobile Chirwa - 484648	M2
10033	R	Read Defined Variable [TT] (TBCU2)LI_TRACTION = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10034	R	Read Defined Variable [NI] Dev2/37 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10035	I	Traction Train Lines: Dev2/37 : END1 90XR25 pin 31 Dev4/81 : END2 90XP35 pin 31		OK		Nqobile Chirwa - 484648	M2
10036	A	Force [NI] Dev4/81 = 0.0		OK		Nqobile Chirwa - 484648	M2
10037	R	Read Defined Variable [TT] (TBCU2)LI_TRACTION = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10038	R	Read Defined Variable [NI] Dev2/37 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10039	I	No Brake Train Lines: Dev2/38 : END1 90XR25 pin 32 Dev4/82 : END2 90XP35 pin 32		OK		Nqobile Chirwa - 484648	M2

10040	A	Force [NI] Dev4/82 = 1.0		OK		Nqobile Chirwa - 484648	M2
10041	R	Read Defined Variable [TT] (TBCU2)LI_NOBRAKE = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10042	R	Read Defined Variable [NI] Dev2/38 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10043	I	No Brake Train Lines: Dev2/38 : END1 90XR25 pin 32 Dev4/82 : END2 90XP35 pin 32		OK		Nqobile Chirwa - 484648	M2
10044	A	Force [NI] Dev4/82 = 0.0		OK		Nqobile Chirwa - 484648	M2
10045	R	Read Defined Variable [TT] (TBCU2)LI_NOBRAKE = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10046	R	Read Defined Variable [NI] Dev2/38 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10047	I	Traction Interlock Bypass Train Lines Dev2/4 : END1 90XR24 pin 6 Dev4/4 : END2 90XP34 pin 6		OK		Nqobile Chirwa - 484648	M2
10048	A	Force [NI] Dev4/4 = 1.0		OK		Nqobile Chirwa - 484648	M2
10049	R	Read Defined Variable [NI] Dev2/4 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10050	A	Force [NI] Dev4/4 = 0.0		OK		Nqobile Chirwa - 484648	M2
10051	R	Read Defined Variable [NI] Dev2/4 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10052	I	Traction Interlock Train Lines Dev2/39 : END1 90XR25 pin 41 Dev4/83 : END2 90XP35 pin 41		OK		Nqobile Chirwa - 484648	M2
10053	A	Force [NI] Dev4/83 = 1.0		OK		Nqobile Chirwa - 484648	M2
10054	R	Read Defined Variable [TT] (TBCU2)LI_NOT_INHIB = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10055	R	Read Defined Variable [NI] Dev2/39 = 1.0		OK	1	Nqobile Chirwa - 484648	M2
10056	I	Traction Interlock Train Lines Dev2/39 : END1 90XR25 pin 41 Dev4/83 : END2 90XP35 pin 41		OK		Nqobile Chirwa - 484648	M2
10057	A	Force [NI] Dev4/83 = 0.0		OK		Nqobile Chirwa - 484648	M2
10058	R	Read Defined Variable [TT] (TBCU2)LI_NOT_INHIB = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10059	R	Read Defined Variable [NI] Dev2/39 = 0.0		OK	0	Nqobile Chirwa - 484648	M2
10060	I	Coolant Liquid		OK		Nqobile Chirwa - 484648	M2

10061	A	Check that the coolant level is at least 1/2 of the sight glass level indicator		OK		Nqobile Chirwa - 484648	M2
10062	R	Coolant Liquid Level is OK		OK		Nqobile Chirwa - 484648	M2
10063	I	End of Test		OK		Nqobile Chirwa - 484648	M2

Section 16 – Vehicle Normalization

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		Nqobile Chirwa - 484648	M2
10002	I	This inspection must be performed by the EPU/Acting EPU Manager on shift		OK		Nqobile Chirwa - 484648	M2
10003	I	The VFT procedures are all completed		OK		Nqobile Chirwa - 484648	M2
10004	I	Vehicle Normalization Check		OK		Nqobile Chirwa - 484648	M2
10005	R	On LV3 all Circuit Breakers are installed and secured		OK		Nqobile Chirwa - 484648	M2
10006	R	On LV3 all Dataplugs are installed, tightened and earth braids are fastened		OK		Nqobile Chirwa - 484648	M2
10007	R	On LV3 all Connectors are tightened		OK		Nqobile Chirwa - 484648	M2
10008	R	On LV3 there are no missing components, device, wiring or connectors.		OK		Nqobile Chirwa - 484648	M2
10009	A	ON LV3, make sure that both bolts on 93XT300 terminal 4 are tightened and torque marked.		OK		Nqobile Chirwa - 484648	M2
10010	R	On LV6 all Dataplugs are installed, tightened and earth braids are fastened		OK		Nqobile Chirwa - 484648	M2
10011	R	On LV6 all Connectors are tightened		OK		Nqobile Chirwa - 484648	M2
10012	R	On LV6 there are no missing components, device, wiring or connectors.		OK		Nqobile Chirwa - 484648	M2
10013	R	On LV4 all Connectors are tightened		OK		Nqobile Chirwa - 484648	M2
10014	R	On LV4 there are no missing components, device, wiring or connectors.		OK		Nqobile Chirwa - 484648	M2
10015	R	On HC Cubicle the Controller is installed and properly tightened and its connectors are tightened		OK		Nqobile Chirwa - 484648	M2
10016	R	All DCUs are properly installed and secured		OK		Nqobile Chirwa - 484648	M2

10017	R	All Internal Displays are properly installed and secured		OK		Nqobile Chirwa - 484648	M2
10018	R	All Light Covers are properly installed		OK		Nqobile Chirwa - 484648	M2
10019	R	All Saloon Fire Detectors are properly installed and secured		OK		Nqobile Chirwa - 484648	M2
10020	R	All covers are normalised inside the car		OK		Nqobile Chirwa - 484648	M2
10021	R	On the Underframe, TBCU Agate is installed and properly tightened		OK		Nqobile Chirwa - 484648	M2
10022	R	On the Underframe, Auxiliary Compressor cover is normalized		OK		Nqobile Chirwa - 484648	M2
10023	R	On the Underframe, Panto panel cover is normalized		OK		Nqobile Chirwa - 484648	M2
10024	R	On the Underframe, Speed Sensors are installed and properly tightened		OK		Nqobile Chirwa - 484648	M2
10025	R	On the LVB, all Circuit Breakers are installed and properly tightened		OK		Nqobile Chirwa - 484648	M2
10026	R	On the LVB, all Relays and Timers are installed and properly tightened		OK		Nqobile Chirwa - 484648	M2
10027	R	On the LVB, BRIOMs are installed and properly tightened		OK		Nqobile Chirwa - 484648	M2
10028	R	On the LVB there are no missing components, device, wiring or connectors.		OK		Nqobile Chirwa - 484648	M2
10029	R	On the Underframe, all Connectors are tightened		OK		Nqobile Chirwa - 484648	M2
10030	R	All underframe covers are normalised		OK		Nokuzola Mdluli - 491469	M2
10031	R	On END1 the Octopus cables are disconnected from the car and properly stored.		OK		Nqobile Chirwa - 484648	M2
10032	R	On END2 the Octopus cables are disconnected from the car and properly stored.		OK		Nqobile Chirwa - 484648	M2
10033	R	On the roof, there is no Strap connected to the Pantograph		OK		Nqobile Chirwa - 484648	M2
10034	R	The Test Bench is switched OFF and the Octopus cables are disconnected and properly stored		OK		Nqobile Chirwa - 484648	M2

10035	R	ALL P.Os of this car are closed		OK		Nokuzola Mdluli - 491469	M2

Section 17 – PACIS Network

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		Nqobile Chirwa - 484648	M2
10002	I	Initial conditions		OK		Nqobile Chirwa - 484648	M2
10003	I	110Vdc Normal line is connected and ON		OK		Nqobile Chirwa - 484648	M2
10004	I	Circuit Breaker		OK		Nqobile Chirwa - 484648	M2
10005	A	Close Circuit Breaker 54Q1		OK		Nqobile Chirwa - 484648	M2
10006	A	Close Circuit Breaker 54Q2		OK		Nqobile Chirwa - 484648	M2
10007	A	Close Circuit Breaker 54Q10		OK		Nqobile Chirwa - 484648	M2
10008	A	Close Circuit Breaker 54Q11		OK		Nqobile Chirwa - 484648	M2
10009	A	Close Circuit Breaker 55Q2		OK		Nqobile Chirwa - 484648	M2
10010	A	Close Circuit Breaker 55Q3		OK		Nqobile Chirwa - 484648	M2
10011	R	All 'Pacis System' circuit breakers are closed		OK		Nqobile Chirwa - 484648	M2
10012	I	Power Supply of Router Switches		OK		Nqobile Chirwa - 484648	M2
10013	I	Ethernet Switch CRS1		OK		Nqobile Chirwa - 484648	M2
10014	R	CRS1 is ON		OK		Nqobile Chirwa - 484648	M2
10015	I	Ethernet Switch CRS2		OK		Nqobile Chirwa - 484648	M2
10016	R	CRS2 is ON		OK		Nqobile Chirwa - 484648	M2
10017	I	DPAI-1		OK		Nqobile Chirwa - 484648	M2
10018	R	DPAI-1 is ON		OK		Nqobile Chirwa - 484648	M2
10019	I	DPAI-2		OK		Nqobile Chirwa - 484648	M2
10020	R	DPAI-2 is ON		OK		Nqobile Chirwa - 484648	M2
10021	I	Lateral Display 'LAT1'		OK		Nqobile Chirwa - 484648	M2

10022	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT1'		OK		Nqobile Chirwa - 484648	M2
10023	I	Lateral Display 'LAT2'		OK		Nqobile Chirwa - 484648	M2
10024	R	The PWR (power) LED is "ON" on the Lateral Display 'LAT2'		OK		Nqobile Chirwa - 484648	M2
10025	I	Interior Display 'INT1'		OK		Nqobile Chirwa - 484648	M2
10026	R	The PWR (power) LED is "ON" on the Interior Display 'INT1'		OK		Nqobile Chirwa - 484648	M2
10027	I	Interior Display 'INT2'		OK		Nqobile Chirwa - 484648	M2
10028	R	The PWR (power) LED is "ON" on the Interior Display 'INT2'		OK		Nqobile Chirwa - 484648	M2
10029	I	Impedance of Loudspeaker		OK		Nqobile Chirwa - 484648	M2
10030	I	Saloon Speakers Commanded by DPAI-1		OK		Nqobile Chirwa - 484648	M2
10031	A	Measure the impedance connector '54XP1_X4' between pins: z32(+) and z30 (-)		OK		Nqobile Chirwa - 484648	M2
10032	R	Impedance Result Max : x <= 32 (Ohms)		OK	30.8	Nqobile Chirwa - 484648	M2
10033	I	Saloon Speakers Commanded by DPAI-2		OK		Nqobile Chirwa - 484648	M2
10034	A	Measure the impedance connector '54XP2_X4' between pins: z32(+) and z30 (-)		OK		Nqobile Chirwa - 484648	M2
10035	R	Impedance Result Max : x <= 32 (Ohms)		OK	30.4	Nqobile Chirwa - 484648	M2
10036	I	Data plugs		OK		Nqobile Chirwa - 484648	M2
10037	A	Insert and secure data plugs in the CRS		OK		Nqobile Chirwa - 484648	M2

Section 18 – Report summaries

18.1 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		
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		

18.2 Tools used

Function	Tool name	Tool number	Next Calibration date
015_NRG	Phasemeter	Phasemeter	8/25/2024
021_PNT	Manometer	Manometer	7/31/2024
040_SBK	Manometer	Manometer	7/31/2024
045_PBK	Manometer	Manometer	7/31/2024
057_HVA	Phasemeter	Phasemeter	8/25/2024
062_ETS	Multimeter	Meter 1	8/25/2024

064_COM	GSM-R - tester	Radio Analyser	8/23/2024
067_FSD	Multimeter	Meter 1	8/25/2024

Vehicle	Equipment	Expected version	Version loaded
M2			