PROJECT	CUSTOMER	VEHICLE
Xtrapolis-PRASA	**PRASA**	**234 – M2 – VPT**

RTR Vehicle Pre-Testing TS234 M2 Report

GIB0000006942

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

Rev	Date	Modifications Content	Writer
A0	17/07/2024	Creation	Neliswa MABUNDA

Internal validations

	Name	Function	Date	Signature
Creator	Neliswa MABUNDA	EPU Manager	17/07/2024	X Neliswa MABUNDA EPU Manager
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Execution Plan

Start Date	09/07/2024
End Date	09/07/2024

Contents

Section 1 – Purpose / Objectives

1. Protective Bonding

The objective of this procedure is to verify the return path of the current to the ground.

2. Reflectometry

The objective of this procedure is to verify the integrity of the ethernet cables.

3. Config

The objective of this procedure is to set up car ID for specific systems such as fire and to verify wiring to the speed sensors and OTDR.

4. Traction motors

The objective of this procedure is to verify the wiring configuration of the motors. This is to ensure that all the motors are wired the same and shall rotate in the same direction in operation

Section 2 – Protective Bonding and Return Current

2.1 Instructions list

2.1.1 012_PB-Protective Bonding and Return Current

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Return Circuit: Car Body to Ground		OK		Vuma Mlaba - 435642	M2
10002	I	The purpose of this test is to confirm that the car body of each car in the train is connected to ground via the earthing brush which will ensure that current from the overhead wire is returned to the substation without damage to equipment or risk of electric shock		OK		Vuma Mlaba - 435642	M2
10003	A	Use the Tool List to record the serial number of the Ohmmeter that will be used in this test		OK		Vuma Mlaba - 435642	M2
10004	A	Ensure that the current setpoint is 50A and voltage <50V (applicable for all impedance measurement) on the ohmmeter device to be used for the test.		OK		Vuma Mlaba - 435642	M2
10005	I	For all impedance measurements of the car body to ground the positive terminal shall be connected to the car body and the negative terminal to the rail		OK		Vuma Mlaba - 435642	M2
10006	I	For all other impedance measurements, the positive terminal shall be connected to the tested subject and the negative terminal to the car body shell		OK		Vuma Mlaba - 435642	M2
10007	A	Visually identify and inspect that the earthing cables of the 1st and 2nd axle of the 1st and 2nd Bogie Frame are properly connected to the axle brushes		OK		Vuma Mlaba - 435642	M2
10008	A	Disconnect from the axle box the earthing cable of the 1st and 2nd axle of the 1st and 2nd Bogie Frame of the M2 car		OK		Vuma Mlaba - 435642	M2
10009	R	All the earthing cables of the M2 car are disconnected.		OK		Vuma Mlaba - 435642	M2
10010	A	Connect the earthing cable of the 1st axle in the 1st Bogie Frame		OK		Vuma Mlaba - 435642	M2
10011	R	Only the earthing cable of the 1st axle of the 1st Bogie Frame is connected		OK		Vuma Mlaba - 435642	M2

10012	A	Using an ohmmeter measure the impedance between the car body to rail		OK		Vuma Mlaba - 435642	M2
10013	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00428	Vuma Mlaba - 435642	M2
10014	A	Disconnect the earthing cable of the 1st axle of the 1st bogie frame		OK		Vuma Mlaba - 435642	M2
10015	R	Earthing cable disconnected		OK		Vuma Mlaba - 435642	M2
10016	A	Connect the earthing cable of the 2nd axle in the 1st Bogie Frame		OK		Vuma Mlaba - 435642	M2
10017	R	Only the earthing cable of the 2nd axle of the 1st Bogie Frame is connected		OK		Vuma Mlaba - 435642	M2
10018	A	Using an ohmmeter measure the impedance between the car body to rail		OK		Vuma Mlaba - 435642	M2
10019	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00438	Vuma Mlaba - 435642	M2
10020	R	Earthing cable disconnected		OK		Vuma Mlaba - 435642	M2
10021	A	Disconnect the earthing cable of the 2nd axle of the 1st bogie frame		OK		Vuma Mlaba - 435642	M2
10022	I	Earthing of Equipment on the Underframe		OK		Vuma Mlaba - 435642	M2
10023	A	Connect the earthing cable of the 1st axle in the 2nd Bogie Frame		OK		Vuma Mlaba - 435642	M2
10024	R	Only the earthing cable of the 1st axle of the 2nd Bogie Frame is connected		OK		Vuma Mlaba - 435642	M2
10025	A	Using an ohmmeter measure the impedance between the car body to rail		OK		Vuma Mlaba - 435642	M2
10026	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00348	Vuma Mlaba - 435642	M2
10027	A	Disconnect the earthing cable of the 1st axle of the 2nd bogie frame		OK		Vuma Mlaba - 435642	M2
10028	R	Earthing cable disconnected		OK		Vuma Mlaba - 435642	M2
10029	A	Connect the earthing cable of the 2nd axle in the 2nd Bogie Frame		OK		Vuma Mlaba - 435642	M2
10030	R	Only the earthing cable of the 1st axle of the 2nd Bogie Frame is connected		OK		Vuma Mlaba - 435642	M2
10031	A	Using an ohmmeter measure the impedance between the car body to rail		OK		Vuma Mlaba - 435642	M2

10032	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00486	Vuma Mlaba - 435642	M2
10033	A	Reconnect all earthing cables of the 1st and 2nd axle of the 1st and 2nd Bogie Frame		OK		Vuma Mlaba - 435642	M2
10034	R	All earthing cables connected on the 1st and 2nd Bogie Frame		OK		Vuma Mlaba - 435642	M2
10035	A	Visually inspect that the earthing cable connecting the Traction Inverter Case to M2 car body is properly connected and related bolts are correctly torqued.		OK		Vuma Mlaba - 435642	M2
10036	R	Traction Inverter Case visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10037	A	Using an ohmmeter measure the impedance between the Traction Inverter Case and the car body		OK		Vuma Mlaba - 435642	M2
10038	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00476	Vuma Mlaba - 435642	M2
10039	A	Visually inspect that the earthing cable connecting the Line Inductor Case to M4 car body is properly connected and related bolts are correctly torqued.		OK		Vuma Mlaba - 435642	M2
10040	R	Line Inductor Case visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10041	A	Using an ohmmeter measure the impedance between the Line Inductor Case and the car body		OK		Vuma Mlaba - 435642	M2
10042	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00217	Vuma Mlaba - 435642	M2
10043	A	Visually inspect that the earthing cable connecting the Traction Motors of the 1st and 2nd axle of the 1st Bogie Frame to the car body is properly connected and related bolts are correctly torqued		OK		Vuma Mlaba - 435642	M2
10044	R	Traction Motors visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10045	A	Using an ohmmeter measure the impedance between the Traction Motors of the 1st and 2nd axle of the 1st Bogie Frame and the car body		OK		Vuma Mlaba - 435642	M2
10046	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00475	Vuma Mlaba - 435642	M2
10047	A	Visually inspect that the earthing cable connecting the Traction Motors of the 1st and 2nd axle of the 2nd Bogie Frame to		OK		Vuma Mlaba - 435642	M2

		the car body is properly connected and related bolts are correctly torqued					
10048	R	Traction Motors visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10049	A	Using an ohmmeter measure the impedance between the Traction Motors of the 1st and 2nd axle of the 2nd Bogie Frame and the car body		OK		Vuma Mlaba - 435642	M2
10050	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00396	Vuma Mlaba - 435642	M2
10051	I	Earthing of Equipment on the Roof		OK		Vuma Mlaba - 435642	M2
10052	A	Visually inspect that the earthing cable connecting the 1st Braking Resistor Box to M2 car body is properly connected and related bolts are correctly torqued.		OK		Vuma Mlaba - 435642	M2
10053	R	1st Braking Resistor Box visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10054	A	Using an ohmmeter measure the impedance between the 1st Braking Resistor Box and the car body		OK		Vuma Mlaba - 435642	M2
10055	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00438	Vuma Mlaba - 435642	M2
10056	A	Visually inspect that the earthing cable connecting the Saloon HVAC to M2 car body is properly connected and related bolts are correctly torqued.		OK		Vuma Mlaba - 435642	M2
10057	R	Saloon HVAC visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10058	A	Using an ohmmeter measure the impedance between the Saloon HVAC and the car body		OK		Vuma Mlaba - 435642	M2
10059	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00438	Vuma Mlaba - 435642	M2
10060	A	Visually inspect that the earthing cable connecting the 2nd Braking Resistor Box to M2 car body is properly connected and related bolts are correctly torqued.		OK		Vuma Mlaba - 435642	M2
10061	R	2nd Braking Resistor Box visually grounded and torque is correctly marked		OK		Vuma Mlaba - 435642	M2
10062	A	Using an ohmmeter measure the impedance between the 2nd Braking Resistor Box and the car body		OK		Vuma Mlaba - 435642	M2

10063	R	Impedance Result Max : x <= 0.05 (Ohms)		OK	0.00438	Vuma Mlaba - 435642	M2

Section 3 – Reflectometry

3.1 Instructions list

3.1.1 025_NET-Network Cabling Integrity

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Network Cabling Integrity Test		OK		Sinazo Mkhwa - 529940	M2
10002	I	It is necessary to check the network cables to ensure that they have been installed correctly to improve the overall operation of the system.		OK		Sinazo Mkhwa - 529940	M2
10003	I	The Cable Analyzer Module DSX-5000 will be used to validate cabling		OK		Sinazo Mkhwa - 529940	M2
10004	I	Register as a new Operator on the DSX-5000. Check on the manual below on how to register as a new Operator		OK		Sinazo Mkhwa - 529940	M2
10005	I	When saving the tests results for each line, it should be named by its trainset number (X) and the test code (Indicated in the test step). i.e. TS021_M2_P01 for PACIS and TS021_M2_T01 for TCMS.		OK		Sinazo Mkhwa - 529940	M2
10006	I	TCMS cabling		OK		Sinazo Mkhwa - 529940	M2
10007	A	From: [25A10 SWITCH ETHERNET (CRS1) (Local: +LV3; Connector: 25XP10_X4)] to: [25A11 SWITCH ETHERNET (CRS2) (Local: +LV3; Connector: 25XP11_X3)] NOTE: Cable is crossed TSX_M2_T01		OK		Sinazo Mkhwa - 529940	M2
10008	A	From: [25A10 SWITCH ETHERNET (CRS1) (Local: +LV3; Connector: 25XP10_X3)] to: [Local: END1 , Connector 90XR21.All NOTE: Cable is crossed TSX_M2_T02		OK		Sinazo Mkhwa - 529940	M2

10009	A	From: [25A14 TBR-M2 (Local: +LV3; Connector: 25XP14_ETH0)] to: [(Local: +END1; Connector: 90XR21.AI)] NOTE: Cable is crossed TSX_M2_T03		OK		Sinazo Mkhwa - 529940	M2
10010	A	From: [25A14 TBR-M2 (Local: +LV3; Connector: 25XP14_ETH1)] to: [(Local: +END2; Connector: 90XR31.AI)] NOTE: Cable is crossed TSX_M2_T04		OK		Sinazo Mkhwa - 529940	M2
10011	A	From: [25A11 Ethernet Switch (Local: +LV3; Connector: 25XP11_X4)] to: [(Local: +END2; Connector: 90XR31.AII)] NOTE: Cable is straight TSX_M2_T05		OK		Sinazo Mkhwa - 529940	M2
10012	A	From: [(Local: +END2; Connector: 90XR32.AI)] to: [(Local: +END1; Connector: 90XR22.AI)] NOTE: Cable is straight TSX_M2_T06		OK		Sinazo Mkhwa - 529940	M2
10013	A	From: [(Local: +END2; Connector: 90XR32.AII)] to: [(Local: +END1; Connector: 90XR22.AII)] NOTE: Cable is straight TSX_M2_T07		OK		Sinazo Mkhwa - 529940	M2
10014	I	Pacis cabling		OK		Sinazo Mkhwa - 529940	M2
10015	A	From: [(Local: +END2; Connector: -90XR32.EII)] to: [(Local: +END1; Connector: -90XR22.EII)] NOTE: Cable is straight TSX_M2_P01		OK		Sinazo Mkhwa - 529940	M2
10016	A	From: [54A10 SWITCH ETHERNET (CRS1) (Local: +LV6; Connector: 54XP10_X7)] to: [(Local: +END2; Connector: -90XR31.EII)] NOTE: Cable is crossed TSX_M2_P02		OK		Sinazo Mkhwa - 529940	M2
10017	A	From: [54A11 SWITCH ETHERNET (CRS2) (Local: +LV6; Connector: 54XP11_X8)] to: [(Local: +END1; Connector: -90XR21.EII)] NOTE: Cable is straight		OK		Sinazo Mkhwa - 529940	M2

		TSX_M2_P03					
10018	A	From: [54A11 SWITCH ETHERNET (CRS2) (Local: +LV6; Connector: 54XP11_X7)] to: [54A10 SWITCH ETHERNET (CRS1) (Local: +LV6; Connector: 54XP10_X8)] NOTE: Cable is crossed TSX_M2_P04		OK		Sinazo Mkhwa - 529940	M2
10019	A	All cables have been validated on M2		OK		Sinazo Mkhwa - 529940	M2
10020	R	Download all the results from Fluke and save them on PC with folder name "M2_TSxx"		OK		Ntobeko Ndlovu - 421595	M2

Section 4 – Config

4.1 Instructions list

4.1.1 CONFIG-Vehicle Configuration

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Configuration Checks		OK		Goitsemodimo Kgatitswe - 526511	M2
10002	A	Check continuity on all pins of End 1 connector 90XP15 & 90XP14 to ground		OK		Goitsemodimo Kgatitswe - 526511	M2
10003	R	There is no continuity		OK		Goitsemodimo Kgatitswe - 526511	M2
10004	A	Check continuity on all pins of End 2 connector 90XP15 & 90XP14 to ground		OK		Goitsemodimo Kgatitswe - 526511	M2
10005	R	There is no continuity		OK		Goitsemodimo Kgatitswe - 526511	M2
10006	I	Smoke Detector Address Configuration		OK		Goitsemodimo Kgatitswe - 526511	M2
10007	A	Remove and configure the Smoke Detector 67A2 (+PA1) according to the figure below.		OK		Goitsemodimo Kgatitswe - 526511	M2
10008	A	Reconnect Smoke Detector 67A2		OK		Goitsemodimo Kgatitswe - 526511	M2
10009	A	Remove and configure the Smoke Detector 67A3 (+PA3) according to the figure below.		OK		Goitsemodimo Kgatitswe - 526511	M2
10010	I	Line Heat Detection		OK		Goitsemodimo Kgatitswe - 526511	M2
10011	R	Measure the resistance between point 1 and point 4 of the connector 67XP3_11 Result Min/Max : 550<= x<= 700 ()		OK	558.7	Goitsemodimo Kgatitswe - 526511	M2
10012	A	Reconnect Smoke Detector 67A3		OK		Goitsemodimo Kgatitswe - 526511	M2
10013	I	OTDR LOOP		OK		Goitsemodimo Kgatitswe - 526511	M2
10014	I	Check the continuity between the following points:		OK		Goitsemodimo Kgatitswe - 526511	M2

10015	A	From: [+lV1 (local +END2 Connector 90XR33.B (pin 1))] to: [local +END1 Connector -90XR23.B (pin1)]		OK		Goitsemodimo Kgatitswe - 526511	M2
10016	A	From: [-lV1 (local +END2 Connector 90XR33.B (pin 2))] to: [local +END1 Connector -90XR23.B (pin 2)]		OK		Goitsemodimo Kgatitswe - 526511	M2

Section 5 – Traction Motors

5.1 Instructions list

5.1.1 011_TRM-Traction Motors

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Traction Motors (SPP = 11)		OK		Vuma Mlaba - 435642	M2
10002	I	Ensure all the CONNECTORS are fully ASSEMBLED before running a continuity test.		OK		Vuma Mlaba - 435642	M2
10003	I	The following test is used to confirm the wiring of the traction motors.		OK		Vuma Mlaba - 435642	M2
10004	I	SAFETY NOTICE: It is important to ensure that there is no 400Vac power supply on the vehicle.		OK		Vuma Mlaba - 435642	M2
10005	A	Switch OFF the 400Vac power supply at the source and disconnect the supply cables from the vehicle		OK		Vuma Mlaba - 435642	M2
10006	R	There is no 400Vac available on the vehicle		OK		Vuma Mlaba - 435642	M2
10007	I	Visual Inspection		OK		Vuma Mlaba - 435642	M2
10008	I	For motor 1 and motor 2 connect 11XR1 and 11XR2 and visually inspect that the following cables are connected. From -11XR1 connector to -11M1 motor and -11XR2 connector to -11M2 motor respectively. NOTE: the cable configuration should be straight, none should cross the other.		OK		Vuma Mlaba - 435642	M2
10009	I	Motor 2		OK		Vuma Mlaba - 435642	M2
10010	R	[-11XR2 connector (local: UND -11XP2_2.X1 pin 1)] connected to: [-11XT2 motor terminals (U) -11M2].		OK		Vuma Mlaba - 435642	M2
10011	R	[-11XR2 connector (local: UND -11XP2_2.X2 pin 1)] connected to: [-		OK		Vuma Mlaba - 435642	M2

		11XT2 motor terminals (V) -11M2].					
10012	R	[-11XR2 connector (local: UND - 11XP2_2.X3 pin 1)] connected to: [-11XT2 motor terminals (W) -11M2].		OK		Vuma Mlaba - 435642	M2
10013	R	-11M2 Motor terminals PE connected to -11GND2.		OK		Vuma Mlaba - 435642	M2
10014	I	Motor 1		OK		Vuma Mlaba - 435642	M2
10015	R	[-11XR1 connector (local: UND - 11XP1_2.X1 pin 1)] connected to: [-11XT1 motor terminals (U) -11M1].		OK		Vuma Mlaba - 435642	M2
10016	R	[-11XR1 connector (local: UND - 11XP1_2.X2 pin 1)] connected to: [-11XT1 motor terminals (V) -11M1].		OK		Vuma Mlaba - 435642	M2
10017	R	[-11XR1 connector (local: UND - 11XP1_2.X3 pin 1)] connected to: [-11XT1 motor terminals (W) -11M1].		OK		Vuma Mlaba - 435642	M2
10018	R	-11M1 Motor terminals PE connected to -11GND1.		OK		Vuma Mlaba - 435642	M2
10019	I	Visual Inspection		OK		Vuma Mlaba - 435642	M2
10020	I	For motor 3 and motor 4 connect 11XR3 and 11XR4 and visually inspect that the following cables are connected. From -11XR3 connector to -11M3 motor and -11XR4 connector to -11M4 motor respectively. NOTE: the cable configuration should be straight, none should cross the other		OK		Vuma Mlaba - 435642	M2
10021	I	Motor 3		OK		Vuma Mlaba - 435642	M2
10022	R	[-11XR3 connector (local: UND - 11XP3_2.X1 pin 1)] connected to: [-11XT3 motor terminals (U) -11M3].		OK		Vuma Mlaba - 435642	M2
10023	R	[-11XR3 connector (local: UND - 11XP3_2.X2 pin 1)] connected to: [-11XT3 motor terminals (V) -11M3].		OK		Vuma Mlaba - 435642	M2
10024	R	[-11XR3 connector (local: UND - 11XP3_2.X3 pin 1)] connected to: [-11XT3 motor terminals (W) -11M3].		OK		Vuma Mlaba - 435642	M2
10025	R	-11M3 Motor terminals PE connected to -11GND3		OK		Vuma Mlaba - 435642	M2

10026	I	Motor 4		OK		Vuma Mlaba - 435642	M2
10027	R	[-11XR4 connector (local: UND - 11XP4_2.X1 pin 1)] connected to: [-11XT4 motor terminals (U) -11M4].		OK		Vuma Mlaba - 435642	M2
10028	R	[-11XR4 connector (local: UND - 11XP4_2.X2 pin 1)] connected to: [-11XT4 motor terminals (V) -11M4].		OK		Vuma Mlaba - 435642	M2
10029	R	[-11XR4 connector (local: UND - 11XP4_2.X3 pin 1)] connected to: [-11XT4 motor terminals (W) -11M4].		OK		Vuma Mlaba - 435642	M2
10030	R	-11M4 Motor terminals PE connected to -11GND4.		OK		Vuma Mlaba - 435642	M2

Section 6 – Report summaries

6.1 Results status

Test Instruction Sheet	Compliant	Incomplete	Non-compliant
Traction Motors	X		
Reflectometry	X		
Protective Bonding and Return Current	X		
Config	X		

6.2 Tools used

Function	Tool name	Tool number	Next Calibration date
012_PB	Megger	Megger	8/25/2025
025_NET	Cable Analyser DSX5000	Fluke machine_Gibela	7/31/2024
CONFIG	Multimeter	Meter 1	8/25/2024

Vehicle	Equipment	Expected version	Version loaded
M2			