

| PROJECT         | CUSTOMER | VEHICLE        |
|-----------------|----------|----------------|
| Xtrapolis-PRASA | PRASA    | 242 – M2 – VPT |

RTR Vehicle Pre-Testing TS242 M2 Report  
 GIB0000007070



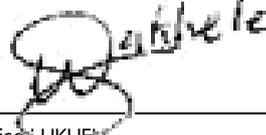
|                  | CREATED       | VERIFIED       | APPROVED        | DISTRIBUTION                                                                                                                                                        |
|------------------|---------------|----------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name</b>      | Vusumuzi ZULU | Sifiso LUKHELE | Kgomotso NKOANA | Confidentiality Category<br><i>Restricted</i> <i>Project</i> <i>Normal</i><br><input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> |
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| <b>Signature</b> |               |                |                 | Language<br><b>EN</b>                                                                                                                                               |

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### Table of modifications

| Rev | Date       | Modifications Content | Writer        |
|-----|------------|-----------------------|---------------|
| A0  | 20/08/2024 | Creation              | Vusumuzi ZULU |

### Internal validations

|                 | Name            | Function            | Date       | Signature                                                                                                                        |
|-----------------|-----------------|---------------------|------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Creator</b>  | Vusumuzi ZULU   | EPU Manager         | 20/08/2024 | X <br>Vusumuzi ZULU<br>EPU Manager            |
| <b>Verifier</b> | Sifiso LUKHELE  | Serial Test Manager | 20/08/2024 | X <br>Sifiso LUKHELE<br>Serial Test Manager |
| <b>Approver</b> | Kgomotso NKOANA | Test Expert         | 20/08/2024 | X <br>Kgomotso NKOANA<br>Test Expert        |

### Execution Plan

|                   |            |
|-------------------|------------|
| <b>Start Date</b> | 22/08/2024 |
| <b>End Date</b>   | 22/08/2024 |

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## Section 1 – Purpose / Objectives

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### 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



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## Section 2 – Protective Bonding and Return Current

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### 2.2 Instructions list

### 2.2.1 012\_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<br>Result Max : $x \leq 0.05$ (Ohms)                              |  | OK | 0.00438 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                              |  | OK | 0.00384 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                              |  | OK | 0.00327 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                                                       |  | OK | 0.00431 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                                                       |  | OK | 0.00361 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                                                       |  | OK | 0.00437 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                                                       |  | OK | 0.00324 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                 |  | OK | 0.00371 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                 |  | OK | 0.00328 | 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<br>Result Max : $x \leq 0.05$ (Ohms)                                                                                                                 |  | OK | 0.00328 | 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 |



|                                                                          |                                                    |                             |
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|       |   |                                                |  |    |         |                     |    |
|-------|---|------------------------------------------------|--|----|---------|---------------------|----|
| 10063 | R | Impedance<br>Result Max : $x \leq 0.05$ (Ohms) |  | OK | 0.00395 | Vuma Mlaba - 435642 | M2 |
|-------|---|------------------------------------------------|--|----|---------|---------------------|----|



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## Section 3 – Reflectometry

### 3.2 Instructions list

#### 3.2.1 025\_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            |              | Thandanani Makhanya<br>- 463827 | 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            |              | Thandanani Makhanya<br>- 463827 | M2      |
| 10003 | I    | The Cable Analyzer Module DSX-5000 will be used to validate cabling                                                                                                                               |                                                                                     | OK            |              | Thandanani Makhanya<br>- 463827 | 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            |              | Thandanani Makhanya<br>- 463827 | 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            |              | Thandanani Makhanya<br>- 463827 | M2      |
| 10006 | I    | TCMS cabling                                                                                                                                                                                      |                                                                                     | OK            |              | Thandanani Makhanya<br>- 463827 | M2      |
| 10007 | A    | From: [25A10 SWITCH ETHERNET (CRS1) (Local: +LV3; Connector: 25XP10_X4)] to: [25A11 SWITCH ETHERNET (CRS2) (Local: +LV3; Connector: 25XP11_X3)]<br><br>NOTE: Cable is crossed<br>TSX_M2_T01       |                                                                                     | OK            |              | Thandanani Makhanya<br>- 463827 | M2      |
| 10008 | A    | From: [25A10 SWITCH ETHERNET (CRS1) (Local: +LV3; Connector: 25XP10_X3)] to: [Local: END1 , Connector 90XR21.All]<br><br>NOTE: Cable is crossed<br>TSX_M2_T02                                     |                                                                                     | OK            |              | Thandanani Makhanya<br>- 463827 | M2      |

|       |   |                                                                                                                                                                  |  |    |  |                                 |    |
|-------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|--|---------------------------------|----|
| 10009 | A | From: [25A14 TBR-M2 (Local: +LV3; Connector: 25XP14_ETH0)] to: [(Local: +END1; Connector: 90XR21.A1)]<br><br>NOTE: Cable is crossed<br>TSX_M2_T03                |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10010 | A | From: [25A14 TBR-M2 (Local: +LV3; Connector: 25XP14_ETH1)] to: [(Local: +END2; Connector: 90XR31.A1)]<br><br>NOTE: Cable is crossed<br>TSX_M2_T04                |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10011 | A | From: [25A11 Ethernet Switch (Local: +LV3; Connector: 25XP11_X4)] to: [(Local: +END2; Connector: 90XR31.A1)]<br><br>NOTE: Cable is straight<br>TSX_M2_T05        |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10012 | A | From: [(Local: +END2; Connector: 90XR32.A1)] to: [(Local: +END1; Connector: 90XR22.A1)]<br><br>NOTE: Cable is straight<br>TSX_M2_T06                             |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10013 | A | From: [(Local: +END2; Connector: 90XR32.A1)] to: [(Local: +END1; Connector: 90XR22.A1)]<br><br>NOTE: Cable is straight<br>TSX_M2_T07                             |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10014 | I | Pacis cabling                                                                                                                                                    |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10015 | A | From: [(Local: +END2; Connector: -90XR32.E1)] to: [(Local: +END1; Connector: -90XR22.E1)]<br><br>NOTE: Cable is straight<br>TSX_M2_P01                           |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10016 | A | From: [54A10 SWITCH ETHERNET (CRS1) (Local: +LV6; Connector: 54XP10_X7)] to: [(Local: +END2; Connector: -90XR31.E1)]<br><br>NOTE: Cable is crossed<br>TSX_M2_P02 |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10017 | A | From: [54A11 SWITCH ETHERNET (CRS2) (Local: +LV6; Connector: 54XP11_X8)] to: [(Local: +END1; Connector: -90XR21.E1)]<br><br>NOTE: Cable is straight              |  | OK |  | Thandanani Makhanya<br>- 463827 | 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)]<br><br>NOTE: Cable is crossed<br>TSX_M2_P04 |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10019 | A | All cables have been validated on M2                                                                                                                                                        |  | OK |  | Thandanani Makhanya<br>- 463827 | M2 |
| 10020 | R | Download all the results from Fluke and save them on PC with folder name "M2_TSxx"                                                                                                          |  | OK |  | Vusumuzi Zulu -<br>420115       | M2 |

## Section 4 – Config

### 4.2 Instructions list

#### 4.2.1 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            |              | Sicelo Mtolo - 525130 | M2      |
| 10002 | A    | Check continuity on all pins of End 1 connector 90XP15 & 90XP14 to ground                                         |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10003 | R    | There is no continuity                                                                                            |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10004 | A    | Check continuity on all pins of End 2 connector 90XP15 & 90XP14 to ground                                         |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10005 | R    | There is no continuity                                                                                            |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10006 | I    | Smoke Detector Address Configuration                                                                              |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10007 | A    | Remove and configure the Smoke Detector 67A2 (+PA1) according to the figure below.                                |  | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10008 | A    | Reconnect Smoke Detector 67A2                                                                                     |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10009 | A    | Remove and configure the Smoke Detector 67A3 (+PA3) according to the figure below.                                |  | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10010 | I    | Line Heat Detection                                                                                               |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10011 | R    | Measure the resistance between point 1 and point 4 of the connector 67XP3_11<br>Result Min/Max : 550<= x<= 700 () |                                                                                     | OK            | 573.3        | Sicelo Mtolo - 525130 | M2      |
| 10012 | A    | Reconnect Smoke Detector 67A3                                                                                     |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10013 | I    | OTDR LOOP                                                                                                         |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |
| 10014 | I    | Check the continuity between the following points:                                                                |                                                                                     | OK            |              | Sicelo Mtolo - 525130 | M2      |



|       |   |                                                                                                      |  |    |  |                       |    |
|-------|---|------------------------------------------------------------------------------------------------------|--|----|--|-----------------------|----|
| 10015 | A | From: [ +IV1 (local +END2 Connector 90XR33.B (pin 1))] to: [local +END1 Connector -90XR23.B (pin1)]  |  | OK |  | Sicelo Mtolo - 525130 | M2 |
| 10016 | A | From: [ -IV1 (local +END2 Connector 90XR33.B (pin 2))] to: [local +END1 Connector -90XR23.B (pin 2)] |  | OK |  | Sicelo Mtolo - 525130 | M2 |

## Section 5 – Traction Motors

### 5.2 Instructions list

#### 5.2.1 011\_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            |              | Dilikani Ngubane - 526515 | M2      |
| 10002 | I    | Ensure all the CONNECTORS are fully ASSEMBLED before running a continuity test.                                                                                                                                                                                                       |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10003 | I    | The following test is used to confirm the wiring of the traction motors.                                                                                                                                                                                                              |  | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10004 | I    | SAFETY NOTICE: It is important to ensure that there is no 400Vac power supply on the vehicle.                                                                                                                                                                                         |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10005 | A    | Switch OFF the 400Vac power supply at the source and disconnect the supply cables from the vehicle                                                                                                                                                                                    |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10006 | R    | There is no 400Vac available on the vehicle                                                                                                                                                                                                                                           |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10007 | I    | Visual Inspection                                                                                                                                                                                                                                                                     |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | 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            |              | Dilikani Ngubane - 526515 | M2      |
| 10009 | I    | Motor 2                                                                                                                                                                                                                                                                               |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10010 | R    | [ -11XR2 connector (local: UND - 11XP2_2.X1 pin 1)] connected to: [ - 11XT2 motor terminals (U) -11M2].                                                                                                                                                                               |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | M2      |
| 10011 | R    | [ -11XR2 connector (local: UND - 11XP2_2.X2 pin 1)] connected to: [ -                                                                                                                                                                                                                 |                                                                                    | OK            |              | Dilikani Ngubane - 526515 | 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 |  | Dilikani Ngubane - 526515 | M2 |
| 10013 | R | -11M2 Motor terminals PE connected to - 11GND2.                                                                                                                                                                                                                                      |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10014 | I | Motor 1                                                                                                                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10015 | R | [ -11XR1 connector (local: UND - 11XP1_2.X1 pin 1)] connected to: [ - 11XT1 motor terminals (U) -11M1].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10016 | R | [ -11XR1 connector (local: UND - 11XP1_2.X2 pin 1)] connected to: [ - 11XT1 motor terminals (V) -11M1].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10017 | R | [ -11XR1 connector (local: UND - 11XP1_2.X3 pin 1)] connected to: [ - 11XT1 motor terminals (W) -11M1].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10018 | R | -11M1 Motor terminals PE connected to - 11GND1.                                                                                                                                                                                                                                      |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10019 | I | Visual Inspection                                                                                                                                                                                                                                                                    |  | OK |  | Dilikani Ngubane - 526515 | 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 |  | Dilikani Ngubane - 526515 | M2 |
| 10021 | I | Motor 3                                                                                                                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10022 | R | [ -11XR3 connector (local: UND - 11XP3_2.X1 pin 1)] connected to: [ - 11XT3 motor terminals (U) -11M3].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10023 | R | [ -11XR3 connector (local: UND - 11XP3_2.X2 pin 1)] connected to: [ - 11XT3 motor terminals (V) -11M3].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10024 | R | [ -11XR3 connector (local: UND - 11XP3_2.X3 pin 1)] connected to: [ - 11XT3 motor terminals (W) -11M3].                                                                                                                                                                              |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10025 | R | -11M3 Motor terminals PE connected to - 11GND3                                                                                                                                                                                                                                       |  | OK |  | Dilikani Ngubane - 526515 | M2 |

|       |   |                                                                                                         |  |    |  |                           |    |
|-------|---|---------------------------------------------------------------------------------------------------------|--|----|--|---------------------------|----|
| 10026 | I | Motor 4                                                                                                 |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10027 | R | [ -11XR4 connector (local: UND - 11XP4_2.X1 pin 1)] connected to: [ - 11XT4 motor terminals (U) -11M4]. |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10028 | R | [ -11XR4 connector (local: UND - 11XP4_2.X2 pin 1)] connected to: [ - 11XT4 motor terminals (V) -11M4]. |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10029 | R | [ -11XR4 connector (local: UND - 11XP4_2.X3 pin 1)] connected to: [ - 11XT4 motor terminals (W) -11M4]. |  | OK |  | Dilikani Ngubane - 526515 | M2 |
| 10030 | R | -11M4 Motor terminals PE connected to - 11GND4.                                                         |  | OK |  | Dilikani Ngubane - 526515 | 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          |
|----------|------------------------|----------------------|
| 012_PB   | Protective bonding     | Megger               |
| 025_NET  | Cable Analyser DSX5000 | Fluke machine_Gibela |
| CONFIG   | Multimetro             | Meter 1              |

| Vehicle | Equipment | Expected version | Version loaded |
|---------|-----------|------------------|----------------|
| M2      |           |                  |                |