

| PROJECT         | CUSTOMER | VEHICLE        |
|-----------------|----------|----------------|
| Xtrapolis-PRASA | PRASA    | 266 – M4 – VFT |

RTR Vehicle Functional Static Testing TS266 M4 Report  
 GIB0000007781



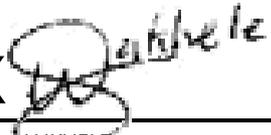
|                  | CREATED       | VERIFIED       | APPROVED        | DISTRIBUTION  |
|------------------|---------------|----------------|-----------------|---|
| <b>Name</b>      | Vusumuzi ZULU | Sifiso LUKHELE | Kgomotso NKOANA | Confidentiality Category<br><i>Restricted</i> <i>Project</i> <i>Normal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

**This report has been automatically generated from TES version 1**

### Table of modifications

| Rev | Date      | Modifications Content | Writer        |
|-----|-----------|-----------------------|---------------|
| A0  | 31/1/2025 | Creation              | Vusumuzi ZULU |

### Internal validations

|                 | Name            | Function            | Date      | Signature  |
|-----------------|-----------------|---------------------|-----------|--|
| <b>Creator</b>  | Vusumuzi ZULU   | EPU Manager         | 31/1/2025 | X <br>Vusumuzi ZULU<br>EPU Manager            |
| <b>Verifier</b> | Sifiso LUKHELE  | Serial Test Manager | 31/1/2025 | X <br>Sifiso LUKHELE<br>Serial Test Manager |
| <b>Approver</b> | Kgomotso NKOANA | Test Expert         | 31/1/2025 | X <br>Kgomotso NKOANA<br>Test Expert        |

### Execution Plan

|                   |           |
|-------------------|-----------|
| <b>Start Date</b> | 24/1/2025 |
| <b>End Date</b>   | 24/1/2025 |

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## Section 1 – Purpose / Objectives

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### 1. Energy Distribution

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

### 2. TCMS Network

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

### 3. Cabin Control

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

### 4. Internal Lighting

Verify the working of all internal lighting functions.

### 5. PACIS System

Verify power supply to all PACIS network equipment.

### 6. Train-Ground Communication

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

### 7. Rescue Mode and Emergency Disconnection

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

### 10. Emergency Brake

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

### 11. Service Brake

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

### 12. Holding and Parking Brake

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

### 13. Passenger Doors

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

### 14. Air Conditioning

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

### 15. Fire protection

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

### 16. Traction and Electric Brake

The objective of this procedure is to verify all the train lines associated with the traction and electric brake systems of the train

### 18. Vehicle Normalization

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



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## Section 2 – Energy Distribution

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### 2.1 Instructions list

### 2.1.1 015\_NRG-Energy Distribution

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | Energy Distribution (SPP=015)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Initial Conditions  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | I    | All the Circuit Breakers should be OPEN   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | I    | Test bench should be connected but with no power supply   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | I    | NO 400Vac should be connected to the car  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | A    | Close Circuit Breaker 15Q3 (Normal Line)  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | I    | Voltage Isolation 110Vdc  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | I    | 230Vac and 400Vac Circuit breakers  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | A    | Close Circuit Breaker 13Q1  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | A    | Close the circuit breaker 13Q3  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10011 | I    | Normal and Permanent Power Supply   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10012 | I    | 110Vdc Permanent Train Line<br>Apply 110Vdc on -93XT304_1 pin 4 to simulate Permanent Train Line  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10013 | A    | Apply 110Vdc on the Normal Line using the external power supply                                   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10014 | A    | Measure 110Vdc between 90XR50.X1/1 (+) and 90XR50.X2/1 (-) (intercar connector).<br>[Normal line] |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10015 | I    | Permanent Line Circuit Breakers   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10016 | A    | Close Circuit Breaker 15Q4 for battery voltage above 80Vdc and close it(permanent Line)           |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10017 | I    | 230Vac Circuit Breakers   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10018 | A    | Close Circuit Breaker 13Q2  |      | OK            |              | Gcobani Baliso - 480570 | M4      |

|       |   |   |  |    |  |                         |    |
|-------|---|---|--|----|--|-------------------------|----|
| 10019 | A | Close Circuit Breaker 13Q3  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10020 | I | 230Vac and 400Vac Voltage Supply  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10021 | A | Apply 400Vac to the Vehicle, either on End1 or End2   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10022 | A | Perform a phase rotation measurement on Connector 90XR62 between phases U(X3),V(X2),W(X1) and ensure the rotation is in the correct direction |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10023 | R | Phase rotation between U,V,W is correct   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10024 | A | Perform a phase rotation measurement on Connector 90XR52 between phases U(X1),V(X2),W(X3) and ensure the rotation is in the correct direction |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10025 | R | Phase rotation between U,V,W is correct   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10026 | A | Check 230Vac between points L and N of socket -13XT1  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10027 | R | 230Vac present  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10028 | A | Check 230Vac between points L and N of socket -13XT2  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10029 | R | 230Vac present  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10030 | A | Remove connector 57XP1_10   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10031 | A | Remove connector 93XP150  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10032 | A | Close circuit breaker 34Q1 and 57Q1   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10033 | A | Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 57XP1_10 (10.b1,10a2,10a1)  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10034 | R | 400Vac +- 5% tolerance is measured between all three phases of 57XP1_10   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10035 | A | Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 93XP150 (E2,E3,E1)  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10036 | R | 400Vac +- 5% tolerance is measured between all three phases on connector 93XP150  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10037 | A | Put back connector 57XP1_10   |  | OK |  | Gcobani Baliso - 480570 | M4 |

|       |   |   |  |    |  |                            |    |
|-------|---|---|--|----|--|----------------------------|----|
| 10038 | A | Put back connector 93XP150  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10039 | A | Switch off the 400Vac power supply from the socket  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10040 | I | Auxiliary Converters Command  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10041 | A | Battery Connection Train Lines<br>Measure continuity between<br>END 1 90XR14 pin 30<br>END 2 90XP24 pin 30  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10042 | R | Both points are continuous  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10043 | A | Battery Disconnection Train Lines<br>Measure continuity between<br>END 1 90XR14 pin 31<br>END 2 90XP24 pin 31                                       |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10044 | R | Both points are continuous  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10045 | A | IES StatusTrain Lines<br>Measure continuity between<br>END 1 90XR15 pin 61<br>END 2 90XP25 pin 61 and<br>END 1 90XR15 pin 62<br>END 2 90XP25 pin 62 |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
| 10046 | R | Both points are continuous  |  | OK |  | Gcobani Baliso -<br>480570 | M4 |



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## Section 3 – TCMS Network

### 3.1 Instructions list

#### 3.1.1 025\_NET-TCMS Network

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | TCMS Network (SPP=25)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Initial conditions  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | I    | Vehicle test bench should be configured as TC1:<br>1. TC1 Dataplugs<br>2. MCE switch set to TC1 |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | A    | 110Vdc supply to the Normal Train line is ON  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | I    | Power Supply to the Router Switches   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | I    | Power supply to the 25A10 SWITCH ETHERNET (CRS1)  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | A    | Close Circuit Breaker 25Q10   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | R    | CRS1 25A10 is ON  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | I    | Power supply to the 25A11 SWITCH ETHERNET (CRS2)  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | A    | Close Circuit Breaker 25Q11   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10011 | R    | CRS2 25A11 is ON  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10012 | I    | Power supply to the 25A14 ETHERNET REPEATER (TBR)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10013 | A    | Close Circuit Breaker 25Q14   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10014 | R    | TBR 25A14 is ON   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10015 | A    | Close Circuit Breaker 25Q6  |      | OK            |              | Gcobani Baliso - 480570 | M4      |

|       |   |   |  |    |  |                         |    |
|-------|---|---|--|----|--|-------------------------|----|
| 10016 | A | Close Circuit Breaker 25Q7  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10017 | I | Ethernet Loop   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10018 | A | For each CRS, check that the Ethernet Loop LEDs are flashing                      |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10019 | R | CRS1 has LEDs on ports X3 and X4 flashing   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10020 | R | CRS2 has ONLY LED on port X4 flashing   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10021 | R | Check on the Test Bench DDU that all Router Switches are available on the network |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10022 | I | Power Supply to the BRIOMS  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10023 | I | Power supply to the 25A6 BRIOM 40/10 ETH 6  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10024 | R | BRIOM 25A6 is ON  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10025 | A | Check visually that ground braid is connected to BRIOM                            |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10026 | I | Power supply to the 25A7 BRIOM 40/10 ETH 7  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10027 | R | BRIOM 25A7 is ON  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10028 | A | Check visually that ground braid is connected to BRIOM                            |  | OK |  | Gcobani Baliso - 480570 | M4 |

## Section 4 – Cabin Control

### 4.1 Instructions list

#### 4.1.1 020\_CAB-Cabin Control

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | Cabin Control (SPP=020)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Train Lines   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | A    | Cab Selected On Train - Train Lines<br>Measure continuity between<br>END1 90XR14 pin 3<br>END2 90XP24 pin 3 |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | R    | Both pins are continuous  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | A    | Cab Active TC1 Train Lines<br>Measure continuity between<br>END1 90XR14 pin 4<br>END2 90XP24 pin 4          |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | R    | Both pins are continuous  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | A    | Cab Active TC2 Train Lines<br>Measure continuity between<br>END1 90XR14 pin 5<br>END2 90XP24 pin 5          |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | R    | Both pins are continuous  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | A    | Master Key TC1 Train Lines<br>Measure continuity between<br>END1 90XR14 pin 17<br>END2 90XP24 pin 17        |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | R    | Both pins are continuous  |      | OK            |              | Gcobani Baliso - 480570 | M4      |



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## Section 5 – Internal Lighting

### 5.1 Instructions list

#### 5.1.1 052\_LGT-Internal Lighting

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator              | Vehicle |
|-------|------|---|------|---------------|--------------|-----------------------|---------|
| 10001 | I    | Internal Lighting (SPP=52)  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | I    | Initial Conditions  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | I    | 110Vdc Normal line is ON  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | I    | Cleaning Lighting Command   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | A    | 110Vdc Permanent Train Line<br>Apply 110V on 93XT304_1 pin 4 to simulate permanent supply |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | A    | Close Circuit Breaker 52Q3  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | A    | Close Circuit Breaker 52Q4  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | A    | Close Circuit Breaker 52Q5  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | R    | All saloon emergency lights (low intensity) are OFF on all light modules (Left + Right).  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | A    | Turn Cleaning Staff Lights Switch 52S6 to ON position                                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10011 | R    | All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right). |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10012 | A    | Reset Circuit Breaker 52Q5 (Open and Close)   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10013 | A    | Close Circuit Breaker 52Q1  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10014 | A    | Close Circuit Breaker 52Q2  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |



|       |   |   |  |    |  |                          |    |
|-------|---|---|--|----|--|--------------------------|----|
| 10015 | R | All saloon emergency lights (low intensity) are "ON" on all light modules (Left + Right). |  | OK |  | Sinazo Mkhwa -<br>529940 | M4 |
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## Section 6 – PACIS System

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### 6.1 Instructions list

### 6.1.1 054\_PIS-PACIS System

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

| N°    | Type | Instruction                                    | File | Result status | Result value | Operator              | Vehicle |
|-------|------|--|------|---------------|--------------|-----------------------|---------|
| 10001 | I    | PACIS System IO (SPP=054)                      |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | I    | Initial conditions                             |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | I    | 110Vdc Normal line is connected and ON         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | I    | Circuit Breakers                               |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | A    | Close Circuit Breaker 54Q1                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | A    | Close Circuit Breaker 54Q2                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | A    | Close Circuit Breaker 54Q10                    |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | A    | Close Circuit Breaker 54Q11                    |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | A    | Close Circuit Breaker 55Q2                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | A    | Close Circuit Breaker 55Q3                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10011 | R    | All 'Pacis System' circuit breakers are closed |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10012 | I    | Power Supply of Router Switches                |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10013 | I    | Ethernet Switch CRS1                           |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10014 | R    | CRS1 is ON                                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10015 | I    | Ethernet Switch CRS2                           |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10016 | R    | CRS2 is ON                                     |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10017 | I    | DPAI-1   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10018 | R    | DPAI-1 is ON                                   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10019 | I    | DPAI-2   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10020 | R    | DPAI-2 is ON                                   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10021 | I    | Lateral Display 'LAT1'                         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |

|       |   |  |  |    |      |                       |    |
|-------|---|--|--|----|------|-----------------------|----|
| 10022 | R | The PWR (power) LED is "ON" on the Lateral Display 'LAT1'.                   |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10023 | I | Lateral Display 'LAT2'   |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10024 | R | The PWR (power) LED is "ON" on the Lateral Display 'LAT2'.                   |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10025 | I | Interior Display 'INT1'  |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10026 | R | The PWR (power) LED is "ON" on the Interior Display 'INT1'.                  |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10027 | I | Interior Display 'INT2'  |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10028 | R | The PWR (power) LED is "ON" on the Interior Display 'INT2' is ON.            |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10029 | I | Impedance of Loudspeaker   |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10030 | I | Saloon Speakers Commanded by DPAI-1  |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10031 | A | Measure the impedance connector '54XP1_X4' between pins: z32(+) and z30 (-). |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10032 | R | Impedance<br>Result Max : x <= 32.00 (Ohm)                                   |  | OK | 31.7 | Sinazo Mkhwa - 529940 | M4 |
| 10033 | I | Saloon Speakers Commanded by DPAI-2  |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10034 | A | Measure the impedance connector '54XP2_X4' between pins: z32(+) and z30 (-). |  | OK |      | Sinazo Mkhwa - 529940 | M4 |
| 10035 | R | Impedance<br>Result Max : x <= 32.00 (Ohm)                                   |  | OK | 31.7 | Sinazo Mkhwa - 529940 | M4 |

## Section 7 – Train Ground Communication

### 7.1 Instructions list

#### 7.1.1 062\_ETS-ERTMS

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

| N°    | Type | Instruction   | File  | Result status | Result value | Operator              | Vehicle |
|-------|------|---|---|---------------|--------------|-----------------------|---------|
| 10001 | I    | ERTMS (SPP=062)   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | A    | ERTMS Bypass Train Lines<br>Check continuity between<br>END1 90XR14 pin 11<br>END2 90XP24 pin 11  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | R    | Both pins are continuous  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | A    | Emergency Brake ERTMS 1 Train Lines<br>Check continuity between<br>END1 90XR14 pin 18<br>END2 90XP24 pin 18   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | R    | Both pins are continuous  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | I    | Emergency Brake ERTMS 2 Train Lines<br>Check continuity between<br>END1 90XR14 pin 20<br>END2 90XP24 pin 20   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | R    | Both pins are continuous  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | I    | Eurobalise Antenna Cable  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | A    | Check continuity between [Inter-car (LOCAL: +END1; Connector -90XR10) and Inter-car (LOCAL: +END2; connector - 90XP20)] according to the image below. |  | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | R    | Eurobalise Antenna cable is correctly configured  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |



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## Section 8 – Rescue Mode and Emergency Disconnection

### 8.1 Instructions list

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

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | Rescue Mode and Emergency Disconnection (SPP=027)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Backup Mode   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | R    | Points are continuous   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | A    | Check continuity on Timer 27D1 between points A4 and B3   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | A    | Backup Mode Train Lines<br>Check continuity between END1 90XR15 pin23<br>END2 90XP25 pin 23 and 27K1 A1 |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | R    | All points are continuous   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | A    | Check continuity between 27K1 A2 and Ground   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | R    | The points are continuous   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | I    | Emergency Disconnection   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | A    | Emergency Disconnection Train Lines<br>Check continuity between END1 90XR15 pin24<br>END2 90XP25 pin 24 |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10011 | R    | All points are continuous   |      | OK            |              | Gcobani Baliso - 480570 | M4      |



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## 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            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | I    | Initial Conditions   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | I    | No PEAs are activated  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | I    | 110Vdc Normal power supply should be connected to the vehicle and ON   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | I    | Visual Inspection  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | A    | Physically and visually inspect all the Disk Break Units (DBU) and brake pads, to ensure they are securely fitted. |  | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | R    | All the brake DBUs are correctly installed, and all the brake pads are correctly installed and locked.             |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | A    | Check the piping installation  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | R    | All the pipes are installed on the vehicle   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | A    | Check all the Passenger Emergency Alarm handles, and ensure they are connected to their respective connectors      |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10011 | R    | All the PEAs are installed and connected   |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10012 | I    | Train Lines  |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10013 | A    | Emergency Brake Loop Train Lines<br>Check continuity between<br>END1 90XR24 pin 8<br>END2 90XP34 pin 8             |   | OK            |              | Sinazo Mkhwa - 529940 | M4      |

|       |   |   |  |    |  |                       |    |
|-------|---|---|--|----|--|-----------------------|----|
| 10014 | R | Both points are continuous  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10015 | A | Emergency Brake Loop Override Train Lines<br>Check continuity between<br>END1 90XR24 pin 9<br>END2 90XP34 pin 9 |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10016 | R | Both points are continuous  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10017 | I | Emergency Brake Train Line<br>Check continuity between<br>END1 90XR25 pin 67<br>END2 90XP35 pin 67              |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10018 | R | Both points are continuous  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10019 | A | PEA Loop OTDR Train Lines<br>Check continuity between<br>END1 90XR24 pin 10<br>END2 90XP34 pin 10               |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10020 | R | Both points are continuous  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10021 | A | PEA Loop Train Lines<br>Check continuity between<br>END1 90XR25 pin 95<br>END2 90XP35 pin95                     |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10022 | R | Both points are continuous  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10023 | A | Close Circuit breaker 44Q1  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |

## Section 10 – Service Brake

### 10.1 Instructions list

#### 10.1.1 040\_SBK-Service Brake

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

| N°    | Type | Instruction   | File  | Result status | Result value | Operator                | Vehicle |
|-------|------|---|---|---------------|--------------|-------------------------|---------|
| 10001 | I    | Service Brake (SPP=040)   |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Initial Conditions  |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | I    | No air supply to the vehicle  |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | I    | All brake panel cocks are in normal position (not isolated)   |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | I    | 110Vdc Normal power supply should be connected to the vehicle and ON  |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | I    | Follow the procedure in the document below to upload software onto the TBCU electronic.<br><a href="#">[16-31-51-335717_TBCU Software Upload.pdf]</a> |  | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | I    | Power Supply  |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | A    | Remove the connector 10XR12_XCB2 from the propulsion box  |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | A    | Close Circuit Breaker 33Q1, 33Q3 and 33Q5   |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | A    | Check the voltage on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and 67(-); and 5(+) and 68(-)   |   | OK            |              | Gcobani Baliso - 480570 | M4      |
| 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            |              | Gcobani Baliso - 480570 | M4      |
| 10012 | A    | Open Circuit Breaker 33Q1 and 33Q3, Replace connector 10XR12_XCB2 on the propulsion box, and Close Circuit breaker                                    |   | OK            |              | Gcobani Baliso - 480570 | M4      |

|       |   |   |  |    |  |                         |    |
|-------|---|---|--|----|--|-------------------------|----|
|       |   | 33Q1 and 33Q3   |  |    |  |                         |    |
| 10013 | A | Remove the connector -40XP2_C2_16 from pneumatic brake panel  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10014 | A | Close Circuit Breaker 40Q1  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10015 | A | Check the voltage on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10016 | R | Battery Voltage (above 80Vdc) is measured on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)                       |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10017 | A | Open Circuit Breaker 40Q1, Replace connector -40XP2_C2_16 on the pneumatic brake panel, and Close Circuit breaker -40Q1 |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10018 | R | The pneumatic brake panel 40A2 is ON  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10019 | I | Train Lines   |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10020 | A | EB Reduced Train Lines<br>Check continuity between<br>END1 90XR15 pin 60<br>END2 90XP25 pin 60                          |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10021 | R | Both points are continuous  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10022 | A | Brake Applied Train Lines<br>Check continuity between<br>END1 90XR15 pin 50<br>END2 90XP25 pin 50                       |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10023 | R | Both points are continuous  |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10024 | A | Remote Isolation Train Lines<br>Check continuity between<br>END1 90XR15 pin 59<br>END2 90XP25 pin 59                    |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10025 | R | Both points are continuous  |  | OK |  | Gcobani Baliso - 480570 | M4 |

## Section 11 – Holding and Parking Brake

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### 11.1 Instructions list

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

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

| N°    | Type | Instruction  | File | Result status | Result value | Operator                 | Vehicle |
|-------|------|--|------|---------------|--------------|--------------------------|---------|
| 10001 | I    | Holding and Parking Brake (SPP_045)  |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10002 | I    | Initial Conditions   |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10003 | A    | Using the tools list on the side of your screen, record the serial number of the manometer that will be used during this test.               |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10004 | A    | Check that the pressure on Test point C2.11/1 is >5bar   |      | OK            |              | Tebogo Mtombeni - 529938 | M4      |
| 10005 | I    | Visual Inspection  |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10006 | A    | Check the installation of the manual parking brake release components (lever + cable)  |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10007 | R    | The lever is securely fixed (tight) and the cable is correctly attached to the bogie (there is no excess cable and all clamps are installed) |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10008 | I    | Circuit Breakers   |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10009 | A    | Close Circuit Breaker 33Q3   |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10010 | A    | Close Circuit Breaker 33Q5   |      | OK            |              | Sinazo Mkhwa - 529940    | M4      |
| 10011 | I    | Parking Brake Pressure Switch  |      | OK            |              | Tebogo Mtombeni - 529938 | M4      |
| 10012 | R    | Read Defined Variable [TT] (TBCU4)LI_PARK_BR_RELEASE = 1.0   |      | OK            | 1            | Tebogo Mtombeni - 529938 | M4      |
| 10013 | R    | Read Defined Variable [TT] (TBCU4)LI_BRAKE_STAT = 0.0  |      | OK            | 0            | Tebogo Mtombeni - 529938 | M4      |
| 10014 | R    | Read Defined Variable [TT] (MPU1)tbcu4_parkbrakerelease = 1.0  |      | OK            | 1            | Tebogo Mtombeni - 529938 | M4      |
| 10015 | R    | Read Defined Variable [TT] (MPU1)tbcu4_li_pbrake_stat = 0.0  |      | OK            | 0            | Tebogo Mtombeni - 529938 | M4      |
| 10016 | A    | Parking Brake Applied Train Lines<br>Check continuity between<br>END1 90XR15 pin 77  |      | OK            |              | Tebogo Mtombeni - 529938 | M4      |

|       |   |   |  |    |   |                       |    |
|-------|---|---|--|----|---|-----------------------|----|
|       |   | END2 90XP25 pin 77  |  |    |   |                       |    |
| 10017 | R | Both points are continuous  |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10018 | A | Remote Parking Command Train Lines<br>Check continuity between<br>END1 90XR15 pin 68<br>END2 90XP25 pin 68  |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10019 | R | Both points are continuous  |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10020 | I | Parking Brake Applied   |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10021 | I | For this section of the test, ensure that the pressure on test point C2.11/1 is ALWAYS BELOW 4.8 Bar. if it goes above, turn the Isolation cock C2.3.2 to CLOSE position to drain the air |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10022 | A | Position the Isolation cock C2.3.2 in CLOSE position. Allow the parking brake air pressure to drain to below 4.5 Bar. Use the test point C2.11/1 to verify the air pressure <4.5 Bar      |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10023 | R | Pressure at test point C2.11/1 <4.5 Bar   |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10024 | R | Read Defined Variable [TT]<br>(TBCU4)LI_PARK_BR_RELEASE = 0.0   |  | OK | 0 | Sinazo Mkhwa - 529940 | M4 |
| 10025 | R | Read Defined Variable [TT]<br>(MPU1)tbcu4_parkbrakerelease = 0.0  |  | OK | 0 | Sinazo Mkhwa - 529940 | M4 |
| 10026 | A | Return the Isolation cock C2.3.2 to OPEN position   |  | OK |   | Sinazo Mkhwa - 529940 | M4 |
| 10027 | R | Read Defined Variable [TT]<br>(TBCU4)LI_BRAKE_STAT = 1.0  |  | OK | 1 | Sinazo Mkhwa - 529940 | M4 |
| 10028 | R | Read Defined Variable [TT]<br>(MPU1)tbcu4_li_pbrake_stat = 1.0  |  | OK | 1 | Sinazo Mkhwa - 529940 | M4 |
| 10029 | R | Read Defined Variable [TT]<br>(TBCU4)LI_PARK_BR_DC = 0.0  |  | OK | 0 | Sinazo Mkhwa - 529940 | M4 |
| 10030 | R | Read Defined Variable [TT]<br>(MPU1)tbcu4_parkbrakeisoldc = 0.0   |  | OK | 0 | Sinazo Mkhwa - 529940 | M4 |
| 10031 | R | Read Defined Variable [TT]<br>(MPU1)li_pbk_m4parkbrakeisol = 0.0  |  | OK | 0 | Sinazo Mkhwa - 529940 | M4 |
| 10032 | A | Position the Isolation cock C2.3.2 in CLOSE position  |  | OK |   | Sinazo Mkhwa - 529940 | M4 |

|       |   |  |  |    |   |                          |    |
|-------|---|--|--|----|---|--------------------------|----|
| 10033 | R | Read Defined Variable [TT]<br>(MPU1)li_pbk_m4parkbrakeisol = 1.0 |  | OK | 1 | Sinazo Mkhwa -<br>529940 | M4 |
| 10034 | R | Read Defined Variable [TT]<br>(TBCU4)LI_BRAKE_STAT = 0.0         |  | OK | 0 | Sinazo Mkhwa -<br>529940 | M4 |
| 10035 | R | Read Defined Variable [TT]<br>(MPU1)tbcu4_li_pbrake_stat = 0.0   |  | OK | 0 | Sinazo Mkhwa -<br>529940 | M4 |
| 10036 | R | Read Defined Variable [TT]<br>(TBCU4)LI_PARK_BR_DC = 1.0         |  | OK | 1 | Sinazo Mkhwa -<br>529940 | M4 |
| 10037 | R | Read Defined Variable [TT]<br>(MPU1)tbcu4_parkbrakeisoldc = 1.0  |  | OK | 1 | Sinazo Mkhwa -<br>529940 | M4 |
| 10038 | A | Return the Isolation cock C2.3.2 to OPEN<br>position             |  | OK |   | Sinazo Mkhwa -<br>529940 | M4 |



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## Section 12 – HVAC Air Conditioning

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### 12.1 Instructions list

### 12.1.1 057\_HVA-HVAC\_TK

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

| N°    | Type | Instruction  | File  | Result status | Result value | Operator | Vehicle |
|-------|------|--|---|---------------|--------------|----------|---------|
| 10001 | I    | Air Conditioning (SPP=057)   |   | NE            |              |          | M4      |
| 10002 | I    | Initial conditions   |   | NE            |              |          | M4      |
| 10003 | A    | Car Should be Prepared   |   | NE            |              |          | M4      |
| 10004 | I    | Power Supply   |   | NE            |              |          | M4      |
| 10005 | A    | Close Circuit Breaker 57Q1   |   | NE            |              |          | M4      |
| 10006 | A    | Close Circuit Breaker 57Q2   |   | NE            |              |          | M4      |
| 10007 | I    | HVAC Electronic Power Supply   |   | NE            |              |          | M4      |
| 10008 | A    | Close Circuit Breaker F1 on the HVAC Panel   |   | NE            |              |          | M4      |
| 10009 | I    | The HVAC electronic is ON  |   | NE            |              |          | M4      |
| 10010 | A    | Turn the control switch to AUTO position on the HVAC Panel   |   | NE            |              |          | M4      |
| 10011 | I    | Software Upload  |   | NE            |              |          | M4      |
| 10012 | I    | Follow the procedure in the document below to upload software onto the HVAC electronic   |   | NE            |              |          | M4      |
| 10013 | A    |  |  | NE            |              |          | M4      |
| 10014 | I    | Checking 400Vac  |   | NE            |              |          | M4      |
| 10015 | A    | Ensure that the 400Vac Shore Supply is connected to the vehicle, else connect it   |   | NE            |              |          | M4      |
| 10016 | A    | Disconnect connector 57XP4_X5 and use a multimeter to measure 400Vac between phases a1, a2 and b1                                      |   | NE            |              |          | M4      |
| 10017 | R    | 400Vac (+-5%) measured   |   | NE            |              |          | M4      |
| 10018 | A    | On the same connector, with a phasemeter, check the correct Phase Rotation between points L1- Phase a1, L2- Phase a2 and L3- Phase b1. |   | NE            |              |          | M4      |

|       |   |   |   |    |  |    |
|-------|---|---|---|----|--|----|
| 10019 | R | The phase rotation is correct between all three phases  |   | NE |  | M4 |
| 10020 | A | Normalize connector 57XP4_X5  |   | NE |  | M4 |
| 10021 | I | HVAC 50% restriction  |   | NE |  | M4 |
| 10022 | A | Force [TT] NRG_HvacM450Cmd = 0  |   | NE |  | M4 |
| 10023 | I | HVAC inhib  |   | NE |  | M4 |
| 10024 | A | Force [TT]<br>(MPU1)lo_hva_m4hvacinhibr1__1 = 1   |   | NE |  | M4 |
| 10025 | A | Force [TT]<br>(MPU1)lo_hva_m4hvacinhibr2__1 = 1   |   | NE |  | M4 |
| 10026 | R | HVAC unit turns ON and starts to work   |   | NE |  | M4 |
| 10027 | I | Emergency Ventilation   |   | NE |  | M4 |
| 10028 | A | Force [TT]<br>(MPU1)lo_hva_m4emergventil__1 = 1   |   | NE |  | M4 |
| 10029 | I | All saloon HVAC units work in Ventilation mode. Not heating/cooling   |   | NE |  | M4 |
| 10030 | A | Connect the laptop to the HVAC maintenance software using HCU Finder and check the actual working mode of HVAC                        |  | NE |  | M4 |
| 10031 | R | Release [TT]<br>(MPU1)lo_hva_m4emergventil__1   |   | NE |  | M4 |
| 10032 | I | Forced Mode (Saloon HVAC)   |   | NE |  | M4 |
| 10033 | I | In the maintenance software, select the 'Forced' tab, and use the "Required working mode" drop down box to force the following modes: |   | NE |  | M4 |
| 10034 | I | For the next sections, walk through the whole car and physically check (feel) that the HVAC is functioning as desired                 |   | NE |  | M4 |
| 10035 | A | Force Ventilation mode on the Saloon HVAC   |   | NE |  | M4 |
| 10036 | I | Ventilation Mode  |  | NE |  | M4 |
| 10037 | R | All saloon HVAC units work in Ventilation mode. Not heating/cooling   |   | NE |  | M4 |

|       |   |   |   |    |  |    |
|-------|---|---|---|----|--|----|
| 10038 | I | Cooling Mode  |   | NE |  | M4 |
| 10039 | A | Force Cooling mode on the Saloon HVAC   |   | NE |  | M4 |
| 10040 | R | All saloon HVAC units work in Cooling mode  |   | NE |  | M4 |
| 10041 | I | Heating Mode  |   | NE |  | M4 |
| 10042 | A | Force Heating mode on the Saloon HVAC   |   | NE |  | M4 |
| 10043 | R | All saloon HVAC units work in Heating mode  |   | NE |  | M4 |
| 10044 | I | Self-Test   |   | NE |  | M4 |
| 10045 | A | Force Self-Test on the Saloon HVAC  |   | NE |  | M4 |
| 10046 | R | All saloon HVAC units work according to the mode described in the "Actual working mode" |   | NE |  | M4 |
| 10047 | R | The Exhaust fans are Turned OFF   |   | NE |  | M4 |
| 10048 | I | HVAC Faults   |   | NE |  | M4 |
| 10049 | A | In the maintenance software, select the "Alarms / Warnings" tab                         |  | NE |  | M4 |
| 10050 | A | Ensure there are no active faults on the HVAC   |   | NE |  | M4 |
| 10051 | R | No active faults identified on the HVAC unit  |   | NE |  | M4 |
| 10052 | A | Release [TT]<br>(MPU1)lo_hva_m4hvacinhibr1__1   |   | NE |  | M4 |
| 10053 | A | Release [TT]<br>(MPU1)lo_hva_m4hvacinhibr2__1   |   | NE |  | M4 |
| 10054 | A | Release [TT] NRG_HvacM450Cmd  |   | NE |  | M4 |
| 10055 | I | End of Test   |   | NE |  | M4 |

### 12.1.2 057\_HVA\_SME-HVAC\_SME

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator              | Vehicle |
|-------|------|---|------|---------------|--------------|-----------------------|---------|
| 10001 | I    | HVA_057 Air Conditioning  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | I    | Initial conditions  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | A    | Car Should be Prepared with CVS running and 400V ac available in the car  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | I    | HVAC AC Power Supply  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | A    | Close Circuit Breaker 13Q1 and 13Q5   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | A    | Check on the DDU if the HVAC is offline   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | I    | Checking 400Vac   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | A    | Close Circuit Breaker 57Q1  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | A    | Disconnect connector 57XP4_X5 and Measure 400Vac between all 3 phases which are a1- phase L1, a2- Phase L2 and b1- phase L3 of connector 57XP4_X5 |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | R    | 400Vac measured between all phases  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10011 | A    | On same connector 57XP4_X5, with a phasemeter, check the correct Phase Rotation between points a1- Phase L1, a2- Phase L2 and b1- Phase L3.       |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10012 | R    | The phase rotation is correct between all three phases  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10013 | A    | Reconnect 57XP4_X5  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10014 | I    | HVAC controller power supply  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10015 | A    | Close Circuit Breaker 57Q2  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10016 | A    | Allow the HVAC to initialize and check on the DDU if the HVAC is online   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10017 | R    | HVAC unit is online and starts to work  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10018 | I    | HVAC inhib  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |

|       |   |   |   |    |  |                       |    |
|-------|---|---|---|----|--|-----------------------|----|
| 10019 | A | Force [TT]<br>(MPU1)lo_hva_m4hvacinhibr1___1 = 1.0  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10020 | A | Force [TT]<br>(MPU1)lo_hva_m4hvacinhibr2___1 = 1.0  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10021 | I | HVAC 50% restriction  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10022 | A | Force [TT] NRG_HvacM450Cmd = 0  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10023 | I | Saloon HVAC   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10024 | I | HVAC web portal   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10025 | A | The attached document is a procedure on how to navigate around the maintenance software.  |    | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10026 | I | Connect the laptop to the HVAC maintenance software using web browser. Enter the following IP address on the web browser 10.136.xxx.32 xxx represents the train number<br>Login: maint<br>Password: maint |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10027 | R | On status tab, Active mode is off for both cab and saloon   |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10028 | A | Go to Alarms tab and clear all the alarms for saloon and cabin  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10029 | I | HVAC saloon   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10030 | I | Full "Self test" saloon   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10031 | I | For the following tests make sure on the webHMI tab you change controller to be controlled by webHMI and not MPU  |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10032 | A | Before running the full test, please click on reset test to reset the previous results.   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10033 | A | Select Full-Test on the Saloon HVAC   |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10034 | R | All saloon HVAC units work according to the mode described in the "ACTIVE MODE" on the status tab   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10035 | 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  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |

|       |   |   |   |    |  |                       |    |
|-------|---|---|---|----|--|-----------------------|----|
|       |   | each mode.  |   |    |  |                       |    |
| 10036 | I | Forced Mode (Saloon HVAC)   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10037 | I | During all tests Walk through the whole car and physically check (feel) that the HVAC is functioning as desired                   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10038 | I | Go to maintenance tab to force the following modes  |    | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10039 | I | Cooling Mode  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10040 | A | Select forced Cooling mode on the Saloon HVAC and let it run for 5 mins   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10041 | R | All HVAC units are cooling  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10042 | I | Heating Mode  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10043 | A | Select forced Heating mode on the Saloon HVAC and let it run for 5 mins   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10044 | R | All HVAC units are heating  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10045 | I | HVAC Faults   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10046 | A | In the maintenance software, select the "Alarms" tab  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10047 | A | Ensure there are no active faults on the HVAC for the Saloon. Use the highlighted drop down to navigate between saloon and cabin. |  | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10048 | R | No active faults identified on the HVAC unit  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10049 | A | Release [TT] (MPU1)lo_hva_m4hvacinhibr1__1  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10050 | A | Release [TT] (MPU1)lo_hva_m4hvacinhibr2__1  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10051 | A | Release [TT] NRG_HvacM450Cmd  |   | OK |  | Sinazo Mkhwa - 529940 | M4 |
| 10052 | I | End of test   |   | OK |  | Sinazo Mkhwa - 529940 | M4 |



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## Section 13 – Fire Protection

### 13.1 Instructions list

#### 13.1.1 067\_FSD-Fire Protection

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator              | Vehicle |
|-------|------|---|------|---------------|--------------|-----------------------|---------|
| 10001 | I    | Fire Protection System (SPP=067)  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10002 | I    | Fire Detection Train Lines  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10003 | A    | Fire Detection Train Lines<br>Check continuity between<br>END1 90XR14 pin 21<br>END2 90XP24 pin 21                      |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10004 | R    | Both points are continuous  |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10005 | I    | Continuity Test   |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10006 | I    | The following steps are continuity tests between the two points described in each step. Use a multimeter for this test. |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10007 | A    | From : [(local: +END1 -90XR13.B (pin 4))] to: [-Inter-connector (local: +END2 -90XP23.b pin 4)]                         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10008 | A    | From : [(local: +END1 -90XR13.B (pin 5))] to: [-Inter-connector (local: +END2 -90XP23.b pin 5)]                         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10009 | A    | From : [(local: +END1 -90XR13.A (pin 7))] to: [-Inter-connector (local: +END2 -90XP23.a pin 7)]                         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |
| 10010 | A    | From : [(local: +END1 -90XR13.A (pin 8))] to: [-Inter-connector (local: +END2 -90XP23.a pin 8)]                         |      | OK            |              | Sinazo Mkhwa - 529940 | M4      |



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## Section 14 – Traction and Electric Brake

### 14.1 Instructions list

#### 14.1.1 033\_TRC-Traction and Electric Brake

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | Traction and Electric Brake (SPP=033)   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | Circuit Breakers and Configuration  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | A    | Close Circuit Breaker 33Q2  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | A    | Close Circuit Breaker 33Q4  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | A    | Close Circuit Breaker 33Q5  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | I    | Circuit Breaker 33Q1 and 33Q3 must be Opened  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | A    | 110Vdc Normal Traction EL Train Line<br>Connect the connector written M4 on 90XP15 End 2    |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | A    | Close Circuit Breaker 33Q1  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | A    | Close Circuit Breaker 33Q3  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | R    | Read Defined Variable [TT]<br>(TBCU4)LI_CAR_ID4 = 1.0                                       |      | OK            | 1            | Gcobani Baliso - 480570 | M4      |
| 10011 | I    | The TBCU should appear on TCMS network on DDU screen  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10012 | I    | Train Lines   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10013 | A    | Forward Train Lines<br>Check continuity between<br>END1 90XR15 pin 25<br>END2 90XP25 pin 25 |      | OK            |              | Gcobani Baliso - 480570 | M4      |

|       |   |  |   |    |  |                         |    |
|-------|---|--|---|----|--|-------------------------|----|
| 10014 | R | Both points are continuous   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10015 | A | Reverse Train Lines<br>Check continuity between<br>END1 90XR15 pin 30<br>END2 90XP25 pin 30  |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10016 | R | Both points are continuous   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10017 | A | Traction Train Lines<br>Check continuity between<br>END1 90XR15 pin 31<br>END2 90XP25 pin 31   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10018 | R | Both points are continuous   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10019 | A | No Brake Train Lines<br>Check continuity between<br>END1 90XR15 pin 32<br>END2 90XP25 pin 32   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10020 | R | Both points are continuous   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10021 | A | Traction Interlock Bypass Train Lines<br>Check continuity between<br>END1 90XR14 pin 6<br>END2 90XP24 pin 6  |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10022 | R | Both points are continuous   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10023 | A | Traction Interlock Train Lines<br>Check continuity between<br>END1 90XR15 pin 41<br>END2 90XP25 pin 41 and<br>-10XP12_XCB2 pin 8                   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10024 | R | All pins are continuous  |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10025 | A | 110Vdc Normal Traction EL Train Line<br>Remove the connector from 90XP15 End 2   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10026 | I | Coolant Liquid   |   | OK |  | Gcobani Baliso - 480570 | M4 |
| 10027 | A | Check that the coolant level is at least 1/2 of the sight glass level indicator<br><a href="#">[9-48-59-278432_277624_Coolant Level Check.pdf]</a> |  | OK |  | Gcobani Baliso - 480570 | M4 |
| 10028 | R | Coolant Liquid Level is OK   |   | OK |  | Gcobani Baliso - 480570 | M4 |



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|       |   |             |  |    |  |                            |    |
|-------|---|-------------|--|----|--|----------------------------|----|
| 10029 | I | End of Test |  | OK |  | Gcobani Baliso -<br>480570 | M4 |
|-------|---|-------------|--|----|--|----------------------------|----|



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## Section 15 – Passenger Doors

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### 15.1 Instructions list

### 15.1.1 050\_DOR-Passenger Doors

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator              | Vehicle |
|-------|------|---|------|---------------|--------------|-----------------------|---------|
| 10001 | I    | Passenger Doors (SPP=050)                                     |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10002 | I    | Initial conditions  |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10003 | I    | 110Vdc Normal power supply is connected to the vehicle and ON |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10004 | I    | Circuit Breakers  |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10005 | A    | Close Circuit Breaker 50Q1                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10006 | R    | DCU 1 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10007 | R    | Check on the DDU that DCU1 is online                          |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10008 | A    | Close Circuit Breaker 50Q2                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10009 | R    | DCU 2 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10010 | R    | Check on the DDU that DCU2 is online                          |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10011 | A    | Close Circuit Breaker 50Q3                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10012 | R    | DCU 3 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10013 | R    | Check on the DDU that DCU3 is online                          |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10014 | A    | Close Circuit Breaker 50Q4                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10015 | R    | DCU 4 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10016 | R    | Check on the DDU that DCU4 is online                          |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10017 | A    | Close Circuit Breaker 50Q5                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10018 | R    | DCU 5 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10019 | R    | Check on the DDU that DCU5 is online                          |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10020 | A    | Close Circuit Breaker 50Q6                                    |      | OK            |              | Sicelo Mtolo - 525130 | M4      |
| 10021 | R    | DCU 6 is powered ON   |      | OK            |              | Sicelo Mtolo - 525130 | M4      |

|       |   |   |   |    |  |                       |    |
|-------|---|---|---|----|--|-----------------------|----|
| 10022 | R | Check on the DDU that DCU6 is online  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10023 | A | Close Circuit Breaker 50Q7  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10024 | I | Car ID Code   |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10025 | A | Using the DDU on the test bench, check that all the doors on M4 are available - as in the picture below |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10026 | R | All doors are available   |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10027 | I | Train Lines and Safety Loop   |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10028 | A | ERTMS Auth Left Train Lines<br>Check continuity between<br>END1 90XR15 pin 44<br>END2 90XP25 pin 44     |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10029 | R | Both points are continuous  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10030 | A | ERTMS Auth Right Train Lines<br>Check continuity between<br>END1 90XR15 pin 47<br>END2 90XP25 pin 47    |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10031 | R | Both points are continuous  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10032 | A | Doors Open Train Lines<br>Check continuity between<br>END1 90XR15 pin 66<br>END2 90XP25 pin 66          |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10033 | R | Both points are continuous  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10034 | A | Door Close Right Train Lines<br>Check continuity between<br>END1 90XR15 pin 78<br>END2 90XP25 pin 78    |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10035 | A | Both points are continuous  |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10036 | A | Door Close Left Train Lines<br>Check continuity between<br>END1 90XR15 pin 79<br>END2 90XP25 pin 79     |   | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10037 | R | Both points are continuous  |   | OK |  | Sicelo Mtolo - 525130 | M4 |

|       |   |   |  |    |  |                       |    |
|-------|---|---|--|----|--|-----------------------|----|
| 10038 | A | Door Auth Left Train Lines<br>Check continuity between<br>END1 90XR15 pin 85<br>END2 90XP25 pin 85    |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10039 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10040 | A | Door Auth Right Train Lines<br>Check continuity between<br>END1 90XR15 pin 84<br>END2 90XP25 pin 84   |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10041 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10042 | A | V<3km/h Train Lines<br>Check continuity between<br>END1 90XR15 pin 29<br>END2 90XP25 pin 29           |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10043 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10044 | A | Door Auth Left Train Lines<br>Check continuity between<br>END1 90XR15 pin 85<br>END2 90XP25 pin 85    |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10045 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10046 | A | Door Auth Right Train Lines<br>Check continuity between<br>END1 90XR15 pin 84<br>END2 90XP25 pin 84   |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10047 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10048 | A | Safety Doors Loop Train Lines<br>Check continuity between<br>END1 90XR15 pin 96<br>END2 90XP25 pin 96 |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10049 | R | Both points are continuous  |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10050 | I | Left Side Doors   |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10051 | A | Put the connector written M4 on 90XP15<br>End 2   |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10052 | I | Door 1  |  | OK |  | Sicelo Mtolo - 525130 | M4 |

|       |   |  |    |      |                      |    |
|-------|---|--|----|------|----------------------|----|
| 10053 | I | The below signals are now simulated:<br>- Door Auth Right<br>- Door Open Right<br>- V<3km/h                | OK |      | Sicelo Mtol - 525130 | M4 |
| 10054 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorleft = 1.0  | OK |      | Sicelo Mtol - 525130 | M4 |
| 10055 | R | Check that the door opens in 3 sec (+1/-0)   | OK |      | Sicelo Mtol - 525130 | M4 |
| 10056 | R | Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05] | OK |      | Sicelo Mtol - 525130 | M4 |
| 10057 | I | Door Opening Gap   | OK |      | Sicelo Mtol - 525130 | M4 |
| 10058 | A | Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)             | OK |      | Sicelo Mtol - 525130 | M4 |
| 10059 | R | Door 1 gap<br>Result Min/Max : 1390<= x <= 1410 (mm)   | OK | 1392 | Sicelo Mtol - 525130 | M4 |
| 10060 | A | Measure the opening gap of the door. (This measurement must be done at the top of the door)                | OK |      | Sicelo Mtol - 525130 | M4 |
| 10061 | R | Door 1 gap<br>Result Min/Max : 1390<= x <= 1410 (mm)   | OK | 1404 | Sicelo Mtol - 525130 | M4 |
| 10062 | A | Measure the opening gap of the door. (This measurement must be done in the middle of the door)             | OK |      | Sicelo Mtol - 525130 | M4 |
| 10063 | R | Door 1 gap<br>Result Min/Max : 1390<= x <= 1410 (mm)   | OK | 1400 | Sicelo Mtol - 525130 | M4 |
| 10064 | I | Door 3   | OK |      | Sicelo Mtol - 525130 | M4 |
| 10065 | A | Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)             | OK |      | Sicelo Mtol - 525130 | M4 |
| 10066 | R | Door 3 gap<br>Result Min/Max : 1390<= x <= 1410 (mm)   | OK | 1394 | Sicelo Mtol - 525130 | M4 |
| 10067 | A | Measure the opening gap of the door. (This measurement must be done at the top of the door)                | OK |      | Sicelo Mtol - 525130 | M4 |
| 10068 | R | Door 3 gap<br>Result Min/Max : 1390<= x <= 1410 (mm)   | OK | 1408 | Sicelo Mtol - 525130 | M4 |
| 10069 | A | Measure the opening gap of the door. (This measurement must be done in the                                 | OK |      | Sicelo Mtol - 525130 | M4 |

|       |   |  |    |      |                       |    |  |
|-------|---|--|----|------|-----------------------|----|--|
|       |   | middle of the door)  |    |      |                       |    |  |
| 10070 | R | Door 3 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  | OK | 1399 | Sicelo Mtolo - 525130 | M4 |  |
| 10071 | I | Door 5   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10072 | I | Door Opening Gap   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10073 | A | Measure the opening gap of the door.<br>(This measurement must be done at the<br>BOTTOM of the door)             | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10074 | R | Door 5 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  | OK | 1395 | Sicelo Mtolo - 525130 | M4 |  |
| 10075 | A | Measure the opening gap of the door.<br>(This measurement must be done at the<br>top of the door)                | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10076 | R | Door 5 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  | OK | 1407 | Sicelo Mtolo - 525130 | M4 |  |
| 10077 | A | Measure the opening gap of the door.<br>(This measurement must be done in the<br>middle of the door)             | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10078 | R | Door 5 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  | OK | 1400 | Sicelo Mtolo - 525130 | M4 |  |
| 10079 | I | Right Side Doors   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10080 | I | Keep the connector 90XP15 End 2.   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10081 | I | Door 2   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10082 | A | The below signals remain simulated:<br>- Door Auth Right<br>- Door Open Right<br>- V<3km/h                       | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10083 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorright = 1.0   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10084 | R | Check that the door opens in 3 sec (+1/-0)   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10085 | R | Check that the GREEN leds on both sides<br>of the door blink while the door opens<br>[Safety Request: Prasa8-05] | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10086 | I | Door Opening Gap   | OK |      | Sicelo Mtolo - 525130 | M4 |  |
| 10087 | A | Measure the opening gap of the door.<br>(This measurement must be done at the                                    | OK |      | Sicelo Mtolo - 525130 | M4 |  |

|       |   |   |    |      |                             |    |  |
|-------|---|---|----|------|-----------------------------|----|--|
|       |   | BOTTOM of the door).  |    |      |                             |    |  |
| 10088 | R | Door 2 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1392 | Sicelo Mtolo - 525130       | M4 |  |
| 10089 | A | Measure the opening gap of the door.<br>(This measurement must be done at the top of the door)    | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10090 | R | Door 2 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1406 | Sicelo Mtolo - 525130       | M4 |  |
| 10091 | A | Measure the opening gap of the door.<br>(This measurement must be done in the middle of the door) | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10092 | R | Door 2 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1400 | Sicelo Mtolo - 525130       | M4 |  |
| 10093 | I | Door 4  | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10094 | I | Door Opening Gap  | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10095 | A | Measure the opening gap of the door.<br>(This measurement must be done at the BOTTOM of the door) | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10096 | R | Door 4 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1394 | Sicelo Mtolo - 525130       | M4 |  |
| 10097 | A | Measure the opening gap of the door.<br>(This measurement must be done at the top of the door)    | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10098 | R | Door 4 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1408 | Sicelo Mtolo - 525130       | M4 |  |
| 10099 | A | Measure the opening gap of the door.<br>(This measurement must be done in the middle of the door) | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10100 | R | Door 4 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1402 | Sicelo Mtolo - 525130       | M4 |  |
| 10101 | I | Door 6  | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10102 | I | Door Opening Gap  | OK |      | Sicelo Mtolo - 525130       | M4 |  |
| 10103 | A | Measure the opening gap of the door.<br>(This measurement must be done at the BOTTOM of the door) | OK |      | Sizwe Sibanyoni -<br>484647 | M4 |  |
| 10104 | R | Door 6 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)   | OK | 1392 | Sizwe Sibanyoni -<br>484647 | M4 |  |

|       |   |  |  |    |      |                       |    |
|-------|---|--|--|----|------|-----------------------|----|
| 10105 | A | Measure the opening gap of the door.<br>(This measurement must be done at the top of the door)   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10106 | R | Door 6 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  |  | OK | 1400 | Sicelo Mtolo - 525130 | M4 |
| 10107 | A | Measure the opening gap of the door.<br>(This measurement must be done in the middle of the door)  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10108 | R | Door 6 gap<br>Result Min/Max : 1390<= x <= 1410<br>(mm)  |  | OK | 1397 | Sicelo Mtolo - 525130 | M4 |
| 10109 | I | Obstacle Detection   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10110 | A | Position an obstacle on the floor in the centre of the door closing line for all the doors   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10111 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorright = 0   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10112 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorleft = 0  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10113 | R | The doors will hit the obstacle, reopen and try to close again 3 times.<br>On the third attempt it will stop and stand ajar - free to be opened manually |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10114 | A | Safety Doors Loop Train Lines<br>Check continuity between<br>END1 90XR15 pin 96<br>END2 90XP25 pin 96  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10115 | R | There is no continuity between the two points  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10116 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorright = 1   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10117 | A | Force [TT]<br>(MPU1)lo_dor_m4opendoorleft = 1  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10118 | R | The door opens fully   |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10119 | A | Remove the obstacle  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10120 | A | Release [TT]<br>(MPU1)lo_dor_m4opendoorleft  |  | OK |      | Sicelo Mtolo - 525130 | M4 |
| 10121 | A | Release [TT]<br>(MPU1)lo_dor_m4opendoorright   |  | OK |      | Sicelo Mtolo - 525130 | M4 |



|       |   |                                      |  |    |  |                       |    |
|-------|---|--------------------------------------|--|----|--|-----------------------|----|
| 10122 | A | Remove the connector on 90XP15 End 2 |  | OK |  | Sicelo Mtolo - 525130 | M4 |
| 10123 | I | End of Test                          |  | OK |  | Sicelo Mtolo - 525130 | M4 |



Serial Tests Report  
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RTR Vehicle Functional Static Testing Report

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## Section 16 – Vehicle Normalization

### 16.1 Instructions list

#### 16.1.1 093\_NORM-Vehicle Normalization

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

| N°    | Type | Instruction   | File | Result status | Result value | Operator                | Vehicle |
|-------|------|---|------|---------------|--------------|-------------------------|---------|
| 10001 | I    | Initial Conditions  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10002 | I    | The VFT procedures are all completed  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10003 | I    | Vehicle Normalization Check   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10004 | R    | On LV3 all Circuit Breakers are installed and secured   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10005 | R    | On LV3 all Dataplugs are installed, tightened and earth braids are fastened                       |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10006 | R    | On LV3 all Connectors are tightened   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10007 | R    | On LV3 there are no missing components, device, wiring or connectors.                             |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10008 | R    | On LV6 all Dataplugs are installed, tightened and earth braids are fastened                       |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10009 | R    | On LV6 all Connectors are tightened   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10010 | R    | On LV6 there are no missing components, device, wiring or connectors.                             |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10011 | R    | On HC Cubicle the Controller is installed and properly tightened and its connectors are tightened |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10012 | R    | All DCUs are properly installed and secured   |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10013 | R    | All Internal Displays are properly installed and secured  |      | OK            |              | Gcobani Baliso - 480570 | M4      |
| 10014 | R    | All Light Covers are properly installed   |      | OK            |              | Gcobani Baliso - 480570 | M4      |

|       |   |  |  |    |  |                            |    |
|-------|---|--|--|----|--|----------------------------|----|
| 10015 | R | All Saloon Fire Detectors are properly installed and secured                               |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10016 | R | All covers are normalised inside the car   |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10017 | R | On the Underframe, TBCU Agate is installed and properly tightened                          |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10018 | R | On the Underframe, Speed Sensors are installed and properly tightened                      |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10019 | R | On the LVB, all Circuit Breakers are installed and properly tightened                      |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10020 | R | On the LVB, all Relays and Timers are installed and properly tightened                     |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10021 | R | On the LVB, BRIOMs are installed and properly tightened                                    |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10022 | R | On the LVB there are no missing components, device, wiring or connectors.                  |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10023 | R | On the Underframe, all Connectors are tightened  |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10024 | R | All underframe covers are normalised   |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10025 | R | On END1 the Octopus cables are disconnected from the car and properly stored.              |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10026 | R | On END2 the Octopus cables are disconnected from the car and properly stored.              |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10027 | R | The Test Bench is switched OFF and the Octopus cables are disconnected and properly stored |  | OK |  | Gcobani Baliso - 480570    | M4 |
| 10028 | R | ALL P.Os of this car are closed  |  | OK |  | Sipheshile Mchunu - 491465 | M4 |
| 10029 | I | End Of Test  |  | OK |  | Gcobani Baliso - 480570    | M4 |

## Section 17 – Report summaries

### 17.2 Results status

| Test Instruction Sheet                  | Compliant | Incomplete | Non-compliant |
|---|-----------|------------|---------------|
| Vehicle Normalization                   | X         |            |               |
| Train Ground Communication              | X         |            |               |
| Traction and Electric Brake             | X         |            |               |
| TCMS Network                            | X         |            |               |
| Service Brake                           | X         |            |               |
| Rescue Mode and Emergency Disconnection | X         |            |               |
| Passenger Doors                         | X         |            |               |
| PACIS System                            | 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         |            |               |

### 17.1 Tools used

| Function    | Tool name   | Tool number  |
|-------------|-------------|--------------|
| 015_NRG     | NPhasemètre | Phasemeter   |
| 027_ERM     | Multimetro  | Meter 1      |
| 033_TRC     | Multimetro  | Meter 1      |
| 040_SBK     | Manometro   | Manometer    |
| 045_PBK     | Manometro   | Manometer    |
| 057_HVA_SME | NPhasemètre | Phasemeter   |
| 067_FSD     | Multimetro  | Multimeter 3 |



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| Vehicle | Equipment | Expected version | Version loaded |
|---------|-----------|------------------|----------------|
| M4      |           |                  |                |