PROJECT	CUSTOMER	VEHICLE
Xtrapolis-PRASA	**PRASA**	**304– M1 – VFT**

RTR Vehicle Functional Static Testing TS304 M1 Report

GIB0000008759

	CREATED	VERIFIED	APPROVED	DISTRIBUTION
Name	Vusumuzi ZULU	Lindani Ngubane	Kgomotso NKOANA	Confidentiality Category *Restricted* ☐ *Project* ☐ *Normal* ☑
Date	9/10/2025	9/10/2025	9/10/2025	Control Category *Controlled* ☑ *Not Controlled* ☐
Signature				Language **EN**

This report has been automatically generated from TES version 1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number

© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Table of modifications

Rev	Date	Modifications Content	Writer
A0	9/10/2025	Creation	Vusumuzi ZULU

Internal validations

	Name	Function	Date	Signature
Creator	Vusumuzi ZULU	EPU Manager	9/10/2025	X Vusumuzi ZULU EPU Manager
Verifier	Lindani Ngubane	Serial Test Manager	9/10/2025	X Lindani Ngubane Serial Test Manager
Approver	Kgomotso NKOANA	Test Expert	9/10/2025	X Kgomotso NKOANA Test Expert

Execution Plan

Start Date	22/9/2025
End Date	22/9/2025

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Contents

Section 1 - Purpose / Objectives

Section 3 – Energy Distribution

3.1 Instructions list

3.1.1 Energy Distribution

Section 4 – TCMS Network

4.1 Instructions list

4.1.1 TCMS Network

Section 5 – Cabin Control

5.1 Instructions list

5.1.1 Cabin Control

Section 6 – Internal Lighting

6.1 Instructions list

6.1.1 Internal Lighting

Section 7 – PACIS Network

7.1 Instructions list

7.1.1 PACIS Network

Section 8 – Train-Ground Communication

8.1 Instructions list

8.1.1 Train-Ground Communication

8.1.2 ERTMS

Section 9 – Pantograph

9.1 Instructions list

9.1.1 Pantograph

Section 10 – Rescue Mode and Emergency Disconnection

10.1 Instructions list

10.1.1 Rescue Mode and Emergency Disconnection

Section 11 – Emergency Brake

11.1 Instructions list

11.1.1 Emergency Brake

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 12 – Service Brake

12.1 Instructions list

12.1.1 Service Brake

Section 13 – Holding and Parking Brake

13.1 Instructions list

13.1.1 Holding and Parking Brake

Section 14 – Passenger Doors

14.1 Instructions list

14.1.1 Passenger Doors

Section 15 – HVAC Air Conditioning

15.1 Instructions list

15.1.1 HVAC_TK

15.1.2 HVAC_SME

Section 16 – Fire protection

16.1 Instructions list

16.1.1 Fire Protection

Section 17 – Traction and Electric Brake

17.1 Instructions list

17.1.1 Traction and Electric Brake

Section 18 – Vehicle Normalization

18.1 Instructions list

18.1.1 Vehicle Normalization

Section 17 - Report summaries

17.1 Results status

17.2 Tools used

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 1 – Purpose / Objectives

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. Pantograph
The objective of this procedure is to ensure the correct control and operation of the pantograph.
8. 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
Verify all the train lines associated with the traction and electric brake systems of the train
18. Vehicle Normalization
The objective of this procedure is to ensure that all connectors, panels a8nd covers are normalized.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 3 – Energy Distribution

3.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

3.1.1 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		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	Initial Conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	I	All the Circuit Breakers should be OPEN		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	I	Test bench should be connected with no active output voltage		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	I	NO 400Vac should be connected to the car		OK		Dilikani Ngubane 526515 22.09.2025	M1
10006	I	110Vdc Circuit Breaker		OK		Dilikani Ngubane 526515 22.09.2025	M1
10007	A	Close Circuit Breaker 15Q3 (Normal Line)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10008	I	230Vac and 400Vac Circuit breakers		OK		Dilikani Ngubane 526515 22.09.2025	M1
10009	A	Close Circuit Breaker 13Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10010	I	Normal and Permanent Power Supply		OK		Dilikani Ngubane 526515 22.09.2025	M1
10011	I	110Vdc Permanent Train Line Dev1/40 = END1 90XP24 pin 29 Dev5/40 = END2 90XP34 pin 29		OK		Dilikani Ngubane 526515 22.09.2025	M1
10012	A	Force [NI] Dev1/40 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10013	R	Read Defined Variable [NI] Dev5/40 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10014	A	Apply 110Vdc on the Normal Line using the external power supply		OK		Dilikani Ngubane 526515 22.09.2025	M1
10015	A	Measure 110Vdc between 90XR50.X1/1 (+) and 90XR50.X2/1 (-) (intercar connector). [Normal line]		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	I	Permanent Line Circuit Breakers		OK		Dilikani Ngubane 526515 22.09.2025	M1
10017	A	Check for battery voltage (above 80Vdc) on Circuit Breaker 15Q4 and close it (permanent Line)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10018	I	230Vac Circuit Breakers		OK		Dilikani Ngubane 526515 22.09.2025	M1
10019	A	Close Circuit Breaker 13Q2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10020	A	Close Circuit Breaker 13Q3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10021	I	230Vac and 400Vac Voltage Supply		OK		Dilikani Ngubane 526515 22.09.2025	M1
10022	A	Apply 400Vac to the Vehicle on End 1 or End 2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10023	A	Perform a phase rotation measurement on Connector 90XR62 between phases U(X3),V(X2),W(X1) and ensure the rotation is in the correct direction		OK		Dilikani Ngubane 526515 22.09.2025	M1
10024	R	Phase rotation between U,V,W is correct		OK		Dilikani Ngubane 526515 22.09.2025	M1
10025	A	Perform a phase rotation measurement on Connector 90XR52_1 between phases U(X1),V(X2),W(X3) and ensure the rotation is in the correct direction		OK		Dilikani Ngubane 526515 22.09.2025	M1
10026	R	Phase rotation between U,V,W is correct		OK		Dilikani Ngubane 526515 22.09.2025	M1
10027	A	Check 230Vac between points L and N of socket -13XT1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10028	R	230Vac present		OK		Dilikani Ngubane 526515 22.09.2025	M1
10029	A	Check 230Vac between points L and N of socket -13XT2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10030	R	230Vac present		OK		Dilikani Ngubane 526515 22.09.2025	M1
10031	A	Remove the connector 57XP1_10		OK		Dilikani Ngubane 526515 22.09.2025	M1
10032	A	Remove the connector 93XP150		OK		Dilikani Ngubane 526515 22.09.2025	M1
10033	A	Close the circuit breaker 34Q1 and 57Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10034	A	Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 57XP1_10 (10b1,10a2,10a1)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10035	R	400Vac +- 5% tolerance is measured between all three phases on connector 93XP150 (E2,E3,E1)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10036	A	Check 400Vac +-5% tolerance between Phases (W,V,U) on connector 93XP150		OK		Dilikani Ngubane 526515 22.09.2025	M1
10037	R	400Vac +- 5% tolerance is measured between all three phases on circuit breaker 57Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10038	A	Put back the connector 57XP1_10		OK		Dilikani Ngubane 526515 22.09.2025	M1
10039	A	Put back the connector 93XP150		OK		Dilikani Ngubane 526515 22.09.2025	M1
10040	I	Auxiliary Converters Command		OK		Dilikani Ngubane 526515 22.09.2025	M1
10041	I	Battery Connection Train Lines Dev1/79 = END 1 90XR24 pin 30 Dev5/79 = END 2 90XP34 pin 30		OK		Dilikani Ngubane 526515 22.09.2025	M1
10042	A	Force [NI] Dev1/79 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10043	R	Read Defined Variable [NI] Dev5/79 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10044	A	Force [NI] Dev1/79 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10045	R	Read Defined Variable [NI] Dev5/79 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10046	I	Battery Disconnection Train Lines Dev1/75 = END 1 90XR24 pin 31 Dev5/75 = END 2 90XP34 pin 31		OK		Dilikani Ngubane 526515 22.09.2025	M1
10047	A	Force [NI] Dev1/75 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10048	R	Read Defined Variable [NI] Dev5/75 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10049	A	Force [NI] Dev1/75 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10050	R	Read Defined Variable [NI] Dev5/75 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10051	I	IES StatusTrain Lines Dev1/86 = END 1 90XR25 pin 61		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

		Dev2/87 = END 1 90XR25 pin 62					
10052	A	Force [NI] Dev1/86 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10053	R	Read Defined Variable [NI] Dev2/87 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10054	A	Force [NI] Dev1/86 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10055	R	Read Defined Variable [NI] Dev2/87 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10056	I	Switch off the 400Vac power supply at the socket		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 4 – TCMS Network

4.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

4.1.1 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 I0 (SPP=25)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	Initial conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	I	Vehicle test bench should be configured as TC1: 1. TC1 Dataplugs 2. MCE switch set to TC1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	R	On DDU TCMS screen the TC1 cab is in BLUE colour		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	I	Power Supply to the Router Switches		OK		Dilikani Ngubane 526515 22.09.2025	M1
10006	I	Power supply to the 25A10 SWITCH ETHERNET (CRS1)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10007	A	Close Circuit Breaker 25Q10		OK		Dilikani Ngubane 526515 22.09.2025	M1
10008	R	CRS1 25A10 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10009	I	Power supply to the 25A11 SWITCH ETHERNET (CRS2)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10010	A	Close Circuit Breaker 25Q11		OK		Dilikani Ngubane 526515 22.09.2025	M1
10011	R	CRS2 25A11 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10012	I	Power supply to the 25A14 ETHERNET REPEATER (TBR)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10013	A	Close Circuit Breaker 25Q14		OK		Dilikani Ngubane 526515 22.09.2025	M1
10014	R	TBR 25A14 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10015	A	Close Circuit Breaker 25Q6		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	A	Close Circuit Breaker 25Q7		OK		Dilikani Ngubane 526515 22.09.2025	M1
10017	I	Ethernet Loop		OK		Dilikani Ngubane 526515 22.09.2025	M1
10018	A	For each CRS, check that the Ethernet Loop LEDs are flashing		OK		Dilikani Ngubane 526515 22.09.2025	M1
10019	R	CRS1 has LEDs on ports X3 and X4 flashing		OK		Dilikani Ngubane 526515 22.09.2025	M1
10020	R	CRS2 has ONLY LED on port X4 flashing		OK		Dilikani Ngubane 526515 22.09.2025	M1
10021	R	Check on the Test Bench DDU that all Router Switches are available on the network		OK		Dilikani Ngubane 526515 22.09.2025	M1
10022	I	Power Supply to the BRIOMS		OK		Dilikani Ngubane 526515 22.09.2025	M1
10023	I	Power supply to the 25A6 BRIOM 40/10 ETH 6		OK		Dilikani Ngubane 526515 22.09.2025	M1
10024	R	BRIOM 25A6 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10025	A	Check visually that ground braid is connected to BRIOM		OK		Dilikani Ngubane 526515 22.09.2025	M1
10026	I	Power supply to the 25A7 BRIOM 40/10 ETH 7		OK		Dilikani Ngubane 526515 22.09.2025	M1
10027	R	BRIOM 25A7 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 5 – Cabin Control

5.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

5.1.1 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		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	Train Lines		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	I	Cab Selected on Train Lines Dev1/1 = END1 90XR24 pin 3 Dev5/1 = END2 90XP34 pin 3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	A	Force [NI] Dev1/1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	R	Read Defined Variable [NI] Dev5/1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10006	A	Force [NI] Dev1/1 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10007	R	Read Defined Variable [NI] Dev5/1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10008	I	Cab Active TC1 Train Lines Dev1/2 = END1 90XR24 pin 4 Dev5/2 = END2 90XP34 pin 4		OK		Dilikani Ngubane 526515 22.09.2025	M1
10009	A	Force [NI] Dev1/2 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10010	R	Read Defined Variable [NI] Dev5/2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10011	A	Force [NI] Dev1/2 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10012	R	Read Defined Variable [NI] Dev5/2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10013	I	Master Key TC1 Train Lines Dev1/73 = END1 90XR24 pin 17 Dev5/73 = END2 90XP34 pin 14		OK		Dilikani Ngubane 526515 22.09.2025	M1
10014	A	Force [NI] Dev1/73 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10015	R	Read Defined Variable [NI] Dev5/73 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10016	A	Force [NI] Dev1/73 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Read Defined Variable [NI] Dev5/73 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 6 – Internal Lighting

6.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

6.1.1 Internal Lighting

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Internal Lighting (SPP=052)		OK		TIVANI Angel 542257 22.09.2025	M1
10002	I	Initial Conditions		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	The 110Vdc Normal line is ON		OK		TIVANI Angel 542257 22.09.2025	M1
10004	I	Cleaning Lighting Command		OK		TIVANI Angel 542257 22.09.2025	M1
10005	I	110Vdc Permanent Train Line Dev1/40 = END1 90XR24 pin 29		OK		TIVANI Angel 542257 22.09.2025	M1
10006	A	Force [NI] Dev1/40 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10007	A	Close Circuit Breaker 52Q5		OK		TIVANI Angel 542257 22.09.2025	M1
10008	A	Close Circuit Breaker 52Q3		OK		TIVANI Angel 542257 22.09.2025	M1
10009	A	Close Circuit Breaker 52Q4		OK		TIVANI Angel 542257 22.09.2025	M1
10010	I	Lighting 33% Train Line Dev1/8 = END1 90XR25 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1
10011	A	Force [NI] Dev1/8 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10012	R	The saloon RIGHT side emergency lights (low intensity) are ON on all light modules		OK		TIVANI Angel 542257 22.09.2025	M1
10013	R	The saloon LEFT side emergency lights (low intensity) are ON on all light modules		OK		TIVANI Angel 542257 22.09.2025	M1
10014	I	Lighting 33% Train Line Dev5/8 = END2 90XP35 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1
10015	R	Read Defined Variable [NI] Dev5/8 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10016	I	Lighting 33% Train Line Dev1/8 = END1 90XR25 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	A	Force [NI] Dev1/8 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10018	I	Lighting 33% Train Line Dev5/8 = END2 90XP35 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1
10019	R	Read Defined Variable [NI] Dev5/8 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10020	R	All saloon emergency lights (low intensity) are OFF on all light modules (Left+Right)		OK		TIVANI Angel 542257 22.09.2025	M1
10021	A	Turn Cleaning Staff Lights Switch 52S6 to ON position		OK		TIVANI Angel 542257 22.09.2025	M1
10022	I	Lighting 33% Train Line Dev5/8 = END2 90XP35 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1
10023	R	Read Defined Variable [NI] Dev5/8 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10024	R	All saloon emergency lights (low intensity) are ON on all light modules (Left+Right)		OK		TIVANI Angel 542257 22.09.2025	M1
10025	A	Reset Circuit Breaker 52Q5 (Open and Close)		OK		TIVANI Angel 542257 22.09.2025	M1
10026	R	Read Defined Variable [NI] Dev5/8 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10027	I	Main Lighting Command		OK		TIVANI Angel 542257 22.09.2025	M1
10028	A	Close Circuit Breaker 52Q1		OK		TIVANI Angel 542257 22.09.2025	M1
10029	A	Close Circuit Breaker 52Q2		OK		TIVANI Angel 542257 22.09.2025	M1
10030	R	All saloon emergency lights (low intensity) are ON on all light modules (Left+Right)		OK		TIVANI Angel 542257 22.09.2025	M1
10031	I	Lighting 33% Train Line Dev5/8 = END2 90XP25 pin 27		OK		TIVANI Angel 542257 22.09.2025	M1
10032	R	Read Defined Variable [NI] Dev5/8 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10033	I	Main Lighting Command Train Line Dev1/32 = END1 90XR25 pin 26		OK		TIVANI Angel 542257 22.09.2025	M1
10034	A	Force [NI] Dev1/32 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	I	Main Lighting Command Train Line Dev5/24 = END2 90XP35 pin 26		OK		TIVANI Angel 542257 22.09.2025	M1
10036	R	Read Defined Variable [NI] Dev5/24 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10037	R	The saloon LEFT side main lighting (high intensity) is ON on all light modules		OK		TIVANI Angel 542257 22.09.2025	M1
10038	R	The saloon RIGHT side main lighting (high intensity) is ON on all light modules		OK		TIVANI Angel 542257 22.09.2025	M1
10039	I	Main Lighting Command Train Line Dev1/32 = END1 90XR25 pin 26		OK		TIVANI Angel 542257 22.09.2025	M1
10040	A	Force [NI] Dev1/32 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10041	R	All saloon emergency lights (low intensity) are ON on all light modules (Left+Right)		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 7 – PACIS Network

7.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

7.1.1 PACIS Network

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	PACIS System (SPP=054)		OK		TIVANI Angel 542257 22.09.2025	M1
10002	I	Initial conditions		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	110Vdc Normal line is connected and ON		OK		TIVANI Angel 542257 22.09.2025	M1
10004	I	Circuit Breakers		OK		TIVANI Angel 542257 22.09.2025	M1
10005	A	Close Circuit Breaker 54Q1		OK		TIVANI Angel 542257 22.09.2025	M1
10006	A	Close Circuit Breaker 54Q2		OK		TIVANI Angel 542257 22.09.2025	M1
10007	A	Close Circuit Breaker 54Q10		OK		TIVANI Angel 542257 22.09.2025	M1
10008	A	Close Circuit Breaker 54Q11		OK		TIVANI Angel 542257 22.09.2025	M1
10009	A	Close Circuit Breaker 55Q2		OK		TIVANI Angel 542257 22.09.2025	M1
10010	A	Close Circuit Breaker 55Q3		OK		TIVANI Angel 542257 22.09.2025	M1
10011	R	All 'Pacis System' circuit breakers are closed		OK		TIVANI Angel 542257 22.09.2025	M1
10012	I	Power Supply of Router Switches		OK		TIVANI Angel 542257 22.09.2025	M1
10013	I	Ethernet Switch CRS1		OK		TIVANI Angel 542257 22.09.2025	M1
10014	R	CRS1 is ON		OK		TIVANI Angel 542257 22.09.2025	M1
10015	I	Ethernet Switch CRS2		OK		TIVANI Angel 542257 22.09.2025	M1
10016	R	CRS2 is ON		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	I	DPAI-1		OK		TIVANI Angel 542257 22.09.2025	M1
10018	R	DPAI-1 is ON		OK		TIVANI Angel 542257 22.09.2025	M1
10019	I	DPAI-2		OK		TIVANI Angel 542257 22.09.2025	M1
10020	R	DPAI-2 is ON		OK		TIVANI Angel 542257 22.09.2025	M1
10021	I	Lateral Display 'LAT1'		OK		TIVANI Angel 542257 22.09.2025	M1
10022	R	The PWR (power) LED is ON on the Lateral Display 'LAT1'		OK		TIVANI Angel 542257 22.09.2025	M1
10023	I	Lateral Display 'LAT2'		OK		TIVANI Angel 542257 22.09.2025	M1
10024	R	The PWR (power) LED is ON on the Lateral Display 'LAT2'		OK		TIVANI Angel 542257 22.09.2025	M1
10025	I	Interior Display 'INT1'		OK		Amanda Ntuli 526239 02.10.2025	M1
10026	R	The PWR (power) LED is ON on the Interior Display 'INT1'		OK		Amanda Ntuli 526239 02.10.2025	M1
10027	I	Interior Display 'INT2'		OK		Amanda Ntuli 526239 02.10.2025	M1
10028	R	The PWR (power) LED is ON on the Interior Display 'INT2'		OK		Amanda Ntuli 526239 02.10.2025	M1
10029	I	Impedance of Loudspeaker		OK		Amanda Ntuli 526239 02.10.2025	M1
10030	I	Saloon Speakers Commanded by DPAI-1		OK		Amanda Ntuli 526239 02.10.2025	M1
10031	A	Measure the impedance connector '54XP1_X4' between pins:z32(+) and z30 (-)		OK		Amanda Ntuli 526239 02.10.2025	M1
10032	R	ImpedanceResult Max : x <= 32 (Ohm)		OK	31.5	Amanda Ntuli 526239 02.10.2025	M1
10033	I	Saloon Speakers Commanded by DPAI-2		OK		Amanda Ntuli 526239 02.10.2025	M1
10034	A	Measure the impedance connector '54XP2_X4' between pins:z32(+) and z30 (-)		OK		Amanda Ntuli 526239 02.10.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	R	ImpedanceResult Max : x <= 32 (Ohm)		OK	31.7	Amanda Ntuli 526239 02.10.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 8 – Train-Ground Communication

8.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

8.1.1 Train-Ground Communication

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Train-Ground Communication (SPP=064)		OK		TIVANI Angel 542257 22.09.2025	M1
10002	A	Using the tool list on the side of your screen, note the serial number of the antenna cable tester used in this procedure		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	Antenna cable tester Calibration		OK		TIVANI Angel 542257 22.09.2025	M1
10004	I	PERFORM THIS CALIBRATION BEFORE TESTING EACH CABLE		OK		TIVANI Angel 542257 22.09.2025	M1
10005	A	Select "preset", then Set the test frequency by selecting "FREQ/DIST" then setting the start and stop frequency, select "calibrate", then "Full 1-port" then Calibrate the Antenna cable tester using the 0.5m extension cable and the T-calibration unit.		OK		TIVANI Angel 542257 22.09.2025	M1
10006	I	GSM Cable		OK		TIVANI Angel 542257 22.09.2025	M1
10007	A	Ensure the frequency range is 876MHz - 961.34MHz; Connect the GSM cable of the Netbox to the measuring cable and note the resulting waveform		OK		TIVANI Angel 542257 22.09.2025	M1
10008	R	The maximum peak of the waveform isResult Max : x <= 2.13 ()		OK	1.54	TIVANI Angel 542257 22.09.2025	M1
10009	A	Save the waveform result with the following name: TS#(#-Train number)_NBX_ GSM1		OK		TIVANI Angel 542257 22.09.2025	M1
10010	A	Recalibrate the tester. Ensure the frequency range is 1.71GHz - 1.88Ghz; Connect the GSM cable of the Netbox to the measuring cable and note the resulting waveform		OK		TIVANI Angel 542257 22.09.2025	M1
10011	R	The maximum peak of the waveform isResult Max : x <= 2.13 ()		OK	1.13	Amanda Ntuli 526239 06.10.2025	M1
10012	A	Save the waveform result with the following name: TS#(#-Train number)_NBX_ GSM2		OK		Amanda Ntuli 526239 06.10.2025	M1
10013	I	GPS Cable		OK		Amanda Ntuli 526239 06.10.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10014	A	Recalibrate the tester. Ensure the frequency range is 1200MHz - 1600MHz; Connect the GPS cable of the Netbox to the measuring cable and note the resulting waveform		OK		Amanda Ntuli 526239 06.10.2025	M1
10015	A	On the cable tester, select "MEAS" and select F1 "Distance to Fault"		OK		Amanda Ntuli 526239 06.10.2025	M1
10016	I	Ensure that the resulting waveform is such as in the picture on the right. The peak of the graph should be at a point >8m; before that, the graph should be flat. Maximum value before the peak should be 1.2		OK		Amanda Ntuli 526239 06.10.2025	M1
10017	R	The maximum peak of the waveform isResult Max : x <= 1.2 ()		OK	1.03	Amanda Ntuli 526239 06.10.2025	M1
10018	A	Save the waveform result with the following name: TS#(#-Train number)_NBX_ GPS		OK		Amanda Ntuli 526239 06.10.2025	M1
10019	I	Wifi Cable		OK		Amanda Ntuli 526239 06.10.2025	M1
10020	A	Recalibrate the tester. Ensure the frequency range is 1710MHz - 2700MHz; Connect the WiFi cable of the Netbox to the measuring cable and note the resulting waveform		OK		Amanda Ntuli 526239 06.10.2025	M1
10021	R	The maximum peak of the waveform isResult Max : x <= 2.45 ()		OK	1.1	Amanda Ntuli 526239 06.10.2025	M1
10022	A	Save the waveform result with the following name: TS#(#-Train number)_NBX_ WiFi1		OK		Amanda Ntuli 526239 06.10.2025	M1
10023	A	Recalibrate the tester. Ensure the frequency range is 4.9GHz - 5.935GHz;		OK		Amanda Ntuli 526239 06.10.2025	M1
10024	R	The maximum peak of the waveform isResult Max : x <= 2.45 ()		OK	1.55	Amanda Ntuli 526239 06.10.2025	M1
10025	A	Save the waveform result with the following name: TS#(#-Train number)_NBX_ WiFi2		OK		Amanda Ntuli 526239 06.10.2025	M1
10026	A	Close Circuit Breaker 64Q1		OK		Amanda Ntuli 526239 06.10.2025	M1
10027	R	Check that the Netbox turns ON		OK		Amanda Ntuli 526239 06.10.2025	M1

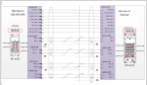
UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

8.1.2 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		TIVANI Angel 542257 22.09.2025	M1
10002	I	ERTMS Bypass Train Lines Dev1/33 = END1 90XR24 pin 11 Dev5/37 = END2 90XP34 pin 11		OK		TIVANI Angel 542257 22.09.2025	M1
10003	A	Force [NI] Dev1/33 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10004	R	Read Defined Variable [NI] Dev5/37 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10005	A	Force [NI] Dev1/33 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10006	R	Read Defined Variable [NI] Dev5/37 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10007	I	Emergency Brake ERTMS 1 Train Lines Dev1/88 = END1 90XR24 pin 18 Dev5/88 = END2 90XP34 pin 18		OK		TIVANI Angel 542257 22.09.2025	M1
10008	A	Force [NI] Dev1/88 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10009	R	Read Defined Variable [NI] Dev5/88 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10010	A	Force [NI] Dev1/88 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10011	R	Read Defined Variable [NI] Dev5/88 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10012	I	Emergency Brake ERTMS 2 Train Lines Dev1/80 = END1 90XR24 pin 20 Dev5/80 = END2 90XP34 pin 20		OK		TIVANI Angel 542257 22.09.2025	M1
10013	A	Force [NI] Dev1/80 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10014	R	Read Defined Variable [NI] Dev5/80 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10015	A	Force [NI] Dev1/80 = 0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	R	Read Defined Variable [NI] Dev5/80 = 0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10017	I	Wheel Sensor Continuity Test		OK		TIVANI Angel 542257 22.09.2025	M1
10018	I	Use the multimeter to test the continuity		OK		TIVANI Angel 542257 22.09.2025	M1
10019	A	Check continuity between [62B1 WHEEL SENSOR (Local:+MB2; Connector 62XP1_1) and Intercar(Local:+END2; connector 90XP33.c)]		OK		TIVANI Angel 542257 22.09.2025	M1
10020	R	There is a continuity between: pin B & pin 2, pin A & pin 1, pin C & pin 7, pin D & pin 8		OK		TIVANI Angel 542257 22.09.2025	M1
10021	R	There is a continuity between: pin F & pin 4, pin E & pin 3, pin G & pin 9, pin H & pin 10		OK		TIVANI Angel 542257 22.09.2025	M1
10022	R	There is a continuity between: pin L & pin 6, pin K & pin 5, pin M & pin 11, pin N & pin 12		OK		TIVANI Angel 542257 22.09.2025	M1
10023	I	Eurobalise Antenna Cable		OK		TIVANI Angel 542257 22.09.2025	M1
10024	A	Check continuity between [Intercar(LOCAL: +END1; Connector -90XR20) and Intercar (LOCAL:+END2; connector -90XP30)] according to the image below		OK		TIVANI Angel 542257 22.09.2025	M1
10025	R	Eurobalise Antenna cable is correctly configured		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 9 – Pantograph

9.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

9.1.1 Pantograph

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Pantograph (SPP = 021)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	There should be no air in the main pipe		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	R	Measure 0 Bar at point K2.8 using the pressure gauge		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	A	Ensure that the pantograph isolation valve K2.5 is normalised (not isolated)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	I	Initial Conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10006	R	Read Defined Variable [TT] (MPU1)li_pnt_m1drainingcockr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10007	R	Read Defined Variable [TT] (MPU1)li_pnt_m1drainingcockr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10008	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10009	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10010	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxpressswitchr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10011	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxpressswitchr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10012	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10013	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10014	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10015	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10016	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10018	I	Auxiliary Compressor		OK		Dilikani Ngubane 526515 22.09.2025	M1
10019	A	Close Circuit Breaker 21Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10020	A	Close Circuit Breaker 21Q2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10021	A	Close Circuit Breaker 21Q3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10022	R	The Auxiliary compressor 21M1 turns ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10023	R	Read Defined Variable [TT] (MPU1)lo_pnt_m1startauxiliarcompr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10024	R	Read Defined Variable [TT] (MPU1)lo_pnt_m1startauxiliarcompr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10025	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10026	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10027	A	Force [TT] (MPU1)lo_pnt_m1raisepantor1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10028	A	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 > 3.8Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10029	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10030	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10031	R	The pantograph is raised		OK		Dilikani Ngubane 526515 22.09.2025	M1
10032	A	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 is between 6 - 7Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10033	R	The Auxiliary compressor 21M1 turns OFF		OK		Dilikani Ngubane 526515 22.09.2025	M1
10034	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1

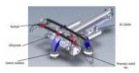
UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	R	Read Defined Variable [TT] (MPU1)li_pnt_m1auxcpcontactorr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10036	A	Turn the pantograph isolation valve K2.5 to isolated position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10037	R	Read Defined Variable [TT] (MPU1)li_pnt_m1drainingcockr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10038	R	Read Defined Variable [TT] (MPU1)li_pnt_m1drainingcockr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10039	A	Force [TT] (MPU1)lo_pnt_m1startauxiliarcompr1 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10040	A	Force [TT] (MPU1)lo_pnt_m1startauxiliarcompr2 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10041	A	Drain the air by putting the isolation valve K2.5 in half way position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10042	R	Using the pressure gauge, check that the Pantograph drops at 3.3 Bar.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10043	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10044	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10045	A	Turn the pantograph isolation valve K2.5 to normal position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10046	A	Release [TT] (MPU1)lo_pnt_m1startauxiliarcompr1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10047	A	Release [TT] (MPU1)lo_pnt_m1startauxiliarcompr2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10048	R	The Auxiliary compressor 21M1 turns ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10049	A	Allow the pressure to rise. Using the pressure gauge, check that the pressure at point K2.8 is between 6 - 7Bar. (VERIFY BEFORE MOVING TO THE NEXT STEP)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10050	R	The Auxiliary compressor 21M1 turns OFF		OK		Dilikani Ngubane 526515 22.09.2025	M1
10051	I	Isolation and Earthing		OK		Dilikani Ngubane 526515 22.09.2025	M1
10052	A	In the HV Box , check that all the Green Keys are present.		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10053	A	In the HV Box , set the HVB1 valve to Isolated position - to isolate the pantograph		OK		Dilikani Ngubane 526515 22.09.2025	M1
10054	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10055	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10056	A	Turn the Earthing Switch to grounded position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10057	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10058	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10059	A	Turn the Earthing Switch to back to Normal position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10060	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10061	R	Read Defined Variable [TT] (MPU1)li_pnt_m1earthpantor2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10062	A	Set the HVB1 valve to Normal position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10063	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10064	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantoisolatedr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10065	A	Normalize the HV box and remove all spare/duplicate keys (green/yellow/blue)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10066	I	Pantograph Mechanical Test		OK		Dilikani Ngubane 526515 22.09.2025	M1
10067	I	Housed Height Measurement, Pantograph Over-Height Measurement, Automatic Drop Device and Control Force Test		OK		Dilikani Ngubane 526515 22.09.2025	M1
10068	I	Initial Conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10069	I	There should be no air in the main pipe		OK		Dilikani Ngubane 526515 22.09.2025	M1
10070	R	Measure 0 Bar at point K2.8 using the pressure gauge		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10071	A	Ensure that the pantograph isolation valve K2.5 is normalised (not isolated)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10072	I	Housed Height Measurement		OK		Dilikani Ngubane 526515 22.09.2025	M1
10073	I	The purpose of this test is to ensure that the housed height of the pantograph complies with the specified dimensions The train must be positioned on a levelled track without any overhead catenary		OK		Dilikani Ngubane 526515 22.09.2025	M1
10074	A	Measure the perpendicular height (using a measuring tape and ruler extended from points A, B and C of the pantohead) of the pantograph on natural housed position (between the roof of the train and the pantograph collector head at points A, B, C)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10075	A	Ensure that no part of the pantograph is higher than 486mm above the roof		OK		Dilikani Ngubane 526515 22.09.2025	M1
10076	R	AResult Max : x <= 486 (mm)		OK	483	Dilikani Ngubane 526515 22.09.2025	M1
10077	R	BResult Max : x <= 486 (mm)		OK	484	Dilikani Ngubane 526515 22.09.2025	M1
10078	R	CResult Max : x <= 486 (mm)		OK	483	Dilikani Ngubane 526515 22.09.2025	M1
10079	A	Check that the centre of the pantograph head corresponds with the track centreline in the housed position (Use marked ruler to compare)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10080	R	Pantograph aligned with the track centreline in housed position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10081	I	Automatic Drop Device		OK		Dilikani Ngubane 526515 22.09.2025	M1
10082	I	The purpose of this test is to verify the correct operation of the automatic drop device (ADD) and will be performed by simulating the activation of the ADD pressure switch.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10083	A	Tie a cable on pantograph head collector		OK		Dilikani Ngubane 526515 22.09.2025	M1
10084	A	Close Circuit Breaker 21Q3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10085	A	Close Circuit Breaker 21Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10086	A	Close Circuit Breaker 21Q2		OK		Dilikani Ngubane 526515 22.09.2025	M1
10087	R	The Auxiliary compressor 21M1 turns ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10088	A	Force [TT] (MPU1)lo_pnt_m1raisepantor1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10089	I	Allow the pressure to rise, and the pantograph to raise		OK		Dilikani Ngubane 526515 22.09.2025	M1
10090	R	The pantograph is raised		OK		Dilikani Ngubane 526515 22.09.2025	M1
10091	A	Activate the ADD manually on the roof by operating the bleeding screw (PT3) on the pan head to simulate a loss of air supply		OK		Dilikani Ngubane 526515 22.09.2025	M1
10092	R	The pressure of the test point PT12 drops to 0 bar		OK		Dilikani Ngubane 526515 22.09.2025	M1
10093	A	On the roof, close the bleeding screw (PT3) to reset the ADD		OK		Dilikani Ngubane 526515 22.09.2025	M1
10094	R	Fault reset and equipment normalized		OK		Dilikani Ngubane 526515 22.09.2025	M1
10095	A	Release [TT] (MPU1)lo_pnt_m1raisepantor1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10096	R	Pantograph is lowered		OK		Dilikani Ngubane 526515 22.09.2025	M1
10097	I	Pantograph Over-Height Measurement		OK		Dilikani Ngubane 526515 22.09.2025	M1
10098	I	The purpose of the next test is to verify that the pantograph over-height detection and auto dropping functions are calibrated and work correctly. This test simulates the condition when a pantograph is incorrectly raised in an area without any overhead line		OK		Dilikani Ngubane 526515 22.09.2025	M1
10099	I	You will be required to time the rising and dropping of the pantograph using a stopwatch. measure the time from the moment the pantograph starts to rise until the pantograph reaches maximum raised position; then time from the moment the pantograph starts dropping at overheight detection till it reaches housed position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10100	A	Use the rope to hook the pantograph and place the marked ruler perpendicular to the roof of the car. See the picture attached.		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10101	A	Force [TT] (MPU1)lo_pnt_m1raisepantor1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10102	A	Whilst holding the end of the rope, allow the pressure to rise, and the pantograph to rise until it reaches the maximum height marked on the ruler.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10103	R	Rising timeResult Max : x <= 10 (S)		OK	6	Dilikani Ngubane 526515 22.09.2025	M1
10104	A	By adjusting the rope, ensure that the Pantograph Panhead is aligned with the marking on the ruler.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10105	A	Adjust the Over-height valve such that when the panto goes above the marking on the ruler, the overheight must be detected.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10106	R	The over-height valve is adjusted correctly.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10107	A	Release [TT] (MPU1)lo_pnt_m1raisepantor1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10108	R	Pantograph is lowered		OK		Dilikani Ngubane 526515 22.09.2025	M1
10109	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10110	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10111	A	Force [TT] (MPU1)lo_pnt_m1raisepantor1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10112	A	Allow the pantograph to rise freely until it reaches overheight.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10113	R	Overheight is detected immediately after passing the marked area on the ruler and pantograph begins to drop		OK		Dilikani Ngubane 526515 22.09.2025	M1
10114	R	Lowering timeResult Max : x <= 7 (S)		OK	5	Dilikani Ngubane 526515 22.09.2025	M1
10115	A	Release [TT] (MPU1)lo_pnt_m1raisepantor1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10116	A	Reset over-height valve (PT2) on the roof		OK		Dilikani Ngubane 526515 22.09.2025	M1
10117	R	Equipment normalized. (Only after resetting the PT2 valve, can the pantograph be raised)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10118	I	Control Force Test		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10119	I	The purpose of this test is to ensure that the pantograph maintains an acceptable force against the catenary wire over all operating heights		OK		Dilikani Ngubane 526515 22.09.2025	M1
10120	A	Attach the dynamometer to the pantograph's head collector		OK		Dilikani Ngubane 526515 22.09.2025	M1
10121	A	Raise the pantograph and measure the static force when the pantograph begins to rise after pulling the dynamometer up (lifting force on housed position)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10122	A	Force [TT] (MPU1)lo_pnt_m1raisepantor1 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10123	I	Allow the pressure to rise, and the pantograph to raise		OK		Dilikani Ngubane 526515 22.09.2025	M1
10124	R	The pantograph is raised		OK		Dilikani Ngubane 526515 22.09.2025	M1
10125	R	F>150N		OK		Dilikani Ngubane 526515 22.09.2025	M1
10126	A	Attach the 8.5kg (one 7.5kg and one 1kg) dead weight to the pantohead to apply a 85N force whilst the panto is in the raised position.		OK		Dilikani Ngubane 526515 22.09.2025	M1
10127	R	The pantographs should remain in the neutral position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10128	A	Check that the centre of the pantograph head corresponds with the track centreline on maximum raised position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10129	R	Pantograph aligned with the track centreline in maximum raised position (Use marked ruler to compare)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10130	A	Remove 1kg dead weight		OK		Dilikani Ngubane 526515 22.09.2025	M1
10131	R	Pantograph continues to rise to over height condition		OK		Dilikani Ngubane 526515 22.09.2025	M1
10132	A	Remove the dynamometer and dead weights from the pantograph's head-collector		OK		Dilikani Ngubane 526515 22.09.2025	M1
10133	A	Release [TT] (MPU1)lo_pnt_m1raisepantor1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10134	R	Pantograph is lowered		OK		Dilikani Ngubane 526515 22.09.2025	M1
10135	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10136	R	Read Defined Variable [TT] (MPU1)li_pnt_m1pantorisedr2 = 0.0		OK	0	Dilikani Ngubane 526515	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

						22.09.2025	

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 10 – Rescue Mode and Emergency Disconnection

10.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10.1.1 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		Carol Gumede 425280 22.09.2025	M1
10002	I	Initial Conditions		OK		Carol Gumede 425280 22.09.2025	M1
10003	I	110Vdc Normal power supply is connected to the vehicle, and switched ON		OK		Carol Gumede 425280 22.09.2025	M1
10004	I	Backup Mode Train Lines Dev1/29 = END1 90XR15 pin23 Dev5/33 = END2 90XP25 pin 23		OK		Carol Gumede 425280 22.09.2025	M1
10005	A	Force [NI] Dev1/29 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10006	R	Read Defined Variable [NI] Dev5/33 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10007	R	Relay 27K1 is Energised		OK		Carol Gumede 425280 22.09.2025	M1
10008	R	Relay 27K2 is De-energised		OK		Carol Gumede 425280 22.09.2025	M1
10009	A	Timer 30.0 S		OK		Carol Gumede 425280 22.09.2025	M1
10010	R	Relay 27K2 is De-energised		OK		Carol Gumede 425280 22.09.2025	M1
10011	A	Timer 30.0 S		OK		Carol Gumede 425280 22.09.2025	M1
10012	R	Relay 27K2 is energised		OK		Carol Gumede 425280 22.09.2025	M1
10013	I	Backup Mode Train Lines Dev1/29 = END1 90XR25 pin23 Dev5/33 = END2 90XP35 pin 23		OK		Carol Gumede 425280 22.09.2025	M1
10014	A	Force [NI] Dev1/29 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10015	R	Read Defined Variable [NI] Dev5/33 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10016	R	Relay 27K1 is De-energised		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Relay 27K2 is De-energised		OK		Carol Gumede 425280 22.09.2025	M1
10018	I	Emergency Disconnection		OK		Carol Gumede 425280 22.09.2025	M1
10019	I	Emergency Disconnection Train Lines Dev1/30 = END1 90XR25 pin24 Dev5/34 = END2 90XP35 pin 24		OK		Carol Gumede 425280 22.09.2025	M1
10020	A	Force [NI] Dev1/30 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10021	R	Read Defined Variable [NI] Dev5/34 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10022	R	Relay 27K5 is Energised		OK		Carol Gumede 425280 22.09.2025	M1
10023	I	Emergency Disconnection Train Lines Dev1/30 = END1 90XR25 pin24 Dev5/34 = END2 90XP35 pin 24		OK		Carol Gumede 425280 22.09.2025	M1
10024	A	Force [NI] Dev1/30 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10025	R	Read Defined Variable [NI] Dev5/34 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10026	R	Relay 27K5 is De-energised		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 11 – Emergency Brake

11.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

11.1.1 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		Carol Gumede 425280 22.09.2025	M1
10002	I	Initial Conditions		OK		Carol Gumede 425280 22.09.2025	M1
10003	I	No PEAs are activated		OK		Carol Gumede 425280 22.09.2025	M1
10004	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Carol Gumede 425280 22.09.2025	M1
10005	I	Visual Inspection		OK		Carol Gumede 425280 22.09.2025	M1
10006	A	Physically and visually inspect all the Disk Break Units (DBU) and brake pads, to ensure they are securely fitted		OK		Carol Gumede 425280 22.09.2025	M1
10007	R	All the brake DBUs are correctly installed and all the brake pads are correctly installed and locked		OK		Carol Gumede 425280 22.09.2025	M1
10008	A	Check the piping installation		OK		Carol Gumede 425280 22.09.2025	M1
10009	R	All the pipes are installed on the vehicle		OK		Carol Gumede 425280 22.09.2025	M1
10010	A	Check all the Passenger Emergency Alarm handles, and ensure they are connected to their respective connectors		OK		Carol Gumede 425280 22.09.2025	M1
10011	R	All the PEAs are installed and connected		OK		Carol Gumede 425280 22.09.2025	M1
10012	I	Train Lines		OK		Carol Gumede 425280 22.09.2025	M1
10013	I	Emergency Brake Loop Train Lines Dev1/5 = END1 90XR24 pin 8 Dev5/5 = END2 90XP34 pin 8		OK		Carol Gumede 425280 22.09.2025	M1
10014	A	Force [NI] Dev1/5 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10015	R	Read Defined Variable [NI] Dev5/5 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10016	A	Force [NI] Dev1/5 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Read Defined Variable [NI] Dev5/5 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10018	I	Emergency Brake Loop Override Train Lines Dev1/6 = END1 90XR24 pin 9 Dev5/6 = END2 90XP34 pin 9		OK		Carol Gumede 425280 22.09.2025	M1
10019	A	Force [NI] Dev1/6 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10020	R	Read Defined Variable [NI] Dev5/6 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10021	A	Force [NI] Dev1/6 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10022	R	Read Defined Variable [NI] Dev5/6 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10023	I	Emergency Brake Train Line Train Lines Dev1/50 = END1 90XR25 pin 67 Dev5/61 = END2 90XP35 pin 67		OK		Carol Gumede 425280 22.09.2025	M1
10024	A	Force [NI] Dev1/50 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10025	R	Read Defined Variable [NI] Dev5/61 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10026	A	Force [NI] Dev1/50 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10027	R	Read Defined Variable [NI] Dev5/61 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10028	I	PEA Loop OTDR Train Lines Dev1/7 = END1 90XR24 pin 10 Dev5/7 = END2 90XP34 pin 10		OK		Carol Gumede 425280 22.09.2025	M1
10029	A	Force [NI] Dev1/7 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10030	R	Read Defined Variable [NI] Dev5/7 = 1.0		OK	1	Nokuzola Mdluli 491469 28.09.2025	M1
10031	A	Force [NI] Dev1/7 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10032	R	Read Defined Variable [NI] Dev5/7 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10033	I	PEA Reset		OK		Carol Gumede 425280 22.09.2025	M1
10034	A	Check continuity on Timer Relay 44D1 between points A1 and B1		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	R	The points are continuous		OK		Carol Gumede 425280 22.09.2025	M1
10036	A	Check continuity on Timer Relay 44D1 between points A4, B3 and C4		OK		Carol Gumede 425280 22.09.2025	M1
10037	R	All three points are continuous		OK		Carol Gumede 425280 22.09.2025	M1
10038	A	Close Circuit Breaker 44Q1		OK		Carol Gumede 425280 22.09.2025	M1
10039	I	PEA Loop Train Lines Dev1/58 = END1 90XR25 pin 95 Dev5/62 = END2 90XP35 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10040	A	Force [NI] Dev1/58 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10041	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10042	A	Force [NI] Dev1/58 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10043	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10044	A	Force [NI] Dev1/58 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10045	A	Activate the PEA on door 5 (44S15)		OK		Carol Gumede 425280 22.09.2025	M1
10046	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10047	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10048	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10049	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10050	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10051	A	Activate the PEA on door 3 (44S13)		OK		Carol Gumede 425280 22.09.2025	M1
10052	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10053	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10054	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10055	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10056	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10057	A	Activate the PEA on door 1 (44S11)		OK		Carol Gumede 425280 22.09.2025	M1
10058	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10059	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10060	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10061	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10062	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10063	A	Activate the PEA on door 2 (44S12)		OK		Carol Gumede 425280 22.09.2025	M1
10064	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10065	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10066	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10067	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10068	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10069	A	Activate the PEA on door 4 (44S14)		OK		Carol Gumede 425280 22.09.2025	M1
10070	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10071	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10072	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10073	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10074	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10075	A	Activate the PEA on door 6 (44S16)		OK		Carol Gumede 425280 22.09.2025	M1
10076	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10077	R	Read Defined Variable [NI] Dev5/62 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10078	A	Reset the PEA using square key		OK		Carol Gumede 425280 22.09.2025	M1
10079	I	PEA Loop Train Lines Dev5/62 = END2 90XP25 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10080	R	Read Defined Variable [NI] Dev5/62 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10081	I	PEA Loop Train Lines Dev1/58 = END1 90XR15 pin 95		OK		Carol Gumede 425280 22.09.2025	M1
10082	A	Force [NI] Dev1/58 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 12 – Service Brake

12.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

12.1.1 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		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	Initial Conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	I	No air supply to the vehicle		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	I	All BPM cocks are in normal position (not isolated)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	I	110Vdc Normal power supply should be connected to the vehicle and ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10006	I	Follow the procedure in the document below to upload software onto the TBCU electronic ***[11-40-49-281074_ TBCU Software Upload.pdf]***	PDF	OK		Dilikani Ngubane 526515 22.09.2025	M1
10007	I	Power Supply		OK		Dilikani Ngubane 526515 22.09.2025	M1
10008	A	Remove the connector 10XR12_XCB2 from the propulsion box		OK		Dilikani Ngubane 526515 22.09.2025	M1
10009	A	Close Circuit Breaker 33Q1, 33Q3 and 33Q5		OK		Dilikani Ngubane 526515 22.09.2025	M1
10010	A	Check the voltage on connector 10XR12_XCB2 between pins 4 (+) and 69 (-) ; 4(+) and 67(-); and 5(+) and 68(-)		OK		Dilikani Ngubane 526515 22.09.2025	M1
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		Dilikani Ngubane 526515 22.09.2025	M1
10012	A	Open Circuit Breaker 33Q1 and 33Q3, Replace connector 10XR12_XCB2 on the propulsion box, and Close Circuit breaker 33Q1 and 33Q3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10013	A	Remove the connector -40XP2_C2_16 from pneumatic BPM		OK		Dilikani Ngubane 526515 22.09.2025	M1
10014	A	Close Circuit Breaker 40Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10015	A	Check the voltage on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	R	Battery voltage (above 80Vdc) is measured on connector 40XP2_C2_16 between pins 13 (+) and 31 (-)		OK		Dilikani Ngubane 526515 22.09.2025	M1
10017	A	Open Circuit Breaker 40Q1, Replace connector -40XP2_C2_16 on the pneumatic BPM, and Close Circuit breaker -40Q1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10018	R	The pneumatic BPM 40A2 is ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10019	I	Brake Air Supply and Brake Application		OK		Dilikani Ngubane 526515 22.09.2025	M1
10020	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XP35 pin 60		OK		Dilikani Ngubane 526515 22.09.2025	M1
10021	R	Read Defined Variable [NI] Dev2/85 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10022	R	Read Defined Variable [NI] Dev5/51 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10023	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XP35 pin 50		OK		Dilikani Ngubane 526515 22.09.2025	M1
10024	R	Read Defined Variable [NI] Dev2/83 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10025	R	Read Defined Variable [NI] Dev5/49 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10026	R	Read Defined Variable [TT] (MPU1)li_sbk_m1brakeairsuppokr1 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10027	R	Read Defined Variable [TT] (MPU1)li_sbk_m1brakeairsuppokr2 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10028	R	Read Defined Variable [TT] (TBCU1)LI_BRPS_NOK = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10029	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_NOT_APPLED = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10030	A	Close/Isolate the Isolation cock F2.1/3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10031	A	Open the Isolation cock F2.2/3		OK		Dilikani Ngubane 526515 22.09.2025	M1
10032	A	Connect the air supply to the vehicle main pipe coupling flexible hose F3/5, and switch the supply ON		OK		Dilikani Ngubane 526515 22.09.2025	M1
10033	I	Take note of any air leaks in the pipes or valves		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10034	A	Allow the pressure to go above 6 bar. The pressure can be checked at the BRTP test point		OK		Dilikani Ngubane 526515 22.09.2025	M1
10035	R	BRTP pressure is measured >=6 Bar		OK		Dilikani Ngubane 526515 22.09.2025	M1
10036	I	Brake Applied Train Lines Dev2/83 = END1 90XR25 pin 50 Dev5/49 = END2 90XP35 pin 50		OK		Dilikani Ngubane 526515 22.09.2025	M1
10037	R	Read Defined Variable [NI] Dev2/83 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10038	R	Read Defined Variable [NI] Dev5/49 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10039	R	Read Defined Variable [TT] (MPU1)li_sbk_m1brakeairsuppokr1 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10040	R	Read Defined Variable [TT] (MPU1)li_sbk_m1brakeairsuppokr2 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10041	R	Read Defined Variable [TT] (TBCU1)LI_BRPS_NOK = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10042	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_NOT_APPLED = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10043	I	Remote Isolation		OK		Dilikani Ngubane 526515 22.09.2025	M1
10044	I	Remote Isolation Train Lines Dev1/84 = END1 90XR25 pin 59 Dev5/50 = END2 90XP35 pin 59		OK		Dilikani Ngubane 526515 22.09.2025	M1
10045	A	Force [NI] Dev1/84 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10046	R	Read Defined Variable [NI] Dev5/50 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10047	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_ISO = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10048	A	Force [TT] (MPU1)lo_sbk_m1isobrake = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10049	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_ISO = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10050	I	Remote Isolation Train Lines Dev5/50 = END2 90XP35 pin 59		OK		Dilikani Ngubane 526515 22.09.2025	M1
10051	R	Read Defined Variable [NI] Dev5/50 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10052	A	Release [TT] (MPU1)Io_sbk_m1isobrake		OK		Dilikani Ngubane 526515 22.09.2025	M1
10053	R	Read Defined Variable [NI] Dev5/50 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10054	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_ISO = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10055	I	Remote Isolation Train Lines Dev1/84 = END1 90XR25 pin 59		OK		Dilikani Ngubane 526515 22.09.2025	M1
10056	A	Force [NI] Dev1/84 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10057	I	Manual Isolation		OK		Dilikani Ngubane 526515 22.09.2025	M1
10058	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XP35 pin 60		OK		Dilikani Ngubane 526515 22.09.2025	M1
10059	R	Read Defined Variable [NI] Dev2/85 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10060	R	Read Defined Variable [NI] Dev5/51 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10061	R	Read Defined Variable [TT] (MPU1)Ii_sbk_m1servicebrakedc = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10062	R	Read Defined Variable [TT] (TBCU1)Li_ServiceBrakeDC = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10063	A	Close the Isolation cock C2.3.1		OK		Dilikani Ngubane 526515 22.09.2025	M1
10064	I	EB Reduced Train Lines Dev2/85 = END1 90XR25 pin 60 Dev5/51 = END2 90XP35 pin 60		OK		Dilikani Ngubane 526515 22.09.2025	M1
10065	R	Read Defined Variable [NI] Dev2/85 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10066	R	Read Defined Variable [NI] Dev5/51 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10067	R	Read Defined Variable [TT] (MPU1)Ii_sbk_m1servicebrakedc = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10068	R	Read Defined Variable [TT] (TBCU1)Li_ServiceBrakeDC = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10069	A	Re-open the Isolation cock C2.3.1		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10070	R	Read Defined Variable [TT] (MPU1)li_sbk_m1servicebrakedc = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10071	I	Switch OFF 400V before reading the bcufault variable		OK		Dilikani Ngubane 526515 22.09.2025	M1
10072	R	Read Defined Variable [TT] (MPU1)li_sbk_m1bcufault = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10073	A	Force [TT] (TBCU1)LO_BRK_FLT = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10074	R	Read Defined Variable [TT] (MPU1)li_sbk_m1bcufault = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10075	A	Release [TT] (TBCU1)LO_BRK_FLT		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 13 – Holding and Parking Brake

13.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

13.1.1 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		Dilikani Ngubane 526515 22.09.2025	M1
10002	I	Initial Conditions		OK		Dilikani Ngubane 526515 22.09.2025	M1
10003	I	Using the tools list on the side of your screen, record the serial number of the manometer that will be used in this test		OK		Dilikani Ngubane 526515 22.09.2025	M1
10004	I	Check that the pressure on Test point C2.11/1 is >5bar		OK		Dilikani Ngubane 526515 22.09.2025	M1
10005	I	Visual Inspection		OK		Dilikani Ngubane 526515 22.09.2025	M1
10006	A	Check the installation of the manual parking brake release components (lever + cable)		OK		Dilikani Ngubane 526515 22.09.2025	M1
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		Dilikani Ngubane 526515 22.09.2025	M1
10008	I	Circuit Breakers		OK		Dilikani Ngubane 526515 22.09.2025	M1
10009	I	Circuit Breaker 33Q3 and 33Q5 should be closed		OK		Dilikani Ngubane 526515 22.09.2025	M1
10010	I	Parking Brake Pressure Switch		OK		Dilikani Ngubane 526515 22.09.2025	M1
10011	R	Read Defined Variable [TT] (TBCU1)LI_PARK_BR_RELEASE = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10012	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_STAT = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10013	R	Read Defined Variable [TT] (MPU1)TBCU1_parkbrakerelease = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10014	R	Read Defined Variable [TT] (MPU1)tbcu1_li_pbrake_stat = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10015	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	R	Read Defined Variable [NI] Dev2/52 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10017	R	Read Defined Variable [NI] Dev5/58 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10018	I	Parking Brake Applied		OK		Dilikani Ngubane 526515 22.09.2025	M1
10019	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		Dilikani Ngubane 526515 22.09.2025	M1
10020	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		Dilikani Ngubane 526515 22.09.2025	M1
10021	R	Pressure at test point C2.11/1 <4.5 Bar		OK		Dilikani Ngubane 526515 22.09.2025	M1
10022	R	Read Defined Variable [TT] (TBCU1)LI_PARK_BR_RELEASE = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10023	R	Read Defined Variable [TT] (MPU1)TBCU1_parkbrakerelease = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10024	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10025	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_STAT = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10026	R	Read Defined Variable [TT] (MPU1)tbcu1_li_pbrake_stat = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10027	R	Read Defined Variable [TT] (TBCU1)LI_PARK_BR_DC = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10028	R	Read Defined Variable [TT] (MPU1)TBCU1_parkbrakeisoldc = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10029	R	Read Defined Variable [TT] (MPU1)li_pbk_m1parkbrakeisol = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10030	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Dilikani Ngubane 526515 22.09.2025	M1
10031	R	Read Defined Variable [NI] Dev2/52 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10032	R	Read Defined Variable [NI] Dev5/58 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10033	A	Position the Isolation cock C2.3.2 in CLOSE position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10034	R	Read Defined Variable [TT] (MPU1)li_pbk_m1parkbrakeisol = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10035	R	Read Defined Variable [TT] (TBCU1)LI_BRAKE_STAT = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10036	R	Read Defined Variable [TT] (MPU1)tbcu1_li_pbrake_stat = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10037	R	Read Defined Variable [TT] (TBCU1)LI_PARK_BR_DC = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10038	R	Read Defined Variable [TT] (MPU1)TBCU1_parkbrakeisoldc = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10039	I	Parking Brake Applied Train Lines Dev2/52 = END1 90XR25 pin 77 Dev5/58 = END2 90XP35 pin 77		OK		Dilikani Ngubane 526515 22.09.2025	M1
10040	R	Read Defined Variable [NI] Dev2/52 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10041	R	Read Defined Variable [NI] Dev5/58 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1
10042	A	Return the Isolation cock C2.3.2 to OPEN position		OK		Dilikani Ngubane 526515 22.09.2025	M1
10043	I	Remote Parking Brake Command		OK		Dilikani Ngubane 526515 22.09.2025	M1
10044	I	Remote Parking Brake Command Train Lines Dev1/51 = END1 90XR25 pin 68 Dev5/57 = END2 90XP35 pin 68		OK		Dilikani Ngubane 526515 22.09.2025	M1
10045	A	Force [NI] Dev1/51 = 1.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10046	R	Read Defined Variable [NI] Dev5/57 = 1.0		OK	1	Dilikani Ngubane 526515 22.09.2025	M1
10047	R	Confirm that the parking brake is applied, and air is released from electro valve C2.5		OK		Dilikani Ngubane 526515 22.09.2025	M1
10048	I	Remote Parking Brake Command Train Lines Dev1/51 = END1 90XR25 pin 68 Dev5/57 = END2 90XP35 pin 68		OK		Dilikani Ngubane 526515 22.09.2025	M1
10049	A	Force [NI] Dev1/51 = 0.0		OK		Dilikani Ngubane 526515 22.09.2025	M1
10050	R	Read Defined Variable [NI] Dev5/57 = 0.0		OK	0	Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10051	R	Confirm that electro valve C2.5 has stopped emitting air		OK		Dilikani Ngubane 526515 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 14 – Passenger Doors

14.1 Instructions list

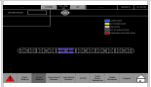
UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

14.1.1 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		TIVANI Angel 542257 22.09.2025	M1
10002	I	Initial conditions		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	110Vdc Normal power supply is connected to the vehicle and ON		OK		TIVANI Angel 542257 22.09.2025	M1
10004	I	Ensure that the TCMS network is functional		OK		TIVANI Angel 542257 22.09.2025	M1
10005	I	Circuit Breakers		OK		TIVANI Angel 542257 22.09.2025	M1
10006	A	Close Circuit Breaker 50Q1		OK		TIVANI Angel 542257 22.09.2025	M1
10007	R	DCU 1 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1
10008	R	Check on the DDU that DCU1 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10009	A	Close Circuit Breaker 50Q2		OK		TIVANI Angel 542257 22.09.2025	M1
10010	R	DCU 2 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1
10011	R	Check on the DDU that DCU2 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10012	A	Close Circuit Breaker 50Q3		OK		TIVANI Angel 542257 22.09.2025	M1
10013	R	DCU 3 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1
10014	R	Check on the DDU that DCU3 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10015	A	Close Circuit Breaker 50Q4		OK		TIVANI Angel 542257 22.09.2025	M1
10016	R	DCU 4 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Check on the DDU that DCU4 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10018	A	Close Circuit Breaker 50Q5		OK		TIVANI Angel 542257 22.09.2025	M1
10019	R	DCU 5 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1
10020	R	Check on the DDU that DCU5 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10021	A	Close Circuit Breaker 50Q6		OK		TIVANI Angel 542257 22.09.2025	M1
10022	R	DCU 6 is powered ON		OK		TIVANI Angel 542257 22.09.2025	M1
10023	R	Check on the DDU that DCU6 is online		OK		TIVANI Angel 542257 22.09.2025	M1
10024	A	Close Circuit Breaker 50Q7		OK		TIVANI Angel 542257 22.09.2025	M1
10025	I	Car ID Code		OK		TIVANI Angel 542257 22.09.2025	M1
10026	A	Using the DDU on the test bench, check that all the doors on M1 are available - as in the picture attached.		OK		TIVANI Angel 542257 22.09.2025	M1
10027	R	All doors are available		OK		TIVANI Angel 542257 22.09.2025	M1
10028	I	Door Open and Close - Safety Loop		OK		TIVANI Angel 542257 22.09.2025	M1
10029	I	ERTMS Auth Left Train Lines Dev1/81 = END1 90XR25 pin 44 Dev5/86 = END2 90XP35 pin 44		OK		TIVANI Angel 542257 22.09.2025	M1
10030	A	Force [NI] Dev1/81 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10031	R	Read Defined Variable [NI] Dev5/86 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10032	A	Force [NI] Dev1/81 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10033	R	Read Defined Variable [NI] Dev5/86 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10034	I	ERTMS Auth RightTrain Lines Dev1/82 = END1 90XR25 pin 47 Dev5/87 = END2 90XP35 pin 47		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	A	Force [NI] Dev1/82 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10036	R	Read Defined Variable [NI] Dev5/87 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10037	A	Force [NI] Dev1/82 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10038	R	Read Defined Variable [NI] Dev5/87 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10039	I	Doors Open Train Lines Dev1/49 = END1 90XR25 pin 66 Dev5/55 = END2 90XP35 pin 66		OK		TIVANI Angel 542257 22.09.2025	M1
10040	A	Force [NI] Dev1/49 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10041	R	Read Defined Variable [NI] Dev5/55 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10042	A	Force [NI] Dev1/49 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10043	R	Read Defined Variable [NI] Dev5/55 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10044	I	Door Close Right Train Lines Dev1/53 = END1 90XR25 pin 78 Dev5/59 = END2 90XP35 pin 78		OK		TIVANI Angel 542257 22.09.2025	M1
10045	A	Force [NI] Dev1/53 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10046	R	Read Defined Variable [NI] Dev5/59 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10047	A	Force [NI] Dev1/53 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10048	R	Read Defined Variable [NI] Dev5/59 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10049	I	Door Close Left Train Lines Dev1/54 = END1 90XR25 pin 79 Dev5/60 = END2 90XP35 pin 79		OK		TIVANI Angel 542257 22.09.2025	M1
10050	A	Force [NI] Dev1/54 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10051	R	Read Defined Variable [NI] Dev5/60 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10052	A	Force [NI] Dev1/54 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10053	R	Read Defined Variable [NI] Dev5/60 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10054	I	Door Auth Left Train Lines Dev1/56 = END1 90XR25 pin 85 Dev5/64 = END2 90XP35 pin 85		OK		TIVANI Angel 542257 22.09.2025	M1
10055	A	Force [NI] Dev1/56 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10056	R	Read Defined Variable [NI] Dev5/64 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10057	I	Door Auth Right Train Lines Dev1/55 = END1 90XR25 pin 84 Dev5/61 = END2 90XP35 pin 84		OK		TIVANI Angel 542257 22.09.2025	M1
10058	A	Force [NI] Dev1/64 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10059	R	Read Defined Variable [NI] Dev5/56 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10060	I	V<3km/h Train Lines Dev1/35 = END1 90XR25 pin 29 Dev5/39 = END2 90XP35 pin 29		OK		TIVANI Angel 542257 22.09.2025	M1
10061	A	Force [NI] Dev1/35 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10062	R	Read Defined Variable [NI] Dev5/39 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10063	A	Force [TT] (MPU1)lo_dor_m1opendoorleft = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10064	A	Force [TT] (MPU1)lo_dor_m1opendoorright = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10065	R	Check that ALL doors are OPEN		OK		TIVANI Angel 542257 22.09.2025	M1
10066	I	Door Auth Left Train Lines Dev1/56 = END1 90XR25 pin 85 Dev5/64 = END2 90XP35 pin 85		OK		TIVANI Angel 542257 22.09.2025	M1
10067	A	Force [NI] Dev1/56 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10068	R	Read Defined Variable [NI] Dev5/64 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10069	I	Door Auth Right Train Lines Dev1/64 = END1 90XR25 pin 84 Dev5/56 = END2 90XP35 pin 84		OK		TIVANI Angel 542257 22.09.2025	M1
10070	A	Force [NI] Dev1/64 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10071	R	Read Defined Variable [NI] Dev5/56 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10072	R	Check that ALL doors are CLOSED		OK		TIVANI Angel 542257 22.09.2025	M1
10073	I	Safety Doors Loop Train Lines Dev1/59 = END1 90XR25 pin 96 Dev5/89 = END2 90XP35 pin 96		OK		TIVANI Angel 542257 22.09.2025	M1
10074	A	Force [NI] Dev1/59 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10075	R	Read Defined Variable [NI] Dev5/89 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10076	I	Left Side Doors		OK		TIVANI Angel 542257 22.09.2025	M1
10077	I	Door 1		OK		TIVANI Angel 542257 22.09.2025	M1
10078	I	Door Auth Left Train Lines Dev1/56 = END1 90XR25 pin 85		OK		TIVANI Angel 542257 22.09.2025	M1
10079	A	Force [NI] Dev1/56 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10080	R	Check if ALL Left doors opens in 3 sec (+1/-0)		OK		TIVANI Angel 542257 22.09.2025	M1
10081	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		TIVANI Angel 542257 22.09.2025	M1
10082	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10083	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10084	R	Door 1 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1397	TIVANI Angel 542257 22.09.2025	M1
10085	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10086	R	Door 1 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1410	TIVANI Angel 542257 22.09.2025	M1
10087	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10088	R	Door 1 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1405	TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10089	I	Door 3		OK		TIVANI Angel 542257 22.09.2025	M1
10090	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10091	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10092	R	Door 3 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1390	TIVANI Angel 542257 22.09.2025	M1
10093	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10094	R	Door 3 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1410	TIVANI Angel 542257 22.09.2025	M1
10095	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10096	R	Door 3 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1399	TIVANI Angel 542257 22.09.2025	M1
10097	I	Door 5		OK		TIVANI Angel 542257 22.09.2025	M1
10098	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10099	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10100	R	Door 5 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1400	TIVANI Angel 542257 22.09.2025	M1
10101	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10102	R	Door 5 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1410	TIVANI Angel 542257 22.09.2025	M1
10103	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door).		OK		TIVANI Angel 542257 22.09.2025	M1
10104	R	Door 5 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1404	TIVANI Angel 542257 22.09.2025	M1
10105	I	Door Auth Left Train Lines Dev1/56 = END1 90XR15 pin 85		OK		TIVANI Angel 542257 22.09.2025	M1
10106	A	Force [NI] Dev1/56 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10107	R	Check if ALL Left doors closes in 3 sec (+1/-0)		OK		TIVANI Angel 542257 22.09.2025	M1
10108	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]		OK		TIVANI Angel 542257 22.09.2025	M1
10109	I	Safety Doors Loop Train Lines Dev5/89 = END2 90XP35 pin 96		OK		TIVANI Angel 542257 22.09.2025	M1
10110	R	Read Defined Variable [NI] Dev5/89 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10111	I	Right Side Doors		OK		TIVANI Angel 542257 22.09.2025	M1
10112	I	Door 2		OK		TIVANI Angel 542257 22.09.2025	M1
10113	I	Door Auth Right Train Lines Dev1/64 = END1 90XR25 pin 84		OK		TIVANI Angel 542257 22.09.2025	M1
10114	A	Force [NI] Dev1/64 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10115	R	Check if ALL Left doors opens in 3 sec (+1/-0)		OK		TIVANI Angel 542257 22.09.2025	M1
10116	R	Check that the GREEN leds on both sides of the door blink while the door opens [Safety Request: Prasa8-05]		OK		TIVANI Angel 542257 22.09.2025	M1
10117	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10118	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10119	R	Door 2 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1399	TIVANI Angel 542257 22.09.2025	M1
10120	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10121	R	Door 2 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1410	TIVANI Angel 542257 22.09.2025	M1
10122	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10123	R	Door 2 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1404	TIVANI Angel 542257 22.09.2025	M1
10124	I	Door 4		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10125	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10126	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10127	R	Door 4 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1401	TIVANI Angel 542257 22.09.2025	M1
10128	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10129	R	Door 4 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1410	TIVANI Angel 542257 22.09.2025	M1
10130	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10131	R	Door 4 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1406	TIVANI Angel 542257 22.09.2025	M1
10132	I	Door 6		OK		TIVANI Angel 542257 22.09.2025	M1
10133	I	Door Opening Gap		OK		TIVANI Angel 542257 22.09.2025	M1
10134	A	Measure the opening gap of the door. (This measurement must be done at the BOTTOM of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10135	R	Door 6 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1390	TIVANI Angel 542257 22.09.2025	M1
10136	A	Measure the opening gap of the door. (This measurement must be done at the top of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10137	R	Door 6 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1402	TIVANI Angel 542257 22.09.2025	M1
10138	A	Measure the opening gap of the door. (This measurement must be done in the middle of the door)		OK		TIVANI Angel 542257 22.09.2025	M1
10139	R	Door 6 gapResult Min/Max : 1390<= x <= 1410 (mm)		OK	1395	TIVANI Angel 542257 22.09.2025	M1
10140	I	Obstacle Detection		OK		TIVANI Angel 542257 22.09.2025	M1
10141	I	Door Auth Left Train Lines Dev1/56 = END1 90XR25 pin 85		OK		TIVANI Angel 542257 22.09.2025	M1
10142	A	Force [NI] Dev1/56 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10143	R	Check if ALL Left doors opens in 3 sec (+1/-0)		OK		TIVANI Angel 542257 22.09.2025	M1
10144	R	Position an obstacle on the floor in the centre of each and every door closing line		OK		TIVANI Angel 542257 22.09.2025	M1
10145	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		TIVANI Angel 542257 22.09.2025	M1
10146	A	Force [NI] Dev1/64 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10147	A	Force [NI] Dev1/56 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10148	R	All doors will hit the obstacles, reopen and try to close again 3 times. On the third attempt ALL doors will stop and stand adjar - free to be opened manually		OK		TIVANI Angel 542257 22.09.2025	M1
10149	I	Safety Doors Loop Train Lines Dev5/89 = END2 90XP35 pin 96		OK		TIVANI Angel 542257 22.09.2025	M1
10150	R	Read Defined Variable [NI] Dev5/89 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10151	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		TIVANI Angel 542257 22.09.2025	M1
10152	A	Force [NI] Dev1/64 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10153	A	Force [NI] Dev1/56 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10154	R	ALL doors opens fully		OK		TIVANI Angel 542257 22.09.2025	M1
10155	A	Remove the obstacles		OK		TIVANI Angel 542257 22.09.2025	M1
10156	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		TIVANI Angel 542257 22.09.2025	M1
10157	A	Force [NI] Dev1/64 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10158	A	Force [NI] Dev1/56 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10159	R	Check that ALL doors closes in 3 sec (+1/-0)		OK		TIVANI Angel 542257 22.09.2025	M1
10160	R	Check that the RED leds on both sides of the door blink while the door closes [Safety Request: Prasa8-05]		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10161	I	Safety Doors Loop Train Lines Dev5/89 = END2 90XP35 pin 96		OK		TIVANI Angel 542257 22.09.2025	M1
10162	R	Read Defined Variable [NI] Dev5/89 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10163	I	Speed Detection		OK		TIVANI Angel 542257 22.09.2025	M1
10164	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		TIVANI Angel 542257 22.09.2025	M1
10165	A	Force [NI] Dev1/64 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10166	A	Force [NI] Dev1/56 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10167	R	All doors open		OK		TIVANI Angel 542257 22.09.2025	M1
10168	I	V>5km/h Train Lines Dev1/34 = END1 90XR25 pin 28 Dev5/38 = END2 90XP35 pin 28		OK		TIVANI Angel 542257 22.09.2025	M1
10169	A	Force [NI] Dev1/34 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10170	R	Read Defined Variable [NI] Dev5/38 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10171	R	All doors close due to the invalid state of the DCU		OK		TIVANI Angel 542257 22.09.2025	M1
10172	A	Release [TT] (MPU1)lo_dor_m1opendoorleft		OK		TIVANI Angel 542257 22.09.2025	M1
10173	A	Release [TT] (MPU1)lo_dor_m1opendoorright		OK		TIVANI Angel 542257 22.09.2025	M1
10174	I	V>5km/h Train Lines Dev1/34 = END1 90XR25 pin 28 Dev5/38 = END2 90XP35 pin 28		OK		TIVANI Angel 542257 22.09.2025	M1
10175	A	Force [NI] Dev1/34 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10176	R	Read Defined Variable [NI] Dev5/38 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10177	I	V<3km/h Train Lines Dev1/35 = END1 90XR25 pin 29		OK		TIVANI Angel 542257 22.09.2025	M1
10178	A	Force [NI] Dev1/35 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10179	I	Door Auth Train Lines Dev1/64 = END1 90XR25 pin 84 (Right) Dev1/56 = END1 90XR25 pin 85 (Left)		OK		TIVANI Angel 542257 22.09.2025	M1
10180	A	Force [NI] Dev1/64 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10181	A	Force [NI] Dev1/56 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10182	I	Safety Doors Loop Train Lines Dev1/59 = END1 90XR25 pin 96		OK		TIVANI Angel 542257 22.09.2025	M1
10183	A	Force [NI] Dev1/59 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 15 – HVAC Air Conditioning

15.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

15.1.1 HVAC_TK

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

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	Air Conditioning (SPP=057)		OK		TIVANI Angel 542257 22.09.2025	M1
10002	I	Initial conditions		OK		TIVANI Angel 542257 22.09.2025	M1
10003	A	Car Should be Prepared		OK		TIVANI Angel 542257 22.09.2025	M1
10004	I	Power Supply		OK		TIVANI Angel 542257 22.09.2025	M1
10005	A	Close Circuit Breaker 57Q1		OK		TIVANI Angel 542257 22.09.2025	M1
10006	A	Close Circuit Breaker 57Q2		OK		TIVANI Angel 542257 22.09.2025	M1
10007	I	HVAC Electronic Power Supply		OK		TIVANI Angel 542257 22.09.2025	M1
10008	A	Close Circuit Breaker F1 on the HVAC Panel		OK		TIVANI Angel 542257 22.09.2025	M1
10009	I	The HVAC electronic is ON		OK		TIVANI Angel 542257 22.09.2025	M1
10010	A	Turn the control switch to AUTO position on the HVAC Panel		OK		TIVANI Angel 542257 22.09.2025	M1
10011	I	Software Upload		OK		TIVANI Angel 542257 22.09.2025	M1
10012	I	Follow the procedure in the document below to upload software onto the HVAC electronic		OK		TIVANI Angel 542257 22.09.2025	M1
10013	A			OK		TIVANI Angel 542257 22.09.2025	M1
10014	I	Checking 400Vac		OK		TIVANI Angel 542257 22.09.2025	M1
10015	A	Ensure that the 400Vac Shore Supply is connected to the vehicle, else connect it		OK		TIVANI Angel 542257 22.09.2025	M1
10016	A	Disconnect connector 57XP4_X5 and use a multimeter to measure 400Vac between phases a1, a2 and b1		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	400Vac (+-5%) measured		OK		TIVANI Angel 542257 22.09.2025	M1
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.		OK		TIVANI Angel 542257 22.09.2025	M1
10019	R	The phase rotation is correct between all three phases		OK		TIVANI Angel 542257 22.09.2025	M1
10020	A	Normalize connector 57XP4_X5		OK		TIVANI Angel 542257 22.09.2025	M1
10021	I	HVAC 50% restriction		OK		TIVANI Angel 542257 22.09.2025	M1
10022	A	Force [TT] NRG_HvacM150Cmd = 0		OK		TIVANI Angel 542257 22.09.2025	M1
10023	I	HVAC inhib		OK		TIVANI Angel 542257 22.09.2025	M1
10024	A	Force [TT] (MPU1)lo_hva_m1hvacinhibr1___1 = 1		OK		TIVANI Angel 542257 22.09.2025	M1
10025	A	Force [TT] (MPU1)lo_hva_m1hvacinhibr2___1 = 1		OK		TIVANI Angel 542257 22.09.2025	M1
10026	R	HVAC unit turns ON and starts to work		OK		TIVANI Angel 542257 22.09.2025	M1
10027	I	Emergency Ventilation		OK		TIVANI Angel 542257 22.09.2025	M1
10028	A	Force [TT] (MPU1)lo_hva_m1emergventil___1 = 1		OK		TIVANI Angel 542257 22.09.2025	M1
10029	I	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		TIVANI Angel 542257 22.09.2025	M1
10030	A	Connect the laptop to the HVAC maintenance software using HCU Finder and check the actual working mode of HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10031	R	Release [TT] (MPU1)lo_hva_m1emergventil___1		OK	UnableToRead	TIVANI Angel 542257 22.09.2025	M1
10032	I	Forced Mode (Saloon HVAC)		OK		TIVANI Angel 542257 22.09.2025	M1
10033	I	In the maintenance software, select the 'Forced' tab, and use the "Required working mode" drop down box to force the following modes:		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10034	I	For the next sections, walk through the whole car and physically check (feel) that the HVAC is functioning as desired		OK		TIVANI Angel 542257 22.09.2025	M1
10035	A	Force Ventilation mode on the Saloon HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10036	I	Ventilation Mode		OK		TIVANI Angel 542257 22.09.2025	M1
10037	R	All saloon HVAC units work in Ventilation mode. Not heating/cooling		OK		TIVANI Angel 542257 22.09.2025	M1
10038	I	Cooling Mode		OK		TIVANI Angel 542257 22.09.2025	M1
10039	A	Force Cooling mode on the Saloon HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10040	R	All saloon HVAC units work in Cooling mode		OK		TIVANI Angel 542257 22.09.2025	M1
10041	I	Heating Mode		OK		TIVANI Angel 542257 22.09.2025	M1
10042	A	Force Heating mode on the Saloon HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10043	R	All saloon HVAC units work in Heating mode		OK		TIVANI Angel 542257 22.09.2025	M1
10044	I	Self-Test		OK		TIVANI Angel 542257 22.09.2025	M1
10045	A	Force Self-Test on the Saloon HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10046	R	All saloon HVAC units work according to the mode described in the "Actual working mode"		OK		TIVANI Angel 542257 22.09.2025	M1
10047	R	The Exhaust fans are Turned OFF		OK		TIVANI Angel 542257 22.09.2025	M1
10048	I	HVAC Faults		OK		TIVANI Angel 542257 22.09.2025	M1
10049	A	In the maintenance software, select the "Alarms / Warnings" tab		OK		TIVANI Angel 542257 22.09.2025	M1
10050	A	Ensure there are no active faults on the HVAC		OK		TIVANI Angel 542257 22.09.2025	M1
10051	R	No active faults identified on the HVAC unit		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10052	A	Release [TT] (MPU1)lo_hva_m1hvacinhibr1___1		OK		TIVANI Angel 542257 22.09.2025	M1
10053	A	Release [TT] (MPU1)lo_hva_m1hvacinhibr2___1		OK		TIVANI Angel 542257 22.09.2025	M1
10054	A	Release [TT] NRG_HvacM150Cmd		OK		TIVANI Angel 542257 22.09.2025	M1
10055	I	End of Test		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

15.1.2 HVAC_SME

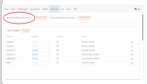
I - Information A - Action R - Result NE - Not Executed

N°	Type	Instruction	File	Result status	Result value	Operator	Vehicle
10001	I	HVA_057 Air Conditioning		NE			M1
10002	I	Initial conditions		NE			M1
10003	A	Car Should be Prepared with CVS running and 400V ac available in the car		NE			M1
10004	I	HVAC AC Power Supply		NE			M1
10005	A	Close Circuit Breaker 13Q1 and 13Q5		NE			M1
10006	A	Check on the DDU if the HVAC is offline		NE			M1
10007	I	Checking 400Vac		NE			M1
10008	A	Close Circuit Breaker 57Q1		NE			M1
10009	A	Disconnect connector 57XP4_X5 and use a multimeter to check 400Vac between each phases a1, a2 and b1		NE			M1
10010	R	400Vac measured between all phases		NE			M1
10011	A	On the same connector 57XP4_X5, with a phasemeter, check the phase rotation of all 3 phases which are a1- phase L1, a2- Phase L2 and b1- phase L3		NE			M1
10012	R	The phase rotation is correct between all three phases		NE			M1
10013	A	Normalize connector 57XP4_X5.		NE			M1
10014	I	HVAC controller power supply		NE			M1
10015	A	Close Circuit Breaker 57Q2		NE			M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10016	A	Allow the HVAC to initialize and check on the DDU if the HVAC is online		NE			M1
10017	R	HVAC unit turns ON and starts to work		NE			M1
10018	I	HVAC inhib		NE			M1
10019	A	Force [TT] (MPU1)lo_hva_m1hvacinhibr1__1 = 1		NE			M1
10020	A	Force [TT] (MPU1)lo_hva_m1hvacinhibr2__1 = 1		NE			M1
10021	I	50% HVAC restriction		NE			M1
10022	A	Force [TT] NRG_HvacM150Cmd = 0		NE			M1
10023	I	saloon HVAC		NE			M1
10024	I	HVAC web portal		NE			M1
10025	I	The attached document is a procedure on how to navigate around the maintenance software		NE			M1
10026	I	Connect the laptop to the HVAC maintenance software using web browser. Enter the following IP address on the web browser 10.136.xxx30 xxx represents the train number Login: maint Password: maint		NE			M1
10027	I	Full "Self test" saloon		NE			M1
10028	R	On status tab, Active mode is off for both cab and saloon		NE			M1
10029	A	Go to Alarms tab and clear all the alarms for saloon and cabin		NE			M1
10030	I	For the following tests make sure on the webHMI tab you change contoller to be controlled by webHMI and not MPU		NE			M1
10031	A	Before running the full test, please click on reset test to reset the previous results.		NE			M1
10032	A	Select Full-Test on the Saloon HVAC		NE			M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10033	R	All saloon HVAC units work according to the mode described in the "ACTIVE MODE" on the status tab		NE			M1
10034	R	When the test is complete, please check if the status is showing as "TEST PASS" and the test took 3 mins +/- 2 seconds for each mode.		NE			M1
10035	I	Forced Mode (Saloon HVAC)		NE			M1
10036	I	During all tests Walk through the whole car and physically check (feel) that the HVAC is functioning as desired		NE			M1
10037	I	Go to maintenance tab to force the following modes		NE			M1
10038	I	Cooling Mode		NE			M1
10039	A	Select forced Cooling mode on the Saloon HVAC and let it run for 5 mins		NE			M1
10040	R	All HVAC units are cooling		NE			M1
10041	I	Heating Mode		NE			M1
10042	A	Select forced Heating mode on the Saloon HVAC and let it run for 5 mins		NE			M1
10043	R	All HVAC units are heating		NE			M1
10044	I	HVAC Faults		NE			M1
10045	A	In the maintenance software, select the "Alarms" tab		NE			M1
10046	A	Ensure there are no active faults on the HVAC for Cabin and Saloon. Use the highlighted drop down to navigate between saloon and cabin.		NE			M1
10047	R	No active faults identified on the HVAC unit		NE			M1
10048	A	Release [TT] (MPU1)lo_hva_m1hvacinhibr1___1		NE			M1
10049	A	Release [TT] (MPU1)lo_hva_m1hvacinhibr2___1		NE			M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10050	A	Release [TT] NRG_HvacM150Cmd		NE			M1
10051	R	Cabin HVAC turned OFF		NE			M1
10052	I	End of test		NE			M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 16 – Fire protection

16.1 Instructions list

16.1.1 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		TIVANI Angel 542257 22.09.2025	M1
10002	I	Fire Detection Train Lines		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	Fire Detection Train Lines Dev1/76 = END1 90XR24 pin 21 Dev5/76 = END2 90XP34 pin 21		OK		TIVANI Angel 542257 22.09.2025	M1
10004	A	Force [NI] Dev1/76 = 1.0		OK		TIVANI Angel 542257 22.09.2025	M1
10005	R	Read Defined Variable [NI] Dev5/76 = 1.0		OK	1	TIVANI Angel 542257 22.09.2025	M1
10006	A	Force [NI] Dev1/76 = 0.0		OK		TIVANI Angel 542257 22.09.2025	M1
10007	R	Read Defined Variable [NI] Dev5/76 = 0.0		OK	0	TIVANI Angel 542257 22.09.2025	M1
10008	I	Continuity Test		OK		TIVANI Angel 542257 22.09.2025	M1
10009	I	The following steps are continuity tests between the two points described in each step. Use a multimeter for this test.		OK		TIVANI Angel 542257 22.09.2025	M1
10010	A	From : [(local: +END1 -90XR23.B (pin 4))] to: [-Inter-connector (local: +END2 -90XP33.a pin 7)]		OK		TIVANI Angel 542257 22.09.2025	M1
10011	A	From : [(local: +END1 -90XR23.B (pin 5))] to: [-Inter-connector (local: +END2 -90XP33.a pin 8)]		OK		TIVANI Angel 542257 22.09.2025	M1
10012	A	From : [(local: +END1 -90XR23.A (pin 7))] to: [-Inter-connector (local: +END2 -		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

		90XP33.b pin 4)]					
10013	A	From : [(local: +END1 -90XR23.A (pin 8))] to: [-Inter-connector (local: +END2 -90XP33.b pin 5)]		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 17 – Traction and Electric Brake

17.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

17.1.1 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		Carol Gumede 425280 22.09.2025	M1
10002	I	Circuit Breakers and Configuration		OK		Carol Gumede 425280 22.09.2025	M1
10003	A	Close Circuit Breaker 33Q1		OK		Carol Gumede 425280 22.09.2025	M1
10004	A	Close Circuit Breaker 33Q2		OK		Carol Gumede 425280 22.09.2025	M1
10005	A	Close Circuit Breaker 33Q3		OK		Carol Gumede 425280 22.09.2025	M1
10006	A	Close Circuit Breaker 33Q4		OK		Carol Gumede 425280 22.09.2025	M1
10007	A	Close Circuit Breaker 33Q5		OK		Carol Gumede 425280 22.09.2025	M1
10008	R	Read Defined Variable [TT] (TBCU1)LI_CAR_ID1 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10009	I	Train Lines		OK		Carol Gumede 425280 22.09.2025	M1
10010	I	110Vdc Normal Traction EL Train Lines Dev 1/66 = END1 90XP25 pin 49 Dev 2/65 = END1 90XP35 pin 42		OK		Carol Gumede 425280 22.09.2025	M1
10011	A	Force [NI] Dev1/66 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10012	R	Read Defined Variable [NI] Dev2/65 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10013	A	Force [NI] Dev1/66 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10014	R	Read Defined Variable [NI] Dev2/65 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10015	I	Forward Train Lines: Dev1/31 : END1 90XR25 pin 25 Dev5/78 : END2 90XP35 pin 30		OK		Carol Gumede 425280 22.09.2025	M1
10016	A	Force [NI] Dev1/31 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	Read Defined Variable [TT] (TBCU1)LI_FORWARD = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10018	R	Read Defined Variable [NI] Dev5/78 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10019	I	Forward Train Lines: Dev1/31 : END1 90XR25 pin 25 Dev5/78 : END2 90XP35 pin 30		OK		Carol Gumede 425280 22.09.2025	M1
10020	A	Force [NI] Dev1/31 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10021	R	Read Defined Variable [TT] (TBCU1)LI_FORWARD = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10022	R	Read Defined Variable [NI] Dev5/78 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10023	I	Reverse Train Lines: Dev1/36 : END1 90XR25 pin 30 Dev5/35 : END2 90XP35 pin 25		OK		Carol Gumede 425280 22.09.2025	M1
10024	A	Force [NI] Dev1/36 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10025	R	Read Defined Variable [TT] (TBCU1)LI_REVERSE = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10026	R	Read Defined Variable [NI] Dev5/35 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10027	I	Reverse Train Lines: Dev1/36 : END1 90XR25 pin 30 Dev5/35 : END2 90XP35 pin 25		OK		Carol Gumede 425280 22.09.2025	M1
10028	A	Force [NI] Dev1/36 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10029	R	Read Defined Variable [TT] (TBCU1)LI_REVERSE = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10030	R	Read Defined Variable [NI] Dev5/35 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10031	I	Traction Train Lines: Dev1/37 : END1 90XR25 pin 31 Dev5/81 : END2 90XP35 pin 31		OK		Carol Gumede 425280 22.09.2025	M1
10032	A	Force [NI] Dev1/37 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10033	R	Read Defined Variable [TT] (TBCU1)LI_TRACTION = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10034	R	Read Defined Variable [NI] Dev5/81 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10035	I	Traction Train Lines: Dev1/37 : END1 90XR25 pin 31 Dev5/81 : END2 90XP35 pin 31		OK		Carol Gumede 425280 22.09.2025	M1
10036	A	Force [NI] Dev1/37 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10037	R	Read Defined Variable [TT] (TBCU1)LI_TRACTION = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10038	R	Read Defined Variable [NI] Dev5/81 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10039	I	No Brake Train Lines: Dev1/38 : END1 90XR25 pin 32 Dev5/82 : END2 90XP35 pin 32		OK		Carol Gumede 425280 22.09.2025	M1
10040	A	Force [NI] Dev1/38 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10041	R	Read Defined Variable [TT] (TBCU1)LI_NOBRAKE = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10042	R	Read Defined Variable [NI] Dev5/82 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10043	I	No Brake Train Lines: Dev1/38 : END1 90XR25 pin 32 Dev5/82 : END2 90XP35 pin 32		OK		Carol Gumede 425280 22.09.2025	M1
10044	A	Force [NI] Dev1/38 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10045	R	Read Defined Variable [TT] (TBCU1)LI_NOBRAKE = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10046	R	Read Defined Variable [NI] Dev5/82 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10047	I	Traction Interlock Bypass Train Lines Dev1/4 : END1 90XR24 pin 6 Dev5/4 : END2 90XP34 pin 6		OK		Carol Gumede 425280 22.09.2025	M1
10048	A	Force [NI] Dev1/4 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10049	R	Read Defined Variable [NI] Dev5/4 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10050	A	Force [NI] Dev1/4 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10051	R	Read Defined Variable [NI] Dev5/4 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10052	I	Traction Interlock Train Lines Dev1/39 : END1 90XR25 pin 41 Dev5/83 : END2 90XP35 pin 41		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10053	A	Force [NI] Dev1/39 = 1.0		OK		Carol Gumede 425280 22.09.2025	M1
10054	R	Read Defined Variable [TT] (TBCU1)LI_NOT_INHIB = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10055	R	Read Defined Variable [NI] Dev5/83 = 1.0		OK	1	Carol Gumede 425280 22.09.2025	M1
10056	I	Traction Interlock Train Lines Dev1/39 : END1 90XR25 pin 41 Dev5/83 : END2 90XP35 pin 41		OK		Carol Gumede 425280 22.09.2025	M1
10057	A	Force [NI] Dev1/39 = 0.0		OK		Carol Gumede 425280 22.09.2025	M1
10058	R	Read Defined Variable [TT] (TBCU1)LI_NOT_INHIB = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10059	R	Read Defined Variable [NI] Dev5/83 = 0.0		OK	0	Carol Gumede 425280 22.09.2025	M1
10060	I	Coolant Liquid		OK		Carol Gumede 425280 22.09.2025	M1
10061	A	Check that the coolant level is atleast 1/2 of the sight glass level indicator ***[9-30-44-281075_Coolant Level Check.pdf]***	PDF	OK		Carol Gumede 425280 22.09.2025	M1
10062	R	Coolant Liquid Level is OK		OK		Carol Gumede 425280 22.09.2025	M1
10063	I	End of Test		OK		Carol Gumede 425280 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 18 – Vehicle Normalization

18.1 Instructions list

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

18.1.1 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		TIVANI Angel 542257 22.09.2025	M1
10002	I	The VFT procedures are all completed		OK		TIVANI Angel 542257 22.09.2025	M1
10003	I	Vehicle Normalization Check		OK		TIVANI Angel 542257 22.09.2025	M1
10004	R	On LV3 all Circuit Breakers are installed and secured		OK		TIVANI Angel 542257 22.09.2025	M1
10005	R	On LV3 all Dataplugs are installed, tightened and earth braids are fastened		OK		TIVANI Angel 542257 22.09.2025	M1
10006	R	On LV3 all Connectors are tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10007	R	On LV3 there are no missing components, device, wiring or connectors.		OK		TIVANI Angel 542257 22.09.2025	M1
10008	A	ON LV3, make sure that both bolts on 93XT300 terminal 4 are tightened and torque marked.		OK		TIVANI Angel 542257 22.09.2025	M1
10009	R	On LV6 all Dataplugs are installed, tightened and earth braids are fastened		OK		TIVANI Angel 542257 22.09.2025	M1
10010	R	On LV6 all Connectors are tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10011	R	On LV6 there are no missing components, device, wiring or connectors.		OK		TIVANI Angel 542257 22.09.2025	M1
10012	R	On HC Cubicle the Controller is installed and properly tightened and its connectors are tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10013	R	All DCUs are properly installed and secured		OK		TIVANI Angel 542257 22.09.2025	M1
10014	R	All Internal Displays are properly installed and secured		OK		TIVANI Angel 542257 22.09.2025	M1
10015	R	All Light Covers are properly installed		OK		TIVANI Angel 542257 22.09.2025	M1
10016	R	All Saloon Fire Detectors are properly installed and secured		OK		TIVANI Angel 542257 22.09.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

10017	R	All covers are normalised inside the car		OK		TIVANI Angel 542257 22.09.2025	M1
10018	R	On the Underframe, TBCU Agate is installed and properly tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10019	R	On the Underframe, Auxiliary Compressor cover is normalized		OK		TIVANI Angel 542257 22.09.2025	M1
10020	R	On the Underframe, Panto panel cover is normalized		OK		TIVANI Angel 542257 22.09.2025	M1
10021	R	On the Underframe, Speed Sensors are installed and properly tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10022	R	On the LVB, all Circuit Breakers are installed and properly tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10023	R	On the LVB, all Relays and Timers are installed and properly tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10024	R	On the LVB, BRIOMs are installed and properly tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10025	R	On the LVB there are no missing components, device, wiring or connectors.		OK		TIVANI Angel 542257 22.09.2025	M1
10026	R	On the Underframe, all Connectors are tightened		OK		TIVANI Angel 542257 22.09.2025	M1
10027	R	All underframe covers are normalised		OK		TIVANI Angel 542257 22.09.2025	M1
10028	R	On END1 the Octopus cables are disconnected from the car and properly stored.		OK		Nokuzola Mdluli 491469 06.10.2025	M1
10029	R	On END2 the Octopus cables are disconnected from the car and properly stored.		OK		Nokuzola Mdluli 491469 06.10.2025	M1
10030	R	On the roof, there is no Strap connected to the Pantograph		OK		Nokuzola Mdluli 491469 06.10.2025	M1
10031	R	The Test Bench is switched OFF and the Octopus cables are disconnected and properly stored		OK		Nokuzola Mdluli 491469 06.10.2025	M1
10032	R	ALL P.Os of this car are closed		OK		Nokuzola Mdluli 491469 06.10.2025	M1

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

Section 17 – Report summaries

17.1 Results status

Test Instruction Sheet	Compliant	Incomplete	Non-compliant
Energy Distribution	X		
TCMS Network	X		
Cabin Control	X		
Internal Lighting	X		
Train-Ground Communication	X		
Pantograph	X		
Rescue Mode and Emergency Disconnection	X		
Emergency Brake	X		
Service Brake	X		
Holding and Parking Brake	X		
Passenger Doors	X		
HVAC Air Conditioning	X		
Fire protection	X		
Traction and Electric Brake	X		
Vehicle Normalization	X		
PACIS Network	X		

17.2 Tools used

Function	Tool name	Tool number	Next Calibration date
015_NRG	Phasemeter	Phasemeter	11/30/2025
021_PNT	Manometer	Manometer	8/31/2026
040_SBK	Manometer	Manometer	8/31/2026
045_PBK	Manometer	Manometer	8/31/2026
057_HVA	Phasemeter	Phasemeter	11/30/2025

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.

062_ETS	Multimeter	Multimeter 2	9/30/2026
064_COM	GSM-R - tester	Radio Analyser	11/10/2025
067_FSD	Multimeter	Multimeter 2	9/30/2026

UNCONTROLLED WHEN PRINTED – Not to be used before verification of applicable version number
© All rights reserved. Reproduction, use or disclosure to third parties, without express written authorization, is strictly prohibited.