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| **X’TRAPOLIS MEGA**  TYPE TEST SCHEDULE | | | | | | | | | | | | | | | | | | | | | | | |
| CONFIDENTIAL INFORMATION  This document and the information contemplated therein have to be considered as Confidential Information  pursuant to the provisions of Clause 25 of the MSA, and treated as such. | | | | | | | | | | | | | | | | | | | | | | | |
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| RELEASED | | | |  | | | | | | | Application:  **PRASA** | | | | | | | | | | | | |
| Technical Modifications | | | | | Geometric tolerances | |  | | A4 | | |  | | | | | | |  | | | | N |
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| Approved | GvR. Els | | 12/11/2014 |
|  | | | Date | | Name |
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|  |  |
| --- | --- |
| **Name – Address of testing centre**  ALSTOM TRANSPORT  LAPA  Brazil | **Name – Customer address**  PRASA South Africa  Johannesburg  South Africa |

# PURPOSE

The purpose of this document is to describe, in detail, the procedure used to conduct a Functional Type Test on the PRASA X’Trapolis Mega HSCB. This document contains

* The Methodology of the tests to be conducted
* Tools required
* Acceptance Criteria

# DOCUMENTS

## Input document

|  |  |  |  |
| --- | --- | --- | --- |
| **Title** | **Reference** | **Revision or date** | **§** |
| RSAD TCMS | DTD0000210109 | A2 |  |
| SPP-PRASA-M1-M2-M3-M4 | DTD0000210083 | V3.1 | 022 |
| SPP-PRASA-TC1-TC2 | DTD0000210082 | V3.1 | 022 |
| RSAD TRAIN | DTD0000210078 | A2 |  |
| SPC-PRASA-M1-M2-M3-M4 | DTD0000210392 | V1 | 022 |

## Distribution list of the test report

This document will be distributed to PRASA for approval before commencement of testing.

# GENERAL TEST CONDITIONS

## General test conditions

The following conditions are important for successful completion of the testing:

* Test must be performed under 3kV DC overhead line system.
* All equipment on the trains are operational
* If any equipment is out of order, the effect of this anomaly on testing shall be carefully evaluated before starting the test.

## Ambient conditions

No specific ambient conditions are mandatory during testing.

## Test location

The test shall be conducted in Brazil, Sao Paulo inside Alstom factory

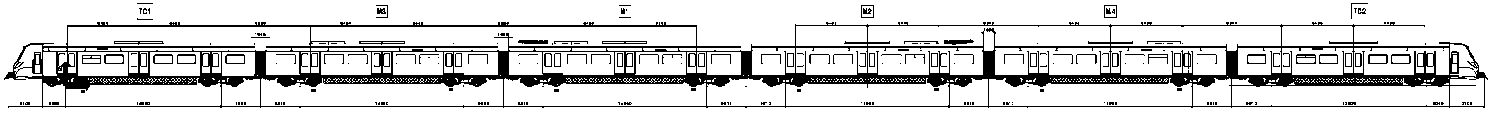
## Test participants

These tests will be completed by the ALSTOM Validation Metier and may be witnessed by the customer or a suitable delegated party.

## Configuration of car under test

Tests will be performed on fully assembled 6 cars configurations as illustrated below.

|  |  |
| --- | --- |
| **Configuration** | **Illustration** |
| Conf1 | **TC1**-M4-M1-M2-M3-**TC2** |
| Conf2 | **TC1**-M4-M1-M2-M3-**TC2**  **TC1**-M4-M1-M2-M3-**TC2 (Only at the laborame)** |



## Tooling and human resources

### Specific tools

* A multimeter and laptop computer that is able to connect to the train TCMS. TrainTracer software will be used for downloading events.

### Human resources

* A validation engineer that will be able to operate the train shall conduct the testing.

## Test duration

The duration of the test might be up to 5 hours excluding shunting movements.

## Data to be recorded

The following data will be recorded:

Refer to each section below.

# TYPE TEST FUNCTIONAL DESCRIPTION

## HSCB Control and Monitoring in Conf1

|  | | HSCB Closing nominal | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  The PNT procedure is recommended to have been executed and passed. | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **6 car train sets in Conf1** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE – Observe all EHS SAFETY Rules * The corresponding pantograph is correctly elevated. * There is no general opening order or particular hardwired disconnection conditions order for each circuit-breaker. * There is no specific inhibition request for a single circuit breaker. * Backup state switch is in OFF position in TC1 and TC2 cars | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  L**aborame : 31da7962b124a9283b18e8e149d66cc7f61ee514**  **MPU: 0.0.4.1**  **DDU: 1.0draft** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
|  | In the lead unit, TC1, in the Switched Off state, activate the Cabin with the driver’s key (This is the “Cabin in Service” state) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | In the Cabin in service state, switch on the battery connection (This is the “LV Ready” state) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | In the LV Ready State, remove the driver’s key to take the train to “Cabin Change” state. Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | Insert the driver’s key and activate TC1. Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2, Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) * Check that an event is logged for the Isolated Pantographs on the TCMS | | **NYT** | **NYT** | Check1:OK  Check2:OK  Check 3: Not yet tested, due to TCMS: Event logging of isolated pantographs not yet implemented. |
|  | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on both M1 and M2. | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | Press the “Pantograph up” button on TC1 (21S1)  Press the “HSCB close” push button on TC1 (22S11) | | * The both HSCBs shall close(HV present on the train) * That the Close HSCB Push button is illuminated. (Visual Check) | | **OK** | **OK** |  |
|  | Press the “HSCB open” button on TC1 (22S12) | | * Both HSCBs will open (No HV on the train) * That the HSCB open Push button is illuminated. (Visual Check) | | **OK** | **OK** |  |
|  | Press the “HSCB close” button on TC1 DDU | | * The both HSCBs shall close(HV present on the train) * That the Close HSCB Push button is illuminated. (Visual Check) | | **NYT** | **OK** |  |
|  | Press the “HSCB open” button on TC1 DDU | | * Both HSCBs will open (No HV on the train) * That the HSCB open Push button is illuminated. (Visual Check) | | **NYT** | **OK** |  |
|  | Press the “Pantograph down” button on TC1 (21S1) | | * Both Pantographs will fall to the roof of M1 and M2 (Visual Check) | | **OK** | **OK** |  |
|  | Press the “Automatic start” button on TC1 (20S1) | | * Both Pantographs will rise (Visual Check) * Both HSCB will close(HV present on the train) | | **OK** | **OK** |  |
|  | After approximately 15 seconds, Press the “Automatic start” button on TC1 (20S1) | | * Both Pantographs will drop to the roof (Visual Check) * • Both HSCB will close(No HV on the train) | | **NOK** | **NOK** | Procedure : Both HSCB will open(No HV on the train)  atvcm00608824 |
|  | Redo all tests from TC2. Use initial conditions as stated above | | | | | | |

|  | | Backup mode HSCB control | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  No procedures necessary | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **6 car train sets in Conf1** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE * Backup state switch is in OFF position in TC1 and TC2 cars * Earthing Switch (located in HV Box) in position “1” on both M1 and M2 * The Complete train earthling procedure was done and passed during the Pantograph type test | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  L**aborame : 31da7962b124a9283b18e8e149d66cc7f61ee514**  **MPU: 0.0.4.1**  **DDU: 1.0draft**  **Equipment required: To be advised** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
|  | In the lead unit, TC1, in the Switched Off state, activate the Cabin with the driver’s key (This is the “Cabin in Service” state) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | In the Cabin in service state, switch on the battery connection (This is the “LV Ready” state) | | * Make sure that NO pantograph rises (Visual Check) * • Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | In the LV Ready State, remove the driver’s key to take the train to “Cabin Change” state. Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | Insert the driver’s key and activate TC1. Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2, Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) * Check that an event is logged for the Isolated Pantographs on the TCMS | | **NYT** | **NYT** | Check1:OK  Check2:OK  Check 3: Not yet tested, due to TCMS: Event logging of isolated pantographs not yet implemented. |
|  | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on both M1 and M2. | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | | **OK** | **OK** |  |
|  | Switch-off train  Set the “Backup State” switch (27S1) to ON position on TC1 | | * Make sure that  appears on the DDU | | **NOK** | **NOK** | Procedure : backup state switch is authorized only when train is switched off. |
|  | * The Backup State Relay 1 (27K1) must activate | | **OK** | **OK** |  |
|  | * The Backup State Time Delay Relay (27D1) and the Backup State Relay 2 (27K2) shall activate. | | **OK** | **OK** |  |
|  | * Both Pantographs of the train shall rise (Visual Check) * Both HSCBs of the train shall close (HV available on the train) | | **OK** | **OK** | Procedure : Voltage indicator? |
|  | Press the “Pantograph down” button on TC1 (21S1) | | * Both Pantographs will be kept risen (Visual Check) * Both HSCBs will be kept Close (HV will stay available in the train) | | **OK** | **OK** |  |
|  | Press the “Emergency Pantograph down” button on TC1 (27S5) | | * Both Pantographs will drop to the roof (Visual Check) * And Both HSCBs will open (NO HV in the train) | | **OK** | **OK** |  |
|  | Reset the “Emergency Pantograph down” button on TC1 (27S5) | | * Both Pantographs will rise (Visual Check) * And Both HSCBs will close ( HV available in the train) | | **OK** | **OK** |  |
|  | Press the “Emergency Pantograph down” button on the opposite cab TC2 (27S5) | | * Both Pantographs will drop to the roof (Visual Check) * And Both HSCBs will open (NO HV in the train) | | **NOK** | **NOK** | Procedure: RSAD states that it is possible only from active cabin.  atvcm00608864 |
|  | Reset the “Emergency Pantograph down” button on the opposite cab TC2 (27S5) | | * Both Pantographs will rise (Visual Check) * Both HSCBs will close ( HV available in the train) | | **NOK** | **NOK** | See previous NOK |
|  | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2 | | * The Pantograph on M1 drops to the Roof upon Isolation * HSCB on M1 will open ( NO HV available in the train) → there is still HV through M2 | | **OK** | **OK** |  |
|  | * The Pantograph of M2 drops to the roof upon Isolation * HSCB on M2 will open ( NO HV available in the train) | | **OK** | **OK** |  |
|  | Redo all tests from TC2. Make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

|  | | Half Train Degraded Mode | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  No procedures necessary | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **6 car train sets in Conf1** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE – Observe all EHS SAFETY Rules * Backup state switch is in OFF position in TC1 and TC2 cars * Pantograph Isolation cock with vent (located on Underframe Pantograph Pneumatic Panel – K2.5) in “Open” Position on both M1 and M2 * Earthing Switch (located in HV Box) in position “1” on both M1 and M2 | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  **MPU: To be advised**  **DDU: To be advised**  **Equipment required: To be advised** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
|  | Insert the driver’s key and activate TC1. | | N.A. | |  | **OK** |  |
|  | Press the “Pantograph up” button on TC1 (21S1) | | * Both Pantographs will rise (Visual Check) | |  | **OK** |  |
|  | Press the “HSCB Close ” button on TC1 (22S11) | | * Both HSCBs will Close (HV available in the train) | |  | **OK** |  |
| 1. 3 | Isolate the Pantograph on M2 by Changing the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on M2 | | * Pantograph of M2 will Fall to the roof(Visual Check) * HSCB of M2 opens(Half of HV is available on the Train) * Check that an event is logged for the Isolated Pantograph on the TCMS | |  | **NOK** | TCMS: We lose all pantographs, then we can raise them again.  atvcm00608880 |
| 4 | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on M2 | | * Check that an event is Cleared for the Isolated Pantograph on the TCMS | |  | **NYT** | TCMS: not yet implemented. |
| 6 | Press the “Pantograph up” button on TC1 (21S1) | | * Both Pantographs will rise (Visual Check) | |  | **NOK** | Procedure: As one PNT is already lowered, it requires to lower all pantographs before raising again. |
|  | Press the “HSCB Close ” button on TC1 (22S11) | | * Both HSCBs will Close (HV available in the train) | |  | **NOK** | TCMS: registering a false fault (autodrop), which requires restart of MCE.  atvcm00608873 |
| 1. 3 | Isolate the Pantograph on M1 by Changing the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on M1 | | * Pantograph of M1 will Fall to the roof(Visual Check) * HSCB of M1 opens (Half of HV is available on the Train) * Check that an event is logged for the Isolated Pantograph on the TCMS | |  | **NOK** | TCMS: We lose all pantographs, then we can raise them again.  atvcm00608880 |
| 4 | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on M1 | | * Check that an event is Cleared for the Isolated Pantograph on the TCMS | |  | **NYT** | TCMS: not yet implemented. |
| 8 | Redo all tests from TC2.Make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

|  | | HSCB Traction bypass | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  No procedures necessary | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **6 car train sets in Conf1** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Active** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE – Observe all EHS SAFETY Rules * Backup state switch is in OFF position in TC1 and TC2 cars * Pantograph Isolation cock with vent (located on Underframe Pantograph Pneumatic Panel – K2.5) in “Open” Position on both M1 and M2 * Earthing Switch (located in HV Box) in position “1” on both M1 and M2 * The Train is powered up (All Pantographs are up and HSCBs Closed) * Activation Key on TC1 is active. | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  **MPU: To be advised**  **DDU: To be advised**  **Equipment required: To be advised** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
|  | In TC1 Turn the Traction Bypass switch (22S1) to position 1 | | * Both HSCBs remain Closed * Traction Bypass event Logged on TCMS | | **NYT** | **NYT** | Laborame: TRACTION cases are not realistically simulated |
|  | In TC1 Turn the Traction Bypass switch (22S1) to position 2 | | * Both HSCBs remain Closed * Traction Bypass event Logged on TCMS | | **NYT** | **NYT** | Laborame: TRACTION cases are not realistically simulated |
|  | In TC1 Turn the Traction Bypass switch (22S1) to position 3 | | * M1/M2 HSCB opens (HV available in half of the train) * Traction Bypass event Logged on TCMS | | **NYT** | **NYT** | Laborame: TRACTION cases are not realistically simulated |
|  | Reset the Traction Bypass switch (22s1) to position | | N/A | | **NYT** | **NYT** | Laborame: TRACTION cases are not realistically simulated |
|  | Redo all tests from TC2. Make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

## HSCB Control and Monitoring in Conf2

|  | | ***HSCB Closing nominal*** | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  The PNT procedure is recommended to have been executed and passed. | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **2 x 6 car train sets in Conf2** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Key Switch initial state in coupled unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in coupled unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in coupled unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in coupled unit TC2:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE – Observe all EHS SAFETY Rules * The corresponding pantograph is correctly elevated. * There is no general opening order or particular hardwired disconnection conditions order for each circuit-breaker. * There is no specific inhibition request for a single circuit breaker. * Backup state switch is in OFF position in TC1 and TC2 cars | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  **MPU: To be advised**  **DDU: To be advised**  **Equipment required: To be advised** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | **Check** | | **OK/ NOK**  **Tc1 / Tc2** | | **Comment** |
|  | In the lead unit, TC1, in the Switched Off state, activate the Cabin with the driver’s key (This is the “Cabin in Service” state) | | * Make sure that NO HSCB closes (Visual Check) | |  |  |  |
|  | In the Cabin in service state, switch on the battery connection (This is the “LV Ready” state) | | * Make sure that NO HSCB closes (Visual Check) | |  |  |  |
|  | In the LV Ready State, remove the driver’s key to take the train to “Cabin Change” state. Press the “HSCB close” push button on TC1 (22S11) in the leading unit | | * Make sure that NO HSCB closes (Visual Check) | |  |  |  |
| 16 | Insert the driver’s key and activate TC1. Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2, Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) * Check that an event is logged for the Isolated Pantographs on the TCMS | |  |  |  |
| 17 | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on both M1 and M2. | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) * Check that an event is Cleared for the pantograph isolated on the TCMS | |  |  |  |
| 18 | Press the “HSCB close” push button on TC1 (22S11) in the leading unit | | * The both HSCBs shall close(HV present on the train) * That the Close HSCB Push button is illuminated. (Visual Check) | |  |  |  |
| 19 | Press the “HSCB open” button on TC1 (22S12) in the leading unit | | * Both HSCBs will open (No HV on the train) * That the HSCB open Push button is illuminated. (Visual Check) | |  |  |  |
| 20 | Press the “HSCB close” button on TC1 DDU in the leading unit | | * The both HSCBs shall close(HV present on the train) * That the Close HSCB Push button is illuminated. (Visual Check) | |  |  |  |
| 21 | Press the “HSCB open” button on TC1 DDU in the leading unit. | | * Both HSCBs will open (No HV on the train) * That the HSCB open Push button is illuminated. (Visual Check) | |  |  |  |
| 22 | Press the “Automatic start” button on TC1 (20S1) in the leading unit | | * Both Pantographs will rise (Visual Check) * Both HSCB will close(HV present on the train) | |  |  |  |
| 23 | After approximately 15 seconds, Press the “Automatic start” button on TC1 (20S1) in the leading unit | | * Both Pantographs will drop to the roof (Visual Check) * •Both HSCB will close(No HV on the train) | |  |  |  |
| 24 | Redo all tests from TC2 of the **coupled vehicle**. Make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

|  | | Backup mode HSCB control | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  No procedures necessary | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Functional Type Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **2 x 6 car train sets in Conf2** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Key Switch initial state in coupled unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in coupled unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in coupled unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in coupled unit TC2:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE * Backup state switch is in OFF position in TC1 and TC2 cars * Earthing Switch (located in HV Box) in position “1” on both M1 and M2 * The Complete train earthling procedure was done and passed during the Pantograph type test | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  **MPU: To be advised**  **DDU: To be advised**  **Equipment required: To be advised** | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
|  | In the lead unit, TC1, in the Switched Off state, activate the Cabin with the driver’s key (This is the “Cabin in Service” state) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | |  |  |  |
|  | In the Cabin in service state, switch on the battery connection (This is the “LV Ready” state) | | * Make sure that NO pantograph rises (Visual Check) * • Make sure NO HSCB closes(No HV in the train) | |  |  |  |
|  | In the LV Ready State, remove the driver’s key to take the train to “Cabin Change” state. Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | |  |  |  |
|  | Insert the driver’s key and activate TC1. Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2, Press the “Pantograph up” button on TC1 (21S1) | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) * Check that an event is logged for the Isolated Pantographs on the TCMS | |  |  |  |
|  | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Open” on both M1 and M2. | | * Make sure that NO Pantograph rises (Visual Check) * Make sure NO HSCB closes(No HV in the train) | |  |  |  |
|  | Set the “Backup State” switch (27S1) to ON position on TC1 | | * Make sure that  appears on the DDU | |  |  |  |
|  | * The Backup State Relay 1 (27K1) must activate | |  |  |  |
|  | * The Backup State Time Delay Relay (27D1) and the Backup State Relay 2 (27K2) shall activate. | |  |  |  |
|  | * Both Pantographs of the train shall rise (Visual Check) * Both HSCBs of the train shall close (HV available on the train) | |  |  |  |
|  | Press the “Pantograph down” button on TC1 (21S1) | | * Both Pantographs will be kept risen (Visual Check) * Both HSCBs will be kept Close (HV will stay available in the train) | |  |  |  |
|  | Press the “Emergency Pantograph down” button on TC1 (27S5) | | * Both Pantographs will drop to the roof (Visual Check) * And Both HSCBs will open (NO HV in the train) | |  |  |  |
|  | Reset the “Emergency Pantograph down” button on TC1 (27S5) | | * Both Pantographs will rise (Visual Check) * And Both HSCBs will close ( HV available in the train) | |  |  |  |
|  | Press the “Emergency Pantograph down” button on the opposite cab TC2 (27S5) | | * Both Pantographs will drop to the roof (Visual Check) * And Both HSCBs will open (NO HV in the train) | |  |  |  |
|  | Reset the “Emergency Pantograph down” button on the opposite cab TC2 (27S5) | | * Both Pantographs will rise (Visual Check) * Both HSCBs will close ( HV available in the train) | |  |  |  |
|  | Change the Pantograph Isolation cock with vent (Zone: Underframe Pantograph Pneumatic Panel) to “Closed” on both M1 and M2 | | * The Pantograph on M1 drops to the Roof upon Isolation * HSCB on M1 will open ( NO HV available in the train) | |  |  |  |
|  | * The Pantograph of M2 drops to the roof upon Isolation * HSCB on M2 will open ( NO HV available in the train) | |  |  |  |
|  | Redo all tests from TC2 of the **coupled vehicle**. Make sure that all air from the train is drained by opening the F2.1 Isolation cock with vent on one of the TC cars, located under the cabin on the underframe, before continuing. Also make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

## Safety Related Validation

|  | | Validation of Safety Related items from RAMS | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **PRE-NECESSARY CARRIED OUT PROCEDURES:**  Safety Validation is to be carried out only when the Validator is confident that the system has passed all preceding clauses of this section. | | | | | | | |
| **TRAIN INITIAL CONFIGURATION:**  No particular preliminary action | | | | | | | |
| **Category:** | | | | **Safety Test** | | | |
| **Test type:** | | | | **Static** | | | |
| **Train configuration:** | | | | **Conf1 and Conf2 (when available)** | | | |
| **HV needed:** | | | | **Yes** | | | |
| **Initial train operating mode:** | | | | **Switched Off** | | | |
| **Key Switch initial state in lead unit TC1:** | | | | **Off** | | | |
| **Key Switch initial state in lead unit TC2:** | | | | **Off** | | | |
| **Running Direction Switch initial state in lead unit TC1:** | | | | **Neutral** | | | |
| **Running Direction Switch initial state in lead unit TC2:** | | | | **Neutral** | | | |
| **PRELIMINARY CHECKS:**   * 3kV overhead line LIVE – Observe all EHS SAFETY Rules * Backup state switch is in OFF position in TC1 and TC2 cars * Earthing Switch (located in HV Box) in position “1”on both M1 and M2 | | | | | | | |
| **SPECIFIC TOOLS:**  No specific tool  **SAFETY PRECAUTIONS:**  High Voltage Precautions to be adhered to at all times  **CONFIGURATION SOFTWARE/HARDWARE:**  **MPU: To be advised**  **DDU: To be advised**  **Equipment required: To be advised**  **HAZLOG/SRIL Requirements tested below**   * Prasa1-08 * Prasa1-70 * Prasa10-20 * Prasa10-21 * Prasa10-22 * Prasa10-24 * Prasa10-25 | | | | | | | |
|  | |  | | | | | |
| **Step** | **Action** | | Check | | OK/ NOK  Tc1 / Tc2 | | **Comment** |
| **Single Unit Safety Tests (Conf1)** | | | | | | | |
|  | In the LV Ready State, remove the driver’s key to take the train to “Cabin Change” state. Press the “HSCB Close” button on TC1 (22S11) | | * Make sure No HSCB Closes (No HV available in the train) | |  |  |  |
|  | Insert the driver’s key and activate TC1.  Press the “HSCB Close” button on TC1 (22S11) | | * Make sure No HSCB Closes (No HV available in the train) | |  |  |  |
|  | Press the blue “Emergency Pantograph down” button (27S5) on the driver’s desk of TC1. | | * Make sure that the Pantographs lower immediately. * And Make sure that the HSCB open immediately | |  |  |  |
|  | Press the “Pantograph up” button on TC1 (21S1) in TC1. | | * Make sure that the Pantographs rise (Visual Check) | |  |  |  |
|  | Press the “HSCB Close” button on TC1 (22S11) in TC1. | | * Make sure that the HSCB Close (HV available in the train) | |  |  |  |
|  | Go to the inactive cab and press the “Emergency Pantograph down” button on the driver’s desk. | | * Make sure that the Pantographs lower immediately. * And Make sure that the HSCB opens immediately | |  |  |  |
|  | Press the “Pantograph up” button on TC1 (21S1) in TC1. | | * Make sure that the Pantographs rise (Visual Check) | |  |  |  |
|  | Press the “HSCB Close” button on TC1 (22S11) in TC1. | | * Make sure that the HSCB Close (HV available in the train) | |  |  |  |
|  | Disable the enabled cab by removing the Master Key with the Pantographs raised. Do not activate a cab for the next 15 minutes. | | * Check that the train goes into a “Cabin Change” mode by verifying that the train configuration icon has two “black” cabs on the DDU. * The pantographs must remain raised and HSCB closed for no more than 15 minutes. After these 15 minutes have elapsed, the pantographs shall immediately be lowered and HSCB opens automatically. | |  |  |  |
|  | With the Pantographs lowered, move to the HV Box area. Take a black key from the intermediate key box and open the HV Box on M1. Without removing the blue key from the pneumatic panel, make sure that the arm of the earthing switch cannot be tipped over from the “service" position to the "earth" position when the blue key is not present. | | * The arm is locked into place and cannot be transferred to “earth”. | |  |  |  |
|  | Try to remove the yellow key from the earthing switch whilst the switch is in position “1”. | | * The yellow key shall not be removable from the earthing switch. | |  |  |  |
|  | Insert the blue key into the earthing switch and turn the arm to “earth” position. Remove the yellow key. | | * The arm is locked into place and cannot be transferred to “1”. | |  |  |  |
|  | Try to remove the Green Keys from their locks without the Yellow Keys being inserted. | | * No Green Key shall be removable from their sockets without the Yellow key being present. | |  |  |  |
|  | Insert a Yellow key into the socket. Turn it and remove a Green key. | | * Make sure that the Yellow key cannot be removed. | |  |  |  |
| **Multiple Unit Safety Tests (Conf2)** | | | | | | | |
|  | TBD | |  | |  |  |  |
|  | Redo all tests from TC2. Make sure that the initial conditions are re-instated before continuing. Use initial conditions as stated above | | | | | | |

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| --- | --- | --- |
| **Data to check** | **Tolerance criteria** | **Unit** |
|  |  |  |
|  |  |  |
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|  |  |  |