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|---|---|--|-------------------|
|  |  | REFERENCE NO AY000447628-25F1 | Rev : 4.0 |
| | | | Date : 19/08/2018 |
| PO NO : | CODE:DTR | Final inspection check sheet for shipment/delivery | |

170000567945

| |
|------------------------------------|
| d |
| Propulsion Box |
| FINAL INSPECTION CHECKSHEET |



| Manufacture | Alstom Ubanye |
|---------------------|----------------|
| Equipment | Propulsion Box |
| Serial no | TC771 |
| Start activity date | 28/02/2024 |
| End activity date | 28/02/2024 |



This symbol indicates that Activities are related to railway securities in order to

- Check if the behavior of the train under specific conditions corresponds to the effects provided in safety analyzes or;
- Check if the assumptions used in the safety

| Actions and verifications | checked OK / Not OK | re-checked OK / Not OK | Def. Type A,B,C |
|--|------------------------|---------------------------|-----------------|
| DOCUMENTS | | | |
| 1. Presence of production test reports completed dated and signed. | OK | | |
| 2. Self-inspection & Component serial no | OK | | |
| 3. Ensure that the production order is closed on the system | OK | | |
| GENERAL APPEARANCE | | | |
| 4. Cleanliness / debarring / chips / filings / wastes / dust / screw / washers / rivets | OK | | |
| 5. Appearance of paintwork / retouches / inclusions / splinters / scratches / missed bits | OK | | |
| 6. Appearance of sheet metalwork / dents / self-tapping screws fastening | OK | | |
| 7. Information plate - QR Code | OK | | |
| 8. Fastening / maintaining of seals (sharp edge protection / integrity) | OK | | |
| 9. Ensure there is no sign of leaks and coolant is filled up to the last line on the gauge below maximum | OK | | |
| MOUNTING | | | |
| 9. Fastening fast lock in agate cover position | OK | | |
| 10. Fastening fast lock HV cover and PM cover | OK | | |

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|---|---|--------------------------------------|-------------------|
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| | | | | | |
|--|-----------|---------------|-------------------|---------------|--------------------------|
| 11.Mounting of resistors enclosure bottom cover | OK | | | | |
| 12.HV cover and PM cover Alignment of key lock by checking opening and closure. | OK | | | | |
| Action verification | OK | Not Ok | Recheck ok | Not ok | Defect type A,B,C |
| 13. Mounting of terminal box covers. Affixing of danger tag above and below. | OK | | | | |
| 14.Mounting of water draining lower plugs (Agate side ,HV and PM) | OK | | | | |
| 15.Mounting of ID plate | OK | | | | |
| 16.Affixing of tags Identify external and electrical connections | OK | | | | |
| 17.Affixing of danger tag and check that is done according to dimension on WI 5.129 and 5.130 | OK | | | | |
| 18.Ensure correct clamp fitted on the cooling unit pipe. | OK | | | | |
| WIRING | | | | | |
| 19.Check of crimping / connections (lugs / pins / strands / insulator) and maintaining of the connectors | OK | | | | |
| 20.Wiring; respect for minimum radii of curvatures and lengths / no loops or chewing | OK | | | | |
| 21.Cable fasteners: fastening correct | OK | | | | |
| 22.Presence of protective measures against direct contacts: HV protective duct / flexi etc. | OK | | | | |
| 23.Presence and application of labels (flat and straight) | OK | | | | |
| 24. Check the present of LHD | OK | | | | |
| 25. Condition of cables: wires (damaged / no contact with sharp ends of ducts and/or rivets etc.) | OK | | | | |

COMMENTS

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REFERENCE NO AY000447628-
25F1

Rev : 4.0

Date : 19/08/2018

PO NO :

CODE:DTR

NU000036745


Final inspection check sheet for shipment/delivery

IN THE EVENT OF NON-CONFORMITY, ATTACHE THE NON-COMPLIANT EQUIPMENT LABEL ON THE PRODUCT

| | | | |
|-------------------------|------------------|--|--------------------|
| AU EPU Nusi | Date 28/02/24 | OK / Not OK <input checked="" type="radio"/> OK | Signature H. P. |
| AU Inspector M. apuk | Date 28/02/24 | OK / Not OK <input checked="" type="radio"/> OK | Signature H. |

| | | | | | | | | | | | |
|--|-------------------------------------|-----|-----------------------|--|---|---|---|---|----------------------|------------|---|
|  ALSTOM UBUNYE | IDENTIFICATION & SERIALIZATION LIST | | | | | | | | | | |
| | CONFIGURATION LEVEL: | | | | 0 | 1 | 2 | 3 | 4 | 5 | 9 |
| Equipment Code | TC0771 | | Equipment Description | | | | | | | 2024/02/25 | |
| DTR0000367945 | TC0771 | | TRACTION CONVERTER | | | | | | | 2024/02/27 | |
| Component Code | Serial Number | Qty | Rev. | Description | | | | | Drawing No. / Ref on | | |
| AY00000202906 | | 1 | E | CONVERTITORE DI TRAZIONE PRASA | | | | | 553597 | | |
| AYD0000233323 | | 1 | A | KIT DOCUMENTAZIONE CONVERTITORE PRASA | | | | | 1000DD | | |
| AYD0000296679 | | 1 | E | ROUTINE TEST CERTIFICATE PRASA 3KV | | | | | 1202CC | | |
| AYD0000296683 | | 1 | E | PROCEDURA COLLAUDO PRASA 3KV | | | | | 4044PC | | |
| AYD0000296685 | | 1 | F1 | ROUTINE TEST PROCEDURE PRASA 3KV | | | | | 4044PC | | |
| AYD0000315036 | | 1 | E | WS PROPULSION BOX | | | | | 495WS | | |
| AYD0000315038 | | 1 | C | SI PROPULSION BOX | | | | | 126SI | | |
| AYD0000315040 | | 1 | B | FI PROPULSION BOX | | | | | 25FI | | |
| AY00000164662 | | 1 | E | ASSIEME DI MONTAGGIO PROGETTO PRASA | | | | | 556176 | | |
| AY00000185895 | | 1 | D | ASSIEME BT (CUST.2) + SCAMBIATORE | | | | | 554161 | | |
| AY00000042588 | F001401331 | 1 | B | PULL DOWN CARD | | | | | 535135 | | |
| AY00000253771 | | 1 | A | ASSIEME CONTROLLO BT/MT | | | | | 555235 | | |
| AY00000292001 | LVMV 0809 | 1 | E | LV/MV CONTACTORS HARNESS | | | | | 513DD | | |
| DTR0000174605 | 51177 | 1 | B | VENTILATION RACK | | | | | | | |
| DTR0000322004 | X68065 | 1 | A | AGATE AC3ME 044 | | | | | | | |
| DTR0000363028 | 2402MP1250004 | 1 | B | COOLING UNIT | | | | | | | |
| DTR0000392691 | 2402MP1250A04 | 1 | A | 400V MOTORFAN | | | | | | | |
| DTR0000392783 | 1090 | 1 | A | HEAT EXCHANGER 19 KW | | | | | | | |
| DTR0000393305 | 071-100/23-364 | 1 | A | MOTOR PUMP 400V | | | | | | | |
| AY00000185945 | | 1 | D | ASSIEME PM+AT (CUST.1) + CONDOTTO CENTRALE | | | | | 554162 | | |
| AY00000241031 | | 1 | A | ASSIEME CONTATTORE DI LINEA | | | | | 555289 | | |
| DTR0000352557 | 2310MP0915007 | 1 | A | CONTACTOR 4000 V/600 A | | | | | | | |
| AY00000291132 | | 1 | A | ASSIEME TV | | | | | 555502 | | |
| DTR0000271049 | 51222290010 | 1 | A | VOLTAGE TRANSDUCER 4 KV | | | | | | | |
| DTR0000271049 | 51222290011 | 1 | A | VOLTAGE TRANSDUCER 4 KV | | | | | | | |
| DTRP000321040 | 3224 | 1 | U | ONIX 233 XHP | | | | | | | |
| DTRP000322040 | 886 | 1 | P | ONIX 233 VHP 1R | | | | | | | |
| DTR0000050054 | 123650012 | 1 | A | CURRENT SENSOR 1000A | | | | | V13804 | | |
| DTR0000050054 | 1232650022 | 1 | A | CURRENT SENSOR 1000A | | | | | V13804 | | |

| | | | | | |
|---------------|------------------|---|----|---|--------|
| DTR0000050054 | 722099000759 | 1 | A | CURRENT SENSOR 1000A | V13804 |
| DTR0000050054 | 722099793 | 1 | A | CURRENT SENSOR 1000A | V13804 |
| DTR0000094298 | 54 | 1 | A1 | CAPACITOR 1.000 MF | V13802 |
| DTR0000094298 | 198 | 1 | A1 | CAPACITOR 1.000 MF | V13802 |
| DTR0000106563 | 5600 | 1 | A | CAPACITOR BUS BAR | |
| DTR0000106564 | 2695 | 1 | B | INTERCONNECTION BUS BAR | |
| DTR0000106565 | 3786 | 1 | B | REDUCED INTER. BUS BAR | |
| DTR0000106566 | 6114 | 1 | A | SHORT CAP. BUS BAR | |
| DTR0000352147 | 6108 | 1 | A4 | CONTACTOR 4000 V/60 A | |
| DTR0000353584 | 2951 | 1 | A | CAPACITOR 1.333 MF | |
| DTR0000363023 | 2311MP0978020A/B | 1 | B | PIPING KIT | |
| AY00000219169 | AU0189 | 1 | F1 | LV HARNESS | 406DD |
| AY00000240077 | AU0303 | 1 | D1 | HV HARNESS | 407DD |
| AY00000278318 | AU00182 | 1 | E | MV HARNESS | 408DD |
| AY00000278322 | F003701106 | 1 | C | FIRE FIGHTING HARNESS | 409DD |
| DTR0000359897 | 9K793988 | 1 | C | KEY LOCK SYSTEM | |
| DTR0000359897 | 9767183 | 1 | C | KEY LOCK SYSTEM | |
| AY00000251587 | 9767173 | 1 | C | ASSIEME D'INGOMBRO CONVERTITORE TRAZIONE PRASA | 554643 |

| | | | | |
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ROUTINE TEST CERTIFICATE

PRASA TRACTION CONVERTER 3KV DTR0000367945

DRAWING N° 553597/...

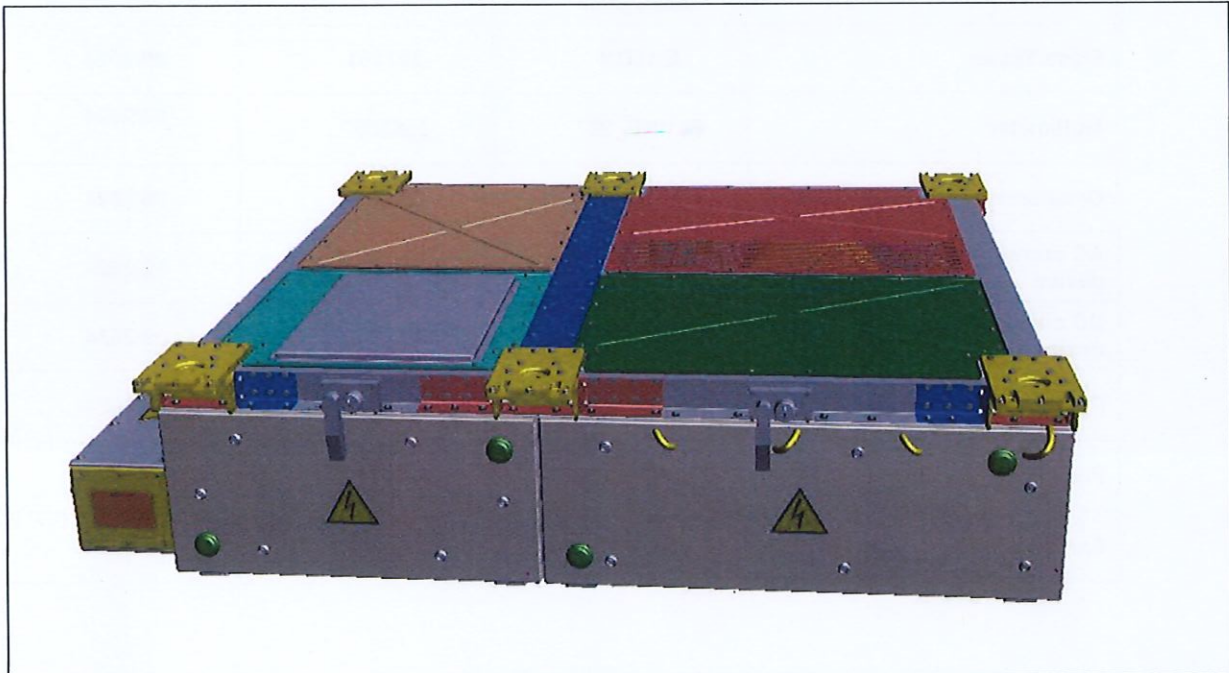
CODICE N° AYD0000296685
PART N°

ROUTINE TEST PROCEDURE: N PC4044/...

We attest that the equipment has successfully undergone all the tests provided in the Routine Test Procedure.

JOINTED WITH THE CORRESPONDING CONFORMITY DECLARATION (DC)

THIS DOCUMENT BECOMES A CERTIFICATION ACCORDING TO EN 10204 PAR. 3.1.b



| | | | | |
|---|--------------|-----------------------|--|-----------------------|
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PRASA TRACTION CONVERTER 3KV DTR0000367945

Choose an item.

TRACTION CONVERTER SERIAL NO:

771

Choose an item.

TEMPERATURA/TEMPERATURE °C.


24.1°

HUMIDITY RELATIVE.....%

64.3

1. List of measuring devices used

| Equipment name | Type | Serial no. | Next calibration date |
|-----------------------------|--------------------|----------------|-----------------------|
| Megger Tester | FLUKE 1550C_5KV | 381963 | 09/2024 |
| Flash Tester | EATON | 107563 | 09/2024 |
| Multimeter | FLUKE_287 | 3563062 | 09/2024 |
| Oscilloscope | TEKTRONIX | C05196 | 09/2024 |
| AC current measuring device | DISPLAY_PANEL | DTR01000043228 | 12/2024 |
| DC current measuring device | DISPLAY_PANEL | DTR01000043228 | 09/2024 |
| Frequency generator | TT1_(TG153) | 493240 | 09/2024 |
| Phase rotation device | FLUKE_9063 | 412096105 | 09/2024 |
| Earth continuity tester | KIKUSUI | YG006883 | 09/2024 |

| | | | | |
|---|--------------|-------------------------------------|---|-------------------------------------|
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| Point | Description | | Value | Result |
|-------|--|-------|---------|--------|
| 2.1 | Visual inspection | | / | DONE |
| 2.2 | Cabling verification | | / | DONE |
| 2.2.1 | Measure values resistance | | | |
| | RS1 | | 118.2KΩ | PASSED |
| | RS2 | | 118.6KΩ | PASSED |
| | RS3 | | 117.1KΩ | PASSED |
| | R_CCZ1 | | 66.9Ω | PASSED |
| | RCCZ2 | | 66.5Ω | PASSED |
| | R_CCZ3 | | 67.3Ω | PASSED |
| 2.2.2 | Adjust of time Relay Q1-GMV Q2-GMV Q1-WP | | | DONE |
| 2.3.1 | 1° Insulation test High Voltage Group A | Value | 4.90GΩ | PASSED |
| 2.3.1 | Dielectric strength test High Voltage Group A | Value | 25.6mA | PASSED |
| 2.3.1 | 2° Insulation test High Voltage Group | Value | 1.29GΩ | PASSED |
| 2.3.2 | 1° Insulation test Low Voltage Group without shields B | Value | 747MΩ | PASSED |
| 2.3.2 | Dielectric strength test Low Voltage without shields Group B | Value | 0.4mA | PASSED |
| 2.3.2 | 2° Insulation test Low Voltage Group B without shields | Value | 563MΩ | PASSED |
| 2.3.3 | 1° Insulation test Low Voltage Group C with shields | Value | 38.8GΩ | PASSED |
| 2.3.3 | Dielectric strength test Low Voltage Group C | Value | 1.7mA | PASSED |
| 2.3.3 | 2° Insulation test Low Voltage Group C | Value | 40.7GΩ | PASSED |
| 2.3.4 | 1° Insulation test Medium Voltage Group D | Value | 919MΩ | PASSED |
| 2.3.4 | Dielectric strength test Medium Voltage Group D | Value | 0.7mA | PASSED |
| 2.3.4 | 2° Insulation test Screen and MVB/Ethernet Group D | Value | 2.06GΩ | PASSED |
| 2.6.1 | Filled volume during Pre-Test and record how many litres | | 16.472ℓ | OK |
| 2.6.2 | Verify the tightness of the glycol | | | OK |

PRETEST TEST OPERATORS

SIPHO SHAPULA

KHUTSO MATLEJOANE

DATE OF PRETEST: 26/02/2024

| | | | | |
|---|---------------------|-------------------------------------|---|-------------------------------------|
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FUNCTIONAL TESTING LOGIC INPUT TEST













Install software on the TBCU using a USB key or Ethernet cable (version:9.1.0) and launch the TrainTracer.

| Connector/pin | Project Ref | Value transition |
|---------------|----------------------------------|------------------|
| XCB2/8 | LI_NOT_INHIB | TRUE |
| XCB2/7 | LI_NEB | TRUE |
| XCB1/4 | LI_CAR_ID1 | FALSE |
| XCB1/5 | LI_CAR_ID2 | TRUE |
| XCB1/6 | LI_CAR_ID3 | TRUE |
| XCB1/7 | LI_CAR_ID4 | TRUE |
| XCB1/8 | LI_EDM | TRUE |
| XCB1/9 | LI_TRACTION | TRUE |
| XCB1/18 | LI_REVERSE | TRUE |
| XCB1/28 | LI_DEMCL_HSCB | TRUE |
| XCB1/29 | LI_HSCB_OP | TRUE |
| XCB1/30 | LI_HSCB_CL | TRUE |
| XCB1/19 | LI_MCB_400V_SUPPLY | TRUE |
| XCB1/20 | LI_TH1_LC | TRUE |
| XCB1/21 | LI_TH2_LC | TRUE |
| XCB1/17 | LI_FORWARD | TRUE |
| XCB1/16 | LI_NOBRAKE | TRUE |
| XCB1/45 | LI_PBRAKE_STAT | TRUE |
| XCB1/43 | LI_ISOL | TRUE |
| XCB1/31 | LI_HSCB_HOLD | TRUE |
| XCB1/44 | LI_BRAKE_ISO | TRUE |
| XCB1/52 | LI_SERVICE_BR_DC | TRUE |
| XCB1/53 | LI_RESERVOIR_PS_OK | TRUE |
| XCB1/54 | LI_PARK_BR_DC | TRUE |
| XCB1/55 | LI_PARK_BRAKE_RELEASE | TRUE |
| XCB1/56 | LI_REGULATOR_STAT | TRUE |
| XCB1/64 | LI_SUSP_DC | TRUE |
| XCB1/42 | LI_PARK_BRPS_NOK(ebt6_in/ebt 21) | TRUE |

| | | | | |
|---|---------------------|-------------------------------------|---|-------------------------------------|
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FUNCTIONAL TESTING LOGIC OUTPUT TEST

Refer to the Test Procedure (2.5.2)

| Confirm Status | | Variable to force / action to do | Check |
|---|---|----------------------------------|---|
| CLOSE | | LO_CK_CCC=1 | Check that capacitor charging contactor K-CCC closes LI_K_CCCC=1 ;LED 43&53 OFF(digital input.xml) |
| OPEN | | LO_CK_CCC=0 | Check that capacitor charging contactor K-CCC opens LI_K_CCCC=0; LED 43&53 ON(digital input.xml) |
| CLOSE | | LO_CK_IC=1 | Check that isolation contactor K-IC close LI_K_ICC=1; LED 43&53 OFF(digital input.xml) |
| OPEN | | LO_CK_IC=0 | Check that isolation contactor K-IC opens LI_K_ICC=0; LED 43&53 ON(digital input.xml) |
| OK | NOK | LO_CK_WP=1 | Check the command to start water pump LI_K_WPC=1(digital input.xml) Check also that the variable ai_cps = 1,6 bar +/-5% (analog input.xml) |
|  |  | | |
| OK | NOK | LO_CK_WP=0 | Check the command to stop water pump LI_K_WPC=0(digital input.xml); Check also that the variable ai cps = 0 bar +/-5% (analog input.xml) |
|  |  | | |
| OK | NOK | LO_CK1_GMV=1 | Check the half-speed command to the fan LI_K1_GMVC=1(digital input.xml) -Check with a rotation sense measurement instrument that the rotation sense is anti-clockwise  |
|  |  | | |
| OK | NOK | LO_CK1_GMV=0 | Check the removal of the half-speed command to the fan LI_K1_GMVC=0(digital input.xml) |
|  |  | | |
| OK | NOK | LO_CK2_GMV=1 | Check the full-speed command to the fan LI_K2_GMVC=1(digital input.xml) -Check with a rotation sense measurement instrument that the rotation sense is anti-clockwise  |
|  |  | | |
| OK | NOK | LO_CK2_GMV=0 | |

| | | | | |
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| Confirm Status | Variable to force / action to do | Check |
|---|--|---|
|   | | Check the removal of the full-speed command to the fan LI_K2_GMVC=0(digital input.xml) |
|   | LO_CK_WP=1 | Start pump LI_K_WPC=1(digital input.xml) |
|   | LO_CK1_GMV=1 | Check the half-speed command to the fan LI_K1_GMVC=1(digital input.xml) |
|   | LO_CK2_GMV=1 | Check the full-speed command to the fan Don't start LI_K2_GMVC=0(digital input.xml) |
|   | LO_CK1_GMV=0 | Check the removal of the half-speed command to the fan LI_K1_GMVC=0(digital input.xml) |
|   | LO_CK2_GMV=0 | Check the removal of the full-speed command to the fan LI_K2_GMVC=0(digital input.xml) |
|   | LO_CK2_GMV=1 | Check the full-speed command to the fan LI_K2_GMVC=1(digital input.xml) |
|   | LO_CK1_GMV=1 | Check the half-speed command to the fan Don't start LI_K1_GMVC=0(digital input.xml) |
|   | LO_CK2_GMV=0 LO_CK1_GMV=0 LO_CK_WP=0 | Pump and fans stop |
| | Switch OFF 400 VAC on the simulator box | |
|   | SBT7_9 =1 | Check that there is continuity between pin 32 and 33 of XCB2; LED "LO_TRAC IN" ON |
|   | SBT7_9 =0 | Check that there is no continuity between pin 32 and 33 of XCB2 ; LED "LO_TRAC IN" OFF |
|   | SBT7_10 =1 | Check that there is continuity between pin 40 and 41 of XCB2 ; LED "LO_BRAKE IN" ON |
|   | SBT7_10 =0 | Check that there is no continuity between pin 40 and 41 of XCB2; LED "LO_BRAKE IN" OFF |
|   | LO_AC_FAN=1 | Check the start of the TBCU fans on the top of AGATE |
|   | LO_AC_FAN=0 | Check the stop of the TBCU fans on the top of AGATE |
|   | LO_INH_TR=1 LO_CK_IC=1 | Check the presence of 110 V on pin 31 of XCB2 ; LED "LO_INH_TR" ON |

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| Confirm Status | | Variable to force / action to do | Check |
|-------------------------------------|--------------------------|----------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | LO_INH_TR=0 LO_CK_IC=0 | Check that there is no 110 V on pin 31 of XCB2; LED "LO_INH_TR" OFF |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | LO_BRK_FLT=1 | Check that there is continuity between pin 29 and 30 of XCB2 ; LED "LO_BRK_FLT" ON |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | LO_BRK_FLT=0 | Check that there is no continuity between pin 29 and 30 of XCB2; LED "LO_BRK_FLT" OFF |









| Signal Label | Check variable | Power supply Measured on the simulator AY317642 test point | Current / voltage to apply | TrainTracer must read | Record the Value |
|----------------|--------------------------------------|---|--|--|------------------------|
| AI_FVMD | ai_uf_fil | 48 vdc | Apply 100 Vrms | 670 Vrms +/-5% | 48.56V |
| AI_LVMD | ai_vline | 30 vdc | Apply 100 Vrms | 450 Vrms +/-5% | 30.06V |
| AI_IR | ff7_events_fault _recorder1/ai_ir | 48 vdc | Apply 20 Arms | 35 Arms +/-5% | 48.54V |
| AI_IS | ff7_events_fault _recorder1/ai_is | 48 vdc | Apply 20 Arms | 35 Arms +/-5% | 48.54V |
| AI_IDC | ai_idc | 48 vdc | Apply 20 Arms | 35 Arms +/-5% | 48.54V |
| AI_IDIFF | ai_idiff | 48 vdc | Apply 20 Arms | 35 Arms +/-5% | 48.54V |
| AI_LOAD_PRES | AI_LOAD_PRES | +15Vdc | Put a 1k Ω resistor between XCSB/53-54 | 15 mA +/-5% | 17V |
| AI_BR_CTR_PRES | AI_BR_CTR_PRES | +15Vdc | Put a 1k Ω resistor between XCSB/5-6 | 15 mA +/-5% | 14.386V |
| AI_CTS | ai_cts | +15Vdc | | Check that the temperature read is the same of the temperature of the environment | 25.172V |

| | | | | |
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| Signal Label | Check variable | Power supply Measured on the simulator AY317642 test point | Current / voltage to apply | TrainTracer must read | Record the Value |
|--------------|---|---|----------------------------------|---|------------------------|
| | | | | (measured with an external thermometer | |
| AI_CPS | ai_cps | +15Vdc | | Verify pump pressure 1,6 bar +/-5% | 1.73bar |
| XMD_Diode | Put the DMM on DIODE mode and test PIN-42 & PIN-44 on XCB plug and measure the Voltage drop across the DIODE. | | | A_DIODE VS K_DIODE | 0.517 |
| XMD_Diode | Put the DMM on DIODE mode and test PIN-42 on XCB plug and PIN-19 on XCB_F plug and measure the Voltage drop across the DIODE. | | | A_DIODE VS K_DIODE | 0.517 |
| XMD_Diode | Swap the DMM leads to verify if the DIODE is blocking | | | K_DIODE VS A_DIODE | OPEN |


TESTING THE SPEED SENSORS

NB: Refer to the test procedure (2.5.4)

| Speed sensor | Pins on connector XCST | Voltage to be measured | STATUS | |
|--------------|---------------------------|---------------------------------------|---|---|
| MOT1_SP1/SP2 | 8, 11 | 15V (+/- 5%) (led M1 on simulator ON) |  |  |
| MOT2_SP1 | 42, 44 | 15V (+/- 5%) (led M2 on simulator ON) |  |  |
| MOT3_SP1 | 64, 66 | 15V (+/- 5%) (led M3 on simulator ON) |  |  |
| MOT4_SP1 | 98, 100 | 15V (+/- 5%) (led M4 on simulator ON) |  |  |

ANALOG OUTPUT TEST

Reset the TBCU and execute the service brake is controlled by generating a PWM signal, 0/15V 500 Hz. The waveform can be verified with an oscilloscope or with a multimeter in AC volt connecting the multimeter cable to the test point (29-39) on the simulator box.

| | | | | |
|---|--------------|-------------------------------------|---|-------------------------------------|
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| Variable to force | Pins on connector XCSB where to connect oscilloscope | Expected value Check with multimeter | Results |
|-----------------------------|---|---|-------------|
| Mech_a_pwm_brake= 50 | 29,30(test point on simulator) Between "-" and "PWM_brake_TEST" | Square wave 0/15 V 500Hz and 50% duty-cycle(7,5V) VAC measured with a multimeter | DONE |

| Send Parameters | Verify if the variable is TRUE or FALSE | Results |
|--------------------------------------|---|-------------|
| Send parameter file setup valve.xml | Verify that the variable CEV3_RetourC1 and CEV3_RetourC2 in dashboard "check_WDG_relay.xml" are TRUE | TRUE |
| Send parameter file AO_WSP_ADM1.xml | Verify that LED on simulator AO_WSP_ADM1 lamp | TRUE |
| Send parameter file AO_WSP_ADM2.xml | Verify that LED on simulator AO_WSP_ADM2 lamp | TRUE |
| Send parameter file AO_WSP_DUMP1.xml | Verify that the LED's AO_WSP_ADM1/AO_WSP_DUMP1 blinking on simulator | TRUE |
| Send parameter file AO_WSP_DUMP2.xml | Verify that the LED's AO_WSP_ADM2/AO_WSP_DUMP2 blinking on simulator | TRUE |

HIGH VOLTAGE TEST

| Execute the below action to prepare for High Voltage and Modules testing | Results |
|--|-------------|
| Power off 110V supply on simulator to reset the TBCU | DONE |
| Switch off the Function wave generator | DONE |
| Connect +HV(TR1) and -HV(TR5), and the L load for the inverter (TR7,TR9,TR11, according with page 2 of the traction converter schematics | DONE |
| Connect the Brake rheostat to point TR12,TR15 of the traction converter | DONE |
| Connect the fast discharge resistor (from cubicle HV4) to pin2 of CF1 Dc link filter condenser | DONE |
| Select the product under test to TC on the Control Desk | DONE |
| Select the HV catenary type to DC on the Control Desk | DONE |
| Close the switch K400 on the Control Desk | DONE |
| Close the switch FAN TC on the Control Desk | DONE |
| Switch on the main switch of the HVPS | DONE |
| Switch on the battery simulator | DONE |
| Press the reset button on the front of the HVPS | DONE |
| Close the Switch HVPS Authorization on the control desk | DONE |
| Press the Button "start infrared" on the control desk | DONE |
| Press the button "OUT of earth" on the control desk | DONE |
| Switch on the 110volt DC on the simulator and make the connection to the TBCU with Train tracer | DONE |
| Send the High voltage.xml on Train_Tracer dashboard | DONE |

| | | | | |
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| | |
|--|------|
| Close the switches on the simulator: LI_NOT_INHIB, LI_TH1_LC, LI_TH2_LC, LI_CAR_ID1, LI_MCB400, LI_HSCB_OP, (Check with that the related variable goes "TRUE" with TrainTracer dashboard "Digital input") | TRUE |
| Send the prm file "PRM_MAINT_AUTHOR" | DONE |
| Send the prm file "LOW VOLTAGE TEST" and verify that the precharge is done(K_ICC and K-IC closed) and after 30 second fans and pump of the cooling unit start. | TRUE |
| Close the switch LI_NEB on the simulator | DONE |
| Send a prm file "OPEN LINE CONTACTOR" and verify that K_ICC(LI_K_CCC=0,LI_K_ICC=0) open and pump and fan stop. | TRUE |
| Close the LI_HSCB_HOLD switch on simulator | DONE |
| Verify that the orange light "Ready to start" on the HVPS remote control, placed on the side of the control desk, is light up. | TRUE |
| Press the button start on the HVPS remote control | DONE |
| Press the button "CLOSE HVC" | DONE |
| Press the button V> ;V< for regulate the HV output | DONE |
| Supply the traction converter with high voltage, at around 2200 volt | DONE |
| Verify that the variable ai_vline =3000V | TRUE |
| The precharge sequence must start (LI_K_ICC=TRUE) | TRUE |
| Raise voltage to 3kV then wait until the start of half speed ventilation and the pump | DONE |

INVERTER TEST

Open on the Dashboard INVERTER TEST

| Execute the below action to prepare for INVERTER testing | Results |
|--|----------|
| Write the variables: Inh_dtcomp_open = 1 | DONE |
| Open the dashboard speed sensors1.xml and verify the variables are TRUE: Fit_speed_axle_0 to 5 | TRUE |
| Force dsp2_wr_inv_b_manual_inv=1 | DONE |
| Force dsp2_WR_inv_A_mod_manual=0,05 | DONE |
| Force dsp2_wr_inv_b_fs_manual=1 | DONE |
| Force dsp2_wr_inv_fq_fs_manual=45 | DONE |
| Force tcu_b_dem_start_inv=1 | DONE |
| Record the value of ai_ir_rms=200A +/- 15A | 221.689A |
| Record the value of ai_is_rms=200A +/- 15A | 221.660A |
| Run the INVERTER Test for 5min | DONE |

CHOPPER TEST

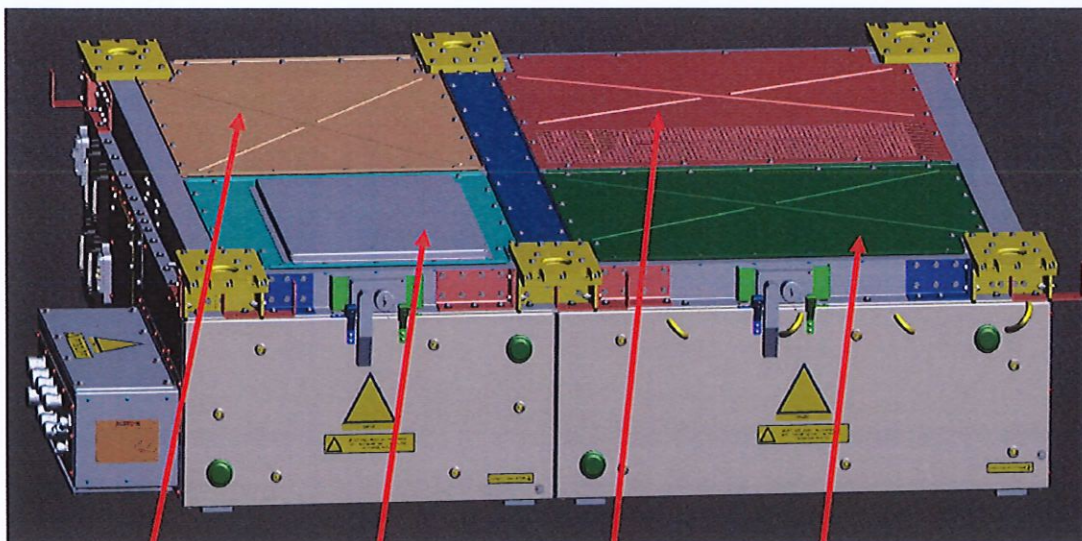
Open on the Dashboard CHOPPER TEST

| | | | | |
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| Execute the below action to prepare for CHOPPER testing | Results |
|--|---------|
| Force the variable K_BC_DC_OL_FORCED =0,03 to enable in open loop the rheostatic chopper after opening the Dashboard "anello aperto chopper.xml" | DONE |
| Verify that the variables ai_idc= 10Amp $\pm 5^\circ$ and record the Value | 10.517A |
| Run the Chopper for 3 minutes | DONE |
| Force K_BC_DC_OL_FORCED =0 for stop chopper test | DONE |
| Send a prm file "OPEN LINE CONTACTOR" and verify that the precharge/line contactors are opens and pump-fans stops and the DC bus is discharged: ai_uf_fil < 50 | DONE |
| Stop the HVPS with the button "STOP" on the remote control and switch off the 400 VAC and 110 Vdc. | DONE |
| Disconnect the TC from the test bench | DONE |
| Verify the level of the COOLANT, top up and record | e |
| Total COOLANT on the TRACTION CONVERTER | 16.472e |

COVER TEST


Record the values of the cover test on the blocks provided below.



| | | | |
|---------|---------|---------|---------|
| 0.021MΩ | 0.022MΩ | 0.022MΩ | 0.022MΩ |
| 0.022MΩ | 0.022MΩ | 0.023MΩ | 0.023MΩ |

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FUNCTIONAL TEST OPERATORS**KHUTSO MATLEJOANE****SIPHO SHAPULA****DATE OF FUNCTIONAL TEST:** 26/02/2024**1. Updated by:**

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