# Base Load Power Hub (BLPH)

## FACTORY ACCEPTANCE TEST PROCEDURE

## LV Switchgear

## Document Number: 1723002197-QC-PRO-00045

Document Class: 2

| | | | | | |
|---|---|---|---|---|---|
| 03 | 21/03/2025 | Accepted for Construction (AFC) | Santinelli | Mastri | Chiappa |
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## Revision / Change Log

| Rev. | Description |
|---|---|
| 00 | Issue for Review (IFR) |
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## HOLDS LIST

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## 1 APPLICABILITY AND RESPONSIBILITY

These Job Instructions describe the testing procedures applicable to LV Electric Switchboards manufactured by IMESA, in accordance with Regulation **IEC 61439-1**
The Head of Quality Control (QC), the Head of CAB and the team leader that perform testing are responsible for ensuring the proper implementation of the following Job Instruction.
The tests described on this document will be executed at IMESA factory.

## 2 GENERAL INFORMATION

The switchboards which are ready for tested should be placed in a separated area to which access should be allowed only to authorised personnel; should it not be possible to isolate the switchboard, the area should be marked off by means of barriers, notices, visible and flashing barriers.

The tester must use the diagrams (SLD, Functional, etc) and the drawings (switchboard front, overall dimensions etc.) and eventual special specifications, as reference.

A list of all the checks and tests carried out on both types of switchboards, namely LV Electric Switchboards (unless otherwise indicated) manufactured by IMESA, is provided (see Annex 1).

When testing the dielectric properties (applied voltage test), insulated gloves and shoes with retractable toe caps, as well as suitable protection clothing covering body and arms, to be worn. If the test is suspended even temporarily, the test instrument must be disconnected from the mains.

Applicable standards:

IEC 61439-1:2020 – Low-voltage switchgear and controlgear assemblies – Part 1: General rules.
IEC 61439-2:2020 – Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies.
IEC 60947-2:2016 with Amendment 1:2019 – Low-voltage switchgear and controlgear – Part 2: Circuit-breakers.
IEC 61869-2:2012 – Instrument transformers – Part 2: Additional requirements for current transformers.
IEC 61869-3:2011 – Instrument transformers – Part 3: Additional requirements for voltage transformers.

IEC 60529:1989 with Amendments 1:1999 and 2:2013 – Degrees of protection provided by enclosures (IP Code).

Reference Contractor Documents:

- 123A90-DDL-EL-SP-20023 / Technical Specification, IDS and DDS for LV Switchgear
- 123A90-DDL-EL-DS-20024 / Technical Data Sheet (TDS) for 6.6kV Switchgear

Applicable IMESA Documents:

| Document ID | Title |
|---|---|
| 1723002197-EL-DA-00007 | SG-200N1 GENERAL ARRANGEMENTS DWG AND FOUNDATION LOAD CALCULATION INCLUDING COG |
| 1723002197-EL-DA-00008 | SG-200D2 GENERAL ARRANGEMENTS DWG AND FOUNDATION LOAD CALCULATION INCLUDING COG |
| 1723002197-EL-DA-00009 | DP-200N1 GENERAL ARRANGEMENTS DWG AND FOUNDATION LOAD CALCULATION INCLUDING COG |
| 1723002197-EL-DG-00011 | SG-200N1 ELECTRICAL SINGLE LINE DIAGRAM |
| 1723002197-EL-DG-00012 | SG-200D2 ELECTRICAL SINGLE LINE DIAGRAM |
| 1723002197-EL-DG-00013 | DP-200N1 ELECTRICAL SINGLE LINE DIAGRAM |
| 1723002197-EL-DG-00030 | SG-200N1 LV SWG FUNCTIONAL DIAGRAMS - INCOMINGS, INTERCONNECTING AND AUX DISTRIBUTION |
| 1723002197-EL-DG-00031 | SG-200N1 LV SWG FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS |
| 1723002197-EL-DG-00032 | SG-200D2 FUNCTIONAL DIAGRAM |
| 1723002197-EL-DG-00033 | DP-200N1 FUNCTIONAL DIAGRAM |
| 1723002197-COM-LIS-00052 | SPARE PART INDEX REGISTER (COMMISSIONING AND OPERATION) |
| 1723002197-EL-LIS-00053 | SPECIAL TOOLS LIST |
| 1723002197-QC-PRO-00055 | PACKING, SHIPPING, HANDLING AND STORAGE PROCEDURES |
| 1723002197-MAT-PRO-00004 | MV-LV SWG PAINTING PROCEDURE |
| 1723002197-QC-ITP-00003 | INSPECTION AND TEST PLAN - LV Switchgear |

## *3 DESIGN, VISUAL AND MECHANICAL CHECKS*

### *3.1 Visual and dimensional check*

1. Check of nameplate and label legend
2. Bus bar creepage and clearance distances check
3. Checking of steel thickness, steel structure work, welding, sheet metal, lifting beams (thickness of roofing sheets, plinths, uprights, 3mm; door sheets, segregations, shelves, 2mm)
4. Equipment characteristic and rated data checking
5. Equipment accessibility and removability checking
6. Check the structural dimensions with respect to those shown by the assembly drawings of the different units.
7. Check that there are no bends and that the sheet plate is perfectly flat
8. Check that assembly has been carried out correctly and that the doors are earthed.
9. Check that ducts have been provided for the auxiliary cables as shown by the foundation drawings.
10. Check the coating or plating If the bus-bars are plated (silver plating, resin coating etc).
11. Check that the Main Equipment has been positioned correctly as per the Mimic Diagrams and Switchboard Front View drawing.
12. Check that the equipment is securely fixed.
13. Check that the equipment is properly earthed, wherever appropriate.
14. Check the equipment for eventual damage caused during assembly.
15. Check that the paint colour complies with that indicated on the assembly list and that is has not been damaged during assembly.
16. Check the thickness of the paint by an appropriate instrument insuring that the thickness corresponds to one in specification.
17. Check the required internal form of segregation

### *3.2 Mechanical structural tests*

1. Check that the circuit-breakers can be plugged in and drawn out correctly and possible mechanical interlocking.
2. Check that mechanical locks to prevent the insertion into the unit of similar circuit breakers with rated current inferior to that of the compartment, have been fitted on the mobile section of the circuit breaker and on the fixed section of the unit.
3. Wherever appropriate, check the operating efficiency of the limit switches for racked-in and isolated circuit breaker. To carry out the check, electrically test the switching of the auxiliary contacts both with the circuit-breaker drawn out and the circuit breaker plugged in.
4. Check the operating efficiency of the signalling auxiliary contacts of the open – closed circuit breaker. The check consists of electrically testing the switching of the auxiliary contact both with the circuit breaker in open and closed position.

5. Check the operating efficiency of the mechanical lock that prevents the manual or electrical closing of the circuit breaker when it is positioned between the plugged in and drawn out positions with the door open. To carry out the check, attempt to close the circuit breaker rack manually and electrically when the circuit breaker is more or less in the plugged in position (or in the case of a MV switchboard, with the door of the box is slightly open).
6. Check the operating efficiency of the key locks and ring the keys if necessary.
7. Check the operating efficiency of all the mechanical interlocks between the circuit-breakers, disconnecting switches and earthing switches.
8. Carry out a number of starting up and stopping sequences as indicated by the table referring to the cell.
9. Check the functional efficiency of the key locks and perform the key ringing when required
10. Check the operating efficiency of all mechanical interlocks between the circuit-breakers, disconnecting switches.
11. Carry out a number of starting up and stopping sequences as indicated by the table referring to the cell.

### *3.3 Checking the degree of protection*

Check that the degree of protection of the Electrical Switchboards complies with the Order Specifications of the Customer and CEI EN 60529 regulation (Classifications of degrees of protection provided by enclosures for electrical equipment).

### *3.4 Checking the wiring*

1. Check that the information shown on the data plates complies with the data shown by the mimic Diagram and apply the setting of caps (when are known).
2. Check that the cables and equipment have been correctly marked and tagged whit what is reported on the operation diagram.
3. Check that the wording on the data plates and positioning of the same comply with the Data Plate and Mimic Diagram List.
4. Check the section of the bars/cables, as provided by project for the power of switch/utilities.
5. Check that the connections on the main circuits are securely tightened (ensuring that the signs on the bolts are correctly marked).
6. Check that the cables and wires comply with requirements (flameproof SH-W) and the nominal voltage $U_0/U$.
7. Check that all the wires are installed in suitable ducts or have been grouped in bunches placed so that they do not interfere with moving components or cut the insulating sheath.
8. Carry out sample checks on the cable terminations to ensure that they are properly crimped and marked as shown by the relevant diagram.
9. Check that the terminal boards have been correctly positioned and marked and that the terminal is suited to the required function.

10. Check the terminal board connection to the adjacent units ensuring that it has been marked as shown by the Operating Diagram and that the terminals and jumpers comply with the Operating Diagram.
11. Carry out all the checks indicated by point 4 on terminal boards supplied by the Customer and check that all the contacts requested by the Customer have been cabled (e.g. auxiliary relay contacts, protection relay contacts etc.).
12. Verification of thightening of internal circuits and connections / bar connections. * Acceptance criteria as per following table: (see Imesa document TAB 11)

| Type of screw | Tightening torque (Nm) | Tolerance |
|---|---|---|
| M5 | 5 | 5% |
| M6 | 9 | 5% |
| M8 | 22 | 5% |
| M10 | 45 | 5% |
| M12 | 75 | 5% |
| M14 | 115 | 5% |
| M16 | 185 | 5% |

*** for tightening torques regarding insulators, CT's-VT's, refer to the values provided by the manufacturer**

## *4 ELECTRICAL AND FUNCTIONAL TESTS*

### 4.1 Functional Test

These tests consist of checking the operating efficiency of all the electric and electromechanical circuits, as shown by the diagrams, by simulating as far as possible different operating conditions.

In particular:

1. Check the supply and closing circuit of the spring charging geared motor as follows: set the supply voltage of the circuit to Vn and check the operating efficiency of the spring charging geared motor. With the supply voltage on Vn, place the unit on local operating mode and check compliance of the remote control and lock circuits with the Operating Diagram of the unit. The remote control function must also be simulated by activating on the output terminal boards.
2. Check the opening circuit as follows: set the supply voltage of the circuit on Vn and check the opening circuit of the circuit breaker in the following conditions:
   - Local: the circuit breaker must open when the relevant pushbutton or controller is pressed or activated.
   - Remote: simulate remote operation by activating the relevant output terminal boards.
3. Check the closing circuit as follows: set the supply voltage of the circuit on Vn and check the closing circuit of the circuit breaker in the following conditions:

- Local: the circuit breaker must close when the relevant pushbutton or controller is pressed or activated.
- Remote: simulate remote operation by activating the relevant output terminal boards.

4. Check the signalling circuits as follows:
   - check the operating efficiency of the optical and acoustic signals on the unit and ensure that they comply with the Operating Diagram;
   - check that the remote signalling circuits on the output terminal boards are suitable.
5. Check the amperometric circuits as follows: apply a primary or secondary current and check the operating efficiency of the current transformers, amperometers, amperometric relays and protection relays.
6. Check the voltmeter circuits as follows: applying primary power, check the operating efficiency of the voltmetric relays and the protection relays.
7. Check that all the logics shown by the diagrams have been complied with and are efficient both in automatic and manual by simulating electrical commands or locks from the exterior (it depends on the operating philosophy)
8. Automatic and Manual transfer operating: please refer to the electric tests that will be performed with the helps of relevant approved Schematic Diagrams
9. Intertrip and interlock signals operating: please refer to the electric tests that will be performed witn the helps of relevant approved Schematic Diagrams
10. HW remote alarm operating: please refer to the electric tests that will be performed with the help of relevant approved Schematic Diagrams
11. Check CT Polarity, physical marking of P1, P2 and S1, S2. Through the galvanometer, with the connection cables, connected to primary and secondary terminals of the current transformer, the instrument will indicate if the polarity is "according to" "or" discording " (100% verification ).
12. Check of the Protection Relays by means of secondary current / voltage injection to verify some trip functions

Note: The above tests are carried out on typical feeders only. Hardware and software modification which come out during the FAT can be implemented, if possible, during the FAT on the tested typical units for a prompt verification. After the FAT the software will be prepared for all units including the IED protections settings (out of IMESA scope), however the download and testing of all units will be carried out during the Commissioning activities. Electrical and functional tests will be performed for 100% of the switchgear during fabrication. Relative test reports will be made available during the FAT for Contractor review.

### 4.2 Tests of auxiliary devices

The check of the auxiliary equipment is double. The first, is to check the supplier and other "general" characteristics with the help of SLD & Schematics, the second is to check their "functionality" by the electrical tests that will be performed (please note that all equipment are - in any case - tested during the internal checks before FAT).

### 4.3 Power Frequency voltage test and measurement of insulation resistance

The dielectric tests are carried out to check the insulation distances, the soundness of the insulating materials and that the connections have been made correctly.

Remember to disconnect all current absorbing equipment which would be damaged by the application of voltage (coils, metering instruments, differential circuit breakers etc). A voltage generator at industrial frequency is used to carry out this test.

Carry out the applied voltage test at industrial frequency on the main circuit between each conductor and the other conductors to earth. The test voltage must comply with that shown by the following table (Table 8 CEI EN 61439-1 pos. 10.9.2.2 + Rina rules) for 1 minute

| Rated insulation voltage Ui | Dielectric test voltage in a.c. (efficacy) |
|---|---|
| Ui ≤ 60 | 1500 |
| 60 < Ui ≤ 300 | 1500 |
| 300 < Ui ≤ 690 | 1890 |
| 690 < Ui ≤ 800 | 2000 |
| 800 < Ui ≤ 1000 | 2200 |

**Carrying out the test :**

To carry out the test, use an insulation reader at a voltage of at least 500V. (as reported by RINA rules PT C – ch2-sec.8 – point 3.4.1)
Measure the insulation resistance of the main circuits.
Read the insulation resistance with a “MEGGER” on the following points:

- between phase L1 and the phases L2 and L3 connected to earth (valid for both tests);
- between phase L2 and the phases L1 and L3 connected to earth (valid for both tests);
- between phase L3 and the phases L1 and L2 connected to earth (valid for both tests).

**Acceptance Criteria:**

Relevant the insulation test, this is considered successful if, for each circuit tested, the insulation resistance is above 1 MΩ as described in the RINA rules (as reported by RINA rules PT C – ch2-sec.8 – point 3.4.2)

Relevant the industrial frequency test, this is considered successful, if no discharges or perforation occur during the test.

### 4.4 Dielectric test on auxiliary circuit and insulation resistance measurement

Testing of voltage applied between the auxiliary and control circuits and mass, applying a voltage as indicated in the table below, for a period of 1 minute (CEI EN 61439-1+ Rina rules)

| Rated insulated voltage Ui | Dielectric test voltage in a.c. (efficacy) |
|---|---|
| Ui ≤ 12 | 250 |
| 12 < Ui ≤ 60 | 500 |
| Ui > 60 | 2 Ui + 1000 with at least 1500 |

**Carrying out the test:**

To carry out the applied voltage test between the auxiliary and control circuits and earth, apply the voltage highlighted in the above table (checking the insulation between the two short-circuited lines and earth)

**Acceptance Criteria:**

Relevant the insulation test, this is considered successful if, for each circuit tested, the insulation resistance is above 1 MΩ as described in the RINA rules (as reported by RINA rules PT C – ch2-sec.8 – point 3.4.2)

Relevant the auxiliary voltage tests, this is considered to be successful, if no discharges or perforation occur during the test.

### 4.5 Checking the continuity of the protection circuit

The purpose of this check is to ensure that the protection circuit has been installed correctly and is carried out with both a visual examination (check that rough contact washers have been fitted) and an electrical test (resistor less than 0,1Ω).

### 4.6 Integrate Test with EMS

(This test will not be held with HV switchgear FAT since it is not in charge of IMESA)

**5 Final checks**

Once all the tests have been carried out on the different units, before sending the switchboard to the packaging department, the following checks must be carried out:

1. Check that all the jumpers used for the electrical tests of the different circuits have been removed from the terminal boards and the equipment.
2. Clean all the equipment in the unit.
3. Touch up the paintwork if necessary.
4. Check that the foundation bars comply precisely with the drawings.
5. Compile the "Mod. CAR/CAB 04 bill of material for shipment" with an indication of the material to be shipped loose, including material required for installation of the units.
6. Make out the list of missing materials (this list should include materials which are missing because found to be faulty during testing and the equipment to be installed by the Customer).
7. Check that the Manufacturer's data plate showing the characteristics of the switchboard has been fitted.
8. Insert the maintenance manual of the framework
9. CQ deals with the issue the test report and sees to its storage.

N.B In case of acceptance by the customer, it's up to present REC inform RP which involves the planning of production and make it aware of CAB and CQ; REC also defines the exact date that he agreed with the customer and informs the affected functions. At the end of the test, the customer must sign the test report.

## *6 TEST EQUIPMENT*

The following test equipment will be used to carry out the above tests:

- Universal power supply for the auxiliary circuits,
- Amperometric power supply for the primary and secondary currents,
- Instrument for the applied voltage test at industrial frequency of the main circuit,
- Instrument for the applied voltage test of the auxiliary and control circuits,
- Digital thickness gauge

## *7 CARRYING OUT THE TESTING ACTIVITIES*

The testing activities must be carried out in compliance with the safety requirements of the current regulation by restricting the test area with the special hurdles. The testing activities must be carried out

exclusively by personnel who have received proper training, anyway the operators must always be at least two.

If testing is manned by customer (or by those third parties designated by it), this is absolutely not permitted to carry out maneuvers on the switch and are not allowed to stay alone at the IMESA plant.

All electrical parts must be banned from all contact and the area should be well lit and free from hindrances and obstacles.

Operators must be equipment with suitable DPI and certified equipment under current regulations.

During testing must always be at least one first aid worker who has received its education.

When testing the dielectric properties (applied voltage test), remember to wear insulated gloves and shoes with retractable toe caps as well as suitable protection clothing covering body and arms. If the test is suspended even temporarily, the test instrument must be disconnected from the mains.

## *8 ANNEX*

- See Annex 1 (Fac-simile Test Report)
- See Annex 2 (Checklist)

# RAPPORTO DI PROVA
# TEST REPORT

**Fornitore/ Supplier: IMESA S.p.A.** Via G. Di Vittorio, 14 JESI (Ancona) – ITALIA
Tel.+39 0731 211034 - Fax.+39 0731 211055 - imesa@imesaspa.com - www.imesaspa.com

| | | | |
|---|---|---|---|
| **N° Certificato/ Certificate N°:** | | **Data / Date:** | |
| **Commessa N° / Workorder N°:** | | | |
| **Matricola N° / Serial N°:** | | | |
| **Ordine N° / Order N°:** | | | |
| **Cliente / Customer:** | | | |

Collaudo eseguito alla presenza di: / Test surveyed by:

| Sig. / Mr. | Ditta / Firm | Firma / Signature |
|---|---|---|
| | **IMESA S.p.A.** | |
| | **IMESA S.p.A.** | |
| | **CUSTOMER** | |
| | **CUSTOMER** | |
| | **REGISTER** | |
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# RAPPORTO DI PROVA
# TEST REPORT

| N° Certificato/ Certificate N°: | | Data / Date: | |
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Materiale collaudato a Norme: **IEC 61439-2**
Material tested according to
Procedura collaudo Quadri BT :
*Procedure test Switchboards LV* ***FAT procedure- 231298/SD/045***

☐ **register RULES**

| QUADRO ELETTRICO BT<br>SWITCHBOARD LV | Tipologia / Type: | MCC/F |
|---|---|---|
| **Tensione Nominale di Isolamento (Ui):**<br>***Rated Insulation Voltage (Ui)*** | **Rated insulation voltage** | |

**DESCRIZIONE/DESCRIPTION:**

DESCRIPTION OF THE PROJECT AND ELECTRICAL CHARACTERISTICS

**DISEGNI/DRAWINGS**:

| Document ID | Title |
|---|---|
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# RAPPORTO DI PROVA
# TEST REPORT

| N° Certificato/ Certificate N°: | | Data / Date: | |
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**PROVE INDIVIDUALI** (secondo lo standard IEC 61439-1)**:**
*ROUTINE TESTS (according to standard IEC 61439-1):*

■ **= TESTED**

☐ **11.1 GENERALITA'**
**GENERALITY**

☐ CONTROLLO VISIVO E DIMENSIONALE
*VISUAL AND DIMENSIONAL CONTROL* *Point 3.1 FAT proc.*

☐ CONTROLLO OSSERVANZA ALLE SPECIFICHE ED ORDINE
*CHECK OF COMPLIANCE TO SPECS AND ORDER* *Point 3.1 FAT proc*

☐ CONTROLLO CARPENTERIA, SBARRE,CONNESSIONI PRIMARIE
*STRUCTURAL WORKS, BUS-BAR CONTROL*

☐ CONTROLLO VERNICIATURA (**RAL 7035 ≥ 60** µm )
*PAINTING CONTROL* *Point 3.1 FAT proc*

☐ **11.2 GRADO DI PROTEZIONE DEGLI INVOLUCRI**
***PROTECTION DEGREE*** *Point 3.3 FAT proc.*

☐ **11.3 DISTANZE DI ISOLAMENTO IN ARIA E SUPERFICIALI**
***CLEARENCE AND CREPAGE DISTANCES*** *Point 3.1 FAT proc.*

☐ **11.4 PROTEZIONE CONTRO LA SCOSSA ELETTRICA ED INTEGRITA' DEI CIRCUITI DI PROTEZIONE**
***PROTECTION AGAINST ELECTRIC SHOCK AND INTEGRITY OF PROTECTIVE CIRCUITS*** *Point 3.4 FAT proc.*

☐ **11.5 INSTALLAZIONE DEI COMPONENTI**
***INCORPORATION OF BUILT-IN COMPONENTS*** *Point 3.4 FAT proc.*

☐ VERIFICA FONDO SCALA STRUMENTI
*CHECK FULL SCALE OF INSTRUMENTS* *Point 3.4 FAT proc.*

☐ CONTROLLO DATI NOMINALI APPARECCHIATURE
*EQUIPMENT RATED DATA CONTROL* *Point 3.4 FAT proc.*

☐ VERIFICA DEL SERRAGGIO E MARCATURA BULLONERIA
CHECKING THE TIGHTENING AND MARKING OF BOLTS
*Point 3.4 FAT proc.*

☐ **MISURA RESISTENZA D'ISOLAMENTO**
**MEASURE OF INSULATION RESISTANCE** *Point 4.3-4.4 FAT proc.*

CIRCUITI DI POTENZA **L1= MΩ; L2= MΩ**
POWER CIRCUIT **L3= MΩ; N = MΩ**
CIRCUITI AUSILIARI xxx Vdc= **MΩ**
AUXILIARY CIRCUITS xxx Vac = **MΩ**

☐ **11.6 CIRCUITI ELETTRICI INTERNI E COLLEGAMENTI**
***INTERNAL ELECTRICAL CIRCUITS AND CONNECTIONS***
*Point 3.4 FAT proc.*

☐ **11.7 CONTROLLO DEI TERMINALI PER I CONDUTTORI ESTERNI**
***CHECK OF TERMINALS FOR EXTERNAL CONDUCTORS***
*Point 3.4 FAT proc.*

☐ **11.8 CONTROLLO FUNZIONAMENTO MECCANICO**
***MECHANICAL OPERATION TEST*** *Point 3.2 FAT proc.*

☐ **11.9 PROVE DI TENSIONE : f = 50 Hz e t = 1 sec.**
***VOLTAGE TEST : f = 50 Hz and t = 1 sec.*** **(*60 sec)**

CIRCUITI DI POTENZA ..... kV
*MAIN CIRCUITS* *Point 4.3 FAT proc.*
***Leakage curr. L1= mA L2= mA L3= mA* N= mA**
CIRCUITI AUSILIARI ..... kV
*AUXILIARY CIRCUITS* *Point 4.4 FAT proc.*
***Leakage curr. XXXVdc= mA; XXXVac= mA***

☐ **11.10 CONTROLLO CABLAGGIO**
***WIRING CHECK*** *Point 3.4 FAT proc.*

☐ **CONTROLLO DATI DI TARGA**
*PLATE CHECK* *Point 3.4 FAT proc.*

☐ **PROVE DI FUNZIONAMENTO ELETTRICO E SEQUENZE**
*ELECTRICAL OPERATION AND SEQUENCE TESTS*
*Point 4.1 FAT proc.*

☐ ***FUNZIONAMENTO CORRETTO DELLE LOGICHE* DI CONTROLLO**
*RIGHT WORKING OF THE LOGICAL CONTROLS*
**VERIFICA DI FUNZIONAMENTO: CIRCUITI AUSILIARI E DI COMANDO, VERIFICA RAPPORTI TRASFORMAZIONE TV-TA**
CHECKING OF OPERATIONS: AUXILIARY AND CONTROL CIRCUIT, CHECK OF VT's-CT's TRANSFORMATION RATIO
*Point 4.1 FAT proc.*

☐ PROVE SUI DISPOSITIVI AUSILIARI
TEST OF AUXILIARY DEVICE *Point 4.2 FAT proc.*

☐ **CONTROLLO DI CONTINUITA' DEL CIRCUITO DI TERRA**
*CHECKING OF ELECTRICAL CONTINUITY EARTH CIRCUIT*
Max value: **≤0,1Ω (measured: … Ω)** *Point 4.5 FAT proc.*

# RAPPORTO DI PROVA
# TEST REPORT

| N° Certificato/ Certificate N°: | | Data / Date: | |
|---|---|---|---|

**The Equipment is :**

**Compliant** ☐ **/ Non Compliant** ☐

**Referring to the FAT Procedure and relevant documents**

| ***Apparecchiature utilizzate/ Equipment used:*** | ***Scadenza Taratura /Expiration date*** |
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Note/ *Notes:*

FIRMA/ *SIGNATURE*

IMESA SPA ROSETTI MARINO SPA RINA

| Type of switchboard: | LV SWGR / MCC/32 | Comm. : | 231298/SD | ELE Resp. : | SD | Node: | |
|---|---|---|---|---|---|---|---|
| Client: | ROSETTI MARINO | | | Annex B | | | |

| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
|---|---|---|---|---|---|---|
| OPERATING TESTS | | | UNIT: "M1-n Typical" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | LOCAL OPENING/CLOSING CONTACTOR IN INSERTED DRAWER POSITION | KM1 | | | | |
| 5 | LOCAL OPENING/CLOSING CONTACTOR IN TESTED DRAWER POSITION | KM1 | | | | |
| 6 | REMOTE OPENING/CLOSING CONTACTOR | KM1 | | | | |
| 7 | TEST FOR SIGNALLING LAMPS / LED | HL1 | | | | |
| 8 | MCB AUX. CONTACTS TEST | / | | | | |
| 9 | TRIPPING "UMC100" | MMU2 | | | | |
| 10 | TEST OF SAFETY RELAY | KSIL | | | | |
| 11 | MECHANICAL TEST FOR INSERTION / DISCONNECTION DRAWER | / | | | | |
| 12 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 13 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | MMU4 | | | | |
| 14 | | | | | | |
| 15 | | | | | | |
| 16 | | | | | | |
| 17 | | | | | | |
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| Type of switchboard: | LV SWGR / MCC/32 | Comm. : | 231298/SD | ELE Resp. : | SD | Node: | |
|---|---|---|---|---|---|---|---|
| Client: | ROSETTI MARINO | | | Annex B | | | |

| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
|---|---|---|---|---|---|---|
| OPERATING TESTS) | | | UNIT: "L1-n & L2-n Typical" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | OPENING CIRCUIT-BREAKER BY OPEN COIL | YO | | | | |
| 5 | TEST FOR SIGNALLING LAMPS / LED | HL1 | | | | |
| 6 | MCB AUX. CONTACTS TEST | / | | | | |
| 7 | MECHANICAL TEST FOR INSERTION / DISCONNECTION DRAWER | / | | | | |
| 8 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 9 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | U2.A | | | | |
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| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
|---|---|---|---|---|---|---|
| OPERATING TESTS) | | | UNIT: "LK1-n & LK2-n Typical" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | LOCAL OPENING/CLOSING CONTACTOR IN INSERTED DRAWER POSITION | KM1 | | | | |
| 5 | LOCAL OPENING/CLOSING CONTACTOR IN TESTED DRAWER POSITION | KM1 | | | | |
| 6 | REMOTE OPENING/CLOSING CONTACTOR | KM1 | | | | |
| 7 | TEST FOR SIGNALLING LAMPS / LED | HL1 | | | | |
| 8 | MCB AUX. CONTACTS TEST | / | | | | |
| 9 | MECHANICAL TEST FOR INSERTION / DISCONNECTION DRAWER | / | | | | |
| 10 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 11 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | U2.A | | | | |
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| Type of switchboard: | LV SWGR / MCC/32 | Comm. : | 231298/SD | ELE Resp. : | SD | Node: | |
|---|---|---|---|---|---|---|---|
| Client: | ROSETTI MARINO | | | Annex B | | | |

| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
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| OPERATING TESTS) | | | UNIT: "LE2-320 Typical" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | OPENING CIRCUIT-BREAKER BY UNDERVOLTAGE COIL | YU | | | | |
| 5 | TEST FOR SIGNALLING LAMPS / LED | HL1 | | | | |
| 6 | MCB AUX. CONTACTS TEST | / | | | | |
| 7 | MECHANICAL TEST FOR INSERTION / DISCONNECTION DRAWER | / | | | | |
| 8 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 9 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | U2.A | | | | |
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| Type of switchboard: | LV SWGR / MCC/32 | Comm. : | 231298/SD | ELE Resp. : | SD | Node: | |
|---|---|---|---|---|---|---|---|
| Client: | ROSETTI MARINO | | | Annex B | | | |

| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
|---|---|---|---|---|---|---|
| OPERATING TESTS) | | | UNIT: "L3-630 Typical" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | REMOTE OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | REMOTE CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 5 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 6 | TEST FOR SIGNALLING LAMPS / LED | HL1÷3 | | | | |
| 7 | MCB AUX. CONTACTS TEST | / | | | | |
| 8 | MECHANICAL TEST FOR INSERTION / DISCONNECTION C.B. | QF1 | | | | |
| 9 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 10 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | U1.A/QF1 | | | | |
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| Type of switchboard: | LV SWGR / MCC/32 | Comm. : | 231298/SD | ELE Resp. : | SD | Node: | |
|---|---|---|---|---|---|---|---|
| Client: | ROSETTI MARINO | | | Annex B | | | |

| Ref. | ACTIVITY (DEPT.) | | YES | NO | N/A | REMARK |
|---|---|---|---|---|---|---|
| OPERATING TESTS) | | | UNIT: "INCOMING" | | | |
| | FUNCTION | DEVICE | *Tested Unit:* | | | |
| 1 | LOCAL OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 2 | LOCAL CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 3 | REMOTE OPENING CIRCUIT-BREAKER | QF1 | | | | |
| 4 | REMOTE CLOSING CIRCUIT-BREAKER | QF1 | | | | |
| 5 | TRIPPING CIRCUIT-BREAKER | QF1 | | | | |
| 6 | LOCK-OUT TEST RELAY | K86 | | | | |
| 7 | MCB AUX. CONTACTS TEST | / | | | | |
| 8 | MECHANICAL TEST FOR INSERTION / DISCONNECTION C.B. | QF1 | | | | |
| 9 | AVAILABLE SIGNALS AND CONTACTS AT THE TERMINAL BOARD | X1 | | | | |
| 10 | READING/WRITING SIGNALS IN ACCORDING TO I//O LIST | A1/FP1 | | | | |
| 11 | AUXILIARY VOLTAGE SWITCHING | QU1 | | | | |
| 12 | ARC SURVEY TRIPPING | FP1 | | | | |
| 13 | INTERNAL SPACE HEATER / LIGHTING DISTRIBUTION | BUS-4 | | | | |
| 14 | COMMAND CIRCUITS TO FEEDERS DISTRIBUTION | BUS-1 | | | | |
| 15 | 24VDC VOLTAGE DISTRIBUTION | BUS-2 | | | | |
| 16 | INTERTRIPPING WITH HV SWBD UPSTREAM | FP1 | | | | |
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