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Power switchgear and controlgear assembly (PSC) for MV Switching Substation


This global standard defines the characteristics of the power switchgear and controlgear assembly (PSC), by according to IEC 61439 series, for auxiliary DC and AC power source in the MV Switching Substation (e. g. EasySAT)

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Revision	Data	List of modifications
00	03.10.2018	First draft
01	16.11.2018	First approved draft
02	06.05.2020	Second approved edition

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1 ACRONYMS


- a. **AC** Alternating Current
- b. **DC** Direct Current
- c. **EMC** Electromagnetic Compatibility
- d. **Inac** Nominal current (AC circuit)
- e. **Indc** Nominal current (DC circuit)
- f. **PSC** Power switchgear and controlgear assembly
- g. **PSS** Power Supply Station
- h. **Vi** Insulation Voltage
- i. **Vimp** Impulse Voltage
- j. **Vnac** Nominal Voltage (Alternating Current)
- k. **Vndc** Nominal Voltage (Direct Current)
- l. **GS** Enel Global standard

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2 LIST OF COMPONENTS, PRODUCT FAMILY OR SOLUTIONS TO WHICH THE GS APPLIES

The Power switchgear and controlgear assembly (PSC) described in this GS can be classified in the product family provided in Table 1.

Table 1 – GSTZ10X product family and description		
GSTZ10X type	Product family code	Description
GSTZ101	GSTZ10X	Power Supply Station (PSS) for auxiliary DC power source in the MV Switching Substation (e. g. EasySAT).
GSTZ102	GSTZ10X	Power switchgear and controlgear assembly (PSC) for auxiliary DC and AC power source in the MV Switching Substation (e. g. EasySAT).


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3 NORMATIVE REFERENCES AND BIBLIOGRAPHY


All the references are intended in the last revision or amendment.

3.1 For all countries

IEC 60068-2-1	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-11	Basic environmental testing procedures - Part 2-11: Tests - Test Ka: Salt mist
IEC 60068-2-14	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-2	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
IEC 60068-2-30	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IEC 60068-2-78	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state
IEC 60068-3-1	Environmental testing - Part 3-1: Supporting documentation and guidance - Cold and dry heat tests
IEC 60068-3-4	Environmental testing - Part 3-4: Supporting documentation and guidance - Damp heat tests
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
IEC 60255-26	Measuring relays and protection equipment - Part 26: Electromagnetic compatibility requirements
IEC 60255-27	Measuring relays and protection equipment - Part 27: Product safety requirements
IEC 60255-5	Electrical Relays - Part 5: Insulation coordination for measuring relays and protection equipment - Requirements and tests
IEC 60309-1	Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements
IEC 60309-2	Plugs, socket-outlets and couplers for industrial purposes - Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories
IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60695-2-10	Fire hazard testing - Part 2-10: Glowing/hot-wire based test methods - Glow-wire apparatus and common test procedure
IEC 60695-2-11	Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)
IEC 60865	Short-circuit currents - Calculation of effects - Part 1: Definitions and calculation methods
IEC 60947-1	Low-voltage switchgear and controlgear - Part 1: General rules
IEC 60947-2	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
IEC 60947-3	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
IEC 60947-4-1	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters
IEC 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements

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IEC 61140	Protection against electric shock – Common aspects for installation and equipment
IEC 61204-6	Low-voltage power supplies, DC output - Part 6: Requirements for low-voltage power supplies of assessed performance
IEC 61204-7	Low-voltage switch mode power supplies - Part 7: Safety requirements
IEC 61439-1	Low-voltage switchgear and controlgear assemblies - Part 1: General rules
IEC 61439-2	Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies
IEC 61439-3	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)
IEC 61810-1	Electromechanical elementary relays - Part 1: General and safety requirements
IEC 61810-2	Electromechanical elementary relays - Part 2: Reliability
IEC 61810-7	Electromechanical elementary relays - Part 7: Test and measurement procedures
IEC 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
IEC 61000-4-4	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
IEC 61000-4-5	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
IEC 61000-4-6	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
IEC 61000-4-8	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
IEC 61000-4-10	Electromagnetic compatibility (EMC) - Part 4-10: Testing and measurement techniques - Damped oscillatory magnetic field immunity test
IEC 61000-4-11	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
IEC 61000-4-12	Electromagnetic Compatibility (EMC) - Part 4-12: Testing and measurement techniques - Ring wave immunity test
IEC 61000-4-16	Electromagnetic compatibility (EMC) - Part 4-16: Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz
IEC 61000-4-29	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on DC input power port immunity tests
IEC 61000-6-5	Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment
IEC 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 62271-207	High-voltage switchgear and controlgear - Part 207: Seismic qualification for gas-insulated switchgear assemblies for rated voltages above 52 kV
IEC TS 60815-1	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles
GSTZ101	Power Supply Station (PSS) for MV Switching Substation
GSTZ101_A1	Electrical Diagrams for the Power Supply Station (PSS) for MV Switching Substation
GSTZ102_A1	Electrical Diagrams for the Power switchgear and controlgear assembly (PSC) for MV Switching Substation

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3.2 For EU countries

EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EU directive 2006/95/CEE	Low Voltage directive
EU directive 93/68/CEE	CE marking directive

3.3 For Colombia


NSR-10	Reglamento colombiano de construcción sismo resistente
RETIE	Reglamento técnico de instalaciones eléctricas

3.4 For Brazil

NR-10	Segurança em instalações e serviços em eletricidade
NBR-5410	Instalações Elétricas de Baixa Tensão


3.5 For Chile

ETGI-1020	Especificaciones técnicas generales - Requisitos de diseño sísmico para equipo eléctrico
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4 REPLACED STANDARDS


DV7077	Quadro Servizi Ausiliari per Cabina Satellite Semplificata (EasySat)
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5 APPLICATION FIELDS

This document standardizes the functional, construction and testing requirements of the Power switchgear and controlgear assembly (PSC) for auxiliary DC and AC power source in the MV Switching Substation (e. g. EasySAT).

The PSC work in conjunction with the Power Supply Station (PSS) defined in the GSTZ101. For the electrical diagrams, refer to GSTZ101_A1 and GSTZ102_A1.

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6 MAIN REQUIREMENTS

The IEC 61439-1 gives all rules and requirements of a general nature applicable to low-voltage switchgear and controlgear assemblies in order to obtain uniformity of requirements and verification.

The IEC 61439-2 defines the specific requirements of power switchgear and controlgear assemblies for use in connection with the generation, transmission, distribution and conversion of electric energy, and for the control of electric energy consuming equipment.

This document and the attached electrical diagram do not constitute an original project as defined by IEC 61439-1 but only a description of the functions and components that must be provided in the PSC.

With reference to the standard, the role of “Original manufacturer” and “Assembly manufacturer” remains the responsibility of the supplier that assumes responsibility for the finished controlgear assembly.

- a. Original manufacturer: is the organization that has carried out the original design and the associated verification of an assembly in accordance with the relevant assembly standard.
- b. Assembly manufacturer: is the organization taking the responsibility for the completed assembly. The assembly manufacturer may be a different organization to the original manufacturer.

The switchboard system or cubicle manufacturer bears also the responsibility for routine verification

Enel, as defined in the IEC 61439-1 standard, assumes the role of “user”:

- a. User: is the party who will specify, purchase, use and/or operate the assembly, or someone acting on their behalf.

6.1 General characteristics

The PSC must feed the components of the MV switching substation with the following voltage levels:

- a. DC: V_{ndc} 24Vdc
- b. AC: V_{nac} (according by V_n indicated in the Table 4).

The PSC configuration is in a rack containing:

- a. Circuit breakers for AC distribution
- b. Circuit breakers for 24VDC distribution
- c. Terminal board for cable connection
- d. Relays an auxiliary equipment

Figure 1 shows the illustrative diagram:

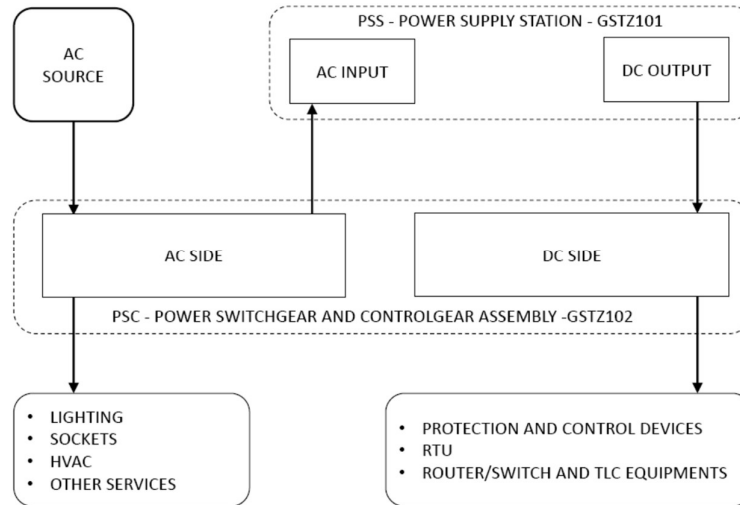


Figure 1 - Illustrative Diagram

6.2 Operating conditions

Exact conditions depend from installation site, during the procurement process (Par.8.2) the information about the operating conditions will be shared.

Table 2 – PSC reference environmental conditions		
PV-IES type	Operating range	On storage and transport range
Temperature	-25 °C ÷ 70 °C	-40 °C ÷ 80 °C
Humidity	0 % ÷ 95% RH, non condensing	
Atmospheric pressure	860 hPa ÷ 1060 hPa	
Altitude	0 m ÷ 2700 m	
Pollution degree (IEC TS 60815-1)	Very Heavy	
Seismic qualification (IEC 62271-207)	AF5 response spectrum	

The operating ranges are applicable at the PSC perimeter, the on storage and transport ranges must be applied at each PSC component.


The design and the characterization of the seismic protection of the PSC must be done using the AF5 response spectrum provided by the IEC 62271-207 usually adopted to qualify the high-voltage switchgear and control gear in seismic prone areas; the PSC must stay fully operative and maintaining the previous operating mode in continuity before, during and after the earthquake.

6.3 Environmental requirements

6.3.1 Rack

All the equipment that composed the PSC must be mounted on a rack 19" with the follow dimensions and characteristic:

- Height: Industry standard rack cabinet 42U tall; internal rack unit $\geq 42U$
- Width: 600 mm
- Depth: 600 mm

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- d. The PSC must guarantee IP3X while maintaining natural ventilation. Cooling grids on the sides are not allowed because the PSC must be mounted next to other protection cabinets. The PSC must have a rubber profile around the perimeter of the side panels, the ceiling and the cabinet door to prevent the entry of dust
- e. IK code resistance to shocks: K08

The rack must be entirely of sheet steel press-folded 20/10 mm thick. The external coating must be made to obtain excellent resistance to wear according to the following cycle:

- a. sheet washing;
- b. phosphating based on non-crystalline iron salts (amorphous);
- c. drying in tunnel at 100 ° C;
- d. internal and external painting with electrostatic application of enamel in thermosetting powder with epoxy-polyester binders, RAL 7032 color, total thickness 70 µm.
- e. Polymerization in oven at 180 ° C.

The access at the element of PSC must be both on the front and on the rear side of the rack 19".

The rack must be supplied complete with a front door and a rear door; the doors must have a maximum opening of 130° (in any case above 90°) and must be equipped with a keyless handle.

A document holder for the manufacturer's wiring diagram and user manual must be mounted on the rear door.

The rack, without sheet metal on the bottom, must have on the base n° 4 holes $\varnothing 12$ for fixing to the floor and n° 4 removable eyebolts on the upper frame. The sides of the cabinets must not have protrusions.

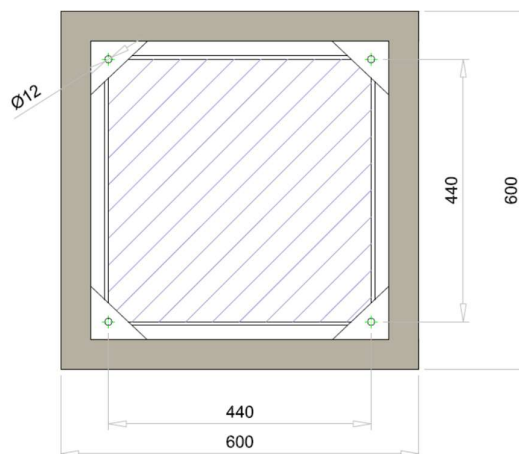


Figure 2 - Holes on the base

The protection against direct contacts of live dangerous internal parts during maintenance or updating must be performed; where not possible the furnisher must provide for the isolation of all the active parts.

The input of the electric connection cables is in the lower part, therefore it is necessary to provide cable ducts, terminal blocks guides for fixing cables and terminal holder rails (DIN type); it is also necessary to provide a grounding bar for the cable shields. Due to the connection of cables through the floor, the PSS must have a seals system that prevents access to the rats.

With reference to the layout of rack, Enel must previously approve any solution.

An example of the layout is shown in the following figure:

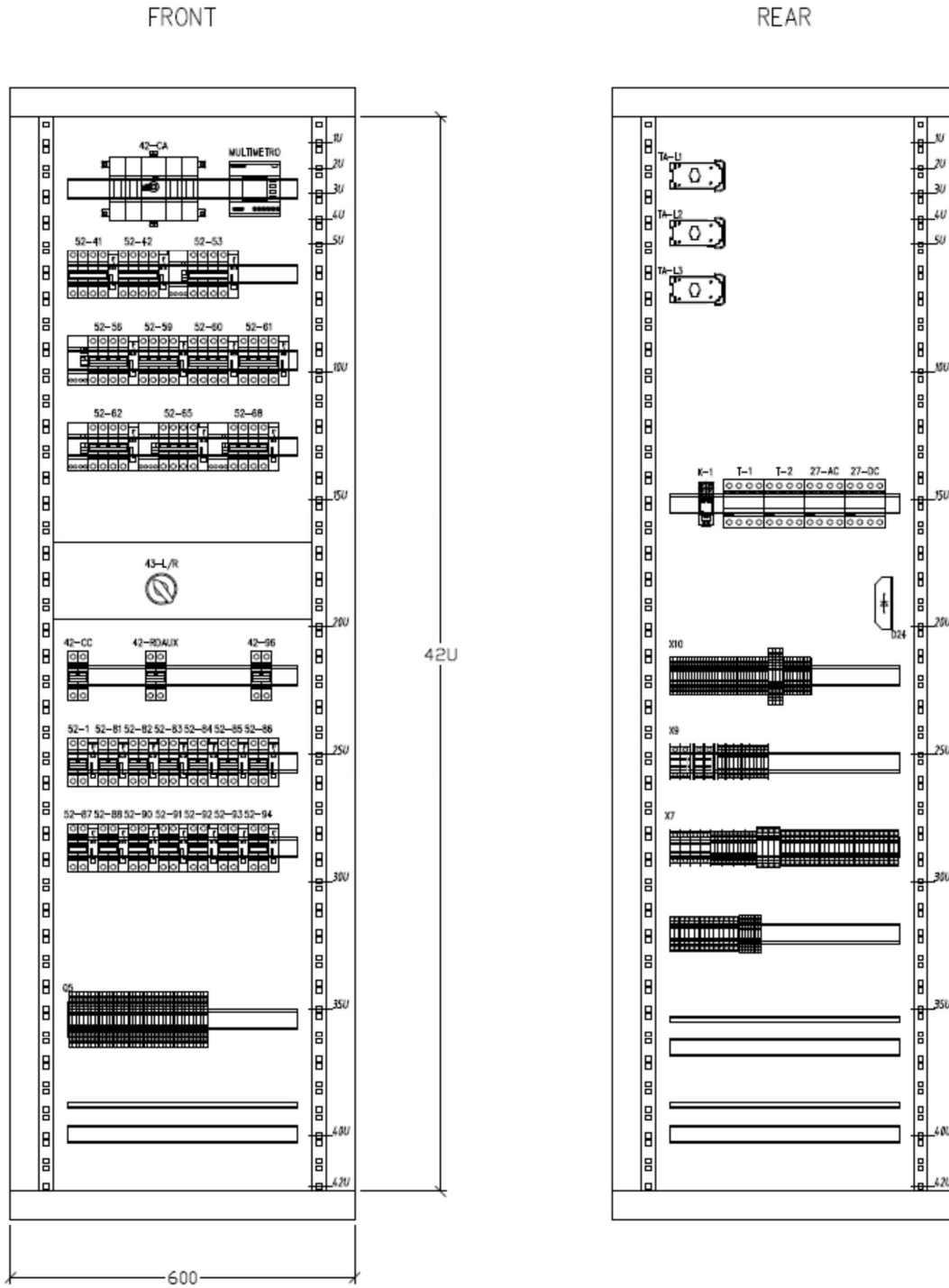



Figure 3 – PSC example layout

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6.4 Electrical characteristics

6.4.1 Electrical connections

The electrical connections must have the following characteristics:

Type of circuit	Phase	Color	Section
AC power circuits	L1		$\geq 6 \text{ mm}^2$
	L2		$\geq 6 \text{ mm}^2$
	L3		$\geq 6 \text{ mm}^2$
	N		$\geq 6 \text{ mm}^2$
DC power circuits	+		$\geq 6 \text{ mm}^2$
	-		$\geq 6 \text{ mm}^2$
Auxiliary connections			$\geq 1,5 \text{ mm}^2$
Ground connections			$\geq 4 \text{ mm}^2$

The colors of the cables (phase, neutral, DC +, DC-, auxiliary and ground connections) will be shared during the procurement process. (Par. 8.2).

The PSC must be able to power a three-phase network with the following characteristics

V_{nac}	380/220Vac \pm 20% - 50 Hz 400/230Vac \pm 10% - 50 Hz 380/220Vac \pm 20% - 60 Hz 220/127Vac \pm 20% - 60 Hz 208/120Vac \pm 20% - 60 Hz
V_i	690V – 50/60Hz
V_{imp}	6kV
I_{nac}	125A
I_{ndc}	50A
short-circuit current (AC)	15kA
short-circuit current (DC)	10kA

AC value depends from installation site: during the procurement process, the information about the operating conditions will be shared. (Par. 8.2).

All connections must be housed in plastic conduits, separating the power circuits from the auxiliary circuits and the AC-DC circuits.

6.4.2 Electromechanical components

With reference to the electromechanical components, Enel must previously approve all the components proposed by the manufacturer.


All the LV components are shown in the electrical diagram (Par.8.4.3)

6.4.3 LV circuit breakers and switches

LV Circuit breakers are signed with 52-XX and LV switches are signed 42-XX

Automatic modular thermal-magnetic circuit breakers and modular switches must be used on the distribution bars. Where required, type AC differential circuit breakers with sensitivity of 30 or 300 mA must be installed.

Each circuit breaker must have the respective auxiliary contact to signal the status of open or closed.

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The electrical characteristics of LV switches and LV circuit breakers are indicated in the attached wiring diagram.

However, the design and verification of the PSC remains the responsibility of the manufacturer as indicated in chapter 6.

6.4.4 Relays, contactors and commutator

Under voltage relays are signed 27-AC for alternating current and 27-DC for 24VDC.

Contactors are signed T-X and relays are signed K-X

The under voltage relays must be mounted to pick up the respective bus voltages. In case of intervention, a contact must signal the intervention of the relay; range and delay time will be approved by Enel on a proposal from the manufacturer.

Auxiliary Power of relays and contactors depends from installation site: during the procurement process, the information about the operating conditions will be shared. (Par. 8.2).

6.4.5 Control & Selector Switch

There must be a 10-way selector (signed 43-L/R), 2 positions, DC14, In 6A, with IP20 degree of protection for the inclusion-exclusion of Local commands or Distance of the various power supply.

6.4.6 Auxiliary Connections

The auxiliary circuits for the connection between the equipment and the terminal blocks will be made with single-core cables, with a minimum cross-section of 1 mm², rated voltage U_o / U_c = 450 / 750V, non-fire-retardant type H07V2-K.

Each conductor will be identifiable at the two ends with a suitable cross-reference marking showing the numbering indicated on the diagrams (Par.8.4.3).

6.4.7 Ground connections

The PSC must be equipped by a copper ground electric bar bolted to the metal structure with a minimum cross-section of 100 mm², and in any case according to the sections foreseen by the standard for the short circuit.

The copper bar must be electrically connected to the metal structure in at least five points and must be equipped with at least a 13 mm hole in the lower end for connection to the earth network; moreover, on the bar there must be 8 mm holes with a constant pitch of 20 mm.

All the structure and the metallic elements must be connected to each other by means of screws, to guarantee a good electrical contact between the parts.

The doors must be connected to the metal structure by means of flexible copper traces, minimum section of 16mm².


All the main components not provided with double or reinforced insulation must be connected to the ground.

6.4.8 Terminal boards

The terminal boards must be mounted on a DIN rail, in an accessible position and must be easily identified.

The position of the terminal boards is mandatory and it is possible to use clamps screw-type, spring-type or push in-type, according to the indications of each Country (during the procurement process, the information about the terminal boards will be shared. (Par. 8.2).

For more information on the composition of the terminal blocks and their position refer to the GSTZ102_A1 electrical diagrams.

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6.4.9 Measurement

In the AC section there must be a digital multimeter with a backlit graphic LCD display (at least 128x80 pixel) in modular execution for mounting on a DIN rail with CT measurement 100/5A – 10VA

Table 5 – Multimeter characteristics	
Measurement	Note
Frequency	
Voltage L1-N, L2-N, L3-N	True RMS
Voltage L1-L2, L2-L3, L1-L3	True RMS
Current	True RMS
Power	P, Q, S
Active, reactive and apparent energy of each single phase and of the three-phase system	
Harmonic voltage and current distortion THD for each single phase	
Voltage and current harmonics	up to 31 ^a

6.4.10 Accessories

Thermostat, humidistat and twilight relay are included in the PSC and supplied as accessories, but they must not be mounted.

6.4.11 Bars


The main connections inside the PSC must be made in cable or with bars. The bars must be made of electrolytic copper, sized according to the nominal current values and be stiffened by suitable supports made of insulating material.

The neutral bar must be sized with a flow not less than 50% of the phase flow.

Moreover, the bars and their supports will have such dimensions as to withstand the electrodynamic stresses caused by the short-circuit currents.

All other power connections will be in single-core cable with rated voltage $U_0 / U_c = 450/750$ V fire-retardant type H07V2-K or similar. Type of the cables must comply with what is indicated by local regulations and by the requirements of each Country.

Each conductor will be identifiable at the two ends with a suitable cross-reference marking showing the numbering indicated on the diagrams (Par.8.4.3).

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7 TESTING AND CERTIFICATIONS

All the requirements from this chapter must be respected. ENEL has the right to ask a prototype for any kind of verification testing. These tests must be performed in the provider factory or third party laboratories (by according to ENEL or relevant standards provision), with no cost participation by ENEL.

The PSC will be subjected to an ENEL Technical Conformity Assessment (TCA) process, by according to GSCG002 that is intended to verify if the supplied device meets regulatory standards and specifications.

7.1 Overview Technical Conformity Assessment (TCA) Process

The information of this paragraph are only indicative and may change by according with ENEL TCA management; final TCA organization will be discussed during the TCA kick off meeting.

7.1.1 TCA documents

The ENEL technical organization unit in charge of the Technical Conformity Assessment of the PSC will supervise the technical documentation and the execution of the tests required to receive the “Statement of Conformity”, according to GSCG002 prescriptions.

All the technical documentation required during that process shall be in English or in the local language of ENEL technical organization unit in charge of the TCA.

The TCA documents that shall be delivered include:

- a. Type A documentation (Not confidential documents used for product manufacturing and management from which it is possible to verify the product conformity to all technical specification requirements, directly or indirectly).
- b. Type B documentation (Confidential documents used for product manufacturing and management where all product project details are described, in order to uniquely identify the product object of the TCA). This type of documentation must be delivered only to the ENEL technical organization unit in charge of the TCA
- c. TCA dossier (Set of final documents delivered by the Supplier for the TCA)
- d. The supplier shall provide the TCA Dossier on digital support.

7.1.2 Quality

During the TCA, the supplier shall provide the technical documentation listed in ENEL Quality Specification for Electronic Assemblies.

7.1.3 Safety warnings on Plate


The safety warnings required in the plate of the PSC and its components must be written in the local language of the destination Countries.

7.1.4 Tests required to complete the TCA

The manufacturer must have a valid and product specific homologation before he may supply PSCs to ENEL. In compliance with this technical specification, the manufacturer must satisfactorily pass, within a maximum period of 6 months after contract award, all the tests described in the following sections.

Once these tests have been successfully completed, an approved manufacturer’s PSC will be subject to ad-hoc reception tests.

In addition, ENEL reserves the right to request the repetition of the type tests at any time to ensure that the PSC continue to meet the standards achieved by the initial testing and certification programs at the time the contact was awarded.

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Type tests will be carried out in Official Laboratories or Laboratories recognized by ENEL, or in the workshops of the manufacturer. ENEL reserves the right to attend any or all of these tests and must be kept informed of the manufacturer's testing programs, schedules and result.

The manufacturer will bear the cost for type tests and for pilot installation tests.

7.1.5 Type test list

The tests below refer to IEC 61439-1 and IEC 61439-2 standards.


- a. Visual examination and control of geometric characteristics,
- b. Strength of materials and parts:
 - b.1. Resistance to corrosion,
 - b.2. Properties of insulating materials,
 - b.3. Thermal stability,
 - b.4. Resistance of insulating materials to abnormal heat and fire due to internal electrical effects,
 - b.5. Resistance to ultra-violet (UV) radiation,
 - b.6. Lifting,
 - b.7. Mechanical impact,
 - b.8. Marking,
- c. Degree of protection provided by enclosures,
- d. Clearance and creepage distance,
- e. Protection against electric shock and integrity of protective circuits:
 - e.1. Effective continuity between the exposed conductive parts of the assembly and the protective circuit,
 - e.2. Short-circuit withstand strength of the protective circuit,
- f. Incorporation of connection devices and components,
- g. Internal electrical circuits and connections,
- h. Terminals for external conductors,
- i. Dielectric properties:
 - i.1. Power frequency withstand voltage,
 - i.2. Impulse withstand voltage,
- j. Temperature rise limits,
- k. Short-circuit withstand strength,
- l. Electromagnetic compatibility (EMC) according to IEC 61000-6-4 and IEC 61000-6-5,
- m. Mechanical operation,

The supplier must retain all the documentation proving the successful results of the type tests and all data must be made available to ENEL in real time.

At ENEL's discretion, these tests may be completely or partially repeated during the lifetime of the contract as continuing evidence of type conformity.

7.1.6 Acceptance tests

The acceptance tests are those indicated in Par.7.1.5 points a, e.1, f, i.1, g, and m.

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7.1.7 Visual inspections


It is mandatory to verify the absence of visible manufacturing defects, the highest build-quality and precision of manufacture, the compliance of the rack/box dimensions with those indicated in the present specification.

7.1.8 Certifications and self-certifications

About the compliance of all the requirements/standards recalled in this GS, a certificate or self-certificate must be provided.

Regional laws or standards may requires additional certifications or self-certifications.

Certifications and self-certifications must be made according to the relevant standards or laws (including the template format).

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8 MISCELLANEOUS

This chapter include further requirements, recommendations and additional information.

8.1 Required documentation

The following documents (in pdf format) must be provided:

- a. PSC data sheet;
- b. Installation, operation and maintenance manuals, with instructions on the installation and interfacing procedures;
- c. Maintenance procedures;
- d. Quick installation and set-up guide;
- e. Parts list;
- f. Recommended Tool List;
- g. One-wire diagrams (also in DWG/DXF formats);
- h. Electrical diagrams (also in DWG/DXF formats);
- i. Mechanical diagrams (also in DWG/DXF formats);

These documents must be made according to IEC 61010-1 and they must be approved by ENEL.

8.2 Clarification during procurement process

By summarizing, during the procurement process the following clarification will be provided to the supplier:

- a. Auxiliary Power Supply (Table 4);
- b. Clarification about operating conditions (Table 2);
- c. Colors of the cables (Table 3);
- d. Terminal boards type (Par.6.4.8)
- e. Language for documentations;
- f. Details about unique serial identifier, serial code and other labeling.


8.3 Procurement management

The information of this paragraph are only indicative and may change by according with ENEL procurement management; final procurement approach will be issued by entrusted ENEL units.

Within 30 days of receiving the present specification, the manufacturer must send the following documentation, in English, along with the technical proposal:

- a. Layout and weight of the PSC,
- b. Detailed diagrams of the PSC,
- c. Lists of references,
- d. Exceptions to this specification,
- e. Instructions for the installation and commissioning of the PSC,
- f. Instructions for checking and maintenance.

If the manufacturer fails to provide any or all of the above information within 30 days of receipt of this specification, he will be disqualified as supplier, for ENEL, of the product standardized in this Technical Specification.

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8.4 Receipt of material

The information of this paragraph are only indicative and may change by according with ENEL product management; final procurement approach will be issued by entrusted ENEL units.

8.4.1 Reception tests

Part of the process of accepting delivery of a manufacturer's devices will include the proof of having successfully passed previously performed acceptance tests (Par. 7.1.6).

Then, the reception tests will be carried out in Official Laboratories or Laboratories accredited by ENEL, or in the workshops of the manufacturer. ENEL reserves the right to attend any or all of these tests and must be kept informed of the manufacturer's testing programs, schedules and results. If the assistance of an ENEL representative is not available, the provisional reception procedure will be conducted when tests protocols are received.

In the event the documentation has undergone modifications with reference to the actual devices delivered, the manufacturer must provide the updated documentation before the reception procedure will be deemed to have been completed.

8.4.2 Warranty

The manufacturer will commit to providing a guarantee of the PSC for a minimum period of 24 months, which will commence immediately following a successful reception.

The guarantee will be legally binding for any device/component faults and/or defects that occur within the guarantee period: accordingly, the PSC and/or components will be replaced. Further, the manufacturer will undertake to continue, free of charge, the software and firmware development and provide the updates to ENEL for the lifetime of the devices.

If during the contract term, the manufacturer fails to address in a prompt and timely manner any functional anomalies or defects in the device behavior or manufacture (hardware or firmware).

ENEL reserves the right to block the necessary positions on the contract, staged payments and/or alter the payment schedules as necessary until the anomalies have been resolved to the complete satisfaction of ENEL.

8.4.3 Electrical Diagrams

For the electrical diagrams, please refer to GSTZ102_A1 Electrical Diagrams for the Power switchgear and controlgear assembly (PSC) for MV Switching Substation.