

**Subject:** GSCP005 – LV LINE VOLTAGE REGULATOR (LVR)

Application Areas
 Perimeter: Global
 Staff Function: -
 Service Function: -
 Business Line: Enel Grids

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THE HEAD OF GLOBAL NETWORK COMPONENTS

Fabrizio GASBARRI



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1 DOCUMENT OBJECTIVES AND AREA OF APPLICATION

This document defines the functional characteristics and installation requirements of three-phase Low Voltage Regulation systems (hereinafter referred to as LVR), installed on the low-voltage distribution networks of the following Enel Grids companies:

- Enel Distribuição Rio - Brazil
- Enel Distribuição São Paulo - Brazil
- Enel Distribución - Chile
- Enel Distribución - Colombia
- e-distribuzione - Italy
- e-distribución – Spain

This document shall be implemented and applied to the extent possible within the Enel Grids Business Line and in compliance with any applicable laws, regulations and governance rules, including any stock exchange and unbundling-relevant provisions, which in any case prevail over the provisions contained in this document.

1.1 RELATED DOCUMENTS TO BE IMPLEMENTED AT COUNTRY LEVEL

This document does not require implementation of further documents.

Anyway, each Enel Grids Company can issue, under the supervision of Enel Grids Global Network Components unit detailed documents, according to the provisions of the present document and in case of specific needs.

2 DOCUMENT VERSION MANAGEMENT

VERSION	ISSUE DATE	DESCRIPTION OF THE MAIN CHANGES
1	30/06/2023	Issuing of “LV Line Voltage Regulator” Technical specification

3 UNITS RESPONSIBLE FOR THE DOCUMENT

Responsible for drawing up the document:

- Enel Grids: Engineering and Construction / Components and Devices Design/ Network Components unit.

Responsible for authorizing the document:

- Enel Grids: Head of Network Components unit.
- Enel Grids Global: Head of Quality unit.

4 REFERENCE

- Integrated Policy for Quality, Health and Safety, Environment, anti-Bribery and Information security;
- ISO 9001 - Quality Management System – Requirements;
- ISO 14001 - Environmental Management System - Requirements with guidance for use;


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- ISO 45001 - Occupational Health and Safety Management System - Requirements with guidance for use;
- ISO 37001 - Anti-bribery Management System - Requirements with guidance for use;
- ISO 27001 - Information Security Management System – Requirements.
- ISO/IEC 17000 - Conformity assessment – Vocabulary and general principles
- ISO/IEC 17020 - General criteria for the operation of various types of bodies performing inspection
- ISO/IEC 17025 - General requirements for the competence of testing and calibration laboratories
- ISO/IEC 17050-1 - Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements (ISO/IEC 17050-1:2004, corrected version 2007-06-15)
- ISO/IEC 17050-2 - Conformity assessment - Supplier's declaration of conformity - Part 2: Supporting documentation (ISO/IEC 17050-2:2004)
- ISO/IEC 17065 - Conformity assessment – Requirements for bodies certifying products, processes and services
- MAT-E&C-NC-2021-0057-GIN “GSCG003” Employer's Information Requirements for supplier components
- ISO 55001, Asset management systems.
- ISO 50001, Energy management systems.
- IEEE 519, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.
- EN 61439-1, Low-voltage switchgear and control gear assemblies - Part 1: General rules.
- EN 61439-5, Low-voltage switchgear and control gear assemblies - Part 5: Assemblies for power distribution in public networks.

Reference documents listed below (amendments included) shall be the edition in-force at the approval request date.

5 REFERENCE LAWS

The Voltage regulation systems must comply with the relevant regulations and laws described below.

5.1 ENEL DISTRIBUIÇÃO RIO – BRAZIL

- NR10 – Segurança em instalações e serviços em eletricidade
- NR 35 – Trabalho em Altura
- NBR-11809 – Regulador de tensão
- Procedimentos de Rede Prodist – Módulo 8 - Qualidade do Fornecimento de Energia Elétrica
- NBR 5440: Distribution transformers – Requirements (Support test)
- Portaria Interministerial nº3, do Ministério de Minas e Energia de 31/07/201

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5.2 ENEL DISTRIBUIÇÃO SÃO PAULO – BRAZIL

- NR 10 – Segurança em instalações e serviços em eletricidade
- NR 35 – Trabalho em Altura
- NBR-11809 – Regulador de tensão
- Procedimentos de Rede Prodist – Módulo 8 - Qualidade do Fornecimento de Energia Elétrica
- NBR 5440: Distribution transformers – Requirements (Support test)
- Portaria Interministerial nº3, do Ministério de Minas e Energia de 31/07/201

5.3 ENEL DISTRIBUCIÓN – CHILE

- RPTD N° 01 - Tensiones y Frecuencias Nominales.
- RIC N°05 - Medidas de Protección Contra Tensiones Peligrosas y Descargas Eléctricas.
- Norma Técnica de Calidad de Servicio Para Sistemas de Distribución.

5.4 ENEL DISTRIBUCIÓN – COLOMBIA

- NTC 2076 “Galvanizado por inmersión en caliente para elementos en hierro y acero”
- RETIE, Reglamento Técnico de Instalaciones Eléctricas

5.5 E-DISTRIBUZIONE – ITALY

- Low voltage directive 2014/35/EU
- CEI EN 50160
- CEI 0-21
- IEC 61439-1 Low-voltage switchgear and control gear assemblies - Part 1: General rules
- IEC 61439-5 Low-voltage switchgear and control gear assemblies - Part 5: Assemblies for power distribution in public networks
- IEC 61000-6-1 Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
- IEC 61000-6-3 Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
- IEC 82079-1 Preparation of instructions for use - Structuring, content and presentation - Part 1: General principles and detailed requirements
- IEC 60364-5-52 wiring method
- EN 60204, Safety of Machinery - Electrical Equipment of Machines
- IEC 62103, Electronic equipment for use in power installations
- EN 61558-2-12, Safety of Transformers, Reactors, Power Supply Units and Combinations Thereof
- EMI/EMC - Meets radiated requirements for Class A as defined by EN 61000-6-4:2007+A1 20011, CISPR22:1997 Class A
- IEC 61000-2-2 Compatibility for Low Frequency Signalling on Public Supply Systems (AFLC)
- EN 61000-3-4 Harmonic Distortion



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- EN 61000-3-5 Limitation of Voltage Fluctuations and Flicker in Low Voltage Power Supply Systems
- EN 61000-4-5 Class 5 (6kV 1.2/50µS waveform) Transient protection of internal electronics
- EN 60529, Salt Fog ASTM B 117-07, Enclosure
- IEC 60068-2-27, 2-29, and 2-64: Vibration during transport

5.6 E-DISTRIBUCIÓN – SPAIN

- Real Decreto 842/2002, de 2 de agosto, por el que se aprueba el Reglamento electrotécnico para baja tensión.
- UNE211024 Cable accessories. Elements of connection to be used in low and medium voltage distribution networks up to 18/30 (36) kV.
- AND001
- AND002
- AND004

Group Pillar References:

- The Code of Ethics of Enel Group;
- The Enel Group Zero Corruption Tolerance Plan (ZTC);
- Human Rights Policy;
- Organization and Management Model as per Legislative Decree No. 231/2001;
- Enel Global Compliance Program (EGCP).

6 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY

- Value Chain/Process Area: Engineering & Construction
- Macro Process: Devices and Components Development
- Process: Standard Catalog Management

7 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
Low Voltage (LV)	Any set of nominal voltage levels exceeding 50 V and up to 1 kV a.c. or 1,5 kV d.c.
Low Voltage Regulation systems (LVR)	It is a solution for voltage maintenance and voltage stabilization in LV Network.
Power Line Communications (PLC)	Power line Communication carries data on a conductor that is also used simultaneously for

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	AC electric power transmission or <u>electric power distribution</u> to consumers.
Technical Conformity Assessment (TCA)	It refers to any activity that determines whether a product, system, service and sometimes people fulfil the requirements and characteristics described in a standard or specification.
Telecommunications (TLC)	It is the technology of sending signals and messages over long distances using electronic equipment, for example by radio and telephone.
Voltage Regulator (VR)	It is any electrical or electronic device that maintains the voltage of a power source within acceptable limits.

8 DESCRIPTION

The LVR implements a low voltage regulation device in series with the load, effectively increasing or decreasing the voltage as necessary to ensure independent voltage regulation for individual phases.

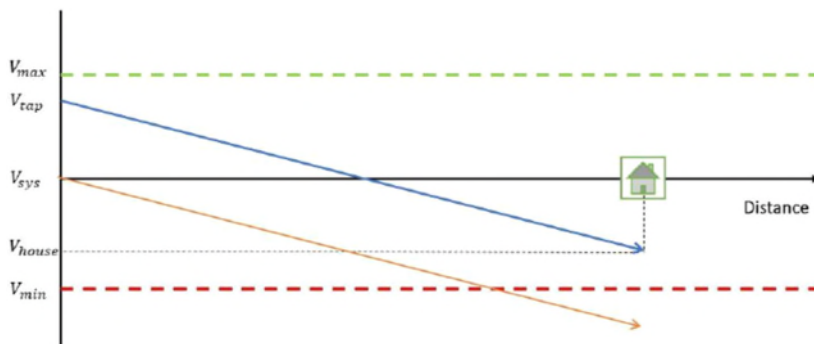
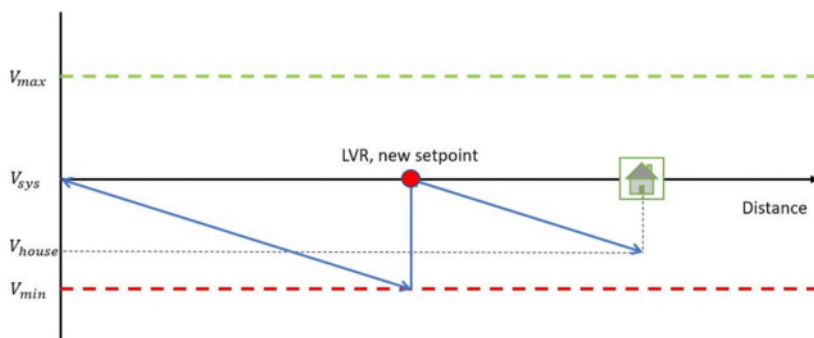


Fig. 1 – Line voltage drop

The LVR can be modelled as a controllable voltage source connected in series with the line, injecting the missing voltage between the reference and the signal.



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Fig. 2 – Example of LVR voltage decoupling

The voltage regulator decouples the system voltage and reset a new set point according to the installation or inject the missing voltage between the reference value and the measured value at the regulator output.

This Set Point shall be adjustable.

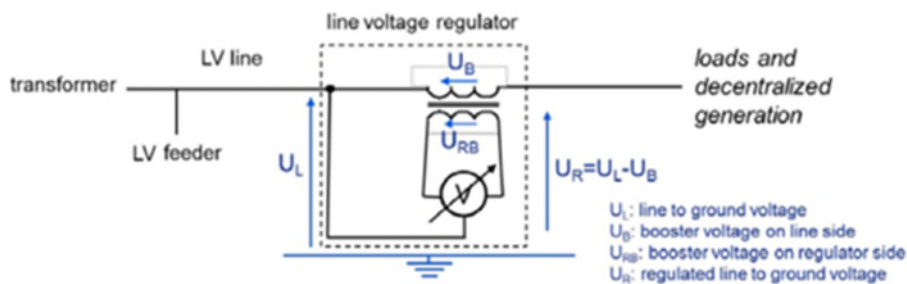


Fig. 3 – Single line diagram of a standard LVR regulator

Different technologies are used to control the injected voltage of the LVR, mainly some solutions modify the inductance of an integrated autotransformer and others use power electronics and cascaded transformers to modify the output voltage.

However, what all technologies have in common is the use of one series transformer per phase to append the voltage and to enable an interruption-free operation even during switch-on and -off processes in the regulator.

Their secondary circuit is connected in series with the line while their primary circuit is switched on or off according to the required regulation.

The primary circuits are supplied by the line voltage and can be connected in phase or in opposite phase to rise or reduce the line voltage.

To switch off a series transformer, the primary circuit is short-circuited.

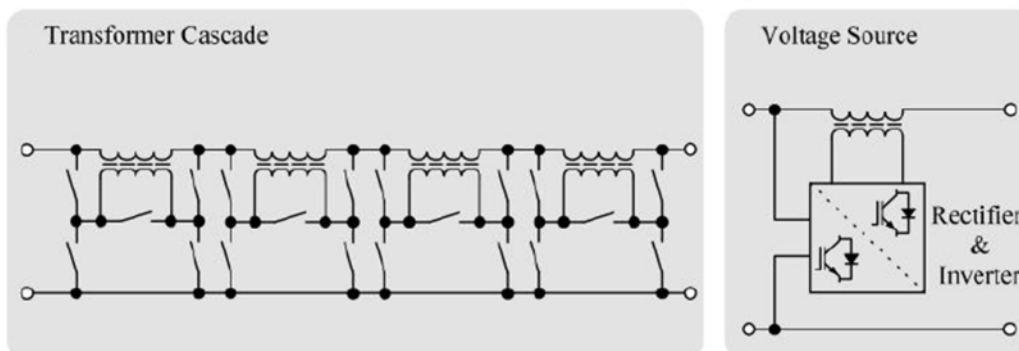


Fig. 4 – Different LVR technologies

9 LVR REQUIREMENT

The LV LVR shall regulates the voltage into a permitted range and enables symmetrical voltage balancing of the three phases, improving the power quality parameters of the LV network.

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The LV LVR shall be able to measure the input line voltage and automatically adjust the output voltage.

This device shall be able to compensate for voltage peaks and variations caused by load imbalances and also by distributed generation and shall be able to handle any critical voltage levels.

The LV LVR shall comply to the stated harmonics standards and shall allow remote meter management signals and digital/analogue data travelling along the LV network (PLC) at a frequency between 9 kHz and 150 kHz to pass through the regulator with minimal attenuation.

The Set Point, that is the desired voltage value at the output from the regulator, shall be calibratable within the Permitted voltage Range.

In case of no voltage regulation demand, the control winding of the series transformer shall be short-circuited, in order to minimize standby losses.

In case that no regulation is required (the voltage is within the tolerance of the nominal voltage) or in case of fault, the regulator shall be deactivated automatically with a bypass switch, without interrupting the supply to the customer.

When the voltage exceeds the tolerance values of the rated voltage, shown in the table above, the bypass is deactivated by starting up the regulator. At this point, the regulator must ensure correct regulation.

The number of attempts to activate the bypass function shall be unlimited and it shall reset automatically without intervention of any operator, except in the case of tripping of the surge-arrester (the characteristics of which are given in Chapter 14) or problems with the device, which shall be reported locally and remotely.

The Voltage Regulator shall be compatible with TT and TN type LV grid systems, it shall not cause any interference with the network, nor cause flicker or harmonics.

If the harmonic distortion (In the output signals) produced by the device exceeds the maximum limit defined in the previous table, it is necessary to provide for the introduction of a filtering system.

In the field, the operator will not require any settings or calibrations to activate the controller but will only be able to access it if the settings need to be changed in the manner described at. Manufacturer's user and maintenance manual.

The LVR shall have no mechanical moving parts and shall be equipped with a natural air-cooling system; electrical heating, forced cooling and the use of insulating oil are not permitted.

The LVR shall be composed by:

- Electronics and transformers
- By-pass switch
- Grounding the Device

The LV LVR shall comply for each country with the requirements listed on the following table:



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Characteristics	Brazil			Chile			Colombia						Italy			Spain								
Material code	500008	500006	500007	500011	500010	500009	500005	500004	500003	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	500001	500002	500003	500003	500002	500001	500006	500005	500004
Phases	Three-Phase																							
LVR Rated Power (kVA)	20	40	60	20	40	60	20	40	60	20	40	60	20	40	60	20	40	60	20	40	60	20	40	60
Max Power Overload for 5 Hours (%)	10																							
LV Network phase Rated Voltage (Vac)	127			220			120			127			277			230			230			133		
Frequency (Hz)	60			50/60			60						50/60			50/60			50/60					
Neutral Connection	TN-C			TT			TN-C-S						TT			TT			TT					
Operating Voltage (Vac)	100 ÷ 134			180 ÷ 253			100 ÷ 134						100 ÷ 277			180 ÷ 253			180 ÷ 253			100 ÷ 140		
Nominal voltage tolerance (%)	-8, + 6			± 7,5			+5, -8 (urban) and -10 (rural)						±10			± 7			± 7					
Phase Voltage Set Point Default (Vac)	127			220			120			127			277			235			230			133		
Set Point Resolution (Vac)	< 0,1																							
Max Time Voltage Variation (sec)	≤ 1																							
Regulation range (%)	± 12																							
Voltage Regulation Type	Continuous or with Steps																							
Max Step Voltage Regulation (%)	≤ 3																							
Reaction Time (V/s)	< 0,1																							
Operation	Bidirectional																							
Type of installation	Pole Mounted / Ground																							
Case IP Code (IEC 60529)	IP54 external case - with humidity discharge capsules			IP54 external case - with humidity discharge capsules			IP55 external case						IP54 external case - with humidity discharge capsules			IP54 external case - with humidity discharge capsules			IP54 external case - with humidity discharge capsules					
	IP 67 relay and button live contacts IP 2X with the door of the box open																							
Operating temperature range (°C)	Temperature -40 to +45 - (for electronics components up to +70)																							
Max. noise level dB(A)	49																							
Max. No-Load Losses (W)	250																							
Min. Efficiency (%)	98																							



INTERNAL

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Max Harmonic Distortion (%)	5				
Data Collection	Fault log, Vin, Vout, Load I, Load P, Active Power, Reactive Power, Temperature				
Control Box Corrosivity Degree	C5	C5	Medium - Pollution level (IEC 60815)	C5	C5


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10 CONNECTIONS

The connections shall be made via a terminal board suitable for both copper and aluminium low-voltage cables with cross-sections as shown in the following table:

Brazil	Chile	Colombia	Italy	Spain
From 50 to 150 mmq	From 16 to 400 mmq	From 25 to 150 mmq	From 10 to 150 mmq	From 50 to 240 mmq

Table 6 – Sections of connections for each country

The input terminal shall be marked with the indication “PHASE IN”, the output one with “PHASE OUT” and the neutral terminal with “NEUTRAL”.

Connectors shall comply with the countries' reference standards.

Internally or externally surge arresters shall be provided for both the PHASE IN and PHASE OUT sides to guarantee protection of the regulator, and electrical protections and automations shall also be installed to guarantee correct operation.

Cables going to the outside of the controller shall be fitted with guards such as cable glands, etc., which are able to prevent access to both water and any external bodies.

11 CONTROL BOX

All electronic circuits shall be adequately protected from adverse weather conditions.

The box shall contain all appropriate connectors to ensure connection to the voltage regulator.

It shall be equipped with a sealable, vandal-resistant lock to prevent access to internal devices. All air intakes shall be shielded against the entry of worms and insects and all electronic parts shall be enclosed to protect them against the entry of moisture and condensation, ensuring a long service life.

The control box shall provide a level of protection against impacts of IK10 rating.

The outer housing shall be able to protect against condensation and the accumulation of dust or pollution.

All external metal parts that are not made of stainless steel and all parts of GRP material or other external materials shall be designed for use in climatic category C5 'Very High' environments, in accordance with ISO 9223 and ISO 14713-1.

They shall be protected by a hot-dip galvanising process in accordance with ISO 1461 with a minimum thickness of 140 µm. The zinc coating will be uniform and continuous, perfectly adherent to withstand all the stresses of normal use without cracking or peeling; after galvanising, the treated surfaces will not be subjected to any process that may alter the continuity or uniformity of the protective coating, respecting the standardised thicknesses; following this test, the surface treatment will not show any significant degradation of its characteristics.

11.1 INSTALLATION

LVR shall be installed along the LV networks and shall provide two types of field installation:

- pole-mounted
- grounded.

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It shall be possible to install a padlock with an 8/10 mm headband compatible with those standardized in the countries.

The connection of the panel to the ground (of a section equal to 16 mm²) must be provided with 6MA grounding bolt. These must be included in the supply.

11.1.1 Pole Mounted Installation

The manufacturer shall provide with the LVR a bracket that fits the poles unified by Enel. The bracket shall be galvanised according to pollution level (C5).

For concrete poles the Enel reference is GSS002 Technical Specification and for steel poles the reference is GSS003 Technical Specification.

The performance of the pole support shall be identified considering the mass of the LVR and the cross-section of the pole according to the installation height.

For field installation, the residual bearing capacity of the pole shall be also considered on a case-by-case basis.

11.1.2 Ground Installation

The manufacturer shall design the Voltage ~~tension~~ regulator according to its weight and size and shall provide a frame for anchoring it to the floor.

12 REQUIREMENTS FOR THE TESTING OF SYNTHETIC RESIN ENCLOSURES FOR BT ELECTRICAL EQUIPMENT

The purpose of these prescriptions is to define the methods for carrying out type and acceptance tests to verify the characteristics of enclosures for LV electrical equipment made of synthetic resin for outdoor installation.

12.1 TEST OF TYPE

Tests of type shall be carried out on three specimens.

Different test configurations shall be approved in advance by e-distribution.

List of tests of type at TCA:

- Visual examination
- Dimensional inspection
- Verification of assembly
- Material verification
- Checking the Degree of protection
- Verification of dielectric properties
- Verification of over-temperature limits
- Verification of static load resistance
- Checking torsion resistance
- Checking the functionality of the locking system
- Verification of impact resistance

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- Testing the impact resistance of a steel ball
- Testing the impact resistance of sharp objects
- Severity test
- Dry heat resistance test
- Verification of flammability category
- Verification of corrosion and ageing resistance
- Verification of resistance to surface currents
- Checking the thickness of surface treatments of metallic materials
- Proof of attempted manual break-in

12.1.1 Examination at view

It shall be checked that:

- packaging corresponds to that prescribed
- packages are complete with all the prescribed elementary parts
- markings correspond to those prescribed
- The colour of the resin parts, for which it is prescribed, corresponds to the UNI RAL 7001 standard
- By resting the test element on a stop plane and making it adhere at three points, it shall be verified that at no point is a deviation of more than 2 mm from the plane detected

12.1.2 Verification dimensional

It shall be checked that all dimensions of the complete products of each elementary part correspond to the values prescribed in the unification within the stipulated tolerances, as well as to the dimensions indicated in the construction drawings of the type approved by e- distribution, within the processing tolerances. Furthermore, the weights of all elementary parts shall be recorded and their arithmetic mean values shall be entered in the approval report.

12.1.3 Verification of assembly

Each movable part (e.g. lock, brackets, etc.) shall be removed, reinserted and secured with its own screws, and it shall be checked to ensure that it can be easily reinserted and properly secured.

12.1.4 Verification of materials

This consists of verifying that the materials used are those specified in the construction drawings and documentation submitted by the Manufacturer for type approval. For this purpose, the Manufacturer shall produce the certificates of origin of the materials used. In the opinion of e-distribuzione, this verification may be carried out by means of mechanical tests and chemical analyses on samples taken from the finished products to ascertain the exact compliance of the materials used with the requirements.

12.1.5 Checking the degree of protection

It shall be verified in accordance with CEI EN 60529 that the product, complete with all elementary parts and installed as in ordinary use, ensures the IP34D degree of protection (D=calibre foreseen in tab. 6 of the above standard).

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12.1.6 Verification of dielectric properties

The test shall be carried out in the manner prescribed in Article 8.9 of standard CEI EN 62208, with the component in its normal installation condition complete with clamps, brackets, etc.

In particular, a dielectric test at 3 kV for 1 minute shall be carried out on the fixing rods.

12.1.7 Verification of load resistance static

The test shall be carried out in the manner prescribed in Article 10.10.1 of standard CEI EN 61439-1.

12.1.8 Verification of load resistance static

The test shall be carried out in the manner prescribed in Article 10.2.101.2 of standard CEI EN 61439-5. In addition, enclosures for which installation on poles is planned, either directly or by means of support brackets, shall be fixed as in normal service conditions.

12.1.9 Strength verification at torsion

The test shall be carried out in the manner prescribed in Article 10.2.101.4 of EN 61439-5.

12.1.10 Checking the functionality of the locking system

100 complete opening and closing manoeuvres shall be carried out on each door or cover, also involving accessory parts; in the case of hinged doors, the 100 complete manoeuvres shall be carried out by applying a force of 120 N at the lock in a direction parallel to the axis of rotation of the door.

In addition, with the door closed, a force of 200 N, acting in the direction of the door opening, shall be applied for a time of not less than 120 s at first at the lock and then at each corner, in the vicinity of the locking of the posts.

The test is favourable if the door, including any hinges, locks, etc., show no signs of wear and tear, breakage or permanent deformation that would impair its subsequent use. In addition, compliance with the prescribed IP degree of protection shall be ensured during the test.

12.1.11 Verification of resistance to impact

The test shall be carried out in the manner prescribed in Article 10.2.101.3 of EN 61439-5.

12.1.12 Verification of the impact tightness of a steel ball

The test shall be carried out in the manner prescribed in Article 10.2.101.5.1 of EN 61439-5.

12.1.13 Verification of resistance to impact with sharp objects

The test shall be carried out in the manner prescribed in Article 10.2.101.8 of EN 61439-5.

12.1.14 Proof of severity

The test shall be carried out in the manner prescribed in Article 10.2.2 of standard EN 61439-5.

12.1.15 Verification of head resistance dry

The test shall be carried out in the manner prescribed in Article 10.2.3.101 of EN 61439-5.



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12.1.16 Verification of the flammability category

All synthetic resin artefacts with a containment function used in e- distribution (such as, ut not limited to: cubicle doors, cabinets, enclosures, electrical panels, supports and the like), the perforation of which would cause a potential connection between the external environment and the live equipment contained within them, shall have the following minimum characteristics of reactivity to flame and heat sources:

- **Self-extinguishing:** complies with IEC 60695-11-10 value V0;
- **Glow wire:** Conforms to IEC 60695-1-1/2 (wire temperature 960°). In accordance with point 10 of this standard, the test will fail if the end of the glow wire penetrates (even partially) into the specimen.

Specimens shall always be taken in accordance with the reference standard.

12.1.17 Verification of corrosion resistance and ageing

The test shall be carried out in the manner prescribed in Article 10.2.2.1 of EN 61439-5.

12.1.18 Verification of resistance to surface currents

The insulating materials used in the construction of the article shall be subjected to the test. The test shall be carried out in the manner prescribed in IEC 60112 on a test specimen taken from each constituent part of the article, with the voltage value of 500 V.

12.1.19 Checking the thickness of surface treatments of metallic materials

The thickness of the protective coating deposit shall be measured by the microscopic method prescribed in UNI EN ISO 1463, for small elementary parts, and by the magnetic method, in accordance with the guidelines in UNI ISO 2178, for all other parts. The thickness measured at each point shall not be less than the prescribed value.

12.1.20 Proof of break-in attempt manual

The manual break-in test is carried out by inserting to a depth of 13 mm the tip of a screwdriver with a total length of 260 mm, blade width 10 mm (tool A no. 2 of standard UNI EN 1630) at the lock and at points above and below 40 mm from the end of the door by applying a force of 100 N to the handle of the screwdriver.

The test is considered passed when the screwdriver fails to open the enclosure and the IP34 enclosure protection rating (CEI EN 60529) is maintained.

13 REMOTE CONTROL FEATURES

The device for control, protection and remote control of the voltage regulator shall be placed in a box that guarantees protection against corrosion.

The control box shall guarantee a free internal space for the telecommunications equipment (modem/router/radio).

The equipment shall communicate with the central systems ensuring secure communication. It shall also be able to communicate its geographical location via gps.

The equipment shall also be provided with the possibility of memorizing events referred to in an annual period of time from the installation. The stored data shall be accessible both locally and remotely.



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13.1 REMOTE CONTROL AND REMOTE MANAGEMENT FUNCTIONS

The voltage regulator shall implement all the functions to be controlled and managed remotely, allowing registration, remote supervision interrogation and the possibility of modifying settings, for which it shall have the necessary inputs and outputs.

13.2 ALARM MANAGEMENT

For each alarm, a spontaneous remote alarm shall be generated; in addition, all events of one year's duration shall be recorded within the device in a memory; the alarms are listed below:

- Bypass Intervention (spontaneous notification)⁽¹⁾
- Surge arrester tripping (spontaneous end-of-life notification of the surge arrester)
- Warning system
- Downloading Remote Operating Data
- Remote configuration and setting

The LV LVR shall have a signal visible from the ground of its operating status. The colouring of this signal shall be as follows: green for correct operation and red for Bypass status or surge arrester tripping.

13.3 COMMUNICATION

The LVR shall interface with the microUp specified in the specification DMIAC000188 to enable the following activities:

- Send a spontaneous state of anomaly/Bypass.
- Download of device operation data
- Sending and changing the calibration of LVR

In the cabinet shall be reserved a volume for the installation, by Enel, the microUP (DMIA000188) and the Router (DMIAB0000272).

14 TCA PROCESS

The Voltage Regulator shall be tested in accordance with all listed standards and shall be subject to the Technical Conformity Assessment (TCA) process in accordance with procedure GSCG002 and the requirements specified in this technical specification.

14.1 TCA DOCUMENTATION

For the TCA process the manufacturer shall provide the following documentation:

- declaration of conformity of the LV LVR with the laws, the technical standards and the voltage quality regulation for each country
- test report of electrical and functional characteristics in all LVR construction and dimension drawings accordance with GSCP005
- test report

⁽¹⁾ If the system goes into bypass when voltage regulation is not required, the system shall not send the by-pass alarm for operational failure.


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- LV LVR construction and dimension drawings (including pole bracket and basement)
- installation, operation and maintenance manual
- detailed scheme for LV LVR commissioning and decommissioning
- BIM drawings in accordance with Technical Specification GSCG003

15 COMPONENTS FOR SUPPLY

- LV LVR homologated
- Surge arrester

Parameter	Values
Impulse Current (10/350 μ s) [L-N]/[N-PE] (I_{imp})	25 / 100 kA
Protection Level [L-N]/[N-PE] (U_p)	$\leq 1,5 / \leq 1,5$ kV

- Pole brackets or the basement in the case of ground installation
- Manual of installation, use and maintenance
- Detailed scheme for commissioning and decommissioning