



**Material Specification code:** GRI-GRI-MAT-E&C-0041  
Version no. 3 dated 26/04/2023

**Subject:** GSCB001 Stationary Lead-Acid Battery VRLA Type for MV - LV  
Substation and pole transformer point

**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 AIMS AND APPLICATION AREA

The scope of this document is to provide the technical requirements for 12Vdc hermetically sealed, Valve-Regulated Lead-Acid (VRLA) type, Absorbent Glass Mat (AGM) or Gel technologies to be used as battery pack, composed by two series monoblocks, for Remote Terminal Unit in pad mounted or pole mounted secondary substations of the Enel Grids companies listed below:

Country	Distribution Company
Argentina	Edesur
Brazil	Enel Distribuição Rio Enel Distribuição Ceará Enel Distribuição São Paulo
Chile	Enel Distribución Chile
Colombia	Enel Codensa
Iberia	e-distribución
Italy	e-distribuzione

**Table 1 - Distribution Companies**

*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 detailed documents, according to the provisions of the present document and in case of specific needs.

## 2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
1	18/01/2016	Issuing of "Global Infrastructure and Networks GSCB001 Stationary Lead-Acid Battery VRLA Type for MV-LV Substation and pole transformer point" technical specification.
2	28/05/2021	General revision of document in compliance with IEC standards. Added documents to be submitted for tenders, including check list.



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3	26/04/2023	<p>General revision of requirements closer to actual technology specification.</p> <p>Closer reference to IEC standard and simplification of the TCA process and understanding.</p> <p>Alignment to the new format</p>
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### 3 UNITS IN CHARGE OF THE DOCUMENT

Responsible for drawing up the document:

- Enel Grids: Engineering and Construction /Components and Devices Design/ Network Components/ MV and LV Equipment unit

Responsible for authorizing the document:

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

### 4 REFERENCES

- 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;
- 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.

### INTERNATIONAL STANDARDS

The listed reference documents shall be intended in the in-force edition at the TCA date (amendments and errata included). Unless otherwise specified, these documents are valid until the new editions:

- IEC 60896-21 “Stationary lead-acid batteries – Part 21: Valve regulated types – Methods of test”;
- IEC 60896-22 “Stationary lead-acid batteries - Part 22: Valve regulated types – Requirements”;


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- IEC 60695-11-10 “Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods”;
- IEC 60695-11-20 “Fire hazard testing - Part 11-20: Test flames - 500 W flame test methods”;
- EN 61429/A11 “Marking of secondary cells and batteries with the international recycling symbol iso 7000-1135 and indications regarding directives 93/86/EEC and 91/157/EEC”;
- IEC 60332-1-2 “Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame”;
- EN 50399 “Common test methods for cables under fire conditions - Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results”;
- ISO 7000-1135 “General symbol for recovery/recyclable”;
- 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.

**Argentina**

- Art 1° de la Resolución 544/94 “Residuos Peligrosos” de la secretaria de Recursos Naturales y Ambiente Humano, de la Nación (Boletín Oficial N° 28043 del 21/12/94) referido a la aplicación de la ley 24051.

**Brazil**

- NR-10 – Segurança em instalações e serviços em eletricidade.



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### **Chile**

- Elec 4/2003 – Instalaciones de consumo en baja tensión;
- NSEG 5. E.n.71 - Reglamento de Instalaciones Eléctricas de Corrientes Fuertes.

### **Colombia**

- RETIE – Reglamento Técnico de Instalaciones Eléctricas;
- Resolución 0372 de 2009, Ministerio de Medio Ambiente - Establece los elementos que deben contener los planes de gestión de devolución de productos posconsumo de baterías usadas plomo ácido;
- Annex PVR006 – “Current revision - Bar Codes, guarantee and traceability of ENEL Codensa materials”.

### **Italy**

- D.Lgs n. 81 of the 9th of April 2008 and subsequent modifications;
- D.P.R. n. 43 of the 27th of January 2012;
- Decreto Ministeriale Ambiente n. 20 – 24 Gen. 2011;
- CEI R021 – Sicurezza ambientale riciclo accumulatori;
- Nota Operativa PVR001 – Rev. 2 – Ott. 2012 - Gestione Garanzie dei materiali di ENEL Distribuzione;
- Nota Operativa PVR006 – Rev. 2 – Ott. 2012 - Codici a Barre, garanzia e rintracciabilità dei materiali di ENEL Distribuzione;
- Allegato alla N.O. PVR006 – Rev. 2 – Ott. 2012 – Note esplicative per la definizione e gestione dei barcode per le batterie di Cabina Primaria e di Cabina Secondaria.

### **Spain**

- R.D. 337/2014, de 9 de mayo, por el que se aprueban el Reglamento sobre condiciones técnicas y garantías de seguridad en instalaciones eléctricas de alta tensión y sus Instrucciones Técnicas Complementarias ITC-RAT 01÷23;
- R.D. 614/2001, de 8 de junio, sobre disposiciones mínimas para la protección de la salud y seguridad de los trabajadores frente al riesgo eléctrico;


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- Ley 22/2011, de 28 de julio, de residuos y suelos contaminados;
- R.D. 106/2008, de 1 de febrero, sobre pilas y acumuladores y la gestión ambiental de sus residuos;
- R.D. 943/2010, de 23 de julio, por el que se modifica el Real Decreto 106/2008, de 1 de febrero, sobre pilas y acumuladores y la gestión ambiental de sus residuos;
- R.D. 710/2015, de 24 de julio, por el que se modifica el Real Decreto 106/2008, de 1 de febrero, sobre pilas y acumuladores y la gestión ambiental de sus residuos.

**Europe**

- Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006;
- Directive 2004/108/EC electromagnetic compatibility.
- MAT-O&M-NCS-2021-0033-EGIN version 3 “Global Infrastructure and Networks – GSCG002 Technical Conformity Assessment”;
- GSTR001/1 rev.1 “Remote Terminal Unit for secondary substation (UP)”;
- Contractual Requirements for Components and Materials Quality management;
- Construction specification GRI-GRI-CNS-O&M-0002 Barcode specification ex CNS-O&M-S&L-2021-0032-EGIN ;
- Packaging, transport, and delivery requirements rev.2.

**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).



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## 5 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY

Value Chain/Process Area: Engineering & Construction

Macro Process: Devices and Components Development

Process: Standard Catalog Management

## 6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
<b>Conformity assessment body</b>	Body that performs the conformity assessment activities
<b>Enel Equipment Family code</b>	Equipment belonging to a specific group (family) in which another equipment is identified as key code
<b>Enel Equipment Key code</b>	It's an equipment representative for a group (family) of similar equipment chose by Enel
<b>Technical Conformity Assessment (TCA)</b>	A "conformity assessment" <sup>1</sup> with respect to "specified requirements" <sup>2</sup> consists in functional, dimensional, constructional and test characteristics required for a product (or a series of products) and quoted in technical specifications and quality requirements issued by Enel Group distribution companies. This also includes the verification of conformity with respect to local applicable regulation and laws and possession of relevant requested certifications
<b>Technical Conformity Assessment dossier (TCA dossier)</b>	Set of final documents delivered by the Supplier for the TCA
<b>Technical Conformity Assessment report</b>	Document describing the activities carried out for TCA

<sup>1</sup> Definition 2.1 of ISO/IEC 17000

<sup>2</sup> Definition 3.1 of ISO/IEC 17000





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<b>Technical Conformity Assessment systems</b>	The “conformity assessment systems”, is applicable specifying that the rules and procedures to carry on the TCA are those specified in the present document
<b>Type A documentation</b>	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</b>	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



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## 7 DESCRIPTION

### 7.1 LIST OF COMPONENTS

12 Vdc monoblocs are used as couple monoblocs, connected in series to make 24V battery, for **enel** it is identified as follows (single monobloc).

Type code	Configuration	Technology	DSO	Country Code	Rated Capacity C10 [Ah]	Rated capacity C3 [Ah]	Rated Voltage [V]	Waight [kg]	Charge retention factor Crf per month at 20°C [Ah]	Life expectancy [years]	Security valve intervention [% of case's breaking point]	Plastic case classification	Maximum dimensions l x t x h (length x thickness x height) [mm]	Terminals IP degree	Connection cable insulation class	Connect ion cable length [mm]	Connection cable section [mm <sup>2</sup> ]	Operating and storage temperature range [°C]	Altitude [m]	Atmospheric pressure [kPa]	Description
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Italy	162068	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2000	70 ÷ 110	ACCUMULATORE PB 12V PER UP Y815 UE
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Spain	160231	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2000	70 ÷ 110	CONJUNTO BATERIAS 2X12V ALIM.UNIDAD PERI
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Brazil	164621	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2000	70 ÷ 110	BATERÍA SELLADA PB-ACIDO VRLA 12VCC 24AH
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Colombia	160496	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2700	70 ÷ 110	BATERÍA SELLADA PB-ACIDO VRLA 12VCC 24AH
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Chile	160496	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2000	70 ÷ 110	12V VRLA ACCUMULATORS FOR POWERING REMOTE-CONT. SEC. SUBSTATIONS
GSCB001/1	2 monoblocs	VRLA/AGM	ED-Argentina	0130-0076	23	76% of C10	12	15	85% of C10	12	20	V-0	250 x 170 x 175 (or 170 x 250 x 175)	IP2X	300/450 V	100 ÷ 150	6	-15 ÷ +45	2000	70 ÷ 110	BATERIA AGM O GEL 12 VCC 25 AH

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## 7.2 SERVICE CONDITIONS

12 V<sub>dc</sub> monoblocs shall be compliant with standards defined in this document, furthermore they shall be able to function satisfactorily for the following values indicated in the table 2.

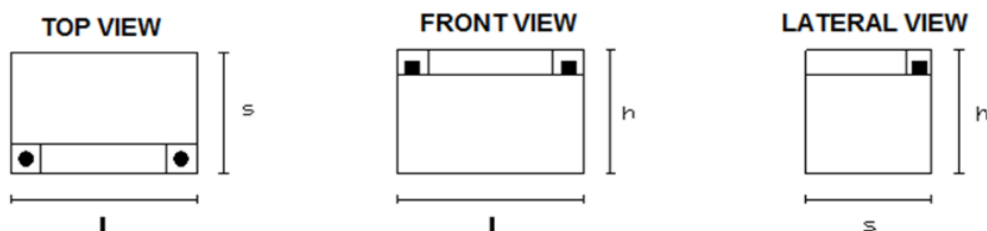
Reference for environmental conditions	
Altitude (m)	< 2000 s.l.m.(2700 s.l.m for Colombia) (*)
Operating and storage temperature range (°C)	-15 ÷ +45
Atmospheric pressure (kPa)	70 ÷ 110
Relative humidity	≤ 95%

**Table 2 - Service Conditions**

(\*) in case that, for > 2000 altitude, limitations, or de-ratings are foreseen by supplier, they are subjected to specific *enel* approval.

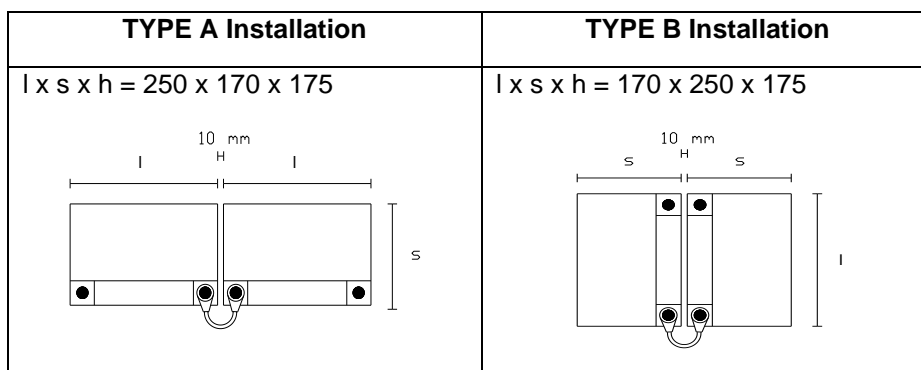
## 7.3 TECHNICAL CHARACTERISTICS

Below the maximum dimensions that the 12 V<sub>dc</sub> monobloc shall comply are shown:



**Figure 1 - 12 V<sub>dc</sub> monobloc dimensions**

The possible installations are described in the figure below:



**Figure 2 - 24 V<sub>dc</sub> monoblocs series dimensions**



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The series of 12 Vdc monoblocs shall be compliant with both type A and B installation. They will be installed in one compartment of the rack cabinet of MV/LV substation or pole mounted transformer point as shown in the picture below:



**Figure 3 - 24 Vdc monoblocs series installation**

The monoblocs will be kept charged, in float operation, by a rectifier contained inside the RTU which, in addition to charging the monoblocs, provides energy continuously to a load absorbing a constant current of about 0,5 A and, occasionally, to electrical switchgear motors representing an additional peak charge.

Adjustment of the floating voltage to temperature change will be achieved using a temperature sensor, connected to the rectifier, located on the side of the monobloc, usually located in the most critical position as far as cooling is concerned.



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The table below contains the required technical features:

<b>Life expectancy (years)</b>	10-12 <sup>3</sup>
<b>Maximum dimensions l x t x h (length x thickness x height)</b> The maximum height refers to a fully equipped 24 Vdc battery (including terminals and terminal covers) [mm]	250 x 170 x 175 (or 170 x 250 x 175)
<b>Maximum weight [kg]</b>	15
<b>Monobloc number of cells</b>	6
<b>Rated voltage [Vdc]</b>	12
<b>Float voltage at 20 °C U<sub>flo</sub> [Vdc]</b>	(2,26 ÷ 2,30) x 6
<b>Rated capacity C<sub>10</sub> [Ah]</b> At 20 °C and cut-off voltage 1,8 V <sub>pc</sub>	≥ 23
<b>Rated capacity C<sub>3</sub> [Ah]</b> At 20 °C and cut-off voltage 1,7 V <sub>pc</sub>	≥ 76% of C <sub>10</sub>
<b>Charge retention factor C<sub>rf</sub> per month at 20°C [Ah]</b>	≥ 85% of C <sub>10</sub>
<b>Short-circuit current I<sub>sc</sub> [A] and Internal resistance R<sub>i</sub> [mΩ]</b>	Shall be declared by the manufacturer
<b>Maintenance</b>	Monobloc shall be maintenance-free for entire life
<b>Recharge diagram</b>	As per figure 5

**Table 3 - Monoblocs technical features**

<sup>3</sup> "Long life" battery according to Eurobat classification or equivalent accelerated aging test



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## 7.4 CONSTRUCTION CHARACTERISTICS

### 7.4.1 Construction characteristics of the monobloc

<b>Characteristics of the monobloc case</b> <sup>(1)</sup>	Made of acid-resistant, shockproof plastic material with flammability rating of materials V-0 <sup>4</sup> according to IEC 60707/ 60695-11-10; Case shall not release impurities to the electrolyte
<b>Acid solution quantity (liters) and density</b>	To be declared by manufacturer (Liters - for neutralizing calculation)
<b>Intervention pressure of safety valves</b> <sup>(1)</sup>	Pressure value not exceeding 20% of the breaking point of the case
<b>Safety valve</b> <sup>(1)</sup>	Shall be resistant to acids and prevent the entry of air into the monobloc. Following intervention, they shall guarantee the absence of acid or aggressive vapors emissions.
<b>Manufacturing date of two monoblocs constituting the battery</b>	The corresponding dates shall be identical for the two monoblocs of a same battery. Date of construction must be no more than 90 days before the Transport Document date.

**Table 4 - Monoblocs construction features**

(1) The Manufacturer shall provide a declaration that the monoblocs are in compliance with the specifications stated in this point.

### 7.4.2 Construction characteristics of the connecting cable

<b>Built</b>	Flexible single-core cable with insulation class 300/450V of category C under fire conditions certified CEI EN IEC 60332-3-24. The connection shall be designed by constructor in order to avoid distancing between the monoblocs and in order to guarantee that the voltage drop between monoblocs terminals (two poles) does not exceed 6 mV with a passing current equal 0,1 I10
<b>Cross-section [mm<sup>2</sup>]</b>	≥ 6
<b>Length [mm]</b>	100 ÷ 150 in any case such as to ensure a correct arrangement of the two monoblocs (spaced at least 10 mm) in both configurations of Fig. 2

<sup>4</sup> Other V-0 conformity certification could be accepted.

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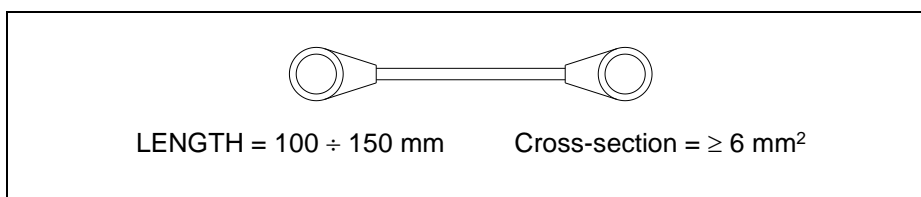
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<b>Caps or connection insulation devices</b>	Protection degree IP2X
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**Table 5 - connection cable characteristics**



**Figure 4 - Connecting cable.**

#### 7.4.3 Marking of the monoblocs

Each monobloc shall be marked a code with technical information of the Table 10 of the standard IEC 60896-22

Additionally, the following information shall be indicated:

- **enel** type;
- **enel** material code;
- International recycling symbols compliant with ISO 7000-1135 and EN 61429/A11;
- Bolts torque value (N/m).

## 7.5 TESTING

The VRLA batteries and related monoblocs shall be compliant with the requirements of the previous chapters and considered as “Tested according to IEC 60896-21 and compliant with defined requirements of IEC 60896-22”.

Tests are divided in:

- Type tests.
- Routine tests.
- Acceptance test

Technical Conformity Assessment (TCA) shall be compliant with MAT-O&M-NCS-2021-0033-EGIN.

#### 7.5.1 Type tests

Following indication are given for the listed subset of type tests. Type tests compliance required by relevant standards not listed below shall be demonstrated by test reports on samples chosen at supplier’s responsibility and according to ISO requirement for prototype selection in Conformity Assessment process.

Type tests of battery and related monoblocs shall be compliant with the IEC 60896-21 and IEC 60896-22, and therefore collected as follow:



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- Safe operation characteristics type tests listed in Table 1.
- Performance characteristics type tests listed in Table 2.
- Durability requirements type tests listed Table 3.

All type tests of Tables 1 and 2 of the IEC 60896-21 and 60896-22 shall be performed.

“Impact of a stress temperature” test from Table 3 shall be performed.

Test set up shall be compliant with chapter 5 of IEC 60896-21.

Type tests and their procedure shall be compliant with IEC 60896-21 and IEC 60896-22 with the additions and clarifications described in the paragraphs below.

Last edition of previous standards shall be utilized, paragraphs indicated are referred to current edition.

#### 7.5.1.1 Visual inspection

This verification shall be added to standard type test list.

Compliance of *enel* type with the prescriptions contained in this document shall be checked.

Shall be checked the following points:

- Technical and constructive characteristics;
- Constructive characteristics of the monobloc connection;
- Case characteristics;
- Absence of manufacturing defects;
- Plate and marking.

#### 7.5.1.2 Drop voltage verification of monoblocs connection

This type test shall be added to standard type test list.

Voltage drop of connection between the monoblocs terminals shall be checked. Voltage drop shall be less than 6 mV with a passing current equal to 0.1 I<sub>10</sub>.

#### 7.5.1.3 Float service with daily discharges

Clause and test of IEC 60896-21 and IEC 60896-22	Requirement and service environment
6.13 Float service with daily discharges	Reliable mains power (no unit below 50)

#### 7.5.1.4 Impact of a stress temperature

The stress test for benchmark purpose to perform is the medium duration at 3 h discharge. Alternatively, can be achieved at least the short duration exposure test with 0,25 h discharge but at a lower ranking evaluation then the longer test.





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Clause and test of IEC 60896-21 and IEC 60896-22	Requirement and service environment
6.16 Impact of a stress temperature of 60 °C	Medium duration exposure time, $\geq 175$ days, capacity monitored with 3 h discharge test
	Brief duration exposure time, $\geq 55$ days, capacity monitored with 0,25 h discharge test

### 7.5.2 Routine and Acceptance test

The Routine tests shall be the following:

- Visual inspection;
- Discharge capacity test in order to check type test values result;
- Short-circuit current and d.c. internal resistance test in order to check type test values result.

The Supplier must produce a report with the results of the Routine tests performed.

In case of execution of the Acceptance tests in the presence of an Enel inspector or appointee, this report must be available for comparison of the results.

Acceptance tests shall be the same of the Routine tests.

Acceptance test shall be carried out on a sample basis, on a number of samples which depends on the consistency of the supply according to conditions establish in document "Contractual Requirements for Components and Materials Quality management" (50% of the sample for non-destructive tests and 25% of the sample for destructive tests).

#### 7.5.2.1 Visual inspection

The compliance of each monobloc with the documents of the TCA Dossier (see par. 7.7) shall be checked.

In particular, shall be checked the following points:

- Dimensions and weight of the single battery element with uncertainty of  $\pm 5\%$ ;
- Plate and markings;
- Congruity of the terminals with the drawings;
- Monobloc connection series and presence of tip voltage measurement of the individual poles;
- Same dates of manufacture and charging for all monoblocs of same battery;
- Presence and correctness of the barcodes;
- Absence of visible manufacturing defects;
- Accuracy of the construction.



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### 7.5.2.2 Short-circuit current and d.c. internal resistance test

Test shall be compliant with paragraph 6.3 of IEC 60896-21 and IEC 60896-22.

The values determined for each monobloc, whether short-circuit current ( $I_{sc}$ ) or internal resistance ( $R_i$ ), shall fall within  $\pm 10\%$  of type test values.

## 7.6 TCA DOSSIER

TCA dossier compliant with MAT-O&M-NCS-2021-0033-EGIN shall be product by Manufacturer

Documents of TCA dossier are listed in the MAT-O&M-NCS-2021-0033-EGIN with the following additions and clarifications:

- Statement relating to the degree of purity of the Pb;
- Statement regarding the compatibility between battery series and GSTR001 and its annexes;
- Statement described in table 4 note 1;
- Type A documents compliant with MAT-O&M-NCS-2021-0033-EGIN with following additions and clarifications:
  - Dimensions and weight of the single battery element;
  - Case main characteristics (material, color, flame-retardant characteristics, over-pressure valve, etc.);
  - Monobloc terminal type;
- Annex B of IEC 60896-22 filled by Constructor as type test result with the following additions
  - Uflo buffer voltage value at 20 °C and the Uflo curve (T);
  - Value of the voltage drop on the connection between the monoblocs constituting the battery;
  - Intervention pressure value of the safety and rupture valves of the monobloc container;
  - Tightening torque of the terminals nominal value;
  - Self-discharge trend during the storage phase;
  - Parameters to define the charging process according to the following figure 5 standard for rectifiers
  - List of materials contained in packaging.

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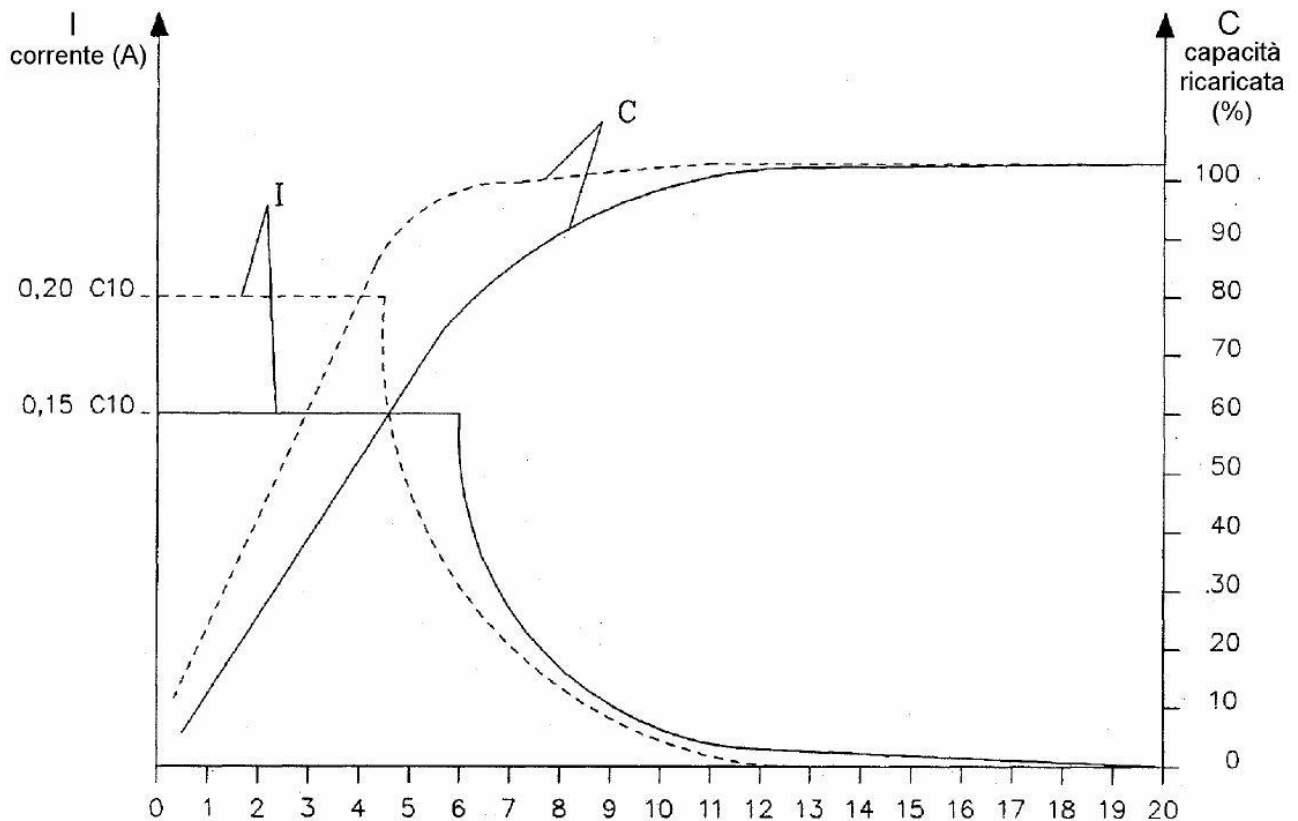
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**Figure 5 – Recharge diagram**

## 7.7 CONDITIONS OF SUPPLY

The ready-to-use monoblocs shall be provided in packaging, such as to ensure suitable protection during transport and storage.

The supply shall include:

- N°2 monoblocs, with the same construction and charging date (the charge shall be carried out within 90 days from the date of the transport document);
- N°1 accessory for the series connection of the monoblocs, consisting of single-core flexible cable with proper terminations;
- N. 2 eye lugs for cable section  $s \geq 4 \text{ mm}^2$  compliant with monobloc terminals;
- self-adhesive markings and plates showing the data and symbols described in paragraph 7.5.3 for each monobloc;



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- N°4 caps or connection insulation devices with IP2X protection degree (these insulating caps shall not be provided in case of recessed poles covered with insulating casing material forming an integral part of the container or of the lid of the accumulator);
- Instruction manual in supply country language, relating to operation and maintenance with the relevant safety warnings and any other document that the manufacturer deems necessary. The safety recommendations shall include, the indication of the electrolyte volume, expressed in liters, contained in each monobloc (see table 4);
- Series of barcodes (Bar Code) for each monobloc according to Construction specification GRI-GRI-CNS-O&M-0002 Barcode specification ex CNS-O&M-S&L-2021-0032-EGIN

#### **7.7.1 Packaging**

For transport and handling in storage ENEL Group shall use packaging compliant to "Packaging, transport and delivery requirements - rev. 2".

#### **7.8 DOCUMENTATIONS TO BE PROVIDED IN TECHNICAL OFFER**

Documentations to be provided in the technical offer:

- Check list, see annex A, to fill in for each *enel* type code;
- Drawings with overall dimensions;
- Supplier declaration of compliance of offered products with present TS and main standards and laws;
- Deviations letter (if any).



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## 8 ANNEXES

### 8.1 ANNEX A - TECHNICAL CHECK LIST

<b>Technical specification:</b>		<b>Offer number:</b>	
<b>Constructor:</b>		<b>Site of production:</b>	
<i>enel</i> type code:		<b>Constructor type code or designation:</b>	
<i>enel</i> material code:			
Technical ratings		Request	Constructor offer
1	Maximum Operating temperature range (°C)	-15 ÷ +45	
2	Maximum altitude (m)	2000 (2700)	
3	Maximum atmospheric pressure range (kPa)	70 ÷ 110	
4	Maximum relative humidity	95%	
5	Minimum life expectancy (years)	12	
6	Monobloc number of cells	6	
7	Monobloc rated voltage (Vdc)	12	
8	Maximum Length /Height/Dept (mm)	250 x 170 x 175	
9	Maximum Weight (kg)	15	
10	Rated capacity C10 (Ah) at 20 °C and 1,8 Vpc	≥ 23	
11	Rated capacity C3 (Ah) at 20 °C and 1,70 Vpc	≥ 76% of C10	
12	Charge retention factor per month at 20°C (Ah)	≥ 85% of C10	
13	Short-circuit current (A)	Constructor Information	
14	Internal resistance (mohm)	Constructor Information	
15	Float voltage Uflo (Vdc)	(2,26 ÷ 2,30) x 6	
16	Positive/Negative number of plates	Constructor Information	
17	Grid patterns dimension	Constructor Information	
18	COS dimension	Constructor Information	
19	Separator dimensions	Constructor Information	
20	Materials present in the plate with them percentual	Constructor Information	

**Table 6 - Technical check list**