



**Technical Specification code: MAT-E&C-NC-2021-0055-EGIN**

Version no. 1 dated 11/10/2021

**Subject:** Global Infrastructure and Networks – GSCM734 Voltage transformer trolley for air insulated “compact” switchgear family

**Application Areas**

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

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**THE HEAD OF Network Components**  
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**Application Areas**

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## 1 DOCUMENT AIMS AND APPLICATION AREA

The aim of this document is to describe the construction and use characteristics of Voltage Transformer Trolley (VTT), for indoor application with maximum nominal voltage  $U_r = 24\text{kV}$ , vertical translation used in the Air Insulated “compact” Switchgear (AIS) family described in the Volume XIX “Family of AIS “compact” **enel** type technical specifications collection” to be installed in HV-MV and MV-MV substation of the Enel Group Distribution Companies, listed below:

Country	Distribution Company
Argentina	Edesur
Brazil	Enel Distribuição Rio Enel Distribuição Ceará Enel Distribuição Goiás Enel Enel Distribuição São Paulo
Chile	Enel Distribución Chile
Colombia	Codensa
Iberia	e-distribución
Italy	e-distribuzione
Peru	Enel Distribución Perú
Romania	Enel Distributie Banat Enel Distributie Dobrogea Enel Distributie Muntenia

**Table 1 - Distribution Companies**

### 1.1 RELATED DOCUMENTS TO BE IMPLEMENTED AT COUNTRY LEVEL

This document applies to both Enel Global Infrastructure and Networks Srl Company and to Infrastructure and Networks Business Line perimeter, when each Company does not have to issue further documents.

## 2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
01	11/10/2021	Issuing of Global Infrastructure and Networks GSCM734 ed.0 “Voltage transformer trolley for air insulated “compact” switchgear family” technical specification.

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### **3 UNITS IN CHARGE OF THE DOCUMENT**

Responsible for drawing up the document:

- Global Infrastructure and Networks: Engineering and Construction / Components and Devices Design/ Network Components.

Responsible for authorizing the document:

- Global Infrastructure and Networks: Head of Engineering and Construction unit;
- Global Infrastructure and Networks: Head of Health, Safety, Environment and Quality unit.

### **4 REFERENCES**

- Code of Ethics of Enel Group;
- Enel Human Right Policy;
- The Enel Group Zero Tolerance of Corruption (ZTC) Plan;
- Organization and management model as per Legislative Decree No. 231/2001;
- RACI Handbook Infrastructure and Networks no. 06;
- Enel Global Compliance Program (EGCP);
- Integrated Policy of Quality, Health and Safety, Environment and anti-Bribery;

### **5 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY**

Value Chain/Process Area: Engineering & Construction;

Macro Process: Devices and Components Development;

Process: Standard Catalog Management.

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## 6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
<b>Manufacturer Product</b>	Component manufactured by a Supplier in accordance with a technical specification
<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>Conformity assessment body</b>	Body that performs the conformity assessment activities [ISO 17000]
<b>Enel Equipment Key code</b>	It's an equipment representative for a group (family) of similar equipment chose by Enel
<b>Enel Equipment Family code</b>	Equipment belonging to a specific group (family) in which another equipment is identified as key code
<b>TCA 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

<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>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
<b>TCA report</b>	Document describing the activities carried out for TCA
<b>TCA dossier</b>	Set of final documents delivered by the Supplier for the TCA
<b>Material LifeCycle Management (MLM)</b>	Integrated IT platform to manage the processes of Technical Specifications (TSM), Technical Conformity Assessment (TCA), Quality Control Tools (QCA), Defects Managing (CMD), Warranties and Materials Shipping(MSH)

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**6.1 ENEL GLOBAL INFRASTRUCTURE AND NETWORKS COUNTRIES REFERENCE STANDARDS**

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

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.

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## 7 DESCRIPTION

### 7.1 LIST OF COMPONENTS

Type code	Description
<b>GSCM734/1</b>	Voltage Transformer Trolley (VVT) Ur=12 kV
<b>GSCM734/2</b>	Voltage Transformer Trolley (VVT) Ur=17,5 kV
<b>GSCM734/3</b>	Voltage Transformer Trolley (VVT) Ur=24 kV

### 7.2 APPLICABLE LAWS AND REFERENCE STANDARDS

Reference documents listed below (amendments included) shall be the edition in-force at the contract date. For South America destinations, the reference standards are the IEC/ISO, whilst for Europe destinations the reference standards are the correspondent European ones (EN).

#### 7.2.1 International standard

- IEC 62271-1 “High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear”;
- IEC 62271-102 “High-voltage switchgear and controlgear - Part 100: Alternating current disconnectors and earthing switches”;
- IEC 62271-200 “High-voltage switchgear and controlgear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV”;
- IEC/TS 62271-210 “High-voltage switchgear and controlgear - Part 210: Seismic qualification for metal enclosed and solid-insulation enclosed switchgear and controlgear assemblies for rated voltages above 1 kV and up to and including 52 kV”;
- IEC 62271-304 “High-voltage switchgear and controlgear - Part 304: Classification of indoor enclosed switchgear and controlgear for rated voltages above 1 kV up to and including 52 kV related to the use in special service conditions with respect to condensation and pollution”;
- IEC 60529 “Degrees of protection provided by enclosures (IP Code)”;
- IEC 61869-3 “Instrument transformers - Part 3: Additional requirements for inductive voltage transformers”;

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- 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”;
- IEC 60445 Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors;
- ISO 16739 “Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries”;
- ISO 12944 “Paints and varnishes — Corrosion protection of steel structures by protective paint systems”.

### 7.2.2 **enel standards**

- MAT-O&M-NCS-2021-0033-EGIN version 3 “Global Infrastructure and Networks – GSCG002 Technical Conformity Assessment”;
- GSCM690 “Family of AIS “compact” **enel** type, technical specifications collection”
- GSCM1676 “Family of AIS “compact” **enel**, Mock-up template utilization procedure”;
- GSCM505 “Extractable, vertical translation, three-pole, vacuum circuit breaker, Ur=24kV for air insulated “compact” switchgear family”;
- GSCM731 “Family of AIS “compact” **enel**, Voltage bus bar measurement functional Unit”;
- GSCT008 “Single-phase indoor voltage transformers”;
- WKI-QPT-CMQ-2020-0019-EGIN “Contractual Requirements for Components and Materials Quality management”;
- CNS-O&M-S&L-2021-0032-EGIN “Global Infrastructure and Networks Barcode specification.

### 7.2.3 **Argentina**

### 7.2.4 **Brazil**

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



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**7.2.5 Chile**

- Norma técnica de calidad de servicios para sistema de distribución, Comisión Nacional de Energía, Diciembre 2017;
- ETG-1020 “Requisitos de Diseño Sísmico para Equipo Eléctrico”;
- IEEE 693-2005 “Recommended Practice for Seismic Design of Substations”;
- Norma Técnica de Seguridad y Calidad de Servicio, Comisión Nacional de Energía, Septiembre 2020;
- Reglamento de producción, transporte y distribución de energía eléctrica – Decreto N°109;
- Pliego Técnico normativo RPTD N°15 Operación y Mantenimiento. Decreto N°109;
- Pliego Técnico normativo RPTD N°17 Sistema de Gestión de integridade de instalaciones eléctricas. Decreto N°109.

**7.2.6 Colombia**

- RETIE – Reglamento Técnico de Instalaciones Eléctricas.

**7.2.7 Perú****7.2.8 Italy**

- D.Lgs n. 81 of the 9 of April 2008 and subsequent modifications;
- GUI 101 “Caratteristiche generali e prescrizioni di impiego del pallet in legno da utilizzare per imballo di trasporto”.

**7.2.9 Spain**

- 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;
- 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 a 23;
- R.D. 223/2008, de 15 de febrero, por el que se aprueban el Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de alta tensión y sus instrucciones técnicas complementarias ITC-LAT 01 a 09.

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**7.2.10 Romania**

- Prescriptia Energetica PE 101/85 – Normativ pentru construcția instalațiilor electrice de conexiuni și transformare cu tensiuni peste 1 kV;
- GUI 101RO.

**7.2.11 Europe**

- Regulation (EU) of the European Parliament and of the Council 517/2014 of the 16th April 2014.

**7.3 SERVICE CONDITIONS**

VTT shall be compliant with normal service conditions for indoor installation, defined in IEC 62271-1, considering as minimum value of ambient temperature -5°C.

Maximum altitude shall be as defined in normal service condition (1000 m).

Constructor shall define the  $U_r$  referred to 2700 m of altitude for Colombia.

Seismic level of apparatuses, functional unit switchgear and VTT shall be:

- seismic severity 2;
- acceptance class 1;

as defined in IEC/TS 62271-210.

VTT shall be compliant for installation in three-phases MV effectively and non-effectively earthed neutral system (solidly earthed, isolated, impedance earthed, resonant earthed and arc-suppression-coil-earth neutral system).

VTT shall be compliant with design class 2 (CH; PH) of IEC 62271-304.

**7.4 TECHNICAL CHARACTERISTICS**

VTT shall be compliant with IEC 62271-102 and IEC 62271-200. In the following table, technical characteristics for each type of VTT GSCM734 are defined.

<b>enel Type</b>	<b>GSCM734/1</b>	<b>GSCM734/2</b>	<b>GSCM734/3</b>
<b>Rated Voltage <math>U_r</math> (kV)</b>	12	17,5	24
<b>Rated power-frequency withstand voltage <math>U_d</math> (kV)</b>	28	38	50

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<b>Rated lightning impulse withstand voltage Up (kV)</b>	75		95		125	
<b>Rated frequency fr (Hz) *</b>	50	60	50	60	50	60
<b>VT transformer type GSCT008 to be installed</b>	/11	/12	/3_5_7_10	/4_6_8_9	/1	/2
<b>Number of VT</b>	3		3		3	
<b>IP degree of frontal case</b>	2X					

**Table 2 - Technical characteristics**

\*Grid Nominal Frequency according grid parameters of destination Country

## 7.5 CONSTRUCTION CHARACTERISTICS

### 7.5.1 Generality

VTT shall be extractable type, with clamp contacts and shall be suitable for operating inside a voltage bus bar measurement functional unit switchgear GSCM731.

Dimensions of VTT and interfaces with GSCM731 functional unit switchgear reference shall be made to GSCM505.

### 7.5.2 Insulated bushings

Insulated bushing allows active part of each pole of VTT to cross the septum of the functional unit switchgear that separates the bus bar compartment from the cable compartment.

In case of high levels of partial discharges due to sharp edges interfering between functional unit switchgear and VTT, suitable deflectors (such as rings embedded in the resin of the bushing) in order to reduce the intensity of the field in the area above described shall be provided.

In any case, the solution adopted shall not introduce any modification to the family of switchgear technical specifications and drawings.

### 7.5.3 Protection panel

VTT shall be equipped, in front and sides, with a protection metallic (other materials shall be taken into account) panel of adequate resistance to mechanical stress and internal fault. Panel shall be without sharp corners at the edges. Panel design of lowest part of the panel shall also take in consideration the maneuverability of the handles for extraction of the VTT (see paragraph 7.5.6).

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**7.5.4 Wheels**

VTT shall be equipped of 4 sliding stainless suited to the guides installed inside the panel switchgear; the wheels shall permit the easy handling of VTT.

Wheels fixing system shall be contained in the maximum width of trolley.

**7.5.5 Earthing contact**

Earthing circuit shall be realized with copper bar of proper dimension to be coupled with the functional unit switchgear earthing system.

**7.5.6 Drag handles for trolley**

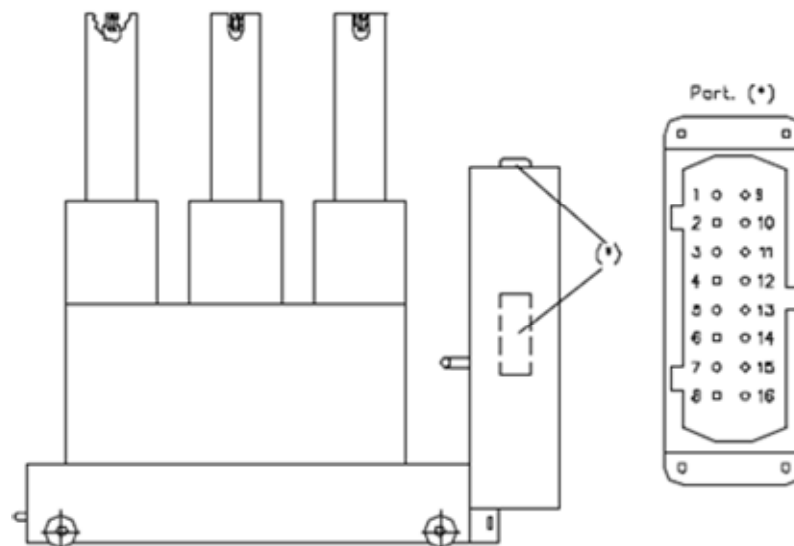
VTT shall be equipped with two handles positioned in the front panel, retractable by means of return springs; handles shall allow to release the two rectangular blocking pivots of the VTT.

Mechanism shall be designed in order to operate correctly with panel switchgear interlocks.

Design of handles shall be ergonomic, safe and effortlessly for operators.

**7.5.7 LV connector**

LV connector shall be mounted on the fixed part of the LV connector, installed on the right part or on the top of VTT. Position of fixed part of connector shall guarantee the dielectric and mechanical distances without interferences, see figure below.



**Figure 1 – Lateral view and LV connector**

The connector for all GSCM734 types shall be socket insert (“female”) to 16 contacts, LV cabling shall be complaint with **enel** drawings.

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Cabling shall be manufactured by flexible single-core cable with 450/750V minimum insulation class and minimum fire reaction Cca-s1b, d1, a1 as described below.

- Cca: EN 50399: Flame Spread (FS)  $\leq 2,00\text{m}$ ; Total Heat Release (THR)  $\leq 30\text{MJ}$ ; Maximum Heat Release Rate (HHR)  $\leq 60\text{kW}$ ; Fire Growth Rate, index of heat release rate (FIGRA)  $\leq 300\text{Ws}^{-1}$  /// IEC 60332-1-2: Flame Spread, vertical flame propagation  $H \leq 425\text{ mm}$ ;
- s1b: Total Smoke Production (TSP1200)  $\leq 50\text{ m}^2$ ; Smoke Production Rate, maximum smoke (SPR)  $0,25\text{ m}^2/\text{s}$ ; transmittance  $\geq 60\% < 80\%$ ;
- a1: electrical conductivity  $< 2,5\text{ }\mu\text{S}/\text{mm}$  ; pH  $> 4,3$ ;
- d1: No flaming droplets/particles persisting longer than 10 s within 1200 s.

Conductors shall be of proper dimension as Constructor design with minimum section of  $4\text{ mm}^2$ , they shall be marked at their extremity, accordance with IEC 60445 and cabling drawings.

**7.5.8 VT**

For each trolley VT to be used shall have an in “force” TCA in compliance with GSCT008 *enel*.

VT's one for each phase shall be installed, primary termination of each VT shall be made with a M16 copper bolt.

Tightening torque and withstood stresses shall be declared by Constructor.

**7.5.9 Clamp contacts**

Clamp contacts shall be designed in order to be coupled with the switchgear panel fixed contacts (reference GSCM505).

Penetration of clamp in the fixed contacts shall be 30 mm as minimum values; at any case the penetration shall be adequate in order to ensure the electrical ratings of functional unit switchgear.

Clamp contacts shall have a degree of mobility to permit a correct coupling with the fixed contacts even in case of offset with respect to the bus bar.

Every group of contacts shall be equipped by independent re-entry springs in order to permit after a disconnection of VTT from bus bar, that the clamp return to pre-connection position.

**7.5.10 Lifting devices**

Removable lifting devices shall be installed on VTT (for example eyebolts or similar), for the lifting of the complete VTT.

**7.5.11 Blocking pivot**

VTT shall be equipped with a blocking pivot with a diameter of 20 mm, rounded edges and stroke at least 20 mm (see GSCM505).

When the trolley is “totally relieved” and “totally lowered” (VTT connected and disconnected), the pivot will be its more external position.

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Pivot position, shall be maintained by a horizontal pressure towards external direction with respect to trolley.

The pressure shall have proper accordance with specific mechanism present on the front of functional unit switchgear (see GSCM505).

Activation of blocking pivot shall occur when it is pushed towards internal direction starting from 5 mm and to 10 mm from beginning of horizontal stroke.

**7.5.12 Protective coatings**

The carpentry shall have a protective coating compliant with ISO 12944 with the following features:

- Durability:
  - o Very High (VH) more than 25 years;
- Atmospheric - corrosivity category:
  - o C5.

Alternative values of atmospheric corrosion category are permit but class 2 of IEC62271-304 shall be guaranteed.

Use of painting cycles or alternatively, electrolytic galvanizing on items that are not part of the load-bearing structure of the trolley is allowed.

**7.6 MANUALS**

Constructor shall produce the VTT manual compliant with IEC 62271-102 and IEC 62271-200.

Minimum time of maintenance shall be 60 months.

VT's manuals shall be supply.

The manuals language shall be compliant with the supply country, e.g. in Italian/Spanish/Romanian/Portuguese.

**7.7 NAMEPLATE**

VTT shall be equipped, on frontal side and visible position, with a nameplate where data indicated by IEC 61869-3 and as applicable, data indicated by IEC 62271-102 and IEC 62271-200 (included the mass) shall be listed.

Also on the nameplate shall be included the followings indications:

- **enel** type;
- **enel** material code;

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- Barcode compliant with CNS-O&M-S&L-2021-0032-EGIN (in case there is not enough space on the nameplate, barcode could be insert out of nameplate).

## 7.8 TESTING

Type and routine test shall be performed in compliance with IEC 62271-1, IEC 62271-102, IEC 62271-200 and the clarifications indicated in the followings paragraphs.

Technical conformity assessment (TCA) process shall be compliant with MAT-O&M-NCS-2021-0033-EGIN.

Electronic type A documentations shall be “BIM compliace” ISO 16739.

Functional unit switchgear GSCM731 with TCA in force necessary for all type tests shall procured by Constructor.

### 7.8.1 Lists of test

#### 7.8.1.1 List of type test

Type test	Reference
Constructive features and interlock functionality verifications	Par. 7.8.3.1
Mechanical operation tests	Par. 7.8.3.2 Par. 7.102 of IEC 62271-200 ed.3
Dielectric tests: <ul style="list-style-type: none"> <li>Power-frequency voltage tests for main circuit;</li> <li>Lightning impulse voltage test;</li> <li>Partial discharge;</li> <li>Power-frequency voltage tests for auxiliary circuit.</li> </ul>	Par. 7.8.3.3 Par. 7.2 of IEC 62271-102 ed.2 Par. 7.2 of IEC 62271-200 ed.3 IEC 60660 IEC 60137
Measurement of the resistance of the main circuit	Par. 7.8.3.4 Par. 7.4 of IEC 62271-102 ed.2 Par. 7.4 of IEC 62271-200 ed.3
Degree of protection verifications	Par. 7.7 of IEC 62271-102 ed.2
Ageing and humidity test	Par. 7.8.3.5 IEC 62271-304
Seismic test	Par. 7.8.3.6 IEC TS 62271-210
Protective coating verifications	ISO 12944
Flammability tests	Par. 7.8.3.7 IEC 60965-11-10

**Table 3 - Type Test**

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

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**7.8.2 List of routine test**

Routine test	Reference
Type correspondence verifications	Par. 7.8.4.1 Par. 8.6 of IEC 62271-102 ed.2 Par. 8.6 of IEC 62271-200 ed.3
Mechanical operation tests and interlock functionality	Par. 7.8.4.2 Par. 8.101 of IEC 62271-102 ed.2 Par. 8.102 of IEC 62271-200 ed.3
Dielectric test on the main circuit and auxiliary	Par. 8.2 and 8.3 of IEC 62271-102 ed.2 Par. 8.2 of IEC 62271-200 ed.3
Measurement of the resistance of the main circuit	Par. 7.8.4.3 Par. 8.4 of IEC 62271-102 ed.2 Par. 8.4 of IEC 62271-200 ed.3
Protective coating verifications	ISO 12944

**Table 4 - Routine test**

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

**7.8.3 Type test**

Tests shall be performed on VTT fully equipped as for ordinary use

**7.8.3.1 Constructive features and interlock functionality verifications**

For this verification, a mechanical simulation of switchboard is necessary.

Mechanical simulation of functional unit switchgear and VTT (mock-up template) shall be manufactured by constructor in compliance with **enel** drawings and specifications; verification of the template accuracy is in charge of constructor.

Annual check of mock-up template with portable 3D automatic measurement shall be performed by constructor.

Portable 3D automatic meter shall have at least 1 mm of precisions.

The right interlock functionality, listed in this document and its annexes, shall be also checked with the mock-up template, procedure described in GSCM1676 shall be followed.

Shall be checked the tightening torque and that primary termination of VT can withstand the stresses transmitted by the force declared by Constructor during the TCA.

Furthermore, LV cabling shall be verified in compliance with paragraph 7.5.7 and nameplates shall be verified in compliance with paragraph 7.7.



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**7.8.3.2 Mechanical operation tests**

Test shall be performed on VTT installed inside functional unit switchgear GSCM731, in compliance with the paragraph 7.102 of IEC 62271-200 ed.3.

Correct insertion, vertical translation, correct LV connector position of VTT inside functional unit switchgear GSCM731 shall be checked.

**7.8.3.3 Dielectric tests**

Tests shall be performed on VVT fully equipped as for ordinary use and installed inside functional unit switchgear GSCM731.

Check of PDS shall be performed with the following indication:

- Inception and extinction voltage level of PDS shall be recorded;
- Measuring circuit shall be capable of detecting an intensity of discharge of at least 2 pC;
- PDS values shall not exceed the reference values described in the **enel** property test reports attached in certification documents.

**7.8.3.4 Measurement of the resistance of the main circuit**

Test shall be performed on VTT installed inside functional unit switchgear, in compliance with paragraphs 7.4 of IEC 62271-102 ed.2 and 7.4 of IEC 62271-200 ed.3.

For each phase the following measurement shall be performed:

- R1: between MV busbar and primary terminal of VT;

average value, for each phase, of measurement carried out during the check, shall be adopted as referring value for the routine tests.

**7.8.3.5 Ageing and humidity test**

Test shall be performed on VTT in compliance with IEC 62271-304 with design class 2.

**7.8.3.6 Seismic test**

Compliance with IEC TS 62271-210 shall be proven of the VTT installed inside functional unit switchgear GSCM731.

**7.8.3.7 Flammability tests**

Test shall be performed on an exemplar for each insulation elements in organic material present on VTT. Test shall be performed in compliance with prescriptions of IEC 60965-11-10 considering the materials as V-0 type.

**7.8.4 Routine test**

The routine tests are indicated in the table 4, these tests shall be carried out by the constructor on all the specimen prepare for the commissioning.

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For each piece belonging to the prepared batch, the supplier shall prepare a test report with the results of the tests performed.

For routine tests reference values and acceptability ranges defined in the TCA Report, type A documents shall be considered.

Routine tests shall be performed on VTT fully equipped as for ordinary use.

**7.8.4.1 Type correspondence verifications**

Test shall be performed on VTT in compliance with the paragraph 8.6 of IEC 62271-102 ed. 2 and 8.6 of IEC 62271-200 ed.3., following verifications shall be performed:

- a) Visual examination in order to check the absence of external imperfections and constructive defects;
- b) Dimensional and constructive verification, with mock-up template of panel switchgear conformity to **enel** drawings and specifications, according procedure described in the GSCM1676 shall be ensured.
- c) Constructive features check with drawings schemes and pictures of the approved type A documentations.

**7.8.4.2 Mechanical operation tests and interlock functionality**

Test compliant with paragraphs 8.102 of IEC 62271-200 ed.3 and 8.101 of IEC 62271-102 ed.2 shall be performed on VTT installed inside functional unit switchgear GSCM731.

Correct functionality of interlocks listed in this document shall be checked.

The right interlock functionality, listed in this document and its annexes, shall be also checked with the mock-up template, procedure described in GSCM1676 shall be followed.

**7.8.4.3 Measurement of the resistance of the main circuit**

Measurement shall be performed in compliance with paragraph 8.4 of IEC 62271-102 ed.2 with paragraph 8.4 IEC 62271-200 ed.3, measures shall be executed with methods indicated in par. 7.8.3.4, checking that measured values do not exceed 1,2 time the values of reference measuring obtained during type test.

**7.8.5 Acceptance test**

Acceptance test 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 conditions establish in document WKI-QPT-CMQ-2020-0019-EGIN “Contractual Requirements for Components and Materials Quality management”.

**Application Areas**Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

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## 7.9 SUPPLY REQUIREMENTS

VTT shall be supplied in single package, in order to ensure a proper protection during the transportation and storage.

Inside the package followings elements shall be supplied:

- VTT completely equipped;
- All accessories necessary for the complete installation and put in service VTT;
- Installation, operation and maintenance manuals;
- Any other device eventually needed for the operation VTT.

Out of the package followings indications shall be present:

- **enel** DSO;
- Name of supplier;
- Description of product;
- **enel** material and type code;
- Constructor designation and serial number;
- Gross weight;
- BAR Code compliant with CNS-O&M-S&L-2021-0032-EGIN.

### 7.9.1 Warranty

60 months of warranty period.

## 7.10 DOCUMENTATIONS TO BE PROVIDED IN TECHNICAL OFFER

Documentations:

- Check list to fill in for each **enel** type code see par.8.1;
- Drawings with overall dimensions;
- Supplier declaration of compliance of offered products with present TS and main standards and laws;
- Deviations letter (if any).

**Application Areas**

 Perimeter: *Global*

Staff Function: -

Service Function: -

 Business Line: *Infrastructure & Networks*

## 8 ANNEXS

### 8.1 CHECK LIST

<b>Technical specification:</b>		<b>Offer number:</b>	
<b>Constructor:</b>		<b>Site of production:</b>	
<b>enel type code:</b>		<b>Constructor type code or designation:</b>	
<b>enel material code:</b>			
Technical ratings		Request	Constructor offer
1	Service conditions	Paragraph 7.3	
2	Maximum altitude (m)	2700	
3	Minimum ambient air temperature (°C)	-5	
4	Severity degree of pollution (IEC 62271-304)	design class 2	
5	Seismic level; acceptance class	2 ;1	
6	Rated frequency fr (Hz)	50 and 60	
7	Rated voltage Ur (kV)	Table 2	
8	Rated power-frequency withstand voltage Ud (kV)	Table 2	
9	Rated lightning impulse withstand voltage Up (kV)	Table 2	
10	IP degree frontal case	2X	
11	Life expectancy (years)	40	
12	Overall dimension	See GSCM505	

**Table 5 - Check list**