



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

Version no. 2 dated 01/07/2022

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*

CONTENTS

1	DOCUMENT AIMS AND APPLICATION AREA	2
2	DOCUMENT VERSION MANAGEMENT	3
3	UNITS IN CHARGE OF THE DOCUMENT	3
4	REFERENCES.....	3
5	ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY	6
6	DEFINITIONS AND ACRONYMS	6
7	DESCRIPTION.....	8
8	ANNEXS.....	19

THE HEAD OF NETWORK COMPONENTS

Fabrizio Gasbarri

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 nominal voltage $U_r = 24kV$, vertical translation used in the GSCM690 “Family of AIS “compact” *enel* type technical specifications collection” to be installed in HV-MV and MV-MV substations 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 Distribuție Banat Enel Distribuție Dobrogea Enel Distribuție Muntenia

Table 1 - Distribution Companies

This document shall be implemented and applied to the extent possible within the Global Infrastructure and Networks 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 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.


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

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2 DOCUMENT VERSION MANAGEMENT

Version	Date	Main changes description
1	11/10/2021	Issuing of Global Infrastructure and Networks GSCM734 ed.0 “Voltage transformer trolley for air insulated “compact” switchgear family” technical specification.
2	01/07/2022	IEC and acceptance test updated

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 unit.

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;
- Enel Global Compliance Program (EGCP);
- Integrated Policy of Quality, Health and Safety, Environment and anti-Bribery;
- MAT-O&M-NCS-2021-0033-EGIN “Global Infrastructure and Networks GSCG002 Technical Conformity Assessment”;
- MAT-E&C-NC-2021-0057-GIN “Global Infrastructure and Networks GSCG003 - Employer’s Information Requirements for supplier components”;
- MAT-E&C-NC-2021-0064-GIN “Global Infrastructure and Networks GSCM690 - Family of AIS “compact” enel type, technical specifications collection”;
- MAT-O&M-NCS-2021-0036-EGIN “Global Infrastructure and Networks GSCM505 - Extractable, Vertical Translation, Three-Pole, Vacuum Circuit Breaker, Ur=24kV for air insulated “Compact” Switchgear Family”;

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

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-
- 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;
 - ISO 9001:2015 - Quality Management System – Requirements;
 - ISO 14001:2015 - Environmental Management System - Requirements with guidance for use;
 - ISO 45001:2018 - Occupational Health and Safety Management System - Requirements with guidance for use;
 - ISO 37001:2016 - Anti-bribery Management System - Requirements with guidance for use;
 - ISO/IEC 17000:2020 - Conformity assessment – Vocabulary and general principles;
 - ISO/IEC 17020:2012 - General criteria for the operation of various types of bodies performing inspection;
 - ISO/IEC 17025:2017 - General requirements for the competence of testing and calibration laboratories;
 - ISO/IEC 17050-1:2004 - Conformity assessment - Supplier’s declaration of conformity - Part 1: General requirements (ISO/IEC 17050-1:2004, corrected version 2007-06-15);
 - ISO/IEC 17050-2:2004 - Conformity assessment - Supplier’s declaration of conformity - Part 2: Supporting documentation (ISO/IEC 17050-2:2004);
 - ISO/IEC 17065:2012 - Conformity assessment – Requirements for bodies certifying products, processes and services;
 - IEC 62271-1 “High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear”;
 - IEC 62271-100 “High-voltage switchgear and controlgear - Part 100: Alternating current circuit-breakers”;
 - IEC 62271-102 “High-voltage switchgear and controlgear - Part 102: 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 61869-3 “Instrument transformers - Part 3: Additional requirements for inductive voltage transformers”;
 - IEC 60332-1-2 “Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical

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

Version no. 2 dated 01/07/2022

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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;
- IEC 60695-11-10 “Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods”;
- ISO 12944 “Paints and varnishes — Corrosion protection of steel structures by protective paint systems”;
- Regulation (EU) of the European Parliament and of the Council 517/2014 of the 16th April 2014.

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).

Argentina**Brazil**

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

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.

Colombia

- RETIE – Reglamento Técnico de Instalaciones Eléctricas.

Perú**Italy**

- D.Lgs n. 81 of the 9 of April 2008 and subsequent modifications;
- D.P.R. n. 43 of the 27th of January 2012;


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

Version no. 2 dated 01/07/2022

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

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Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

- Nota Operativa PVR001 – Rev. 2 – Ott. 2012 - Gestione Garanzie dei materiali di ENEL Distribuzione.
- GUI 101 “Caratteristiche generali e prescrizioni di impiego del pallet in legno da utilizzare per imballo di trasporto”.

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.

Romania

- Prescriptia Energetica PE 101/85 – Normativ pentru construcția instalațiilor electrice de conexiuni și transformare cu tensiuni peste 1 kV;
- GUI 101RO "Caracteristicile generale și cerințele de utilizare ale paletului de lemn care urmează să fie utilizat pentru ambalarea de transport.

5 ORGANIZATIONAL PROCESS POSITION IN THE PROCESS TAXONOMY

Value Chain/Process Area: Engineering and Construction

Macro Process: Devices and Components Development

Process: Standard Catalog Management

6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
High Voltage (HV)	Electrical system with 230kV to 35kV nominal operative voltage between the phases
Medium Voltage (MV)	System with a nominal operative voltage between the phases higher than 1 kV to 35 kV included. NOTE: The boundary value between medium voltage and high voltage depends on local and historical circumstances or on common usage. Nevertheless for internal standardization purposes, medium voltage is defined as a system with a nominal operative voltage between the phases higher than 1 kV to 35 kV included”


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

Version no. 2 dated 01/07/2022

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Application Areas
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Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

Technical Conformity Assessment (TCA)	<p>A “conformity assessment”¹ with respect to “specified requirements”² 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</p>
Type A documentation	<p>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</p>

¹ Definition 2.1 of ISO/IEC 17000

² Definition 3.1 of ISO/IEC 17000

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

7 DESCRIPTION

7.1 LIST OF COMPONENTS

Type code	Description
GSCM734/1	Voltage Transformer Trolley (VVT) for GSCM690 Ur=12 kV
GSCM734/2	Voltage Transformer Trolley (VVT) for GSCM690 Ur=17,5 kV
GSCM734/3	Voltage Transformer Trolley (VVT) for GSCM690 Ur=24 kV

Material codes please refer to Annex B.

7.2 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).

Manufacturer shall define the Ur 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 of IEC 62271-304.

7.3 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.


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

Version no. 2 dated 01/07/2022

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enei Type	GSCM734/1	GSCM734/2	GSCM734/3
Rated Voltage Ur (kV)	24		
Rated power-frequency withstand voltage Ud (kV)	50		
Rated lightning impulse withstand voltage Up (kV)	125		
Rated frequency fr (Hz) *	50 or 60		
VT transformer to install	According to enei indication and compliant with GSCM690 and GSCM505 maximum dimensions		
VT's Rated Voltage Ur/Ud/Up (kV)	12/28/75	17,5/38/95	24/50/125
Number of VT	3	3	3
IP degree of frontal case	2X		

Table 2 - Technical characteristics
7.4 CONSTRUCTION CHARACTERISTICS
7.4.1 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 (see annex G GSCM690).

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

7.4.2 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.

Application Areas
Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

7.4.3 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 7.4.6).

7.4.4 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.

7.4.5 Earthing contact

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

7.4.6 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.

7.4.7 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.

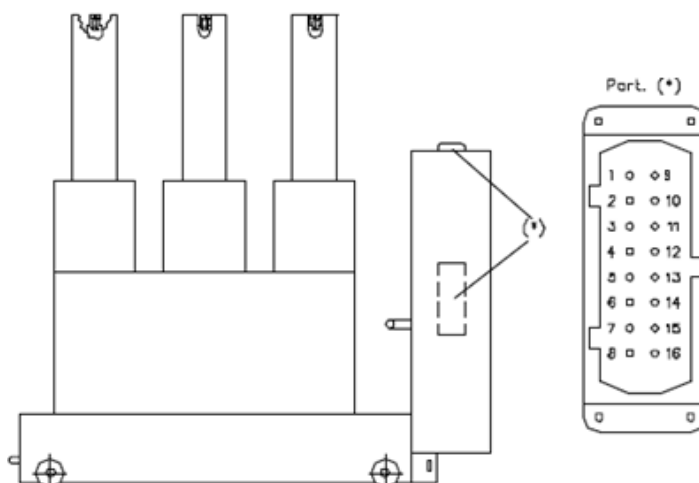


Figure 1 – Lateral view and LV connector


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

Version no. 2 dated 01/07/2022

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

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Business Line: *Infrastructure & Networks*

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

LV 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 $< 2,5\ \mu\text{S}/\text{mm}$; pH $> 4,3$;
- d1: No flaming droplets/particles persisting longer than 10 s within 1200 s.

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

Data sheet of LV cable shall be present as type A documents.

7.4.8 Voltage Transformer

For each VTT shall use a Voltage Transformer (VT) compliant with **enel** local standard.

Manufacturer shall check that overall measures of VTT included the VT, are compliant with GSCM690 and are contained in the maximum measures of GSCM505.

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 Manufacturer.

7.4.9 Clamp contacts

Clamp contacts shall be designed 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 to permit after a disconnection of VTT from bus bar, that the clamp return to pre-connection position.

7.4.10 Lifting devices

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


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

Version no. 2 dated 01/07/2022

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

Application Areas
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Business Line: *Infrastructure & Networks*

7.4.11 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.

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.

7.4.12 Protective coatings

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

- Durability: High (H);
- Atmospheric - corrosivity category:C3.

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

7.5 MANUALS

Manufacturer 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.

7.6 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;
- 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).


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

Version no. 2 dated 01/07/2022

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

7.7 TESTING

Type, routine and factory acceptance tests shall be performed in compliance with IEC 62271-1, IEC 62271-102, IEC 62271-200 and the clarifications indicated in the following paragraphs.

Technical conformity assessment (TCA) process shall be compliant with GSCG002.

Drawings included in the type A documentations shall be compliant with GSCG003.

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

Manufacturer shall produce a “values declared by Manufacturer” document necessary for Routine Test to be insert in TCA report.

7.7.1 Lists of type test

Type test	Reference
Constructive features and interlock functionality verifications	Par. 7.7.3.1
Mechanical operation tests	Par. 7.7.3.2 Par. 7.102 of IEC 62271-200 ed.3
Dielectric tests: <ul style="list-style-type: none"> • Power-frequency voltage tests for main circuit; • Lightning impulse voltage test; • Partial discharge; • Power-frequency voltage tests for auxiliary circuit. 	Par. 7.7.3.3 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. 7.7.3.4 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 Par. 7.7 of IEC 62271-200 ed.3
Ageing and humidity test	Par. 7.7.3.5 IEC 62271-304
Seismic test	Par. 7.7.3.6 IEC TS 62271-210
Protective coating verifications	ISO 12944
Flammability tests	Par. 7.7.3.7


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

Version no. 2 dated 01/07/2022

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Service Function: -

Business Line: *Infrastructure & Networks*

	IEC 60965-11-10
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Table 3 - Type Test

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

7.7.2 List of routine test

Routine test	Reference
Type correspondence verifications	Par. 7.7.4.1 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. 7.7.4.2 Par. 8.101 of IEC 62271-102 ed.2 Par. 8.102 of IEC 62271-200 ed.3
Dielectric test on the main circuit	Par. 8.2 of IEC 62271-102 ed.2 Par. 8.2 of IEC 62271-200 ed.3
Tests on auxiliary and control circuits	Par. 8.3 of IEC 62271-102 ed.2 Par. 8.3 of IEC 62271-200 ed.3
Measurement of the resistance of the main circuit	Par. 7.7.4.3 Par. 8.4 of IEC 62271-102 ed.2 Par. 8.4 of IEC 62271-200 ed.3
Partial discharge verification	Par. 7.7.4.4
Protective coating dimensional check	Par. 7.7.4.5 and Main standards applicable

Table 4 - Routine test

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

7.7.3 Type test

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

Manufacturer shall define the VT to use for type test considering the maximum dimensions of VCB GSCM505.

7.7.3.1 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 Manufacturer in compliance with **enel** drawings and specifications; verification of the template accuracy is in charge of Manufacturer.


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

Version no. 2 dated 01/07/2022

Subject: Global Infrastructure and Networks – GSCM734 Voltage transformer trolley for air insulated “compact” switchgear family
Application Areas
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Service Function: -

Business Line: *Infrastructure & Networks*

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

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 GSCM690 annex N 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 Manufacturer during the TCA.

Furthermore, LV cabling shall be verified in compliance with paragraph 7.4.7 and nameplates shall be verified in compliance with paragraph 7.6.

7.7.3.2 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.

7.7.3.3 Dielectric tests

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

Check of Partial Discharges (PDs) shall be performed with the following indication:

- Test shall be preferably performed on VTT inside functional switchgear GSCM731, where is possible, alternative configuration could be used by manufacturer under own responsibility;
- 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 be declared and checked by Manufacturer ensuring the correct functionality of VCB installed inside its functional unit switchgear GSCM731

7.7.3.4 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.


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

Version no. 2 dated 01/07/2022

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*
7.7.3.5 Ageing and humidity test

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

7.7.3.6 Seismic test

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

7.7.3.7 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.

7.7.4 Routine test

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

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.

7.7.4.1 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) Constructive features check with drawings schemes and pictures of the approved type A documentations.

7.7.4.2 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.

List of tests necessary to verify the mechanical operation and interlocks and their procedure shall be defined by Manufacturer under own responsibility, a line guide present in the par. 8.12.4 GSCM690 annex N, could be take in the account from Manufacturer.

7.7.4.3 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.


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

Version no. 2 dated 01/07/2022

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*
7.7.4.4 PDs verification

Manufacturer shall perform PDS measures compliant with the method used for type test described on the par. 7.7.3.3.

Maximum values shall be defined by the Manufacturer it orders of magnitude shall be close to the values indicated by IEC 62271-200 ed.3 annex B.

7.7.4.5 Protective coating dimensional check

Protective coating dimension declared during TCA shall be checked using the main standards applicable.

7.7.5 Factory acceptance test

Factory acceptance tests shall be carried out on a sample basis, on a number of samples which depends on the consistency of the supply according to the conditions establish in the document WKI-QPT-CMQ-2020-0019-EGIN “Contractual Requirements for Components and Materials Quality management”.

Factory acceptance tests shall be the same of the Routine tests with the following clarifications:

- Dielectric tests on auxiliary and control circuits foreseen in routine “Tests on auxiliary and control circuits” shall be only a documental verification of routine tests performed;
- Measurement of the resistance of the main circuit shall be only a documental verification of routine tests performed;
- PDs verification shall be only a documental verification of routine tests performed.

7.8 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 (VT's included);
- Manufacturers' IEC certification for VT's;
- All accessories necessary for the complete installation and put in service VTT;
- Installation, operation and maintenance manuals;
- Only for Spain, annex D.2 GSCG002 for each equipment supplied;
- 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;

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

Version no. 2 dated 01/07/2022

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*

- Manufacturer designation and serial number;
- Gross weight;
- BAR Code compliant with CNS-O&M-S&L-2021-0032-EGIN.

Package shall be assembled for delivering as prescribed in **enel** standard.

7.8.1 Warranty

60 months of warranty period.

7.9 DOCUMENTATIONS TO BE PROVIDED IN TECHNICAL OFFER

Documentations:

- Check list see annex A to fill in for each **enel** type code;
- Deviations letter (if any).


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

Version no. 2 dated 01/07/2022

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*

8 ANNEXS

8.1 ANNEX A - CHECK LIST

Technical specification:		Offer number:	
Manufacturer		Site of production:	
enel type code:		Manufacturer type code or designation:	
enel material code:			
Technical ratings		Request	Manufacturer offer
1	Service conditions	Paragraph 7.2	
2	Maximum altitude (m)	1000	
3	Maximum altitude only for Colombia(m)	2700	
4	Minimum ambient air temperature (°C)	-5	
5	Severity degree of pollution (IEC 62271-304)	design class 2	
6	Seismic level; acceptance class	2 ;1	
7	Rated frequency fr (Hz)	Country information before tender	
8	Rated voltage Ur (kV)	Table 2	
9	Grid rated Voltage (kV)	Country information before tender	
10	Maximum grid rated voltage (kV)	Country information before tender	
11	Rated Voltage Ur (kV) to 2700 m	Manufacturer information	
12	Rated power-frequency withstand voltage Ud (kV)	Table 2	
13	Rated lightning impulse withstand voltage Up (kV)	Table 2	
14	IP degree frontal case	2X	
15	Life expectancy (years)	40	
16	Overall dimension	See GSCM505	
17	Protective coatings (durability/category)	H/C3	

Table 5 - Check list

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

Version no. 2 dated 01/07/2022

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*

8.2 ANNEX B – MATERIAL CODES

Type code	Argentina	Brazil	Chile	Colombia	Italy	Perú	Rumania	Spain
GSCM734/1					140133			140754
GSCM734/2					140131			140753
GSCM734/3					140130			140752

Table 6 - Local of material codes