



Subject: Global Infrastructure and Networks – GSCM770 MV Section for Primary Substation in container solution

Application Areas

Perimeter: *Global*

Staff Function: -

Service Function: -

Business Line: *Infrastructure & Networks*

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THE HEAD OF Network Components Standardization
Maurizio Mazzotti

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1 DOCUMENT AIMS AND APPLICATION AREA

This document contains technical specifications for early installations of Container as in “Liberty1” project in the HV/MV substations (primary 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 Distribuție Banat Enel Distribuție Dobrogea Enel Distribuție 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
1	28/05/2021	Issuing of “Global Infrastructure and Networks GSCM770 MV Section for Primary Substation in container solution” technical specification

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3 UNITS IN CHARGE OF THE DOCUMENT

Responsible for drawing up the document:

- Global Infrastructure and Networks: Operation and Maintenance / Network Components Standardization unit.

Responsible for authorizing the document:

- Global Infrastructure and Networks: Head of Operation and Maintenance 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: Networks Management

Macro Process: Materials management

Process: Network components standardization

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6 DEFINITIONS AND ACRONYMS

Acronym and Key words	Description
Manufacturer Product	Component manufactured by a Supplier in accordance with a technical specification
Technical Conformity Assessment (TCA)	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
Conformity assessment body	Body that performs the conformity assessment activities [ISO 17000]
Enel Equipment Key code	It's an equipment representative for a group (family) of similar equipment chose by Enel
Enel Equipment Family code	Equipment belonging to a specific group (family) in which another equipment is identified as key code
TCA systems	The “conformity assessment systems”, is applicable specifying that the rules and procedures to carry on the TCA are those specified in the present document
Type A documentation	Not confidential documents used for product manufacturing and management from which it is possible to verify the product conformity to all technical specification requirements, directly or indirectly

¹ Definition 2.1 of ISO/IEC 17000

² Definition 3.1 of ISO/IEC 17000

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Type B documentation	Confidential documents used for product manufacturing and management where all product project details are described, in order to uniquely identify the product object of the TCA
TCA report	Document describing the activities carried out for TCA
TCA dossier	Set of final documents delivered by the Supplier for the TCA
Material LifeCycle Management (MLM)	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

List of components please refer to ANNEX B.

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

- ISO 668:2020 “Series 1 freight containers — Classification, dimensions and ratings”;
- IEC 62271-1 “High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear”;
- IEC 62271-202 “High-voltage switchgear and controlgear - Part 202: High-voltage/ low-voltage prefabricated substation”;
- IEC-TS 60815-1 “Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles”;
- 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”.

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”;
- GSCM1674 “Family of AIS “compact” **enel** type, routine test procedure”;
- GSCM739 “Family of AIS “compact” **enel**, auxiliary components”;

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- GSCM505 “Extractable, vertical translation, three-pole, vacuum circuit breaker, Ur=24kV for air insulated “compact” switchgear family”;
- GSCB003 “Stationary lead – acid battery VRLA type for HV-MV substation and MV-MV substation”;
- GSCM734 “Voltage transformer trolley for air insulated “compact” switchgear family”;
- GSCM735 “Earthing trolley for air insulated “compact” switchgear family”;
- GSTZ111 “Power Supply Station (PSS) for HV/MV Substation”;
- GSTZ111_A1 “Addendum GSTZ111”;
- GSTZ112 “Power switchgear and controlgear assembly (PSC) for HV/MV Substation”;
- GSTZ112_A1 “Addendum GSTZ112”;
- GSCT007 “Toroidal current transformers for MV cable for indoor”;
- GSC001 “Underground Medium voltage cables”;
- 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 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;
- Nota Operativa PVR001 – Rev. 2 – Ott. 2012 - Gestione Garanzie dei materiali di ENEL Distribuzione;
- EA0143 “Lampada portatile ricaricabile a luce LED”.

7.2.4 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

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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 .

7.2.5 Rumania

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

7.2.6 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, Enero 2016.

7.2.7 Brazil

- NR-10 - segurança em instalações e serviços em eletricidade.

7.2.8 Peru

7.2.9 Colombia

- RETIE - Reglamento Técnico de Instalaciones Eléctricas.

7.2.10 Argentine

7.2.11 All European Countries

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

7.3 SUPPLY CONFIGURATION

The supply shall be configured as below:

- Assembly of Medium Voltage (MV) Air Insulated Switchgear (AIS) compliant with GSCM690 “Family of AIS “compact” **enel** type technical specifications collection”;
- Completely assembling and cabling of MV AIS and LV equipment (protection relays, LV cabinet etc) compliant with **enel** drawings;

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- Accessories for assembly of MV Switchgear compliant with GSCM739;
- Current Transformer (CT) compliant with GSCT007 to be installed inside the MV switchgear for protection function;
- CT homopolar compliant with **enel** standard to be installed inside the interspace under container floor for line switchgear;
- Voltage Transformer (VT) trolley compliant with GSCM734;
- Vacuum Circuit Breaker (VCB) trolley compliant with GSCM505;
- Earthing trolley compliant with GSCM735;
- Protection relays installation;
- N°10 Low Voltage (LV) rack with self-supporting structure, with dimensions 600X600 mm for LV equipments cabling according to **enel** drawings;
- Air-conditioning system;
- Smoke detector system;
- Pest control repeller system;
- Internal LV power system complaint with GSTZ112;
- Internal and external (on top of container) light system;
- Earthing system;
- Energy station compliant with GSTZ111 and VRLA battery compliant GSCB003;
- Remote terminal unit system installation and LV/OF cabling;
- MV cable terminations for transformer functional unit and bus bar tie functional unit, suitable for **enel** GSC001 copper 630mm² MV cables, provided under Constructor responsibility compliant with relevant standards;
- Operation and safety equipment (signals, fire extinguisher etc.);
- Electrical and mechanical design of all systems;
- Services:
 - Transportation, unloading and installation in all **enel** site;
 - All that is needed for unloading, positioning and final assembly of Container will be Supplier's responsibility;

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- TCA compliant with MAT-O&M-NCS-2021-0033-EGIN;
- Factory commissioning;
- Site commissioning and start up support.

7.4 SERVICES EXCLUDED FROM SUPPLY

Followings equipment, excluded from supply, shall be installed inside the container by constructor:

- Protection relays;
- RTU;
- Teletransmission equipment.

Installation and cabling of previous equipment shall be performed by Constructor.

7.5 SERVICE CONDITIONS

Container shall be installed to outdoor and fit for installation in three-phases MV effectively and non-effectively earthed neutral system.

Environmental values refer to normal outdoor condition according IEC 62271-1 with following special condition added:

- Maximum altitude 1000 m and 2700 m for Colombia;
- Maximum temperature 55 °C;
- Minimum temperature -30 °C;
- Relative humidity 98%;
- Maximum wind speed: 40 m/s;
- Maximum snow load on horizontal projection: 1,95 kN/m²;
- Very heavy (e) pollution compliant with IEC-TS 60815-1;
- Seismic level: AF5.

7.6 TECNICAL CHARACTERISTICS

Container shall be compliant with standards described in the paragraph 7.2, table below and in the following paragraphs.

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enel Type	GSCM770/1_2
IP degree of container	33
IK degree of container	10
Operation	indoor
IAC degree	A
Dimensions	Annex D

Table 2 - Container features

7.6.1 Casing and structure

Container for outdoor installation shall have a metallic self-supporting structure built in profiles, insulated panels and corner blocks, similar to containers for oversea transport and with minimum thicknesses:

- 3 mm for sheet metals used for pillars;
- 2 mm for regular steel sheets used for internal panels and for inox steel sheets used for external infills (cover, slats, doors, hatches etc...).

Insulated panels for external walls can be built with 2 mm thick internal aluminum sheet and with 1.5 mm external inox steel sheet.

Internal surfaces shall be made of 2 mm thick steel or 2 mm aluminum, so this prescription is valid for walls and ceiling.

The structure must be resistant enough in order to be transported and installed on mounting brackets in one single block without being disassembled in multiple parts. Diagonal tie rods to maintain squaring between edges are not allowed.

The waterproof container will be equipped with apposite slots for ventilation and gas venting, appropriately shielded in order to ensure IP33 protection level.

7.6.2 Mounting brackets and loading/unloading system

Mounting brackets shall be defined according Constructor design, in any case correct functionality of equipment inside the container shall be guaranteed even in maximum deformation conditions.

They will be equipped with attachment for fixing to the structure on one side and with support plate on the other. Their nominal height will be 90 cm. The surface of support plates shall be sized for a specific pressure on the ground lower than 10 N/cm².

Mounting brackets shall be preferably fixed to container's platform through twist locks, and they must be bounded to the concrete foundation with chemical or mechanical anchors, whose dimensions must be in accordance with environmental conditions described at paragraph 7.5.

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Unload operation must be able to take place through four removable hydraulic jacks, suitable to lift the whole structure from the vehicle and to place it on mounting brackets, without other lifting means. The jacks will be single operation to level the container and then mechanically coupled in pairs (those on the short side) for lifting or lowering it on the truck bed or on definitive mounting brackets. The stroke of hydraulic jacks must be adequate for the movement required to load and unload the container on the truck bed or on mounting brackets. A kit of hydraulic jacks will be provided for each container.

Unload operation from vehicle must be able to take place through crane. Minimum requirements for crane shall be specified by the Supplier.

The container shall be crane liftable by hooking upper corner blocks only.

7.6.3 Dimensions

Container dimensions shall be compliant with annex C and D.

Overall dimensions and weight of container in transport operating conditions are mandatory with reference to ISO 668 2020, other external dimensions of container are indicative and subject to **enel** approval.

7.6.4 Cable outlets

MV/LV cable outlets must be arranged on the floor and equipped with anti-animal closure, both with MV section out of order (without cables) and in service (with cables installed).

In order to place homopolar/phase CTs, bars to be installed on holes prepared on the base structure must be provided.

7.6.5 Hatches

The container shall have, on both long sides, double hatches for access, each one made by upper and lower hinged half doors. Therefore, they can be overturned one upward and the other downward.

These hatches are provided with security mechanical stop in open position. They shall be moved by manually operated screw jacks with reduction mechanism.

The screw jacks shall be prepared for a motor command installation, optionally supply of hydraulic jacks actioned by hydraulic power unit installed on short side of container with external access (see paragraph 7.8.3) could be requested.

Lower hatches will lay on shelves bounded to the base structure of the container during installation. Shelves must be provided with adjustment devices in order to achieve perfect levelling of the hatch, which is mandatory condition in order to continue the assembly. Two adjustable struts shall be included for each side in order to support the hatches.

Two recessed guides will be made on the lower hatch, so that the circuit breaker platform can slide in constrained position. This platform must be equipped with a suitable device to lock it in a defined position on the front of each MV compartment.

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A device shall be built in order to block the trolley on the platform during handling.

Each Container must be equipped with two platforms.

Whenever replacement or maintenance of circuit breakers needs be performed, it is necessary to move them safely from inside the container to outside. For this reason, the Supplier will provide a steel structure that will lean on the landing of the stair and will be joined and connected to the platform, so that the trolley can be moved through the container's door.

7.6.6 Walls

Walls shall be installed on the outer perimeter of hatches once the assembly of MV switchgear is placed on site, in order to create continuous corridors between switchgear cells front and the walls themselves.

All junctions must be made carefully to avoid water infiltrations. Particular care must be taken on their profiles and on interposed gaskets.

7.6.7 Floor

Walking surfaces of the container shall be non-slip, made of checkered aluminum sheets.

The floor of the central corridor can be made of steel if it has structural function. It must have anti-slip surface. Apposite profiles must be laid where differences in planarity on walking surface occur, for example on the hinge of the lower hatch, in order to avoid dangers.

7.6.8 Doors and stairs

The container shall be equipped with 3 entrance doors, as shown in drawings, with minimum width 900 mm and minimum height 2100 mm.

The door on the short side shall have an unbreakable glass on the upper side with minimum surface of 0,45 m².

Each door will be equipped with external lock, internal panic bar and a position detector able to send an alarm when the door is open.

The three lockers must be openable with a security key with the same encryption.

A stair with steps and landing in grating steel and double handrail shall be supplied for each door. It must be disassemblable in order to be carried inside the container during transportation.

Each door shall be equipped with a chain or lever mechanism able to lock it in open position.

Stair sides shall be made of hot zinc plated steel or inox steel. The latter won't be painted but brushed.

Steel steps and stair landing made of inox steel or hot zinc plated steel, shall be compliant with the main standard applicable the max weight withstood shall be indicated by constructor in order to guarantee the correct functionality and accessibility of container.

The stair landing shall be provided of side footbeds.

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7.6.9 Cover

A cover made of metal reticular structures properly attached to the top of the container must be installed.

These structures support some crosspieces on which insulated panels (thermal cover) lay.

Panels protrude 500 mm from the plan shape of the container.

Minimum panel's thickness is 40 mm. Eventual corrugations could be necessary to strengthen the structure in order to bear wind, snow and accidental loads (see paragraph 7.5.).

Panels shall be made with inox steel sheets on both sides, with 0,6 mm thickness. An insulating layer is interposed between sheets, made of self-extinguishing polyurethane resins with superior non flammability characteristics and CFC-free.

A sheet metal shall be fixed on the top, with an interposed gasket for water tightness. It has to replicate inclination and corrugation of cover panels.

Both sides of the cover shall end on an inox steel channel, made to gather rainwater and for finishing.

Tubes with 80 mm diameter and 100 mm length must be welded on the channels ends, in correspondence of the beginning of the container. They will eventually allow to install a descending tube.

On headers an inox steel flashing will be applied, with finishing function.

Overall height of the cover from container's roof to the top shall be about 850 mm, while channels will be placed about 1000 mm under the top of the cover, so that proper ventilation is guaranteed and, on side view, there will be superposition between cover and container.

All materials described above must be treated with the same painting cycle used for the container and described at paragraph 7.6.10.

The structure of cover shall be completely supported by the container. Hot zinc plating is allowed for structures that support cover panels. From the ground point of view the cut section of panels mustn't be visible, indeed channel's edge is expected to be higher. Alternatively, panel's edges shall be closed with a sheet metal properly fixed. Channel and lower side of panels can be unpainted.

7.6.10 Material and protective coating

Container and all its auxiliary structure shall be in the following materials:

- stainless steel ;
- carbon steel.

carbon steel is allowed for following structural parts:

- the container's platform.
- the four corner posts.
- the four perimeter side members of the roof.

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- supports that bear the lower hatch when open.

The bolting and accessory part like hinges, air conditioner brackets, headlight brackets, gas expulsion grids etc shall be in the stainless steel.

Container shall have a protective coating for carbon steel and stainless steel compliant with ISO 12944 with the following features:

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

Stainless steel and carbon steel could have different protective coating.

7.6.11 Nameplates

Container shall be equipped with a nameplate where data indicated by IEC 62271-202 shall be listed.

Also on the nameplate shall be included the followings indications:

- **enel** type;
- **enel** material code;
- QR code compliant with CNS-O&M-S&L-2021-0032-EGIN;
- Empty, transportation and installation container weight.

7.6.12 Manuals

Constructor shall produce the operation, maintenance and safety manuals for container compliant with IEC 62271-202.

MV and LV equipment manuals shall be supplied, too.

Minimum time of maintenance for container shall be 120 months.

All safety indications and signals shall be supplied and installed by constructor.

Manuals shall be in supply country language.

7.7 ASSEMBLY OF MV SWITCHGEAR COMPOSITION AND SYSTEM INCLUDED IN THE CONTAINER

MV assembly of switchgear has no structural function. For this reason, supports can't be installed between switchgear and container's roof.

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7.7.1 Assembly of MV switchgear

Assembly of MV switchgear compliant with GSCM690 AIS “compact” **enel** type technical specifications collection” with TCA in force shall be supplied by constructor.

7.7.1.1 GSCM770/1

This type of container shall be used as half MV section of primary substation.

Assembly of MV switchgear shall be constituted by the following functional unit:

- n° 1 GSCM697;
- n° 12 GSCM696. If required GSCM696 should be substituted by GSCM730 or GSCM699;
- n° 1 GSCM698;
- n° 1 GSCM731;
- n° 1 GSCM700;
- n° 1 GSCM738.

7.7.1.2 GSCM770/2

This type of container shall be used as MV section of primary substation.

Assembly of MV switchgear shall be constituted by the following functional unit:

- n° 2 GSCM697;
- n° 11 GSCM696. If required GSCM696 should be substituted by GSCM730 or GSCM699;
- n° 2 functional units switchgear GSCM698 with MV cables and terminals installation;
- n° 2 functional units switchgear GSCM731;
- n° 1 functional unit switchgear GSCM700.

7.7.2 Key interlocks

The auxiliary MV/LV transformer shall be installed outside of container.

The transformer cabinet key, necessary to open the door shall be interlocked with the key of the earthing switch present on functional unit switchgear GSCM730 that will be free only when earthing switch will be closed.

7.7.3 Vents for gas overpressure

External openings for gas overpressure vent shall be realized in line with assembly of switchgear duct (placed 1820 mm above the floor), with tolerance that can allow correct coupling without modification of direction and/or cross section of the channel itself.

7.7.4 Air-conditioning system and ventilation system

Air conditioning system compliant with the relevant standard shall be installed for the container, it shall be composed by two “no house solution” conditioner/heat pump utilizing inverter technology.

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Rated power of each conditioning shall be equal or higher than 80% of the power needed, in order to have acceptable conditions in case of failure of one unit.

These conditioners shall be powered by two separated electrical circuits, in order to be completely independent.

Air conditioning shall be able to guarantee, internal temperatures of 25 °C during hot season and 15 °C during cold season.

Relative humidity shall be kept below 80% by the system.

Conditioners shall have the following signalizations from instrument installed in the container:

- Generic alarm;
- Maximum and minimum temperature of container;
- Maximum humidity.

Ventilation slots shall be shielded, and their protection must be IP 33 or higher.

If conditioners lack of external air intake, necessary for air circulation inside the container, the Supplier shall provide a stand-alone ventilation system. Minimum diameter for the ventilator is 250 mm and the air intake must be openable only when ventilator is on, so that conditioned air is not dissipated outside.

On the opposite wall an opening shall be installed to allow air exit. Opening flaps will open only in reaction to overpressure generated by ventilator.

7.7.5 Lighting system

Internal and external lighting system shall be designed in conformity to relevant standards in order to guarantee proper visibility during operations.

Lighting system shall be energy-saving type (for example to LED devices) composed by quality marked components, compliant with AC Voltage according to local electrical LV distribution system.

Lighting system shall be divided to two separate systems, services lighting (internal and external) and emergency lighting (internal and external).

The lighting system shall be powered from one AC LV switch site on LV auxiliary board.

External services lighting system shall be made by lighting devices above each container door.

External services lighting system shall be activated either automatically from dusky system or by manual switch trough a selector inside the container.

The container shall be equipped with three portable emergency LED spotlights with rechargeable battery.

Portable emergency LED spotlights shall have technical features compliant with EA0143 and shall be installed near each container door.

7.7.6 LV power system

LV power system AC Voltage to local electrical LV distribution system shall be composed by:

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- Switchboard placed at container's entrance on the wall of the head compartment, including:
 - n° 1 C.E.E. socket 3p+g rated 32 A, equipped with plug and fuses;
 - n° 2 C.E.E. sockets 2p+g rated 16 A, interlocked and equipped with plug;
 - n° 2 standard sockets, rated 16 A ;
 - n° 3 10 A sockets to power portable spotlights;
 - n°3 multistandard sockets rated 16 A in each corridor, distributed at regular intervals.

7.7.7 LV cable and conductors

LV connections of all LV equipment and installed MV assembly switchgears shall be of proper dimensions and shall be compliant with features described in the **enel** drawings.

The minimum insulation level shall be 0,6/1kV for cable and 450/750V for conductor.

The minimum fire reaction of LV cable and conductors shall be 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.

7.7.8 Earth circuit

A copper conductor of proper cross section shall be installed inside the container according to **enel** drawings.

Such ring will be connected with all equipment and systems and shall be accessible from the outside at least in two easily reachable points, placed on each short side of the container. earth connections with HV/MV Substation's earth electrical circuit will be possible through these points.

7.7.9 Smoke detecting system

Smoke detecting system compliant with the relevant standard shall be installed in the container.

Alarm of anomaly system and smoke presence signaling shall be made available from smoke detecting system.

7.7.10 Pest control repeller system

Pest control repeller system shall repel or eliminate pests, usually rodents or insects.

This system shall be compliant with the relevant standard.

Alarm of anomaly system signaling shall be made available from this system.

7.7.11 Accessories

Following accessories must be supplied/installed:

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- An edged C-profile shall be fixed on each corridor wall through all its length. It must be suitable to support both removable tables and convectors (eventually requested by option, see paragraph 7.8.1.);
- Three removable tables for each corridor installed on the wall-fixed profile. Their tabletop will be about 320 x 900 mm and able to bear a 15 kg load;
- Two folding chairs with small footprint;
- A pressed cork notice board with inox steel frame and dimensions 1,00 m x 0,80 m shall be fixed on the right corridor's wall close to transition from cabinets and MV assembly switchgear.

7.8 OPTIONAL SUPPLY

Following additional systems shall be supplied if requested.

7.8.1 Harsh climate setup

Containers for locations characterized by harsh winter climate will be powered with:

- Installation on the cover of appropriate snow hooks close to the channel;
- Installation of a self-regulating heating cable on the channel powered with dedicated switch from LV auxiliary services.

Installation of four removable convectors rated 2000 W for each side corridor, locked to the wall-fixed profile. They will be powered through sockets with interlocked switches located on the upper part of the wall.

Power supply will be provided by a dedicated circuit installed on auxiliary service switchboard and driven by a thermostat placed in the center of the container. Being this an integration to standard included heating system, its operation will be independently managed and not interlocked with conditioners operation.

7.8.2 MV connection between GSCM698

MV connection between GSCM698 functional units shall be constituted by the following material:

- 2 cable copper cable 630 mm² for each phase compliant with GSC001;
- Stainless structure for fixing and supporting of MV cable under the container.

7.8.3 Oil dynamic system for hatches opening (“mobile” container)

Container utilized as “mobile station” could optionally be equipped with oil dynamic system for hatches opening (see paragraph 7.6.5).

The hydraulic power unit if requested, shall be positioned on the rear short side, and shall be accessible from outside.

7.8.4 Phase CT's for GSCM697 and GSCM698

CT's compliant with GSCT007 to be installed inside the interspace under container floor for transformer energy measurement.

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7.9 TYPE, ROUTINE AND ACCEPTANCE TESTS

Type and routine test shall be performed in compliance with IEC 62271-202 and the clarifications indicated in the followings paragraphs.

7.9.1 Lists of test

7.9.1.1 List of type test

In the table below is described a type test list.

Type test	Reference
Constructive features verifications	Par. 7.9.2.1
Dielectric tests of MV connections and main LV connection	Par. 6.2 of IEC 62271-202 ed.2;
Short-time withstand current and peak withstand current tests for earth circuit	Par. 6.6 of IEC 62271-202 ed.2
Degree of protection verifications	Par. 6.7 of IEC 62271-202 ed.2
Electromagnetic compatibility tests (EMC)	Par. 6.9 of IEC 62271-202 ed.2
Additional tests on auxiliary and control circuits and check of electric scheme	Par. 6.10 of IEC 62271-202 ed.2
Calculations and mechanical tests	Par. 6.101 of IEC 62271-202 ed.2
IAC test	Par. 6.102 of IEC 62271-202 ed.2
Protective coating verifications	ISO 12944

Table 3- Type Test

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

7.9.1.2 List of routine test

In the table below is described a routine test list.

Routine test	Reference
Type correspondence verifications	Par. 7.9.3.1
Dielectric test on the high voltage interconnection	Par. 7.101 of IEC 62271-202 ed.2
Voltage withstand tests on auxiliary circuits	Par. 7.102 of IEC 62271-202 ed.2
Functional tests	Par. 7.103 of IEC 62271-202 ed.2 Par. 7.9.3.2
Verification of correct wiring	Par. 7.104 of IEC 62271-202 ed.2
Protective coating verifications	ISO 12944
Routine Tests on Assembly of MV Switchgear	GSCM1674

Table 4 - Routine test

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

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7.9.2 Type tests

The number of test specimen shall be compliant with par 6.1 of IEC 62271-202 ed.2, tests shall be performed on exemplars fully equipped as for ordinary use.

7.9.2.1 Constructive features verifications

Compliance with the present TS with features of container shall be checked.

Dimensions, compositions and apparatuses described in the present TS shall be checked.

Material verifications shall be performed by documentations checking.

Nameplates shall be verified in compliance with paragraph 7.6.11.

Furthermore the integrity of container shall be checked: deformations, damages and irregularities shall not be present.

7.9.3 Routine and Acceptance tests

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.

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

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 “Contractual Requirements for Components and Materials Quality management”.

For routine and acceptance tests reference values and acceptability ranges defined in the TCA Report shall be considered.

7.9.3.1 Type correspondence verifications

Test shall be performed on Container fully equipped as for ordinary use, 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 according to type A documentations;
- c) IP degree verification.

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7.9.3.2 Functional tests

Test shall be performed on Container fully equipped as for ordinary use in compliance with the paragraph 7.103 of IEC 62271-202 ed.2.

Following functional verification and check shall be performed:

- a) Container functionality;
- b) Internal and external lighting systems;
- c) Air conditioning system;
- d) Smoke detector system;
- e) Pest control repeller system;
- f) LV equipment;
- g) Signalling and safety panels presence.

7.10 COMMISSIONING AND START UP**7.10.1 List of Commissioning activities**

Below are listed the commissioning activities to perform in manufactory factory and site.

- a) Tests after assembly on site (reference to Par. 7.105 of IEC 62271-202);
- b) Verification of internal and external lighting systems;
- c) Verification of air conditioning system;
- d) Smoke detector system verification;
- e) Pest control repeller system verification;
- f) MV assemblies switchgears verifications compliant with GSCM1674;
- g) Verification of painting and eventual fix of damage resulting from transport;
- h) Start up support.

7.11 TYPE A DOCUMENT

Technical conformity assessment (TCA) process shall be compliant with MAT-O&M-NCS-2021-0033-EGIN version 3.

Type A documentations shall be as listed in the MAT-O&M-NCS-2021-0033-EGIN version 3 with the following integration:

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- 1) Container layout and various views (frontal, lateral, posterior, internal and external);
- 2) Air-conditioning system design and calculation reports;
- 3) LV power system design and calculation reports;
- 4) Light design and calculation reports;
- 5) Smoke detecting system design and calculation reports;
- 6) Pest control repeller system design and calculation reports;
- 7) Cabling design and calculation reports;
- 8) Main international and local standards conformity declarations for the systems defined in the points from 2) to 7);
- 9) Structural design, calculation report, seismic report;
- 10) Container energy efficiency calculation;
- 11) Accessory devices documentations;
- 12) Complete design and schemes (electrical, mechanical and structural) of different system, in piper format (present in container) and media format;
- 13) Escape route and safety design;
- 14) Container Operation and maintenance manual;
- 15) MV-LV apparatuses present in the container operation and maintenance manual;
- 16) Container safety manual of compliant with IEC 62271-202;

Drawings included in the type A documentations shall be “BIM compliant” ISO 16739.

7.12 WARRANTY

60 months of warranty period.

7.13 DOCUMENTATIONS TO BE PROVIDED IN TECHNICAL OFFER

Technical offer shall include following documents:

- o Check list, see annex A, to fill in for each **enel** type code;
- o Drawings with overall dimensions, views, sections etc ;
- o TCA confirmation of equipment to be installed inside the container:
 - Assembly of MV Switchgear compliant with GSCM690;
 - VCB trolley compliant with GSCM505;

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- VT trolley compliant with GSCM734;
- ET trolley compliant with GSCM735;
- LV equipment:
 - Internal LV power system compliant with GSTZ112;
 - Energy station compliant with GSTZ111 and VRLA battery compliant with GSCB003;
 - LV racks.
- CTs compliant with GSCT007.
- Weight of container without equipment and completed of all devices in transport configuration and operation configuration.

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8 ANNEXES

8.1 ANNEX A - TECHNICAL CHECK LIST

Technical specification:		Offer number:	
Constructor:		Manufactory factory :	
enel type code:		Constructor type code or designation:	
enel material code:			
Technical ratings		Request	Constructor offer
1	Maximum altitude (m)	1000	
2	Maximum altitude only for Colombia(m)	2700	
3	Minimum ambient air temperature (°C)	-30	
4	Maximum ambient air temperature (°C)	55	
5	Relative humidity	98%	
6	Maximum wind (m/s)	40	
7	Maximum snow load on horizontal projection (kN/m2)	1,95	
8	Seismic level	AF5	
9	Pollution (IEC-TS 60815-1)	Very heavy (e)	
10	IP degree of container	33	
11	IK degree of container	10	
12	Operation	indoor	
13	IAC degree	A	
14	Overall dimension	Annex B	
15	Life expectancy (years)	40	

Table 5 - Check list



Technical Specification code: MAT-O&M-NCS-2021-0037-EGIN

Version no. 1 dated 28/05/2021

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8.2 ANNEX B - LOCAL MATERIAL CODES

Type code	Description	Argentina	Brazil	Chile	Colombia	Italy	Perú	Rumania	Spain
GSCM770/1	Container with single section MV								140741
GSCM770/2	Container with double section MV								140742

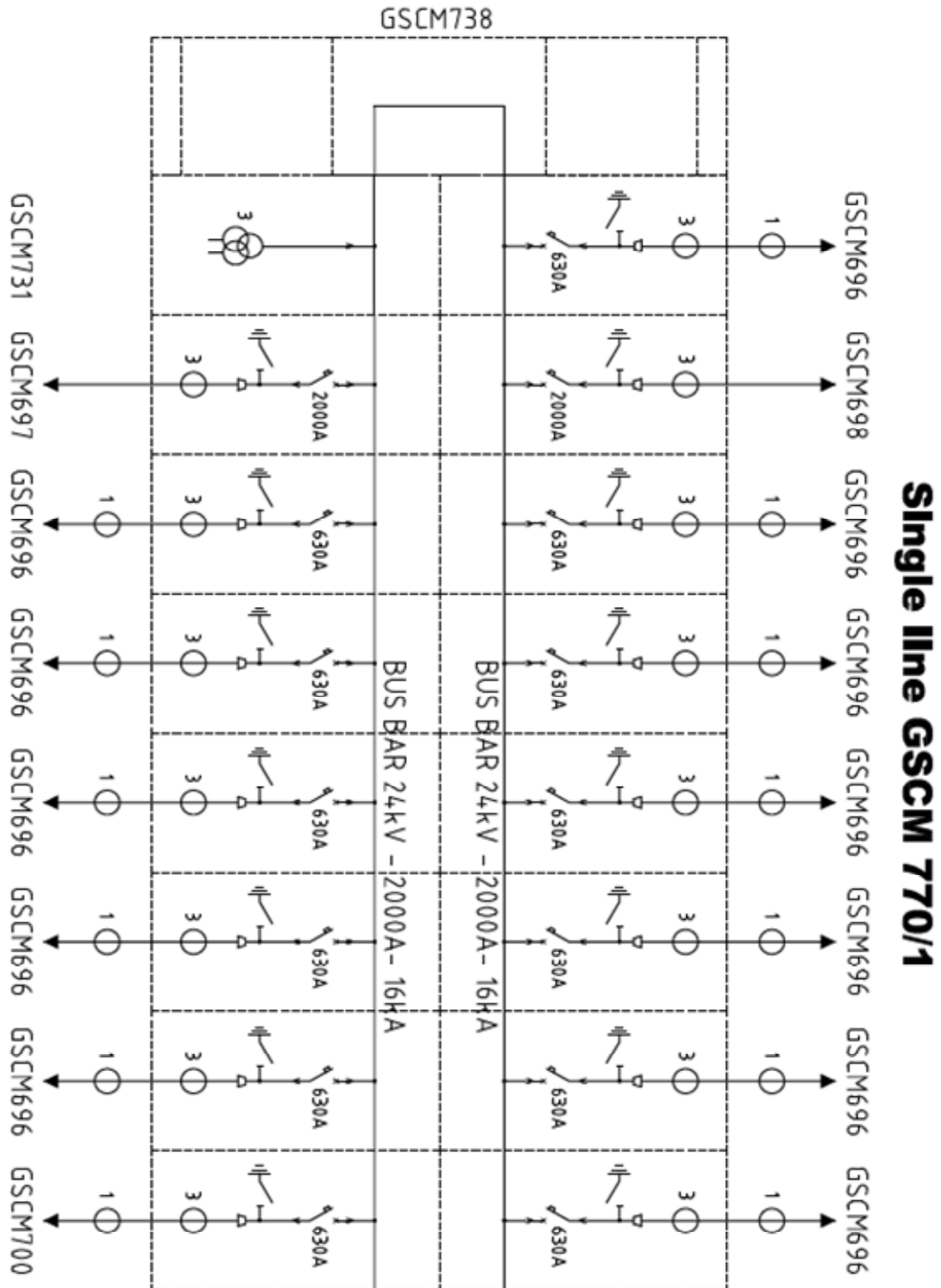
Table 6 - Local material codes

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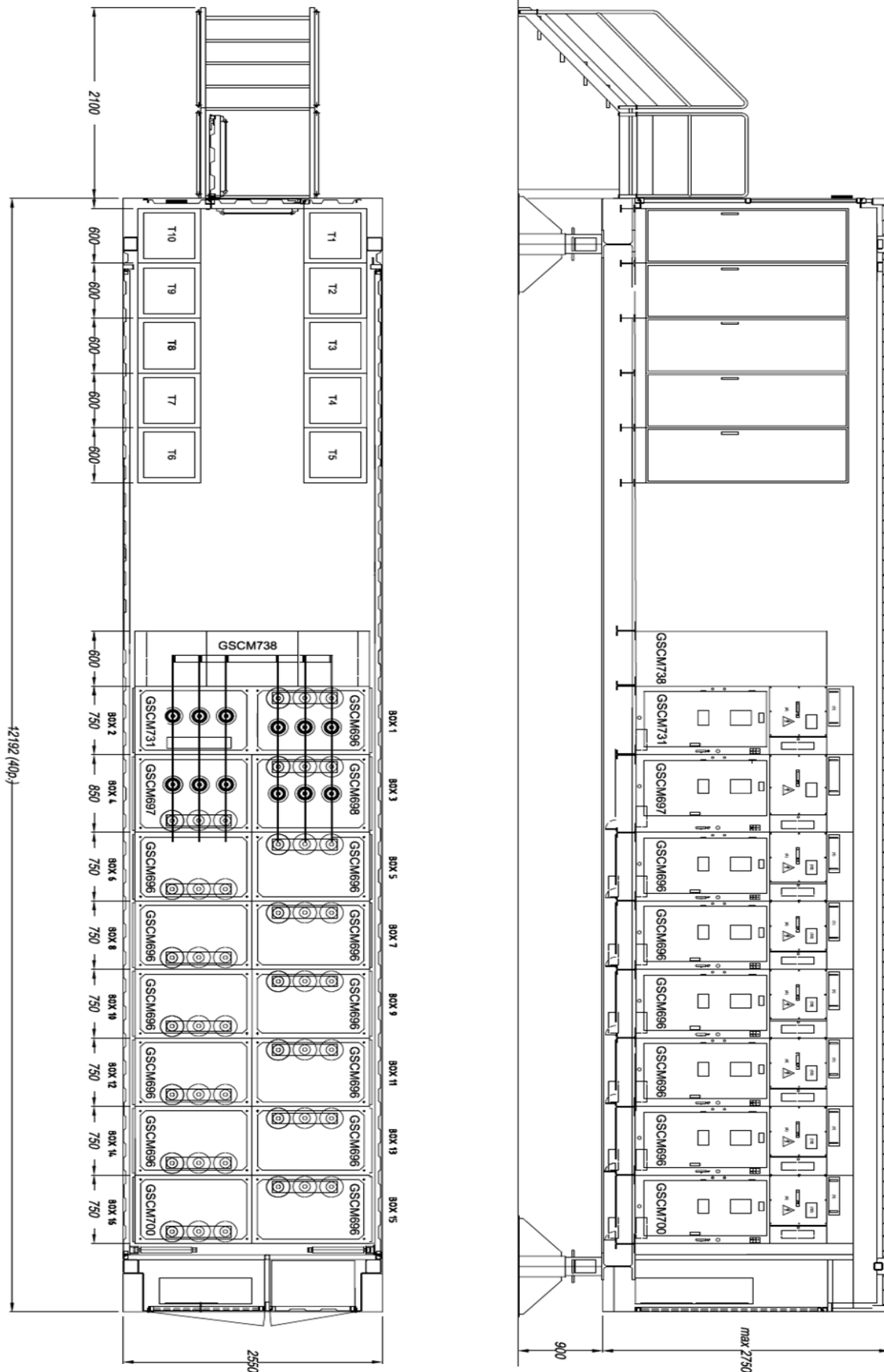
8.3 ANNEX C - ASSEMBLY OF MV SWITCHGEAR FOR EACH CONTAINER ENEL TYPE



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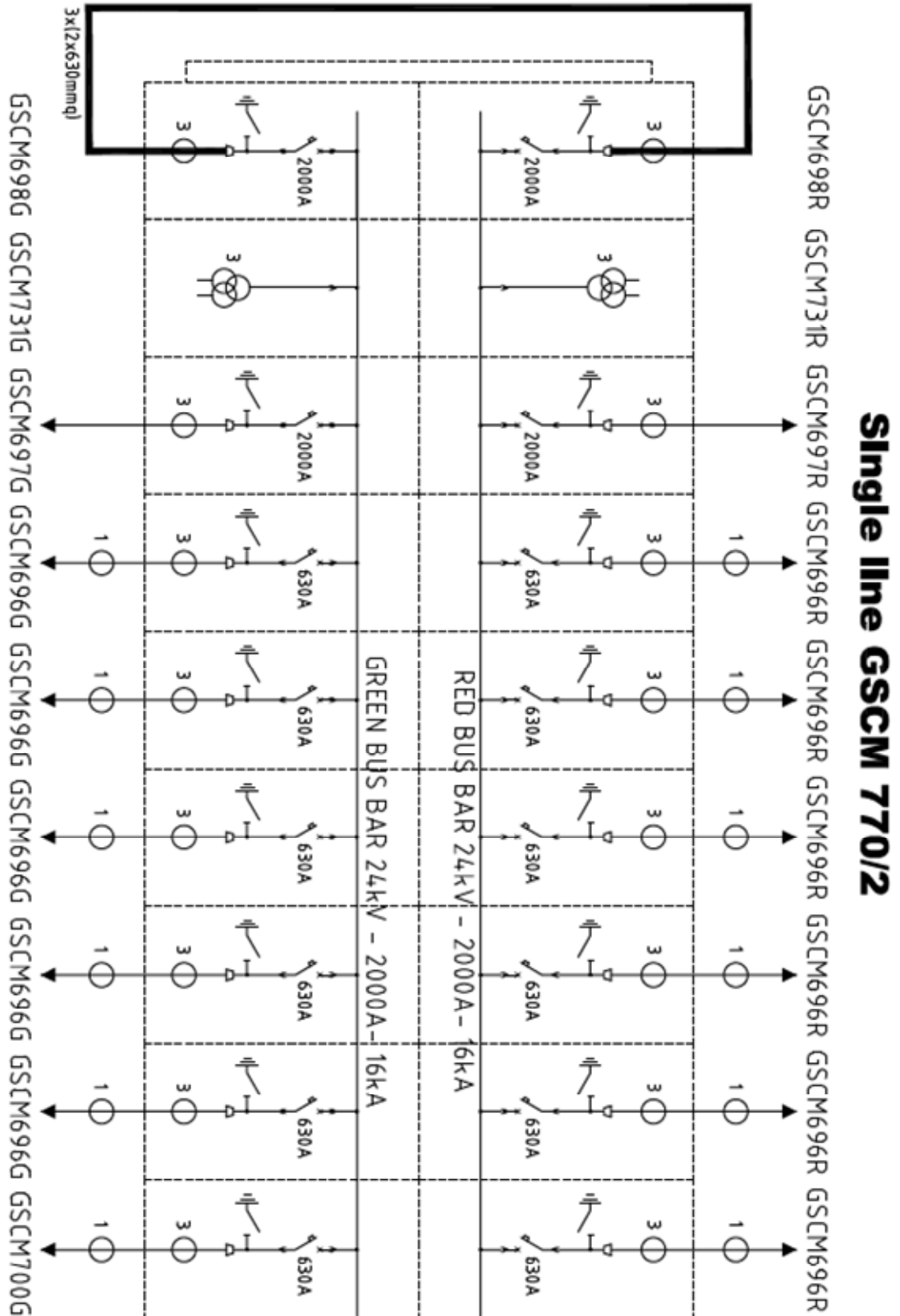


Layout and lateral view GSCM770/1

Subject: Global Infrastructure and Networks – GSCM770 MV Section for Primary Substation in container solution

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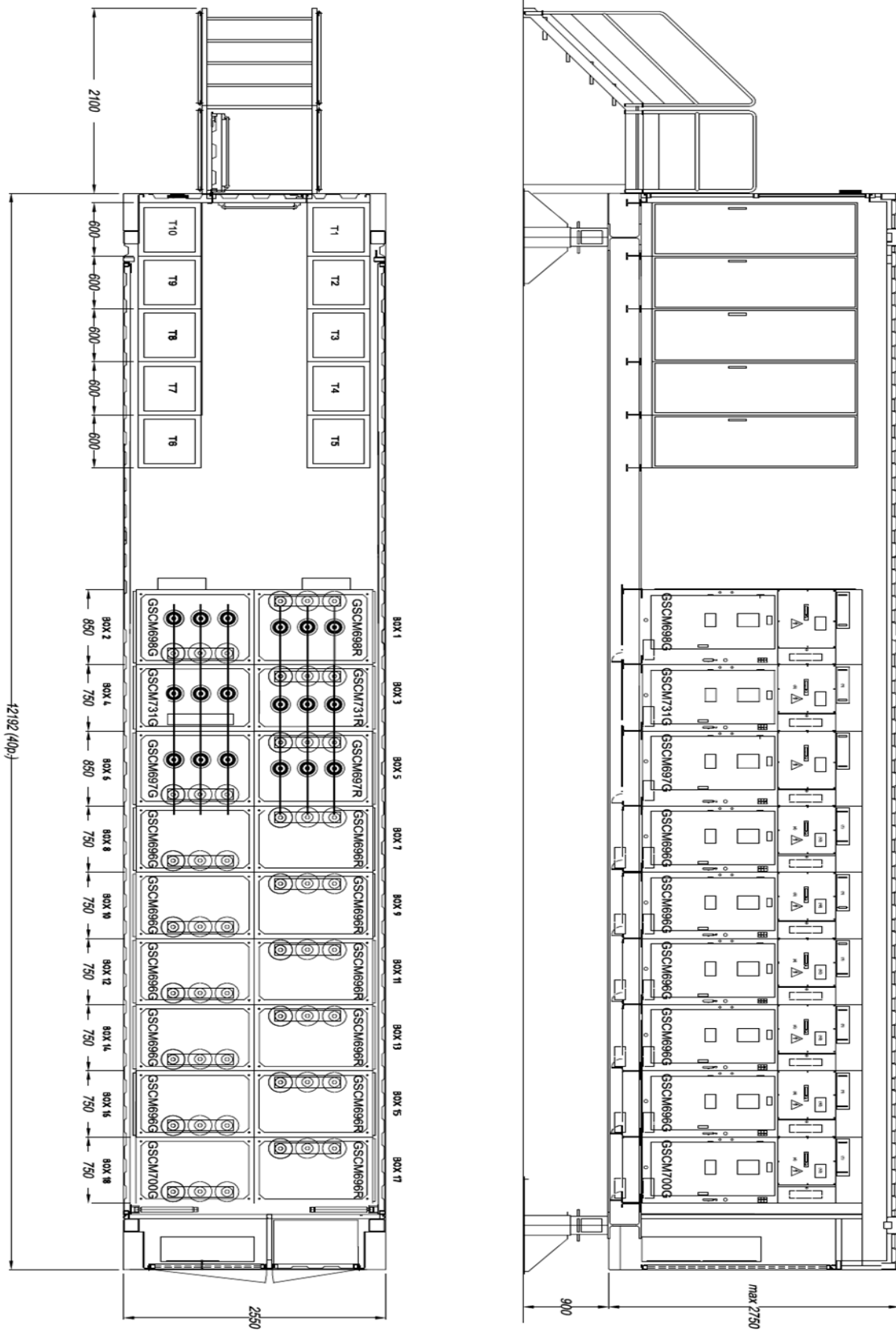
Perimeter: *Global*
Staff Function: -
Service Function: -
Business Line: *Infrastructure & Networks*



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Perimeter: *Global*
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Layout and lateral view GSCM770/2

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Perimeter: *Global*

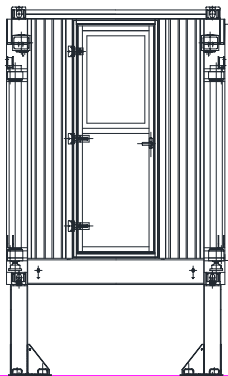
Staff Function: -

Service Function: -

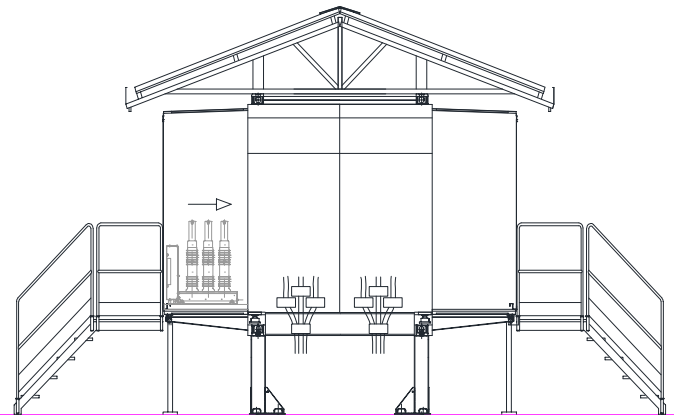
Business Line: *Infrastructure & Networks*

8.4 ANNEX D - CONTAINER VIEWS AND DIMENSIONS

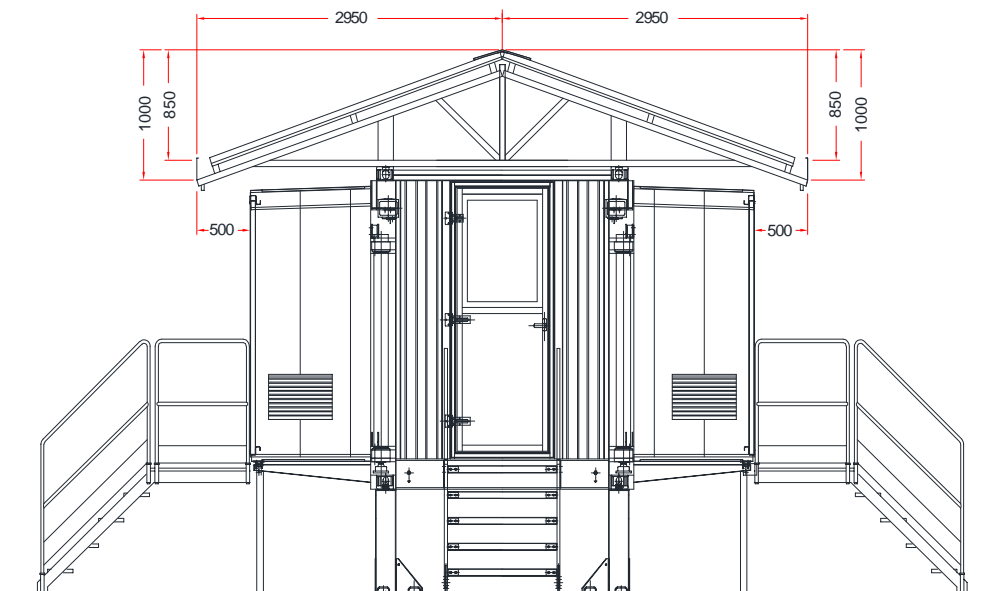
Front view container closed



Back view container opened



Front view container opened with dimensions



Subject: Global Infrastructure and Networks – GSCM770 MV Section for Primary Substation in container solution

Application Areas

Perimeter: *Global*
Staff Function: -
Service Function: -
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Final Layout of container with dimensions

