

TECHNICAL SPECIFICATION

FOR LV MAIN / SUB-

DISTRIBUTION BOARDS IN KIT

FOR INDOOR INSTALLATION

Client:

Plant:

Job:

Rev.:

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This technical specification is intended to define the basic requirements for enclosures' supply project in kit for the low voltage main distribution.

The enclosures will consist of independent and modular compartments segregable into cubicles, in order to be extendable from both sides.

1. KEY FEATURES OF THE ENCLOSURE

- Rated insulation voltage U_i : up to 1000V AC/1500V DC
- Rated operational voltage U_e : up to 1000V AC/1500V DC
- Rated impulse withstand voltage U_{imp} : 12kV
- Rated frequency : 50/60Hz
- Rated short-time withstand current I_{cw} : up to 120 kA
- Rated peak withstand current I_{pk} : up to 264 kA
- Rated current I_n : up to 6300A
- Ingoing access : from above and from below
- Outgoing access : from above and from below
- Installation : internal
- Segregation Form : up to 4b
- IP degree of protection :IP30,IP31,IP40,IP41,IP65
- IK mechanical resistance :IK09-IK10

2. RULES AND REQUIREMENTS

- Enclosure	IEC 61439-2-1 / IEC 60439-1 Standard
- Degree of protection	IEC 60529 Standard

There will also be compliance with the rules and regulations laid down by Italian legislation for the prevention of accidents and the EU Directives.

3. CONSTRUCTION FEATURES

For construction features are hereby intended the structural characteristics, the mechanical protection, the segregation, the accessibility of the equipment, the safety features and the realization of the electrical connections inside the enclosure.

3.1 Metal structure

The enclosure should be composed of several vertical modules called panels, joined together by means of bolts. In this way, by means of lifting eyebolts and lifting brackets, it will be possible to transport sections of the enclosure and not just the individual panels. The socket must be designed for handling with transpallet.

Each panel must have a crushproof metal frame provided with holes for fastening with 25mm pitch. The structure must be made of metal including side and top covers.

The closing panels have to be equipped with one or more grids in order to allow the ventilation cycle according to the degree of protection of the enclosure.

The front/rear closings have to be suitable for the hinging and the assembling of opening / closing handles; in case of limited space on the front/rear, bolted panels should be available without handles.

The degree of protection must be adequate to different environmental conditions of the plant; the minimum IP protection degree should be IP30, reachable with closed doors or with front panels and finishing profiles with open doors.

The enclosure should provide for the possibility of being extended on both sides and on the front/back by means of special mechanical joining kits.

The enclosure must be equipped with a supporting structure.

The minimum thickness of structural components must be:

- galvanized steel sheet uprights (EN10326-S 280 GD Z) with closed profile 12/10mm (in hot galvanized steel)
- stainless steel sheet uprights (AISI 304) with closed profile 12/10mm for busbars system In > 4000A
- galvanized sheet steel angle pieces 23/10mm
- sheet steel plinth flanges 15/10mm
- galvanized steel sheet mounting plates 20/10mm

The minimum thickness of pickled metal sheet components must be:

- Panels 15/10mm.
- Doors 15/10mm.

The segregations must be made of galvanized sheet steel 12/10mm / Lexan /EPDM/ rubber

3.2 Busbars section

- The main busbars have to be suitable for positioning at any height (including roof and bottom) of the enclosure.
- The derivation busbars have to cross vertically in to the side/on the bottom of each panel;
- Metal/plastic/Lexan separators must provide for the segregation of the main and sub-busbars from the other components.
- The busbars must have an adequate section in order to support the electrodynamic forces symmetrical short-term current for 1 second.
- The busbars shall be made of electrolytic copper bare, in detail:
flat busbars ETP 99.9% UNI-EN 13601 R=25 daN/mm
shaped section busbar ETP 99.9% UNI-EN 13601 R=20 daN/mm
- If required by specific environmental conditions linked to the local installation site, it must be possible (under special condition) to tin, silver or sheathe the busbars themselves.
- The busbars can be either flat or shaped section busbars.
- The busbar holders can be either linear or scaled busbar holders.

3.3 Installation kit for equipment

- Taking advantage of the modularity of the columns (modules E=25mm) it should be possible to install more than one switch, also of different size, in the same column; the enclosure must be suitable for assembling different types of switches (fixed, plug-in, withdrawable, fixed-with accessories, plug-in with accessories, withdrawable with accessories) and switches with front and rear terminals.
- In order to reduce the size of the enclosure it shall be possible to install more than one air circuit-breakers in the same column (for $I_n < 4000A$)

3.4 Accessibility

All the normal operations shall be possible from the outside of the enclosure after the door is opened.

3.5 Connecting cables area

The area dedicated to the connection of the power cables is to be placed at the rear side of the panel, and shall have the following characteristics:

- The size shall be such as to allow a comfortable cable access for all maintenance services and any possible extensions
- Possibility of receiving the power cables from both above and bottom side

3.6 Enclosures earthing plant

- The enclosure should be longitudinally crossed by an electric copper earthing busbar, bolted solidly to the metal frame and provided with a section in compliance with the sections planned for the short-circuit withstand of the enclosure itself.
- The whole structure and elements of the carpentry shall be firmly attached one to each other by means of special screws, in order to ensure appropriate electrical contact between the parties.
- The doors, in case of instruments installed, shall be connected to the metal frame using flexible copper twisted cables, provided with a minimum section of 16mmq

3.7 Painting

All the compartments metal infill should be properly treated and painted so as to provide excellent resistance to wear.

Painting cycle:

- Sheet washing
- Phosphating with iron salt base
- Drying in tunnel at 100°C
- External and internal painting with electrostatic application of thermosetting powder enamel with epoxy polyester binders. Grey orange-peel RAL 7035 colour, total thickness: 60/70 micron.
- Polymerisation in oven at 180°C.

Paint characteristics:

- Binder: epoxy polyester
- Specific gravity: 1,61g/cm³
- Theoretical coverage: 10,4 m²/Kg. with films of average thickness 60 microns
- Melting point: 85-95 °C (Kofler Hot bar Method)
- Granulometry: standard distribution between 5 and 100 micron with average size of the particles between 30 and 40 micron. Hardening: 12 min. at 190 °C (temperature of object).
- Hardness: 1H - 2H
- DIN 53152 bending elasticity: DIN 53152: unaltered on 1/4" spindle
- DIN 53151 reticular adherence: GT O (100%)
- Erichem elasticity: SEN DIN 53156: > 6mm
- Gardner resistance to impact: 25 Kg. x cm.

The painting shall have passed the resistance tests to saline fog (193 hours).

4. LOW VOLTAGE EQUIPMENT

The main apparatuses assembled in the enclosure should be tailored-made according to the characteristics of the project described in the wiring diagrams and should respond to specific requirements.

The main apparatuses that can be mounted on the panel are of the following type:

- Modular switches
- Moulded-case circuit-breakers
- Air-circuit
- Contactors
- Disconnectors
- Measuring instruments

5. TESTS AND CERTIFICATES

- The enclosure must be in compliance with IEC 61439-2-1/IEC 60439-1 standard
- The enclosure must have passed vibration test according to IEC 60068-2-57 standard
- The enclosure must have passed seismic test according to IEE Std 693 standard
- The enclosure must report IK degree (mechanical resistance) expressed in Joules in compliance with the requirements of the IEC 62262 standard.
- The enclosure must report IP degree (degree of protection) expressed in compliance with the requirements of the CEI EN 60529 - IEC 60529 standard.

6. INSTALLATION PROCEDURE

- The enclosure must be installed on the floor with plinth or without plinth using the relating kit.
- If required by the installation requirements, the enclosure must be able to be fixed to the floor in the following ways:
through the plinth with appropriate fittings for floor fixing
using special fixing kit to the floor;

The enclosure, when requested by dimensional requirements, must be suitable for wall fastening using wall mounting brackets.