# SPEN Project Management Guidance Pack - IBERDROLA S.A. 'Pre-fabricated enclosures for distribution substations'

# Introduction

The needs of large, commercial connection customers can be different to the needs of smaller, domestic connections customers. To address this, Ofgem introduced ICE which ensures that Distribution Network Operators continually listen, adapt, and change to meet the needs of this type of customer.

As part of this process one of the key actions identified after engaging with our key stakeholders and connection customers was the creation of a project management guidance pack to help facilitate connections activities for our large commercial connection customers in the Demand, Generation and UMS market segments. This can be found under action 7.1 in our ICE Plan 2021/22.

This pack is one of 4 packs we have published which includes Project Management guidance packs for General, Civil, Electrical and IBERDROLA S.A. 'Pre-fabricated enclosures for distribution substations' document. Within these packs contains all the relevant information to assist our customers in understanding their requirements for the successful delivery of their projects by detailing SPEN's commitments for the Design, Commercial, Land & Planning and DELIVERY of each project.

## Contents

This project management guidance pack covers the scope and overview of the IBERDROLA S.A. 'Pre-fabricated enclosures for distribution substations' document. For more information please contact your assigned design/delivery engineer upon a project being accepted.

# Pre-fabricated enclosures for distribution substations

This specification details The Company's requirements for the design, manufacture, supply, test, and delivery of enclosures to house electrical substation equipment such as switchgear, auxiliary services, transformers and control cabinets for distribution substations. Clarifying and amending, where appropriate, the relevant standards and specifications applicable. The specified enclosures characteristics and testing requirements shall comply with the standards mentioned in this specification.

Conformance with this specification shall not relieve the supplier of their obligation to provide equipment that is complete and fully functional. Items not specifically indicated in this specification but which are essential to the proper operation of the equipment shall be provided.

The details of particular requirements specific to IBDE, AVANGRID-Networks, SPEN and EKT will be clarified in the respective country sections and annexes.

For more information please contact your assigned design/delivery engineer upon acceptance of your project

## 4.4 Normal & special service conditions

The Enclosures defined in this standard are destined for service outdoor (and indoor where indicated) use under the following general service conditions depending on the area of The Company:

| Information | Unit | ELEKTRO | IBDE | SPEN | AVANGRID Networks |
|---|---|---|---|---|---|
| **Temperature Range** | °C/°F | -10°C to +45°C (+14°F to +113°F) | -25°C to +45°C (-13°F to +113°F) | -20°C to +30°C (-4°F to +86°F) | -40°F to +104°F (-40°C to +40°C) |
| **Altitude** | m / ft | Sea Level to 1000m (3280ft) | | | |
| **Control house interior cooling and heating design temperature** | | ND | Guarantee the internal normal conditions of UNE-EN 62271-1 | ND | Summer: 77°F ( 25°C) Winter: 55°F (12.8°C) |
| **Internal Average Ambient Temperature** | °C/°F | ND | ND | +20°C (+68°F) | ND |
| **Internal Ambient Conditions** | °C/°F | +20°C to +30°C (+68 (68°F to +86 °F) | +5°C to +30°C (+41°F to +86°F) | +15°C to +20°C (+59°F to +68°F) | 65°F to 78°F (18.3°C to 25.6°C) |
| **Monthly average temp of air** | °C/°F | +35°C (+95°F) | ND | ND | ND |
| **Relative Humidity** | % | mean value: <80% | mean value (2h): <95% | <80% | <100% |
| **Corrosive Atmosphere/Pollution Level** | | Guaranteed not to be inferior than ABNT IEC 60815/2005's Level III (heavy level) | Guarantee the internal normal conditions of UNE-EN 62271-1. Consider for metallic elements an enviromental classification: ambient C4 defined as high corrosive atmosphere | Internal: The internal normal service conditions as specified in IEC 62271-1. External: In accordance with ISO 12944-2, the environments atmospheric corrosively category shall be C4, high. | Sal Air – Medium pollution. Level II |
| **Horizontal wind load of building** | m/s (mph) | Designed to withstand wind pressure with speeds up to 40 m/s (89.477 mph) | Comply with CTE and UNE-EN 62271-202 As per UNE-EN 62271-1 | Complying with BS EN 1991-1-3 and BS EN 1991-1-4 | 100 mph (44.704 m/s) |
| **Seismic actions** | | ND | Seismic actions as required by NCSR-02 standard, and the related requirements of the EHE-08. | ND | ND |

(ND: Not Defined)

## ANNEX A: SPEN

| Requirement | Unit | Type 1 and Type 2 Enclosure |
|---|---|---|
| Roof/Ceiling Insulation Material Type & R-Value | W/m² K / USA R-Value | 0.2 W/m² K (USA R-Value 28.39) |
| External Walls Insulation Material Type & R-Value | | 0.27 W/m² K (USA R-Value 21.0296) |
| Floors Insulation Material Type & R-Value | | 0.22 W/m² K (USA R-Value 25.8091) |
| Venting of Internal Arcs | N/A | The installation shall be designed and installed so that SPEN personnel and the public are protected as far as reasonably practicable from arc faults. |
| Internal Fire Rating | mins | Standard Build (typically 30mins, uncertified)<br>Low Risk Area: 60 mins<br>Medium Risk Area: 90 mins<br>High Risk Area: 120 mins |
| External Fire Rating Minimum | mins | Standard Build (typically 30mins, uncertified)<br>Low Risk Area: 60 mins<br>Medium Risk Area: 90 mins<br>High Risk Area: 120 mins |

Enclosures will accommodate electrical equipment: switchgear up to 36 kV, auxiliary services transformers, control and cabinets, etc.

The table below corresponds to a prefabricated Enclosure for both 'Type 1' and 'Type 2' configurations at 11kV.

Table: (SPEN 'Type 1' and 'Type 2' Enclosures for 11kV)

| Designation | Clear Internal Dimensions (D x C x A) | Fire Rating | Type 1 SAP Code | Type 2 SAP Code |
|---|---|---|---|---|
| A | 4 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| B | 6 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| C | 8 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| D | 10 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| E | 12 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| F | 14 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| G | 16 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| H | 18 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| I | 20 x 3.2 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |

The table below corresponds to a prefabricated Enclosure for both 'Type 1' and 'Type 2' configurations for 33kV Schneider CBGS-0 Switchgear.

Table: (SPEN 'Type 1' and 'Type 2' Enclosures for 33kV Schneider CBGS-0 Switchgear)

| Designation | Clear Internal Dimensions (D x C x A) | Fire Rating | Type 1 SAP Code | Type 2 SAP Code |
|---|---|---|---|---|
| J | 6 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| K | 8 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| L | 10 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| M | 12 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| N | 14 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| O | 16 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| P | 18 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| Q | 20 x 3.5 x 3 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |

The table below corresponds to a prefabricated Enclosure for both 'Type 1' and 'Type 2' configurations for 33kV Schneider GHA Switchgear.

Table: (SPEN 'Type 1' and 'Type 2' Enclosures for 33kV)

| Designation | Clear Internal Dimensions (D x C x A) | Fire Rating | Type 1 SAP Code | Type 2 SAP Code |
|---|---|---|---|---|
| R | 6 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| S | 8 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| T | 10 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| U | 12 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| V | 14 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| W | 16 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| X | 18 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |
| Y | 20 x 3.7 x 3.45 m | Standard Build | | |
| | | Low Risk Area (60mins) | | |
| | | Medium Risk Area (90mins) | | |
| | | High Risk Area (120mins) | | |

# ANNEX B: SPEN

## 1 DIMENSIONAL INFORMATION:

Dimensions to be taken into account are as shown below.

A: Minimum internal height [mm]

C: Minimun internal width [mm]

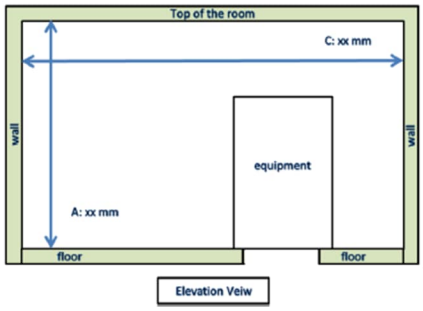
D: Minimum internal longitudinal dimension [mm]

**Notes:**

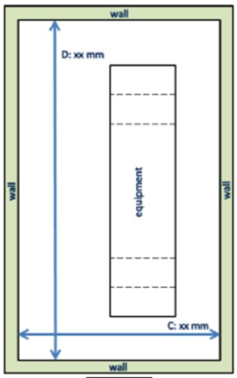
i) Dimensions are for all enclosure types.

ii) All designations shall have a choice of four fire ratings.

iii) The minimum internal heght is to the top of the room.




Elevation Veiw




Plan Veiw

| Designation | Internal Dimensions (mm) | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| A | 3000 | ND | 3200 | 4000 | ND |
| B | 3000 | ND | 3200 | 6000 | ND |
| C | 3000 | ND | 3200 | 8000 | ND |
| D | 3000 | ND | 3200 | 10000 | ND |
| E | 3000 | ND | 3200 | 12000 | ND |
| F | 3000 | ND | 3200 | 14000 | ND |
| G | 3000 | ND | 3200 | 16000 | ND |
| H | 3000 | ND | 3200 | 18000 | ND |
| I | 3000 | ND | 3200 | 20000 | ND |
| **Designation** | **Internal Dimensions (mm)** | | | | |
| J | 3000 | ND | 3500 | 6000 | ND |
| K | 3000 | ND | 3500 | 8000 | ND |
| L | 3000 | ND | 3500 | 10000 | ND |
| M | 3000 | ND | 3500 | 12000 | ND |
| N | 3000 | ND | 3500 | 14000 | ND |
| O | 3000 | ND | 3500 | 16000 | ND |
| P | 3000 | ND | 3500 | 18000 | ND |
| Q | 3000 | ND | 3500 | 20000 | ND |
| **Designation** | **Internal Dimensions (mm)** | | | | |
| R | 3450 | ND | 3700 | 6000 | ND |
| S | 3450 | ND | 3700 | 8000 | ND |
| T | 3450 | ND | 3700 | 10000 | ND |
| U | 3450 | ND | 3700 | 12000 | ND |
| V | 3450 | ND | 3700 | 14000 | ND |
| W | 3450 | ND | 3700 | 16000 | ND |
| X | 3450 | ND | 3700 | 18000 | ND |
| Y | 3450 | ND | 3700 | 20000 | ND |

**Note:** Drawings are not to scale. ND – Not Defined

## 2 REFERENCE DRAWINGS:

**11kV**

The following are applicable to all 11kV Enclosures and their respective reference drawings.

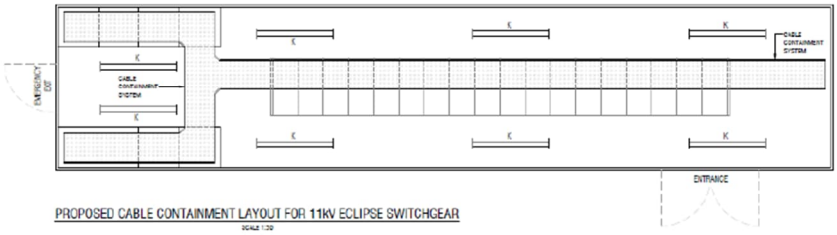
All dimensions given are clear internal sizes.
An exit light above each door.
De-humidifier, EBAC CD30E or equivalent, mounted at high level.
Cable rack installed at high level for SPEN multicore cables using trapeze type supports.
LV DB to be 3ph, 8 way, c/w 3ph phase fail alarm relay.
230V LV AC supplied from existing LVAC room to FSW mounted below DB.
2 off, double switched socket outlets with RCD protection.
2 off, standard 1 kW panel heaters c/w integral thermostats.
Cable rack to be 600 mm wide.
Telephone mounting board (plywood) to be provided adjacent to main entrance door, 400h x 300w x 15d.

**33kV**

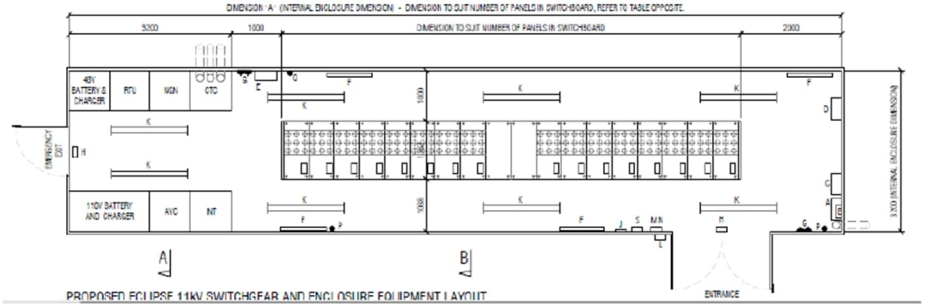
The following are applicable to all 33kV Enclosures and their respective reference drawings.

All dimensions given are clear internal sizes.
An exit light above each door.
De-humidifier, EBAC CD30E or equivalent, mounted at high level.
Cable rack installed at high level for SPEN multicore cables using trapeze type supports.
LV DB to be 1ph, 12 way.
110 AC DB to be 6 way double pole c/w 20A type C DP mcbs. 230 / 110 Tx to be 3kVA, 55-0-55 volts.
DC – Mounting boards (plywood) to be provided, 1000(h) x 600(w) x 15(d), 2 off.
230V LV AC supplied from existing LVAC room to double pole isolator below DB.
3 off, double switched socket outlets with RCD protection.
3 off, standard 1 kW panel heaters c/w integral thermostats.
Cable rack to be 900mm and 600mm as shown.
Telephone mounting board (plywood) to be provided adjacent to main entrance door, 400h x 300w x 15d.

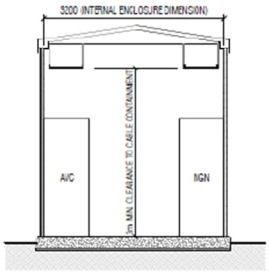
11kV, Type 2 Enclosure reference drawing details:



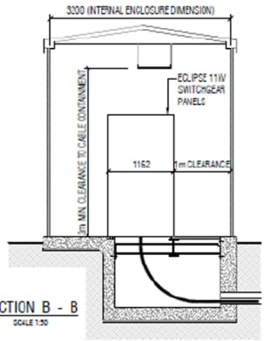

PROPOSED CABLE CONTAINMENT LAYOUT FOR 11kV ECLIPSE SWITCHGEAR




PROPOSED ECLIPSE 11kV SWITCHGEAR AND ENCLOSURE EQUIPMENT LAYOUT




SECTION A - A




SECTION B - B

33kV, Type 2 Enclosure reference drawing details: