TECHNICAL SPECIFICATION

NCEM 1.62.003

June 2022

Main Collective Switchboard

Contents

1 Application field

This section applies to the main collective switchboard of the collective installations of buildings whose purpose is to feed residential and commercial premises where electricity is supplied in low voltage by CEM.

It is admitted that the main collective switchboard for the modification of old installations may have constructive characteristics different from those specified in this document, provided that the utilization of the switchboard is practically impossible. In any case, the switchboard to be installed shall be subject to the prior approval of CEM.

2 Rated values

- Rated Voltage: 1kV
- Number of phases: 3

The values of the rated currents are as follows:

32 A, 63 A, 100 A, 125 A, 250 A, 400 A, 630 A, 800 A, 1250 A,

corresponding to the nominal current of main switch cubicle switchboard.

3 Constructive features

3.1 Generalities

In principle, each building shall be provided with a main collective switchboard. In duly justified cases, this provision may be waived, but there should be a clear indication in each collective switchboard of the existence of other collective switchboard.

3.2 Location

Main collective switchboard shall be installed within the building, as close as possible to its normal access and to the relevant potheads, if any.

Main collective switchboard shall be in a location such that an accident occurring inside the switchboard cannot obstruct the evacuation of personnel or the organization aids under any circumstances.

Main collective switchboard shall be installed in a suitable location and easily accessible so that the devices mounted thereon are easily accessible from the ground.

If the building is located in a low-lying flooding area (as defined by MSAR Government), the installation height of the main collective switchboard should meet the requirements defined in Annex 12 of NCEM C14-100.

3.3 Constitution

Main collective switchboard shall consist of cubicles, suitablygrouped, which, depending on the apparatus and other components contained therein, are designated by:

- Main switch cubicle switchboard (CCG);
- Busbar cubicle switchboard (CBR);
- Riser protection cubicle switchboard (CPS).

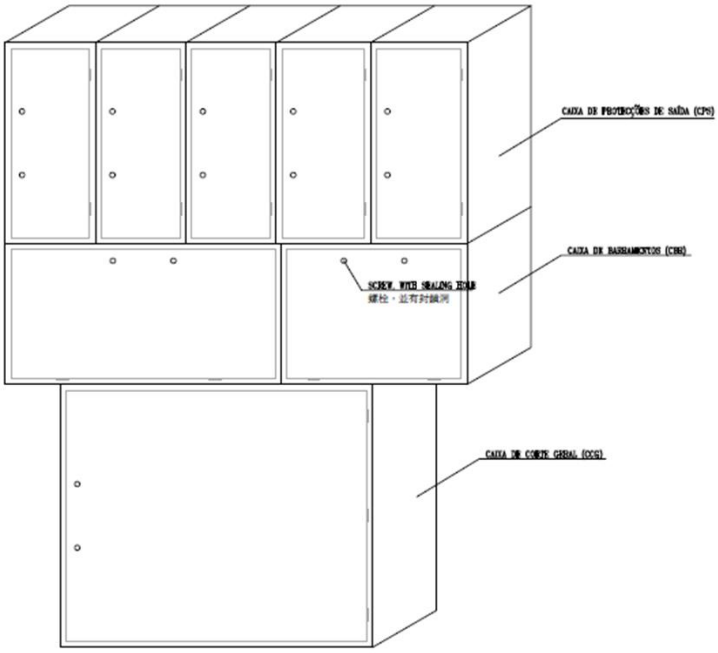


Figure 1 – Typical drawing of main collective switchboard

A single main switch cubicle switchboard should be, obligatorily, part of the main collective switchboard.

3.4 Enclosure

- Materials

Enclosure of switchboards shall be made of metal sheet, polyester or other suitable material. The enclosure shall be flame retardant and shall be used under temperature between -5 °C and +70 °C.

Note: In addition to the usual measures to protect against severe weather conditions in Macau, it is suggested to use polyester reinforced with fiberglass enclosure to avoid rust.

The switchboards shall comply with the test specified in IEC 61439-2.

- Surface protection

When executed in galvanized steel plate, the galvanizing thickness shall not be less than 20 µm. A zinc-rich primer coating (zinc powder or zinc chromate), a wash-primer coating and a finish enamel coating should be applied successively to a carefully cleaned and degreased sheet. A coating of finishmarine type enamel shall be applied (Transocean Marine Paint, Hammer-Tonefinish, color 916-05, or equivalent type from another manufacturer, but of similar color).

When executed in stainless steel sheet, a suitable primer coating and anenamel coating mentioned above shall be applied to the carefully cleaned and degreased surface.

In all cases, all bolts, washers and nuts shall be of stainless material orprotected by zinc plating or electrolytic plating of minimum 12 µm thicknessapplied before assembly. After assembly, all screws should be painted with afinishing coating.

When executed in aluminum alloy, the surface should be protected by anodizing or another process that guarantees protection against corrosion for a period not less than 10 years.

- Incoming and outgoing

Main collective switchboards allow one or more incomingand outgoing conduits.

The incoming and outgoing conduits shall be on opposite horizontal faces and shall be fitted with appropriate fixing and sealing elements for the conduits.

The passage of the electrical conduits will be carried out using nozzles or stoppers for tube, according to cross-sections of tube, and in thermoplastic material. For multicore cable, it will be carried out using cable glands of suitable diameter.

- Interior accessibility

The boxes of main collective switchboard shall be provided with a door in accordance with attached figures. The doors will be provided with 2 inner hexagon head screw with sealing hole according to the same figures. The hinges shall be of thetype indicated also in the attached figures.

- Degree of protection

For outdoor mounting, the switchboard should have a degree of protection not less than IP43 and IK07 as defined in IEC 60529 and IEC 62262 respectively.

3.5 Types of switchboard

- Main switch cubicle switchboard (CCG)

The main switch cubicle switchboard shall contain a 4-pole isolating switch, which shall comply with the provisions in Section 3.6.

The following types of main switch cubicle switchboards are adopted:

- Type CCG 400,
- Type CCG 750.

- Busbar cubicle switchboard (CBR)

The cubicle switchboards are intended to contain the elements necessary for the interconnection of main switch cubicle switchboard and riser protection cubicle switchboard or the interconnection of more than one door to the main switch cubicle switchboard.

The following types of busbar cubicle switchboards are adopted:

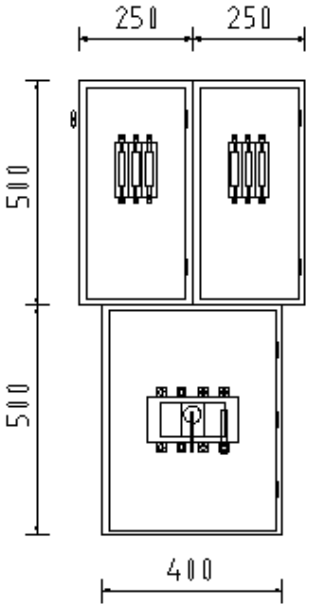
- Type CBR 750
- Type CBR 1000

- Riser protection cubicle switchboard (CPS).

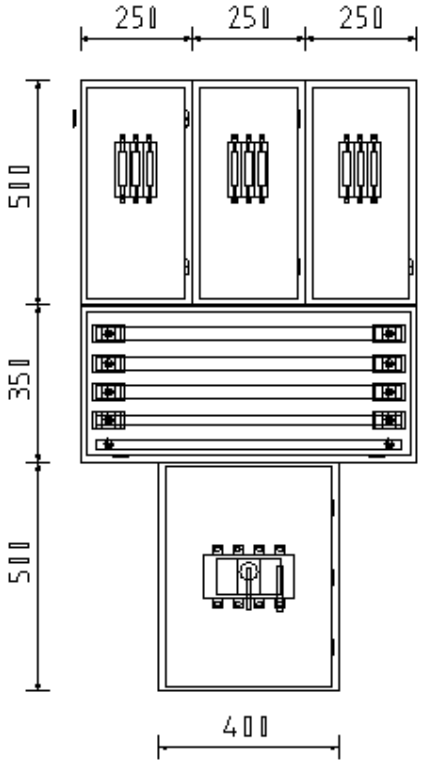
The riser protection boxes are intended to contain overcurrent protection devices consisting of fuses or circuit breakers which comply with Section 3.6.

The following types of riser protection cubicle switchboards are adopted:

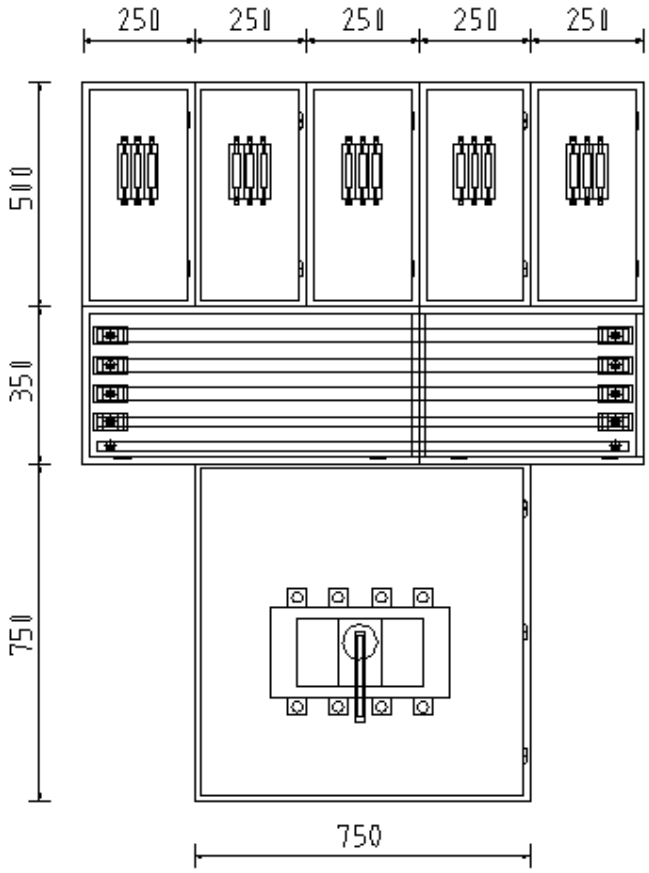
- Type CPS 250



(a)



(b)



(c)

Figure 2 – Main collective switchboard with (a) 2 outgoings; (b) 3 outgoings; (c) 5 outgoings

3.6 Electrical equipment

- Isolating switch

Main isolating switch must be 4-pole, with visible break or positive contact indication, class AC22, must comply with the provisions of IEC 60947-3, and the nominal current must be adequate to the power to be supplied.

- Connectors

The connectors for copper conductors should be tinned copper.

The connectors for aluminum conductors shall be of tinned aluminum or an alloy that does not give rise to the appearance of electrolytic corrosion phenomena in the contact between metals. In these connectors, the entire contact zone should be covered with neutral grease of drop point higher than 105°C.

The aluminum-copper transition connectors shall be of the bimetallic or alloy type which does not give rise to electrolytic corrosion phenomena in the contact between metals. In these connectors the contact zone should also be covered with neutral grease of drop point higher than 105 ºC.

The connectors shall be sufficiently robust not to deform as to the tightening or loosening of the conductors and shall be of adequate size to the nominal sections of the conductors to be used.

The connectors should be located so that the placement of the conductors and their tightening are easy.

The neutral connectors should be located to the left of the fuse of the collective line or entrance-service line to which they correspond.

The earth (ground) connector should be located below the neutral connectors and be electrically connected to the earth of the collective switchboard.

- Fuses

The cut-off device to be installed in the riser protection cubicle switchboardsshall consist of single pole or three-pole bases and fuse size 00, 0 or 1 (IEC60269-2), of high breaking capacity and with nominal intensity adequate to the protection of the outgoing conduits.

In the case of riser protection cubicle switchboards, if, after the fuses have been inserted, the distance between active parts with different polarity is less than 30 mm, a fixed insulating separator with suitably dimensioned should be used in such a way as to avoid possible contact between these parts.

These separators should be extended in order to separate the fuse connectors from each other.

- Protection conductors

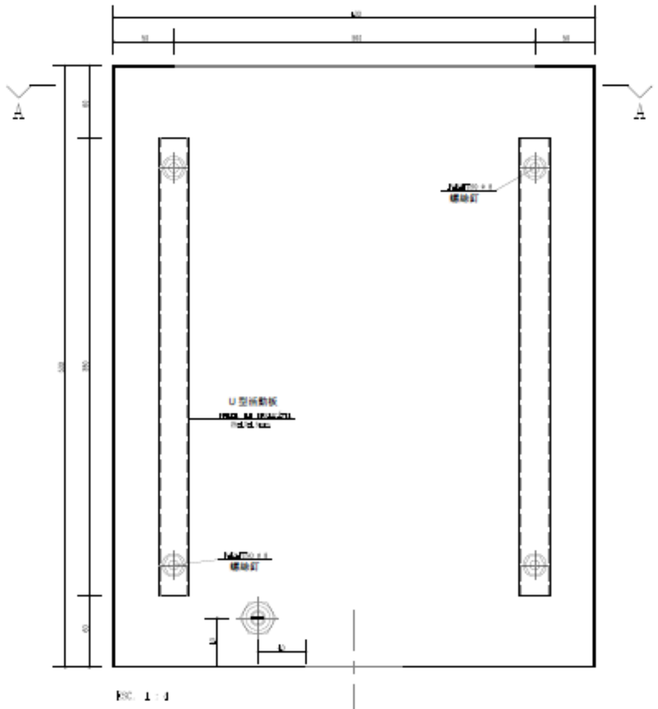
The main protective conductor and outgoing protective conductors should be placed inside the main collective switchboard so that they will not be in contact with the live parts even if the conductors are separated or detached from the connectors.

3.7 Marking

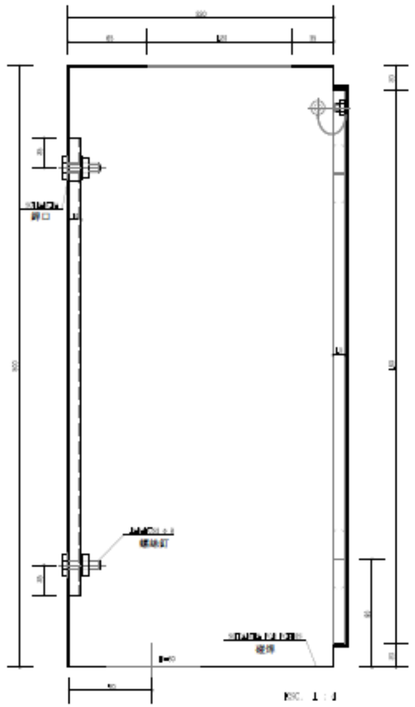
Inside the enclosures of the collective switchboards, the neutral connector shall be identified by the symbol N and the protection earth (ground) connector shall be identified by the symbol ⏚. These markings should not be placed on the bolts, nuts, washers or other removable parts.

The markings should be made in an indelible, unambiguous and easily readable form.

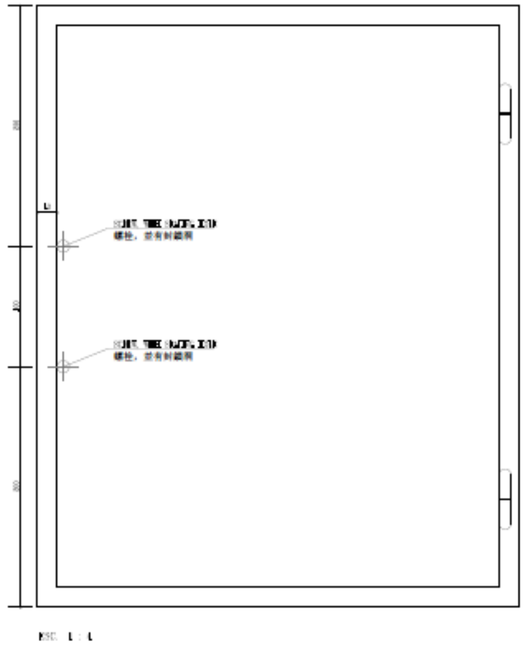
The switchboard must be provided with the following label: 「有電危險 Danger - Electricity Perigo - Eletricidade」.



CORTE B – B
剖面圖 B-B

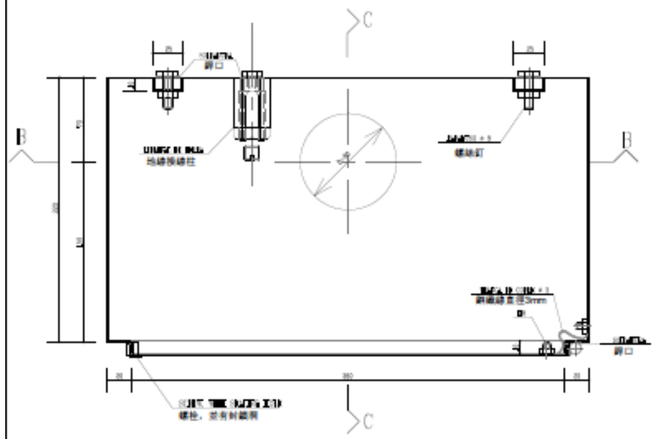


CORTE C – C
剖面圖 C-C

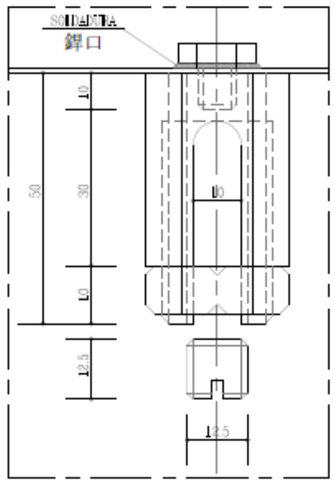


ALÇADO FRONTAL
正立面圖

MATERIAL : CHAPA DE AÇO GALVANIZADO OU EQUIVALENTE
ESPESSURAS : CAIXA – CHAPA DE 1mm
PORTA – CHAPA DE 1.5mm
材料：電鍍或不鏽鋼片
厚度：箱板厚 1mm
門板厚 1.5mm



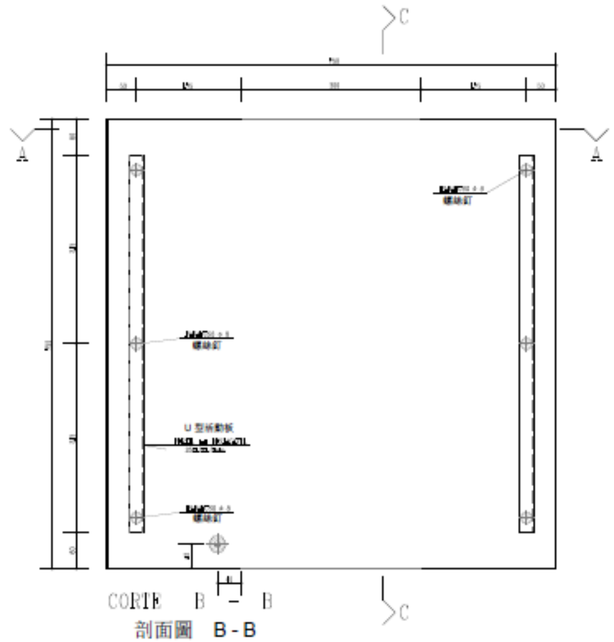
CORTE A – A
剖面圖 A-A



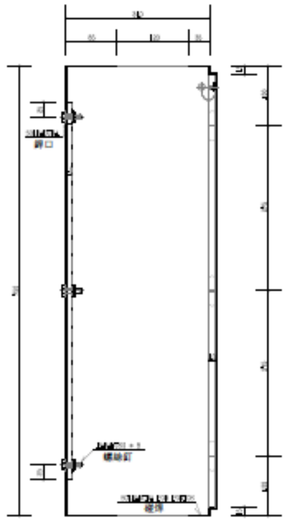
TERMINAL DE TERRA
地線接線柱
ESC. 1 : 1

D					
C					
B					
A	04/12/1984	Localização do terminal de terra e da trança de cobre			
	Date	Modification	Draft.	Verif.	Approv.

Draft.		03/09/1984	Componentes para Quadros de Colunas 幹線配電盤之配件	澳電 cem
Verif.				
Approv.		03/09/1984	Caixa de corte geral CCG 400 Tipo GD (Norma Portuguesa) 總開關箱 GD 型葡國標準	TAD
Scale 1 : 4 & 1 : 1.	Remarks	Job No.		Drawing No. J-088



CORTE B – B
剖面圖 B - B



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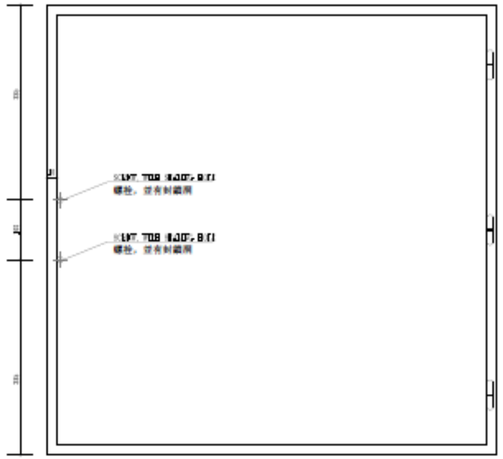
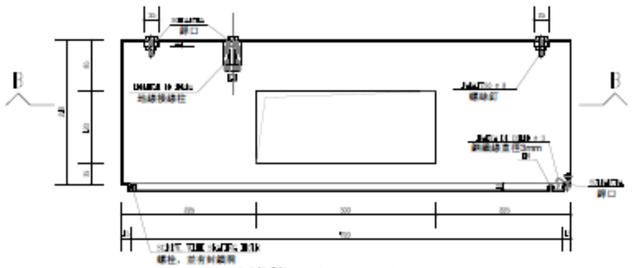
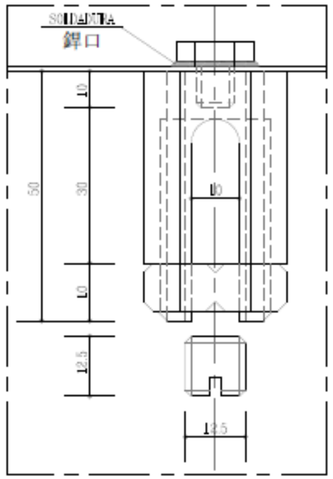
剖面圖 C - C



ALÇADO FRONTAL
正立面圖



CORTE A – A
剖面圖 A - A

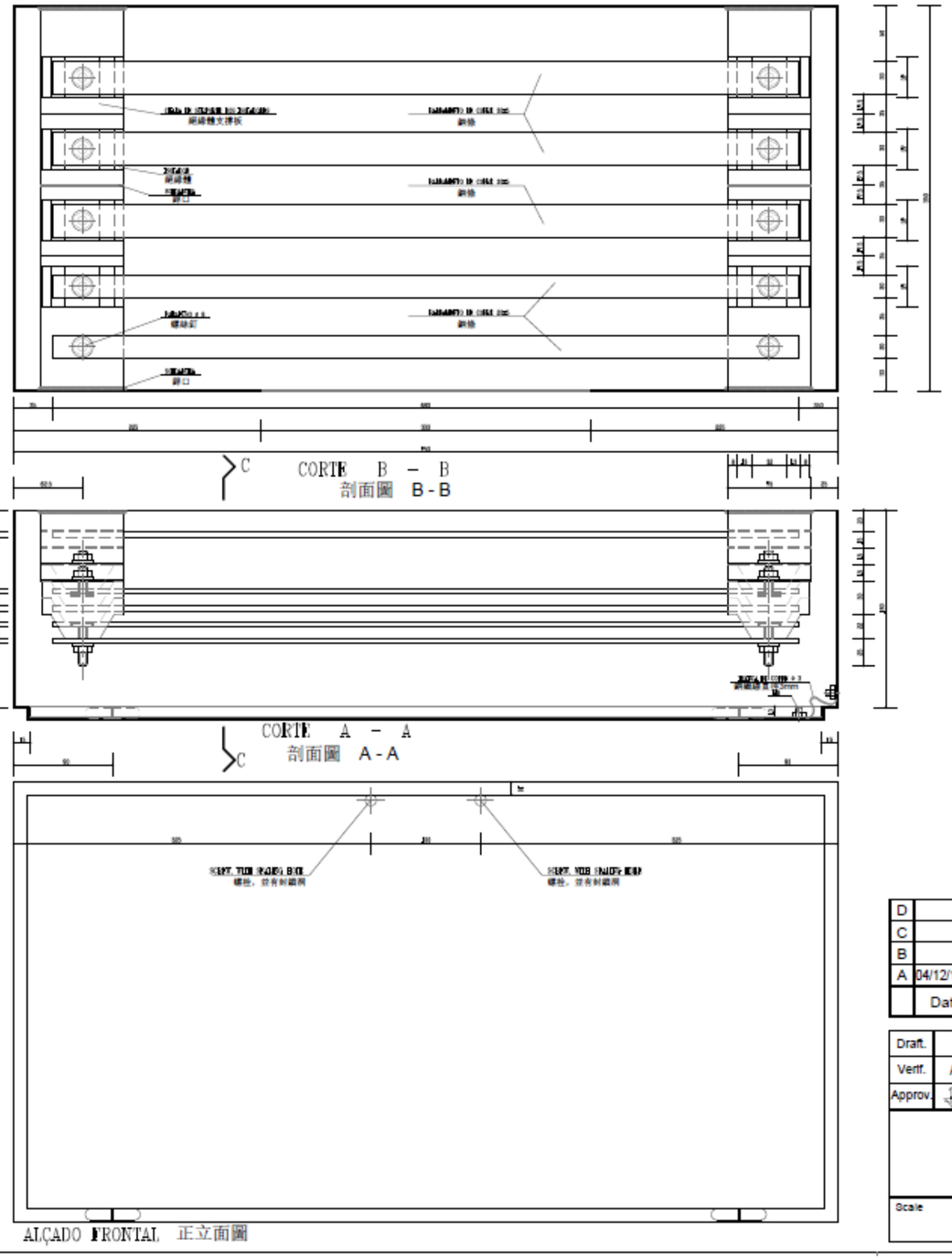


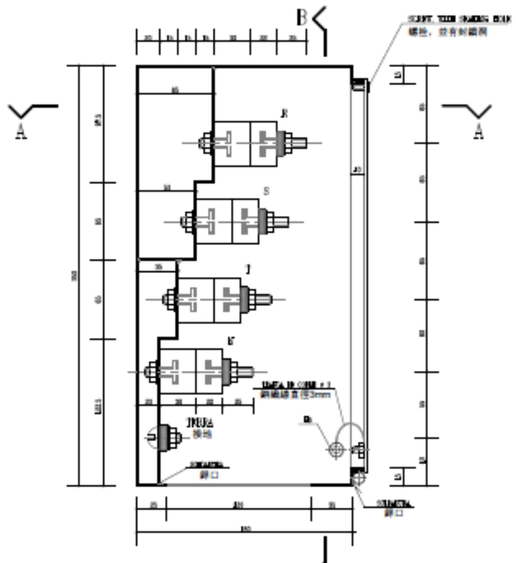
TERMINAL DE TERRA
地線接線柱
ESC. 1 : 1

MATERIAL : CHAPA DE AÇO GALVANIZADO OU INOXIDAVEL
ESPESSURAS : CAIXA – CHAPA DE 1mm
PORTA – CHAPA DE 1.5mm
材料： 電鍍或不鏽鋼片
厚度： 箱板厚 1mm
門板厚 1.5mm

D					
C					
B					
A	04/12/1984	Localização do terminal de terra e da trança de cobre			
	Date	**Modification**	Draft.	Verif.	Approv.

Draft.	Chao	03/09/1984	Componentes para Quadros de Colunas 幹線配電盤之配件	澳電 cem
Verif.	Alvaro	03/09/1984		
Approv.				
Caixa de corte geral CCG 750 Tipo GG (Norma Portuguesa) 總開關箱 GG 型葡國標準				TAD
Scale 1 : 8 & 1 : 1.	Remarks		Job No.	Drawing No. J-098





MATERIAL : CHAPA DE AÇO GALVANIZADO OU INOXIDÁVEL

ESPESSURAS : CAIXA – CHAPA DE 1mm
PORTA – CHAPA DE 1.5mm
SUPORTE DOS ISOLADORES – 1.5mm

材料：電鍍或不鏽鋼片
厚度：箱板厚 1mm
門板厚 1.5mm
絕緣體支撐板厚 1.5mm

D					
C					
B					
A	04/12/1984	Colocação da tranca de cobre			
	Date	Modification	Draft.	Verif.	Approv.

Draft.	Lam	18/06/1984	Componentes para Quadros de Colunas 幹線配電盤之配件
Verif.	Alvaro	20/08/1984	
Approv.		23/08/1984	

Caixa de barramentos
CBR 750
Tipo BBD (Norma Portuguesa)
匯流銅條箱 BBD 型 (葡國標準)

澳電 cem

TAD

Scale	Remarks	Job No.	Drawing No.
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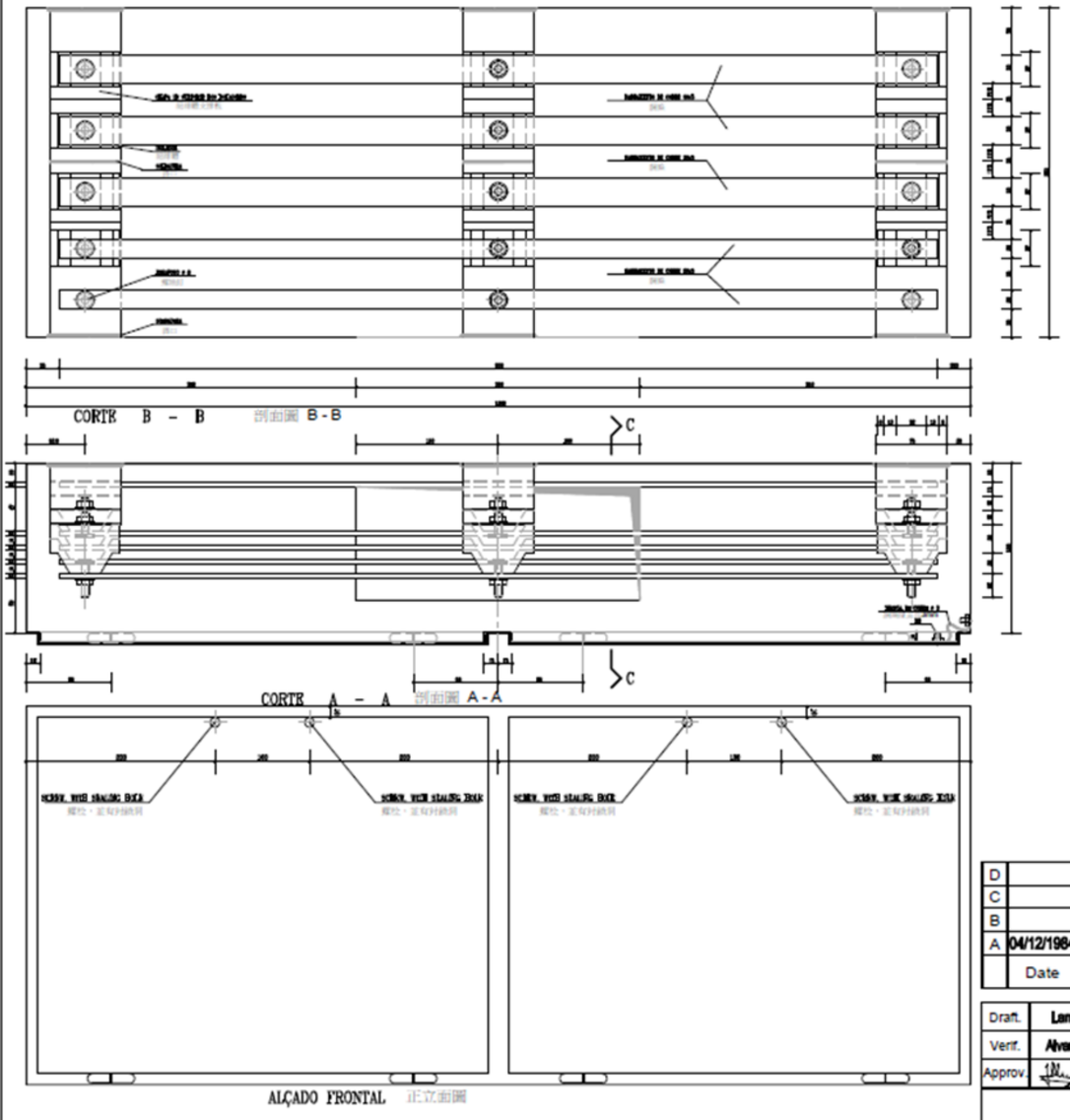
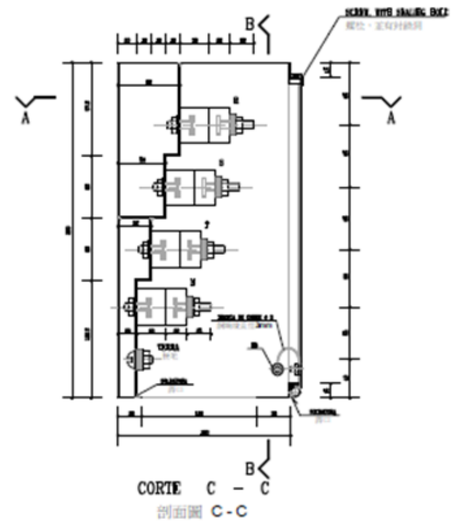


ALÇADO FRONTAL 正立面圖



CORTE C - C
剖面圖 C-C

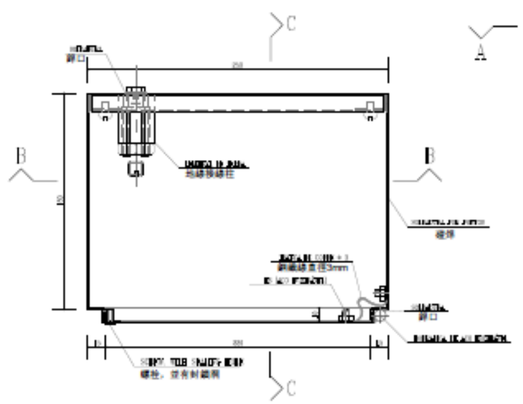
MATERIAL : CHAPA DE AÇO GALVANIZADO OU INOXIDÁVEL

ESPESSURAS : CAIXA - CHAPA DE 1mm
PORTA - CHAPA DE 1.5mm
SUPORTE DOS ISOLADORES - 1.5mm

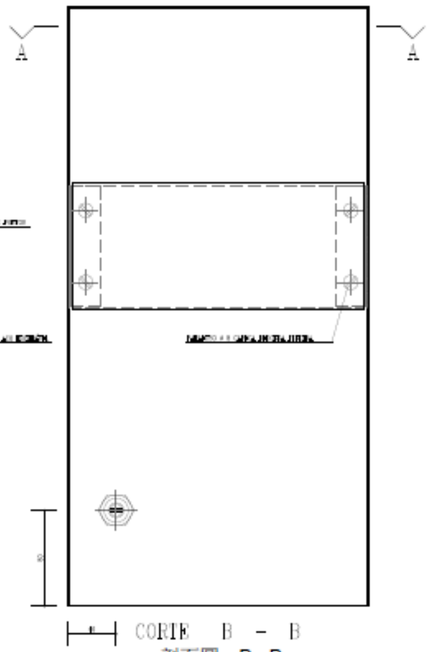
材料：電鍍或不鏽鋼片
厚度：箱板厚 1mm
門板厚 1.5mm
絕緣體支撐板厚 1.5mm

D					
C					
B					
A	04/12/1984	Colocação da tranca de cobre			
	Date	Modification	Draft.	Verif.	Approv.

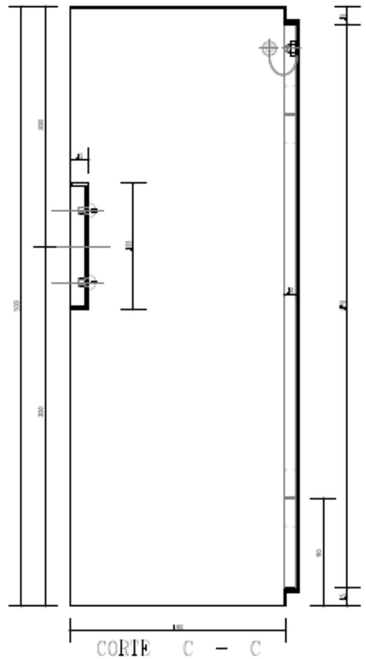
Draft.	Lam	18/06/1984	Componentes para Quadros de Colunas	澳電 cem
Verif.	Alvaro	20/08/1984		
Approv.		23/08/1984		
			Caixa de barramentos CBR 1000 Tipo BCT (Norma Portuguesa) 匯流銅條箱 BCT 型 (葡國標準)	TAD
Scale 1 : 2		Remarks	Job No.	Drawing No. J-094B	



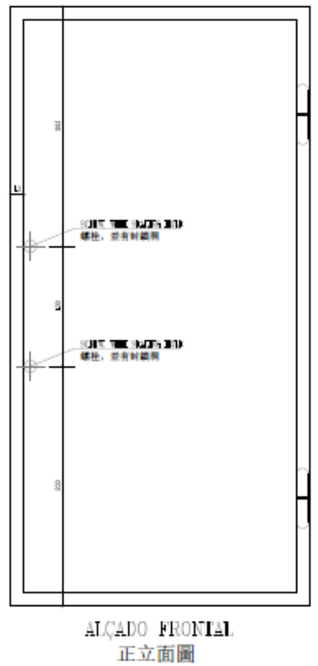
CORTE A – A
剖面圖 A - A



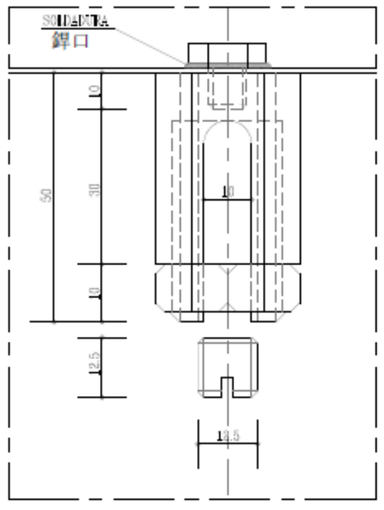
CORTE B – B
剖面圖 B - B



CORTE C – C
剖面圖 C - C



ALÇADO FRONTAL
正立面圖



TERMINAL DE TERRA
ESC. 1:1

MATERIAL : CHAPA DE AÇO GALVANIZADO OU EQUIVALENTE
ESPESSURAS : CAIXA – CHAPA DE 1mm
PORTA – CHAPA DE 1.5mm
SUPORTE DAS BARRAS DOS ESTATOS – CHAPA DE 1.5mm
材料：電鍍或不鏽鋼片
厚度：箱板厚 1mm
門板厚 1.5mm
絕緣體支撐板厚 1.5mm

	Date	Modification	Draft.	Verif.	Approv.
D					
C					
B					
A	04/12/1984	Colocação da tranca de cobre			

Draft.	Lam	18/06/1984
Verif.	Alvaro	20/08/1984
Approv.		23/08/1984

Componentes para Quadros de Colunas
幹線配電盤之配件

Caixa de protecção de saída
CPS 250
Tipo PB (Norma Portuguesa)

澳電 cem

TAD

Scale	Remarks	Job No.	Drawing No.
1 : 4, 1:1			J-099