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**ELECTRICITE DU CAMBODGE**

**TECHNICAL SPECIFICATION**

**EDC-DTS-LV 003**


**LV Distribution Boards for Indoor Distribution  
Substation and One Pillar Substations**

**May 2023 (Version 2)**

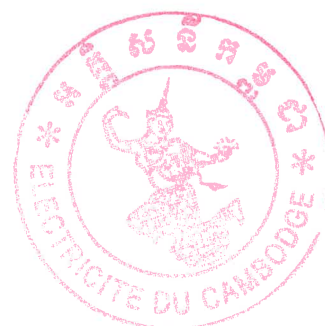




## ELECTRICITE DU CAMBODGE

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2.0	May, 2023	LV Distribution Boards for Indoor Distribution Substation and One Pillar Substation	AUN HEMRITH





# EDC-DTS-LV003- Low Voltage Distribution Board for Indoor Distribution Substation and OPS

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## Main modifications for version 2:

- Introduction of LVDB for OPS with LBS operating lever approximately in the vertical axle of the LVDB
- Add 63 Amp fuses
- Other minor modifications



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# LV Distribution Boards for Indoor Distribution Substation and OPS

## 1 Scope

This specification deals with Low Voltage Distribution Boards (LVDB) intended to be installed indoor in the public distribution and One Pillar substation (OPS) MV/LV substation of Electricité du Cambodge (EDC).

The low voltage distribution boards shall be installed indoor in building substation, prefabricated substations and one pillar substations. The life expectancy of this equipment shall not be less than 25 years.

This document defines the main characteristics of this equipment.

## 2 Standards

Unless a year is specified, the equipment shall comply with the latest editions and amendment of standards / specifications listed below:

IEC : International Electromechanical Commission

IEC 60269-1 : Low voltage fuses. Part 1: General requirements.

IEC 60269-2 : Low voltage fuses. Part 2: supplementary requirements for fuses for use by authorised persons (fuses mainly for industrial application).

IEC 60269-2/A1: Low voltage fuses. Part 2: supplementary requirements for fuses for use by authorised persons (fuses mainly for industrial application).

IEC 60269-2-1 section I and III : Low voltage fuses. Part 2: supplementary requirements for fuses for use by authorised persons (fuses mainly for industrial application).

IEC 60947-1 : Low voltage switchgear and controlgear- Part 1: General rules

IEC 60947-1/A1: Low voltage switchgear and controlgear- Part 1: General rules

IEC 60947-3 : Low voltage switchgear and controlgear- Part 3: Switches, disconnectors, switches disconnectors and fuse-combination units.

IEC 60947-3/A1: Low voltage switchgear and controlgear- Part 3: Switches, disconnectors, switches disconnectors and fuse-combination units.

ISO Standards

ISO 2063 : Metallic coating-protection of iron and steel against corrosion

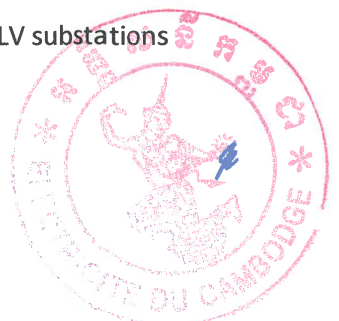
ISO 1461 : Hot dip galvanized coatings on fabricated iron and steel articles  
Specifications and test methods

ISO/IEC 17025 : General requirements for the competence of testing and calibration laboratories

ISO 9001 : Quality management systems – Requirements

HN - EDF French Standards

HN 63-S-61 - 1<sup>st</sup> edition 1979: Reduced sized LV Distribution boards for MV/LV substations



### 3 Definitions

The definitions of the relevant IEC and ISO standards apply to this technical specification.

### 4 Testing and Inspection

#### 4.1 General Notes for Test

Low Voltage distribution board may be inspected at the factory by EDC's representatives.

The inspection and routine tests shall be carried out in accordance with the provisions of HN 63-S-61 recommendations.

LVDB shall be subjected to tests as specified below.

#### 4.2 Type Tests

All type tests required by the HN 63-S-61 shall be carried out.

Type test reports shall be carried out by internationally recognized electrical testing laboratories.

Full copies of type test reports or type test certificates shall be submitted within the bid of the manufacturer/supplier.

If the manufacturer is certified by EDC, it is not necessary to submit type test reports for the considered equipment.

Nevertheless, in case the testing laboratory is not internationally recognized, the testing laboratory shall be mandatorily accredited ISO/IEC 17025 by an international or national accreditation body specialized in testing laboratories accreditation/acceptance. In that case, the testing laboratory shall prove mandatorily its capability/capacity to carry out all type tests mentioned in the type tests reports by supplying: Full description of all tests the laboratory can carry out, list of testing equipment with full characteristics, drawing of testing rooms with location of testing equipment, ...etc., supported by pictures and copy of the ISO/IEC 17025 accreditation certificate.

Acceptability of any accredited testing laboratory is at the discretion of the EDC.

##### 4.2.1 Low Voltage Distribution Board

###### 4.2.1.1 LVDB for indoor substation

The following Test reports of the type tests shall be submitted with the tender:

- Overheating test
- Load break switch Mechanical operation test (according § 8.2.1)
- Load break switch Breaking and making capacity test (according § 8.2.1)
- Load break switch making on short circuit (according § 8.2.1)
- Over current withstand test of complete LV board (short circuit test. See 8.1.4)
- Insulation withstand tests
- Wet heat corrosion test
- Insulators and fuse holder mechanical tests

Agreement of use issued by internationally reputed utility is also accepted.

###### 4.2.1.2 LVDB for One Pilar Substation (OPS)

Considering that the HN 63-S-61 do not request rotating lever for LV LBS with central location, it is accepted that:

- Type tests for LVDB indoor substation (lever on right side) been provided with the bid (as per requirements of paragraph 4.2.1.2)





- Type tests of the LV load break switch only according IEC 60947-3 testing requirement being provided with the bid

Both type test reports (or Agreement of use issues by internationally reputed utility for full LVDB) must be provided within the bid.

#### 4.2.2 LV Fuses

All type tests requested by the relevant IEC shall be carried out and the full type test reports shall be provided.

Breaking capacity type tests shall be specifically analysed.

#### 4.3 Routine Tests

The Routine tests carried out by the manufacturer shall be backed by test reports signed by the factory's quality control department.

#### 4.4 Inspection

Low voltage distribution boards shall be subject to inspection by a representative of EDC at the place of manufacture and routine tests carried out on samples picked at random in their presence.

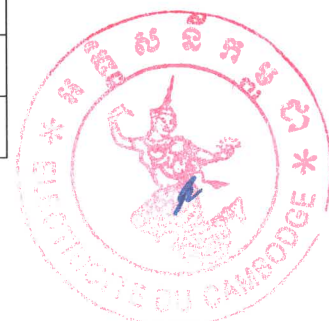
### 5 Quality Management

Design, development and production of the proposed equipment shall be ISO 9001 certified. The ISO 9001 certificate shall be submitted within the bid.

### 6 Ambient Conditions

Low voltage distribution boards shall be suitable to operate in the ambient conditions described here after:

Altitude	Sea level to 1,000 meters
Climate	Tropical
Annual Rainfall	1,300 mm.140 days
Monsoon Period	June to November
Ambient Air Temperatures:	
Average	27.5°C
Minimum	13.3°C
Maximum	40.5°C
Relative Air Humidity	65-100%
Soil Thermal Resistivity,:	
Average	1.20c m/W
Maximum	3.00c m/W
Solar Emissivity	0.8
Solar absorption	0.8





Wind Velocity:	
Average	37 km/h (10.3 m/s)
Maximum	72 km/h (20 m/s)

The LV Distribution board shall be indoor installed.

## 7 Composition of Low Voltage Distribution Boards

### 7.1 Equipment

Low Voltage Distribution Boards shall include a metallic frame where are installed:

- One four poles incoming general load break switch.
- One general busbar,
- Several Monobloc compact type Outgoings equipped with LV fuse cut out.

### 7.2 Type of Low Voltage Distribution Boards

In accordance with the MV/LV transformer capacity, four types of Low Voltage Distribution Boards shall be provided.

Designation	Max. Nb of LV Monobloc outgoing feeders	Max. transformer capacity
Type 4-800	4	400 kVA
Type 4-1200 for OPS	4	630 kVA
Type 8-1200	8	630 kVA
Type 8-1800	8	1000 kVA

## 8 Rated Characteristics

### 8.1 Common Rated Characteristics of Constitutive Components

#### 8.1.1 Rated Voltage

The rated voltage shall be 400 Volts.

#### 8.1.2 Rated Insulation Level

##### 8.1.2.1 Rated lightning impulse withstand Voltage

LV switchboards defined in this specification shall have the following rated lightning impulse withstand Voltage:

- Phase to Earth (1.2/50  $\mu$ s wave) : 20 kV peak

##### 8.1.2.2 Rated withstand voltage at power frequency

The LV switchboard defined in this specification shall have a rated short time withstand voltage at power frequency of:

- 10 kV rms between Phase and frame,
- 4 kV rms. between conductors,
- 4 kV rms over the sectioning distance.



### 8.1.3 Continuous Operating Rated Current

The rated currents of the different Low Voltage Boards and associated load break switches shall be the following:

Designation	Rated current of busbar	Rated current of load break switch
Type 4-800	800 A	800 A
Type 4-1200 for OPS	1200 A	1200 A
Type 8-1200	1200 A	1200 A
Type 8-1800	1800 A	1800 A

Monobloc compact type Outgoing shall have a rated current of 400 A.

### 8.1.4 Rated Short Time Withstand Current

The rated short time withstand current of load break switches and busbar shall be:

Designation	rms./ 0.5 second	Peak
Type 4-800	16 kA	32 kA (cos.φ=0.35)
Type 4-1200	25 kA	52 kA (cos. φ=0.25)
Type 8-1200	25 kA	52 kA (cos.φ=0.25)
Type 8-1800	32 kA	72 kA (cos.φ=0.20)

### 8.1.5 Maximum Dimensions

The maximum dimensions of the LVDB shall be:

LVDB type 4-800	
High	1600 mm
larger	560 mm
width	500 mm

LVDB type 4-1200 for OPS	
High	1600 mm
larger	560 mm
width	500 mm

LVDB type 8-1200 or 1800	
High	1600 mm
larger	900 mm
width	500 mm



## 8.2 Particular Characteristics of each Component

### 8.2.1 General Load Break Switch

#### 8.2.1.1 Breaking Capacity

The breaking capacity of general load break switches shall be equal to their respective rated current with a voltage of 440 V and a  $\cos. \phi = 0.9$ .

The number of C.O. cycle on load shall be 40:

20 between phases and 20 between neutral and phases.

The number of C.O. cycle off load shall be 1000.

#### 8.2.1.2 Making Capacity on Short Circuit

The general load break switches shall be able to make the short circuit current (voltage = 440 V) limited by the fuses described in 10.1, limiting the least of presumed peak short circuit current indicated in 8.1.4.

### 8.2.2 Fuse Cut-out

#### 8.2.2.1 Breaking capacity (using in load switch)

The breaking capacity of fuse cut-out shall be 400 A (250V and  $\cos.\phi=0.9$ ).

The number of operating cycle shall be 20 under nominal current.

#### 8.2.2.2 Making capacity on short circuit (using in load switch)

The fuse cut-out shall be able to make the short circuit current (voltage = 250 V) limited by the fuses described in 10.1, the presumed peak short circuit current be equal to 32 kA rms.

## 9 Mounting Arrangement and Fabrication

The components Low Voltage Distribution Boards shall be in accordance with the requirements of IEC 60947-1 and 60947-3.

### 9.1 Metallic Frame

It shall be sufficiently rigid to avoid any buckling during:

- Handling,
- Operation of general load break switch,
- Opening and closing operation on fuse cut-out.

The metallic frame shall include an earthing bushing and it shall be fixed against wall with four pads.

### 9.2 General Load Break Switch

#### 9.2.1 Location

The general load break switch shall be located on the top of the Low Voltage Distribution Boards.

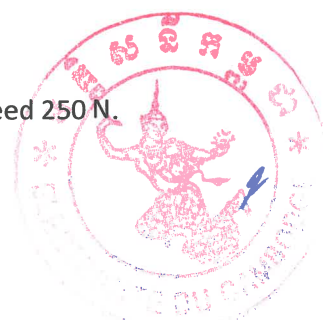
#### 9.2.2 Operating Lever for indoor substation LVDB

The operations shall be straightforward. The lever shall be located on the right of the LV board.

When the general load break switch is closed, the lever shall be in high position.

Opening and closing operations shall be independent of the operator action.

The effort to be exerted on a lever by operators for closing operation shall not exceed 250 N.



### 9.2.3 Operating Lever for OPS LVDB

The operations shall be of rotating type. The lever shall be located approximately in the centre of the LV board and the load break switch. It shall be easily removable.



Opening and closing operations shall be independent of the operator action.

The effort to be exerted on a lever by operators for closing operation shall not exceed 250 N.

**The operating lever shall be easily removable.**

### 9.2.4 Padlocking Facilities

Padlocking facilities shall be provided to lock the load break switch open position.

### 9.2.5 Upstream Connection Palm

According the LV board type, the incoming connection palms shall be able to receive:

LV board	Nb of 240 sq.mm copper LV cable	
	For 1 Phase	Neutral
Type 4-800	2	1
Type 4-1200	3	1
Type 8-1200	3	1
Type 8-1800	4	2

The incoming connection palm shall be made of copper or copper alloy. They shall be drilled with holes of 13 mm diameter to allow the cable connections (see nb above) with copper terminal lugs (not supplied).

Copper or stainless steel M12 bolts for connections shall be supplied with the LVBD.

## 9.3 Busbar

The busbar shall be made of tinned copper or tinned aluminium.

The cross section of busbar shall be sufficient to avoid:

- Overheating under rated current transit,
- Permanent buckling during short circuit current transit.

The busbar comprises:

- 4 horizontal manifold bars which includes all the unlosable components able to connect Monobloc compact type outgoing.

- 4 vertical connection bars between horizontal bars and the general load break switch.

The neutral bar shall be drilled with a hole of 12 mm diameter to allow earthing connection. A bolt M12 shall be supplied.

A mark shall be embossed or engraved on each horizontal bar:

- Neutral: N
- Phases: 1, 2, 3 or A, B, C

These marks shall be legible after complete equipping of the LV distribution board.

#### 9.4 Monobloc Compact Type Outgoing

Each outgoing shall be made of a Monobloc assembly including 3 cut-outs and one neutral opening bar.

It shall be mandatory that monoblocs being of 4 poles monoblocs.

The rated current of the monobloc busbar shall be 400 A and the monobloc busbar shall be made of tinned copper or tinned aluminium.

The frame busbar being under voltage, the Monobloc compact outgoing shall be easily installed with direct fixing on horizontal bar (one fastening per bar).

A monobloc compact type outgoing shall be installable on either any type of LVDB frame: T-4 800 or T-4 1200 for OPS, T-8 1200 or T-8 1800.

##### 9.4.1 Cut-out

The LV cut-out shall allow the operation of fuses on load thanks to the insulated fuse holder and quick closing and opening fuse links.

It shall be able to receive the LV fuses described in 11.1.

The clamping of contact jaws shall be of elastic type and the copper jaws shall be silvered.

Setting up and removal of fuse links shall be carried out with horizontal translatory motion (by hand).

##### 9.4.2 Fuse Holder

Made of transparent insulating material, the fuse holder shall allow for easy operation on fuse and shall protect the operator from any further projections in case of setting up under short circuit.

After setting up of fuse with the fuse holder, it shall be impossible to remove only the fuse holder.

##### 9.4.3 Neutral Bar

The neutral of each Monobloc outgoing shall be fitted with an opening neutral bar. This neutral bar shall be protected against corrosion.

##### 9.4.4 Connection of Outgoing Cables

The connection palms shall be located in the bottom of the Monobloc compact type outgoing. The palms shall be **aligned and stepped**.

They shall be drilled with holes of 13 mm diameter in order to allow 240 mm<sup>2</sup> (maximum) aluminium cable connections with bi-metallic aluminium copper terminal lugs (not supplied).

Copper or stainless steel M12 bolts for connections shall be supplied.

One lateral insulating protection screen shall be supplied with each Monobloc outgoing to allow connection of a cable, the other monobloc outgoing being under voltage.



### 9.5 Test Short-Circuit and Padlocking Panel

This panel made of insulating material and installed on monobloc compact outgoing shall allow the following functions:

- padlocking an outgoing after having withdrawn fuses,
- cable testing on an outgoing unit,
- short-circuit making an outgoing feeder for safe operation,
- emergency supply from another substation in case of outage.

One test, short circuit and padlocking panel shall be supplied with each LV distribution board.

### 9.6 Reservation Panel

This panel made of insulating material shall be installed on the horizontal bars in place of one monobloc outgoing unit allowing for future extension of the quantity of outgoing units.

### 9.7 Insulated Wrench

One insulated wrench shall be supplied with each LV distribution board. These wrenches will allow the tightening of bolts which hold monobloc outgoing unit on frame busbars.

### 9.8 Lighting and Auxiliary Supply

To allow power supply of substation lighting, cable fault detector, power outlets, remote control unit, etc..., one 32 Amp (Neutral +phase) miniature circuit breaker (MCB) conform to the requirements of IEC 60947-2 shall be installed on the top of the LV distribution board near the general load break switch. The wiring shall be connected on incoming side of the load break switch.

The insulation withstand of this assembly shall be:

- 10 kV at 50 Hz for 1 minute.
- 20 kV at 1.2/50  $\mu$ s wave.

The characteristics of the MCB shall be:

Number of pole	2
Rated voltage	220...240 V AC
Rated frequency	50 Hz
Rated current	32 A
Ultimate breaking capacity (Icu) IEC 60947-2	20 kA
Curve	C

### 9.9 LV Metering Voltage Circuit

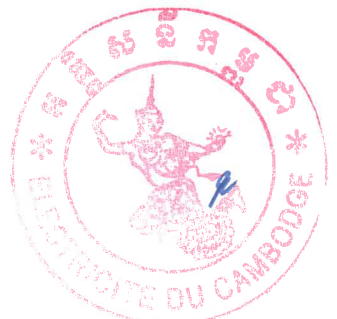
To allow power supply of substation general LV metering one pad-lockable fuse block (neutral and 3 phases) shall be installed on the top of the LV distribution board near the general load break switch. Fuses with a size of 14x51 and 10 amperes shall be supplied. The wiring shall be made with 16 sq.mm copper cable and connected downstream of the load break switch.

The insulation withstand of this assembly (wiring and fuse block) shall be:

- 10 kV at 50 Hz for 1 minute.
- 20 kV at 1.2/50  $\mu$ s wave.

### 9.10 Corrosion Resistance

The LV distribution board shall be protected against corrosion.





## 10 Marking

Each LV distribution board shall bear the following permanent marking:

- Name of Manufacturer
- Standard
- Type of LVDB
- Serial number
- Year of manufacturing
- Rated Voltage
- Rated insulation levels

## 11 Fuse Cartridges

### 11.1 Fuses for Monobloc Compact Type Outgoing

LV blade fuse cartridges shall be of size 2 (115 mm between axles) according the requirement of IEC 60269-2.1 section 1.

The blades shall be silvered, plane, without hole or notch.

The holding brackets shall be made either of insulating material or metallic.

#### 11.1.1 Rated Voltage

The fuse rated voltage shall be 440 Volts

#### 11.1.2 Rated Currents

The range of supplied fuses shall be the following:

- 63 A
- 125 A
- 160 A
- 200 A
- 250 A
- 315 A
- 400 A

#### 11.1.3 Utilization Category

Utilization category of LV fuses shall be gG as per IEC 60269-1.

#### 11.1.4 Minimum Breaking Capacity

The minimum nominal breaking capacity of fuses shall be 50 kA.

### 11.2 LV Metering Voltage Circuit

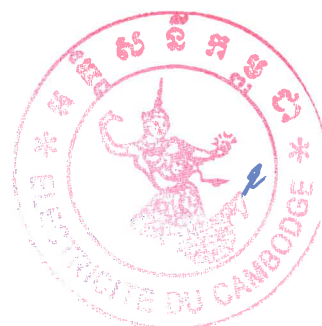
LV fuse cartridges and neutral tube shall be of 14 x 51 size shall be according the requirement of IEC 60269-2.1 section 3.

#### 11.2.1 Rated Voltage

The rated voltage shall be 440V

#### 11.2.2 Rated Current

The rated fuse current shall be 10 Amperes





### 11.2.3 Utilization Category

Utilization category of LV fuses shall be gG as per IEC 60269-1.

### 11.2.4 Minimum Breaking Capacity

The minimum nominal breaking capacity of fuses shall be 100 kA.

### 11.3 Fuse Marking

Fuses shall be permanently marked as requested by the relevant IEC standard (IEC 60269-2).

## 12 Delivery

Each low voltage distribution boards shall be delivered as follow:

LVDB	Number of compact monobloc outgoing	Number of fuse holder	Number of Test, short circuit and padlocking panel	Number of insulated wrench
Type 4	4	12	1	1
Type 8	8	24	1	1

**The complete LVDB (Frame, busbar and load break switch) and all accessories (compact monobloc outgoing, fuse holders) shall mandatorily come from the same origin (Manufacturer). Assembly of diverse origins equipment without type tests of the full apparatus shall not be accepted.**

The LVDB shall be delivered well protected in wooden box and on a wooden pallet.

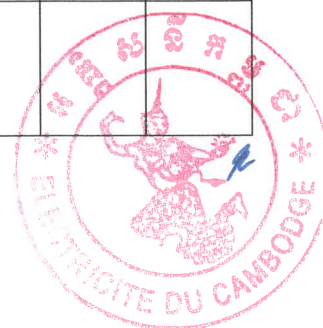
Fuses shall be delivered in suitably protected card box on a wooden pallet.

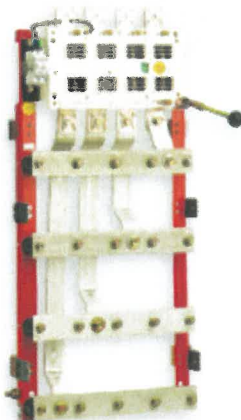
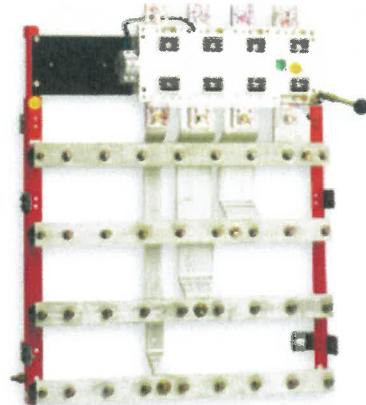


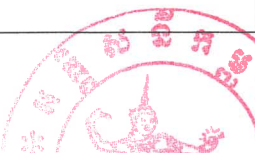
### 13 Technical Data Sheet

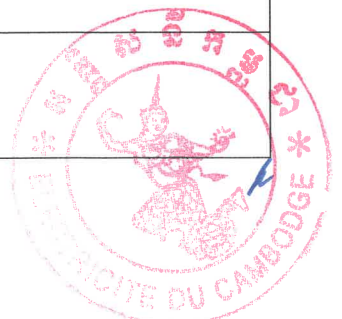
#### 13.1 Low Voltage Distribution Board for indoor substation

No.	Description	Unit	Requirements			Supplier's Offer		
1	Country		to be specified					
2	Manufacturer		to be specified					
3	Manufacturer's Reference		to be specified					
4	Applicable Standard		EDF HN 63-S-61					
4.a	Full type tests reports supplied or agreement of use from reputed utility		Mandatorily as per HN 63-S-61					
5	Rated Voltage	kV	0.4					
6	Power frequency Dielectric withstand between Phase and frame between conductors over the sectioning distance	kV rms kV rms kV rms	10 4 4					
7	Impulse Withstand Voltage Phase to Earth (1.2/50 $\mu$ s wave)	kV	20 peak					
	LVDB TYPE		TR4 800	TR8 1200	TR8 1800	TR4 800	TR8 1200	TR8 1800
8	<b>Continuous operating Rated current</b>							
8a	load break switch	A	800	1200	1800			
8b	bus-bar	A	800	1200	1800			
9	<b>Rated short time withstand current rms/ 0.5 second</b>							
9a	load break switch	kA	16	25	32			
9b	Bus bar	kA	16	25	32			
9	<b>Peak rated short time withstand current</b>							
9a	load break switch	kA	32 (cos.p= 0.35)	52 (cos.p= 0.25)	72 (cos.p= 0.20)			
9b	Bus bar	kA	32 (cos.p= 0.35)	52 (cos.p= 0.25)	72 (cos.p= 0.20)			
10	Breaking capacity of Load break switch: 440 Volts and a cos $\rho$ = 0.9	A	800	1200	1800			



11	On Load minimum number of C.O. cycle		40	40	40			
12	Off load minimum number of C.O. cycle		1000	1000	1000			
13	Load break switch short circuit making capacity (limited by fuses)	kA	32	52	72			
14	Dimensions							
14a	High	mm	≤ 1600	≤ 1600	≤ 1600			
14b	larger	mm	≤ 560	≤ 900	≤ 900			
14c	width	mm	≤ 500	≤ 500	≤ 500			
	Sample of requested Type 4 LVBD			Sample of requested Type 8 LVBD				
								
15	Metallic frame							
15a	Sufficiently rigid to avoid any buckling during handling		Mandatory					
15b	Sufficiently rigid to avoid any buckling during operation of general load break switch		Mandatory					
15c	Sufficiently rigid to avoid any buckling during opening and closing operation on fuse cut-out		Mandatory					
15d	include an earthing bushing		Mandatory					
15e	To be fixed against wall with four pads.		Mandatory					
16	General load break switch							
16a	Located on the top of the Low Voltage Distribution Boards.		Yes	Yes	Yes			

16b	Operating lever operations		straightforward						
16c	Operating lever located		On the right side of the LVDB.						
16d	Position of lever when the general load break switch is closed		High position.						
16e	Opening and closing operations are independent of the operator action.		Yes						
16f	Effort to be exerted on a lever by operators for closing operation	N	≤ 250						
16g	Padlocking facilities provided to lock the load break switch open position		Mandatory						
17	Load break switch Upstream Connection palm								
17a	Nb of phase 240 mm <sup>2</sup> copper LV cable		2	3	4				
17b	Nb of neutral 240 mm <sup>2</sup> copper LV cable		1	1	2				
17c	connection palm made of:		copper or copper alloy						
17d	Hole diameter for lugs connection	mm	13						
17e	Copper or stainless steel M12 bolts supplied		Mandatory						
18	Bus bar								
18a	Made of tinned copper or tinned aluminium.		To be specified						
18b	Size of vertical bars (w x h)	mm	To be specified						
18c	Size of horizontal bars	mm	To be specified						
18d	Bus bar cross section sufficient to avoid: <ul style="list-style-type: none"><li>Overheating under rated current transit,</li><li>Permanent buckling during short circuit current transit</li></ul>		Mandatory						
			Mandatory						
18f	4 horizontal manifold bars including all the unlosable components able to connect		Yes						

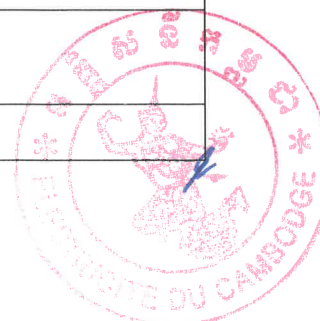


	Monobloc compact type outgoings.			
18g	4 vertical connection bars between horizontal bars and the general load break switch		Yes	
18h	Neutral bar drilled with a hole of 13 mm diameter for earthing connection. Bolt M12 supplied.		Mandatory	
18i	Embossed or engraved marking on each horizontal bar: <ul style="list-style-type: none"> <li>• Neutral: N</li> <li>• Phases: 1, 2, 3 or A,B,C</li> </ul>		Yes Yes	
18j	Marking legible after complete equipping of the LV distribution board		Yes	

**13.2 LVDB for one pillar substation (OPS)**

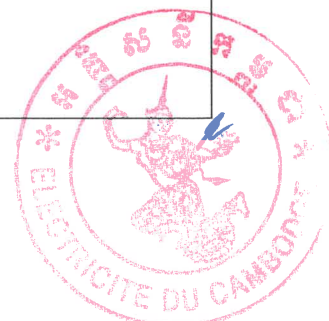
No.	Description	Unit	Requirements	Supplier's Offer
19	Country		to be specified	
20	Manufacturer		to be specified	
21	Manufacturer's Reference		to be specified	
22	Applicable Standard		EDF HN 63-S-61	
23	Full type tests reports supplied		Mandatory as per HN 63-S-61 requirement + type test of load break switch as per requirements of IEC 60947-3	
24	Rated Voltage	kV	0.4	
25	Power frequency Dielectric withstand between Phase and frame between conductors over the sectioning distance	kV rms kV rms kV rms	10 4 4	
26	Impulse Withstand Voltage Phase to Earth (1.2/50μs wave)	kV	20 peak	
	LVDB TYPE		TR4 1200 OPS	

27	<b>Continuous operating Rated current</b>				
27a	load break switch	A	1200		
27b	bus-bar	A	1200		
28	<b>Rated short time withstand current rms/ 0.5 second</b>				
28a	load break switch	kA	25		
28b	Bus bar	kA	25		
29	<b>Peak rated short time withstand current</b>				
29a	load break switch	kA	52 (cos.p=0.25)		
29b	Bus bar	kA	52 (cos.p=0.25)		
30	Breaking capacity of Load break switch: 440 Volts and a cos p= 0.9	A	1200		
31	<b>On Load</b> minimum number of C.O. cycle		40		
32	<b>Off load</b> minimum number of C.O. cycle		1000		
33	Load break switch short circuit making capacity (limited by fuses)	kA	52		
34	<b>Dimensions</b>				
34a	High	mm	≤ 1600		
34b	larger	mm	≤ 560		
34c	width	mm	≤ 500		
35	<b>Metallic frame</b>				
35a	Sufficiently rigid to avoid any buckling during handling		Mandatory		
35b	Sufficiently rigid to avoid any buckling during operation of general load break switch		Mandatory		
35c	Sufficiently rigid to avoid any buckling during opening and closing operation on fuse cut-out		Mandatory		
35d	include an earthing bushing		Mandatory		
35e	To be fixed against wall with four pads.		Mandatory		
36	<b>General load break switch</b>				



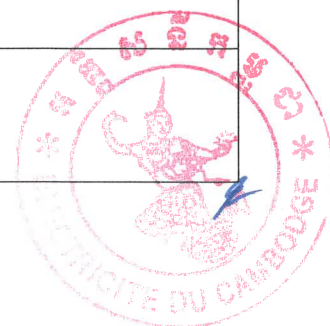



36a	Located on the top of the Low Voltage Distribution Boards.		Yes	
36b	Operating lever operations		Rotating motion	
36c	Operating lever located		<b>Approximately in the centre of the LVDB. (vertical axle)</b>	
36d	Opening and closing operations are independent of the operator action.		Yes	
36e	Effort to be exerted on a lever by operators for closing operation	N	$\leq 250$	
36f	Padlocking facilities provided to lock the load break switch open position		Mandatory	
36g	Operating lever shall be easily removable		Mandatory	
37	<b>Load break switch Upstream Connection palm</b>			
37a	Nb of phase 240 mm <sup>2</sup> copper LV cable		3	
37b	Nb of neutral 240 mm <sup>2</sup> copper LV cable		1	
37c	connection palm made of:		Tinned copper or copper alloy	
37d	Hole diameter for lugs connection	mm	13	
37e	Copper or stainless steel M12 bolts supplied		Mandatory	
38	<b>Bus bar</b>			
38a	Made of tinned copper or tinned aluminium.		To be specified	
38b	Size of vertical bars (w x h)	mm	To be specified	
38c	Size of horizontal bars	mm	To be specified	
38d	Bus bar cross section sufficient to avoid: <ul style="list-style-type: none"> <li>Overheating under rated current transit,</li> </ul>		Mandatory  Mandatory	










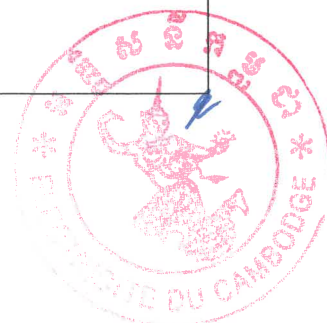
	<ul style="list-style-type: none"> <li>Permanent buckling during short circuit current transit</li> </ul>			
38f	4 horizontal manifold bars including all the unlosable components able to connect Monobloc compact type outgoings.		Yes	
38g	4 vertical connection bars between horizontal bars and the general load break switch		Yes	
38h	Neutral bar drilled with a hole of 13 mm diameter for earthing connection. Bolt M12 supplied.		Mandatory	
38i	Embossed or engraved marking on each horizontal bar: <ul style="list-style-type: none"> <li>Neutral: N</li> <li>Phases: 1, 2, 3 or A,B,C</li> </ul>		Yes Yes	
38j	Marking legible after complete equipping of the LV distribution board		Yes	
39	<b>13.3 Monobloc compact type outgoing</b>			
39a	Monobloc assembly including 3 cut-outs and one neutral bar		Mandatory	
39b	Rated operational current	A	400	
39c	Busbar		Tinned copper or tinned aluminum	
39d	Easy to install under voltage with direct fixing on frame horizontal bars		Mandatory	
39e	LV cut-out allow the operation of fuses on load thanks to the insulated fuse holder and quick closing and opening fuse links.		Mandatory	
39f	Able to receive size 2 LV fuses 115mm		Mandatory	
39g	Fuse Ccontact jaws of elastic type and made of copper silvered		Mandatory	



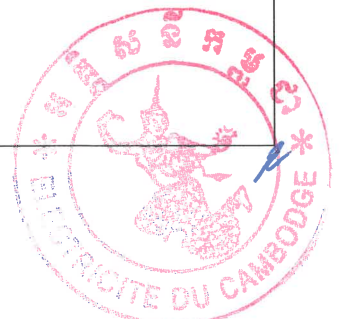
39h	Setting up and removal of fuse links shall be carried out with horizontal translatory motion		Mandatory	
39i	Fitted with opening neutral bar protected against corrosion		Mandatory	
39j	LV feeder cable connection palms located at the bottom of Monobloc		Mandatory	
39k	Cable connection palms <b>vertically aligned and stepped</b>		Mandatory	
39l	Palms drilled with 1 holes of 13 mm diameter		Mandatory	
39m	Palm allow 240 mm <sup>2</sup> (maximum) aluminium cable connections with bi-metallic aluminium copper terminal lugs (not supplied).		Mandatory	
39n	Copper or stainless steel M12 bolts for connections supplied		Mandatory	
39o	One lateral insulating protection screen supplied with each Monobloc outgoing to allow connection of a cable, the other Monobloc outgoing being under voltage.		Mandatory	
	<p>Sample of Monobloc compact type outgoing</p> 			
40	<b>13.4 Fuse holder</b>			
40a	Made of transparent insulating material		Mandatory	

40b	Allow easy fuse operation		Mandatory	
40c	Protect the operator from any projections in case of short circuit		Mandatory	
40d	After setting up of fuse with the fuse holder, it is impossible to remove only the fuse holder.		Mandatory	
	Sample of Fuse holder 			
41	<b>13.5 Test, short circuit and padlocking panel</b>			
41a	Panel made of insulating material		Yes	
41b	Allow padlocking of outgoing after having withdrawn fuses		Mandatory	
41c	Allow cable testing on outgoing unit		Yes	
41d	Allow short-circuit making on outgoing feeder for safe operation		Mandatory	
41e	Allow emergency supply		Yes	
41f	test, short circuit and padlocking panel		Supplied on request <input type="checkbox"/>	
42	One insulated wrench supplied with each LV distribution board. This wrench will allow the tightening of bolts which hold monobloc outgoing unit on bars and opening of neutral bar		Mandatory	
43	<b>Reservation panel</b> made of insulating material shall be installed on the horizontal bars in place of one Monobloc outgoing unit allowing future extension of the quantity of outgoing units.		Supplied on request <input type="checkbox"/>	

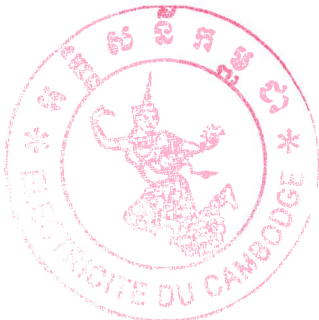
	Sample of Test, short circuit and padlocking panel		Sample of wrench	
44	<b>13.6 MCB for Lighting and auxiliary supply</b>			
44a	installed on the top of the LV distribution board near the general load break switch		Yes	
44b	Connected on incoming side of the load break switch.		Yes	
44c	MCB installation assembly shall withstand <ul style="list-style-type: none"><li>50 Hz 1 minute</li><li>1.2/50 <math>\mu</math>s wave</li></ul>	kV kV	10 20	
44d	MCB Standard		IEC 60947-2	
44e	MCB Manufacturer		To be specified	
44f	MCB Country of manufacturing		To be specified	
44g	Number of pole		2	
45h	Rated voltage	V AC	220...240	
44i	Rated frequency	Hz	50	
44j	Rated current	A	32	
44k	Ultimate breaking capacity (Icu) IEC 60947-2	kA	20	
44l	Curve		C	
45	<b>13.7 LV metering supply</b>			
45a	Padlockable fuse block is installed on the top of the LV distribution board near the general load break switch		Yes	



45b	Neutral and 3 phases fuse block		Yes	
45c	Fuses size	mm	14 x 51	
45d	Fuses rated voltage	V	440	
45e	Rated current	A	10	
45f	Utilization category (IEC 0269-1)		gG	
45g	Nominal breaking capacity of fuses shall be.	kA	$\geq 100$	
45h	Fuses supplied		Yes	
45i	Wiring made with 16 sq.mm copper cable and connected downstream of the load break switch.		Mandatory	
45j	The insulation withstand of this assembly (wiring and fuse block) is: <ul style="list-style-type: none"> <li>• 50 Hz 1 minute</li> <li>• 1.2/50 <math>\mu</math>s wave</li> </ul>	kV kV	10 20	
46	LVDB Marking		Name of Manufacturer Standard Type of LVDB Serial number Year of manufacturing Rated Voltage rated insulation levels	
47	<b>Delivery</b>			
47a	Type 4 LVDB includes:		4 monobloc outgoing <input type="checkbox"/> 12 fuse holders <input type="checkbox"/> 1 insulated wrench <input type="checkbox"/> 1 test and padlocking panel <input type="checkbox"/>	
47b	Type 8 LVDB includes:		8 monobloc outgoing <input type="checkbox"/> 24 fuse holders <input type="checkbox"/> 1 insulated wrench <input type="checkbox"/> 1 test and padlocking panel <input type="checkbox"/>	



48	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p> <p>1/ 2/ 3/</p> <p>Full technical information shall be supplied within the bid.</p> <p>Bidder signature:</p>				



**13.8 Fuses for Monobloc Compact Type Outgoing**

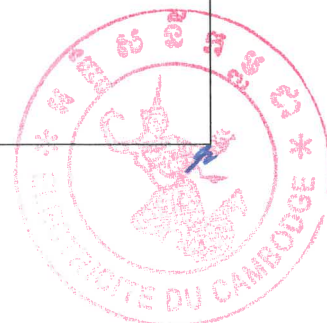
No.	Description	Unit	Requirements	Supplier's Offer
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's Reference		to be specified	
4	Applicable Standard		IEC 60269	
5	Full type tests reports supplied		Yes, as per IEC 60269	
6	Rated Voltage	V	440	
7	Fuse size (IEC 60269-2.1 section 1)		2 (115mm between axles)	
8	Blades		silvered and plane	
9	Blades		without hole or notch	
10	Fuse holding brackets		made of insulating material	
11	Rated currents	A	<input type="checkbox"/> 63 <input type="checkbox"/> 125 <input type="checkbox"/> 160 <input type="checkbox"/> 200 <input type="checkbox"/> 250 <input type="checkbox"/> 315 <input type="checkbox"/> 400	
12	Utilization category (IEC 60269-1)		gG	
13	Breaking capacity	kA	≥ 50	
14	Fuses permanently marked as per IEC 60269-2		Yes	
15	Delivered in protected card box		Yes	
16	Technical drawings, Catalogue, full technical information, etc...		<b>Must be provided</b> <b>If not the offer is not considered.</b>	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.

**Deviation from the technical specification:**

The bidder shall list point after point and explain here in after all deviation from the requested technical specification.

1/  
2/





3/

Full technical information shall be supplied within the bid.

Bidder signature:

4

