



KINGDOM OF CAMBODIA
NATION RELIGION KING



ELECTRICITE DU CAMBODGE

TECHNICAL SPECIFICATION

EDC-DTS-LV004

**LV Distribution Boards for Pole Mounted
Distribution Substation**

November 2017





ELECTRICITE DU CAMBODGE

Version	Date	Technical Specification Name	Authorized by : (name and signature)
1.0	November, 2017	LV Distribution Board for Pole Mounted Substation	 DR. REANG CHULASA

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Low Voltage Distribution Boards for Pole Mounted Substation

1 Scope

This specification deals with Low Voltage Distribution Boards intended to be installed outdoor on the pole mounted distribution substations of distribution grid of Electricité du Cambodge (EDC).

The low voltage distribution boards for pole mounted distribution substation comprises a LV board and a cabinet. 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 60044-1 : Instrument Transformers- Part 1 Current Transformers.
- 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 60529 : Degree of protection provided by enclosures (IP code)
- 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.
- IEC 62052 : Electricity metering equipment (AC) General requirements, tests and test conditions
- IEC 62053 : Electricity metering equipment (AC) - Particular requirements
- IEC 62262 : Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts

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 - 1st publishing 1979 : Reduced sized LV Distribution boards for MV/LV substations.

The Supplier may propose alternative standards, provided it is demonstrated that they give an equivalent degree of quality as the referenced standard. Acceptability of any alternative standard is at the discretion of the Purchaser.

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 for pole mounted substation 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 the relevant IEC and ISO recommendations.

LVDB for pole mounted substation shall be subjected to tests as specified below.

4.2 Type Tests

All type tests required by the IEC and ISO or any national standards 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.

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



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4.2.1 Enclosure

IP and IK type tests according the respective IEC standards.

4.2.2 Low Voltage Distribution Board for Transformers Equal or Less 160 kVA

- Overheating test,
- Insulators and fuse holder mechanical tests,
- All type Tests required by the relevant IEC standard.

4.2.3 Low Voltage Distribution Board for Transformer of More than 160 kVA

- Overheating test
- Load break switch Mechanical operation test
- Load break switch Breaking and making capacity test
- Load break switch making on short circuit
- Over current withstand test of complete LV board (short circuit test)
- Insulation withstand tests
- Wet heat corrosion test
- Insulators and fuse holder mechanical tests
- All type Tests required by IEC 60947-3

4.2.4 LV Fuses

All type test reports requested by the relevant IEC standards shall be provided.

A special attention shall be paid on the breaking capacity type test by EDC. If LV fuses type tests are not provided, the fuse shall be rejected.

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

LV distribution boards for pole mounted substation 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 for pole mounted distribution substation 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)

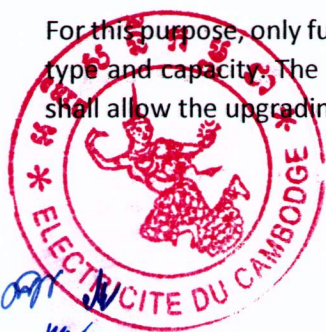
7 Composition of Low Voltage Distribution Boards for Pole Mounted Distribution Substation

7.1 Substation with a Transformer Capacity of 160 kVA Maximum

Only one type of LVDB for pole mounted substation shall be installed for the following transformers:

Type of Transformer	Transformer capacity (kVA)
Two phases transformers	25, 30, 50, 75
Three phases transformers	25, 50, 100, 160

For this purpose, only fuse number installed and fuse capacity will change according to the transformer type and capacity. The fuse board and the cabinet shall be identical for all transformer capacity and shall allow the upgrading of the transformer only with fuse ampacity changing.



7.1.1 LV Distribution Board

7.1.1.1 Description

The LV distribution board shall be constituted of a 3 phase + Neutral fuse cut out (four poles) that shall accommodate Type 2 fuses and neutral solid link requested by EDC-DTS-LV003 technical specification.

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

The maximum fuse ampacity to be installed in the fuse cut out shall be 315 Amp.

The cut out shall be of horizontal type and the neutral shall be located on the left side of the fuse cut out.

The LV cut-out shall allow the simultaneous withdrawal operation of the 3 fuses and neutral bar on load thanks to a specific fuse holder device and a handle to be operated with two hands.

The operation handle shall be mandatorily located in front face of the cut out.

Installation of the fuses and the neutral bar shall be done one after one by means of a specific fuse holder installation tool.

The neutral bar shall be supplied with the LV distribution board.

The protective indice (IP) of the cut out shall be IP2X.

7.1.1.2 Rated voltage

The rated voltage of the cut out shall be 400 Volts.

7.1.1.3 Cable connection

Cut out upstream and downstream cable shall be connected directly on the fuse cut out without the need of terminal lugs. The Connecting devices shall allow the connection of Aluminum Aerial bundled conductors from 50 to 150 mm². It shall be possible to connect the incomer and outgoing conductor cable without the need to fold it. For this purpose, the front face of the cable connector shall be removable and easily put in place.

The incomer ABC cable connection shall be connected to the upstream jaws of the fuse cut out and the outgoing connected to the downstream fuse jaws.

7.1.1.4 Cabinet

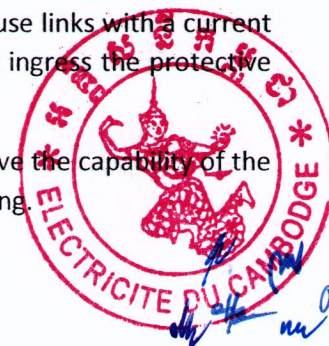
The cabinet shall be made of fibreglass loaded polyester by hot compression moulding, fire-resistant, self-extinguishing and high impact proof.

The exterior surface shall be smooth without any surface defect and shall be of ivory colour.

The protective indices of the cabinet shall be IP 44 and IK 10. This shall be proven by submitting the type test reports according the relevant IEC standards.

In addition, the cabinet shall have a sufficient volume in order to avoid excessive heating of the internal components under the local conditions when the cut out is fitted with 315 A fuse links with a current of 300 A. Installation of down and up airing are permitted provided they not ingress the protective indices (IP, IK).

The manufacturer shall provide a heating withstand test report in order to prove the capability of the LV distribution board to operate with a current of 300 A without any overheating.



Near the LV distribution board, a sticker on the cabinet bottom shall mention in red colour letters of not less than 3 cm high the following text in English **"FUSE: Maximum 315 Amp"** and in Khmer language: "ហ្វុយស៊ីប៖ កំរិតចរន្តអតិបរមា 315 អំពែរ".

7.1.1.4.1 Door

The cabinet shall be fitted with a right side opening door. The door hinges shall be not visible and shall not protrude the door or cabinet surface. It shall allow door opening up to 180°. The door shall also be possible to be removed when opened. The door hinging mechanism shall be sturdy and it shall withstand strong winds blowing at the door when open.

The lock of the door shall be operated by means of 11 mm triangle "key". It shall be possible to lock the access to the door lock by using a standard 6 mm or 8 mm diameter padlock. For this purpose the locking device used shall be made of corrosion resistant metal.

The outside face door shall bear the Electricité du Cambodge logo and the three letters: EDC. This marking (logo and letters) shall be embossed or engraved and shall not reduce the requested protective indices.

7.1.1.4.2 Cable entrance

All cable core entrance shall be located on the lowest side of the cabinet. The cable to be connected shall be LV aerial bundled conductors from the following cross section: 1x50 mm² (aluminium phase) + 1x54.6 mm² (aluminium alloy Neutral), 3x70 mm² (aluminum phase) + 1x70 mm² (aluminum alloy Neutral) and 3x150 mm² (aluminum phase) + 1x70 mm² (aluminum alloy Neutral).

Conductor entrance shall be fitted with 8 cable glands located in straight line under the cut out conductor connection device. The cables glands shall accommodate insulated conductors from 6 mm to 18 mm and shall be of good quality. They shall be durable and should last for the life time of the equipment i.e. more than 25 years.

7.1.1.4.3 Fixation of cabinet

It shall be possible to fix the cabinet onto one single pole by means of stainless steel straps and/or bolts and metallic collars, both.

In addition the cabinet shall be easily installable on two U shape steel channel of 70 mm large (case of 2 pole mounted transformer).

The fixing frame or device shall be protected against corrosion.

Stainless steel strap, bolts and collar are not included in the furniture.

7.2 Substation with a Transformer Capacity of More than 160 kVA

7.2.1 LV Distribution Board

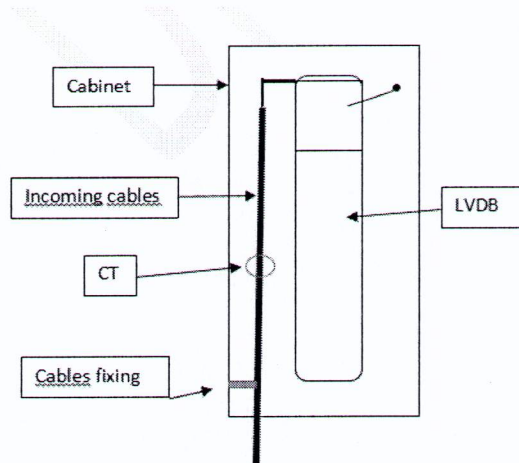
The LVDB to be used is the equipment described in **EDC-DTS-LV003** from which the article 9.8 *Lighting and auxiliary supply* is cancelled.

Nevertheless the following is to be inserted at the end of the article 9.2.4

As installed in a cabinet with cable entrance located at the lowest side of its enclosure, the upstream connection palms shall be located in such manner it is not necessary to fold any of the incoming cables for connection. For such a purpose, the connecting palms shall be located at the rear top side of the



LVDB and shall be easily accessible from the front of the board when Monobloc outgoings are removed.



7.2.2 Current Transformers

The current transformers for metering shall be supplied and installed by EDC.

Nevertheless, the wiring between CT and a terminal bloc located on top of LV board shall be factory made and supplied with the LVDB.

7.2.3 Cabinet

The LV Distribution board shall be installed inside a fibreglass reinforced polyester cabinet. Metallic cabinets are not accepted.

The cabinet shall be made of fibreglass reinforced polyester, fire-resistant, self-extinguishing and high impact proof.

Cabinet volumes and sizes shall be suitable for each LV distribution boards described in EDC DTS LV003 and shall not complicate the wiring and operation of the boards.

The exterior surface shall be smooth without any surface defect and the gel coat shall be of ivory colour.

The protective indices of the cabinet shall be IP 44 and IK 10. This shall be proven by submitting the test reports according the respective IEC standards.

In addition, the cabinet shall have a sufficient volume in order to avoid excessive heating of the internal components under the local conditions. Installation of down and up airing are permitted provided they not ingress the protective indices.

7.2.3.1 Door

The cabinet shall be fitted with two opening doors (left and right) that allow access to whole the LV distribution board. The hinge mechanism shall allow door(s) opening up to 180°. The door(s) hinging mechanism shall be sturdy and it shall withstand strong winds blowing at the door(s) when it is open. It shall be possible to lock the door(s) in open position.

The two lock (minimum) of the door(s) located in such manner that they firmly lock the top and bottom of the door(s) and shall be operated by means of 11 mm triangle "key". It shall be possible to lock the



access to the door(s) lock by using a standard 6 or 8 mm diameter padlock. For this purpose the device used shall be made of corrosion resistant metal.

The doors shall bear the Electricité du Cambodge logo and the three letters: EDC. This marking (logo and letters) shall be embossed or engraved and shall not reduce the requested protective indice. Weather resistant stickers are allowed.

In addition the door(s) shall be of anti-poster sticking type.

7.2.3.2 Cable entrance

All cable core entrance shall be located on the lowest side of the cabinet. The cable to be connected are:

A/ Incomer cables

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

LV board	Nb of 240 mm ² single core copper LV cable	
	Phases	Neutral
Type 4-800	2	1
Type 8-1200	3	1
Type 8-1800	4	2

B/ Outgoing LV feeder cables

The cables to be connected are LV aerial bundled conductors from 3x70 mm² (aluminum phase)+ 1x70 mm² (aluminum alloy Neutral) to 3x150 mm² (aluminum phase)+ 1x70 mm² (aluminum alloy Neutral) or LV underground cables with the following cross sections : 3x70 mm² (aluminum phase) + 50 mm² (aluminum neutral), 3x150 mm² (aluminum phase) + 95 mm² (aluminum neutral) and 3x240 mm² (aluminum phase) + 150 mm² (aluminum neutral).

Conductor entrance shall be fitted with necessary cable glands located in straight line under the LV distribution board conductor connection equipment in order to avoid folding the cables. The cables glands shall be of good quality. They shall be durable and should last for the life time of the equipment i.e. more than 25 years.

The number and diameter of cable glands to be installed is a follow:

Type of LV board	Incoming feeders	Outgoing feeders
Gland for one core cable	Insulated single core cable from 20 to 35 mm diameter	Insulated single core cable from 10 to 35 mm diameter
Type 4-800	7 nb (6 phase and 1 neutral)	16 nb
Type 8-1200	10 nb (9 phase and 1 neutral)	32 nb
Type 8-1800	14 nb (12 phase and 2 neutral)	32 nb



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7.2.3.3 Metering box

A box for installing an electronic meter shall be installed on the middle of the out right side of the cabinet. This box shall be of similar construction than the cabinet with the same IP and IK indice and the same colour. It shall include a panel for fixing the meter.

Two holes for Voltage and Current circuits shall be done on the rear side of the meter box and the LVDB cabinet side.

7.2.3.3.1 Door

The metering box shall be fitted with a right side opening door. The door hinges shall be not visible and shall not protrude the door or cabinet surface. It shall allow door opening up to 180°. The door shall also be possible to be removed when opened. The door hinging mechanism shall be sturdy and it shall withstand strong winds blowing at the door when it is open.

Integral transparent windows shall be part of the door, approximately 100 mm square pattern. Windows shall be permanently fixed on the meter front door.

If the meter windows are subject to breakage it shall be possible to replace the individual windows.

The windows shall allow easy reading of installed meters without the need to open the door. Meters will be read either visually or with the aid of infrared hand-held meter readers.

The reading window material shall be non-yellowing or discolouring and shall not deteriorate with time. Manufacturer shall mandatorily prove that those requirements are met.

The lock of the door shall be operated by means of 11mm triangle "key". It shall be possible to lock the access to the door lock by using a standard 6 or 8 mm diameter padlock. For this purpose the device used shall be made of corrosion resistant metal.

The door shall bear the Electricité du Cambodge logo and the three letters: EDC. This marking (logo and letters) shall be embossed or engraved and shall not reduce the requested protective indice.

7.2.3.3.2 Wiring

The voltage and Current wiring shall be installed inside LVDB cabinet and metering box and factory done.

7.2.4 Fixation of Cabinet

The cabinet and its LVDB shall be easily installable on two U shape steel channel of 70 or 80 mm large fixed between two concrete poles. The cabinet fixing frame, if any, shall be protected against corrosion.

All precaution to avoid buckling or deformation of the LV distribution board and the cabinet during operation shall be taken at design stage. So the solution consisting of fixing the LVDB and the cabinet onto the steel channel using the same bolts is preferable.

8 Marking

All cabinets shall be fitted outside with an indelible plate mentioning:

- Name or logo of the manufacturer
- Cabinet reference



- Year/month of manufacturing
- IP and IK indices

9 Delivery

Equipment shall be delivered in only one packaging for one type of LV distribution board for pole mounted substation.

The equipment shall be well protected and on a wooden pallet.



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10 Technical Data Sheets

10.1 Outdoor Low Voltage Distribution Board ≤ 160 KVA

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		To be specified	
5	Full type tests reports supplied		IP and IK tests Overheating test, Insulators and fuse holder mechanical tests, All type Tests required by the relevant IEC standard.	
LV cut out				
6	Rated Voltage	kV	0.4	
7	3 phase + Neutral cut out		Yes	
8	Type 2 fuses and neutral solid link as per EDC-DTS-LV003		Yes	
9	Copper silvered and elastic contact jaws		Yes	
10	Max fuse ampacity	A	315	
11	horizontal type and neutral on the left side		Yes	
12	Simultaneous withdrawal of the 3 fuses and neutral bar on load		Yes	
	Specific fuse holder mechanism		Yes	
	Handle operated with two hands.		Yes	
	Operation handle mandatorily located in front face of the cut out.		Yes	



13	Installation of the fuses and the neutral bar done one after one by means of a specific fuse installation tool.		Yes	
	Neutral bar size 2		Supplied	
14	Protective indice (IP) of the cut out		IP2X.	
15	Upstream/downstream cables connected directly on the fuse cut out without the need of terminal lugs		Yes	
16	Allow the connection of Aluminum Aerial bundled conductors from 50 to 150 mm ² .		Yes	
17	Possible to connect the incomer and outgoing conductor without the need to fold it		Yes	
18	Front face of the cable connector removable and easily put in place.		Yes	
19	Incomer ABC cable connection connected to the upstream jaws		Yes	
Cabinet				
20	Made of fibreglass loaded polyester by hot compression moulding		Yes	
21	Fire-resistant		Yes	
22	Self-extinguishing		Yes	
23	High impact proof.		Yes	
24	Exterior surface smooth without any defect		Yes	
25	Ivory colour.		Yes	
26	Protective indices		IP 44 IK 10	



27	Volume sufficient in order to avoid excessive heating of the internal components under the local conditions when the cut out is fitted with 315 A fuse links with a current of 300 A.		Yes	
28	Airings		To be specified	
29	Heating withstand test report in order to prove the capability of the LV distribution board to operate with a current of 300 A without any overheating		To be supplied	
30	Sticker inside the cabinet mentioning in red colour letters of not less than 3 cm high the following text in English "FUSE: Maximum 315 Amp" and in Khmer language: "ហ្វុយស៊ីប៖ កំរិតចរន្តអតិបរមា 315 អំពែរ".		Yes	
31	Door Right side opening door. Door hinges not visible and not protrude the door or cabinet surface. Opening Possible to remove the door when opened. Sturdy hinging mechanism that withstand strong winds blowing at the door when open. Lock of the door is operated by means of 11mm triangle "key" Possible to lock the access to the door lock by using a standard 6 or 8 mm diameter padlock. Locking device made of corrosion resistant metal.		Yes Yes 180° Yes Yes Yes Yes Yes	



	Outside face door bears the Electricité du Cambodge logo and EDC. This marking (logo and letters) is embossed or engraved and not reduce the requested protective indice.		Yes Yes	
32	Single pole fixing by means of stainless steel straps and/or bolts and metallic collars, both.		Yes	
33	And possibility to install on Two U shape steel channel of 70 mm large (case of 2 poles mounted transformer) fixing		Yes	
34	Fixing frame or device protected against corrosion		Yes	
35	Cable core entrance located on the lowest side of the cabinet.		Yes	
36	Entrance for 1x50mm ² (aluminum phase)+ 1x54.6mm ² (aluminum alloy Neutral), 3x70mm ² (aluminum phase)+ 1x70 mm ² (aluminum alloy Neutral) and 3x150mm ² (aluminum phase)+ 1x70 mm ² (aluminum alloy Neutral).		Yes	
37	Fitted		with 8 cable glands located in straight line under the cut out conductor connection device.	
38	glands shall accommodate insulated conductors		from 6 mm to 18 mm	
39	LVDB Marking		Name of Manufacturer Standard Type of LVDB Serial number Year of manufacturing Rated Voltage Rated insulation levels	



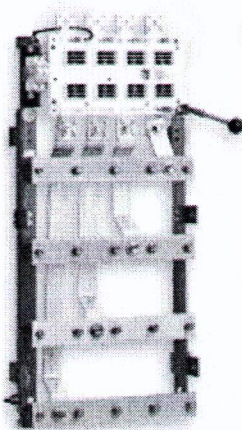
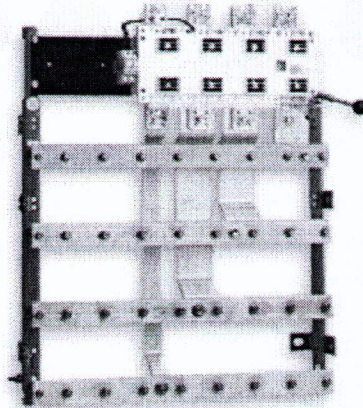
40	Cabinet marking		Name of manufacturer Cabinet reference Year/month of manufacturing IP and IK indices	
41	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
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:				



10.2 Outdoor Low Voltage Distribution Board > 160 kVA

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		Mandatory 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 (1.2/50μs wave)	kV	20 peak					
	LVDB TYPE		TR4 800	TR8 1200	TR8 1800	TR4 800	TR8 1200	TR8 1800
8	Continuous operating Rated current							
8a	load break switch	A	800	1200	1800			
8b	bus-bar	A	800	1200	1800			
9	Rated short time withstand current rms/ 0.5 second							
9a	load break switch	kA	16	25	32			
9b	Bus bar	kA	16	25	32			
9	Peak rated short time withstand current							
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 ² copper LV cable		2	3	4			
17b	Nb of neutral 240 mm ² 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					
17f	Upstream connection palms shall be located in such manner it is not necessary to fold any of the incoming cables for connection		Yes					
17g	Connecting palms are located at the rear top side of the LVDB and are easily accessible		Yes					

	from the front of the board when Monobloc outgoings are removed.					
18	Bus bar					
18a	Made of tinned copper or tinned aluminium.		To be specified			
18b	Size of vertical bars	mm	To be specified			
18c	Size of horizontal bars	mm	To be specified			
18d	Bus bar cross section sufficient to avoid: - Overheating under rated current transit, - Permanent buckling during short circuit current transit		Mandatory Mandatory			
18f	4 horizontal manifold bars including all the unlosable components able to connect Monobloc compact type outgoings.		Yes			
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: - Neutral: N - Phases: 1, 2, 3 or A,B,C		Yes Yes			
18j	Marking legible after complete equipping of the LV distribution board		Yes			
19	Monobloc compact type outgoing					
19a	Monobloc assembly including 3 cut-outs and one neutral bar		Mandatory			

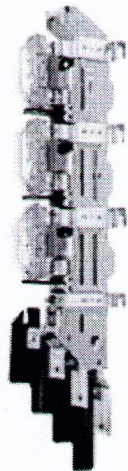
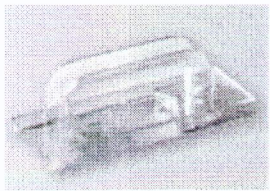


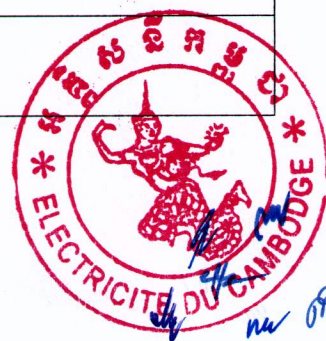
19b	Rated operational current	A	400	
19c	Busbar		Tinned copper or tinned aluminum	
19d	Easy to install under voltage with direct fixing on frame horizontal bars		Mandatory	
19e	LV cut-out allow the operation of fuses on load thanks to the insulated fuse holder and quick closing and opening fuse links.		Mandatory	
19f	Able to receive size 2 LV fuses 115 mm		Mandatory	
19g	Fuse Contact jaws of elastic type and made of copper silvered		Mandatory	
19h	Setting up and removal of fuse links shall be carried out with horizontal translatory motion		Mandatory	
19i	Fitted with opening neutral bar		Mandatory	
19j	LV feeder cable connection palms located at the bottom of Monobloc		Mandatory	
19k	Cable connection palms vertically aligned and stepped		Mandatory	
19l	Palms drilled with 1 holes of 13 mm diameter		Mandatory	
19m	Palm allow 240 mm ² (maximum) aluminium cable connections with bi-metallic aluminium copper terminal lugs (not supplied).		Mandatory	
19n	Copper or stainless steel M12 bolts for connections supplied		Mandatory	
19o	One lateral insulating protection screen supplied with each Monobloc outgoing to allow connection of a cable, the other Monobloc outgoing being under voltage.		Mandatory	



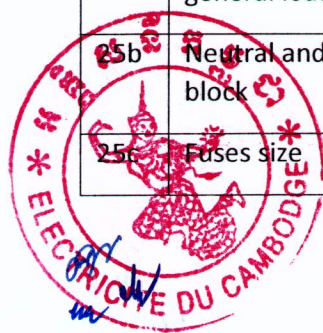
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	Sample of Monobloc compact type outgoing			
				
20	Fuse holder			
20a	Made of transparent insulating material		Mandatory	
20b	Allow easy fuse operation		Mandatory	
20c	Protect the operator from any projections in case of short circuit		Mandatory	
20d	After setting up of fuse with the fuse holder, it is impossible to remove only the fuse holder.		Mandatory	
	Sample of Fuse holder			
				
21	Test, short circuit and padlocking panel			
21a	Panel made of insulating material		Yes	
21b	Allow padlocking of outgoing after having withdrawn fuses		Mandatory	
21c	Allow cable testing on outgoing unit		Yes	



21d	Allow short-circuit making on outgoing feeder for safe operation		Mandatory	
21e	Allow emergency supply		Yes	
21f	test, short circuit and padlocking panel		Supplied on request ☐	
22	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	
23	Reservation panel 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 ☐	
Sample of Test, short circuit and padlocking panel		Sample of wrench		
				
25	LV metering supply			
25a	Padlockable fuse block is installed on the top of the LV distribution board near the general load break switch		Yes	
25b	Neutral and 3 phases fuse block		Yes	
25c	Fuses size	mm	14 x 51	



25d	Fuses rated voltage	V	440	
25e	Rated current	A	10	
25f	Utilization category (IEC 0269-1)		gG	
25g	Nominal breaking capacity of fuses shall be.	kA	≥ 100	
25h	Fuses supplied		Yes	
25i	Wiring made with 16 mm ² copper cable and connected downstream of the load break switch.		Mandatory	
25j	The insulation withstand of this assembly (wiring and fuse block) is:			
	• 50 Hz for 1 minute	kV	10	
	• 1.2/50 μ s wave	kV	20	
26	LVDB Marking		Name of Manufacturer Standard Type of LVDB Serial number Year of manufacturing Rated Voltage rated insulation levels	
27	Delivery			
27a	Type 4 LVDB includes:		4 monobloc outgoing ☐ 12 fuse holders ☐ 1 insulated wrench ☐ 1 test and padlocking panel ☐	
27b	Type 8 LVDB includes:		8 monobloc outgoing ☐ 24 fuse holders ☐ 1 insulated wrench ☐	



			1 test and padlocking panel ☐					
B	Cabinet							
28	The LV Distribution board is installed inside a fibreglass reinforced polyester cabinet		Yes					
29	Made of fibreglass reinforced polyester, fire-resistant, self-extinguishing and high impact proof.		Yes					
30	Cabinet volumes and sizes are suitable for each LV distribution boards type		Yes					
	LVDB TYPE		TR4 800	TR8 1200	TR8 1800	TR4 800	TR8 1200	TR8 1800
31	Cabinet size Width Height Depth	mm	To be specified					
32	Airings		To be specified					
33	Do not complicate the wiring and operation of the boards.		Yes					
34	Smooth exterior surface without any defect		Yes					
35	Ivory color		Yes					
36	Protective indices		IP 44 IK 10					
37	Doors Two opening doors that allow access to whole the LV distribution board Doors opening Hinging mechanism that withstand strong winds blowing at the doors when opened		Left and right 180° Yes					



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	Doors lockable in open position		Yes					
	Number of door locks		≥ 2					
	Locks operated by means of 11 mm triangle "key".		Yes					
	Possible to padlock the access to the door(s) lock by using a standard 6 or 8 mm diameter padlock		Yes					
	Padlocking device made of corrosion resistant metal.		Yes					
	The doors bear the Electricité du Cambodge logo and EDC		Yes					
	This marking (logo and letters) is embossed or engraved		Yes					
	Doors of anti-poster sticking type.		Yes					
38	Cable entrances located on the lowest side of the cabinet		Yes					
	Cabinet for LVDB TYPE		TR4 800	TR8 1200	TR8 1800	TR4 800	TR8 1200	TR8 1800
39	Nb of Incomer cables (240mm ² Cu) for each phase		2	3	4			
40	Nb of neutral Incomer cables (240 mm ² Cu)		1	1	2			
41	Nb of Incomer cable glands		7	10	14			
42	Nb of outgoing feeder cable glands (10 to 35 mm diameter)		16	32	32			
43	Glands located in straight line under the connection pads		Yes					
C	Metering box							
44	Located on the middle of the out right side of the cabinet.		Yes					
45	Made of fibreglass reinforced polyester, fire-resistant, self-extinguishing and high impact proof.		Yes					



46	Ivory colour		Yes	
47	Box volumes and sizes are suitable for receiving any kind of electronic meter		Yes	
48	Include a panel for fixing the meter.		Yes	
49	Two holes for Voltage and Current circuits are done on the rear side of the meter box and the LVDB cabinet side.		Yes	
50	Right side opening door		Yes	
51	Door hinges not visible and not protrude the door or cabinet surface		Yes	
52	Door opening		180°	
53	Integral transparent windows shall be part of the door, approximately 100 mm square pattern.		Yes	
54	Windows non-yellowing or discolouring and shall not deteriorate with time.		Yes	
55	Proved by the manufacturer		Mandatory	
56	The windows shall allow easy reading of installed meters without the need to open the door		Yes	
57	The lock of the door shall be operated by means of 11mm triangle "key"		Yes	
58	Possible to lock the access to the door lock by using a standard 6 or 8 mm diameter padlock		Yes	
59	Padlock device made of corrosion resistant metal.		Yes	
60	The doors bear the Electricité du Cambodge logo and EDC		Yes	



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61	This marking (logo and letters) is embossed or engraved		Yes	
D	Assembly : LVDB + cabinet + meter box			
62	Current and voltage wiring for metering done in factory		Yes	
63	Fully assembled		Yes	
64	Easily installable on two U shape steel channel of 70 or 80 mm large fixed between two concrete poles		Yes	
65	Cabinet fixing frame, protected against corrosion.		Yes	
66	Precaution to avoid buckling or deformation of the LV distribution board and the cabinet during operation be at design stage		Yes	
67	Fixing of the LVDB and the cabinet onto the steel channel using the same bolts		To be specified	
68	Outdoor marking		Indelible plate Name or logo of the manufacturer Cabinet reference Year/month of manufacturing IP and IK indices	
69	Cabinet for LVDB TYPE		TR4 800 TR8 1200 TR8 1800	TR4 800 TR8 1200 TR8 1800
70	Weight		To be specified	
71	Delivered in only one packaging for one type of LV distribution board		Yes	
72	Protected and on a wooden pallet.		Yes	



73	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.				
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:				



10.3 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 (115 mm between axles)	
8	Blades		Copper silvered and plane	
9	Blades		without hole or notch	
10	Fuse holding brackets		made of insulating material	
11	Rated currents	A	☐ 125 ☐ 160 ☐ 200 ☐ 250 ☐ 315 ☐ 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...		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.

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/

Full technical information shall be supplied within the bid.

Bidder signature:

