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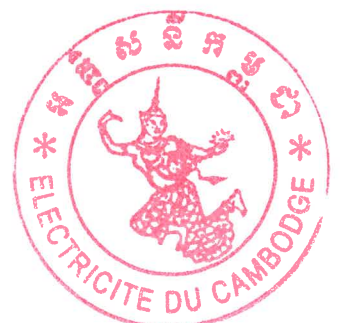
# **ELECTRICITE DU CAMBODGE**

## **TECHNICAL SPECIFICATION**

**EDC-DTS-LV006**

### **LV Underground Cable and Connecting Accessories**

**May 2023**





**ELECTRICITE DU CAMBODGE**

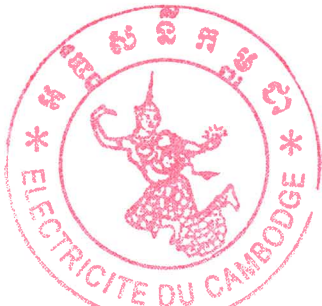
Version	Date	Technical Specification Name	Authorized by : (name and signature)
1.0	May, 2023	LV Underground Cable and Connecting Accessories	<u>E. G. H.</u>

**AUN HEMRITH**

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Version	Drafted/reviewed by	Verified by	Approved by	Date
Draft 1	AD			
Draft 2	AD			Feb 2018
Draft 3	EDC/AD			Feb 2022
Final 1	EDC/AD			May 2022
Final 2	EDC/AD/manufacturers			August 2022

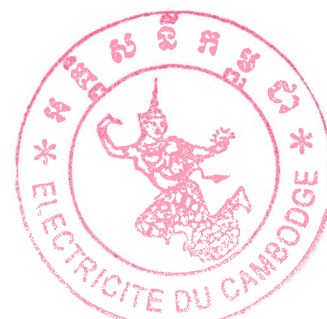


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# LV Underground cable and Connecting Accessories

## 1 Scope

This specification covers the design, manufacturing, supply, delivery, testing and performance requirement of low voltage underground cables to be installed on the network of Electricité Du Cambodge.

Terminating and jointing accessories that are installed on all cable type are also defined. The life expectancy of LV underground cable and accessories shall not be less than 30 years.

## 2 Standards

IEC International Electro-technical Commission

IEC 60038 : IEC Standard Voltage

IEC 60228 : Conductors of insulated cables

IEC 60230 : Impulse tests on cables and their accessories

IEC 60502 : Power cables with extruded insulation and their accessories for rated voltages from 1kV ( $U_m = 1.2$  kV) up to 30 kV ( $U_m = 36$  kV)

IEC 60502 : Part 1: Cables for rated voltages of 1 kV ( $U_m = 1.2$  kV) and 3 kV ( $U_m = 3.6$  kV)

IEC 60811 : Common test methods for insulating and sheathing materials of electric cables.

IEC 60885-2 : Electrical test methods for electric cables

IEC 60949 : Calculation of thermal Permissible Short Circuit Currents, taking into account non-adiabatic effects.

IEC 61238-1 : Compression and mechanical connectors for power cables for rated voltages up to 30 kV ( $U_m = 36$  kV).

EN European Standards

EN 50393 Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV

ISO International Standard Organization

ISO 48 : Rubber, vulcanized or thermoplastic. Determination of hardness (hardness between 10 IRHD and 100 IRHD).

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

ISO 9001 : Quality management systems – Requirements

Unless if standard year is specified, the latest version of the above standards apply.

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 definition of the relevant IEC standards apply to this technical specification.

### 4 Testing and inspection

#### 4.1 General Notes for Test

Cables and accessories may be inspected at the manufacturer's factory by EDC's representatives.

The inspection and routine tests shall be carried out in accordance with the provisions of the relevant IEC recommendations.

The cable and all accessories shall be subjected to test as specified below.

#### 4.2 Type Tests

All type tests required by the relevant IEC (60502-1, 60501-4 as a minimum) and EN 50393 for cable accessories shall be carried out. Type tests carried out on very similar cables and accessories may be accepted.

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

**Full copies of type test reports shall be submitted within the bid of the manufacturer/supplier. If not, the offer shall be rejected.**

**It is understood that the proposed equipment is the type tested equipment according to the latest IEC standard (or equivalent) and other specified standards requirements, unless a standard year is stated in the technical specifications.**

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.

#### 4.3 Routine Tests

The routine tests requested by relevant IEC standards shall be carried out on all equipment. Routine test reports shall be sent to EDC prior the shipment for EDC acceptance.

#### 4.4 Sample Tests

The sample tests as requested by paragraph 16 of IEC 60502-1 shall be carried out. This sample tests shall be carried out as acceptance tests in the presence of EDC representatives. Sample tests reports shall be sent to EDC prior the shipment for EDC acceptance.

### 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.





In case the design, development and production of cables and accessories are not ISO 9001 certified, the Cambodia manufacturer processes and design/production workshops shall mandatorily implement a quality process satisfactory to EDC and/or Local Authorities with the target to obtain ISO certification in a near future.

## 6 Ambient conditions

The cable underground will be laid directly in the ground at a depth of 800mm to 1000mm with an average soil temperature of 25°C. The Soil Thermal Resistivity will have an Average of 1.20°K m/W and a Maximum of 3.00°K m/W. In some specific cases, underground cables could be installed inside plastic pipes.

The cable 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%
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)

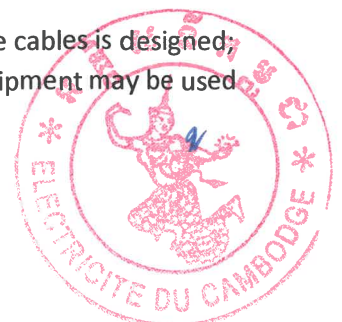
## 7 Technical Requirements

### 7.1 Voltage Designations and Materials

The rated voltage of the cable  $U_o/U$  ( $U_m$ ) shall be 0.6/1 (1.2) kV.

In the voltage designation of cables  $U_o/U$  ( $U_m$ ):

- $U_o$  is the rated power frequency voltage between conductor and earth or metallic screen for which the cable is designed;
- $U$  is the rated power frequency voltage between conductors for which the cables is designed;
- $U_m$  is the maximum value of the highest system voltage for which the equipment may be used (IEC 60038).





The rated voltage of the cable for given application shall be suitable for the operating conditions in the system in which the cable is used.

## 7.2 Maximum Permissible Temperatures

The maximum permissible temperature are as follows:

- Conductor

- : 90°C during normal operation
- : 120°C under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)
- : 250°C under multi-phase short-circuit conditions during 5 second,

These temperature are based on the intrinsic properties of the insulting materials. The values can be only be used for calculation permissible current rating.

## 8 General Characteristics

### 8.1 Constitution of cable

#### 8.1.1 Conductors

The conductors shall be of class 2 (IEC 60228) **compacted** aluminium. The cores shall be circular. The cable cross section area of the cable to be provided are:

- $3 \times 240 \text{ mm}^2 + 120 \text{ mm}^2$
- $3 \times 240 \text{ mm}^2 + 95 \text{ mm}^2$
- $3 \times 150 \text{ mm}^2 + 95 \text{ mm}^2$
- $3 \times 95 \text{ mm}^2 + 50 \text{ mm}^2$
- $3 \times 50 \text{ mm}^2 + 50 \text{ mm}^2$

For each cross section, the manufacturer must declare the minimum and maximum diameters of the conductor. The manufacturer shall provide the average diameter of the core and shall declare, for information, the number of strands constituting the core and their diameter.

#### 8.1.2 Maximum resistance of conductors

The maximum resistance of conductors at 20°C shall be as follow (as per table 2 of IEC 60224:

Cross section (mm <sup>2</sup> )	Max resistance at 20°C (Ω/Km)
240	0.125
150	0.206
120	0.253
95	0.320
50	0.641

#### 8.1.3 Insulation

Insulation shall be made of extruded cross-linked polyethylene (XLPE).

PVC or other insulation compound are not accepted.



**8.1.3.1 Thickness**

The minimal nominal thickness of cross-linked polyethylene (XLPE) insulation shall be:

Cross section (mm <sup>2</sup> )	XLPE insulation minimal thickness (mm)
240	1.7
150	1.4
120	1.2
95	1.1
50	1

**8.1.3.2 Core marking/colour**

The conductors marking shall be:

Conductor	Colour
Neutral	Black
Phase 1	Red
Phase 2	Yellow
Phase 3	Blue

Full coloured insulation and not coloured mass insulation (Transparent white) with mass coloured band of at least 3 mm large are accepted.

**8.1.4 Assembly of cores, fillers, binding tape and inner coverings****8.1.4.1 Cores assembly**

The four cores shall be twisted together.

**8.1.4.2 Fillers and binder tape**

The materials used for inner coverings and fillers shall be suitable for the operating temperature of the cable and compatible with the insulating material.

Filler may be extruded.

In case the filler is not extruded (PP fibres as example), a lapped binder tape shall be applied only if the interstices between the cores are substantially filled. In any case (extruded or not) the filler shall avoid longitudinal penetration of water.

**8.1.4.3 Inner covering**

An inner covering made of PVC of black colour is then applied on the cable assembly. The nominal thickness of this inner covering shall not be less than 2 mm.



### 8.1.5 Metallic Screen and armour

The cable shall include metallic armour under the form of 2 galvanized steel tapes of each 0.5 mm thickness. The overlap of the metallic tapes shall be comprised between 20 to 50 %.

### 8.1.6 Outer sheath

The outer sheath shall be made of PVC (ST2) or XLPE (ST7) of black colour.

This outer sheath shall be extruded.

Any cable with an outer sheath not proved to be made of PVC ST2 or XLPE ST7 compounds shall not be accepted.

#### 8.1.6.1 Thickness

The nominal thickness  $t_s$  expressed in millimetres shall be calculated using the following formula:

$t_s = 0,035 D + 1,0$  where  $D$  is the fictitious diameter immediately under the outer sheath, in millimetres (see Annex A of IEC 60502-1).

The value resulting from the formula shall be rounded off to the nearest 0,1 mm (see Annex B of IEC 60502-1)).

Nevertheless, the nominal thickness of the outer sheath shall be not less than:

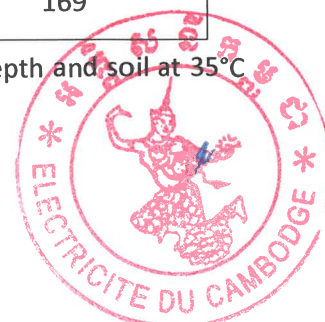
LV Cable	Minimum Outer sheath thickness
$3 \times 240 \text{ mm}^2 + 120 \text{ mm}^2$	2.6 mm
$3 \times 240 \text{ mm}^2 + 95 \text{ mm}^2$	2.6 mm
$3 \times 150 \text{ mm}^2 + 95 \text{ mm}^2$	2.3 mm
$3 \times 95 \text{ mm}^2 + 50 \text{ mm}^2$	2.0 mm
$3 \times 50 \text{ mm}^2 + 50 \text{ mm}^2$	1.8 mm

## 8.2 Admissible current of finished cables

The maximal admissible current in LV underground cables shall be as follow:

UGC cable	Current (A) Buried (1)	Current (A) in air (2)
$3 \times 240 \text{ mm}^2 + 120 \text{ mm}^2$	388	439
$3 \times 240 \text{ mm}^2 + 95 \text{ mm}^2$	388	439
$3 \times 150 \text{ mm}^2 + 95 \text{ mm}^2$	300	324
$3 \times 95 \text{ mm}^2 + 50 \text{ mm}^2$	234	242
$3 \times 50 \text{ mm}^2 + 50 \text{ mm}^2$	160	169

- (1) Cable buried alone. Max core temperature 90°C permanently. 80 cm depth and soil at 35°C with soil thermal resistivity of 0.7 K.m/W)
- (2) Cable in 30°C in air. Max core temperature 90°C permanently



### 8.3 Marking

Each cable shall have the range of markings listed here below, engraved or embossed on the outer sheath surface at one meter intervals.

- Manufacturer's identification : YY
- Manufacturing batch reference : XXXX
- Year of manufacture : four digits
- Cross section : for example 3x240 + 120
- Designation of conductor type : AL
- Rated voltage class : 0.6/1 (1.2) kV
- Reference Standard : IEC 60502-1
- Supplier : as option

The markings shall be made in the sequence indicated above. For example if the manufacturer is YY and the cable is manufactured in 2015, the markings would be:

- YY – XXXX-2015-3x240+150-AL-0.6/1 (1.2) kV - IEC 60502-1- XXXX

### 8.4 Protection for storage and delivery

Cable ends must be fitted with a end device preventing the penetration of water or moisture inside the cable during storage and delivery. This device can be a heat shrinkable end cap.

### 8.5 Drums and Marking

LV Underground Cables shall be delivered wound on strong wooden drums treated to an approved international standard by impregnation with copper-chrome-arsenate (CCA) preservative to resist rotting and termite and fungus attacks. Steel drums shall be also accepted. Drums with an outside diameter exceeding 2.5 meters and outside width exceeding 1.4 meter shall not be used except with the Purchaser's approval. The drum shall be no returnable. The central hole of the drums shall be reinforced with a steel plate of thickness not less than 10mm to fit an axle of size 95mm diameter.

The interior of the conductor drums shall be lined with bituminous paper to prevent the conductor being in contact with the timber. Waterproof paper and felt lining shall overlap at seams by at least 20 mm, and the seams shall be sealed.

Drums shall be adequately protected by securely fastening substantial wooden battens around the periphery. These battens shall be secured by means of steel tap bindings.

Cables shall be securely fastened around the periphery of the drum. Cables shall be supplied with both ends properly capped, and protected against damage and water penetration. Each drum shall bear a metal label detailing manufacturer's name, specified voltage, and type and length of conductor. Cable drums shall be suitable for outside storage, for a minimum period of five years in the Cambodia climate, the inner cable end attached to the drum shall be capped and sealed in such a manner that the core screening and sheath are able to be merged from the outer cable end without removing the inner end cap.

All nails and metallic parts of the inner surfaces must be countersunk so that they cannot damage the cable.

The thread of bolts used to strengthen the cable drums shall be in such a way that the nut can be tightened but cannot readily removed.



Drums shall not be treated with chemicals injurious to the cable and conductors.

The cable length per drum shall be:

Cable Type	length
3x240 mm <sup>2</sup> + 120 mm <sup>2</sup>	300 m ± 5m On EDC request
3x240 mm <sup>2</sup> + 95 mm <sup>2</sup>	300 m ± 5m On EDC request
3x150 mm <sup>2</sup> + 95 mm <sup>2</sup>	300 m ± 5m On EDC request
3x95 mm <sup>2</sup> + 50 mm <sup>2</sup>	500 m ± 5m On EDC request
3x50mm <sup>2</sup> + 50mm <sup>2</sup>	1000 m ± 5m On EDC request

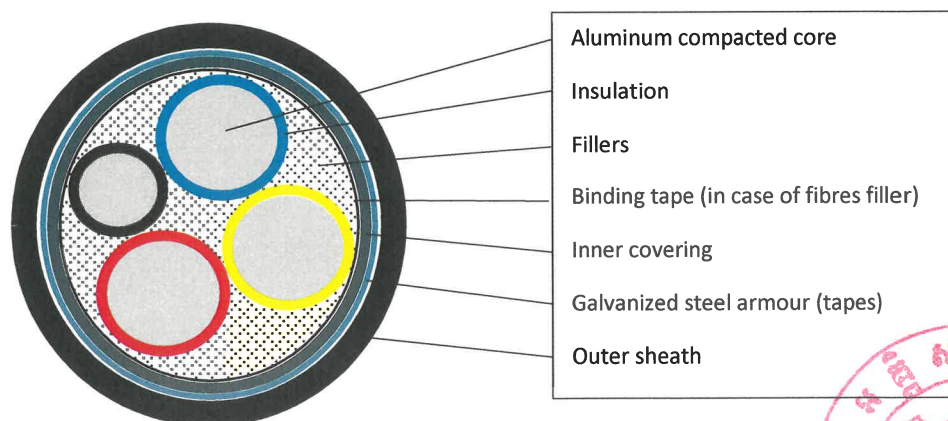
Specific drum length could be ordered.

Drums shall be marked with the indelible following information:

- Manufacturer's name
- Month/Year of manufacture
- Batch number
- Total gross weight and Net weight
- Distributor's name
- Cable references and cross section
- Length of cable (m)

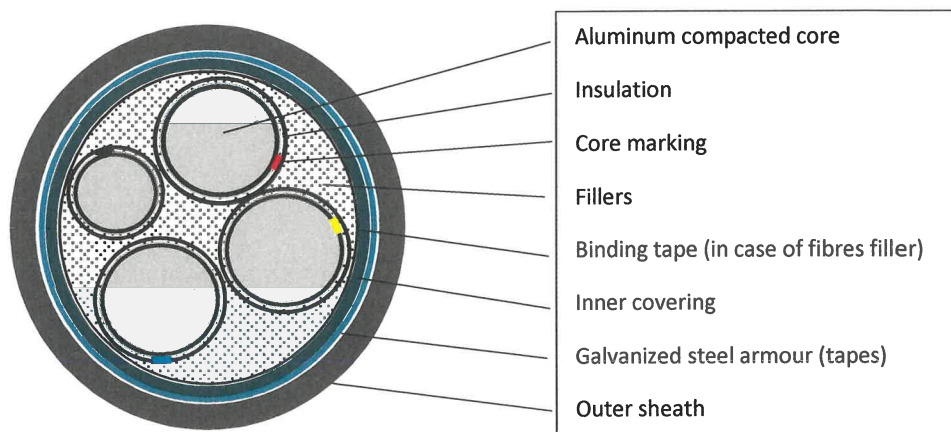
## 8.6 Cable drawing

## 8.7 Mass coloured insulation





## 8.1 Not coloured insulation



## 9 Accessories for Cables

### 9.1 General

The following accessories shall be supplied:

- Lugs and joints sleeves
- Heat shrinkable breakout gloves four cores
- Conductor UV protection heat shrinkable tube
- Lugs/sleeves insulation heat shrinkable tube
- Underground heat shrinkable joints kits
- LV UGC/LV ABC junction kits
- LV UGC end lugs kits

All accessories shall be type tested according the requirement of IEC 60502-4 or any other national standard.

All the equipment offered for joints, terminations shall conform to the following requirements:

- All accessories shall be capable of being stored without damage or deterioration at temperature up to 50°C. The material expiring date shall be marked on all packages, where appropriate.

#### 9.1.1 Technical characteristics

The rated voltage of the accessories  $U_0/U$  ( $U_m$ ) shall be 0.6/1 (1.2) kV.

Those accessories shall withstand at least the temperature conditions of the LV underground cables:

Conductor:

- : 90°C during normal operation,
- : 120°C under a short time overload (a total of 24 hours a year in separate of 3 hours at the most),
- : 250°C under multi-phase short-circuit conditions during 5 second,

Accessories shall be provided for the following cables cross section area:

- $3 \times 240 \text{ mm}^2 + 120 \text{ mm}^2$

- 3x240 mm<sup>2</sup> + 95 mm<sup>2</sup>
- 3x150 mm<sup>2</sup> + 95 mm<sup>2</sup>
- 3x95 mm<sup>2</sup> + 50 mm<sup>2</sup>
- 3x50mm<sup>2</sup> + 50mm<sup>2</sup>

#### 9.1.2 Components

Components shall not be adversely affected in any manner by contact with other materials normally used in the construction of cable joint, and shall not increase the rate of corrosion of any metals with which they may come into contact.

Components supplied with adhesive coatings shall have means to prevent the coated surfaces from adhering to each other.

Accessories shall be designed to provide a complete moisture seal, and complete re-jacketing of the individual cables. These components shall be suitable for indoor and/or outdoor installation and they shall be resistant to ultra violet radiation and chemical attack.

#### 9.1.3 Marking

Name of manufacturer as well as equipment reference shall be clearly mentioned on the equipment. In addition, the serial number or batch reference of the accessory shall be permanently and clearly visible on the accessory package.

### 9.2 Joint sleeves and Terminal lugs

Connectors and terminal lugs shall conform to the requirement of IEC 61238 (class A)

Connectors and terminal lugs shall perform without distress under normal, cyclic loading and fault conditions, and shall not limit the rating of the cables that they joint.

They shall be made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors or connecting bars or bushing.

They shall be of **mechanical tightening type**. Bolts shall be of metric size. The range of connectors and terminal lugs offered shall be suitable for tightening with shear off screw heads. The shear head breaking off shall always occur inside the connector body (never protruding).

The ends of joints and terminal lugs shall be suitably chamfered coned to facilitate insertion of the conductors. Connectors shall have a solid central barrier to facilitate the insertion of the conductor to the correct depth.

Compounds or greases for improving contact between the connector or terminal and the conductor are permitted. They must, however, be chemically neutral to the connector, terminal and conductor materials and must be present in the delivered connectors and terminal lugs.

Cable connectors and terminals shall be able to accommodate typical variations in dimensions of cable supplied by different manufacturers.

The palm of termination lug shall be suitable to be connected onto a copper, copper alloy or aluminum pad with a stainless steel 12 mm diameter metric bolt.







### 9.3 Heat shrinkable breakout gloves four cores

Four cores Breakout gloves shall be used at cable terminations. This accessory shall be of heat shrinkable type with black colour.

Inside, breakouts gloves and "fingers" shall include **compound** that melt during heating in order to stick against outer sheath and avoid water to come inside the cable.



### 9.4 Conductor UV protection heat shrinkable tube

This heat shrinkable tube shall be install on insulated core where outer sheath is removed and when the insulated core are exposed to UV rays. This tube shall protect the core insulation against UV rays aggression and reinforce the insulation.

This tube shall not be inside compounded, shall be of **medium thickness** and flexible and delivered in length of 10 meters or of the required length when included in kit.



### 9.5 Colour marking heat shrinkable tube

This heat shrinkable tube shall be install on insulated core for phase marking.

This tube shall not be inside compounded, shall be **very thin** and flexible and delivered in length of 10 meters or in length of 10 cm when included in termination kit.

The colours shall be: red, yellow and blue.



### 9.6 Lugs/sleeve insulation heat shrinkable tube with adhesive compound inside

This black heat shrinkable tube of **heavy thickness** shall be install onto installed terminal lugs or junction sleeves for insulation and avoid penetration of water inside the conductor core and isolate the tube of the end lug or the junction sleeve.

This tube shall include adhesive **compound** inside and shall be delivered in length of 1m or according the required lengths when included in kits.

In any cases rolled or folded lengths of this heat shrinkable tube with adhesive compound inside shall not be accepted because of sticking of inside faces of the tube under hot temperatures in Cambodia.



### 9.7 Connecting kits

#### 9.7.1 Underground heat shrinkable straight joints kits

The straight joints shall be supplied within a complete kit for LV UGC. It shall include all components for the complete implementation of the straight set. The straight joint kit shall include:

- 3 x Phase Joint sleeves of mechanical tightening type according phase cross sections
- 1 Neutral joint sleeves of mechanical tightening type according neutral cross sections
- 4 x Heat shrinkable tubes of heavy thickness with adhesive compound inside for joint sleeve insulation of 25 cm length
- 1 x Heat shrinkable tubes of heavy thickness with adhesive compound inside for reconstitution of the outer sheath of 50 cm length.

The cable route is subject to periodic flooding and sections of the cable and the cable joints may be submerged in water for long periods. The cable Joints must withstand these installation conditions. The recovered thickness of insulation over the connector of straight joints shall be uniform and equal to or greater than the cable insulation thickness as given in IEC 60502-1.

The components comprising the kit shall be strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.

The Joint kits shall comprise all the items necessary to complete the functions including mechanical tightening splices. Joints shall provide waterproofing, mechanical and electrical protection, and they shall be completely sealed from cable jacket to cable jacket.

The following joint kits shall be supplied:

- UGC 3x240+120 / UGC 3x240+120
- UGC 3x240+120/ UGC 3x240+95
- UGC 3x150+95/ UGC 3x150+95
- UGC 3x95+50/ UGC 3x95+50
- UGC 3x50+50/ UGC 3x50+50

#### 9.7.2 LV UGC/LV ABC junction kits

This kit shall be used for connection of an LV ABC onto an LV underground cable in case of underground/overhead interface.

It shall comprise:

- 3 x phase junction sleeves with mechanical tightening adapted to the cross sections of UGC and ABC,
- 1 neutral junction sleeves with mechanical tightening adapted to the cross sections of the neutrals of UGC and ABC,
- 1 heat shrinkable UGC breakout adapted to the UGC outer diameter and cores diameters,
- 1.5 m length of Conductor UV protection heat shrinkable tube for UV protection of UGC conductors,
- 3 phase insulation heat shrinkable tubes with heavy thickness and adhesive compound inside for insulation of phases junction sleeves and watertight of conductors. For that purpose, the tube shall be long enough (20 cm), with adhesive compound inside and adapted to the diameter of the junction sleeves and the outer diameter of the UGC and ABC phase cores,
- A neutral insulation heat shrinkable tube with heavy thickness and adhesive compound inside for insulation of neutral junction sleeves and watertight of conductors. For that purpose the tube shall be long enough (20 cm), with compound inside and adapted to the diameter of the neutral junction sleeves and the outer diameter of the UGC and ABC neutral cores.

The components comprising the kit shall be strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.

The following kits shall be supplied:

- UGC 3x240+120/ABC 3x150+N70 Junction kit
- UGC 3x240+95/ABC 3x150+N70 Junction kit
- UGC 3x150+95/ABC 3x150+N70 Junction kit
- UGC 3x95+50/ABC 3x150+N70 Junction kit



- UGC 3x95+50/ABC 3x70+N70 Junction kit
- UGC 3x50+50/ABC 3x70+N70 Junction kit

#### 9.7.3 UGC connection kits

This connection kit shall be used for connecting an underground cable onto a LVDB or any other equipment. It can be used either on Aluminum or copper connecting bar or terminal.

It shall comprise:

- 3 x phase end lugs with mechanical tightening adapted to the cross sections of UGC phases,
- 1 neutral end lug with mechanical tightening adapted to the cross sections of the UGC neutral,
- 1 UGC heat shrinkable breakout adapted to the UGC outer diameter,
- 3 x phase insulation heat shrinkable tubes of heavy thickness for insulation lug sleeves and watertight of conductors. For that purpose the tube shall be of 10 cm length, with adhesive compound inside and adapted to the diameter of the phase lugs and the outer diameter of the UGC phase cores.
- A neutral insulation heat shrinkable tube of heavy thickness for insulation of neutral lug sleeves and watertight of conductors. For that purpose the tube shall be of 10 cm length, with adhesive compound inside and adapted to the diameter of the neutral lug and the outer diameter of the UGC neutral core.
- 1 set of 3 colours marking thin heat shrinkable tube of red, yellow and blue colours of 10 cm length adapted to the phase lugs diameter.

The components comprising the kit shall be strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.

The following UGC connection kits shall be supplied:

- UGC 3x240+120 end lugs kit
- UGC 3x240+95 end lugs kit
- UGC 3x150+95 end lugs kit
- UGC 3x95+50 end lugs kit
- UGC 3x50+50 end lugs kit

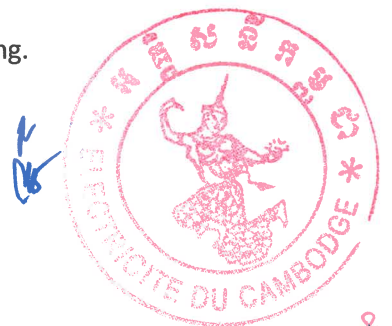
#### 9.8 Accessories packing/markings

All connecting accessories kit/accessories shall be delivered as follow:

- Lugs: suitably packed in plastic bag or card box including 10 pcs.
- Heat shrinkable breakout gloves four cores: In bag or cardbox including 10 pcs.
- Thin Heat shrinkable marking tube of red, yellow and blue colour in length of 10 m (bag or cardbox)
- Conductor UV protection heat shrinkable tube : In length of 10 meters (bag or cardbox)
- Lugs/sleeve insulation heat shrinkable tube with adhesive compound: in length of 1 meter (cardbox)
- Underground heat shrinkable joints: by **complete kit** suitably packed in plastic bag or card box.
- LV UGC/LV ABC junction kits: **complete kit** individually packed in bag or card box,
- LV UGC end lugs kits: **complete kit** individually packed in bag or card box,

Each kit shall be supplied with installation guide or at least one installation drawing.

They shall be packed in strong card box and card box properly stored on a pallet.



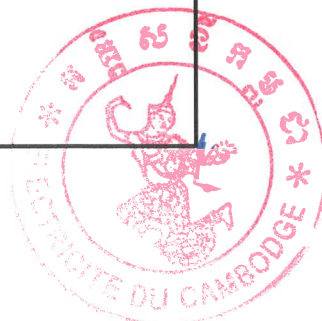
Each card box and individual bag shall be clearly marked with:

- Name / Logo of the Manufacturer
- The type of accessory
- The Cross section
- Batch reference or serial number
- Packing date
- Expiring date (if appropriate)

## 10 Technical data sheets



	Description	Unit	Requirement	Supplier's Offer
<b>10.1 LV UGC cables</b>				
1	Required cross section	mm <sup>2</sup>	3x50+50 <input type="checkbox"/> 3x95+50 <input type="checkbox"/> 3x150+95 <input type="checkbox"/> 3x240+95 <input type="checkbox"/> 3x240+120 <input type="checkbox"/>	
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 60502	
6	Type test reports or test certification as per § 4.2 and IEC 60502		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (Um) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	The conductors of class 2 (IEC 60228) compacted aluminum.		Mandatory	
12	The cores are circular.		Mandatory	
13	Minimum diameter of core  50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup>	mm	To be specified	





	150 mm <sup>2</sup> 240 mm <sup>2</sup>			
14	Maximum diameter of core 50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	mm	To be specified	
15	Real core cross section	mm <sup>2</sup>	50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
16	Number of wires constituting the core	mm	50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
17	Diameter of wires		50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
17a	Max Resistance 50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	Ω/km	0.641 0.320 0.253 0.206 0.125	
18	Core insulation is made of extruded cross-linked polyethylene (XLPE).		Mandatory	



19	Nominal thickness of insulation	mm		
	50 mm <sup>2</sup>		1	
	95 mm <sup>2</sup>		1.1	
	120 mm <sup>2</sup>		1.2	
	150 mm <sup>2</sup>		1.4	
	240 mm <sup>2</sup>		1.7	
20	Conductor marking			
	Neutral		Black	
	Phase 1		Red	
	Phase 2		Yellow	
	Phase 3		Blue	
21	Marking type		Full colored insulation	<input type="checkbox"/>
			Mass colored band of at least 3 mm large	<input type="checkbox"/>
22	Assembling of the four cores		twisted together	
23	Fillers suitable for the operating temperature of the cable and compatible with the insulating material.		Yes	
24	Type of filler		Extruded	<input type="checkbox"/>
			PP fibers	<input type="checkbox"/>
			Other	<input type="checkbox"/>
25	Binder tape on PP fibers		Yes	
26	The filler avoids longitudinal penetration of water.		Yes	
27	An inner covering made of PVC of black color is then applied on the cable assembly.		Mandatory	
	Nominal thickness of inner covering	mm	≥ 2	



## EDC-DTS-LV006-LV Underground Cable and Connecting Accessories

	Manufacturer's identification : YY Manufacturing batch reference : XXXX Year of manufacture : four digits Cross section : for example 3x240 + 120 Designation of conductor type : AL Rated voltage class : 0.6/1 (1.2) kV Reference Standard : IEC 60502-1 Supplier : as option		Yes Yes Yes Yes Yes Yes Yes Yes <input type="checkbox"/> No <input type="checkbox"/>	
36	Marking is		engraved <input type="checkbox"/> embossed <input type="checkbox"/>	
37	Marking on the outer sheath surface at one meter intervals.		Yes	
38	Diameter of cable 3x50mm <sup>2</sup> + 50mm <sup>2</sup> 3x95 mm <sup>2</sup> + 50 mm <sup>2</sup> 3x150 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 120 mm <sup>2</sup>	mm	To be mentioned	
39	Weight of cable 3x50mm <sup>2</sup> + 50mm <sup>2</sup> 3x95 mm <sup>2</sup> + 50 mm <sup>2</sup> 3x150 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 120 mm <sup>2</sup>	Kg/m	To be mentioned	
40	LV Underground Cables shall be delivered wound on strong wooden drums treated to an approved international standard by impregnation with copper-chrome-arsenate (CCA) preservative to resist rotting and termite and fungus attacks		Mandatory	
41	Maximum drum diameter	m	2.5	
41	Maximum drum width	m	1.4	

EDC-DTS-LV006-LV Underground Cable and Connecting Accessories

43	The central hole of the drums shall be reinforced with a steel plate of thickness not less than 10mm to fit an axle of size 95mm diameter.		Mandatory	
44	Cable drums shall be suitable for outside storage, for a minimum period of five years in the Cambodia climate		Mandatory	
45	Cable standard length on drum 3x240 mm <sup>2</sup> + 120 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x150 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x95 mm <sup>2</sup> + 50 mm <sup>2</sup> 3x50mm <sup>2</sup> + 50mm <sup>2</sup>		300 m ± 5m 300 m ± 5m 300 m ± 5m 500 m ± 5m 1000 m ± 5m	
46	Specific length L request on one drum: 3x240 mm <sup>2</sup> + 120 mm <sup>2</sup> 3x240 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x150 mm <sup>2</sup> + 95 mm <sup>2</sup> 3x95 mm <sup>2</sup> + 50 mm <sup>2</sup> 3x50mm <sup>2</sup> + 50mm <sup>2</sup>	mm	<input type="checkbox"/> : L= <input type="checkbox"/> : L= <input type="checkbox"/> : L= <input type="checkbox"/> : L= <input type="checkbox"/> : L=	
47	Drum marking <ul style="list-style-type: none"> <li>Manufacturer's name</li> <li>Month/Year of manufacture</li> <li>Batch number</li> <li>Total gross weight and Net weight</li> <li>Distributor's name</li> <li>Cable references and cross section</li> <li>Length of cable (m)</li> </ul>		Yes Yes Yes Yes Yes Yes Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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.

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Full technical information shall be supplied within the bid.

Bidder signature:

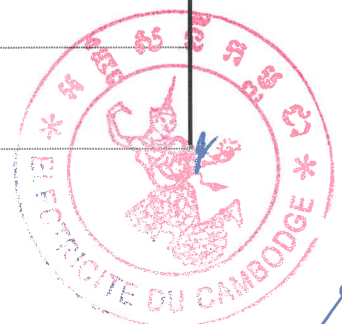
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	Description	Unit	Requirement	Supplier's Offer
<b>10.2 Underground cables heat shrinkable straight joints kits</b>				
1	Required cross sections	mm <sup>2</sup>		
	3x50mm <sup>2</sup> +50mm <sup>2</sup> / 3x50mm <sup>2</sup> +50mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3X95mm <sup>2</sup> +50mm <sup>2</sup> / 3x50mm <sup>2</sup> +50mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3X95mm <sup>2</sup> +50mm <sup>2</sup> / 3x95mm <sup>2</sup> +50mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3X150mm <sup>2</sup> +95mm <sup>2</sup> / 3x95mm <sup>2</sup> +50mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3X150mm <sup>2</sup> +95mm <sup>2</sup> / 3x150mm <sup>2</sup> +95mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3x240mm <sup>2</sup> +95mm <sup>2</sup> / 3X150mm <sup>2</sup> +95mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3x240mm <sup>2</sup> +120 mm <sup>2</sup> / 3X150mm <sup>2</sup> +95mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3x240mm <sup>2</sup> +120 mm <sup>2</sup> / 3X240mm <sup>2</sup> +95mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
	3x240mm <sup>2</sup> +120 mm <sup>2</sup> / 3X240mm <sup>2</sup> +120mm <sup>2</sup>		<input type="checkbox"/>	<input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 60502-4	
6	Type test reports or test certification as per § 4.2 and IEC 60502-4		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation		90	
	Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)	°C	120	
	Temperature withstand under multi-phase short-circuit conditions during 5 second,		250	
11	The kit includes			



	<ul style="list-style-type: none"> <li>• 3 x Phase Joint sleeves of <b>mechanical tightening type</b> according phase cross sections</li> <li>• 1 Neutral joint sleeves of <b>mechanical tightening type</b> according neutral cross sections</li> <li>• 4 x Heat shrinkable tubes of <b>heavy thickness with adhesive compound inside</b> for joint sleeve insulation of 25 cm length</li> <li>• 1 x Heat shrinkable tube of <b>heavy thickness with adhesive compound inside</b> for reconstitution of the outer sheath of 50 cm length.</li> </ul>		Mandatory	
			Mandatory	
			Mandatory	
			Mandatory	
12	The components comprising the kit are strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.		Mandatory	
13	Number of bolts (metric size) of neutral joint sleeves		To be specified	
14	Number of bolts (metric size) of phase joint sleeves		To be specified	
15	Junction sleeves for circular conductors		Mandatory	
15a	Junction sleeves made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors		Mandatory	
15b	Junction sleeves do not reduce the carrying capacity of conductors		Mandatory	
16	Diameter of heat shrinkable tube of heavy thickness with adhesive compound inside for reconstitution of the outer sheath	mm	To be specified	
17	Joints provide waterproofing, mechanical and electrical protection, and they are completely sealed from cable jacket to cable jacket.		Mandatory	
18	Packing: complete kit individually packed in bag or card box,  Each kit shall be supplied with installation guide or at least one installation drawing.		Yes	
19	Each card box and/or individual bag shall be clearly marked with:			





	<ul style="list-style-type: none"> <li>• Name / Logo of the Manufacturer</li> <li>• The type of accessory</li> <li>• The Cross sections</li> <li>• Batch reference or serial number</li> <li>• Packing date</li> <li>• Expiring date (if appropriate)</li> </ul>		Yes  Yes  Yes  Yes  Yes	
20	Delivery: suitably protected on pallet or case		Yes	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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.

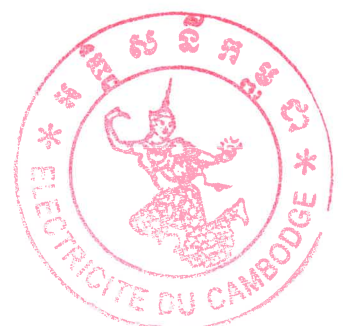
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Full technical information shall be supplied within the bid.

Bidder signature:



	Description	Unit	Requirement	Supplier's Offer
<b>10.3 LV UGC/LV ABC junction kits</b>				
1	Cross sections to be supplied:  UGC 3x240+120/ABC 3x150+N70  UGC 3x240+95/ABC 3x150+N70  UGC 3x150+95/ABC 3x150+N70  UGC 3x95+50/ABC 3x150+N70  UGC 3x95+50/ABC 3x70+N70  UGC 3x50+50/ABC 3x70+N70		  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 60502-4	
6	Type test reports or test certification as per § 4.2 and IEC 60502-4		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	The kit includes  • 3 x phase junction sleeves with mechanical tightening adapted to the phase cross sections of UGC and ABC,  • 1 neutral junction sleeves with mechanical tightening adapted to the cross sections of the neutrals of UGC and ABC,		Mandatory  Mandatory	



	<ul style="list-style-type: none"> <li>• 1 heat shrinkable UGC breakout with adhesive compound inside adapted to the UGC outer diameter and cores diameters,</li> <li>• 1.5 m length of Conductor UV protection heat shrinkable tube for UV protection of UGC conductors,</li> <li>• 3 phase insulation heat shrinkable tubes with heavy thickness and adhesive compound inside for insulation of phases junction sleeves and watertight of conductors. For that purpose, the tube is be long enough (20 cm), with adhesive compound inside and adapted to the diameter of the junction sleeves and the outer diameter of the UGC and ABC phase cores,</li> <li>• A neutral insulation heat shrinkable tube with heavy thickness and adhesive compound inside for insulation of neutral junction sleeves and watertight of conductors. For that purpose the tube is be long enough (20 cm), with compound inside and adapted to the diameter of the neutral junction sleeves and the outer diameter of the UGC and ABC neutral cores.</li> </ul>		Mandatory	
			Mandatory	
			Mandatory	
			Mandatory	
12	The components comprising the kit are strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.		Mandatory	
12a	Junction sleeves made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors		Mandatory	
12b	Junction sleeves do not reduce the carrying capacity of conductors		Mandatory	
12c	Number of metric bolts for Phase sleeve		To be specified	
12d	Number of metric bolts for neutral sleeve		To be specified	
13	Joints provide waterproofing, mechanical and electrical protection, and they are completely sealed from cable jacket to cable jacket.		Mandatory	
14	Packing: complete kit individually packed in bag or card box,		Yes	

	Each kit shall be supplied with installation guide or at least one installation drawing.			
15	Each card box and/or individual bag shall be clearly marked with: <ul style="list-style-type: none"> <li>• Name / Logo of the Manufacturer</li> <li>• The type of accessory</li> <li>• The Cross sections</li> <li>• Batch reference or serial number</li> <li>• Packing date</li> <li>• Expiring date (if appropriate)</li> </ul>		Yes Yes Yes Yes Yes Yes	
16	Delivery: suitably protected on pallet or case		Yes	

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

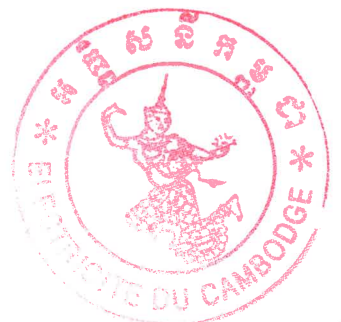
**Deviation from the technical specification:**

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

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Full technical information shall be supplied within the bid.

Bidder signature:



	Description	Unit	Requirement	Supplier's Offer
<b>10.4 LV UGC connection kits (End lugs kits)</b>				
1	Cross sections to be supplied:  UGC 3x240+120  UGC 3x240+95  UGC 3x150+95  UGC 3x95+50  UGC 3x50+50		  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		To be specified	
6	Type test reports or test certification as per § 4.2		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	The kit includes  • 3 x phase end lugs with <b>mechanical tightening</b> adapted to the cross sections of UGC phases,  • 1 neutral end lug with <b>mechanical tightening</b> adapted to the cross sections of the UGC neutral,		Mandatory    Mandatory	



	<ul style="list-style-type: none"> <li>• 1 UGC heat shrinkable breakout <b>with adhesive compound inside</b> adapted to the UGC outer diameter,</li> <li>• 3 x phase insulation heat shrinkable tubes of <b>heavy thickness</b> for insulation lug sleeves and watertight of conductors. For that purpose the tube shall be of 10 cm length, <b>with adhesive compound inside</b> and adapted to the diameter of the phase lugs and the outer diameter of the UGC phase cores.</li> <li>• A neutral insulation heat shrinkable tube of <b>heavy thickness</b> for insulation of neutral lug sleeves and watertight of conductors. For that purpose the tube shall be of 10 cm length, <b>with adhesive compound inside</b> and adapted to the diameter of the neutral lug and the outer diameter of the UGC neutral core.</li> <li>• 1 set of 3 colours marking thin heat shrinkable tube of red, yellow and blue colours of 10 cm length adapted to the phase lugs diameter.</li> </ul>		Mandatory	
			Mandatory	
			Mandatory	
			Mandatory	
12	The components comprising the kit are strictly in accordance with the requirements of paragraphs: 9.2, 9.3, 9.4, 9.5 and 9.6.		Mandatory	
12a	Lugs made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors and connected onto aluminum or copper bars with a stainless steel 12 mm diameter metric bolt.		Mandatory	
12b	Lugs do not reduce the carrying capacity of conductors		Mandatory	
12c	Number of metric bolts for phase lug		To be specified	
12d	Number of metric bolts for neutral lug		To be specified	
13	Kits provide waterproofing, electrical protection.		Mandatory	
14	Packing: complete kit individually packed in bag or card box,  Each kit shall be supplied with installation guide or at least one installation drawing.		Yes	



15	Each card box and/or individual bag shall be clearly marked with: <ul style="list-style-type: none"> <li>• Name / Logo of the Manufacturer</li> <li>• The type of accessory</li> <li>• The Cross sections</li> <li>• Batch reference or serial number</li> <li>• Packing date</li> <li>• Expiring date (if appropriate)</li> </ul>		Yes Yes Yes Yes Yes Yes	
16	Delivery: suitably protected on pallet or case		Yes	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", "✓", 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.

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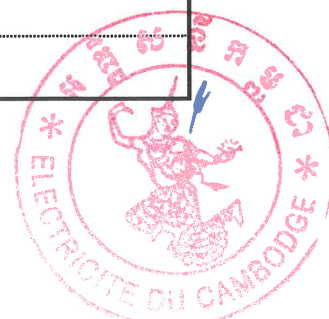
Full technical information shall be supplied within the bid.

Bidder signature:





	Description	Unit	Requirement	Supplier's Offer
<b>10.5 LV UGC Joint sleeves</b>				
1	Cross sections to be supplied:  UGC 50 mm <sup>2</sup> /UGC 50 mm <sup>2</sup>  UGC 95 mm <sup>2</sup> /UGC 50 mm <sup>2</sup>  UGC 95 mm <sup>2</sup> /UGC 95 mm <sup>2</sup>  UGC 120 mm <sup>2</sup> /UGC 95 mm <sup>2</sup>  UGC 120 mm <sup>2</sup> /UGC 120 mm <sup>2</sup>  UGC 150 mm <sup>2</sup> /UGC 95 mm <sup>2</sup>  UGC 150 mm <sup>2</sup> /UGC 150 mm <sup>2</sup>  UGC 240 mm <sup>2</sup> /UGC 150 mm <sup>2</sup>  UGC 240 mm <sup>2</sup> /UGC 120 mm <sup>2</sup>		  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 61238 (class A)	
6	Type test reports or test certification as per § 4.2		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11				



12	The junction sleeves are strictly in accordance with the requirements of paragraph 9.2 of the technical specification		Mandatory	
12a	Junction sleeves are made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors		Mandatory	
12b	Junction sleeves do not reduce the carrying capacity of conductors		Mandatory	
12c	Number of metric bolts for neutral junction sleeves	mm <sup>2</sup>	To be specified 50/50 95/50 95/95 120/95	
12d	Number of metric bolts for phase junction sleeves		To be specified 50/50 95/50 95/95 150/95 150/150 240/150 240/240	
13	Catalogue with length of junction sleeves		To be provided	
14	Packing: 10 pcs packed in bag or card box,		Yes	
	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer The Cross sections Batch reference or serial number		Mandatory	
15	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory • The Cross sections • Batch reference or serial number		Yes Yes Yes Yes	



	• Packing date		Yes	
16	Delivery: suitably protected on pallet or case in carbox		Yes	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, "✓", 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.

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Full technical information shall be supplied within the bid.

Bidder signature:



	Description	Unit	Requirement	Supplier's Offer
<b>10.6 LV UGC /LV ABC Joint sleeves</b>				
1	Cross sections to be supplied:  UGC 50 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Phase  UGC 50 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Neutral  UGC 95 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Phase  UGC 95 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Neutral  UGC 120 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Neutral  UGC 150 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Phase  UGC 150 mm <sup>2</sup> /ABC 70 mm <sup>2</sup> Neutral  UGC 150 mm <sup>2</sup> /ABC 150 mm <sup>2</sup> Phase  UGC 240 mm <sup>2</sup> /ABC 150 mm <sup>2</sup> Phase		  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 61238 (class A)	
6	Type test reports or test certification as per § 4.2		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11				

12	The junction sleeves are strictly in accordance with the requirements of paragraph 9.2 of the technical specification		Mandatory	
12a	Junction sleeves are made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors		Mandatory	
12b	Junction sleeves do not reduce the carrying capacity of conductors		Mandatory	
12c	Number of metric bolts for neutral junction sleeves	mm <sup>2</sup>	To be specified 50/70N 95/70N 95/70N 120/70N	
12d	Number of metric bolts for phase junction sleeves		To be specified 50/70 95/70 95/150 150/70 150/150 240/150	
13	Catalogue with length of junction sleeves		To be provided	
14	Packing: 10 pcs packed in bag or card box,		Yes	
	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer The Cross sections Batch reference or serial number		Mandatory	
15	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory • The Cross sections • Batch reference or serial number • Packing date		Yes Yes Yes Yes Yes	



			Yes	
16	Delivery: suitably protected on pallet or case in carbox		Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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>				





	Description	Unit	Requirement	Supplier's Offer
<b>10.7 LV UGC terminal lugs</b>				
1	Cross sections to be supplied:			
	UGC 50 mm <sup>2</sup> phase		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 50 mm <sup>2</sup> Neutral		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 95 mm <sup>2</sup> Phase		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 95 mm <sup>2</sup> Phase		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 120 mm <sup>2</sup> Neutral		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 150 mm <sup>2</sup> Phase		<input type="checkbox"/>	<input type="checkbox"/>
	UGC 240 mm <sup>2</sup> Phase		<input type="checkbox"/>	<input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		IEC 61238 (class A)	
6	Type test reports or test certification as per § 4.2		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation	°C	90	
	Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)		120	
	Temperature withstand under multi-phase short-circuit conditions during 5 second,		250	
11	Suitable to be used with M12 bolt for connection		Yes	
12	The lugs are strictly in accordance with the requirements of paragraph 9.2 of the technical specification		Mandatory	

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12a	Lugs are made of tinned or silvered aluminum suitable to be used on aluminum or copper conductors and connected on aluminum or copper bars		Mandatory	
12b	Lugs do not reduce the carrying capacity of conductors		Mandatory	
12c	Number of metric bolts for neutral lug	mm <sup>2</sup>	To be specified 50 mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup>	
12d	Number of metric bolts for phase lug		To be specified 50 mm <sup>2</sup> 95 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
13	Catalogue with length of lugs		To be provided	
14	Packing: 10 pcs packed in bag or card box,		Yes	
	Each pcs is indelibly marked with: Name / Logo of the Manufacturer Cross section Batch reference or serial number		Mandatory	
15	Each card box and/or bag shall be clearly marked with: <ul style="list-style-type: none"><li>• Name / Logo of the Manufacturer</li><li>• The type of accessory</li><li>• The Cross sections</li><li>• Batch reference or serial number</li><li>• Packing date</li></ul>		Yes Yes Yes Yes Yes Yes	
16	Delivery: suitably protected on pallet or case in carbox		Yes	

Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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.

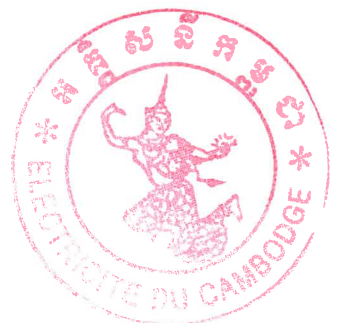
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Full technical information shall be supplied within the bid.

Bidder signature:



	Description	Unit	Requirement	Supplier's Offer
<b>10.8 Heat shrinkable breakout gloves four cores</b>				
1	For UGC cable:  3x50mm <sup>2</sup> + 50mm <sup>2</sup>  3x95 mm <sup>2</sup> + 50 mm <sup>2</sup>  3x150 mm <sup>2</sup> + 95 mm <sup>2</sup>  3x240 mm <sup>2</sup> + 95 mm <sup>2</sup>  3x240 mm <sup>2</sup> + 120 mm <sup>2</sup>		<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		To be supplied	
6	Type test reports or test certification		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	For cable with four cores		Mandatory	
12	Includes adhesive compound inside		Mandatory	
13	Max diameter of cable	mm	3x50 + 50  3x95 + 50  3x150 + 95  3x240 + 95	

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			3x240 + 120	
14	Min diameter of cable		3x50 + 50 3x95 + 50 3x150 + 95 3x240 + 95 3x240 + 120	
15	Max diameter of cores		3x50 + 50 3x95 + 50 3x150 + 95 3x240 + 95 3x240 + 120	
16	Min Diameter of core		3x50 + 50 3x95 + 50 3x150 + 95 3x240 + 95 3x240 + 120	
17	Catalogue with all dimensions		To be provided	
18	Packing: 10 pcs packed in bag or card box,		Yes	
	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer Batch reference or serial number		Mandatory	
19	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory • Batch reference or serial number • Packing date		Yes Yes Yes Yes	
20	Delivery: suitably protected on pallet or case in carbox		Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", "✓, etc..." are not accepted				



Deviation from the technical specification:

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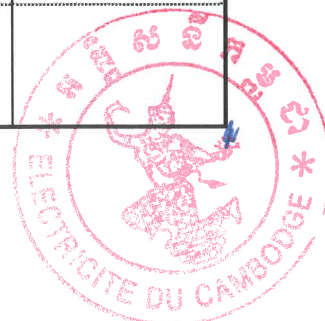
Full technical information shall be supplied within the bid.

Bidder signature:





	Description	Unit	Requirement	Supplier's Offer
<b>10.9 Conductor (core) UV protection heat shrinkable tube</b>				
1	For UGC cable core:  50mm <sup>2</sup>  95 mm <sup>2</sup>  120 mm <sup>2</sup>  150 mm <sup>2</sup>  240 mm <sup>2</sup>		<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		To be supplied	
6	Type test reports or test certification		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	For UGC cables cores with their insulation		Mandatory	
11a	For UV protection		Mandatory	
11b	Black color		Mandatory	
12	Medium thickness wall		Mandatory	
13	Max diameter of conductor	mm	50mm <sup>2</sup>  95 mm <sup>2</sup>	



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			120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
14	Min diameter of conductor		50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
15	Catalogue with all dimensions		To be provided	
16	Deliver in roll of 10 m length		Mandatory	
17	Packing: 10 rolls packed in bag or card box,		Yes	
18	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer Batch reference or serial number Diameter		Mandatory	
19	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory • Diameter • Batch reference or serial number • Packing date		Yes Yes Yes Yes Yes	
20	Delivery: suitably protected on pallet or case in carbox		Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ",√, etc..." are not accepted				



Deviation from the technical specification:

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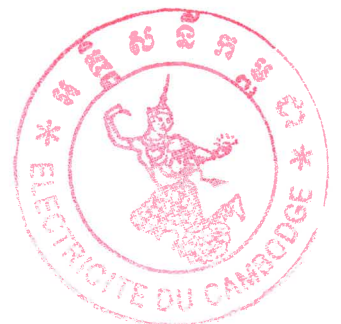
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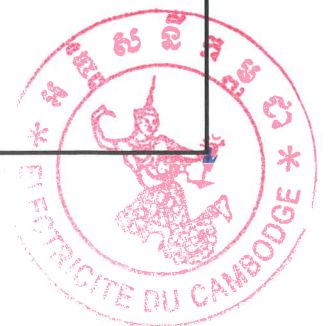
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Full technical information shall be supplied within the bid.

Bidder signature:



	Description	Unit	Requirement	Supplier's Offer
<b>10.10 Colour marking heat shrinkable tube.</b>				
1	For aluminum lugs of mechanical tightening type:  50mm <sup>2</sup>  95 mm <sup>2</sup>  120 mm <sup>2</sup>  150 mm <sup>2</sup>  240 mm <sup>2</sup>		<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	<input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		To be supplied	
6	Type test reports or test certification		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	For terminal lugs and UGC cables cores with their insulation		Mandatory	
11a	For marking of lugs		Yes	
11b	Color		Red <input type="checkbox"/>  yellow <input type="checkbox"/>  blue <input type="checkbox"/>	



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12	Very thin wall		Mandatory	
13	Max diameter of lug	mm	50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
14	Min diameter of lug		50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
15	Catalogue with all dimensions		To be provided	
16	Deliver in roll of 10 m length		Mandatory	
17	Packing: 10 rolls packed in bag or card box,		Yes	
18	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer Batch reference or serial number Diameter		Mandatory	
19	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory and color • Diameter • Batch reference or serial number • Packing date		Yes Yes Yes Yes Yes	
20	Delivery: suitably protected on pallet or case in carbox		Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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.

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Full technical information shall be supplied within the bid.

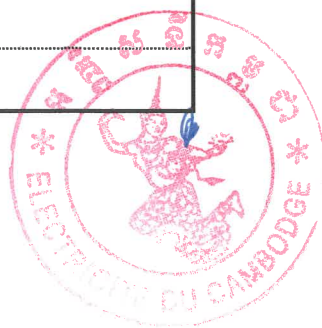
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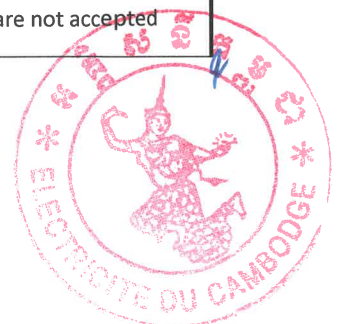


	Description	Unit	Requirement	Supplier's Offer
<b>10.11 Lugs/sleeve insulation heat shrinkable tube with adhesive compound inside</b>				
1	For aluminum lugs and sleeves of mechanical tightening type:  50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2	Manufacturing Country		to be specified	
3	Manufacturer		to be specified	
4	Manufacturer's reference		to be specified	
5	Standard		To be supplied	
6	Type test reports or test certification		To be provided with bid.	
7	ISO 9001 for design, development and production		Yes. Certificate to be provided	
8	Life expectancy	Year	≥ 30	
<b>Construction and physical characteristics</b>				
9	Voltage U <sub>0</sub> /U (U <sub>m</sub> ) shall be	kV	0.6/1 (1.2)	
10	Temperature withstand during normal operation  Temperature withstand under a short time overload (a total of 24 hours a year in separate of 3 hours at the most)  Temperature withstand under multi-phase short-circuit conditions during 5 second,	°C	90  120  250	
11	For UGC cables cores with their insulation, terminal lugs and junction sleeves		Mandatory	
11a	Includes adhesive compound for waterproofness		Mandatory	
11b	Black color		Mandatory	



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11c	For full insulation of lug barrel and junction sleeves		Mandatory	
12	Heavy thickness wall		Mandatory	
13	Max diameter of lug and sleeve	mm	50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
14	Min diameter of lug and sleeve		50mm <sup>2</sup> 95 mm <sup>2</sup> 120 mm <sup>2</sup> 150 mm <sup>2</sup> 240 mm <sup>2</sup>	
15	Catalogue with all dimensions		To be provided	
16	Deliver in length of 1 meter		Mandatory	
17	Packing: 10 pcs packed in bag or card box,		Yes	
18	Each pcs is indelibly marked with:  Name / Logo of the Manufacturer Batch reference or serial number Diameter		Mandatory	
19	Each card box and/or bag shall be clearly marked with:  • Name / Logo of the Manufacturer • The type of accessory • Diameter • Batch reference or serial number • Packing date		Yes  Yes  Yes  Yes  Yes	
20	Delivery: suitably protected on pallet or case in carbox		Yes	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", 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.

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Full technical information shall be supplied within the bid.

Bidder signature:

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