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ELECTRICITE DU CAMBODGE

TECHNICAL SPECIFICATION

EDC-DTS-MV005

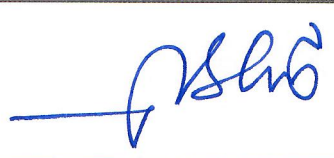
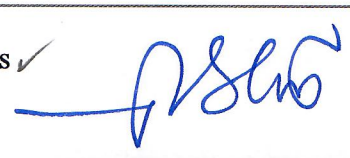
Overhead Conductors and Accessories

VERSION 2: December 2021





ELECTRICITE DU CAMBODGE

Version	Date	Technical Specification Name	Authorized by : (name and signature)
1.0	November, 2017	Overhead Conductors and Accessories	
2.0	January, 2022	Overhead Conductors and Accessories ✓	 Dr. Praing Chutasa



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Draft 1	AD			24 July 2020
Draft 2	AD/EDC			25 June 2021
Draft 2 rev1	EDC/AD			16 Nov 2021
Draft 2 rev2	EDC/AD/suppliers			8 Dec 2021

Version 2: Main modifications from version 1 (November 2017):

Addition of hand/live line work ring connector for bare conductors (main and tap).

Clear mention of the min/max real cross section of bare conductors

Modification for covered conductor's and accessories:

- Introduction of 240 mm² covered conductors and accessories
- Clear mention of the min/max real cross section of covered conductors
- Mention of the pin standards for Tie-Termination Anchor Sleeve, Pin Branch Joint and pin connector
- Mention of the pin connector standard
- Clarification of mid-span junctions for covered conductors
- Allow heat shrinkable tube and caps with adhesive compound inside (in addition to specific gaskets) for waterproofness of covered conductors accessories

Addition of bare conductor pin branch joint for connection of covered conductor using pin connector onto a bare OHL (connection of pole mounted transformer as example)

Correction of mistakes/errors

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Overhead Conductors and Accessories

1 Scope

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements of overhead conductors and accessories for MV overhead lines used on 35 and 22 kV networks of Electricité du Cambodge.

2 Standards

The equipment shall comply with the latest editions and amendments of standards/specifications listed below:

IEC : International Electromechanical Commission

IEC 60104 : Aluminium-magnesium-silicon alloy wires for overhead line conductors

IEC 60889 : Hard Drawn Aluminium wires for overhead line conductors

IEC 61089 : Round wire concentric lay overhead electrical stranded conductors

EN European Standard CENELEC

EN 50182 : Conductors for overhead lines -round wire concentric lay stranded conductors

EN 50183 : Conductors for overhead lines- Aluminium-magnesium-silicon alloy wires

EN 50397 : Covered conductors for overhead lines and the related accessories for rated voltages above 1 kV AC and not exceeding 36 kV AC

ISO : International Standard Organization

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

ISO 9001 : Quality management systems – Requirements

EDF : Electricité de France

HN 66-S-46 : Connecting pin

HN 66-S-45 : Pin connector

The Bidder 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 EDC.

3 Testing and Inspection

3.1 General Notes for Test

Conductors 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 or national recommendations. In the absence of IEC standards, the inspection and tests shall be carried out in such a manner as to be at least equivalent to conditions, provisions and definitions set out in one of the standards listed in this specification.

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

3.2 Conductors Type Tests

All type tests required by the relevant IEC bare conductors and EN for covered conductors and accessories shall be carried out.

Type test reports 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. Type test reports older than 15 years will not be accepted.

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.

3.3 Conductors Routine Tests

EDC Representative may call for routine tests to be carried out at the Manufacturer's Works and witnessed by EDC or their Inspecting Engineers. Such tests would be on random samples at the discretion of EDC Representative and failure to meet the conditions of tests could result in the rejection of a complete batch of conductor.

Routine tests shall be carried out on all the conductors in a particular order, and shall be free of charge to EDC.

Before stranding, tests shall be carried out on samples of wire, selected from not less than 10% of the individual lengths of wire to be included in any one consignment. Each sample shall be of sufficient length to provide one test specimen for each of the appropriate tests.

After stranding, tests shall be carried out on samples selected from every drum in the consignment. Each sample shall be sufficient length to provide one test specimen for each of the appropriate tests.

If any sample fails to pass any one of the tests nominated for that conductor or wire, then samples shall be taken from every drum in the consignment and any drum length from which a sample proves defective shall be rejected. On no account shall any rejected material be again presented for test unless with the written approval of, and under conditions determined by, the purchaser.

Each sample selected as described above, shall be subjected to the tests described hereafter.

For each wire sample:

- Diameter measurement
- Tensile strength measurement
- Resistance test
- Wrapping test

For each complete conductor sample:

- Lay ratio of each layer to be measured.
- Dimensions (diameters, thickness, etc.),
- Tensile strength of complete conductor to be measured. Alternatively, the tensile strength may be calculated from the results of tests on individual wires using the method of IEC 61089.
- Resistivity of complete conductor to be measured as applied to individual aluminium or aluminium alloy wires. Alternatively, the resistivity may be calculated from the results of tests on individual wires, using the method of IEC 61089.

The following routine tests shall also be included:

- Electrical resistance of conductors.
- covering spark test (covered conductors)

3.4 Conductors Special Tests

Special tests shall be carried out at EDC's discretion on a number of conductor samples selected by EDC from the contract consignment. The tests shall be carried out on one randomly selected sample of the production batch of the conductor type and cross section.

The following special tests shall be included:

- Conductor examination
- Check of dimensions
- Voltage and leakage test (covered conductors)
- Hot set test for XLPE insulation (covered conductors)

3.5 Bare Conductors Accessories Tests

3.5.1 Preformed ties for Insulators

In absence of IEC test standard, any EN or national test standard could be applied. As a minimum, the following type test reports shall be supplied:

- Tensile strength test for attaching ties
- Breaking load type test for dead end grips and anchorage

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

3.5.2 Mid Span Full Tension Joint

In absence of IEC test standard, any EN or national test standard could be applied. As a minimum, the following type test reports shall be supplied:

- Tensile strength test
- Electrical resistance measurements test

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

3.5.3 Terminal Lugs

In absence of IEC test standard, any national test standard could be applied. As a minimum, the following type test reports shall be supplied:

- Electrical resistance measurement test

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

3.5.4 Cable clamp (PG clamps)

In absence of IEC test standard, any national test standard could be applied. As a minimum, the following type test reports shall be supplied:

- Electrical resistance measurement test

The Routine and sample tests carried out on accessories by the manufacturer shall be backed by routine test reports which are signed by the factory's quality control department.

3.6 Covered Conductor's Accessories Tests

All covered conductor's accessories shall be type tested according the requirements of EN 50397-2 standard and/or EDF HN 66-S-46 and EDF HN 66-S-45 (pin connector). Full type tests report shall be provided for at least the type tests carried out according EDF HN 66-S-46 and HN 66-S-45.

The Routine and sample tests carried out on accessories by the manufacturer shall be backed by routine test reports which are signed by the factory's quality control department.

4 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.

5 Ambient Conditions

Conductors and accessories 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	1.20 cm/W
Maximum	3.00 cm/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)

6 Bare Conductors

6.1 Constitution and Cross Sections

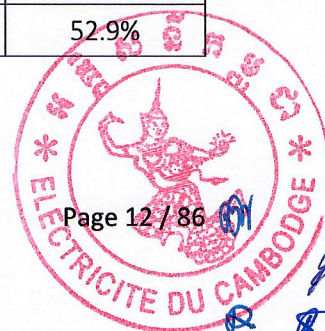
The bare conductors shall be made of **Aluminium-magnesium-silicon alloy** wires (AAAC).

The cross sections of bare conductors to be supplied are 240 mm², 185 mm², 150 mm², 70 mm² and 35 mm².

Depending of international and national standards, real cross section areas shall be accepted as per the table herein after.

The minimal characteristics of bare conductors shall be as follows

AAAC bare conductors						
Cross section (mm ²)			Minimum breaking strength KN	Modulus of elasticity N/mm ²	Coefficient of linear expansion per °C x 10 ⁻⁶	Conductivity % IACS
Approximate	Real Minimum	Real Maximum				
240 mm ²	227.8	245	74	57 000	23	52.9%
185 mm ²	181.6	188	58	57 000	23	52.9%
150 mm ²	147	153	47	60 000	23	52.9%
70 mm ²	69	75.5	20	60 000	23	52.9%
35 mm ²	34	36	10	62 000	23	52.9%



6.2 Outer Area

The area shall be longitudinally identical; the stranded wires shall not be overlapped, not have any defect; there shall be bandages to keep the ends of conductor coil fixed.

6.3 Layers

All the layers shall be stranded securely. The direction of lay of two consecutive layers shall be different; the outmost layer of wires shall be right-hand direction.

6.4 Jointing

Welding on aluminium alloy wire is tolerated but if we consider all the wires, a distance of 50 meters between 2 consecutive welding is requested, in all cases the table below shall be respected.

Jointing shall be performed by butt-welding. There shall be not more than 5 joints within any wire of the outer layer. The distance between two consecutive joints among different wires shall be different.

Number of layers	Maximum number of welding acceptable per section of 1500 m
1	2
2	3
3	4
4	5

6.5 Grease

In order to protect wires from the corrosion, the conductors shall be greased: The internal core and all aluminium alloy layers excluding outer layer will be greased.

The grease used shall be high temperature melting point grease of more than 70 °C.

7 Accessories for Bare Conductors

7.1 Preformed Dead End Grips for Bare Conductors

This preformed dead end grips shall be used for bare conductor anchorage on the strain insulators.



7.1.1 Functional Characteristics

Preformed dead end grip is used to:

- Anchor the bare conductor without cutting it.
- Connect with the strain insulator by a clevis thimble with a breaking load of not less than 70 kN.

Dead end grips shall be used with the following conductors:

Conductor type	Cross Section (mm ²)
AAC (existing network)	35, 70 and 150
AAAC	35, 70, 150, 185 and 240
ACSR (existing network)	35, 70 and 150

These terminations shall guarantee mechanical features at least equivalent to those of the conductor on which they are installed and shall be protected against corrosion.

When installed on the conductor, no conductor failure shall appear next to the dead end grip and no conductor slip shall appear at tensile load below the nominal breaking load value of the conductor.

7.1.2 Markings

Each individual Preformed Dead-End Grip shall be marked by colour code depending the associated conductor cross sections.

7.2 Metallic Preformed Ties

These preformed ties shall be used for attaching/fixing the bare conductors onto the 35 and 22 kV line post insulators.

For sample only

Preformed ties shall be used with the following conductors:

Conductor type	Cross Section (mm ²)
AAC (existing network)	35, 70 and 150
AAAC	35, 70, 150, 185 and 240
ACSR (existing network)	35, 70 and 150

Side or top preformed ties shall be supplied according the conductor location on the line post insulator.



The preformed tie shall suit perfectly the conductor cross section size and the insulator.

All preformed ties shall be supplied with a neoprene pad for insertion over the conductor where it rests in the insulator top or side groove.

7.2.1 Markings

Each individual preformed tie shall be marked by colour code depending the associated conductor cross sections.

7.3 Mid-span Full Tension Joints

This equipment is intended to ensure mechanical and electrical connection between two lengths of same cross section of bare conductors under mechanical strength.



Each mid-span full tension joint comprises:

- One aluminium alloy sleeve allowing the hexagonal compression on conductor core for aluminium and aluminium alloy conductors
- One steel sleeve and one aluminium alloy sleeve and eventually aluminium insert tubes allowing the hexagonal compression on conductor core for ACSR conductors.

Mid-span full tension joints shall be used with:

Conductor type	Cross Section (mm ²)
AAC (existing network)	35, 70 and 150
AAAC	35, 70, 150 and 185 and 240
ACSR (existing network)	35, 70 and 150

Mid-span full tension joints shall be of regular hexagonal compression type. These joints shall guarantee mechanical and electrical features at least equivalent to those of the conductor on which they are installed.

They shall include internal barer for correct insertion of the conductor.

When in use, no conductor failure shall appear next to the mid-span full tension joints and no conductor slip shall occur at tensile load below the nominal breaking load value of the conductor.

This accessory shall be delivered with necessary grease inside and both ends shall be capped.

7.3.1 Markings

Each individual Mid-span full tension joint shall have the range of permanent embossed markings listed below,



- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference (s).
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression.

7.4 Terminal Lugs

The compression terminal lugs are intended to connect overhead network apparatuses (LBS, Auto-Recloser, Transformer, etc.) to a bridge constituted by a non-stretched linking conductor.



Each terminal lug comprises:

- One tube to be compressed on the conductor.
- One palm with a hole to connect the lug onto the network apparatus.

Terminal lugs shall be used with:

Conductor type	Cross Section (mm ²)
AAC (existing network)	35, 70 and 150
AAAC	35, 70, 150 and 185 and 240
ACSR (existing network)	35, 70 and 150

Terminal lugs for conductors shall be filled with high quality oxide inhibiting compound.

The carrying capacity of the terminal lugs shall be at least equal to the capacity of the conductor.

Two type of lugs shall be supplied:

- Aluminium terminal lug for connection of AAC, or AAAC, or ACSR conductors on aluminium terminals.
- Bi-metallic Aluminium/copper terminal lug for connection of AAC, AAAC or ACSR conductors on copper terminals.

Bi-metallic terminal lugs shall be made of:

- One aluminium or aluminium alloy tube
- One copper palm.

These two components shall be a not dissociable assembly.



Friction welding between aluminium tube and copper palm of bi-metallic lugs is not accepted for reason of too short lifespan under daily OHL vibrations.

The minimum hole diameter of palm of each kind of lug shall be:

- 13 mm for bi-metallic terminal lug and for copper terminal lug.
- 15 mm for aluminium terminal lug.

The lugs shall be supplied with a bolt in accordance with the metal of the connecting palm and fitted with bolt, nut and washers.

These accessories shall be delivered with necessary grease inside and both ends shall be capped.

7.4.1 Markings

Each individual terminal lug shall have the range of permanent embossed markings listed below,

- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference.
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression.

7.5 Cable Clamps (PG)

Bolted cable clamps shall be used for connecting two conductors or for fixing connection stirrup on tight conductors.

These cable clamps shall be of bolted type with parallel grooves (PG).



7.5.1 Clamp Body

The clamp body shall be made of high corrosion resistance aluminium alloy.

7.5.2 Bolts

The minimum number of tightening bolts per cable clamps shall be suitable for cross section of conductors and at least two pieces screwed in one half of the PG clamp. The bolts shall be made of aluminium alloy or stainless steel and fitted with one locking nut.

7.5.3 Markings

Each individual parallel grooves clamp shall have the range of permanent embossed markings listed below,

- Manufacturer's identification.
- Cross section range.
- Reference of lot including the last two digits of manufacture Year.

7.6 Hand/Live line work ring connector

This specific connector shall be use to connect one stretched bare conductor to a not stretched tap bare conductor.

It shall be designed to be installed by hand (dead work) and by live line work thanks a ring for gun hot stick.

For that purpose, the tightening screw of the connector onto the main stretched bare conductor shall include:

- One share-off metric head that break when the tightening torque is reach
- One ring to be operated with gun stick.

The tap bare conductor shall be connected onto the connector using also a screw with shear-off head which break when the right tightening torque is reach.

The main body of the connector shall be made of aluminum or aluminum alloy. It shall include a flap in open normal position that automatically closed when the connector is in place on the main conductor and remain closed when the connector is tightened on the main bare conductor.

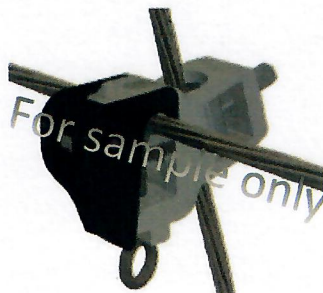
The connector shall adapt for one reference only the cross sections afore:

Main stretched bare conductor

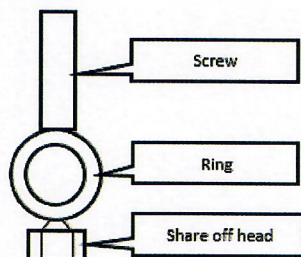
From 35 to 240 mm²

Tap not stretched bare conductor

From 35 to 150 mm²



Installed on conductors.



Detail of main conductor tightening screw

7.6.1 Markings

Each hand/LLW ring connector shall have the range of permanent embossed or engraved markings listed below,

- Manufacturer's identification.
- Cross section range.
- Reference of lot including the last two digits of manufacture Year.

8 MV Covered Conductors

This specification applies to 22 kV insulated, unscreened, Water Blocking Covered Conductors. The conductor shall be made of **compacted aluminium alloy wire** (Aluminium - Magnesium - Silicon) of AL4 type as per EN 50183 standard, and of compacted Aluminium for 35 mm², stranded in layers.

Covered conductors consist of a compacted conductor surrounded by a covering made of insulating material as protection against accidental contacts with other covered conductors and with grounded parts such as tree branches, etc. In comparison with insulated conductors, this covering has reduced properties, but is able to withstand the phase-to-earth voltage temporarily.

Since covered conductors are unscreened, they are not touch-proof, i.e., they must be treated as bare conductors with respect to electric shock.

The covered conductor's networks implementation shall be similar to the bare conductor implementation.

Depending of international and national standards, approximate section areas shall be accepted.

The 35 mm² cross section Covered Conductor is specifically dedicated for Pole Mounted distribution substation wiring.

The life expectancy of covered conductor and accessories shall be not less than 30 years.

8.1 General

System voltage: 12.7/22 (24) kV

Conductor rated voltage (U) : 24 kV

Full type test reports carried out in accordance with the requirement of EN 50397 shall be supplied.

8.2 Breaking Strength

The minimal breaking strength and characteristics of MV covered conductor cores shall be as follows:



Cross section (mm ²)			Minimum breaking strength (kN)	Modulus of elasticity hbar	Coefficient of linear expansion per °C x 10 ⁻⁶
Approximate	Real minimum	Real maximum			
CC 240 mm ²	227.8	245	70	6000	23
CC 185 mm ²	181.6	188	54	6000	23
CC 150 mm ²	148	153	43	6000	23
CC 95 mm ²	92	95	27	6000	23
CC 70 mm ²	69	75	20	6000	23
CC 50 mm ²	54	55	14	6200	23
CC 35 mm ²	34	37	5	7000	23

The covered conductor comprises:

- Circular aluminium alloy stranded compacted conductor or aluminium stranded conductor for 35 mm².
- Watertight system for longitudinal water tightness.
- XLPE covering sheath.

A semi- conductive layer could be inserted between core and insulation.

8.3 Core of Conductor

The core of covered conductor shall be made of **compacted AL4** (EN 50183) Aluminium alloy (aluminium-magnesium-silicium) wires for 240 mm², 185 mm², 150 mm², 95 mm², 70 mm² and 50 mm² cross section conductor and Aluminium for 35mm² cross section conductor. It is a stranded conductor with a circular cross section.

The 35 mm² shall be used for wiring of pole mounted substations.

8.4 Longitudinal Water Tightness

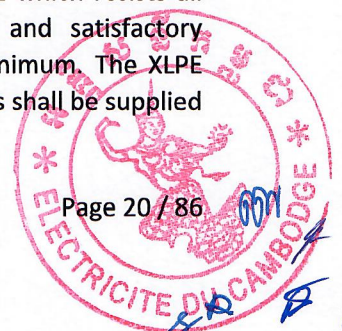
The stranded conductor shall be longitudinally watertight by means of adequate measures as e.g. filling with an adequate mass, water blocking fibber or powder etc... The filling mass or other materials for obtaining the longitudinal water tightness, shall be compatible with the conductor material and the material of the covering to prevent the migration of water inside the covered conductor which guarantees the long performance required.

This water blocking mass shall not migrate into the core of the conductor. It shall not deteriorate mechanical and electrical characteristics of accessories thereafter. No specific tool and no solvent shall have to be used to prepare the contact between conductors and accessories.

The water blocking mass used shall be safe for the environment. This shall be proved by supplying relevant tests and certificates within the offer.

8.5 Covering

The covering sheath is a black UV stabilized and weather resistant extruded XLPE which resists all atmospheric agents. The covering thickness, consistent with minimum cost and satisfactory performance proved by type tests may be offered but it shall be of 2.5 mm minimum. The XLPE compound shall be in accordance with the EN 50397 requirements. Compound tests shall be supplied



within the offer as well as all type tests. Failure to supply type tests as requested will result in the rejection of the offer.

It shall be possible to remove the covering without damage to the conductor.

8.6 Maximum Permissible Temperatures

The maximum permissible temperatures shall be as follow:

- 90°C during normal operation,
- 120° C under a short duration overload (a total of 24 hours a year in separate periods of 3 hours at the most),
- 250°C under short circuit (max 5 seconds)

These temperatures are based on the intrinsic properties of the insulating materials. These values can only be used for calculating permissible current ratings.

8.7 Markings

Each individual conductor shall have the range of markings listed below, embossed on the insulation surface at one meter intervals. The letters and figures shall be raised on the insulation surface, thus it does not damage the insulation.

- **Manufacturer's identification** :
- Year of manufacture : Four digits
- Conductor type : CC;
- Covering material : S (for semi-conductive conductor screen, if any),
: X (for cross-linked polyethylene),
- Conductor material and cross-section : AL4
- Conductor design : W (for watertight),
: K (for compacted);
- Rated voltage U_m in kV : 24 kV
- Supplier name : XXXX

The markings shall be made in the sequence indicated above. Thus, if the manufacturer is XY, the core of AL4 and the cross section is 150 mm², without semi conductive layer, the cable was manufactured in 2015, the markings would be: **XY 2015 CCX 150-AL4 WK 24kV - XXXX**

9 Accessories for Covered Conductors

9.1 General

The above accessories shall be used with watertight covered conductors without removing the covering with exception of hexagonal compression accessories for which the covering (if any) shall have the same basic insulation properties as the conductor covering.

All proposed accessories shall be specially manufactured or adapted for covered connectors on the considered voltage level. None of the proposed accessories when installed on the covered conductor shall be the origin of radio influence, corona, electrical field stresses and tracking effect.



9.2 Tie-Termination Anchor Sleeve

This Tie-Termination anchor sleeve shall be installed on strain insulators.



9.2.1 Functional Characteristics

Each Tie-Termination anchor sleeve is used to:

- Anchor the covered conductor by hexagonal compression on covered conductor core.
- Connect with the strain insulator by a clevis with a breaking load of 70 kN.
- Connect with a branch or a jumper through a diameter 25 mm pin connector
- Prevent the penetration of water into the covered conductor (gasket or heat shrinkable short sleeve with adhesive compound inside)
- Short circuiting and earthing of covered conductor

Tie-Termination shall be used with the following covered conductors: 240 mm², 185 mm², 150 mm², 95 mm², 70 mm² and 50 mm².

These terminations guarantee mechanical and electrical features at least equivalent to those of the conductor core on which they are installed.

When using, no covered conductor failure shall appear next to the Tie - Termination anchor sleeve and no conductor slip shall appear at tensile load below the nominal breaking load value of the conductor.

With exception of the cross sections and requirements above, the pin of this equipment shall be conformed to the requirement of EDF HN 66-S-46

9.2.2 Markings

Each individual Tie - Termination shall have the range of permanent embossed markings listed below:

- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference.
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression.

9.3 Mid-span Full Tension Joints

This equipment is intended to ensure mechanical and electrical connection between two lengths of same cross section of stretched bare conductors.

9.3.1 Functional Characteristics

Each mid-span full tension joint comprises:

- One aluminium alloy sleeve allowing the hexagonal compression on conductor core.
- One water tightening system (heat shrinkable sleeve with internal adhesive compound) to prevent the penetration of water into the covered conductor and reconstitute the conductor covering on the aluminum sleeve. **Pre-insulated tension joints are not accepted.**

Mid-span full tension joints shall be used with the following covered conductors: 240mm², 185 mm², 150 mm², 95 mm², 70 mm² and 50 mm².

Mid-span full tension joints shall be hexagonal compression type. These joints shall guarantee mechanical and electrical features at least equivalent to those of the conductor on which they are installed.

When in use, no covered conductor failure shall appear next to the mid-span full tension joints and no conductor slip shall appear at tensile load below the nominal breaking load value of the conductor.

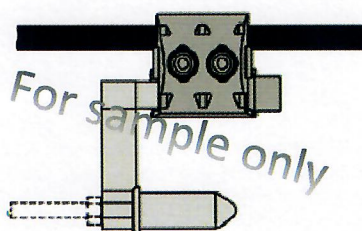
9.3.2 Markings

Each individual Mid-span full tension joint shall have the range of permanent embossed markings listed below,

- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference.
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression.

9.4 Pin Branch Joint for covered conductor

These joints are intended to connect a covered, non-cut, stretched line conductor with a cut tap covered conductor. This connection is made with a branch associated pin and a pin connector defined after.



9.4.1 Functional Characteristics

Each pin branch joint for Covered Conductor comprises:

- One or two insulation piercing connectors with water-tightness system (gasket, cap...) to prevent the penetration of water into the covered conductor.
- One 25 mm diameter aluminium alloy tap pin to connect a jumper with a pin connector.

Pin branch joints for Covered Conductors shall be used with the following covered conductors: 240 mm², 185 mm²; 150 mm²; 95 mm², 70 mm² and 50 mm².



The carrying capacity of pin branch joints shall be at least equal to the one of the bigger cross section indifferently line or tap conductor.

The insulation piercing connector (s) shall not have components that are liable to be lost during installation. The housing shall be made entirely of mechanical and resistant plastic insulation material and no metallic part outside the housing is acceptable except for the tightening system. The housing shall be an integral part of the connector. The bolts tightening torque shall be controlled by shear head screws without the need of any special tool.

The number and the length of the teeth shall be adequate enough to penetrate the relevant covered conductor covering to establish proper contact without any contract resistance and without the need to strip the covered conductor insulation. To achieve the required water tightness a special rubber seal be provide around the teeth of the present connector. The bolts and washers shall be of corrosion resistant type.

The pin shall be conformed to the requirement of EDF HN 66-S-46.

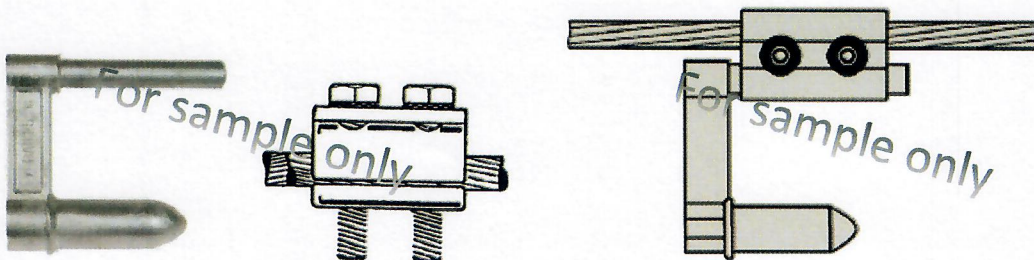
9.4.2 Markings

Each individual pin branch joint shall have the range of permanent embossed markings listed below:

- Manufacturer's identification.
- Type of conductor
- Cross section range of conductor.
- Reference of lot including the last two digits of manufacture Year.

9.5 Pin branch joint for bare conductor

These joints are intended to connect a bare non-cut, stretched line conductor with a tap covered conductor. This connection is made with a branch associated pin and a pin connector defined after as example for connecting a pole mounted substation wired with 35 mm² covered conductor onto a bare OHL.



9.5.1 Functional Characteristics

Each pin branch joint for bare Conductor comprises:

- One parallel groove clamp (PG) made of aluminium or aluminium alloy for connecting the pin adaptor branch onto the main bare conductor
- One 25 mm diameter aluminium alloy tap pin adaptor to connect a jumper with a pin connector.

Pin branch joints for bare Conductors shall be used with the following main bare conductors cross section: 240 mm², 185 mm²; 150 mm², 70 mm² and 50 mm².

The carrying capacity of pin branch joints for bare conductors shall be at least equal to the cross section of the bigger cross section indifferently line or tap conductor.

The minimum number of tightening bolts per PG cable clamps shall be suitable for cross section of conductors and at least two pieces screwed in one half of the PG clamp. The bolts shall be made of aluminium alloy or stainless steel and fitted with one locking nut.

9.5.2 Marking

Each individual pin branch joint for bare conductor shall have the range of permanent embossed markings listed below:

- Manufacturer's identification.
- Type of conductor
- Cross section range of conductor on the PG clamp
- Reference of lot including the last two digits of manufacture Year.

9.6 Pin Connector

These connectors are intended to connect Tie-Termination anchor sleeve and pin branch joints to a bridge constituted by a non-stretched linking bare or covered conductor. This connector is to be used on a 25mm diameter pin as defined by EDF HN 66-S-46.



Those connectors are conform to the requirement of EDF HN 66-S-45 and are of OPEN type.

9.6.1 Functional Characteristics

Each pin connector comprises:

One body made of aluminium alloy including a tightening system. This body shall permit the electrical connection on the 25 mm diameter pin of the tie-termination or the pin branch joints.

One tube welded on the body. On site, this tube shall be hexagonally compressed onto the conductor.

For covered conductors, the tube shall include a water-tightened system (gasket or heat shrinkable cap plus heat shrinkable tube with adhesive compound inside) to prevent the penetration of water into the covered conductor. There is no specific need of device indicating the correct penetration of conductors but this one can be offered.

Covered conductors Pin connectors' type shall be used with the following Aluminium alloy tap covered conductors: 240 mm², 185 mm², 150 mm², 95 mm², 70mm², 50 mm² and with the 35 mm² Aluminium covered conductor.

All tube connectors shall be filled with high quality oxide inhibiting compound.

The carrying capacity of the connectors shall be at least equal to the capacity of the compressed conductor.

The tightening bolts shall include an over-torque shear head made of suitable material which allows a clamping torque in conformity with the recommendation of the manufacturer, without the need of any special tool. This head shall be hexagonal head type.

A ring shall be accessible after breaking of the first head to allow disconnection of pin connector from a pin with hook stick for future hot line working.

According the cross sections, dies used to hexagonal compression of the tube of pin connectors shall be same as the dies used for compression of pin dead end tension joints and mid-span full tension joints.

With exception of the cross sections and specific requirements above, this equipment shall be conformed to the requirement of EDF HN 66-S-45 and shall be of the "OPEN" type.

9.6.2 Markings

Each individual pin connector shall have the range of permanent embossed markings listed below,

- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference.
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression.

9.7 Terminal Lugs for Covered Conductors

The compression terminal lugs are intended to connect overhead network apparatuses to a bridge constituted by a non-stretched linking covered conductor. Those lugs shall be identical to the bare conductor lugs with exception of a water-tightness system for preventing penetration of water inside the covered conductor.

9.7.1 Functional Characteristics

Each terminal lug comprises:

- One tube to be compressed on the conductor.
- One palm with a hole to connect the lug on the network apparatus.

The tube shall include a water-tightness system (gasket or heat shrinkable short tube with adhesive compound inside) to prevent the penetration of water into the covered conductor.

Terminal lugs shall be used with the following conductors: 240 mm², 185 mm²; 150 mm²; 95 mm², 70 mm², 50 mm² and 35 mm² covered conductors.

Terminal lugs for conductors shall be filled with high quality oxide inhibiting compound.

The carrying capacity of the terminal lugs shall be at least equal to the capacity of the conductor.

Two types of lugs shall be supplied:

- Aluminium terminal lug for connection of covered conductors on aluminium terminals.



- Bi-metallic Aluminium/copper terminal lug for connection of covered conductors on copper terminals.

Bi-metallic terminal lugs shall be made of:

- One aluminium or aluminium alloy tube
- One copper palm.

These two components shall be an in dissociable assembly.

Friction welding between aluminium tube and copper palm of bi-metallic lugs is not accepted for reason of too short lifespan under daily OHL vibrations.

The minimum hole diameter of palm of each kind of lug shall be:

- 13 mm for bi-metallic terminal lug and for copper terminal lug.
- 15 mm for aluminium terminal lug.

The lugs shall be supplied with a bolt in accordance with the metal of the connecting palm and fitted with bolt, nut and washers.

5.4.1 Markings

Each individual terminal lug shall have the range of permanent embossed markings listed below,

- Manufacturer's identification.
- Type of conductor.
- Cross section of conductor.
- Compression die reference.
- Reference of lot including the last two digits of manufacture Year.
- Marks showing the places of compression

9.8 Insulation Piercing Connectors

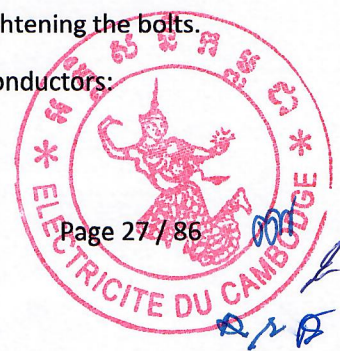
These insulation-piercing connectors are intended to connect two covered conductors with the same or different cross section between them without possibility of disconnection latter. They shall be of not reusable type. The main conductor should be stretched or not. The tap conductor shall be a bridge constituted by a not stretched linking covered conductor.

The insulation piercing connector shall not have components that are liable to be lost during installation. The housing shall be made entirely of mechanical and resistant plastic insulation material and no metallic part outside the housing is acceptable except for the tightening system. The housing shall be an integral part of the connector. The bolts tightening torque shall be controlled by shear head screws without the need of any special tool.

The number and the length of the teeth shall be adequate enough to penetrate the relevant covered conductor covering to establish proper contact without any contract resistance and without the need to strip the covered conductor insulation. To achieve the required water tightness a special rubber seal be provide around the teeth of the present connector. The bolts and washers shall be of corrosion resistant type.

The piercing of insulation shall be simultaneous on main and tap conductor when tightening the bolts.

The insulation piercing connector shall accept the following cross section covered conductors:



Main covered conductor cross section (mm ²)	Tap covered conductor cross section (mm ²)
240, 185, 150, 95, 50 and 35	240, 185, 150, 95, 50 and 35

As example, it could be requested a connector with the following cross section capacity: Main 185 mm² and Tap 35 mm².

This means that different connectors shall be supplied for covering all connection capacities. Nevertheless, the number of connectors for covering all possibilities shall be reduce to a minimum.

9.9 Insulating Ties

Insulating ties will be used for attaching 22 kV covered conductors onto line post insulators.

The insulating ties for 22 kV covered conductor shall be single material plastic ties of the highest integrity type, no metal parts are allowed. Ties shall be used without removing the sheath of covered conductors.

They shall combine the necessary mechanical holding function with protection of the conductor sheath from long term deterioration caused by electrical stress. The electrical integrity of covered conductor/ line post insulator system shall be maintained.

Insulating ties shall be used with the following covered conductors: 240 mm², 185 mm², 150 mm², 95 mm², 70 mm², 50 mm² and 35 mm² and they shall be of weather and UV resistant type.

9.10 Sample Goods

Two (2) sample of each type of accessories and two (2) piece (50 cm) of each cross section of the proposed covered conductor shall be submitted to EDC within the offer.

10 Technical Data Sheets

10.1 Bare conductors

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 Standards		IEC 60104 IEC 60889 IEC 61089 EN 50182 EN 50183	
5	Full type tests reports supplied		Yes, as per IEC and EN requirements	
	Conductors made of:		Aluminium-magnesium-silicon alloy wires (AAAC)	
6	Aluminium alloy origin		To be specified	
7	Approximate Cross sections	mm ²	<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 70 <input type="checkbox"/> 35	
8	Real cross section: RCS			
	240 mm ²	mm ²	$227.8 \leq RCS \leq 245$	To be specified If not, offer will be rejected
	185 mm ²	mm ²	$181.6 \leq RCS \leq 188$	
	150 mm ²	mm ²	$148 \leq RCS \leq 153$	
	70 mm ²	mm ²	$69 \leq RCS \leq 75$	
	35 mm ²	mm ²	$37 \leq RCS \leq 34$	
	Conductor diameter	mm		
	240		To be specified	
	185			
	150			
	70			



	35			
9	Minimum breaking strength 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²	kN	74 58 47 20 10	
10	Conductivity	% IACS	52.9%	
11	Modulus of elasticity – 240 mm ² and 185 mm ² – 150 mm ² and 70 mm ² – 35 mm ²	N/mm ²	– 57 000 – 60 000 – 62 000	
12	Coefficient of linear expansion per °C x 10 ⁻⁶		23	
13	Nominal carrying capacity 20°C in air without wind 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²	A	≥ 485 ≥ 415 ≥ 365 ≥ 230 ≥ 145	
14	Minimal linear resistance 20°C 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²	Ω/km	≤ 0.146 ≤ 0.183 ≤ 0.224 ≤ 0.483 ≤ 0.958	
15	Number of wires 240 mm ² 185 mm ²			

	150 mm ² 70 mm ² 35 mm ²		To be specified	
16	Diameter of wires 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²		To be specified	
17	Number of layers 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²		To be specified	
18	Outer area The area shall be longitudinally identical; The stranded wires shall not be overlapped, not have any defect		Yes Yes Yes	
19	Layers All the layers shall be stranded securely The direction of lay of two consecutive layers shall be different the outmost layer of wires shall be right-hand direction		Yes Yes Yes	
20	Jointing Butt-welding Jointing 50 meters between 2 consecutive welding.		Yes	



	<p>No more than 5 joints within any wire of the outer layer.</p> <p>The distance between two consecutive joints among different wires is different.</p> <p>Maximum number of welding acceptable per section of 1500m</p> <p>One layer</p> <p>Two layers</p> <p>Three layers</p> <p>Four layers</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p>	
21	<p>Grease</p> <p>The internal core and all aluminium alloy layers excluding outer layer are greased.</p> <p>Grease melting point</p>	°C	<p>Yes</p> <p>>70</p>	
22	<p>Packing</p> <p>Material of Drum (Non-returnable)</p> <p>Length of Cable per Drum</p> <p>≤ 70mm²</p> <p>> 70 mm²</p>	m	<p>Steel/Timber</p> <p>3000 ± 5m</p> <p>2000 ± 5m</p>	
23	<p>Drum Marking:</p> <p>Manufacturer's name</p> <p>Month and Year of manufacture</p> <p>Batch number</p> <p>Total gross weight</p> <p>Net weight</p> <p>Distributor's name</p> <p>Length of conductor</p>	m	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	



			Yes	
24	Technical drawings, Catalog, full technical information, etc...		Must be provided If not, the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p style="text-align: center;">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/</p> <p>2/</p> <p>3/</p> <p>Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p style="text-align: center;">Bidder signature:</p>				

10.2 Preformed Dead End Grips for Bare Conductors

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		Breaking load type test	
6	Used for bare conductor anchorage on strain insulators without cut of the conductor.		Yes	
7	Connect with the strain insulator by a clevis thimble with a breaking load of not less than 70 kN		Yes	
8	AAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
9	AAAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
10	ACSR conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
11	Mechanical features at least equivalent to those of the conductor on which they are installed.		Yes	
11a	Breaking load		To be specified	
11b	Length		To be specified	
11c	Number of wires		To be specified	
12	When installed on the conductor, no conductor failure appears next to the dead end grip		Yes	



13	no conductor slip shall appear at tensile load below the nominal breaking load value of the conductor		Yes	
14	Colour code: AAC conductors 35 70 150 AAAC conductors 35 70 150 185 240 ACSR conductors 35 70 150		to be specified	
15	Constitution of preformed dead end grips		to be described	
16	Packing Cardbox or bag of 10 pcs		Yes	
17	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Distributor's name Reference of dead end Type of conductor Min and Max cross section		Yes Yes Yes Yes Yes Yes Yes Yes	
18	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p>				



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Full technical information shall be supplied within the bid. If not, the offer shall not be considered

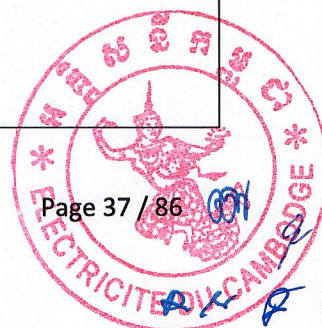
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10.3 Metallic Preformed Ties

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		Tensile strength test	
6	Used for bare conductor fixing on line post insulators		Yes	
7	AAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
8	AAAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
9	ACSR conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
10	Conductor position on line post insulator		<input type="checkbox"/> Side (neck) <input type="checkbox"/> Top	
11	Supplied with a neoprene pad for insertion over the conductor where it rests in the insulator top or side groove.		Yes	
12	Colour code: AAC conductors 35 70 150 AAAC conductors 35 70 150 185 240 ACSR conductors 35		to be specified	

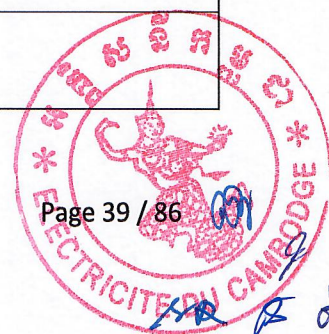


	70 150			
13	Constitution of preformed ties		to be described	
14	Packing Cardbox or bag of 10 pcs		Yes	
15	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Distributor's name Reference of tie Top or side tie Type of conductor Min and Max cross section Min and max insulator diameter		Yes Yes Yes Yes Yes Yes Yes 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.				
<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/</p> <p>2/</p> <p>3/</p> <p>Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p>Bidder signature:</p>				

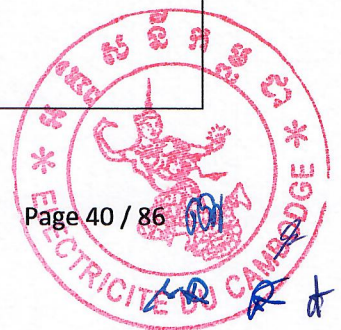


10.4 Mid-span Full Tension Joints

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 (as a minimum)		Tensile strength test Electrical resistance measurements test	
6	Used to ensure mechanical and electrical connection between two lengths of same cross section of bare conductors under mechanical strength.		Yes	
7	AAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
8	AAAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
9	ACSR conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
10	One aluminum alloy sleeve allowing the hexagonal compression on conductor core for AAC and AAAC		Yes	
10a	Diameter of conductor hole <input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	mm	To be specified	
10b	Internal barer for correct insertion of conductor		Yes	
10c	Supplied with internal grease and Two caps		Yes	



11	One steel sleeve and one aluminum alloy sleeve and eventually aluminum insert tubes allowing the hexagonal compression on steel core for ACSR conductors.		Yes	
12	Guarantee mechanical and electrical features at least equivalent to those of the conductor on which they are installed		Yes	
12 a	Breaking strength	kN	To be specified	
12b	Length	mm	To be specified	
12c	No conductor failure appears next to the mid-span full tension joints. and		Yes	
13	No conductor slip occurs at tensile load below the nominal breaking load value of the conductor.		Yes	
14	Regular hexagonal compression type.		Yes	
15	Regular hexagonal dies references AAC conductors 35 12.0 70 14.0 150 23.0 AAAC conductors 35 – 70 12.0 150 14.0 185 23.0 240 25.0 28.0 ACSR conductors 35 – 70 7.2 and 14.0 150 12.0 and 23.0 12.0 and 23.0	(mm)	–	
16	Marking Manufacturer's identification. Type of conductor. Cross section of conductor. Compression die reference (s).		Yes	



	Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression			
17	Packing Cardbox or bag of 10 pcs		Yes	
18	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference of mid span joint Type of conductor Cross section		Yes Yes Yes Yes Yes Yes Yes	
19	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.

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Full technical information shall be supplied within the bid. If not, the offer shall not be considered

Bidder signature:



10.5 Aluminium Terminal Lug

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 (as a minimum)		Electrical resistance measurements test	
6	For connection of AAC, or AAAC, or ACSR not stretch conductors on aluminium terminals.		Yes	
7	AAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
8	AAAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
9	ACSR conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
10	One aluminum alloy sleeve allowing the hexagonal compression on conductor and one aluminum palm		Yes	
10a	Diameter of conductor hole <input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	mm	To be specified	
10b	Internal grease and cap		Yes	
11	Guarantee electrical features at least equivalent to those of the conductor on which they are installed		Yes	



12	No conductor failure appears next to the lug		Yes	
13	Palm hole diameter	mm	15	
14	Regular hexagonal compression type.		Yes	
15	Regular hexagonal dies references 35 70 150 185 240	(mm)	12.0 14.0 23.0 25.0 28.0	
16	Marking Manufacturer's identification. Cross section of conductor. Compression die reference Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression		Yes	
17	M14 x 50 mm aluminium bolt and two aluminium washers		Supplied	
18	Packing Cardbox or bag of 10 pcs		Yes	
19	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference of lug Type of conductor Cross section		Yes Yes Yes Yes Yes Yes Yes	
20	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.

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Full technical information shall be supplied within the bid. If not, the offer shall not be considered

Bidder signature:

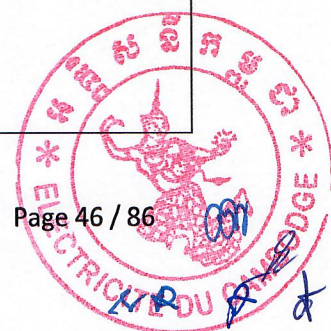


10.6 Bi-metallic Terminal Lug

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 (as a minimum)		Electrical resistance measurements test Climatical ageing test	
6	For connection of AAC, or AAAC, or ACSR not stretch conductors on copper terminals.		Yes	
7	AAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
8	AAAC conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
9	ACSR conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150	
10	One aluminum alloy sleeve allowing the hexagonal compression on conductor and one copper palm		Yes	
10a	Diameter of conductor hole <input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	mm	To be specified	
11	Guarantee electrical features at least equivalent to those of the conductor on which they are installed		Yes	



12	No conductor failure appears next to the lug		Yes	
13	Method of aluminum/copper connection and corrosion protection		To be described	
14	Palm hole diameter	mm	13	
15	Regular hexagonal compression type.		Yes	
16	Regular hexagonal dies references <div> 35 70 150 185 240 </div>	(mm)	12.0 14.0 23.0 25.0 28.0	
17	Marking Manufacturer's identification. Cross section of conductor. Compression die reference Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression		Yes	
18	M12 x 50 mm copper or stainless-steel bolt and two copper or stainless steel washers		Supplied	
19	Packing Cardbox or bag of 10 pcs		Yes	
20	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference of lug Type of conductor Cross section		Yes Yes Yes Yes Yes Yes	



21	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p style="text-align: center;">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/</p> <p>2/</p> <p>3/</p> <p>Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p style="text-align: center;">Bidder signature:</p>				



10.7 PG Clamp

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 (as a minimum)		Electrical resistance measurements test	
6	Parallel grooves type		Yes	
7	For connection of AAC, or AAAC, or ACSR		Yes	
8	Main conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
9	Tap conductors		<input type="checkbox"/> 35 <input type="checkbox"/> 70 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
10	The clamp body shall be made of high corrosion resistance aluminum alloy.		Yes	
11	Minimum number of tightening bolts		2	
12	Number and diameter of bolts according cross section range		To be specified	
13	Bolts screwed in one half of the PG clamp.		Yes	
14	Bolts made of aluminum alloy or stainless steel and fitted with one locking nut.		Yes	
15	Markings Manufacturer's identification. Cross section range.		Yes	



	Reference of lot including the last two digits of manufacture Year.			
16	Packing Cardbox or bag of 10 pcs		Yes	
17	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference of PG clamp		Yes Yes Yes Yes Yes	
18	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.

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Full technical information shall be supplied within the bid. If not, the offer shall not be considered

Bidder signature:

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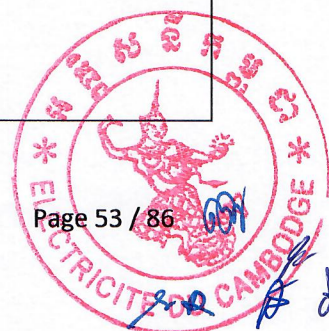
13	The tap bare conductor shall be connected onto the connector using also a screw with shear-off head which break when the right tightening torque is reach.			
14	The main body of the connector shall be made of aluminum or aluminum alloy.			
15	It includes a flap in open normal position that automatically closed when the connector is in place on the main conductor and remain closed when the connector is tightened on the main bare conductor.			
16	Bolts made of aluminum alloy or stainless steel		Yes	
17	Markings Manufacturer's identification. Cross section range. Reference of lot including the last two digits of manufacture Year.		Yes	
18	Packing Cardbox or bag of 10 pcs		Yes	
19	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference		Yes Yes Yes Yes Yes	
20	Technical drawings, Catalogue, full technical information, etc...		Must be provided	



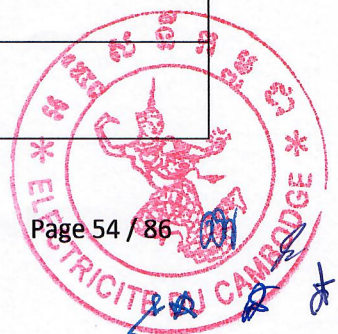
			If not, the offer is not considered.	
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p style="text-align: center;">Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here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

10.9 Covered Conductors

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		EN 50397 EN 50183	
5	Full type tests reports supplied		Yes as per EN 50397 requirements	
6	Rated Voltage (Um)	kV	24 kV	
7	Voltage withstand one minute	kV	30 kV	
8	Conductor's core made of: 240 mm ² , 185 mm ² , 150 mm ² , 95 mm ² , 70mm ² , 50 mm ² , 35 mm ² .		AL4 Aluminium alloy (EN 50397) Aluminium for 35mm ²	
9	Compacted cores		Yes	
10	Aluminium (35 mm ²) and Aluminium alloy AL4 origin		To be specified	
11	Approximate Core Cross sections	mm ²	<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	
12	Real core cross section of the core (RCS): 240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ² 50 mm ² 35 mm ²	mm ² mm ² mm ² mm ² mm ² mm ² mm ²	$227.1 \leq RCS \leq 245$ $181.6 \leq RCS \leq 188$ $148 \leq RCS \leq 153$ $92 \leq RCS \leq 98$ $69 \leq RCS \leq 75.5$ $49 \leq RCS \leq 55$ $37 \leq RCS \leq 34$	To be specified. If not, the offer shall be rejected



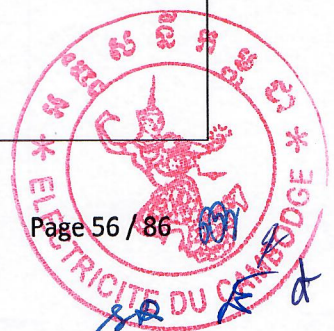
12a	Core diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	
	Diameter over covering <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	
13	Number of wires 240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ² 50 mm ² 35 mm ²		To be specified	
14	Diameter of wires 240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ² 50 mm ² 35 mm ²	mm	To be specified	
15	Number of layers			



	240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ² 50 mm ² 35 mm ²			
16	Minimum breaking strength of complete covered conductor 240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ² 50 mm ² 35 mm ²	kN	70 54 43 27 20 14 5	
17	Conductivity	% IACS	52.9%	
18	Modulus of elasticity – 240, 185, 150, 95, 70 mm ² – 50 mm ² – 35 mm ²	hbar	– 6000 – 6200 – 7000	
19	Coefficient of linear expansion per °C x 10 ⁻⁶		23	
20	Minimal carrying capacity 20°C in air without wind 240 mm ² 185 mm ² 150 mm ² 95 mm ² 70 mm ²	A	To be specified 440 390 340 280 200	

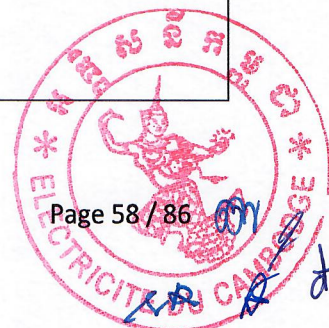


	50 mm ²		150	
	35 mm ²		130	
21	Minimal linear resistance 20°C	Ω/km	To be specified	
	240 mm ²			
	185 mm ²			
	150 mm ²			
	95 mm ²			
	70 mm ²			
	50 mm ²			
	35 mm ²			
22	<p>Core water tightness</p> <p>The stranded conductor shall be longitudinally watertight</p> <p>Means for water tightness</p> <p>The filling mass or other materials for obtaining the longitudinal water tightness, shall be compatible with the conductor material and the material of the covering to prevent the migration of water inside the covered conductor</p> <p>This water blocking mass shall not migrate into the core of the conductor.</p> <p>It shall not deteriorate mechanical and electrical characteristics of accessories thereafter.</p> <p>No specific tool and no solvent shall have to be used to prepare the contact between conductors and accessories.</p> <p>The water blocking mass used shall be safe for the environment. This shall be proved by supplying relevant tests and certificates.</p>		<p>Yes</p> <p>To be described</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	



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	Covering material		CC	
	Conductor material		S (for semi-conductive conductor screen, if any) X (for cross-linked polyethylene),	
	Cross-section		AL4 or AL (35mm ²)	
	Conductor design		Yes	
	Rated voltage Um		W (for watertight), : K (for compacted);	
	Supplier name	kV	24	
			To be mentioned	
27	Packing			
	Material of Drum (Non-returnable)		Steel/Timber	
	Length of Cable per Drum	m	1000 ± 5m	
28	Drum Marking:			
	Manufacturer's name		Yes	
	Month and Year of manufacture		Yes	
	Type and cross section		Yes	
	Batch number		Yes	
	Total gross weight		Yes	
	Net weight		Yes	
	Distributor's name	m	Yes	
	Length of conductor		Yes	
18	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not the offer is not considered.	
2 samples of 50 cm length of the offered covered conductor to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p>				



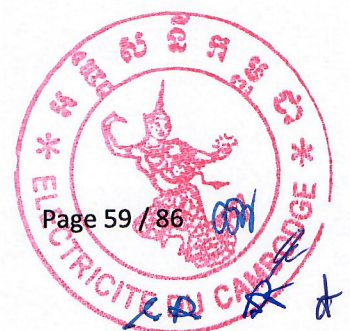
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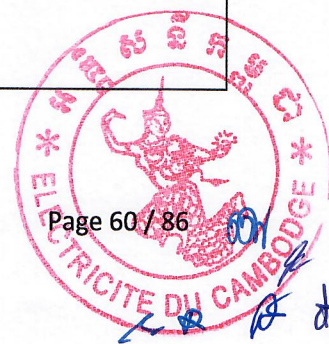
Full technical information shall be supplied within the bid. If not, the offer shall not be considered

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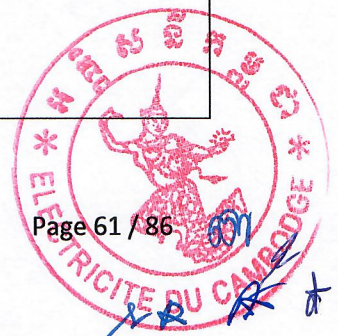


10.10 Tie Termination Anchor Sleeve

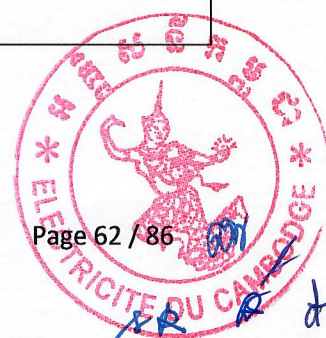
No.	Description	Unit	Requirements	Supplier's Offer
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's Reference		to be specified	
4	Applicable Standard		EDF HN 66-S-46 for the pin and other standards	
5	Full type tests reports supplied		Yes	
6	<p>Used to</p> <p>Anchor the covered conductor by hexagonal compression on covered conductor core.</p> <p>Connect with the strain insulator by a clevis with a breaking load of 70 kN.</p> <p>Connect with a branch or a jumper through a diameter 25 mm pin connector</p> <p>Prevent the penetration of water into the covered conductor</p> <p>Short circuiting and earthing of covered conductor</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	
7	<p>Compression tube inside diameter</p> <p><input type="checkbox"/> 240</p> <p><input type="checkbox"/> 185</p> <p><input type="checkbox"/> 150</p> <p><input type="checkbox"/> 95</p> <p><input type="checkbox"/> 70</p> <p><input type="checkbox"/> 50</p>	mm	To be specified	
8	Cross section	mm ²	<p><input type="checkbox"/> 240</p> <p><input type="checkbox"/> 185</p> <p><input type="checkbox"/> 150</p> <p><input type="checkbox"/> 95</p> <p><input type="checkbox"/> 70</p>	



			<input type="checkbox"/> 50	
9	Guarantee mechanical and electrical features at least equivalent to those of the conductor core on which they are installed.		Yes	
10	No covered conductor failure shall appear next to the Tie - Termination anchor sleeve		Yes	
11	No conductor slip shall appear at tensile load below the nominal breaking load value of the conductor.		Yes	
12	Regular Hexagonal compression type		Yes	
13	Compression dies sizes	mm		
	240 mm ²		28	
	185 mm ²		25 or 23	
	150 mm ²		23	
	95 mm ²		17.3	
	70 mm ²		17.3	
	50 mm ²		14	
13a	Water tightening system		Gasket Or heat shrinkable tube with adhesive compound inside	<input type="checkbox"/> <input type="checkbox"/>
13b	Grease filled and capped		Yes	
14	Markings Manufacturer's identification. Type of conductor. Cross section of conductor. Compression die reference. Reference of lot including the last two digits of manufacture Year.		Yes Yes Yes Yes Yes	

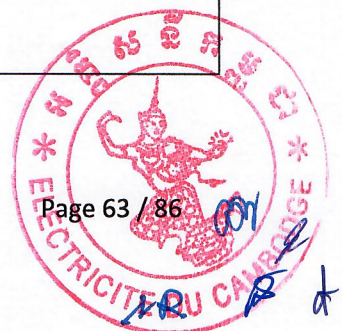


	Marks showing the places of compression.		Yes	
15	Packing Cardbox or bag of 10 pcs		Yes	
16	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference and cross section of equipment		Yes Yes Yes Yes Yes	
17	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p> <p>1/ 2/ 3/</p> <p>Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p>Bidder signature:</p>				

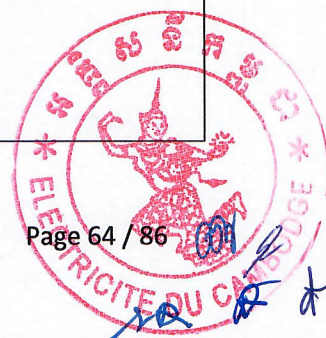


10.11 Mid-span Full Tension Joints for Covered Conductors

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 (as a minimum)		Tensile strength test Electrical resistance measurements test	
6	Ensure mechanical and electrical connection between two lengths of same cross section of stretched bare conductors.		Yes	
7	Each mid-span full tension joint comprises: One aluminium alloy sleeve allowing the hexagonal compression on conductor core. One water tightening system (gasket, cap, sleeve) to prevent the penetration of water into the covered conductor		Yes Yes	
8	Cross sections of covered conductors	mm ²	<input type="checkbox"/> 50 <input type="checkbox"/> 70 <input type="checkbox"/> 95 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
8a	Compression tube inside diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50	mm	To be specified	



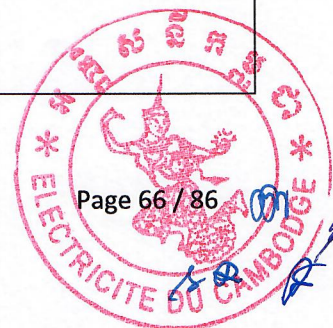
8b	Grease filled and capped		Yes	
9	Guarantee mechanical and electrical features at least equivalent to those of the covered conductor on which they are installed		Yes	
10	No conductor failure appears next to the mid-span full tension joints. and		Yes	
11	No conductor slip occurs at tensile load below the nominal breaking load value of the covered conductor.		Yes	
12	Regular hexagonal compression type.		Yes	
13	Regular hexagonal dies references 50 70 95 150 185 240	(mm)	14 70 17.3 23 25 or 23 28	
13a	Water tightening system and covering		Heat shrinkable tube with adhesive compound inside	
14	Marking Manufacturer's identification. Type of conductor. Cross section of conductor. Compression die reference (s). Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression		Yes	
15	Packing Cardbox or bag of 10 pcs		Yes	
16	Packing Marking: Manufacturer's name		Yes	



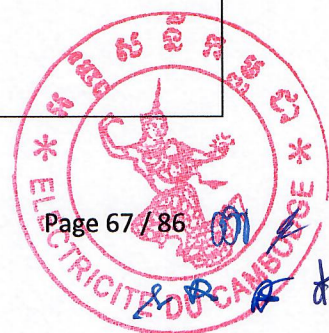
	Month and Year of manufacture		Yes	
	Batch number		Yes	
	Total gross weight		Yes	
	Reference of mid span joint		Yes	
	Type of conductor		Yes	
	Cross section		Yes	
17	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p> <p>1/</p> <p>2/</p> <p>3/</p> <p>Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p>Bidder signature:</p>				

10.12 Pin Branch Joint for covered conductor

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		EN 50397-2 EDF HN 66-S-46 (pin)	
5	Full type tests reports supplied		According EN 50397-2 EDF HN 66-S-46 (pin)	
6	Used to connect a covered, non-cut, stretched line conductor with a cut covered conductor		Yes	
7	Each pin branch joint for Covered Conductor comprises: One or two insulation piercing connectors with water-tightness system (gasket, cap...) to prevent the penetration of water into the covered conductor. One 25 mm diameter aluminum alloy tap pin to connect a jumper with a pin connector.		Yes Yes	
8	To be used with the following covered conductors	mm ²	<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50	
9	The carrying capacity of pin branch joints shall be at least equal to the one of the bigger		Yes	



	<p>cross sections indifferently line or tap conductor</p> <p>Carrying capacity</p> <p>240 mm²</p> <p>185 mm²</p> <p>150 mm²</p> <p>95 mm²</p> <p>70 mm²</p> <p>50 mm²</p>	A	To be specified	
10	<p>insulation piercing connector</p> <p>Not have components that are liable to be lost during installation.</p> <p>The housing made entirely of mechanical and resistant plastic insulation material</p> <p>No metallic part outside the housing is acceptable except for the tightening system.</p> <p>The housing is an integral part of the connector.</p> <p>The bolts tightening torque are controlled by shear head screws without the need of any special tool.</p> <p>The number and the length of the teeth are adequate enough to penetrate the relevant covered conductor covering to establish proper contact without any contract resistance and without the need to strip the covered conductor insulation.</p> <p>To achieve the required water tightness a special rubber seal be provide around the teeth of the present connector.</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	



	The bolts and washers are of corrosion resistant type.		Yes	
11	Pin Metal Diameter Length Conform to EDF HN 66-S-46 requirements	mm	To be specified 25 To be specified Mandatory	
12	IPC cross section range	mm ²	To be specified for each type of IPC	
14	Markings Manufacturer's identification. Type of conductor. Cross section range of conductor. Reference of lot including the last two digits of manufacture Year.		Yes Yes Yes Yes Yes	
15	Packing Cardbox or bag of 10 pcs		Yes	
16	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference and cross section of equipment		Yes Yes Yes Yes Yes	
17	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p>				



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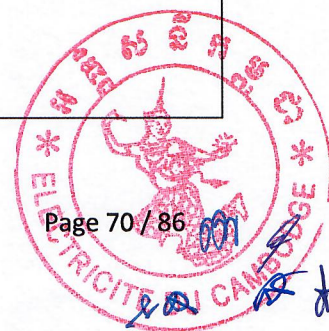
Full technical information shall be supplied within the bid. If not, the offer shall not be considered

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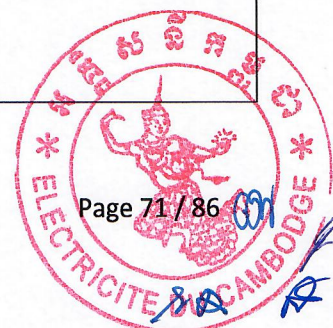


10.13 Pin branch joint for barre conductor

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 66-S-46 (pin) And other standard	
5	Full type tests reports supplied		EDF HN 66-S-46 (pin) And other standards	
6	Used to connect a bare non-cut, stretched line conductor with a cut covered conductor		Yes	
7	Each pin branch joint for Covered Conductor comprises: • One PG clamp adapted to the conductor cross section • One 25 mm diameter aluminum alloy tap pin to connect a jumper with a pin connector.		Yes Yes	
8	To be used with the following bare stretched conductors	mm ²	<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 70 <input type="checkbox"/> 50	
9	The carrying capacity of pin branch joints shall be at least equal to the one of the bigger cross section indifferently line or tap conductor		Yes	
10	Carrying capacity 240 mm ² 185 mm ² 150 mm ² 70 mm ² 35 mm ²	A	To be specified	



11	Pin Metal Diameter Length Conform to EDF HN 66-S-46 requirements	mm	To be specified 25 To be specified Mandatory	
	Number of tightening bolts of PG clamps screwed in one half of the PG clamp.		2 minimum	
	The bolts are be made of aluminum alloy or stainless steel and fitted with one locking nut.			
14	Markings Manufacturer's identification. Type of conductor. Cross section range of conductor. Reference of lot including the last two digits of manufacture Year.		Yes Yes Yes Yes Yes	
15	Packing Cardbox or bag of 10 pcs		Yes	
16	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference		Yes Yes Yes Yes Yes	
17	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
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.

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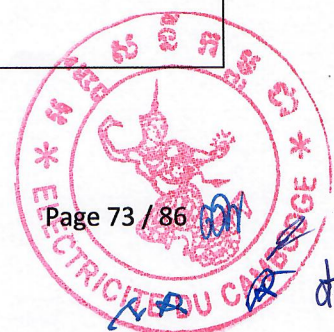
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Full technical information shall be supplied within the bid. If not, the offer shall not be considered

Bidder signature:

10.15 Pin Connector

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 66-S-45 Except specific requirement of this technical specification	
5	Full type tests reports supplied		Yes according EDF HN 66-S-45	
6	Used to connect Tie-Termination anchor sleeve and pin branch joints to a bridge constituted by a non-stretched linking bare or covered conductor		Yes	
7	To be installed on a 25mm diameter pin conform to EDF HN 66-S-46 requirements		Mandatory	
8	To be used with the following AAAC bare conductors	mm ²	<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	
8a	Compression tube inside diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	



9	To be used with the following covered conductors		<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35 Alu	
9a	Compression tube inside diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	
10	A Pin connector comprises: <ul style="list-style-type: none"> One body made of aluminum alloy including a tightening system. This body allows the electrical connection on the 25mm diameter pin of the tie-termination or the pin branch joints One tube welded on the body For covered conductors, the tube shall include a water-tightening system to prevent the penetration of water into the covered conductor 		Yes Yes Yes Yes	
10a	Water tightening system		Gaskets Or Heat shrinkable cap and tube with adhesive compound inside	<input type="checkbox"/> <input type="checkbox"/>
11	All tubes are filled with high quality oxide inhibiting compound and capped		Yes	
12	On site, the tube is hexagonally compressed onto the conductor		Yes	

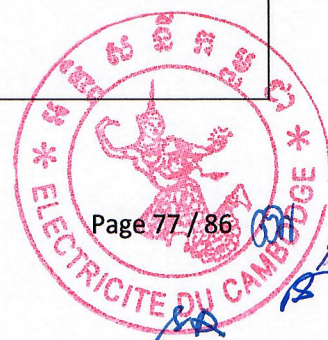


13	The carrying capacity of the connectors is at least equal to the capacity of the compressed conductor		Yes	
14	<p>Tightening system onto the pin</p> <p>The tightening bolts include an over-torque shear head made of suitable material which allows a clamping torque in conformity with the recommendation of the manufacturer, without the need of any special tool.</p> <p>This head shall be hexagonal head type.</p> <p>A ring is accessible after breaking of the first head to allow disconnection of pin connector from a pin with hook stick for future hot line working.</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p>	
15	Tube of Regular hexagonal compression type.		Yes	
16	Regular hexagonal dies references	(mm)	<p>12</p> <p>14</p> <p>17.3</p> <p>17.3</p> <p>23</p> <p>25 or 23</p> <p>28</p>	
17	<p>Markings</p> <p>Manufacturer's identification.</p> <p>Type of conductor.</p> <p>Cross section</p> <p>Reference of lot including the last two digits of manufacture Year.</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	
18	<p>Packing</p> <p>Cardbox or bag of 10 pcs</p>		Yes	

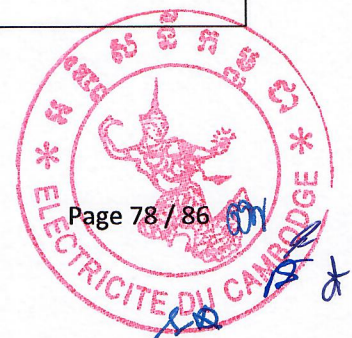
19	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference and cross section of equipment		Yes Yes Yes Yes Yes	
20	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p style="text-align: center;">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/</p> <p>2/</p> <p>3/</p> <p style="text-align: center;">Full technical information shall be supplied within the bid. If not, the offer shall not be considered</p> <p style="text-align: center;">Bidder signature:</p>				

10.16 Aluminium Terminal Lug for Covered Conductor

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 (as a minimum)		Electrical resistance measurements test	
6	For connection covered conductors onto aluminum terminals.		Yes	
7	Covered conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 50 <input type="checkbox"/> 70 <input type="checkbox"/> 95 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
8	One aluminum alloy tube allowing the hexagonal compression on conductor and one aluminum palm		Yes	
8a	Compression tube inside diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	
9	Water tightening system		Gaskets Or Heat shrinkable tube with adhesive compound inside	<input type="checkbox"/> <input type="checkbox"/>
10	Guarantee electrical features at least equivalent to those of the conductor on which they are installed		Yes	



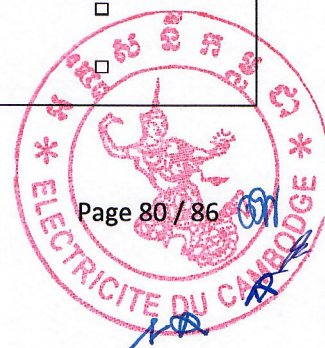
11	No covered conductor failure appears next to the lug		Yes	
12	Palm hole diameter	mm	15	
13	Regular hexagonal compression type.		Yes	
14	Regular hexagonal dies references <div> 35 50 70 95 150 185 240 </div>	(mm)	12.0 14.0 17.3 17.3 23.0 25.0 or 23.0 28.0	
15	Marking Manufacturer's identification. Cross section of conductor. Compression die reference Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression		Yes	
16	M14 x 50 mm aluminium bolt and two aluminium washers		Supplied	
17	Packing Cardbox or bag of 10 pcs		Yes	
18	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference of lug Type of conductor Cross section		Yes Yes Yes Yes Yes Yes Yes	



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

10.17 Bi-metallic Terminal Lug for Covered Conductors

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 (as a minimum)		Electrical resistance measurements test Climatical ageing test	
6	For connection of covered conductors on copper terminals.		Yes	
7	Covered conductors	mm ²	<input type="checkbox"/> 35 <input type="checkbox"/> 50 <input type="checkbox"/> 70 <input type="checkbox"/> 95 <input type="checkbox"/> 150 <input type="checkbox"/> 185 <input type="checkbox"/> 240	
8	One aluminum alloy sleeve allowing the hexagonal compression on conductor and one copper palm		Yes	
8a	Compression tube inside diameter <input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35	mm	To be specified	
9	Guarantee electrical features at least equivalent to those of the conductor on which they are installed		Yes	
9	Water tightening system		Gaskets	<input type="checkbox"/> <input type="checkbox"/>



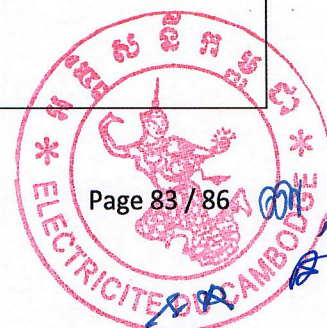
			Or Heat shrinkable tube with adhesive compound inside	
11	No conductor failure appears next to the lug		Yes	
12	Method of aluminum/copper connection and corrosion protection		To be described	
13	Palm hole diameter	mm	13	
14	Regular hexagonal compression type.		Yes	
15	Regular hexagonal dies references <div> <div>35</div> <div>50</div> <div>70</div> <div>95</div> <div>150</div> <div>185</div> <div>240</div> </div>	(mm)	12.0 14.0 17.3 17.3 23.0 25.0 or 23.0 28.0	
16	Marking Manufacturer's identification. Cross section of conductor. Compression die reference Reference of lot including the last two digits of manufacture Year. Marks showing the places of compression		Yes	
17	M12 x 50 mm copper or stainless steel bolt and two copper or stainless steel washers		Supplied	
18	Packing Cardbox or bag of 10 pcs		Yes	
19	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number		Yes Yes Yes	



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

10.18 IPC for Covered Conductors

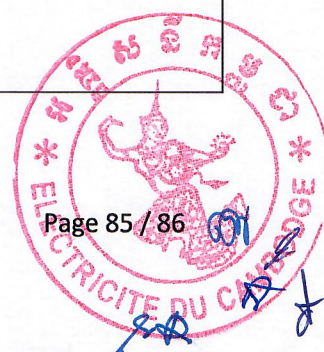
No.	Description	Unit	Requirements	Supplier's Offer
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's Reference		to be specified	
4	Applicable Standard		EN 50397-2	
5	Full type tests reports supplied		As per requirements of EN 50397-2	
6	Used to connect two covered conductors with the same or different cross section between them without possibility of disconnection latter.		Yes	
7	They are of not reusable type.		Yes	
8	The main conductor is stretched or not.		Yes	
9	The tap conductor is a bridge constituted by a not stretched linking covered conductor.		Yes	
10	To be used with the following covered conductors on main		<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35 Alu	
11	To be used with the following covered conductors on Tap		<input type="checkbox"/> 240 <input type="checkbox"/> 185 <input type="checkbox"/> 150 <input type="checkbox"/> 95 <input type="checkbox"/> 70 <input type="checkbox"/> 50 <input type="checkbox"/> 35 Alu	
12	Cross section ranges (Main and tap) for each IPC supplied	mm ²	To be specified	
13	The carrying capacity of pin branch joints shall be at least equal to the one of the bigger		Yes	



	<p>cross sections indifferently main or tap conductor</p> <p>Carrying capacity</p> <p>240 mm²</p> <p>185 mm²</p> <p>150 mm²</p> <p>95 mm²</p> <p>70 mm²</p> <p>50 mm²</p> <p>35 mm²</p>	A	To be specified	
14	<p>Not have components that are liable to be lost during installation.</p> <p>The housing made entirely of mechanical and resistant plastic insulation material</p> <p>No metallic part outside the housing is acceptable except for the tightening system.</p> <p>The housing is an integral part of the connector.</p> <p>The bolts tightening torque are controlled by shear head screws without the need of any special tool.</p> <p>The number and the length of the teeth are adequate enough to penetrate the relevant covered conductor covering to establish proper contact without any contract resistance and without the need to strip the covered conductor insulation.</p> <p>To achieve the required water tightness a special rubber seal be provide around the teeth of the present connector.</p>		<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>Yes</p>	



	The bolts and washers are of corrosion resistant type.		Yes	
15	Markings Manufacturer's identification. Type of conductor. Min/max Cross section on main and tap Reference of lot including the last two digits of manufacture Year.		Yes Yes Yes Yes Yes	
16	Packing Cardbox or bag of 10 pcs		Yes	
17	Packing Marking: Manufacturer's name Month and Year of manufacture Batch number Total gross weight Reference and cross section of equipment		Yes Yes Yes Yes Yes	
18	Technical drawings, Catalogue, full technical information, etc...		Must be provided If not, the offer is not considered.	
2 samples of the offered equipment to be supplied within the bid				
Supplier's offer column must be properly filled with the right figures. "Compliant, Yes, ", V , etc..." are not accepted.				
<p>Deviation from the technical specification:</p> <p>The bidder shall list point after point and explain here in after all deviation from the requested technical specification.</p> <p>1/</p> <p>2/</p> <p>3/</p>				



Full technical information shall be supplied within the bid. If not, the offer shall not be considered

Bidder signature:

