KINGDOM OF CAMBODIA

NATION RELIGION KING

ELECTRICITE DU CAMBODGE

TECHNICAL SPECIFICATION

EDC-DTS-MV016

Stays Wire and Accessories

November 2017

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Version	Date	Techincal Specification Name	Authorized by : (name and signature)
1.0	November, 2017	Stay Wire and Accessories	DI FRAING CHULASA

Version	Drafted/reviewed by	Verified by	Approved by	Date
Draft 1	AD			
Draft 2 Final 2	AD EDC/AD			

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Stays Wire and Accessories

1 Scope

This specification covers the design, manufacturing, testing, supply, delivery and performance requirements of wires and accessories for pole staying used on medium and low voltage networks of Cambodia with a life expectancy of at least 25 years.

This specification describes the following equipment:

- Stay wires
- Stay preformed grips
- Stays insulators
- Stay rods
- Stays eyebolts
- Eye thimble

2 Standards

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

IEC : International Electromechanical Commission

IEC 60383	: Tests on insulators of ceramic material or glass for overhead lines with a nominal voltage greater than 1000V
IEC 60060-1	: High-voltage test techniques. Part 1: General definitions and test requirements.

ISO Standards

ISO 2408-85	: Steel wire ropes for general purposes - Characteristics
ISO 3108-74	: Steel wire ropes for general purposes - determination of actual breaking load
ISO 3178-88	: Steel wire ropes for general purposes - terms of acceptance
ISO 2063	: Metallic coating-protection of iron and steel against corrosion
ISO 1461	: Hot dip galvanized coatings on fabricated iron and steel articles Specifications and test methods
ISO/IEC 17025	: General requirements for the competence of testing and calibration laboratories
ISO 9001	: Quality management systems – Requirements

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

3 Definitions

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

4 Testing and Inspection

4.1 General Notes for Test

Stay wires and accessories may be inspected at the factory by EDC's representatives.

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

Stay wires and accessories shall be subjected to tests as specified below.

4.2 Type Tests

All type tests required by the IEC and ISO or any national standards shall be carried out.

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

Full copies of type test reports shall be submitted within the bid of the manufacturer/supplier. Type test reports older than 10 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 suppling: Full description of all tests the laboratory can carry out, list of testing equipment with full characteristics, drawing of testing rooms with location of testing equipment, ...etc, supported by pictures and copy of the ISO/IEC 17025 accreditation certificate.

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

4.2.1 Stay Wire Type Tests

The stay wires shall be tested in accordance with ISO standards or any other national standard (BS 183 and BS 443 as example). It shall be the responsibility of the manufacturer to perform or to have performed all the tests specified.

The type test reports shall cover, as a minimum, dimensions, tensile strength, elongation, wrapping test and uniformity, adherence and mass of zinc coating.

4.2.2 Stays Preformed Grips Type Tests

Those type tests could be carried out according any national standard.

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The manufacturer shall provide certified copies of test reports to confirm that the preformed guy grips withstand the breaking load of the stay strand to be used with as well as corrosion resistance test.

There shall be no movement of the stay strand relative to the guy grip due to slip during the test. The test report shall indicate that this requirement has been met.

4.2.3 Stay Insulators Tests

Type tests, routine tests and sample tests shall be done following the procedures specified in IEC 60383 and IEC 60060-1 and the requirements of this specification. It shall be the responsibility of the manufacturer to perform or to have performed the tests specified.

Type test reports to be submitted shall include as a minimum dry lightning impulse withstand voltage test, wet power-frequency withstand voltage test and mechanical strength tests.

4.2.4 Stay Rods and Eye Bolts

The manufacturer shall be responsible for performing or for having performed all the required tests specified in this specification.

The complete stay rod and eye bolts shall be tested to determine the minimum failing load.

Uniformity, adherence and mass of coating of the galvanizing test shall be done in accordance with ISO standards.

4.2.5 UT Wedge Clamp

The manufacturer shall be responsible for performing or for having performed all the required tests specified in this specification.

The complete UT wedge clamp shall be tested to determine the minimum failing load.

Uniformity, adherence and mass of coating of the galvanizing test shall be done in accordance with ISO standards.

4.3 Routine Tests

The routine test shall be carried out according the requirement of IEC and ISO standards or any other national standard.

4.4 Inspection

Stay wires and accessories shall be subject to inspection by a representative of EDC at the place of manufacture and routine tests carried out on samples picked at random in their presence.

5 Quality Management

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

6 Ambient Conditions

Stay wire and accessories for MV and LV networks shall be suitable to operate in the ambient conditions described here after:

Altitude	Sea level to 1,000 meters
Climate	Tropical
Annual Rainfall	1,300 mm.140 days
Monsoon Period	June to November
Ambient Air Temperatures:	
Average	27.5°C
Minimum	13.3°C
Maximum	40.5°C
Relative Air Humidity	65-100%
Soil Thermal Resistivity,:	
Average	1.20c m/W
Maximum	3.00c m/W
Solar Emissivity	0.8
Solar absorption	0.8
Wind Velocity:	
Average	37 km/h (10.3 m/s)
Maximum	72 km/h (20 m/s)

7 Stay Wires

7.1 Metal

The base metal shall be steel made by the open-hearth, basic-oxygen or electric-furnace process and of such quality and purity that, when drawn to the size of wire specified and coated with zinc, the finished strand and the individual wires shall be of uniform quality and have the properties and characteristics as specified in this specification.

The zinc used for hot dip galvanising shall be pure (99%).

7.2 Hot Dip Galvanizing

Wires shall be hot dip galvanised according the requirements of ISO standard. The minimum zinc thickness shall be of at least 325 gr/m² (45 µm).

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7.3 Manufacturing

The outer wires of all strands shall have a right-hand lay.

All wires shall be stranded with uniform tension. Stranding shall be sufficiently close to ensure no appreciable reduction in diameter when stressed to 10% of the specified wire strength.

The wires shall be concentrically twisted with a uniform pitch of not less than 10 nor more than 18 times the specified nominal diameter of the strand.

Joints made in individual conductors shall be accepted provided there is no more than one joint in any 45m section of the completed span. Joints made during stranding shall be protected against corrosion.

The stay wire shall be constituted of 19 wires of 2.2 mm diameter for an approximate nominal cross section of 70 mm^2. The approximate diameter shall be 11 mm.

7.4 Mechanical strength requirements

The minimum breaking load of the stay wire shall be 91 kN.

8 Stay Grips

The guy grips shall be suitable for use with proposed Stay Wires.

The guy grips shall be manufactured from galvanized steel wire of such quality that when applied to the specified stay strand, they hold the full rated breaking strength of the stay strand without slip or breaking.

The guy grips shall be heli-formed to be quickly installed and present a neat finished appearance. They shall have a long-term performance commensurate with other fittings used in guying applications.

The guy grips shall be capable of being removed and re-applied to their original position on the stay strand up to three times for the purpose of stay adjustment during line construction procedures.

The guy grip termination fittings shall be supplied for termination stay wires on thimbles fixed to pole eyebolts, thimbles fixed to anchor bolts, and directly to the porcelain guy strain insulators

9 Stay Insulators

9.1 Materials and Construction

The insulating material shall be porcelain.

The porcelain shall be sound, free from flaws and blemishes, thoroughly vitrified, smoothly glazed and of uniform brown colour when finished.

The insulator shall be free from stresses due to expansion and contraction in any part which may lead to deterioration.

The holes in the insulator shall be smoothly radiuses with as large radius as practicable to present an even bearing surface to the stay grip.

9.2 Particular Requirements

The insulator shall be strain type suitable for the stay wire size mentioned above.

- The minimum failing load shall be: 89 kN
- The minimum power frequency withstand voltage, dry : 38 kV, r.m.s
- The minimum power frequency withstand voltage, wet: 22 kV, r.m.s.

9.2.1 Marking

The following information shall be clearly and indelibly marked on each insulator:

- Name or trade mark of the manufacturer
- Year of manufacture
- Electrical and Mechanical Characteristics
- Batch or Serial Number

The marking may be printed or impressed provided such impressions do not impair the performance of the insulator.

10 Stay Rods

Anchor rods are required for attachment of the stay wire to a buried deadpan or anchor block installed with the eye close to ground level.

The rods shall be of hot dip galvanized steel, minimum failing load of 140 kN, 2400 mm x 24 mm diameter, with an eye of internal diameter of 40mm. This eye shall be of closed eye type. In case the eye is done by hot folding the rod, the end of the rod shall be welded to the straight part of the rod.

The rods shall have a thread length not less than 75 mm and be supplied fitted with one 200 mm x 200 mm x 10 mm square hot dip galvanized steel washers, and two full sized galvanized M24 nuts.

6.2 Hot dip Galvanizing

Stay rods and accessories shall be hot dip galvanised after manufacturing according the requirements of ISO standard. The average zinc thickness shall not be of less than 610 g/m² (85μm).

11 Pole Eyebolts

Galvanized steel eyebolts shall be used to attach the guy wire to the concrete poles.

The eyebolts shall be of 350 mm x M16 size in order to suit the pole dimension at the point of fixing, with an eye of internal diameter of 40 mm.

The thread length shall not be less than 150 mm in order to be sufficient for the range of pole dimensions.

This eye shall be of closed eye type. In case the eye is done by hot folding the rod, the end of the rod shall be welded to the straight part of the rod.

In any cases, a round flat washer of 4 mm thickness shall be welded all around the bolt near the eye. Each eyebolt shall be supplied fitted with 75 x 75 x 6 mm square and hot dip galvanized washer and two hot dip galvanized nuts.

The shape of the eye shall be such that when the eyebolt is fully tightened, the eye does not damage the concrete pole.

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Eye bolt and accessories shall be hot dip galvanised after manufacturing according the requirements of ISO standard. The average zinc thickness shall not be of less than 610 g/m² (85 µm).

The threaded parts of the nuts shall not be galvanized but oiled.

12 UT Wedge Adjustable Clamp

UT adjustable clamps are required to fix and adjust the stay wire onto the pole eye bolt.

The U bolt of the clamp shall be made of hot dip galvanized steel with a length of not less than 450 mm and a diameter of 18 mm. The threaded part shall be of at least 250 mm length. The U bolt shall be fitted with 4 (four) M18 nuts. The threaded part of the nuts shall not be galvanized but oiled.

The body and the wedge shall be made of hot dip galvanised iron. Both shall be suitable for 11 mm diameter stay wire.

The minimum mechanical breaking load shall be 88 kN.

All parts shall be hot dip galvanised according the requirement of ISO standard. The minimum zinc thickness shall be 395 g/m² (50 µm).

13 Eye Thimble

Hot dip galvanized steel thimbles are required on the anchor rods.

The thimbles shall be suitably dimensioned for the loop on the helical guy grip dead end fittings. The thimbles shall be of the open type suitable for eyes formed 24mm diameter rod.

14 Stay Marker

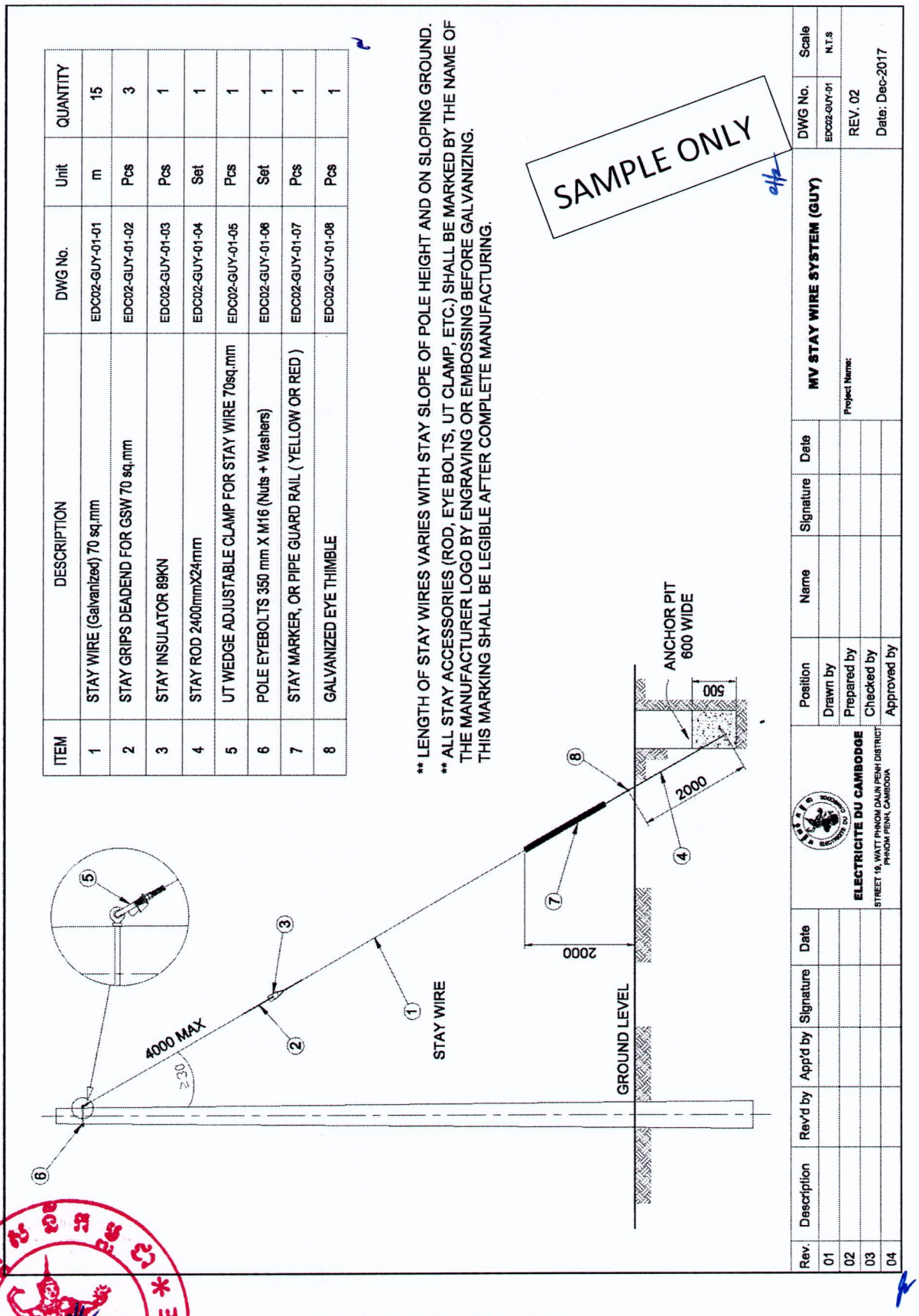
The base of stays from ground level to two meters high shall be fitted with red or yellow pipe stay marker in order the warn walkers on pavement or road sides.

They shall be made of UV resistant mass coloured HDPE of about 25 mm diameter. Hot dip galvanized steel pipe is also accepted provided the pipe been painted with 2 layers of UV resistant zinc special paint after conscientious cleaning.

15 Marking

All stay accessories (Rods, plates, eye bolt, UY clamp, etc..) shall be marked by the name or the manufacturer logo by engraving or embossing before galvanizing. This marking shall be legible after complete manufacturing.

16 Drawings



ITEM	DESCRIPTION	DWG No.	Unit	QUANTITY
1	STAY WIRE (Galvanized) 70 sq.mm	EDC02-GUY-01-01	m	15
2	STAY GRIPS DEADEND FOR GSW 70 sq.mm	EDC02-GUY-01-02	Pcs	3
3	STAY INSULATOR 89KN	EDC02-GUY-01-03	Pcs	1
4	STAY ROD 2400mmX24mm	EDC02-GUY-01-04	Set	1
5	UT WEDGE ADJUSTABLE CLAMP FOR STAY WIRE 70sq.mm	EDC02-GUY-01-05	Pcs	1
6	POLE EYEBOLTS 350 mm X M16 (Nuts + Washers)	EDC02-GUY-01-06	Set	1
7	STAY MARKER, OR PIPE GUARD RAIL (YELLOW OR RED)	EDC02-GUY-01-07	Pcs	1
8	GALVANIZED EYE THIMBLE	EDC02-GUY-01-08	Pcs	1

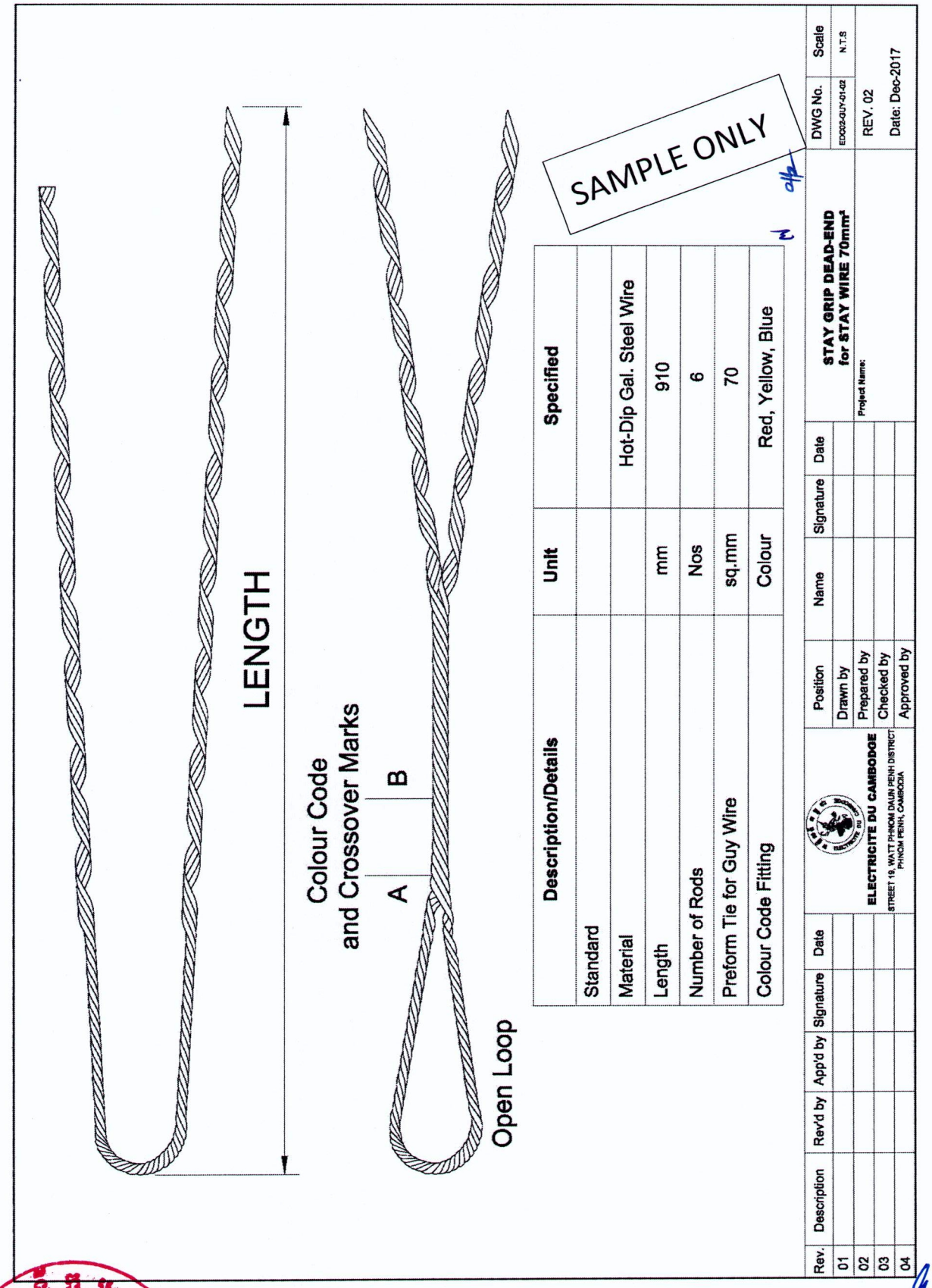
Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

Position	Name	Signature	Date
Drawn by			
Prepared by			
Checked by			
Approved by			

Project Name:

Figure 1 MV Stay Wire System

Figure 2 Stay Wires 70 mm²



Description/Details	Unit	Specified
Standard		
Material		Hot-Dip Gal. Steel Wire
Length	mm	910
Number of Rods	Nos	6
Preform Tie for Guy Wire	sq.mm	70
Colour Code Fitting	Colour	Red, Yellow, Blue

Rev.	Description	Rev'd by	App'd by	Signature	Date
01					
02					
03					
04					

ELECTRICITE DU CAMBODGE
STREET 19, WAT PHNOM DAUN PENH DISTRICT
PHNOM PENH, CAMBODIA

	Name	Signature	Date
Position			
Drawn by			
Prepared by			
Checked by			
Approved by			

STAY GRIP DEAD-END
for STAY WIRE 70mm²

Project Name:

DWG No.	Scale
EDC03-GUY-01-02	N.T.S
REV. 02	
Date: Dec-2017	

Figure 3 Stay Grip Dead-end

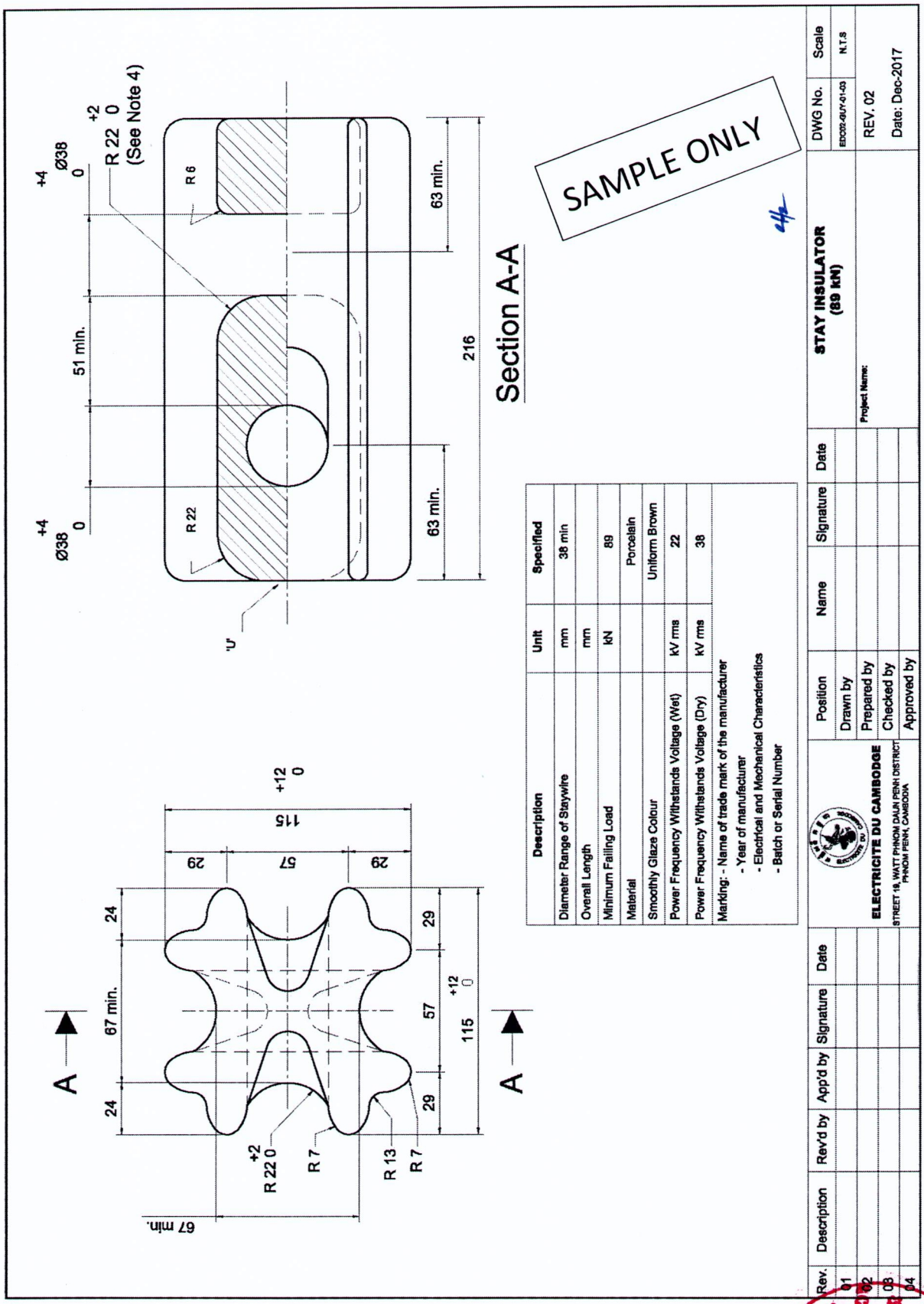


Figure 4 Stay Insulator

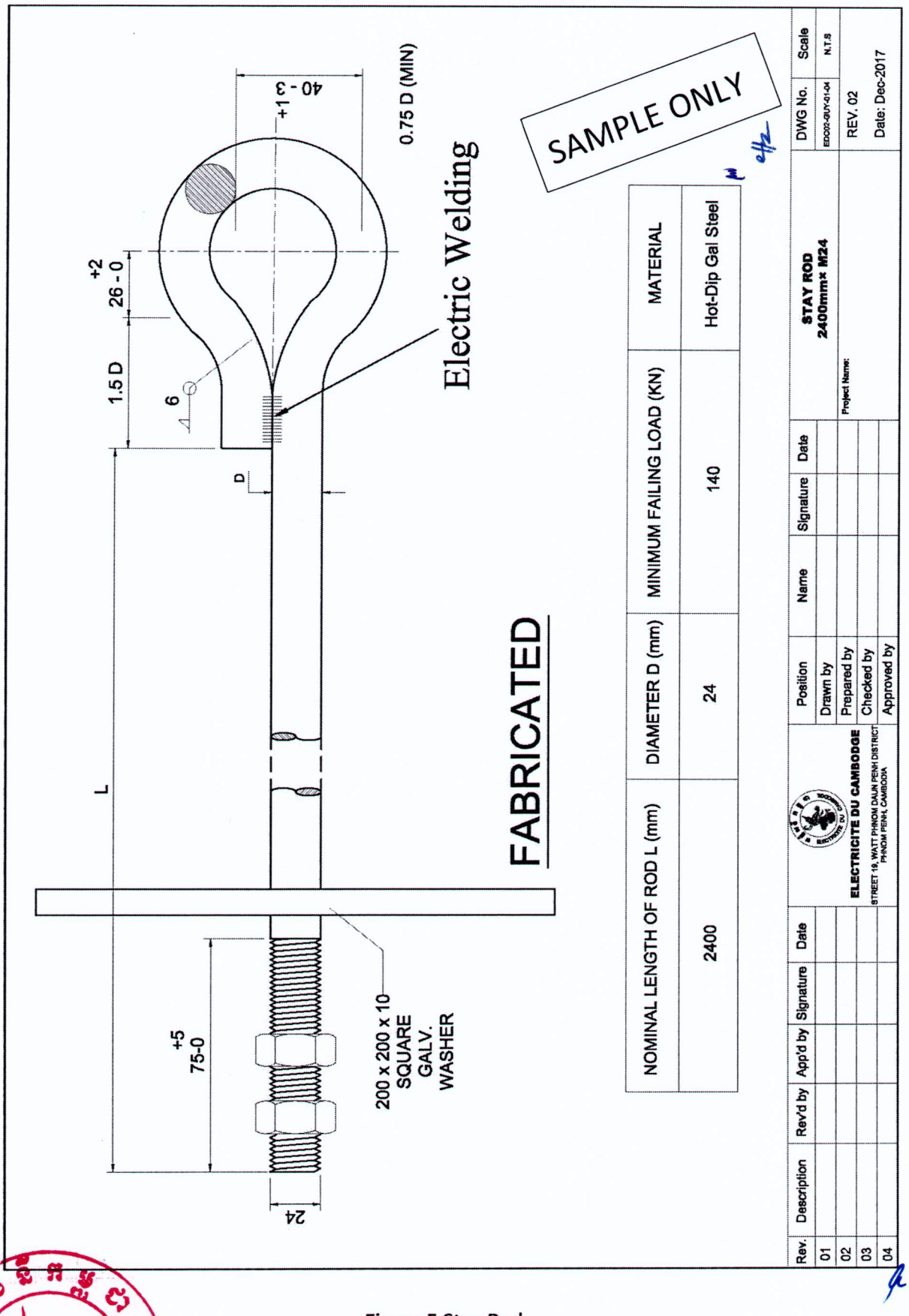


Figure 5 Stay Rod

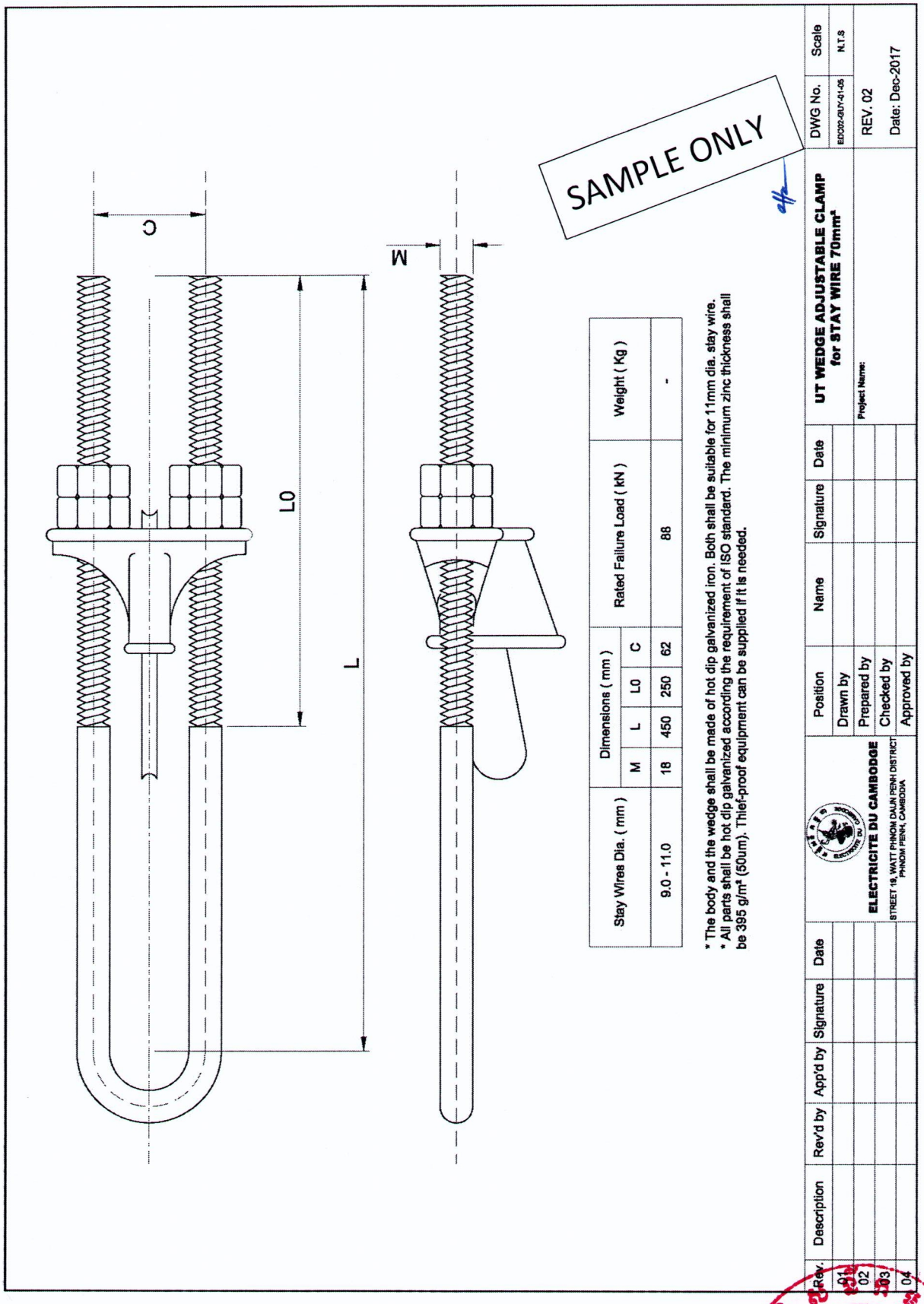


Figure 6 UT Wedge Adjustable Clamp

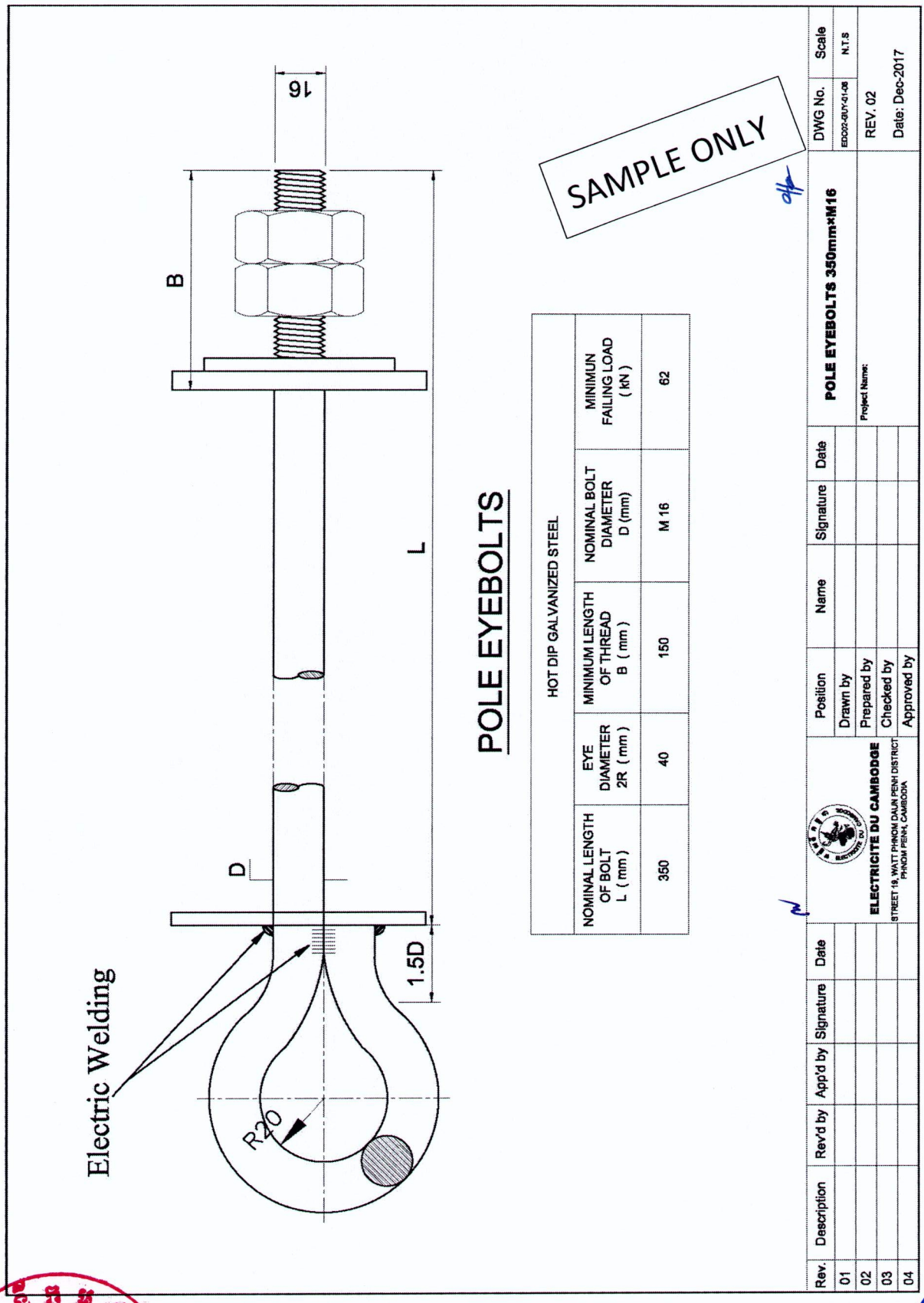


Figure 7 Pole Eye Bolts

Figure 8 Stay Marker

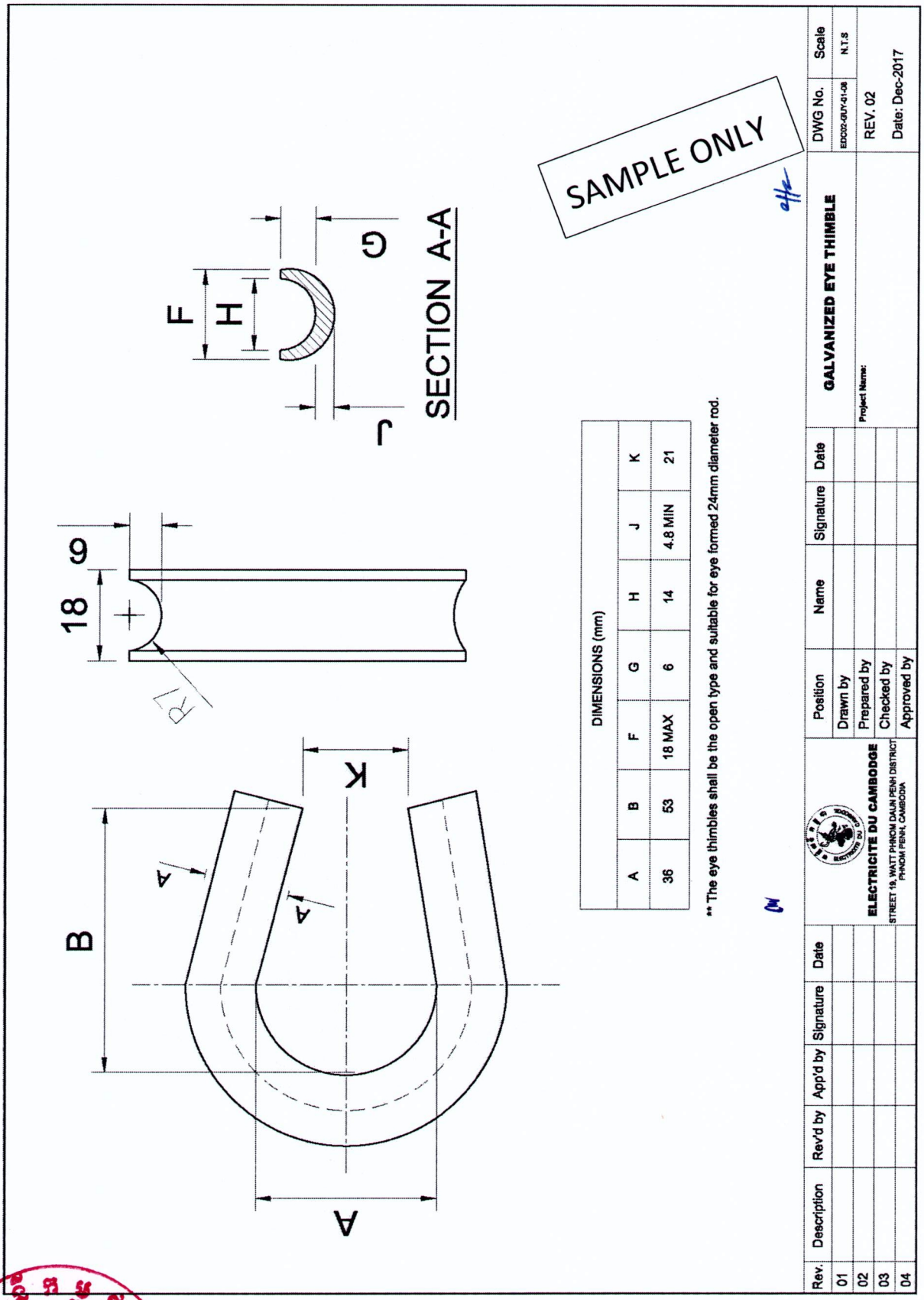


Figure 9 Galvanized Eye Thimble

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17 Technical Data Sheets

No.	Description	Unit	Requirements	Supplier's Offer
17.1	**Stay Wire**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	Kind of steel		to be specified	
6	Number of wire		19	
7	Diameter of wire	mm	2.2	
8	Nominal Cross section	mm^2	70	
	Nominal Diameter	mm	11	
9	Zinc thickness		≥ 325 g/m^2 (45µm).	
10	Reduction in diameter when stressed	%	≤ 10	
11	Minimum breaking load	kN	≥ 91	
17.2	**Stay Wire Grip**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	Steel type		to be specified	
6	Minimum breaking load	kN	to be specified	
7	Suitable for 70 mm^2 stay wire above		Yes	
17.3	**Stay Insulator**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	

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No.	Description	Unit	Requirements	Supplier's Offer
4	Standard		to be specified	
5	Material		Porcelain	
6	Minimum failing load	kN	89	
7	Minimum power frequency withstand voltage, wet	kV	22	
8	The minimum power frequency withstand voltage, dry	kV	38	
9	Dimensions	mm	to be specified	
10	Weight	kg	to be specified	
17.4	**Stay Rod**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	Rod diameter	mm	24	
6	Length	mm	2400	
7	Close eyes (forged or welded) diameter	mm	40	
8	Threading		M24	
9	Treading length	mm	≥ 75	
10	Minimum failing load	kN	140	
11	Minimum Zinc thickness		610 g/m² (85µm).	
12	Supplied with: - 200 mm x 200 mm x 10 mm square hot dip galvanized (610 g/m²) steel washer - and two full sized galvanized M24 nuts.		Yes Yes	
13	Marking Name or the logo engraved or embossed before galvanizing.		Yes	

No.	Description	Unit	Requirements	Supplier's Offer
	Legible after complete manufacturing.		Yes	
17.5	**UT Wedge Adjustable Clamp**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	U bolt of the clamp made of hot dip galvanized steel		Yes	
6	Threaded length	mm	≥ 250	
7	U bolt length	mm	≥ 450	
8	U bolt diameter	mm	18	
9	Number of M18 nuts		4	
10	Body and wedge made of galvanised iron		Yes	
11	Suitable for 11mm stay wire		Yes	
12	Minimum breaking strength of the UT clamp	kN	88	
13	Minimum zinc thickness of all parts		395g/m² (50µm).	
14	Weight	g	To be specified	
15	Marking Name or the logo engraved or embossed before galvanizing. Legible after complete manufacturing.		 Yes Yes	
17.6	**Pole EyeBolt**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	Length	mm	350	
6	Diameter	mm	16	

No.	Description	Unit	Requirements	Supplier's Offer
7	M16 threaded length	mm	≥ 150	
8	Eye internal diameter	mm	40	
9	Closed eye type		Drop forged or welded	
10	Round washer welded near the eye		Dia. = 40 Thickness 4 mm	
11	Supplied with 1 square flat washer 2 nuts	mm	 75 x 75 x 6mm Yes	
12	All parts hot dip galvanised thickness		≥ 610 g/m² (85µm).	
13	Threaded parts of nuts		oiled	
14	Total weight	g		
15	Marking on eye: Name or the logo engraved or embossed before galvanizing. Legible after complete manufacturing.		 Yes Yes	
17.7	**Stay Marker**			
1	Country		to be specified	
2	Manufacturer		to be specified	
3	Manufacturer's reference		to be specified	
4	Standard		to be specified	
5	made of UV resistant mass coloured HDPE		Yes	
6	Length	m	2	
7	Diameter	mm	≈ 25	

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

Deviation from the technical specification:

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

1/

2/

3/

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

Bidder signature: