

BIDDING DOCUMENT
FOR

**“Supply of ACSR Panther, ACSR Zebra and ACSR Moose
Conductors in Lower Assam, Central Assam and Upper Assam
Region of AEGCL”**



(E-Tender)

VOLUME -2

<https://assamtenders.gov.in>

BID IDENTIFICATION NO:

AEGCL/MD/TECH-1025/DRRA/2024/BID

**ASSAM ELECTRICITY GRID
CORPORATION LIMITED**

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Section-1

SCOPE AND GENERAL TECHNICAL CONDITIONS

1.1.0 INTENT OF THE SPECIFICATION

1.1.1 This volume of the specification deals with the general technical information & criteria for design, manufacture, supply & delivery of equipment/material as defined in Volume-1.

1.1.2 The provisions of this section shall supplement all the detailed Technical Specifications and requirements brought out herein. The Contractor's proposal shall be based on the use of materials complying fully with the requirements specified herein.

1.2.0 SCOPE

1.2.1 The work involves design, engineering, manufacture, assembly, inspection, testing at manufacturer's works before dispatch, packing, supply, including insurance during transit, delivery at site (as per Annexure-I) of various equipment and materials as specified in subsequent Clauses and Sections.

1.2.2 It is not the intent to specify completely herein all details of design and construction of the equipment and accessories. However, the equipment and accessories shall conform in all respects to high standards of engineering, design and workmanship and be capable of performing in continuous operation up to the bidder's guarantees in a manner acceptable to the Purchaser. The Purchaser will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgement is not in full accordance therewith.

1.2.3 The major items of works included in the scope of this specification are listed below: -

- i) Design, engineering, manufacture, assembly and testing at manufacturer's works of ACSR Panther, ACSR Zebra and ACSR Moose Conductors as specified in the BoQ.
- ii) Loading at manufacturer's works, transportation and delivery to site, including unloading at destination site.

1.2.4 The various items of supply are described very briefly in the schedule of Bid Form, Prices & Other Schedules and annexure. The various items as defined in these schedules shall be read in conjunction with the corresponding section in the technical specifications including amendments and, additions if any.

1.2.5 The bidder is required to fill up the BOQ/price schedule as given in the e-tendering portal.

1.3.0 DESIGN IMPROVEMENTS

1.3.1 The Employer or the Contractor may propose changes in the specification and if the parties agree upon any such changes and the cost implication, the specification shall be modified accordingly.

1.4.0 DESIGN CO-ORDINATION

1.4.1 Wherever, the design is in the scope of Contractor, the Contractor shall be responsible for the selection and design of appropriate material/item to provide the best coordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

1.5.0 DESIGN REVIEW MEETING

1.5.1 The contractor will be called upon to attend design review meetings with the Employer, and the consultants of the Employer during the period of Contract. The contractor shall attend such meetings at his own cost at

Assam or at mutually agreed venue as and when required. Such review meeting will be held generally minimum once a month or the frequency of these meeting shall be mutually agreed between the Employer and the Contractor. Frequency of Design Review Meetings shall depend upon the project requirement to ensure project implementation as per the Master Programme.

1.6.0 PACKING

- 1.6.1 All the materials shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. The CONTRACTOR shall be responsible for any loss or damage during transportation, handling and storage due to improper packing.
- 1.6.2 The CONTRACTOR shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during transport by air, sea, rail and road.
- 1.6.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'up' and 'down' on the sides of boxes, and handling and unpacking instructions as considered necessary. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea.
- 1.6.4 The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols, i.e., fragile, handle with care, use no hook etc. wherever applicable.
- 1.6.5 Each package shall be legibly marked by the-CONTRACTOR at his expenses showing the details such as description and quantity of contents, the name of the consignee and address, the gross and net weights of the package, the name of the CONTRACTOR etc.

SECTION-2 TECHNICAL SPECIFICATION: ACSR CONDUCTORS

2.1.0 SCOPE

2.1.1 This Section of the Specification covers the technical parameters for design, manufacture, testing at manufacturer's works and supply of Conductor.

2.2.0 POWER CONDUCTOR

2.2.1 TYPE OF CONDUCTOR

The ACSR Conductor shall generally conform to IEC: 61089/ IS: 398 (relevant part)/ ASTM: B-232 except where otherwise specified herein. Conductor conforming to a standard other than the Indian Standard specification then an English version of the Standard in addition to the original standard if written in a language other than English should be submitted indicating clearly the advantage, if any, that would be obtained by the Employer for adopting this standard instead of the said India Standard.

2.3.0 STANDARD TECHNICAL PARTICULARS

All ACSR Conductor shall satisfy all the parameters as furnished in Technical Data Sheet. All the aluminium and steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die marks, scratches, abrasions, etc., after drawing and also after stranding.

The steel strands shall be hot dip galvanised and shall have a minimum zinc coating.

2.4.0 MATERIAL

The aluminium strands shall be hard drawn from electrolytic aluminium rods having purity and copper content as per the values indicated in the STP. They shall have the same properties and characteristics as prescribed in IEC: 60889.

The steel wire strands shall be drawn from high carbon steel wire rods produced by either the acid or the basic open-hearth process, the electric furnace process, or the basic oxygen process and shall conform to the chemical composition indicated in the STP.

The Steel wire strands shall have the same properties and characteristics as prescribed for regular strength steel wire in IEC: 60888.

The zinc used for galvanizing shall be electrolytic High-Grade Zinc of purity. It shall conform to and satisfy all the requirements of IS:209.

2.5.0 JOINTS IN WIRE

In the Aluminium wires no joints shall be permitted in the individual wires in the outer most layer of the finished conductor. However, joints are permitted in the inner layer of the conductor unavoidably broken during stranding provided such breaks are not associated with either inherently defective wire or with the use of short lengths of aluminium wires. Such joints shall not be more than four (4) per conductor length and shall not be closer than 15 meters from joint in the same wire or in any other aluminium wire of the completed conductor.

Joints shall be made by cold pressure butt welding and shall withstand a stress of not less than the breaking strength of individual strand as per STP.

In the Steel wires there shall be no joint of any kind in the finished wire entering into the manufacture of the strand. There shall also be no strand joints or strand splices in any length of the completed stranded steel core of the conductor.

2.6.0 STRANDING

The wires used in construction of a ACSR conductor shall, before and after stranding, satisfy all requirements of IS 398 with latest amendments thereof.

The lay ratio of the different layers shall be within the limits as per the said Standard. In all constructions, the successive layers shall have opposite directions of lay, the outer most layer being right-handed. The wires in each layer shall be evenly and closely stranded. In aluminium alloy stranded conductors having multiple layers of wires, the lay ratio of any layer shall not be greater than the lay ratio of the layer immediately beneath it.

2.7.0 TYPE/ROUTINE/ACCEPTANCE TESTS

Type Test:

The following tests shall be conducted on a sample/sample of the conductor(s) required under the package from each stranding machine from which the conductor is to be manufactured & supplied:

- a) DC resistance test on stranded conductor
- b) UTS test on stranded conductor
- c) Corona extinction voltage test (dry)
- d) Radio interference voltage test (dry)

Acceptance Test:

- a) Visual and dimensional check on drum
- b) Visual check for joints, scratches etc. and length measurement of conductor by rewinding
- c) Measurement of diameters of individual Steel and Aluminium strands
- d) Galvanizing test on steel strands
- e) Check for lay Ratios of various layers
- f) Torsion and Elongation tests on steel strands
- g) Breaking load test on steel and Aluminium strands
- h) Wrap test on Steel & Aluminium strands
- i) DC resistance test on Aluminium strands
- j) Procedure qualification test on welded joint of Aluminium strands
- k) Drum strength test (steel drum)
- l) Barrel Batten strength test (wooden drum)

The above acceptance tests shall be repeated on one conductor sample taken from site in presence of AEGCL's representative for each 500km progressive supply. The tests shall be carried out by the supplier at his cost at its own premises or any other tests centre having required facilities. The sample shall be selected by AEGCL's site representative and the tests shall be witnessed by AEGCL's representative.

Routine Tests:

- a) Check to ensure that the joints are as per Specification
- b) Check that there are no cuts, fins etc. on the strands
- c) Check that drums are as per Specification
- d) All acceptance test as mentioned above to be carried out on aluminium and steel strands of 20% of drums

Tests During manufacture:

- a) Chemical Analysis of Zinc used for galvanising
- b) Chemical Analysis of Aluminium used for making Aluminium Strands
- c) Chemical Analysis of Steel used for making Steel Strands.

2.8.0 REJECTION AND RETESTS

Stipulations made in the IS 398 (Part-IV) on Rejection and Retests shall be followed.

2.9.0 PACKING

All conductor reels shall conform to latest edition of IS: 1778 and be of dimensions approved by the Employer and made of seasoned wood sufficiently strong to ensure arrival at site, intact withstanding normal handling and hazards inland and ocean transit. The reels shall be of such size as to provide at least 12.5 mm clearance at all points from the conductor to the inner surface of the laggings.

All reels shall have two coats of aluminium paint on both inside and outside surface and shall be fitted with malleable iron Hub-bushings.

All reels shall be a layer of waterproof paper around the hub under the cable and another layer over the outermost layer of the cable, that is next to the lagging.

The reels shall be properly reinforced with galvanized steel wires or iron straps over the lagging in two places in an approved manner.

The wooden drums shall preferably be given protective coating of a reliable organic wood preservative before painting with Aluminium paint and the laggings shall also be given a similar treatment before being fixed on the drum. There shall be one standard length of Conductor in each drum.

2.10.0 TECHNICAL DATA SHEET FOR CONDUCTOR

ACSR Panther

Sl. No.	DESCRIPTION	ACSR 'PANTHER'
1	Code name	PANTHER
2	Number of strands & size	Al: 30/ 3.00 mm St: 7/ 3.00 mm
3	Overall diameter	21.00 mm
4	Breaking load	130.32 kN
5	Weight of conductor	974 kg / km
6	Co-efficient of linear expansion	$19.35 \times 10^{-6} / ^\circ\text{C}$
7	Number of strands	
	Steel centre	1
	1st Steel Layer	6
	1st Aluminium Layer	12
	2nd Aluminium Layer	18
	3rd Aluminium Layer	-
8	Sectional area of Aluminium	212.10 mm ²
9	Total sectional area	261.50 mm ²
10	Calculated d.c. resistance at 20 ^o C	0.1400 ohm/km
11	Ultimate tensile strength	89.67

ACSR Zebra

1.	Code Name	ZEBRA
2.	Equivalent area of Aluminium(sq.mm.)	418.6
3.	Wire Strand (Al./Steel)	54/7
4.	Nominal diameter of strand(Al./Steel) (mm.)	3.18/3.18
5.	Weight (Kg/Km)	1621
6.	Co-eff. of linear expansion per α_C	19.30×10^{-6}
7.	Ultimate Tensile Strength (kgf.)	13316
8.	Maxm. DC resistance at 20°C (Ω/Km) (Calculated from maxm. Value of resistivity and min. Cross-sectional area)	0.0680
9.	Zinc coating of steel:	
	i) No. of one minute dip	3
	ii) Min. wt. of zinc. (gm.m ²)	260
	iii) Purity of zinc (%)	99.95
10.	Diameter of conductor (mm)	28.62
11.	Standard Length (meter)	1100

ACSR MOOSE

Sl. No	DESCRIPTION	PARTICULARS
I	II	III
1	Type of Conductor	Aluminium Conductor Steel Reinforced (ACSR)

Sl. No	DESCRIPTION	PARTICULARS
I	II	III
2	No of Strand x size	54 x 3.53 mm
3	Conductor over all diameter	31.77 mm
4	Total sectional area	597 mm ²
5	Approx. weight	2004 kg/km
6	Minimum UTS	161.2 kN
7	Modulus of Elasticity (Final)	0.7034 kg/cm ²
8	Coefficient of linear expansion	19.3 x 10 ⁻⁶ /°C
9	Calculated maximum resistance/Km of Conductor at 20°C	0.05552 ohms/km
10	Layer and No of Wire	
	Steel core	1
	1st steel layer	6
	1st Aluminium layer	12
	2nd Aluminium layer	18
	3rd Aluminium layer	24
11	Aluminium strands after stranding	
(a)	Diameter	
	Nominal	3.53
	Maximum	3.55
	Minimum	3.51
(b)	Minimum breaking load of strand	
	Before stranding	1.57
	After stranding	1.49
12	Steel strand after stranding	
(a)	Diameter	
	Nominal	3.53
	Maximum	3.59
	Minimum	3.47
(b)	Minimum breaking load of strand	
	Before stranding	12.86
	After stranding	12.22
13	DC resistance of the conductor at 20°C	0.05552
14	Direction of lay of outer layer	Right Hand
15	Linear mass of the conductor	
	Standard	2004
	Minimum	1969
	Maximum	2040

Annexure-I (Destinations for Supply of BoQ Items)

Sl. No.	Item	Quantity to be delivered and destinations	Total quantity as per BoQ
1	ACSR Panther Conductor	01 km each at Guwahati T&T Circle, Silchar T&T Circle, Bongaigaon T&T Circle, Jorhat T&T Circle, Tezpur T&T Circle, Mirza T&T Circle, Dibrugarh T&T Circle and North Lakhimpur T&T Circle, AEGCL	8 km
2	ACSR Zebra Conductor	01 km each at Guwahati T&T Circle, Silchar T&T Circle, Bongaigaon T&T Circle, Jorhat T&T Circle, Tezpur T&T Circle, Mirza T&T Circle, Dibrugarh T&T Circle and North Lakhimpur T&T Circle, AEGCL	8 km
3	ACSR Moose Conductor	01 km each at Guwahati T&T Circle, Bongaigaon T&T Circle, Jorhat T&T Circle, Tezpur T&T Circle, Mirza T&T Circle, Dibrugarh T&T Circle and North Lakhimpur T&T Circle, AEGCL	7 km