

ASSAM ELECTRICITY GRID CORPORATION LIMITED

OFFICE OF THE MANAGING DIRECTOR

Regd. Office:(FIRST FLOOR), BIJULEE BHAWAN, PALTANBAZAR; GUWAHATI - 781001

CIN: U40101AS2003SGC007238 GSTIN: 18AAFCA4973J9Z3

PHONE: 0361-2739520 Web: www.aegcl.co.in

No. AEGCL/MD/AIIB/TENDER/2020/Extn-19

Date: 05.07.2020

CORRIGENDUM-VI

Tender Reference No : AEGCL/MD/AIIB/PACKAGE-I/2020/02-I
 AEGCL/MD/AIIB/PACKAGE-I/2020/02-J
 AEGCL/MD/AIIB/PACKAGE-I/2020/02-K

Name of Work: 1. AUGMENTATION OF TRANSFORMATION CAPACITY AT FIVE SUBSTATIONS (NARENGI, KAHILIPARA, RANGIA, KUKURMARA & BOKO) (PACKAGE-I)
 2. AUGMENTATION OF TRANSFORMATION CAPACITY AT FOUR SUBSTATIONS (BARNAGAR, PANCHGRAM, AGIA & GAURIPUR)_(PACKAGE-J)
 3. AUGMENTATION OF EXISTING TRANSFORMER CAPACITY AT VARIOUS SUBSTATIONS IN ASSAM (PACKAGE-K)

TABLE-2

SI No	Clause No.	As Existing	As Amended	Reference to Sl. No. of Response [Table 1] wherever applicable
Volume-II				
1	Clause 4.10.0, Sub-clause 4.10.4 of Volume II.	<u>Maximum losses:</u> 50 MVA (3-ph, 132/33 kV Transformer): At ambient temperature, 1) No Load Loss (kW): 14 2) Load Loss (kW): 95 3) I^2R (kW): 76 4) Stray + Eddy (kW): 19 5) Aux. Loss: 2	<u>Maximum losses:</u> 50 MVA (3-ph, 132/33 kV Transformer): At ambient temperature, 6) No Load Loss (kW): 25 7) Load Loss (kW): 125 8) I^2R (kW): 105 9) Stray + Eddy (kW): 20 10) Aux. Loss: 3	c.32, c.53, c.90

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2	Section 7, Clause No. 7.12 of Volume II.	TECHNICAL DATA SHEET FOR ISOLATORS (For 132 kV and 33 kV)	Additional Technical specification for 220 kV Isolator is attached below (Refer Table-3)	c.116
3	Clause no 5.1.12 sub-clause 5.1.13 of Volume II.	TECHNICAL DATA SHEET FOR CURRENT TRANSFORMER	Revised Technical specification for 33 kV Current Transformer is attached below. (See Table No. 4).	c.114
4	Section 8	TECHNICAL SPECIFICATIONS OF ALUMINIUM TUBULAR BUS-BAR	TECHNICAL SPECIFICATIONS OF ALUMINIUM TUBULAR BUS-BAR AND ACSR ZEBRA ACSR ZEBRA: ATTACHED AS ANNEXURE B	c.129
5	BOQ	Original BOQ	The BOQ has been modified.	
Qualification Requirement Section 3				
6	Volume 1: Section 2: Tender Data Sheet (TDS): ITT 4.1(b)	Maximum number of Partners in a Joint Venture/Consortium for a Package is limited to TWO (02) only including the lead partner	Maximum number of Partners in a Joint Venture/Consortium for a Package is limited to THREE (03) only including the lead partner	
7	Volume 1: Section 3, All the tables under Clause No. 2.2,2.3 and 2.4, Compliance Requirement	Joint Venture (maximum 2 parties allowed including lead bidder)	Joint Venture (maximum 3 parties allowed including lead partner)	
8	Clause No 2.4.1 Of Volume I	Tenderer's Experience (Package I & J)	Please refer to table 5	b.4, b.13, b.19
9	Clause No 2.4.2 Of Volume I	Experience in Key Activities (Package I & J)	Please refer to table 6	b.1, b.14, b.16
10	Clause No 2.4.1	Tenderer's Experience (Package K)	Please refer to table 5	b.4, b.13, b.19

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	Of Volume I			
11	Clause No 2.4.2 Of Volume I	Experience in Key Activities(Package K)	Please refer to table 7	b.1, b.14
12	Clause 2.3.2	Average Annual Turnover of Volume I (Package I)	Please refer Table 8	b.10
13	Clause 2.3.3 section 3 of Volume I	Financial Resources of Volume I (Package I)	Please refer to table 9	b.11, b.12
14	Clause 2.3.2 section 3 of Volume I	Average Annual Turnover of Volume I (Package J)	Please refer to table 10	b.10
15	Clause 2.3.3 section 3 of Volume I	Financial Resources of Volume I (Package J)	Please refer to table 11	b.11, b.12
16	Clause 2.3.2 section 3 of Volume I	Average Annual Turnover of Volume I (Package K)	Please refer to table 12	b.10
17	Clause 2.3.3 section 3 of Volume I	Financial Resources of Volume I (Package K)	Please refer to table 13	b.11, b.12
Section 9: Contract Forms, Appendix 1: Terms and Procedures of Payment, (A) Terms of Payment				
Schedule No. 1 & 2 - Plant and Mandatory Spare Parts Supplied from Abroad and Within the Employer's Country respectively.				
18	A. Advance Payment.:	The advance will be adjusted at the rate of 25% of the advance amount from each subsequent bill till the complete amount of advance is adjusted.	The advance will be adjusted at the rate of 10% of the taxable invoice value from each subsequent bill till the complete amount of advance is adjusted.	8, 34
19	B. Progressive payments for supply items:	1. Within 60 (sixty) days from the date of submission of the invoice against supply, not more than 60% (sixty percent) payment of the total supply invoice value would be made, on receipt and acceptance of materials in full and good conditions (Subject to availability of fund). However, GST amount on invoice would be paid 100% or as per Govt. Rules.	1. Within 60 (sixty) days from the date of submission of the invoice against supply, not more than 60% (sixty percent) of the total supply invoice value of that particular item would be made, on receipt and acceptance of materials in full and good conditions (Subject to availability of fund). However, GST amount on invoice would be paid 100% or as per Govt. Rules. 2.Deleted	44

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		<p>2. Maximum 20 (twenty) Nos. of progressive summary supplyinvoice would be entertained.</p> <p>3. Remaining 40% (forty percent) retention amount would be released subject to fulfilment of the following conditions –</p> <p>(a) 50% of balance supply amount would be paid on completion of 50% of the total erection works of the project as per Schedule 4 (Tender Forms).</p> <p>(b) Remaining 50% of the supply amount would be paid on completion of 100% erection, testing, commissioning and stringing activities of the project as per schedule 4 (Tender Forms), which must be certified by the Project Authority.</p>	<p>3. Remaining 40% (forty percent) retention amount of that item would be released subject to fulfillment of the following conditions –</p> <p>a) 20% supply amount would be paid on completion of 50% of the total erection works of that particular item.</p> <p>b) Next 10% of the supply amount of that supply item would be payable on completion of 100% of the total erection, testing, commissioning works of that particular item.</p> <p>b) within 60 (sixty) days after receipt of invoice out of remaining 10% of the supply amount 5% would be paid upon issue of the Completion Certificate and balance 5% upon issue of the Operational Acceptance Certificate as per clause 25, 26 & 27 of GCC, which should be certified by the Project Authority</p>	
	Schedule No. 4 – Installation, ESMP and Other Services (Installation, commissioning and stringing services including Civil Works)			
20	A. Progressive payments for Erection Works:	<p>1. Within 60 (sixty) days from the date of submission of invoice against foundation, erection & civil works, not more than 80% (eighty percent) of the total verified invoice would be made. However, GST amount on invoice would be paid 100% or as per Govt. Rules.</p> <p>2. Maximum 10 (ten) Nos. of progressive summary erection invoice/ bill would be entertained during entire erection work.</p> <p>3. The 1st progressive erection invoice/ bill would be entertained on completion of 10% of total erection cost of the project as per Schedule4</p>	<p>1. Within 60 (sixty) days from the date of submission of invoice against foundation, erection & civil works, not more than 90% (Ninety percent) of the total verified invoice would be made. However, GST amount on invoice would be paid 100% or as per Govt. Rules.</p> <p>2. Deleted.</p> <p>3. Deleted.</p> <p>4. Deleted.</p> <p>5. Within 60 (sixty) days after receipt of invoice out of remaining 10% of the supply amount 5% would be paid upon issue of the Completion Certificate</p>	8, 34,

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		(Tender Forms). 4. Maximum 8 (eight) Nos. of additional progressive erection invoice/ bill would be entertained. Minimum value of each invoice should be 10% of the total ordered value for foundation, erection and civil work. 5. Remaining 20% of the erection value would be paid on successful completion of 100% erection, testing, commissioning and stringing activities and operational acceptance of the project as per clause 25, 26 & 27 of GCC, which should be certified by the Project Authority.				and balance 5% upon issue of the Operational Acceptance Certificate as per clause 25, 26 & 27 of GCC, which should be certified by the Project Authority.						
21	Volume-II/ Clause 4.27.0/ SYSTEM DATA/	SL NO	DESCRIPTION	VOLTAGE CLASS			SL NO	DESCRIPTION	VOLTAGE CLASS			c.112
				220kV	132kV	33kV			220kV	132kV	33kV	
		6.	Minimum creepage distance, mm	6125	3625	900	6.	Minimum creepage distance, mm	7595	4495	1116	

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PHONE: 0361-2739520 Web: www.aegcl.co.in**Table No. 3****TECHNICAL DATA SHEET FOR 220 kV Isolator**

Sl. No.	Type:	220 kV Isolator
1	Main switch	Horizontal Centre break
2	Service	Outdoor
3	Applicable standard	IS : 9921 / IEC-62271-102
4	No. of Phases	3 phases
5	Design Ambient temperature	50°C
6	Type of operation	Mechanically Ganged
7	Rated voltage (kV)	In KV
	a) Nominal	220
	b) Maximum	245
8	Rated current (Amps)	3150
9	Short time current for 1 sec.(kA)	50
10	Rated frequency	50 HZ \pm 5%
11	System earthing	Effectively earthed
12	Temperature rise	As per relevant IS/IEC standards
13	Lightening Impulse withstand voltage (kVp)	
	(a) Across Isolating distance	1220
	(b) To earth	1050
14	1-minute power frequency withstand voltage	
	a) Across Isolating distance	605
	b) To earth	460
15	Switching Impulse withstand voltage (kVp)	
	a) Across Isolating distance	-
	b) To earth	-
16	Max. RIV for frequency between 0.5MHz and 2MHz (micro-volt)	1000 at 156kV
17	Corona Extinction Voltage (kV)	-
18	Operating mechanism	
	a) Isolator	Motor
	b) Earth switch	Motor
19	Auxiliary voltage	
	a) Control & Interlock	110V or 220V DC 80% to 110%
	b) Motor voltage	3 Phase 415V AC 50Hz
	c) Heater, lamp & socket	Single phase 240 V 50HZ
20	Safe duration of overload	
	150% of rated current	5 minute

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	120% of rated current	30 minute
21	Minimum creepage distance of insulator (mm)	6125
22	Mounting structure	Tubular/Lattice
23	Operating time	Less than 12 secs
24	Insulator Data	
	a) Bending Strength (kgf)	800
	b) Height (mm)	2300
	c) Bottom PCD (mm)	254
	d) No. of holes & hole dia.	8x18
	e) Top PCD	127
	f) No. of holes & hole dia.	4xM16
	g) Minimum creepage distance (mm) 25mm/kV	6125
25	Working clearance (live part to ground) (in mm)	5900
26	Phase Spacing (mm.)	4500
27	Minimum clearances (mm.)	
	a) Phase to Phase	2100
	b) Phase to earth	2100
	c) Sectional clearance	5000

**Table No. 4
TECHNICAL DATA SHEET FOR CURRENT TRANSFORMER**

Item	RATINGS AND PARTICULARS
(A) Nominal system voltage	33 kV
(B) Highest system voltage, kV	36
(C) Rated frequency ,HZ	50
(D) System earthing	Solidly earth
(E) Insulation level	
(a) Impulse withstand voltage: kVp	170
(b) One minute p.f. Withstand voltage, kV (r.m.s.)	70
(F) Short time current for one second, kA	31.5
(G) Minimum creepage distance, mm	900
(H) Tan Delta at $U_m / \sqrt{3}$, (Max)	0.3%
(H) Temperature rise	As per ISS
(I) Transformer CT	
(i) No. of Cores	4
(ii) Transformation Ratio	As per schedule of requirement
(iii) Rated Output, VA	
(a) Core-1	30 VA
(b) Core-2	15 VA
(c) Core-3	-

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(d) Core-4	-
(e) Core-5	N.A
(iv) Accuracy Class	
(a) Core-1	0.2
(b) Core-2	5P
(c) Core-3	PS
(d) Core-4	PS
(e) Core-5	N.A
(v) Accuracy Limit Factor	
(a) Core-1	--
(b) Core-2	10
(c) Core-3	-
(d) Core-4	-
(e) Core-5	N.A
(vi) Instrument security factor	
(a) Core-1	Less than 5
(b) Core-2	-
(c) Core-3	-
(d) Core-4	-
(e) Core-5	N.A
(vii) Minimum Knee point voltage, Volts	
(a) Core-1	-
(b) Core-2	-
(c) Core-3	600
(d) Core-4	600
(e) Core-5	N.A
(viii) Maximum secondary resistance, ohm	
(a) Core-1	-
(b) Core-2	-
(c) Core-3	3
(d) Core-4	3
(e) Core-5	N.A
(ix) Maximum exciting current, at $V_k/4$ mA	
(a) Core-1	-
(b) Core-2(at $V_k/4$)	-
(c) Core-3 (at $V_k/4$)	15
(d) Core-4(at $V_k/2$)	15
(e) Core-5 (at $V_k/2$)	N.A
(x) Application	
(a) Core-1	Metering
(b) Core-2	Back up Protection
(c) Core-3	Differential Protection
(d) Core-4	For Future use
(e) Core-5	N.A

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Table 5

- 2.4 Tenderer's Experience(Revised)**
2.4.1 Contracts of Similar Size and Nature

Criteria	Compliance Requirements			Documents	
Requirement	Single Entity	Joint Venture (maximum 3 parties allowed including lead bidder)			Submission Requirements
		All Partners Combined	Each Partner	(Lead Partner)	
1.Experience as a contractor/Partner in a JV /Manufacturer in Erection, Testing and commissioning of Power Transformers of 132kV and/or above for at least three (3) years prior to the Bid submission deadline .	Must meet requirement.	Must meet requirement.	Not Applicable	Not Applicable	Form EXP - 1

Table 6

Experience in Key Activities

2.4.2(a) Must be complied with by the Tenderer. In case of a Joint Venture Tenderer, at least one of the partners must meet the requirement in the key activity.

Table A (Revised)

Criteria	Compliance Requirements		Documents
Requirement	Single Entity	Joint Venture	Submission Requirements
<p>The Bidder or if the Bidder is not a manufacturer his supplier for supply of 220kV transformers: must have designed, manufactured, type tested, supplied at least ten (10) Auto/ Power transformers of 220kV or higher voltage class and of capacity of at least 50MVA and more, which are in successful operation for at least five(5) years as on the date of Bid opening. AND for supply of 132kV transformers must have designed, manufactured, type tested, supplied at least Twenty (20) Auto/ Power transformers of 132kV or higher voltage class and of capacity of at least 40MVA and more, which are in successful operation for at least five(5) years as on the date of Bid opening.</p> <p>The Bidder should furnish a list of such works executed along with Client's Performance Certificates to substantiate the requirement of this clause.</p>	Must meet requirement	Must meet requirement	Form EXP – 2

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Table 7

Experience in Key Activities (Package K)

2.4.2(a) Must be complied with by the Tenderer. In case of a Joint Venture Tenderer, at least one of the partners must meet the requirement in the key activity.

Table A (Revised)

Criteria	Compliance Requirements		Documents
Requirement	Single Entity	Joint Venture	Submission Requirements
The Bidder or if the Bidder is not a manufacturer his supplier must have designed, manufactured, type tested, supplied at least Twenty (20) Auto/ Power transformers of 132kV or higher voltage class and of capacity of at least 40MVA and more, which are in successful operation for at least five(5) years as on the date of Bid opening. The Bidder should furnish a list of such works executed along with Client's Performance Certificates to substantiate the requirement of this clause.	Must meet requirement	Must meet requirement	Form EXP – 2

Table 8:

2.3.2 Average Annual Turnover (Revised)

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture (maximum 3 parties allowed including lead bidder)			Submission Requirements
		All Partners Combined	Each Partner	One Partner (Lead Partner)	
Minimum average annual turnover of ₹ 50 core (Fifty Crore) calculated as total certified payments received for contracts in progress or completed, within the last three (3) years .	Must meet requirement	Must meet requirement	must meet 25% of the requirement	must meet 55% of the requirement	Form FIN - 2

Note:

- The bidder has to furnish the certificate from the chartered Accountant (CA) registered in India certifying the Project related Annual turnover of the company only (excluding its Associated Companies on Standalone Basis) based on audited accounts of the last five financial years. In case the bidder has executed any project in joint venture/consortium, the project related turnover certified by the chartered Accountant (CA) registered in India should reflect his share of the project related turnover only.

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2. In case of Joint Venture/consortium, the bidder shall be furnished independently by each partner duly certified by Chartered Accountant (CA) registered in India

Table 9:

2.3.3 Financial Resources(Revised)

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner (Lead partner)	
For Single Entities: The Tenderer must demonstrate that its financial resources defined in FIN-3, less its financial obligations for its current contract commitments defined in FIN-4, meet or exceed the total requirement for the Subject Contract. The minimum cash flow shall be ₹ 9 Crore (Rupees Nine Crore) .	Must meet requirement	Not applicable	Not applicable	Not applicable	Form FIN – 3 and Form FIN - 4
The Joint Venture must demonstrate that the combined financial resources of all partners defined in FIN-3, less all the partners' total financial obligations for the current contract commitments defined in FIN-4, meet or exceed the total requirement of be ₹ 9 Crore (Rupees Nine Crore) whereas the lead partners shall have to meet minimum 55% and each partners 25 % of the criteria.	Not applicable	Must meet requirement	must meet minimum 25% of the requirement	must meet minimum 55% of the requirement	Form Fin-3 and Form FIN-4

Table 10:

2.3.2 Average Annual Turnover (Revised)

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture (maximum 3 parties allowed including lead bidder)			Submission Requirements
		All Partners Combined	Each Partner	One Partner (Lead Partner)	

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Minimum average annual turnover of ₹ 37 core (Thirty-seven Crore) calculated as total certified payments received for contracts in progress or completed, within the last three (3) years.	Must meet requirement	Must meet requirement	must meet minimum 25% of the requirement	must meet minimum 55% of the requirement	Form FIN - 2
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Note:

- The bidder has to furnish the certificate from the chartered Accountant (CA) registered in India certifying the Project related Annual turnover of the company only (excluding its Associated Companies on Standalone Basis) based on audited accounts of the last five financial years. In case the bidder has executed any project in joint venture/consortium, the project related turnover certified by the chartered Accountant (CA) registered in India should reflect his share of the project related turnover only.
- In case of Joint Venture/consortium, the bidder shall be furnished independently by each partner duly certified by Chartered Accountant (CA) registered in India

Table 11:
2.3.3 Financial Resources(Revised)

Criteria Requirement	Compliance Requirements			Documents	
	Single Entity	Joint Venture		Submission Requirements	
		All Partners Combined	Each Partner	One Partner (Lead partner)	
For Single Entities: The Tenderer must demonstrate that its financial resources defined in FIN-3, less its financial obligations for its current contract commitments defined in FIN-4, meet or exceed the total requirement for the Subject Contract. The minimum cash flow shall be ₹ 7 Crore (Rupees Seven Crore) .	Must meet requirement	Not applicable	Not applicable	Not applicable	Form FIN – 3 and Form FIN - 4

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The Joint Venture must demonstrate that the combined financial resources of all partners defined in FIN-3, less all the partners' total financial obligations for the current contract commitments defined in FIN-4, meet or exceed the total requirement of be ₹ 7 Crore (Rupees Seven Crore) whereas the lead partners shall have to meet minimum 55% and each partners 25 % of the criteria.	Not applicable	Must meet requirement	must meet minimum 25% of the requirement	must meet minimum 55% of the requirement	Form Fin-3 and Form FIN-4
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Table 12:**2.3.2 Average Annual Turnover (Revised)**

Criteria	Compliance Requirements			Documents	
	Single Entity	All Partners Combined	Each Partner	One Partner (Lead Partner)	Submission Requirements
Minimum average annual turnover of ₹ 44 core (Rupees Forty-four Crore)calculated as total certified payments received for contracts in progress or completed, within the last three (3) years.	Must meet requirement	Must meet requirement	must meet minimum 25% of the requirement	must meet minimum 55% of the requirement	Form FIN - 2

Note:

- The bidder has to furnish the certificate from the chartered Accountant (CA) registered in India certifying the Project related Annual turnover of the company only (excluding its Associated Companies on Standalone Basis) based on audited accounts of the last five financial years. In case the bidder has executed any project in joint venture/consortium, the project related turnover certified by the chartered Accountant (CA) registered in India should reflect his share of the project related turnover only.
- In case of Joint Venture/consortium, the bidder shall be furnished independently by each partner duly certified by Chartered Accountant (CA) registered in India

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PHONE: 0361-2739520 Web: www.aegcl.co.in**Table 13****2.3.3 Financial Resources (Revised)**

Criteria Requirement	Compliance Requirements				Documents
	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner (Lead partner)	
For Single Entities: The Tenderer must demonstrate that its financial resources defined in FIN-3, less its financial obligations for its current contract commitments defined in FIN-4, meet or exceed the total requirement for the Subject Contract. The minimum cash flow shall be ₹ 8 Crore (Rupees Eight Crore) .	Must meet requirement	Not applicable	Not applicable	Not applicable	Form FIN – 3 and Form FIN - 4
The Joint Venture must demonstrate that the combined financial resources of all partners defined in FIN-3, less all the partners' total financial obligations for the current contract commitments defined in FIN-4, meet or exceed the total requirement of be ₹ 8 Crore (Rupees Eight Crore) whereas the lead partners shall have to meet minimum 55% and each partners 25 % of the criteria.	Not applicable	Must meet requirement	must meet minimum 25% of the requirement	must meet minimum 55% of the requirement	Form Fin-3 and Form FIN-4

Note:

- Please refer to the modified BOQ in the e-tender portal.**

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PHONE: 0361-2739520 Web: www.aegcl.co.in**Annexure B****TECHNICAL SPECIFICATION FOR ACSR CONDUCTOR****1. SCOPE :**

This specification covers design, manufacture, testing at manufacturer's works before despatch, supply and delivery of ACSR 'MOOSE', ACSR 'PANTHER' & ACSR 'ZEBRA' Conductor for use in new as well as for existing Sub-Station.

2. STANDARD :

The ACSR Conductor shall conform to the latest edition of the following Indian Standards unless otherwise specified hereinafter and as per latest relevant IEC's.

Sl. No.	Indian Standards	Title
1.	IS 1778	Reels and drums for bare conductor
2.	IS 2629	Recommended practice for hot dip Galvanising on iron and steel.
3.	IS 2633	Method for testing uniformity of coating of Zinc-coated articles.
4.	IS 209	Specification for Zinc Ingot.
5.	IS 4826	Hot-dip Galvanised coatings on Round Steel Wires.
6.	IS 1521	Methods for Tensile testing of Steel Wires.
7.	IS 398	Aluminium Conductors for O.H. transmission purposes (Aluminium conductors galvanised steel reinforced).
8.	IS 6745	Method of Determination of weight of zinc coating of zinc coated Iron & Steel articles.

3. I) DEVIATION :

Normally the offer should be as per Technical Specification without any deviation.

II) MODIFICATION :

If any modification felt necessary to improve performance, efficiency and utility of equipment, the same must be mentioned in the 'Modification schedule' with reasons duly supported by documentary evidences and advantages. Such modifications suggested may or may not be accepted, but the same must be submitted along with Pre-Bid Queries. The modifications not mentioned in Schedule will not be considered.

4. DESIGN CRITERIA & CONSTRUCTION :**4.1. MATERIALS (Materials for ACSR Conductor) :****i) ALUMINIUM :**

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The aluminium strands of the steel coredaluminium conductor shall be hard drawn electrolytic aluminium rods of E.C. Grade having purity not less than 99.5%.

ii) STEEL :

The steel wire strand shall be drawn from High carbon steel wire rods produced by either the acid or the basic open hearth process, or, the electric furnace process of the basic oxygen process and shall conform to the following requirements as to the chemical composition.

Element	% Composition
Manganese	0.40 to 1.10
Carbon	0.50 to 0.85
Phosphorus	0.05 max.
Sulphur	0.05 max.
Silicon	0.15 to 0.35

iii) ZINC :

The zinc used for galvanizing shall be electrolytic High Grade (HG) quality of 99.95% purity. It shall conform to the requirements of IS: 209.

4.2. WORKMANSHIP :

- i) All the Aluminium and Steel strands shall be smooth, uniform and free from all imperfections, such as spills & splits, die marks, scratches, abrasions etc. after drawing and also after stranding.
- ii) The composite conductor surface shall be smooth without any cuts, abrasions scuff marks and shall be free from dirt, grease etc.
- iii) The steel strand shall be hot dip galvanised and shall have a zinc coating of minimum 260 gms /sqm on uncoated wire surface. The zinc coating shall be smooth continuous and of uniform thickness and shall withstand minimum three dips of one-minute duration.
- iv) The wire used in construction of a steel coredaluminium conductor, before stranding shall satisfy the requirements for solid wires given in Tables 1 & 2 of IS:398 (Part-V), values given in this specification will hold good in case of any difference.

4.3. JOINTS IN WIRES (for ACSR) :i) ALUMINIUM WIRES :

No joints shall be permitted in the individual wires in the outermost layer of the finished conductor. Joints in the individual wires in the layers are permitted in addition to those made in the base rod or wire before final drawing but no two such joints shall be less than 15 m. apart in the complete stranded conductor. Such joints shall be made by the cold pressure butt welding.

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ii) STEEL WIRES :

There shall be no joint in the finished wire entering into the construction of the strand. There shall also be no strand joints or strand splice in any length of the completed stranded steel core of the conductor.

4.4. STANDARD LENGTH :

- i) The standard length of the conductor has been specified under Specific Technical Parameters. The tolerance on this length shall be +/- 5%.
- ii) Not less than 95% of the total quantity of the conductor shall be supplied in standard lengths. Conductor length in respect to balance 5% (maximum) supply shall be in random length of not less than 67% of a standard length and shall be supplied in individual drum.

4.5. STRANDING :

The wire used in the construction of a stranded conductor shall before stranding, satisfy all the relevant requirement of the standard. The lay ratio of different layers shall be within the limit as specified.

In all constructions, the successive layers shall have opposite directions of lay, the outermost layer must be right-handed. The wires in each layer shall be eventual and closely stranded,

5. TESTS & INSPECTION :

5.1. AEGCL RESERVE THE RIGHT FOR TESTING AND INSPECTION OF THE CONDUCTOR AND STEEL WIRE AND VERIFY ITS COMPONENT.

i) ACCEPTANCE TESTS :

All acceptance tests shall be conducted on every lot offered for inspection at the manufacturer's works as per relevant IS in presence of Engineers of AEGCL. Bidder shall have adequate testing facilities at their works to conduct all relevant routine and acceptance test as stipulated in the relevant IS in presence of engineers of AEGCL. The entire cost of carrying out all routine as well as all acceptance test on all offered lot as per stipulation of IS shall be treated as included in the quoted unit price of conductors. Contractor shall give at least 15 (fifteen) days advance notice intimating actual date of inspection and details of all tests that are to be carried out. Selection of sample for acceptance test as well as rejection and re-testing shall be guided by relevant IS. All routine tests at manufacturer's works i.r.o conductor of each drum shall be carried out and Test Report are to be submitted.

FOR ACSR CONDUCTOR :

- a) Visual checks for joints etc.
Two / three drums from each lot shall be rewound in presence of the purchaser's representative to facilitate visual checks for joints, scratches etc. and to see that the conductor generally conforms to the requirement of the specification.
In the process declared length and weight shall also be verified.
- b) Dimensional check on aluminium and steel strands.
- c) Checking of lay ratio of each layer of conductor and lay direction.
- d) Breaking load test on individual wires.
- e) Elongation test on steel wire.
- f) Wrap test on steel and aluminium wire.
- g) D.C. resistance test on Aluminium strands.
- h) Galvanising test on steel strands.
- i) Visual check on drums.

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j) Ductility test on galvanized steel wires.

ii) ROUTINE TEST :

To ensure quality of conductor to be supplied under this contract, the suppliers have to carry out all the routing tests as described in IS:398 and maintain a record. Routine Test reports are to be submitted to AEGCL.

Moreover, in course of production, the contractor shall ensure the following:

- a) Check that the joints are as per specifications.
- b) Check that there are no cuts, fins etc. on the strands.
- c) Check that correctness of stranding.
- d) Check that the drums are as per specification.

For quality assurance of the materials used in the production he will also check the following:

- i) Chemical analysis of aluminium used or making aluminium strands.
- ii) Chemical analysis of steel used for making steel strands.
- iii) Chemical analysis of zinc used for Galvanising.

5.2. GUARANTEE:

Electrical characteristics shall be guaranteed by the bidder. In case of failure of materials to meet the guarantee, AEGCL shall have right to reject the material. Guaranteed Technical Particulars are to be submitted by successful bidder during detailed engineering along with submitted drawings/documents. However, format for submission of GTP shall be handed over to intending bidders at the time of sale of tender documents.

5.3. CONTRACT DRAWINGS & DOCUMENT :

In the event of placement of Letter of Award (LOA) the contractor shall submit four (4) copies of relevant drawings, leaflets, G.T.P. and other particulars to the CGM (PP&D), AEGCL for approval.

After approval ten (10) sets of approved GTP & relevant documents for each sub-station shall be submitted by the contractor to the CGM (PP&D) AEGCL for our record and distribution to site.

5.4. TESTS AT MANUFACTURER'S WORKS AND TEST CERTIFICATES :

- i) Each type of conductor shall comply with the requirements of routine tests as per relevant IS.
- ii) All routine and acceptance tests shall be carried out at the manufacturer's works on every lot of offered different type of conductor as per relevant IS. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS. Three (3) copies of test reports shall be submitted to the CGM (PP&D), AEGCL for approval and distribution to site. The contractor shall give at least 21 (twenty-one) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out.

5.5. TESTS REPORTS AND TYPE TESTS :

Only type tested ACSR Conductor are to be offered conforming to our technical specification, and relevant IS and IEC. ACSR Conductor offered should be similar with ones on which type testing has been carried out as per relevant IS and IEC. Three sets of complete type test reports carried out in Govt. recognized Test House or Laboratory /NABL accredited laboratory shall have to be submitted by successful bidder positively along with submission of drawings during

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detailed Engineering. Successful bidder may require to produce original copies of type test reports at the time of detail Engineering if asked by AEGCL.

6. PACKING AND FORWARDING :

6.1. GENERAL:

- i) The conductor shall be wound on returnable wooden drum strong enough and provided with tagging of adequate strength, constructed to protect the conductor against all damage and displacement during transit, storage and subsequent handling and stringing operations in the field. The drums shall generally conform to IS:1778 – 1980 as amended up to date and the dimensions shall be as per requirement of conductor length.
- ii) Only one conductor length shall be packed on such drum.
- iii) The drum shall be suitable for wheel mounting.

6.2. CONSTRUCTION OF DRUMS:

All wooden component shall be manufactured out of seasoned soft wood free from defects that may materially weaken the component parts of the drums. Preservative treatment shall be applied to the entire drum with preservatives of such a quality which is not harmful to the conductor.

6.3. PROTECTIVE ARRANGEMENT:

- i) The inner side of the flanges and drum barrel surfaces shall be painted with a bitumen based paint/aluminium paint.
- ii) Before reeling, cardboard or double corrugated or thick bituminised waterproof paper shall be secured to the drum barrel and inside of flanges of the drums by means of suitable adhesive material. These protective wrappings and the adhesive material used, shall be of a quality which is not harmful to the conductor. The bituminous water proof paper shall also be provided between each layer of conductor.
- iii) After reeling the conductor, the exposed surface of the outer layer of the conductor shall be wrapped with waterproof, thick, bituminised paper and also with thick plastic sheet to prevent the conductor from dirt, grit and damage during transport and handling.
- iv) After application of bituminised and plastic paper, protective tagging of circumferential batten of suitable thickness shall be provided, in order to protect conductor from damage during transit in the event of breakage/detachment of the external protective tagging.
- v) The thickness of the external protective tagging or circumferential batten shall be sufficient to withstand transit hazards.
- vi) Outside the protective tagging, there shall be minimum of two binders' consisting of hoop iron or galvanised steel wire. Each protective tagging shall have two recesses to accommodate hoop binders.
- vii) The conductor ends shall be properly sealed and secured with the help of 'U' clamps on the side of one of the flanges to avoid loosening of the conductor layers during transit and handling.

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Each drum shall have following information stenciled on it in indelible ink along with other essential details.

- (a) Contract/Purchase order number
- (b) Name and address of the consignee
- (c) Manufacturer's name or trademark
- (d) Drum number
- (e) Code name and size of the conductor
- (f) Length of the conductor in meters
- (g) Gross weight of the drum with protective tagging including conductor
- (h) Net weight of the conductor
 - (i) Arrow marking for unwinding
 - (j) Position of the conductor end
 - (k) Lot number
- (l) Name of the destination
- (m) Date of Manufacture.

Before dispatch, property identification mark 'AEGCL' shall be engraved in each drum.

SPECIFIC TECHNICAL PARAMETERS

Sl. No.	Description	For ACSR Conductor		
		MOOSE	ZEBRA	PANTHER
1.	Code Name	MOOSE	ZEBRA	PANTHER
2.	Equivalent area of Aluminium(sq.mm.)	520	418.6	207.0
3.	Wire Strand (Al./Steel)	54/7	54/7	30/7
4.	Nominal diameter of strand (Al./Steel)(mm.)	3.53/3.53	3.18/3.18	3.00/3.00
5.	Weight (Kg/Km)	2004	1621	976
6.	Co-eff. of linear expansion per α_c	19.30×10^{-6}	19.30×10^{-6}	17.80×10^{-6}
7.	Ultimate Tensile Strength (kgf.)	16250	13316	9127
8.	Maxm. DC resistance at 20°C (Ω /Km) (Calculated from maxm. Value of resistivity and min. Cross-sectional area)	0.05552	0.0680	0.1375
	Zinc coating of steel :			
	i) No. of one minute dip	3	3	3
	ii) Min. wt. of zinc.(gm.m ²)	260	260	260
9.	iii) Purity of zinc (%)	99.95	99.95	99.95
10.	Diameter of conductor (mm)	31.77	28.62	21.00
11.	Standard Length (meter)	1100	1100	1000 to 1250

GUARANTEED TECHNICAL PARTICULARS FOR ACSR CONDUCTOR*(To be filled in and signed by the Bidder)*

Sl. No.	Description	MOOSE
1	Material Designation	
2	Particulars of Raw Material	
	i) Aluminium	
	a) Minimum purity of aluminium	
	b) Maximum Copper content	
	ii) Steel Wire/Rods	
	a) Carbon	
	b) Manganese content	
	c) Phosphorous content	
	d) Sulphur content	
	e) Silicon content	
	iii) Zinc	
	a) Minimum purity of Zinc	
3	Name of the Manufacturer and Address :	
4	Nominal diameter of Aluminium steel wire (mm)	
5	Minimum and Maximum diameter of Aluminium and Steel wire	
6	Number of Aluminium wires (No.)	
7	Number of Steel wires (No)	
8	Overall diameter of the conductor (mm)	
9	DC resistance at 20 deg C (Max) (Ohm/kM)	
10	Approx. Calculated breaking Load (kN)	
11	Nominal current carrying capacity at 45 deg C ambient (Amps)	
12	Approx. weight of conductor (kg/kM)	
13	Approximate ultimate tensile strength of conductor (kgf)	
14	Conforming standard	
15	Modules of Elasticity (kg/sq. cm)	
16	Standard Length (in Mtr)	

Sd/-
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