निविदा / Enquiry

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
पारेषण व्यापार समूह / Transmission Business Group
सामग्री प्रबंधन / Materials Management

Project : PGCIL AJMER AND CHITTORGARH

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Techni Comm
275E349	15-Mar-16	0		342250351	Package		06-Apr-16	As per tender	As per ter

Document Enclosed

SN	Equipment	Phy Unit	Qty	Unit Exworks	Unit Packing	% ED	% CST	% VAT	% ST	Unit F&I	Plan Dt	Comments
1	OVER HEAD CONDUCTORS AAC BULL	KM	20.2								15-Jul-16	1. QUANTITY IS FC AND CHITTOGARH TO BE SUPPLIED / NO.TB-386-316-11

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED. BHEL shall not be responsible for any postal delay.

IN YOUR OWN INTEREST YOU ARE ADVISED TO CAREFULLY READ "THE INSTRUCTIONS TO BIDDERS". INCOMPLETE BIDS AI COMPLYING WITH TENDER CONDITIONS SHALL BE TREATED AS NON RESPONSIVE AND ARE LIKELY TO BE IGNORED.

In case Tender Documents are not received within 7 days of this E-mail message, intimate BHEL accordingly. If no intimation considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will n

YOU ARE REQUESTED TO SUBMIT YOUR MOST COMPETITIVE OFFER SO AS TO REACH US POSITIVELY BY 2 PM ON THE TEN AND TENDER WILL BE OPENED AT 2:30 PM WITH EFFECT FROM 15-SEP-09.

BHEL RESERVES THE RIGHT TO OPT FOR REVERSE AUCTION FOR OBTAINING BEST PRICES.

OFFERS THROUGH E-MAIL / FAX:

WHOSOEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO S THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX .

THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONV FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTI KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE.

OFFERS SENT TO ANY OTHER E-MAIL ID or FAX NO AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATI

It is suggested that the bidders are advised to send the files with 'password protection'. procedure for giving a password to a file has bee

For saving Excel file with password

Steps to be followed:

1. Click on the FILE option in XP system and Start sign in Vista system then go to SAVE AS option.
2. Select the location to save and Click on the TOOLS box and go to GENERAL OPTION.
3. It will ask for the password, type the password into open or modify box or both as required.
4. Then click on the OK button it will ask for reenter of the password.
5. After reentering the password click on the save box.

For saving Word file with password

Steps to be followed:

1. Click on the FILE option in XP and Start sign in Vista then go to SAVE AS option.
2. Select the location to save and Click on the TOOLS box and go to SECURITY OPTION in XP system and GENERAL OPTION in Vista s
3. It will ask for the password, type the password into open or modify box or both as required.
4. Then click on the OK button it will ask for reenter of the password.
5. After reentering the password click on the save box.

The venders who has sent offers with password,the passwords are to be forwarded to another email id:supplierinfo@bhelindustry.com

MSME STATUS

"THOSE INDUSTRIES WHO HAVE FILED A MEMORANDUM WITH THE CONCERNED AUTHORITIES AND REGISTERED AS MICR(ENTERPRISE UNDER MICRO, SMALL AND MEDIUM ENTERPRISES DEVELOPMENT ACT 2006, HAVE TO SUBMIT A COPY OF SU CERTIFICATE / MEMORANDUM TO BHEL FOR NECESSARY COMPLIANCES OF THE ABOVE ACT".

Please acknowledge the receipt of tender enquiry and fax back this letter by ticking the appropriate item below.

भारत हैवी इलेक्ट्रिकल्स लिमिटेड के लिए / for BHARAT H

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To
S C Shivhare
Sr.Manager
BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS GROUP
TOWER-A,5th Floor,
Advant Navis IT Business Park,
Plot No-7,Sector-142,Expressway Noida
Noida-201305
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हस्ताक्षर और निविदाकार की सील / **Signat**

Enquiry No : 275E349 **Enquiry Dt :** 15-Mar-16

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

NEW DELHI

DOCUMENT No.	TB-386-316-111	Rev	00		Prepared	Checked	Approved
CUSTOMER Doc. No.				NAME	SK	AS	RS
TYPE OF DOC.	TECHNICAL SPECIFICATION			SIGN			
TITLE	AAC BULL CONDUCTOR			DATE	23.02.16	24/02/16	
				GROUP	TBEM		
				W.O. No	85004		

CUSTOMER	POWER GRID CORPORATION OF INDIA LIMITED
PROJECT	SUBSTATION PACKAGE-SS01 FOR EXTENSIONS OF 765kV AJMER S/S AND 765kV CHITORGARH S/S UNDER GREEN ENERGY CORRIDOR ISTS(PARTS B)
NOA Ref:	

List of Contents — No. of Pages

Enclosures:

00					First Issue
Rev.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	CUSTOMER	TBMM	O/C	
	-	1	1	

SECTION – I

SCOPE, SPECIFIC TECHNICAL REQUIREMENT AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of AAC Bull Conductor.

The equipment is required for the following project.

Customer : Power Grid Corporation of India Ltd.
Project : Substation package-SS01 for extensions of 765kV Ajmer S/s and 765kV Chitorgarh S/s under green energy corridor ISTS(Parts B)

1.1 BILL OF QUANTITY

Sl. No	Description	Ajmer	Chitorgarh
1.	**AAC Bull Conductor**	**6.2kM**	**14kM**

Note:

a. The Qty may vary upto ±30% before placement of order.

b. The Qty. May vary by ±20% during contract stage.

1.2 TYPE TESTING

Bidder shall submit valid type test reports (as per relevant IEC/IS Standard) for approval. The type test reports submitted shall be of tests conducted within last 10 years prior to the date of bid opening i.e. **03.02.2015.** The bidder should have conducted type test on identical or similar equipment/ components to those offered. In case type test reports are found to be technically unacceptable to BHEL/PGCIL, the type test shall be conducted without cost and delivery implication to BHEL.

1.3 QUALITY PLAN

Bidder to follow valid PGCIL approved Quality Plan as per PGCIL procedure. In case the bidder don't have PGCIL approved QP, it will be the bidder's responsibility to get its QP approved directly from the ultimate customer.

1.4 DRAWING/DOCUMENTS APPROVAL:

Standardized GTP of POWERGRID is enclsoed as Annexure-B, no approval on GTP is required and inspection shall be carried out as per standardized GTP.

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SECTION – II

TECHNICAL SPECIFICATION

2.1 This section covers the technical requirements of the AAC BULL Conductor.

2.2 TECHNICAL REQUIREMENTS

1. Conductor type : AAC
2. Commercial name item : BULL

2.2.1 The details of the conductor are tabulated below:

a)	Stranding and wire Diameter in mm	61/4.25 mm Al
b)	Number of strands	
c)	1st Aluminium layer	1
d)	2nd Aluminium layer	6
e)	3rd Aluminium layer	12
f)	4th Aluminium layer	18
g)	5th Aluminium layer	24
h)	Sectional area of aluminium	865.36 mm^2
i)	Total sectional area	865.36 mm^2
j)	Overall diameter	38.25 mm
	Linear Mass of the conductor	
k)	standard	2400 kg/km
l)	Minimum	2355 kg/km
m)	Maximum	2445 kg/km
n)	Calculated dc resistance at 20°C	0.0334 ohm/km
o)	Minimum UTS	139 kN
p)	Drum Length	1000m
q)	Tolerance on standard length (%)	(+/ -) 5
r)	Raw Material	
s)	Minimum purity of Aluminium (%)	99.5
t)	Max. Copper content (%)	0.04
u)	Direction of lay of outer layer	Right Hand
v)	Modulus of elasticity (kg/sqmm)	4709(initial) and 5869(final)
w)	Coefficient of linear expansion (/deg C)	$23x10^{-6}$
x)	Minimum corona Extinction Voltage kV rms	508 kV rms
y)	RIV at 1MHz (micro volts)	Less than 1000 at 508kV (rms)

2.2.2 The details of **aluminium strand** are as follows:

i)	Minimum breaking load of strand - before stranding - after stranding	 2.23kN 2.12kN
ii)	Max. D.C. resistance of strand at 20°C	03.651 ohm/km
iii)	Max. resistance of 1 m length of strand at 20°C	0.00203 ohm

2.2.3 Drum Dimensions (Generally conforms to IS-1778)

i)	Flange diameter (mm)	1855
ii)	Traverse width (mm)	925
iii)	Barrel diameter (mm)	850
iv)	Flange thickness (mm)	50x50

2.3 APPLICABLE STANDARDS

The Conductor shall strictly conform to the following Indian and International standards, as appropriate:

IS 398 (Part-V): 1992	Aluminium conductors
IS 8263:1990	Methods for radio interference test
IS 1778:1980	Reels and drums for bare conductors
IS 1521:1991	Method for tensile testing of aluminium wire

2.4 TECHNICAL REQUIREMENT AND CONSTRUCTIONAL DETAILS

2.4.1 The finished conductor shall be smooth, compact, uniform and free from all imperfections including spills and splits, die marks, scratches, abrasion, scuff marks, kinks (protrusion of wires), dents, press marks, cut marks, wire cross over, over riding, looseness (wire being dislocated by finger/hand pressure and/or unusual bangle noise on tapping), material inclusions, white rust, power formation or black spots (on account of reaction with trapped rain water etc.), dirt, grit etc.

2.4.2 All the aluminium strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die-marks, scratches, abrasions and kinks after drawing.

2.5 Joints in wires

2.5.1 Aluminium wires

No joints shall be permitted in the individual wires in the outermost 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 length 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 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 the breaking strength of individual strand guaranteed.

2.6 Tolerances

The manufacturing tolerances to the extent of the following limits only shall be permitted in the diameter of individual aluminium strands and lay-ratio of the conductor.

a) Diameter of aluminium strands after stranding (in millimetres):

	Standard	Nominal	Maximum	Minimum
Aluminium	Al 61/4.25mm	4.25	4.29	4.21

b) Lay ratio of conductor:

		Maximum	Minimum
Aluminium	6-wire layer	16	10
	12-wire layer	16	10
	18-wire layer	16	10
	24-wire layer	14	10

2.7 Materials

2.7.1 Aluminium

The aluminium strands shall be hard drawn from electrolytic aluminium rods having purity not less than 99.5% and a copper content not exceeding 0.04%

2.8 Standard length

The conductor shall be supplied in lengths as required.

2.9 Tests:

The following type, acceptance and routine tests and tests during manufacturing shall be carried out on the conductor.

2.9.1 Type Tests

The following type test reports conducted within past 10years as on 03.02.15 shall be submitted

UTS test	139 kN (Min)
Corona extinction voltage test (dry)	508 kV rms
Radio interference voltage test (dry)	Less than 1000 micro Volts at 508 kV
DC resistance test of Conductor at 20 degree C	0.0334 ohm/km

2.9.2 Acceptance tests

a)	Visual check for joints, scratches, etc. and lengths of conductor	As per clause No. 2.10.6 below
b)	Dimensional check on strands	As per clause No. 2.10.7 below
c)	Check for lay ratio of various layers	As per clause No. 2.10.8 below
e)	Torsion and elongation test on Aluminium strands	As per clause No. 2.10.9 below
f)	Breaking load test on strands	As per clause No. 2.10.10 below

In addition wrap test on aluminium strands, DC resistance test on aluminium strands and UTS test on welded joint of aluminium strands shall be carried out as per clauses 12.5.2,12.7& 12.8 respectively of IS:398 (part V)1982.

NOTE:

All the above tests except test mentioned at (a) shall be carried out on aluminium after stranding only.

2.9.3 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) All acceptance tests as mentioned in clause 2.9.2 above to be carried out on each coil.

2.9.4 Tests during manufacture

a)	Chemical analysis of aluminium used for making aluminium strands	As per clause No. 2.10.5

2.9.5 Sample batch for type testing

The bidder shall offer material for selection of samples for type testing, only after getting quality assurance plans approved from owner's quality assurance department. The sample

shall be manufactured strictly in accordance with the quality assurance plan approved by owner.

2.10 TESTING PROCEDURE FOR AAC BULL CONDUCTOR

2.10.1 UTS Test on Stranded Conductor

Circles perpendicular to the axis of the conductor shall be marked at two places on a sample of conductor of minimum 5 m length suitably compressed with dead end clamps at either end. The load shall be increased at a steady rate up to 50% of minimum specified UTS and held for one minute. The circles drawn shall not be distorted due to relative movement of strands. Thereafter the load shall be increased at a steady rate to 100% of minimum specified and held for one minute. The applied load shall then be increased until the failing load is reached and the value recorded.

2.10.2 Corona Extinction Voltage Test

Two samples of conductor of 5m length shall be strung with a spacing of 450 mm between them at a height not exceeding 8.0 m above ground. This assembly shall be tested as per Annexure-A, corona extinction voltage shall not be less than 508 kV (rms) Line to ground for 765kV & system.

2.10.3 Radio Interference Voltage Test

The sample assembly similar to that specified under (2:10.2) above shall be tested as per annexure-A. Maximum RIV level (across 300 ohm resistor at 1 MHz) at 508 kV (rms) line to ground voltage shall be 1000 μV.

2.10.4 D.C Resistance Test on Stranded Conductor

On a conductor sample of minimum 5 m length two contact clamps shall be fixed with a pre-determined bolt torque. The resistance shall be measured by a Kelvin double bridge by placing the clamps initially zero meter and subsequently one meter apart. The test shall be repeated at least five times and the average value recorded. The value obtained shall be corrected to the value at 20^0C as per clause no. 12.8 of IS:398 (Part V)-1982.The resistance corrected at 20^0C shall conform to the requirements of this specification.

2.10.5 Chemical Analysis of Aluminium

Samples taken from the Aluminium ingots/ coils/ strands shall be chemically/ spectrographically analyzed. The same shall be in conformity to the requirements in this specification.

2.10.6 Visual Check for Joints, Scratches etc.

Conductor drums shall be rewound in the presence of the inspector. The inspector shall visually check for scratches, joints, etc. and that the conductor generally conforms to the requirements of this specification. The length of conductor wound on the drum shall be measured with the help of counter meter during rewinding.

2.10.7 Dimensional Check for Aluminium Strands .

The individual strands shall be dimensionally checked to ensure that they conform to the requirements of this specification.

2.10.8 Check for Lay –ratios of various Layers.

The lay-ratios of various layers shall be checked to ensure that they conform to the requirements of this specification and clause no. 9.4 and 9.5 of IS-398 (Part-V) 1982.

2.10.9 Torsion and Elongation Tests on Steel Strands

The test procedures shall be as per relevant clauses of IS 398 (Part V): 1982. In torsion test, the number of complete twists before fracture shall not be less than 18 on a length equal to 100 times the standard diameter of the strand before stranding & 16 after stranding. In case test sample length of less or more than 100 times the standard diameter of the strand, the minimum number of twist will be proportionate to the length and if number comes in the fraction then it will be rounded off to next higher whole number. In elongation test, the elongation of the strand shall not be less than 4% for a gauge length of 200 mm.

2.10.10 Breaking load test on welded Aluminium strand:

Two Aluminium wires shall be welded as per the approved quality plan and shall be subjected to tensile load. The welded point of the wire shall be able to with stand the minimum breaking load of the individual strand guaranteed by the bidder.

ANNEXURE-A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & above) both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV) for 132kV above.

2. Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3. Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency with 10% of 0.5 Mhz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be in accordance with NEMA standard Publication No. 107-1964, except otherwise noted herein.

3.3 In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, and 110% of the specified RIV test voltage for all equipment unless otherwise specified.The specified RIV test voltage for 765kV, 400 kV, 220 KV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5 The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noisel meter.

4. Test Methods for Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 110% of specified corona

extinction voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped, otherwise test shall be continued and the voltage will then be decreased slowly until all visible corona disappears. The procedure shall be repeated at least 4 times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, and 110%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall be photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

For recording purpose, modern devices utilizing UV recording methods such as image intensifier may also be used.

4.1 The test shall be recorded on each photograph. Additional photograph shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.

4.2 In addition to photographs of the test object preferably four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Purchaser's inspector, after determining the best camera locations by trial energisation of test object at a voltage which results in corona.

4.3 The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.

4.4 However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Purchaser's inspector if, in his opinion, it will not prejudice other test.

5. Test Records:

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

a) Background noise before and after test.

b) Detailed procedure of application of test voltage.

c) Measurements of RIV levels expressed in micro volts at each level.

d) Results and observations with regard to location and type of interference

sources detected at each step.

e) Test voltage shall be recorded when measured RIV passes through 100microvolts in each direction.

f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

6. POWERGRID STANDARDIZED GTP: As per Annexure-B of this specification.

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SECTION-3
PROJECT DETAILS & GENERAL SPECIFICATION

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1. SITE INFORMATION

	Particular	Details
a)	Owner	POWERGRID
b)	Customer	POWERGRID
c)	Project Title	Substation package-SS01 for extensions of 765kV Ajmer S/s and 765kV Chitorgarh S/s under green energy corridor ISTS(Parts B)
d)	Location	Ajmer-Rajasthan Chitorgarh-Rajasthan
e)	Transport Facilities	RAOD/TRAIN
	SITE CONDITIONS	
a)	Max. ambient air temp.	50°C
b)	Min. ambient air temp.	0°C
c)	Max. design ambient temp.	50°C
d)	Design reference temp.	50°C
e)	Average Humidity	Max. 100%
f)	Special corrosion conditions	No
g)	Solar Radiation	1.2kW/sqmtr
h)	Atmospheric UV radiation	High
i)	Altitude above sea level	Less than 1000meter
j)	Pollution Severity	High Polution (25mm/kV)
k)	Seismic Zone	As per the seismic zone defined in the relevant BIS but not less than 0.3g horrizontal
	WIND DATA	
	Wind velocity	As per IS
	Average No. of thunderstorm days per annum	As per IS
	Main Electrical Parameters:	
	Fault Levels:	**For** both Ajmer and Chitorgarh 765kV: **40kA for 1 sec**
	Creepage Distance	**25mm/kV**

SECTION IV

TECHNICAL CHECK LIST

(INFORMATION TO BE FURNISHED WITH OFFER)

RETURN THIS CHECKLIST AS THE PART OF THE OFFER DULY SIGNED BY THEM.

S.No.		Confirmation Yes/No	Remarks
1.	Compliance to Powergrid GTP enclosed with specification		
2.	Powergrid approved valid Manufacturing Plan (pls mention date till it is valid)		
3.	Powergrid approved type test report (pls check the date of validity wrt to 03.02.15)		

Date:
Place:
Phone:
Fax:
E-mail:
Mobile:
Website:

ANNEXURE - 1

SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Page No.	Clause No.	Deviation	Reason / Justification

Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Tenderer's Stamp & Signature

STANDARD GTP OF AAC BULL CONDUCTOR

Doc No- TB-386-316-111 ,Rev-0

SECTION - (SE)
SWITCHYARD ERECTION

ANNEXURE-B

STANDARD TECHNICAL DATA SHEETS FOR AAC/~~ACSR~~ CONDUCTORS, GS EARTHWIRE AND ALUMINIUM TUBE

1.0 GENERAL

Employer has stardardised the guaranteed technical particulars for the following AAC/~~ACSR~~ conductors, Galvanised steel earthwire and aluminum tube. The contractor shall supply the conductors as per the standard GTP mentioned below. Any deviation to the following GTP shall be clearly brought out by the bidder in their bid.

1.1 Guaranteed Technical Particulars (GTP) for conductors:

A. **GTP of AAC BULL and AAC TARANTULA conductor:**

Sl.	Description	Unit	AAC BULL ✓	AAC TARANTULA
1.0	**Applicable Standard**		IS:398	
2.0	**Raw Materials**			
2.1	Steel Wire / Rods			
2.1.1	Aluminium			
a)	Minimum purity of Aluminium	%	99.50	99.50
b)	Maximum copper content	%	0.04	0.04
3.0	**Aluminum strands after stranding**			
3.1	Diameter			
a)	Nominal	mm	4.25	5.23
b)	Maximum	mm	4.29	5.28
c)	Minimum	mm	4.21	5.18
3.2	Minimum breaking load of strand			
a)	Before stranding	KN	2.23	3.44
b)	After stranding	KN	2.12	3.27
c)	Maximum D.C. resistance of strand at 20 deg. Centigrade	Ohm /KM	3.651	3.627
3.3	Maximum resistance of 1 m length of strand at 20 deg. C	Ohm	0.00203	0.001341
4.0	**AAC Conductor**			
4.1. a)	Stranding		Al – 61/4.25 mm	Al – 37/ 5.23 mm
b)	Number of Strands			
i.	1st Aluminium Layer	Nos.	1	1
ii.	2nd Aluminium Layer	Nos.	6	6

ANNEXURE-B

Sl.	Description	Unit	AAC BULL	AAC TARANTULA
iii.	3rd Aluminium Layer	Nos.	12	12
iv.	4th Aluminium Layer	Nos.	18	18
v.	5th Aluminium Layer	Nos.	24	-
4.2	Sectional Area of aluminium	Sq. mm	865.36	794.80
4.3	Total sectional area	Sq. mm	865.36	794.80
4.4	Approximate Weight	Kg/m	2.4	2.191
4.5	Diameter of the conductor	mm	38.25	36.60
4.6	UTS of the conductor	kN	139 (Min.)	120 (Min.)
4.7	Lay ratio of the conductor	mm	Max Min	Max Min
a)	6 wire Aluminium layer	mm	16 10	16 10
b)	12 wire Aluminium layer	mm	16 10	16 10
c)	18 wire Aluminium layer	mm	16 10	14 10
d)	24 wire Aluminium layer	mm	14 10	- -
4.8	DC resistance of the conductor at 20℃	ohm/ km	0.03340	0.03628
4.9	Standard length of the conductor	m	1000	1000
4.10	Tolerance on Standard length	%	(+/-) 5	(+/-) 5
4.11	Direction of lay of outer layer		Right Hand	Right Hand
4.12	Linear mass of the conductor			
a)	Standard	kg/ km	2400	2192
b)	Minimum	kg/ km	2355	2150
c)	Maximum	kg/ km	2445	2234
4.13	Modulus of Elasticity	Kg/sq .mm	4709 (Initial) 5869 (Final)	4709 (Initial) 5869 (Final)
4.14	Co-efficient of Linear Expansion	Per Deg. C	$23.0x10^{-6}$	$23.0x10^{-6}$
4.15	Minimum Corona Extinction Voltage	KV (rms)	508	320
4.16	RIV at 1 Mhz	Micro volts	Less than 1000 at 508 kV (rms)	Less than 1000 at 320 kV (rms)
5.0	**Drum Dimensions**		Generally conforms to IS:1778	

ANNEXURE-B

Sl.	Description	Unit	AAC BULL	AAC TARANTULA
a)	Flange Diameter	mm	1855	1855
b)	Traverse width	mm	925	925
c)	Barrel Diameter	mm	850	850
d)	Flange thickness	mm	50x50	50x50

B. GTP of ACSR BERSIMIS and ACSR MOOSE conductor:

Sl.	Description	Unit	ACSR BERSIMIS	ACSR MOOSE
1.0	**Applicable Standard**		IS:398 / IEC - 1089	
2.0	**Raw Materials**			
2.1	Aluminium			
a)	Minimum purity of Aluminium	%	99.50	99.50
b)	Maximum copper content	%	0.04	0.04
2.2	Steel wires/ rods			
a)	Carbon	%	0.50 to 0.85	0.50 to 0.85
b)	Manganese	%	0.50 to 1.10	0.50 to 1.10
c)	Phosphorous	%	Not more than 0.035	Not more than 0.035
d)	Sulphur	%	Not more than 0.045	Not more than 0.045
e)	Silicon	%	0.10 to 0.35 (Max.)	0.10 to 0.35 (Max.)
2.3	Zinc			
a)	Minimum purity of Zinc	%	99.95	99.95
3.0	**Aluminum strands after stranding**			
3.1	Diameter			
a)	Nominal	mm	4.57	3.53
b)	Maximum	mm	4.61	3.55
c)	Minimum	mm	4.53	3.51
3.2	Minimum breaking load of strand			
a)	Before stranding	KN	2.64	1.57
b)	After stranding	KN	2.51	1.49
c)	Maximum D.C. resistance of strand at 20 deg. Centigrade	Ohm/ KM	1.738	2.921
3.3	Maximum resistance of 1 m length of strand at 20 deg. C	Ohm	0.001738	0.002921