Enquiry

Bharat Heavy Electricals Limited
Transmission Business Group
Materials Management

Project : RRVUNL SURATGARH

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	
274E052	23-Jun-14	0		342230197	Package		18-Jul-14			

Document Enclosed

- Technical Specifications
- Terms & Conditions for Indigenous Enquiry
- Activity Schedule
- Schedule of Commercial Deviation
- Schedule of Technical Deviation

SN	Equipment	Phy Unit	Qty	Unit Exworks	Unit Packing	% ED	% CST	% VAT	Unit F&I	Plan Dt	Comments
1	OVER HEAD CONDUCTORS ACSR MOOSE	KM	84							30-Aug-14	REFER ATTACHED DOC. 005, REV-0 FOR DETAILE TECHNICAL REQUIREME

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS NOT R 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 AND/OR 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 is rece considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will not be e

YOU ARE REQUESTED TO SUBMIT YOUR MOST COMPETITIVE OFFER SO AS TO REACH US POSITIVELY BY 2 PM ON THE TENDER O 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 SEND T 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 CONVENTIC FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE 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 EVALUATION PU

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

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 system.
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 MICRO & SM ENTERPRISE UNDER MICRO, SMALL AND MEDIUM ENTERPRISES DEVELOPMENT ACT 2006, HAVE TO SUBMIT A COPY OF SUCH RE 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.

for BHARAT HEAVY

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
Distt. Gautam BudhNagar,U.P

Ph: 0120-6748471
Fax: 0120-6748581

Signature and

Enquiry No : 274E052 **Enquiry Dt :** 23-Jun-14

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-360-316-005	Rev no.-00	Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION	NAME	SK	SKS	SS
TITLE		SIGN			
SPECIFICATION FOR ACSR MOOSE CONDUCTOR		DATE	24.08.13	26/08/13	26/8/13
		GROUP	TBEM	W.O. No	83001
CUSTOMER/ CONSULTANT	Rajasthan Rajya Vidyut Utpadan Nigam Ltd. , Jaipur / Tata consulting Engineer Ltd. , Bangalore				
PROJECT	2X660MW Super –Critical Thermal Power Station, Stage –V, Unit 7 & 8-400kV Switchyard at Suratgarh				

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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	To	TBTS	O/C	TBMM	TBQM	TBCM
	Copies	-	1	3	-	-

SECTION 1
SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.1 SCOPE:

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of ACSR Moose conductor complete with accessories as listed under this specification.

This section covers the specific technical requirements of ACSR Moose Conductor . This constitutes minimum technical parameters for the above item as specified by the customer (RRVUNL). The offered equipment shall also comply with the General Technical Requirements for the project as detailed under section-3 of this specification.

The specification comprise of following sections:
Section-1: Scope, specific technical requirements & Bill of Quantities.
Section-2: Equipment specification under scope of supplies.
Section-3: General technical requirements for all equipments under the project.
Section-4: Equipment Data Sheet
In case of any conflict between various sections, order of precedence shall be in the same order as listed above.

The equipment is required for the following project:

Name of customer : Rajasthan Rajya Vidyut Utpadan Nigam Ltd., Jaipur.

Name of Consultant : Tata consulting Engineer Ltd., Bangalore

Name of the project : 2X660MW Super –Critical Thermal Power Station, Stage – V, Unit 7 & 8-400kV Switchyard at Suratgarh

1.2 SPECIFIC TECHNICAL REQUIREMENTS: As per section -2

1.3 QUANTITIES:

Sl. no.	Description	Unit	Qty.
1.	ACSR moose conductor	Km	84

Note-1 The Quantities indicated above is subject to change by ±30%

1.4 TYPE TESTS:

Bidder shall submit valid type test reports (as per relevant IEC/IS standard) for the tests carried out within last five years **from the date of opening of the tender** (i.e. 03.12.2012). The reports should have been conducted on identical or similar equipment/components to those offered. In case type test reports are more than 5 years old (from the date of opening of the tender) or the reports of type tests are found to be technically unacceptable , the type test shall be conducted by the vendor without cost and delivery implication to BHEL. The type test if conducted shall be witnessed by BHEL/Customer.

1.5 INSPECTION & TESTING:

Before being fitted on the equipment, all components shall be subjected to routine tests at the Contractors factory, as per the relevant IEC/IS standards. A detailed test report proving the successful passing of such tests shall be provided.

Prior to dispatch, the routine & acceptance tests shall be carried out on equipment in accordance with the applicable IEC /IS and the material shall be offered for final inspection to BHEL and RRVUNL in accordance with agreed quality plan with 3 weeks advance information.

1.6 QUALITY PLAN:

The contractor shall carry out contract works in accordance with sound quality management principles which shall include such as controls which are necessary to ensure full compliance to all requirements of the specification & applicable international standards. These quality management requirement shall apply to all activities during design, procurement, manufacturing, inspection, testing, packaging, shipping, inland transportation, storage, site erection & commissioning. Contractor shall submit detailed Quality Plan for BHEL / customer's approval within 1 week of P.O. placement.

SECTION – 2

STANDARD TECHNICAL SPECIFICATION

2.1 This section covers the standard technical requirements of the ACSR MOOSE Conductor. In case of any discrepancies between the requirements mentioned in this section and those specified in other sections of this specification, the later shall prevail and shall be treated as binding requirements.

2.2 TECHNICAL REQUIREMENTS

1. Conductor type : ACSR
2. Commercial name item : MOOSE

2.2.1 The details of the conductor are tabulated below:

a)	Stranding and wire Diameter in mm	54/3.53 mm Al+7/3.53 Steel
b)	Number of strands	
	Steel center	1
	1st steel layer	6
	1st Aluminium layer	12
	2nd Aluminium layer	18
	3rd Aluminium layer	24
c)	Sectional area of aluminium	528.5 mm^2
d)	Total sectional area	597.00 mm^2
e)	Overall diameter	31.77 mm
f)	Approximate weight	2004 kg/km
g)	Calculated d.c. resistance at 20°C	0.05552 ohm/km
h)	Minimum UTS	161.2kN
i)	Drum Length	Tentative 1800m (but actual drum length shall be intimated during contract stage)

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

i)	Minimum breaking load of strand - before stranding - after stranding	 1.57kN 1.49kN
ii)	Max. D.C. resistance of strand at 20°C	2.921 ohm/km

2.2.3 The details of steel strand are as follows:

i)	Minimum breaking load of strand - before stranding - after stranding	 12.86 kN 12.22 kN
ii)	Minimum number of twist to be withstood in torsion test when tested on a gauge length of 100 times diameter of wire	18-before stranding 16-after stranding

2.3 APPLICABLE STANDARDS

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

IS 398 (Part-V): 1992	Aluminium conductors galvanized Steel reinforced
IS 2629:1990	Recommended practice for hot dip galvanizing on iron and steel.
IS 4826:1992	Hot dip galvanized coatings on round steel wires
IS 2633:1992	Method for testing uniformity of coating of zinc--coated articles.
IS 6745: 1990	Methods for determination of mass of Zinc coating on zinc coated iron and steel articles
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 steel 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 and steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die-marks, scratches, abrasions and kinks after drawing.

2.4.3 The steel strands shall be hot dip galvanized and shall have a minimum Zinc coating of 260 gm/m^2 after stranding of the uncoated wire surface. The zinc coating shall be smooth, continuous and of uniform thickness, free from imperfections and shall withstand minimum three dips after stranding in standard Preece Test. The finished strands and the individual wires shall be of uniform quality and have the same properties and characteristic as prescribed in ASTM designation: B 498-74.

2.4.4 The steel strands shall be preformed and post-formed in order to prevent spreading of strands in the event of cutting of composite core wire. Care shall be taken to avoid damage to galvanization during pre-forming and post-forming operation.

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 Aluminium layers of the conductor but these joints shall be made by cold pressure butt welding and shall be such that no such joints are within 15 metres of each other in the complete stranded conductor.

2.5.2 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 splices in any length of the completed stranded steel core of the conductor.

2.6 Tolerances

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

a) Diameter of aluminium and steel strands (in millimeters):

	Standard	Maximum	Minimum
Aluminium	3.53	3.55	3.51
Steel	3.53	3.60	3.46

b) Lay ratio of conductor:

		Maximum	Minimum
Steel	6-wire layer	18	16
Aluminium	12-wire layer	14	12
	18-wire layer	13	11
	24-wire layer	12	10

2.7 Materials

2.7.1 Aluminium

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

2.7.2 Steel

The steel wire strands shall be drawn from high carbon steel wire rods and shall conform to the following chemical composition:

Element	-	**% composition**
Carbon	-	0.50 to 0.85
Manganese	-	0.50 to 1.10
Phosphorous-	-	not more than 0.035
Sulphur	-	not more than 0.045
Silicone	-	0.10 to 0.35

2.7.3 Zinc

The zinc used for galvanizing shall be electrolytic high grade zinc of 99.95% purity. It shall conform to and satisfy all the requirements of IS: 209-1979.

2.8 Standard length

The conductor shall be supplied in lengths as required generally in the range of 1500/ 1800 metres.

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

In accordance with the stipulation of specification, the following type test reports but not limited to this shall be submitted as per relevant IS.

a)	UTS test	As per clause No. 2.10.1 below (The number of samples shall be mutually agreed)
b)	Corona extinction voltage test (dry)	As per clause No. 2.10.2 below
c)	Radio interference voltage test (dry)	As per clause No. 2.10.3 below
d)	DC resistance test	As per clause No. 2.10.4 below

2.9.2 Acceptance tests

a)	Visual check for joints, scratches, etc. and lengths of conductor	As per clause No. 2.10.7 below
b)	Dimensional check on strands	As per clause No. 2.10.8 below
c)	Check for lay ratio of various layers	As per clause No. 2.10.9 below
d)	Galvanizing test on steel strands	As per clause No. 2.10.10 below
e)	Torsion and elongation test on steel strands	As per clause No. 2.10.11 below
f)	Breaking load test on strands	As per clause No. 2.10.12 below
g	wrap test on steel and aluminium strands	-

In addition 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 and steel strands 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 test 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 zinc used for galvanizing	As per clause No. 2.10.5
b)	Chemical analysis of aluminium used for making aluminium stands	As per clause No. 2.10.6
c)	Chemical analysis of steel used for making steel strands	As per clause No. 2.10.6

2.9.5 Sample batch for type testing

The contractor 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 ACSR MOOSE 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 80 kN 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 161.2 kN 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 Section 3, corona extinction voltage shall not be less than 320kV (RMS) Line to ground for 400 kV system.

2.10.3 Radio Interference Voltage Test

The sample assembly similar to that specified above shall be tested as per Section 3. Maximum RIV level (across 300 ohm resistor at 1 MHz) at 305 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 Zinc

Samples taken from the zinc ingots shall be chemically/spectrographically analysed. The same shall be in conformity to the requirements stated in this specification.

2.10.6 Chemical Analysis of Aluminium and Steel

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.

2.10.7 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.

2.10.8 Dimensional Check for steel and Aluminium Strands.

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

2.10.9 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.

2.10.10 Galvanising Test

The test procedure shall be as specified in IS: 4826-1968. The material shall conform to the requirements of this specification.

2.10.11 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.

2.10.12 Breaking load test on welded Aluminium stand:

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.

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SECTION-3

3.0 GENERAL

This section stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.
The provisions under this section are intended to supplement general requirements for the materials, equipments and services covered under other respective sections and are not exclusive. However in case of conflict between the requirements specified in this section and requirements specified under other sections, the requirements specified under respective sections shall hold good.

3.1 PROJECT INFORMATION AND SYSTEM PARAMETERS

a)	Customer/ Purchaser/ Owner	Rajasthan Rajya Vidyut Utpadan Nigam Ltd., Jaipur
b)	Consultant	Tata consulting Engineer Ltd., Bangalore
c)	Project Title	2X660MW Super –Critical Thermal Power Station, Stage –V, Unit 7 & 8-400kV Switchyard at Suratgarh
d)	Location	Prabat Nagar, Suratgarh Sriganganagar district, Rajasthan
e)	Altitude and longitude	Lattitude:29 deg. 10 min. N Longitude: 74 deg. 01 min. E
f)	Elevation above mean sea level	186 m(approximately)
g)	Transport Facilities	Suratgarh project is located 27 km from Suratgarh, 15 km from Suratgarh to Biradhwal on NH15,12km in east from NH15.
h)	Postal Address	To follow
SITE CONDITIONS		
a)	Mean of daily maximum temperature	32.3 deg. C
b)	Mean of daily minimum temperature	19.6 deg. C
c)	Highest temperature recorded	50 deg. C
d)	Lowest temperature recorded	-2.8 deg. C
e)	Design ambient temperature for electrical equipment design	50 deg. C
f)	Relative humidity	Varies between 21 % and 81%
g)	Pollution Severity	Heavily Polluted
h)	Seismic zone	II

i)	Basic Wind speed	47 m/sec
j)	Annual mean wind speed	4km/hr
k)	Terrain category	2
l)	Annual average rain fall	312 mm

SYSTEM PARAMETERS

Nominal system voltage	**400 kV**	**11kV**
Highest system voltage	420 kV	12kV
Basic Impulse level(dry /wet)	1425kVP	75kVP
Power frequency withstand voltage	630kVrms	28kVrms
Switching Impulse withstand voltage	1050 kVP	NA
Rated short time current	50 kA for 3 sec	40 kA for 3 sec
Frequency	50 Hz	50 Hz
Creepage distance	31mm/kV	31mm/kV
System Earthing	Effectively Earthed	Effectively Earthed

3.2 GENERAL TECHNICAL REQUIREMENT

3.2.1 TYPE TESTS

All equipment/systems to be supplied shall conform to type tests as per relevant standards and proven type. The Bidder / Contractor shall furnish the reports of all the type tests carried out within last **five years from the date of opening of the tender** (i.e. 03.12.2012) as listed in relevant clauses in respective electrical specification and relevant standards for all components / equipment / systems. These reports should be for the tests conducted on identical/ similar components /equipment/systems to those offered / proposed to be supplied under this contract.

Type tests done in an independent government laboratory or in the presence of representative of State Electricity Board or other reputed public undertakings, the type test reports of the same shall be submitted for scrutiny /approval. If these are found suitable and technically acceptable, conducting of type tests shall be waived off.

In case Contractor is not able to submit report of type test(s) conducted in last five years, or in case type test report(s) are not found to be meeting the specification/relevant standard requirements, then all such tests shall be conducted under this contract by the Bidder free of cost to Employer/Purchaser, and reports shall be submitted for approval. No charges shall be paid

under this contract. All acceptance and routine tests as per relevant standards and specification shall be deemed to be included in the bid price.

3.2.3 CODES AND STANDARDS

All materials and equipment shall generally comply in all respect with the latest edition of relevant international electro-technical commission (IEC) or any other internationally accepted standard which ensure equal or better quality or relevant Indian standard(IS) mentioned against each equipment and this specification.

3.3 MATERIAL/WORKMANSHIP

3.3.1 General Requirement

Where the specification does not contain characteristics with reference to workmanship, equipment, materials and components of the covered Equipment it is understood that the same must be new, of highest grade of the best quality of their kind conforming to best engineering practice and suitable for the purpose for which they are intended.

The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements and shall be used throughout the design. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfill their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall be interchangeable with, and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be constructed as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, leveling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances and instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacture's limits suitable guards shall be provided for the protection of personal on all exposed rotating and / or moving

machine parts and shall be designed for easy installation and removal for maintenance purpose. The spare equipment(s) shall be installed at designated locations and tested for healthiness.
The Contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Contractor shall apply all operational lubricants to the equipment installed by him.
All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Contractor has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare in the proposal, where such oil or grease is available. He shall help purchaser in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

3.3.2 Provisions For Exposure to Hot and Humid climate

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favorable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

3.4 COLOUR SCHEME AND CODES FOR PIPE SERVICE/PANELS

The contractor shall propose a color scheme for those equipment/Items for which the colour scheme has not been specified in the specification for the approval of purchaser. The decision of purchaser shall be final. The scheme shall include:

Finishing colour of Indoor equipment

Finishing colour of Outdoor equipment.

Finish colour of all cubicles.

Finishing colour of various auxiliary system equipment including piping

Finishing colour of various building items.

All the steel works shall be thoroughly cleaned of rust , scale , oil , grease, dirt and scarf by pickling , emulsion cleaning , etc. The sheet steel shall be phosphated /oven dried and then painted with two coats of zinc rich primer paints . After application of the primer, two coats of finished synthetic enamel paint shall be applied. The colour of the finished coats inside shall be **glossy white** and exterior of the treated sheet steel shall be **shade 631 of IS 5 /RAL 7032** for all switchboard /MCC/distribution board , control panels etc.

Sufficient quantities of touch paint shall be furnished for application at site. All the indoor cubicles shall be the same as exterior surface and for other miscellaneous items, colour scheme

will be approved by the purchaser.

3.5 PROTECTION

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner. Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

3.6 FUNGI-STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish.

3.7 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or other wise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

3.8 GALVANIZING

All ferrous parts including all sizes of nuts, bolts, Plain and spring washers, support channels, structures, shall be hot dip galvanized conforming to latest version of IS:2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvanized. Minimum weight of zinc coating shall be **610 gm/sq.m** and minimum thickness of

coating shall be 85 microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM. Average weight of zinc coating shall be **750gm/sq.m.**

3.9 PACKING

The following details are to be clearly indicated in the material forwarding documents:

a) Name and address of the consignee.
b) Purchase order number.
c) Name of supplier/s.
d) Description of equipment / material.
e) Net weight.
f) Gross weight.

All the equipments 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. On request of the purchaser, the Contractor shall also submit packing details/associated drawing for any equipment material under his scope of supply, to facilitate the purchaser to repack any equipment/ material at a later date, in case the need arises. Any material found short inside the packing cases shall be supplied by the supplier without any extra cost. The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbol i.e. fragile, handle with care, use no Hooks etc.

3.10 HANDLING, STORING AND INSTALLATION

Contractor may engage manufacturer's Engineers to supervise if required for unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the purchaser. Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

Where assemblies are supplied in more than one section, contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning.

Contractor shall be responsible for examining all the shipment immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. Any demurrage, pilferage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. The Contractor shall be fully responsible, for the equipment/material until the same is handed over to the purchaser in an operating condition after commissioning.

The minimum phase to earth, phase to phase and section clearance along-with other technical parameters for the various switchyard voltage levels to be maintained shall be strictly as per the approved drawings.

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances, the Contractor shall immediately proceed to correct the discrepancy at his risks and costs.

3.11 DEGREE OF PROTECTION

The enclosures of the Control Cabinets, Junction boxes and Marshalling boxes panels etc to be installed shall be provided with degree of protection as detailed here under:

a) Installed out door: IP-55

b) Installed indoor in air conditioned area: IP-42

c) Installed in covered area IP:52

d) For LT switchgear (AC & DC distribution Boards): IP-54

The degree of protection shall be in accordance with IS:13947, (Part-1)/IEC-947(Part-1). Type test report/or degree of protection test on each type of the box shall be submitted for approval.

3.12 RATING PLATES, NAME PLATES AND LABELS

Type or serial number together with details of the loading conditions under which the item of the substation in question has designed to operate and such diagram plates as may be required by the Purchaser. The rating plate of each equipment shall be according to IEC requirements.

All such nameplate instruction plates, rating plates shall be bilingual with Hindi inscription first followed by English. Alternately two separate plates one with Hindi and other with English inscriptions may be provided.

3.13 EARTHING

Circuit breakers, LA, Isolator, CVT , CT , BPI shall be provided with two grounding pads suitable for connection to galvanized steel flat. Control panels, Relay panel, outdoor marshalling boxes, Junction boxes, Lighting panels and distribution board shall be provided with two grounding pads, for connection to galvanized steel flat. The two pads shall be provided, one each at the middle of the two opposite sides of the bottom frame of the equipment. Earthing of hinged door shall be done by using a separate earth wire.

3.14 QUALITY

BHEL quality plan to be followed subject to TBEM / customer's approval.

3.15 DOCUMENTATION

3.15.1 LIST OF DOCUMENTS

The bidder shall submit a detailed list of drawings / documents along with the bid proposal which he intends to submit to the Employer after award of the contract.

The supplier shall necessarily submit all the drawings / documents unless any thing is waived.

All engineering data submitted by the Contractor after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under this specification shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

3.15.2 DRAWINGS

All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, the external connections, fixing arrangement required, the dimensions required for installation and interconnections with other equipments and materials, clearances and spaces required for installation and interconnection between various portions of equipments and any other information specifically requested in the specifications.

Each drawing submitted by the Contractor shall be clearly marked with the name of the Employer, name of consultant, the unit designation, RRVUNL contract no. and the name of the Project .If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

Further work by the Contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the Employer if so required.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the Contractor's risk. The Contractor may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of Contractor's drawing or work by the Employer shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

3.15.3 APPROVAL PROCEDURE

The scheduled dates for the submission of these as well as for, any data/information to be furnished by the Employer would be discussed and finalised at the time of award. The supplier shall also submit required no. of copies as mentioned in this specification of all drawings/design documents/test reports for approval by the Employer. The following schedule shall be followed generally for approval.

i.	Approval/comments/by employer on Initial submission	Within 3 weeks of receipt
ii.	Resubmission	Within 2 (two) weeks (whenever from date of comments required) Including both ways postal time.
iii.	Approval or comments	Within 2 weeks of receipt of resubmission
iv.	Furnishing of distribution copies	2 weeks from the date of last approval.

Note: The contractor may please note that all resubmissions must incorporate, all comments given in the submission by the Employer failing which the submission of documents is likely to be returned. Every revision shall be a revision number, date and subject, in a revision block provided in the drawing, clearly marking the changes incorporated.

The title block of drawings shall contain the following information incorporated in all contract drawings. Please refer enclosed sheet for details of Title block.

3.15.4 DOCUMENTS TO BE SUBMITTED ALONGWITH OFFER

1) Drawings
2) Guaranteed Technical Particulars
3) Type Test Reports
4) Manufacturing Quality Plan

3.15.5 DOCUMENTATION SCHEDULE

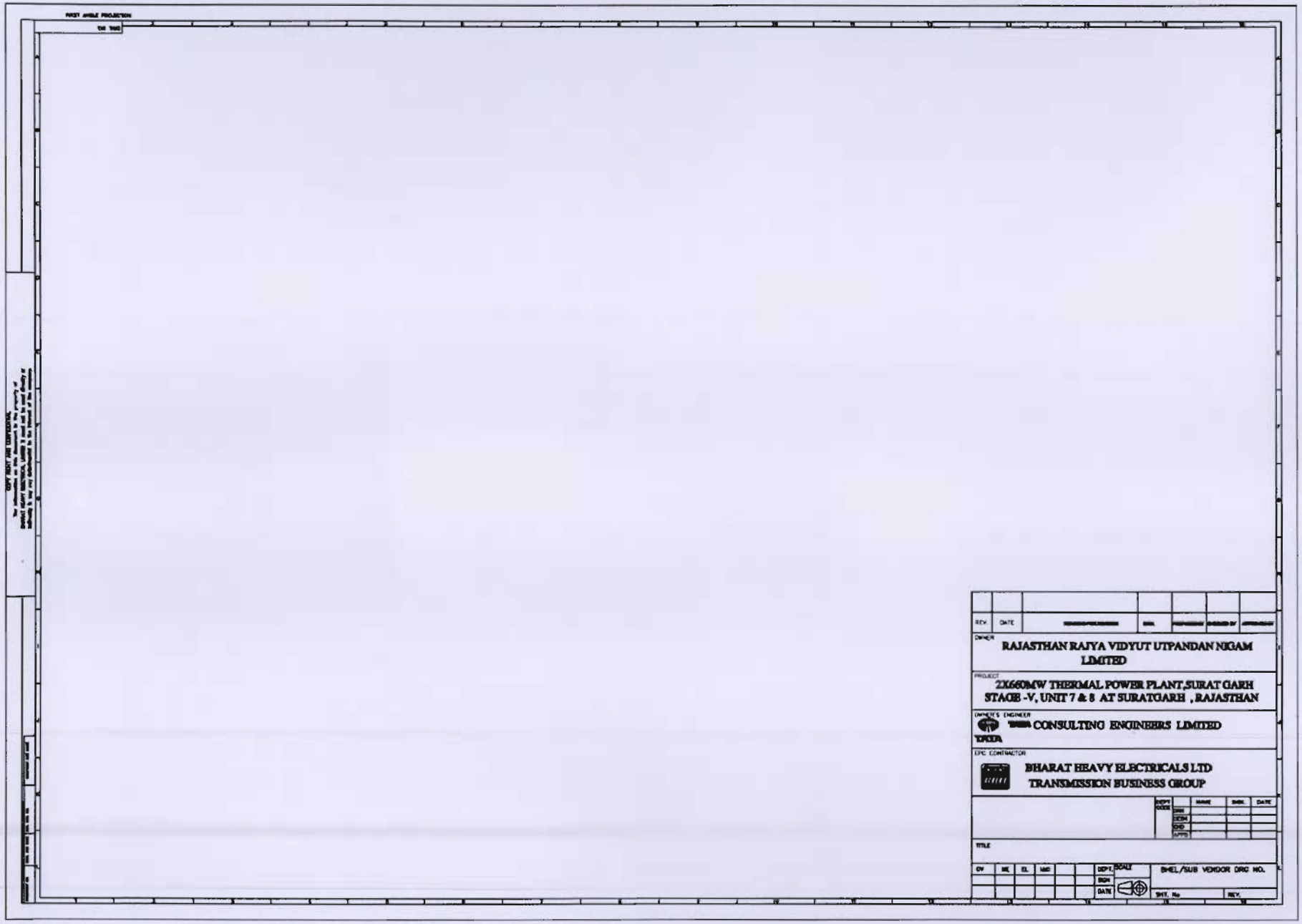
S. No.	DESCRIPTION	TENDER STAGE	CONTRACT STAGE FOR APPROVAL	FINAL DOCUMENTATION	
			Prints	Prints	CDs
1	Drawings and Data Sheets	1	7	8	-
2	Drawings "As Built"	-	-	8	05
3	Type Test Reports	1	3	4	-
4	Erection Manuals	-	7	8	-

5	Operation and Maintenance Manuals	-	7	8	-
6	Manufacturing Quality Plan	1	7	8	-
7	Field Quality Plan	1	7	8	-
8	Inspection Test Reports	-	-	8	-

Soft copies of drawings at contract stage shall also be submitted in **PDF format**.

Drawings will also be submitted in CD in AUTOCAD package for all major items.

Final Documentation shall be submitted in bound volumes with Customer & Project etc. written on top.


FIRST ANGLE PROJECTION
REV
DATE
OWNER
RAJASTHAN RAJYA VIDYUT UTPANDAN NIGAM LIMITED
PROJECT
2X660MW THERMAL POWER PLANT,SURAT GARH STAGE -V, UNIT 7 & 8 AT SURATGARH , RAJASTHAN
OWNER'S ENGINEER
CONSULTING ENGINEERS LIMITED
EPC CONTRACTOR
BHARAT HEAVY ELECTRICALS LTD
TRANSMISSION BUSINESS GROUP
NAME
SIGN
DATE
TITLE
DEPT.
SCALE
BHEL/SUB VENDOR DRG NO.
SHT. No
REV.

SECTION-4

GUARANTEED AND TECHNICAL PARTICULARS OF ACSR MOOSE

1.	Manufacturer's Name & address	
2.	Particulars of raw material	
2.1	Aluminium	
a)	Min. purity of aluminium	%
b)	Max. Copper content	%
2.2	Steel wires/ Rods	
a)	Carbon	%
b)	Manganese	%
c)	Phosphorus	%
d)	Sulphur	%
e)	Silicon	%
2.3	Zinc- Minimum Purity	%
3.	Aluminium Strands after stranding	
3.1	Diameter	
	a) Nominal	mm
	b) Maximum	mm
	c) Minimum	mm
3.2	Min. breaking load of strand after stranding	kN
3.3	Max. resistance of 1m length of strand at 20° C	
4.	STEEL STRANDS AFTER STRANDING	
4.1	Diameter	
	a)Nominal	mm
	b)Maximum	mm
	c)Minimum	mm
4.2	Min. breaking load of strand	Kn
4.3	Galvanizing	
a)	Min. weight of zinc coating per sq.m ofgm. uncoated wire surface	
b)	Min. no. of dips that the galvanized strand can withstand in the standard preece test	
c)	Min. number of twist to be withstood inNos. torsion test when tested on a gauge length of100 times diameter of wire	

5.	ACSR CONDUCTOR	
5.1	Minimum UTS	kN
5.2	Lay Ratio of conductor	
a)	Outer Steel layer	
b)	Aluminium - 12 wire layer	
c)	Aluminium 18 wire layer	
d)	Aluminium 24 wire layer	
5.3	DC resistance of ACSR at 20°C	Ω
5.4	Min. corona extinction voltage (dry)	kV
5.5	RIV at 1 MHz across 300-ohm resistor at 305 kV under dry conditions	
5.6	Standard length of conductor in one drum	m
5.7	Direction of lay for outside layer	-
5.8	Linear mass of conductor	mm
a)	Standard	kg/km
b)	Minimum	kg/km
c)	Maximum	kg/km
6.	No. of cold pressure but welding equipment available at works	

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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