



BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS ENGINEERING MANAGEMENT
NOIDA

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TYPE OF DOC.	TECHNICAL SPECIFICATION	NAME	GV	MM/VK	AG
TITLE 33/33kV (UE) CABLE TERMINATION KIT	SIGN		<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
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	GROUP		TBEM		
	WO No.		88005		

CUSTOMER	UPPTCL
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PROJECT	400/220/132 KV GIS s/s at Rasra, Ballia
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TENDER NO./ NOA NO.	
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Remarks: Bidder to note that data and details of Guaranteed Technical Particulars shall not be reviewed during Technical Evaluation/ Review, hence compliance of Guaranteed Technical Particulars in line with Technical Specification shall be bidder's responsibility.

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SECTION-1

Scope, Quantities and Specific Technical Requirements

1.1 Scope

This technical specification covers the requirements of design, engineering, manufacture, testing & inspection, packing, loading at works and transport to *site* of **33/33kV (UE) Cable Termination Kits** along with its accessories etc. as mentioned in this section and in various other sections of this specification.

The scope includes: --

- 1) Crimping type cable lugs, including hardware for fastening the lug to the equipment terminal
- 2) Heat Shrinkable type or pre-moulded type cable termination kit including the stress cone, boot and etc.
- 3) Cable gland / cable clamping arrangement where ever required.
- 4) Any other item required to complete the cable termination work at site
- 5) Supplier shall also quote for supervision for the termination of the kits at site.

The equipment is required for the following project:

Name of Customer: Uttar Pradesh Transmission Corporation Ltd. (UPPTCL)

Name of the Project: 400/220/132 kV GIS Substation at Rasra, Ballia (UP)

Refer section-3 of this document for project details and general specification.

1.2 Quantities

Sl. No	Item Description	Installation	Qty (nos.)
1.	Cable Termination Kit for 33/33 kV(UE), 1Cx630 mm ² Copper conductor, XLPE insulated, Armoured, FRLS PVC outer sheath Power Cable	Outdoor Installation in yard	12
2.	Supervision for one termination kit at site	Outdoor	01

Note: Overall quantity may vary by 10%.

1.3 Specific Technical Specification

Cable Termination kits shall be suitable for Cables of following parameters:

S. No.	PARTICULAR	UNIT	DATA
1.	Rated Voltage	kV	33
2.	Type of Insulation	XLPE	
3.	Single core / Multi core	Single	
4.	Armoured /Unarmoured	Armoured	
5.	Material of Conductor	Copper	
6.	System	grounded system	
7.	Highest System Voltage	kV	36
8.	Conductor Size	mm ²	630
9.	Material	Stranded Copper	
10.	Shape of conductor	Compact Circular	

11.	One minute power frequency dry and wet withstand voltage (rms)	kVrms	95
12	Full wave impulse withstand voltage (1.2/50 microsec)	kVp	250
13.	Continuous Withstand Temperature	°C	90
14.	Short Circuit Withstand Temp.	°C	250
15.	Creepage	mm/kV	25
16.	Application	Connection to transformer tertiary circuit	

1.4 Type tests

Bidder shall ensure that the cable termination kits procured have valid type test certificates as per relevant IS/IEC from CPRI or any other accredited testing lab. In case, any of type test certificates are of dates earlier than 17.04.13, Bidder/manufacturer shall carry out the type tests at CPRI or any other accredited testing lab prior to dispatch of equipment with no commercial implication to BHEL/UPPTCL.

Type tests and special tests to be conducted/valid certificates to be submitted shall be governed as follows:

In case any of Type tests have not been conducted on the offered design of 33/33 kV (UE) Cable termination kit or there has been a change in the design after the type tests, the requisite tests shall be conducted by bidder on the offered cable termination kit without any extra cost and delivery impact to BHEL/UPPTCL.

1.5 Manufacturing quality plan

The successful bidder shall submit the Quality Plan for BHEL/UPPTCL approval. In case bidder has reference Quality plan agreed with BHEL/UPPTCL, same can be submitted for specific project after award of contract for BHEL/UPPTCL approval. There shall be no commercial implication to BHEL on account of Quality Plan approval.

All materials shall be procured, manufactured, inspected and tested by bidder/vendor/ sub-vendor as per approved quality plan. The bidder/vendor shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification. Charges for all these tests for all the equipment & components shall be deemed to be included in the bid price.

1.6 Deviations

The bidder shall list all the deviation from the specification separately. Offers without specific deviation will be deemed to be totally in compliance with the specification and NO DEVIATION on any account will be entertained at a later date.

1.7 Packing Instruction

1.7.1 All equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and outdoor storage (for a minimum period of 1 years) at site till the time of erection. While packing all the materials, the limitations from the point

of view of availability of transportation facilities in India should be taken into account. The Bidder shall be responsible for any loss or damage during transportation, handling and storage.

1.7.2 The Bidder shall include and provide for security, protection and packing the equipment so as to avoid loss or damage during transport by any mode.

1.7.3 All packing shall allow for easy removal and checking at site. Wherever necessary, proper arrangement for attaching slings for lifting shall be provided. All packages shall be clearly marked for with signs showing 'UP' and 'DOWN' side of boxes, and handling and unpacking instructions as considered necessary. Special precautions shall be taken to prevent rusting of steel and iron parts during transit and storage. Gas seals or other methods proposed to be adopted for protection against moisture during transit shall be to the satisfaction of the purchaser.

1.7.4 The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbols i.e. FRAGILE, HANDLE WITH CARE, USE NO HOOKS etc.

1.7.5 Each package delivered under the contract shall be marked by the Bidder at his expense and such marking must be distinct (all previous irrelevant marking being carefully obliterated). Such marking shall show the description and quantity of contents, the name of consignee and address, the gross and net weights of the package, the name of Bidder with a distinctive number of mark sufficient for purpose of identification. All markings shall be carried out with such materials as to ensure quickness of drying, fastness and legibility.

1.7.6 Each Package shall contain a note quoting specifically the name of the Bidder, the number and date of contract or order and the name of office placing the contract, nomenclature of the stores and include a schedule of parts for each complete equipment giving the parts number with reference to the General Arrangement/ Assembly drawing and the quantity of each part, drawing number and tag numbers.

1.7.7 All equipment/ material shall be suitably packed for transport, carriage at site and outdoor storage during transit. The Bidder shall be responsible for any damage to the equipment during transit. The contents of each package shall bear marking that can be readily identified from the package list and packing shall provide complete protection from moisture, termites and mechanical shocks etc.

1.7.8 Any material found short inside the packing cases shall be supplied by the Bidder without any extra cost.

1.7.9 Notwithstanding anything stated in this clause the Bidder shall be entirely responsible for any loss, damage or depreciation to the stores.

TECHNICAL REQUIREMENT OF PQR

Name of Project: - 400/220/132kV GIS S/S at Rasra, Ballia

Name of Item: - 33kV (UE) Cable Termination Kit

Sr. No	Description	Supporting Document to be attached								Reference of attached documents																
01	The bidder should be manufacturer/agent of the equipment. The equipment being offered should be of reputed make. The manufacturer whose equipment are offered, must have tested and supplied equipment of the type being offered and these must be under successful operation# for at least three (3) years in power sector or industrial installations as on date of bid opening. #: satisfactory operation means certificate issued by End Customer certifying the operation without any adverse remark.	1. Bidder to Provide Compliance/Confirmation of fulfilling SL No.1 Technical Requirement. 2. Performance certificate /Letter /MOM etc. issued by end customer for Satisfactory operation 3. PO Copy / PO list in following format <table><tr><th>Sr. No</th><th>ITEMS SUPPLIED TO</th><th>ORDER REFERENCE No. & DATE</th><th>ITEMS</th><th>QUANTITY</th><th>ORDER FULLY EXECUTED.</th><th>STATUS, IF ORDER UNDER</th><th>REMARK</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> 4. Dispatch instructions/ Tax invoice/ Material receipt at site/ lorry receipt details etc								Sr. No	ITEMS SUPPLIED TO	ORDER REFERENCE No. & DATE	ITEMS	QUANTITY	ORDER FULLY EXECUTED.	STATUS, IF ORDER UNDER	REMARK									
Sr. No	ITEMS SUPPLIED TO	ORDER REFERENCE No. & DATE	ITEMS	QUANTITY	ORDER FULLY EXECUTED.	STATUS, IF ORDER UNDER	REMARK																			

SECTION-2 Equipment Specification

2.1 General

This section covers the general technical requirements of **33/33kV (UE) Cable Termination Kits**. In case of any discrepancies between the requirements mentioned in this section and those specified in section-3 of this specification, this section shall prevail and shall be treated as binding requirement.

2.2 Standards

The 33/33kV (UE) Cable Termination Kits and accessories shall conform to the following standards.

IS 13573:1992 & amendment 1996,1997	Joints and terminations of Polymeric cables for Voltages from 6.6 kV upto and including 33 kV - Performance Requirements and Type tests.
VDE 0278	Accessories for cables rated upto 36 kV
IS 7098 (Part II)	Specification for Cross-linked Polyethylene insulated PVC sheathed cables (from 3.3 kV upto 33 kV)
IEEE 48:1975	Standard Test Procedures and Requirements for High Voltage Alternating Current Cable Accessories
IEC 507	Specification for Salt fog test
EATS-09-13	Electricity Association Technical Specification 09-13
IEC 60502	Power cables with extruded insulation and their accessories for rated voltages

2.3 Technical Requirements

The material of stress control cones shall have volume resistivity of minimum 1000 MΩ-cm for the termination. The cable termination kits shall be suitable for termination of the cable on outdoor installation in yard and shall be single phase type.

Terminations and joints shall be either of a heat shrinkable or pre-moulded type. They shall be factory assembled kits of the cable manufacturer containing all the necessary components to reinstate the cable insulation, metallic shielding of each core, together with the reinstatement of the outer sheath, equivalent for size of cable.

Each terminating or jointing kit shall be in a separate package and a list of materials indicating quantities and weights in the kit and an instruction sheet to be included in the package. Kit shall contain sufficient clearing solvents and cleaning clothes for proper making of the joints or terminations.

Voltage stress relief shall be provided and this may be inherent in the heat recoverable polymeric material or alternatively incorporated in the pre-moulded terminations. The termination or joints shall be capable of tolerating any variances in the manufacture dimensions of the cable such as oval, out of

round, sectored or oversize cable cores. The terminations shall be capable of immediate energization once all the components have been installed. The terminating or jointly material shall not be subject to storage limitations such as controlled temperature or humidity restrictions nor have shelf life limitations.

The termination kits shall have the following features (one or more of which may be included in one item):

- Bi-metallic compression lugs
- Weather-proof seal between lugs and termination
- Non-tracking weather resistant exterior complete with weather skirts for outdoor terminations
- Built in stress control equipment
- Copper braid for earthing onto screen
- All other items necessary to complete the kit.

The material of completed termination and joints shall be for the appropriate type of service, and voltage. They shall include ferrules, lugs and other material necessary for the terminating and jointing of the conductor and clamps braid etc. necessary for the terminating, jointing of screen and sheath for earth continuity.

All heat shrinkable polymeric tubing and pre-moulded materials shall be ultra violet stable non-tracking (per ASTM D2302) and suitable for operation in the presence of severe external contamination and environmental pollution.

The entire termination or joints shall be environmentally sealed and capable of preventing the ingress of external moisture and contamination.

The external leakage insulation between high voltage conductor and ground as specified in IEEE 48 shall be non-tracking, erosion-resistant and weather resistant flexible sleeve.

The offered kit shall provide for total environmental sealing of the cable crotch and at the lug end. The exact dimensions of cables shall be furnished at the time of order.

The kit shall be complete in all respects, complete with all accessories, jointing material, insulating stress control and sealing material as well as the instruction booklet explaining method of using kit.

Material used for construction of a termination shall perfectly match with the dielectric, chemical and physical characteristics of the associated cable. The material and design concepts shall incorporate high degree of operating compatibility between the cable and the termination. Stress grading system involving taping is not acceptable.

The bidder shall indicate the required net dimensions of the cable joints in the form of length, breadth and depth in millimetres.

The bidder shall specifically list the precautions to be observed while carrying out the termination to avoid any damage to the kit or cable or the personnel or installation. Detailed instructions with suitable illustrations shall be provided in an instruction booklet, which shall be furnished with each kit to enable proper execution of work at site.

PROJECT: 400/220/132kV GIS s/s at Rasra, Ballia

CUSTOMER: UTTAR PRADESH TRANSMISSION CORPORATION LTD. (UPPTCL)

Technical Specification for 33/33kV (UE) cable termination kit

Section-2: Equipment Specification

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2.4 Information to be furnished during detailed engineering

- Bidder shall furnish documentary evidence confirming requirements of volume resistivity and relative permittivity of the material of the stress control cones.
- Detailed sectional views of the termination/ assembly, including environmental sealing of cable at both the lug and crutch ends.
- Detailed bill of material.
- Type and routine test certificates.
- Instruction booklet.
- Details of testing.

2.5 Technical documents to be furnished with the offer

- Detailed sectional views of the termination/ assembly, including environmental sealing of cable at both the lug and crutch ends.
- Full details of the kit and its components.
- Information required to be submitted with offer as per different clauses of the specification
- The bidder shall furnish the detailed guaranteed technical particulars of the accessories like termination kit offered by them.

SECTION-3

PROJECT DETAILS & GENERAL SPECIFICATION

SITE INFORMATION

	Particular	Details
a)	Owner	UPPTCL
b)	Customer	UPPTCL
c)	Project Title	400/220/132 kV GIS at Rasra, Ballia
d)	Location	Uttar Pradesh
e)	Transport Facilities	Nearest rail head - Ballia
SITE CONDITIONS		
a)	Max. ambient air temp.	50°C
b)	Min. ambient air temp.	0°C
c)	Max. design ambient emp.	50°C
d)	Design reference temp.	50°C
e)	Average Humidity	Max. 100%
f)	Special corrosion conditions	No
g)	Solar Radiation	
h)	Atmospheric UV radiation	High
i)	Altitude above sea level	Less than 1000 meter
j)	Pollution Severity	High Pollution level
k)	Seismic Zone	As per the seismic zone defined in the relevant BIS / IEC-62271-300 but not less than 0.3g horizontal
WIND DATA		
	Wind load	195kg/sqm
	Average No. of thunderstorm days per annum	As per IS

1. GENERAL

This Chapter covers Technical Requirements and requirements of auxiliary items.

- 1.1** Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories specified &/or normally provided with such equipment and/ or needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specifications.

Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the substation unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost All similar standard components/ parts of similar standard equipment provided, shall be inter-changeable with one another.

- 1.2** The Bidder shall supply type tested (including special test as per technical specification) equipment and materials. The test reports/details shall be furnished by the Bidder in the bid.
In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification and/or IEC/ IS, same, shall be

carried out without any additional cost implication to the Purchaser. The Purchaser reserves the right to get any or all type tests conducted/ repeated.

The reports for all type tests and additional type tests as per technical specification furnished by the Bidder shall be of the tests conducted within last 05(five) years prior to the date of bid opening. The type tests conducted should have either been conducted in accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by UPPTCL or representative authorized by UPPTCL or Utility or representative of accredited test lab or reputed consultant.

2. SYSTEM PARTICULARS

	Rated System voltage	420 kV, 245kV, 145kV, 36kV
	System frequency	50 Hz, This may vary by $\pm 5\%$
	Number of phases	Three
	Neutral	Effectively Earthed
	Auxiliary power supply:-	
	Auxiliary electrical equipment shall be suitable for operation on the following supply system:	
(a)	Power device (Like drive motors)	400V, 3Phase, 4Wire 50Hz Effectively earthed AC system.
(b)	Lighting fixtures, space heaters, fractional Horse Power motors and control devices.	250V, 2wire, 50Hz, AC supply with one point grounded.
(c)	DC alarm, Control and Protective Devices from substation batteries as under	2 wire ungrounded DC supplies (i) 400 kV S/S: 220V DC (ii) 220/132kV S/S: 110V DC (iii) Communication: 48 V DC The above supply voltage is subject to variation as follows: All devices must be suitable for a continuous operation over the entire range of voltage variations: (i) AC Voltage may vary by $\pm 10\%$. Frequency by $\pm 5\%$ Combined Voltage & frequency by $\pm 10\%$. (ii) DC a) 220 V may vary between 187 & 242 V b) 110 V may vary between 93 & 121 V c) 48 V may vary between 41 & 53 V

3. System parameters

Sl. No.	Description of Parameters	400 kV System	220 kV System	132 kV System	33 kV System
1	Nominal system voltage	4000kV	220kV	132kV	33kV
2	Maximum operating voltage of the system(rms)	420kV	245kV	145kV	36kV
3	Rated frequency	50Hz	50Hz	50Hz	50Hz
4	No. of phase	3	3	3	3
5	Rated short time current	50 kA for 3 Sec.	40 kA for 3 SEC	40 kA for 3 SEC	25 kA for 3 SEC
6	Dry and wet one minute power frequency withstand voltage	680 kV	460 kV	275 kV	95 kV
7	Dry and wet impulse withstand voltage positive and negative	1550 kVp	1050 kVp	650 kVp	250 kVp
8	Corona extinction voltage	320 kV	156 kV	105 kV	-
9	Max. Radio interference voltage for frequency between 0.5 MHz and 2 MHz at 508 kV rms for 765kV, 320kV rms for 400kV system and 156kV rms for 220kV system & 92kV rms for 132kV system system & 92kV rms for 132kV system	1000 microvolt	1000 microvolt	500 microvolt	-
10	Minimum total creepage	25mm/kV (10500 mm)	25mm/kV (6125 mm)	25mm/kV (3625 mm)	25mm/kV (1300 mm)
11	Min. clearances				
	i. Phase to phase	4000mm (for Conductor - conductor)	2100 mm	1300 mm	320 mm
		4200mm (for rod - Conductor)			
	ii. Phase to earth	3500 mm	2100 mm	1300 mm	320 mm
	iii) Sectional clearances	6500 mm	5000 mm	4000 mm	3000 mm
12.	System neutral earthing	Effectively Earthed			

4. SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

- 4.1** All equipment shall perform satisfactorily under various electrical, electromechanical and meteorological conditions of the installation site.
- 4.2** All equipment shall be able to withstand all external and internal mechanical thermal and electromechanical forces due to various factors like wind load temperature variation, ice & snow (wherever applicable) short circuit etc. for the equipment.
- 4.3** The Bidder shall design the various forces which the terminal connectors of the equipment are required to withstand.

4.4 All outdoor EHV equipments except marshalling kiosks shall be suitable for hot line washing.

4.5 To facilitate erection of equipment, all items to be assembled at site shall be "match marked".

5. SUPPORT STRUCTURES (If in the scope of Bidder)

The base design of all the equipment, to be installed on auxiliary structures, shall conform to the standard auxiliary structure designs presently being used in UPPTCL at 400/220/132/33kV Substations.

All equipment support structures shall be supplied along with brackets, angles, stools etc. for attaching the operating mechanism, control cabinets and marshalling box (wherever applicable) etc. The support structures should be hot dip galvanised with minimum 610 gram/sq. net of zinc.

6. STANDARDS

6.1 **Except** as modified by this Bid specification, all material and equipment shall conform to the requirement of the latest editions of relevant ISS/ IEC and other applicable standards. The equipments/ works shall be designed, engineered, manufactured, built, tested and commissioned shall be carried out in accordance with the Acts, Rules, Laws and Regulations in force in India.

6.2 In addition to meeting the specific requirements called for in the respective sections of the Technical Specification, the equipment shall also conform to the general requirement of the relevant standards which shall form an integral part of the specification. When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

6.3 In the event of the Bidder offering equipment conforming to standards other than ISS/IES standards, which ensure equivalent or better performance than that specified in the standards, the salient point of comparison between the standards adopted and relevant ISS/ IEC standards shall be indicated clearly in the proposal, along with English language version of such standard or relevant extract of the same. The equipment conforming to standards other than IS/IEC shall be subject to Purchaser's approval.

6.4 The standards mentioned in the respective equipment specifications are not mutually exclusive or complete in themselves. The equipment &/or work shall also conform to any other applicable standard, even if not specifically mentioned in these specifications.

6.5 Should the Bidder wish to depart from the provisions of the specifications, either on accounts of manufacturing practices or for any other reason, he shall clearly mention the departure and submit complete justification supported by information, drawings etc. as will enable to assess the suitability of equipment(s) offered. In the event of the Bidder's specifications, drawings, forms and tables etc. being found to disagree with the requirement of the Bid specifications at any stage, Bid specifications shall be binding, unless the departures have been duly approved in writing by the purchaser.

6.6 REFERENCE OF STANDARDS

Reference	Abbreviation	Name and Address
BS	British Standards,	British Standards Institution, 101, Pentonville Road, N-19-ND UK
ISO	International Organization For Standardization,	Danish Board of Standardization Danish Standardising Sraat, Aurehoegvej-12, DK-2900, Heelstrup, DENMARK
NEMA	National Electric Manufacture Associate	115, East 44th Street, New York NY 10017 U.S.A
BS	British Standards,	British Standards Institution, 101, Pentonville Road, N-19-ND UK
ISO	International Organization For Standardization,	Danish Board of Standardization Danish Standardising Sraat, Aurehoegvej-12, DK-2900, Heelstrup, DENMARK
NEMA	National Electric Manufacture Associate	115, East 44th Street, New York NY 10017 U.S.A

7. ENGINEERING DATA AND DRAWINGS

7.1 SUBMISSION AND APPROVAL OF DRAWINGS/ DOCUMENTS

- 7.1.1 The Bidder shall follow a well-defined coding system for proper and quick identification of all systems/ sub-systems/ equipments/ assemblies/ sub-assemblies/ accessories/ other plant material/ spare parts/ special tools and plants and drawings for the execution of the plant and later for its operation and maintenance. Copies of coding documents defining the above shall be supplied along with drawings to understand the system.
- 7.1.2 All drawings submitted by the Bidder shall be in sufficient details to indicate the type, size arrangement, weight of each component, details for packing and shipment, the external connections, fixing arrangements, dimensions required for installation arrangement, dimensions required for installation and interconnections with other equipment and other information specifically, as called for in the drawing schedules. All the equipments tapping points etc. shall be numbered according to pre-determined scheme/ system which shall be subject to approval of Purchaser.
- 7.1.3 Each drawing shall be clearly marked with the name of the Purchaser, unit designation, UPPTCL's 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 drawings shall be in English. All the dimensions should be in metric units.

- 7.1.4 If any dimension figures on a drawing or a plan differs from those obtained by scaling the drawing or plan, the dimensions as mentioned in figures on the drawing or plan shall be taken as correct.

7.2 Submission and distribution of drawings/ documents

All the drawings which do not require approval shall be submitted along with reproducible in required number and those requiring approval shall be initially submitted for comments/ approval before submitting along with reproducible as per "Document Distribution Schedule".

7.3 APPROVAL OF DRAWINGS

- 7.3.1 The Purchaser shall return to the Bidder one set of drawings, plans and technical data requiring approval after marking them with their comments/ corrections, if any, either (a) marked 'Approved' or (b) marked 'Approved subject to incorporation of comments' or (c) marked 'Not Approved' with comments requiring resubmission of drawings etc. in 14 days or (d) marked 'Approval not required', where drawing is for information only. In case of (a) no further revision of drawings will be required. In case of (b) Bidder can proceed with the work but will resubmit the drawings incorporating the corrections as per comments only within fourteen (14) days. In case of (c) Bidder can proceed with the work only after resubmitting the drawings within fourteen (14) days and getting approval under (a) or (b) categories above. In case of (d) the Bidder drawing is deemed to have been received only for information purpose.
- 7.3.2 The Purchaser shall have the right to ask the Bidder to make any change in the design/ drawing which may be necessary to make equipment conform to the provisions and intent of the contract, without any extra cost to the Purchaser.
The drawings submitted shall be re-viewed by the Purchaser and shall be modified by the Bidder as required. The Bidder shall incorporate such modifications and/or corrections and submit the final drawings for approval/ reference.
- 7.3.3 No deviation from the approved drawings shall be permitted without the written approval of the Engineer.
- 7.3.4 The review of drawings/ data by the Purchaser will cover only general conformance of the data of the specifications and document, interfaces with the equipment provided under the specifications, external connections and the dimensions which might effect substation layout.
This review by the Purchaser may not indicate thorough review of all dimensions, quantities and details of the equipment, wiring, materials, any devices or items indicated or the accuracy of the information submitted. This review and/ or approval by the purchaser shall not be considered by the Bidder, as limiting any of his responsibilities specified under these specifications and documents.
Approval/ comments conveyed as above shall neither relieve the Bidder of his contractual obligations and his responsibilities for correctness of dimensions, material of construction, quantities, design details, assembly fits, performance particulars, guarantees and conformity of the supplies with the specifications, schemes, systems and statutory laws, nor does it limit the Purchasers right under the contract.
- 7.3.5 Should any minor revision be made after 'approval', at the time of erection/ commissioning the Bidder shall redistribute prints and reproducible, clearly certifying the changes incorporated in the drawing and marking it in a block. Every revision shall be marked by a revision number, date and subject, in a revision block provided in the drawing, clearly marking the changes incorporated.

- 7.3.6 The Bidder shall be responsible for and shall pay for any alterations of the work due to any discrepancies, errors and omissions in the drawings or other particulars supplied by him, whether such drawings or particulars have been approved by Engineer or not.

No extension of delivery periods shall be granted on this account.

7.3.7 As- build drawings

Drawings of all equipments as detailed in technical specifications of respective equipments necessarily including schematic drawings and terminal block drawings wherever applicable whether mentioned in respective technical specifications or not.

8. NAME PLATE, MARKING OF PARTS, LABELS

- 8.1 All equipment shall have metal name plates fixed in suitable position with full particulars engraved legibly thereon and not painted.
- 8.2 Each main and auxiliary item of plant is to have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which is to be engraved identifying manufacturer's name, equipment type or serial number, rating together with details of the loading/ operating conditions under which the item or plant in question has been designed to operate and such diagram plates as may be required by the Engineer.
- 8.3 Each item of plant is to be provided with a name plate or label designating the service of the particular equipment. These inscriptions are to be approved by the Engineer or as detailed in the appropriate sections of the technical specifications.
- 8.4 Such name plates or labels are to be white non hygroscopic material with engraved block lettering or, alternatively, in the case of indoor equipments of transparent plastic material with suitably colored lettering engraved on the back
- 8.5 Each bay module in GIS room will have a clear marking showing the name of bay, identification, name and rating plate marking for each individual equipment like circuit breaker, disconnectors grounding switches, current transformer, voltage transformers and bushings etc. as per relevant IEC to facilitate identification during routine operation/ maintenance.
- 8.6 All such name plates, instruction plates, lubrication charts etc. shall be bilingual with Hindi inscription first followed by English. Provisions shall be made to fit in name plates, lubrication/ connection diagram plates etc.
- 8.7 In order to facilitate identification, the parts of the equipment shall be suitably marked.

9. INSTRUCTION MANUALS

- 9.1 The Bidder shall submit to the Engineer 'Descriptive Manuals', i.e. system design concept, detailed catalogues of equipment and typical equipment instructions for this project, for all major systems and equipment, covered under this contract along with dispatch of equipment.
These initial copies of descriptive manuals shall be in sufficient details, bringing out detailed internal construction, characteristics, performance parameters, principles of operation, maintenance requirements, replacement and renewals needed, erection and overhauling procedure, testing and operation procedure etc. for various equipment.
- 9.2 The integrated instruction manuals, fully defining the interfaces between various systems and complete in all respects shall be submitted by the Bidder one month before scheduled date of commissioning. The instruction manuals shall contain full details of designation and drawings of all the equipment furnished, the erection procedure, testing procedure, operation and maintenance procedure of the equipment, single line diagrams,

and schematics. After the commissioning and initial operation of the plant, modifications/ additions/ changes, wherever required shall be incorporated in the instruction manuals and drawings shall be submitted by the Bidder to the Purchaser.

9.3 The manuals shall be specific to the equipment supplied and not of general nature.

10. DOCUMENTS AND ERECTION DRAWINGS

The Bidder shall submit within a reasonable time but at least four (4) weeks before dispatch of equipment (as per distribution schedule) the following drawings/ documents and instruction manuals etc. to the consignee and the Engineer.

- I. List of item-wise equipment as proposed to be dispatched by the Bidder.
- II. Erection drawings along with reproducible prints of each drawing.
- III. Instruction books for proper handling/checking of material on receipt at site/storage, erection and assembly of all equipment and necessary instruction for checking and recording proper assembly of the plant.
- IV. Instruction sheets for proper balancing, alignment, adjustment, checking and calibrations as may be necessary.
- V. Descriptive literature and drawings to illustrate the working principals, methods of assembly and dismantling of plants and equipment.
- VI. Testing/commissioning format for recording data during erection/testing/ commissioning and trial run. These formats/data sheets shall clearly indicate the results obtained during shop tests and permissible deviations.

11. QUALITY CONTROL PROGRAMME

To ensure that the equipment construction work and the services covered under this job are in accordance with the specifications and conform to the high standard of workmanship. It is obligatory on the part of the Bidder to adopt a suitable quality control program. Such a program shall include suitable hold point for check for major equipments during manufacture at supplier's work, during erection at site and during the construction stage such that material checks for attaining proper strength and dimensional checks for attaining close tolerances required for equipment installation can be obtained.

In order to attain the above objectives, the Bidder shall draw out a plan listing all quality control checks in detail, including all hold points at which the quality checks shall be applied, also specifically mentioning those hold points where the Purchaser shall also participate in the quality check to assure him of the quality of the products supplied. Such a program shall be outlined by the Bidder for the acceptance by the Purchaser. The Bidder shall furnish detailed information regarding his quality control program and its strict implementation. Following information shall be included in the proposal along with others regarding quality control program:

- I. The quality control organizations and the proposal of its implementation.
- II. The system for controlling drawings and documents for correctness.
- III. The system of quality control for raw materials, process control and maintaining tolerances during manufacturing, assembly and fabrication.
- IV. Quality control during purchase of components, sub-systems and assemblies.
- V. Methods for ensuring selection of proper vendors/ sub-vendors.
- VI. Inspection of testing at shop after assembly.
- VII. Control of accuracy during calibration of measuring and testing equipments.
- VIII. Preservation and quality control during the transit.
- IX. Procedure for inspection before erection and quality control during erection.
- X. System for storage and delivery.

Bidder shall be wholly responsible for the quality control and quality assurance for the manufacture, supply, erection, testing and commissioning etc.

During inspection, destructive testing and non-destructive test evaluation shall be done wherever applicable, in presence of Purchaser's representative in accordance with established norms. Directions of Purchaser shall be rigorously followed.

12. INSPECTION & TESTING

- 12.1** The Purchaser reserves the right to inspect any machinery and material to ensure that approved Q.A.P. is being strictly implemented by the Bidder or his Sub Bidder/ Supplier under this contract and to reject any item found defective in workmanship or design or otherwise unsuitable for the use and purpose intended or which is not in accordance with the intent of this contract. The Bidder should on demand by the Purchaser, rectify or replace such defective or unsuitable equipment, or the Purchaser may at the Bidder's expense, rectify or replace such defective or unsuitable equipment whether before or after supply.
- 12.2** That Bidder shall, for purpose of clause 15 of the annexed conditions of contract Form-A inform to the Purchaser places of manufacture, testing and inspection of various equipment offered by him. Unless specifically provided otherwise, all tests shall be carried out at the Bidder's work or for bought out items at sub-vendors works before dispatch.
- 12.3** The Bidder shall advise the Purchaser at least 4 weeks in advance as to when the equipment will be ready for stage/ final inspection at the Bidder's works or at his Sub-Bidder's works.

PENAL CHARGES

In case the equipment is not available for inspection at the time of arrival of inspection officers, the Bidder shall pay to UPPTCL towards futile journey a sum decided by Chief Engineer (765 KV DU), UPPTCL and demanded by "Engineer of Contract". This amount shall be paid within 10 days from the date of demand. Further action for inspection of the material shall be taken only after the said amount is deposited.

- 12.4** During inspection, the Purchaser's Inspecting Engineers at all times have access to all part of shops where the equipment is being manufactured and also shall be provided with all reasonable inspection facilities by the Bidder and/ or sub-Bidders. Even without scheduled inspection, the Engineer and/or his duly authorized representative shall have at all reasonable times access to the Bidder's premises, works or site and shall have the power to inspect and examine the materials and workmanship of the works during its manufacture or erection.
- 12.5** All plants equipment/ parts, sub-assemblies/ assemblies shall comply with the requirement of type tests and shall be subjected to the routine/ acceptance tests specified in the set of standards adopted and to such other tests as are stipulated in the respective technical specifications.

The Purchaser reserves to himself the right of having at his own expense any inspection or special test of a reasonable nature at Bidder's premises or at site, in addition to those prescribed in applicable standards and the enclosed technical specifications.

- 12.6** The Engineer shall either depute his representative to witness the tests as applicable

and inspect the material or shall waive the inspection. In case of waiver the Bidder or his sub-Bidder shall carryout the all applicable tests in absence of Purchaser's representative. In both the cases i.e. either inspection or waiver the test certificates shall be submitted to Engineer of Contract for approval and issue of dispatch authorization. In case of inspection the test certificates must bear signatures of the Purchaser's inspecting officer.

The Engineer of Contract, within 10 days of receipt of test certificates, shall issue approval/ dispatch authorization, if test certificates are found satisfactory.

In case test certificates are not found satisfactory the Engineer of Contract, within 10 days of receipt of test certificates, shall communicate his objections and actions required to be taken in writing to the Bidder. The Bidder shall take remedial action and shall re-submit the test certificates or re-offer the material for inspection as asked for by the Engineer. Subsequent actions shall follow as in case of fresh offer for inspection. No extension of delivery/ completion period shall be granted on this account.

12.7 REJECTON

Purchaser reserves the right to reject any equipment if during the tests at works or site, the test value achieved do not comply with the respective standard/ specifications and exceeds that tolerable limits. Rejection of any equipment will not be held as a valid reason for delay in timely completion of the work.

12.8 No equipment to be furnished or used in connection with this contract shall be dispatched, until factory inspection and acceptance test have been carried out satisfactorily and dispatch authorization issued by Engineer of Contract. Such factory inspection of the equipment or approval of acceptance tests shall not however, relieve the Bidder from full responsibility for supplying equipment conforming to the requirements of this contract, nor prejudice any claim, right or privilege which the Purchaser may have because of the use of defective or unsatisfactory equipment. Should Purchaser waive the right to inspect any equipment, such waiver shall not relieve the Bidder in any way from his obligations under this contract. The inspection/waiver by Engineer and/ or approval of test certificates shall in no way limit the liabilities and responsibilities of the Bidder in respect of the agreed quality assurance program, and the desired performance of the equipment.

12.9 In all cases where the contract provides for tests whether at the premises or works of the Bidder or of any Sub-Bidder, the Bidder shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably required to carry out effectively, such tests on the equipment in accordance with the contract and shall give facilities to the Engineer or to his authorized representative to accomplish inspection. All the expenses incurred for testing including material consumed in testing shall be to the Bidder's account.

12.10 Purchaser will not entertain any request for waiver of inspection on the ground that sub vendors are not agreeing for the Purchaser's inspection. It is the responsibility of the Bidder to ensure that all the requirements of the Purchaser as envisaged in the technical specifications are incorporated.

12.11 The Bidder is required to record the following certificates on the invoices and challans of each and every consignment:
"Certified that material being dispatched against the above invoices and challan has been inspected and tested by the representative of Engineer of the contract on (date) and all the test results were satisfactory, as per approved test certificate enclosed."

Or

Certified that inspection of material being dispatched against the above invoice and challan has been waived off by Engineer of Contract vide letter No.....Dt..... (Copy enclosed) and all the acceptance and routine tests as per relevant standards and those provided in Contract, have been conducted and all the test results were found satisfactory as per test certificates enclosed."

- 12.12** In case the inspection or testing of the material is to be carried out outside India, all the expenditure including boarding and lodging etc. of the inspecting officer/ officers shall be borne by the contractor and information regarding inspection has to given at least 8 weeks in advance.

13. DESPATCH OF EQUIPMENT

- 13.1** Detailed dispatch instructions will be intimated to the Bidder. All materials shall be dispatched by road.

- 13.2** The Bidder shall intimate, at least thirty (30) days in advance to the consignee as well as the concerned Superintending Engineer at site, the probable date when the equipment will be ready for dispatch from the works. Notification of delivery or dispatch in regard to each and every consignment shall be made to the Purchaser immediately after dispatch or delivery. The supplier shall further supply to the consignee a priced invoice and packing account of all stores delivered or dispatched by him. All packages, containers, bundles and loose materials forming parts of each and every consignment shall be described fully in the packing account, and full details of the contents of packages and quantity of material shall be given to enable the consignee to check the stores on arrival at destination.

- 13.3** A list in duplicate containing details of equipment for verification at site shall also be placed inside each package and shall correspond with the advice note. One additional copy of each of the package lists shall also be sent to the consignee.

14. TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

The Bidder shall supply type tested (including special test as per technical specification) equipments and materials. The test reports/details shall be furnished by the Bidder in the bid.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes or due to non-compliance with the requirement stipulated in the Technical Specification and/or IEC/ IS, same, shall be carried out without any additional cost implication to the Purchaser. The Purchaser reserves the right to get any or all type tests conducted/ repeated.

The reports for all type tests and additional type tests as per technical specification furnished by the Bidder shall be of the tests conducted within last 5 (five) years prior to the date of bid opening. The type tests conducted should have either been conducted in accredited laboratory (accredited based on ISO/ IEC Guide 25/ 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by UPPTCL or representative authorized by UPPTCL or Utility or representative of accredited test lab or reputed consultant.

14.1 Pre-commissioning Tests

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Purchaser and the Contractor for correctness and completeness of installation and

acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed are given in respective chapters and shall be included in the Contractor's quality assurance programme.

14.2 Commissioning Tests

- 14.2.1 The available instrumentation and control equipment will to be used during such tests and the Purchaser will calibrate, all such measuring equipment and devices as far as practicable.
- 14.2.2 Any special equipment, tools and tackles required for the successful completion of the Commissioning Tests shall be provided by the Contractor, free of cost.
- 14.2.3 The specific tests requirement on equipment have been brought out in the respective chapters of the technical specification.
- 14.2.4 The Contractor shall be responsible for obtaining statutory clearances from the concerned authorities for commissioning the equipment and the switchyard. However necessary fee shall be reimbursed by POWERGRID on production of requisite documents.

16 Degree of Protection

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

- a) Installed out door: IP- 55
- b) Installed indoor in air conditioned area: IP-31
- c) Installed in covered area: IP-52
- d) Installed indoor in non-air conditioned area where possibility of entry of water is limited: IP-41.
- e) For LT Switchgear (AC & DC distribution Boards): IP-52

The degree of protection shall be in accordance with IS:13947 (Part-I) / IEC-60947(Part-I) / IS 12063 / IEC-60529. Type test report for degree of protection test, shall be submitted for approval.

17 RATING PLATES, NAME PLATES AND LABELS

Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been 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 requirement.

All such nameplates, instructions plates, rating plates CB, CT, VT, SA, Isolators and Relay & Protection panels equipments shall be bilingual with Hindi inscription first followed by English.

Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.

SECTION – 4
Guaranteed Technical Particulars

To be furnished for each type and size of cable

Sl. No	Description	Unit	Data
1	Type of Kit		
2	Applicable Standards for the termination and major raw materials		
3	Shelf Life of Kit		
4	Design life of kit		
5	Guaranteed life of kit		
6	Net Dimension of Kit		
7	Net weight of kit		
8	Craft sensitivity and reliability		
9	Time required for completing termination including preparation time		
10	Time required for energisation after completing the termination.		
11	Special storage requirements, if any, for ambient of upto 50°C		
12	Whether provision is made for 1) Stress relief 2) Track resistance 3) Sealing		
13	Whether any additional support is required for the termination?		
14	Details of site facilities including equipment required for carrying out installation of termination		
15	Make and type of 1) Lugs 2) Glands/ Clamps provided with the kit		
16	Creepage distance of outdoor kit		
17	Any other information		

SECTION-5

Technical Check List

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER.

RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED.

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

Sl. No.	Parameters	Data	Confirmation	Remarks
1.	Applicable Standards	As per TS	Yes/No	
2.	Type of termination kit	Heat Shrinkable type	Yes/No	
		pre-moulded type	Yes/No	
3.	Accessories	Considered the following in offer 1) Crimping type cable lugs, including hardware for fastening the lug to the equipment terminal 2) Cable gland / cable clamping arrangement where ever required	Yes/No	
4.	BOQ and Supervision	Quoted as per Spec clause 1.2	Yes	
5.	Technical parameters	The offered cable termination kit meets cable requirement as per spec clause 1.3	Yes	
6.	Type tests	Offered equipment is type tested as per relevant standard and BIL of 250kV as per clause 1.4	Yes	
7.	Prequalifying Conditions	Documentary proof against the Technical (Pre-Qualifying) requirements mentioned in Annexure-PQR of section 1, has been attached along with offer. Note: Bidder to ensure completeness of offer in this regard. No further communication regarding Qualifying requirement documentary proof is envisaged during tender evaluation.	Yes	
8.	Manufacturing quality plan	Bidder to confirm the manufacturing quality plan requirement as per cl 1.5 of section 1.	Confirmed	
9.	Technical requirements	Bidder to confirm the Technical requirement as per clause 2.3	Confirmed	

ANNEXURE - A
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
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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