BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

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TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	PC	VK	AG
TITLE	220kV LINE TRAP			SIGN	--sd--	--sd--	--sd--
				DATE	09.11.18	09.11.18	09.11.18
				GROUP	TBEM	W.O. No	
CUSTOMER	UJVN LIMITED						
PROJECTS	2X60MW VYASI HEP			Project code : 398			

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Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS
01	04-06-19	---PC---	--VK--	--VK--	SCR revised from 40kA for 1sec to 50 kA for 1 sec as per customer letter.

	TBMM	TBQM	TBCM	TBTS
Distribution				
Copies	2	-	-	-

SECTION -I

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of Line Traps complete with accessories as listed in clause 3.0 below. This section covers the specific technical requirements of 220kV Line Traps.
In case of any conflict between the technical details mentioned in this section and the remaining sections of this document, then Section-1 shall prevail and is to be considered as binding requirement.

The specification comprise of following sections:

Section-I:	Scope, Specific Technical Requirements & Bill of Quantities
Section-II:	Detailed Technical Requirement - Equipment Specification
Section-III:	Project Details & General Technical Requirements
Section-IV:	Guaranteed Technical Particulars
Section-V:	Checklist

In case of any conflict between various sections, order of precedence shall be in the same order as listed above.

Note: The terms used in this specification namely, "Employer/Purchaser" refers to UJVN Limited, "Contractor "refers to BHEL & "Sub-contractor" refers to successful bidder.

1.1 The equipment is required for the following Project.

Name of Customer : UJVN Limited

Name of the Project : 2x60MW VYASI HEP

Refer Section - III for Project Details and General Specifications.

2.0 SPECIFIC TECHNICAL PARTICULARS

S.No	Description of parameters	220kV System
1.	System operating voltage	220kV
2.	Maximum operating voltage of the system (rms)	245kV
3.	Rated frequency.	50Hz
4.	No. of phase.	3
5	Type of tuning	Broad Band
6	Rated bandwidth	50-500 kHz**
7	Capacitance of CVT	4400pF

**** If required, two tuning ports to be offered to meet design requirement.**

S.No	Sub-Station	System Fault Level	Min. Creepage Distance
1.	220kV S/s Vyasi	50kA for 1 Sec	25mm/kV

3.0 BILL OF QUANTITY:

Sl No	Description	Unit	Total Qty.
1	220kV, 1600A , 1 mH , 50kA for 1sec,1ph Pedestal / suspension mounted Line Trap for UJVNL Vyasi S/s.	No.	04
2	Terminal Connectors for line side of 220kV Line Trap	Set	04
3	Terminal Connectors for station side of 220kV Line Trap	Set	04

NOTE-

a) The quantity of Line trap might change by ±25% at contract stage. BHEL reserves the right to delete the above line item at contract stage.
b) The final details of terminal connectors of the line traps will be furnished to the successful bidder.
c) The line trap shall be mounted on a tripod structure formed by 3(three) insulator stacks arranged in triangular form/ suspension mounted.
d) The insulators /structure is not in scope of equipment supplier/bidder.
e) The necessary hardwares (Nuts, Bolts and washers) for mounting the Line trap shall be in scope of supply of Equipment supplier/bidder.
f) The mounting (pedestal/suspension) of the Line trap will be informed at the contract stage.

4.0 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

a. All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

b. The reports for all type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings. However, type test reports of similar equipments/ material already accepted in UJVN Limited shall be applicable for all project with similar requirement. The type tests conducted earlier 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 UJVNL or representative authorized by UJVNL or Utility or representative of accredited test lab or reputed consultant.

The type test reports submitted shall be of the tests conducted within last 10 (ten) years prior to 08th May, 2017. In case the test reports are of the test conducted earlier than 10 (ten) years prior to 08th May, 2017, the bidder shall repeat these test(s) at no extra cost to BHEL.

c. In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all type tests not carried out, same shall be carried out without any additional cost implication to the Purchaser.
The bidder shall intimate the BHEL/UJVNL the detailed program about the tests at least two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies. Further, in case type tests are required to be conducted/repeated and the deputation of Inspector/Purchaser's representative is required, then all the expenses shall be borne by the bidder.

5.0 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.

6.0 MANUFACTURING QUALITY PLAN:

The contractor shall carry out the 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.

7.0 DRAWINGS / DOCUMENTS

The drawings / documents submitted shall be project and product specific and shall incorporate all project details and title block and numbering scheme of the customer as detailed in Section 2 & 3.

8.0 PACKING

a) All equipments 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 2 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.

b) 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.

c) 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.

d) 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.

e) 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.

f) 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.

g) 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.

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

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

SECTION-II: LINE TRAP

1 Line trap shall be broad band tuned for its entire carrier frequency range. Resistive component of impedance of the line trap within its carrier frequency blocking range shall not be less than 450 ohms for 765kV/400 kV system and 570 ohms for 220kV and 132 kV systems.

2 Line trap shall be provided with a protective device in the form of surge arrestors which shall be designed and arranged such that neither significant alteration in its protective function nor physical damage shall result from either temperature rise or the magnetic field of the main coil at continuous rated current or rated short time current. The protective device shall neither enter into operation nor remain in operation, following transient actuation by the power frequency voltage developed across the line trap by the rated short time current. The lightning arrestor shall be station class current limiting active gap type. Its rated discharge current shall be 10 kA. Coordination, however, shall be done by taking 20 kA at 8/20 micro-sec. discharge current into account. Bidder has to furnish full justification in case the use of gap-less metal oxide arrestor is recommended by them.

3 The lightning arrestor provided with the line trap of each rating shall fully comply with the requirements of IS: 3070 Part-I/IEC-60099-I Part-I. It shall conform to type tests as applicable and type test certificate for the same shall be submitted by the Bidder.

4 The lightning arrestor provided with the line trap shall be subject to routine and acceptance tests as per IEC-60099-1 (Part-I).

5 The line trap on 765kV & 400 kV lines shall show no visual corona discharge at a voltage of 508kV (rms) and 320 KV (rms) power frequency falling voltage. Suitable corona rings may be incorporated in the line trap. Radio interference voltage for 420/245/132 kV shall not exceed 500 micro volts at 280/163/97 kV (rms) respectively. For 765kV, RIV shall not exceed 1000 micro volts at 508kV (rms).

6 Line trap shall be equipped with the bird barriers.

7 Line trap shall conform to IEC 60353 (latest) fulfilling all the technical requirements. The rated short time current for 1 Second shall be 31.5/40/50/63 kA as per requirement. The mH. rating shall be 0.25/0.5/1.0 mH depending on frequency plan.

8 The Bidder shall indicate continuous current rating of the line trap at 65 deg. C ambient.

9 Reports for the following type tests on each type of line trap shall be submitted as per clause Section-III

i) Measurement of Inductance of the main coil.
ii) Measurement of temperature rise.
iii) Insulation test.
iv) Short time current test.
v) Corona Extinction Voltage test (procedure for this shall be mutually agreed).
vi) Radio Interference Voltage measurement test (procedure for this shall be mutually agreed)

10 The Bidder must enclose with his bid the reports of type and routine tests conducted on similar equipment earlier as per IEC-60353.

11 Welding

All the welding included in the manufacture of line traps shall be performed by personnel and procedure qualified in accordance with ASME-IX and all the critical welds shall be subject to NDT as applicable.

12 Line Trap Mounting

i) The Line Trap shall be suitable for outdoor pedestal or suspension mounting and shall be mechanically strong enough to withstand the stresses due to maximum wind pressure of 260 kg/square meter.

ii) For pedestal mounting, each line trap shall be mounted on a tripod structure formed by three insulator stacks arranged in a triangular form. All the accessories and hardware, mounting stool including bolts for fixing the line trap on insulators shall be of non-magnetic material and shall be supplied by the Bidder.

iii) For suspension mounting, Bidder shall be required to coordinate the mounting arrangement with the existing arrangement. Non-magnetic suspension hook/link of adequate length and tensile strength to provide necessary magnetic clearance between the line trap and suspension hardware shall be supplied by the bidder.

13 Terminal Connectors

i) The line traps shall be suitable for connecting to 4" IPS Aluminium tube or 3" IPS Al. tube or ACSR single/twin/Quad bundle conductor with horizontal or vertical take off. Necessary connector shall be supplied by the Bidder.

ii) Terminal Connectors shall conform to IS:5561.

iii) No part of clamp or connector (including hardware) shall be of magnetic material.

iv) Clamps and connectors shall be designed corona controlled. Visual Corona extinction voltage shall not be less than 508kV (rms) & 320kV (rms) for 765kV and 420kV respectively. All nuts and bolts shall be suitably shrouded.

v) Radio interference Voltage for 420/245/132 kV shall not exceed 500 microvolts at 280/163/97 kV (rms) respectively. For 765kV, RIV shall not exceed 1000 micro volts at 508kV (rms).

vi) Clamps/connectors shall be designed for the same current ratings as line trap and temperature rise shall not exceed 35 deg. C over 50 deg. C ambient. No current carrying part shall be less than 10 mm thick.

vii) Clamps/connectors shall conform to type test as per IS:5561. Type Test reports shall also be submitted for following additional type tests :

a) Visual Corona Extinction Test

b) Radio Interference Voltage Measurement

viii) Bidders are required to submit alongwith their bid typical drawings clearly indicating the above mentioned features of the line traps, line trap mounting arrangement and terminal connectors. For suspension mounted line traps, Bidder shall submit drawings showing single point as well as multipoint (normally 3 point) suspension arrangements.

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	Uttarakhand Jal Vidhyut Nigam Limited
b)	Project Title	220kV switchyard for 2 X 60MW Vyasi HEP
c)	Location	Village Vyasi, 5.0 Km.d/s of Lakhwar, Dehradun
d)	Elevation above MSL	535 mtr.
e)	Transport Facilities	Airport ,Railways at Dehradun, accessible by Road from National Highway NH-123 at Barawala (3 km from Dakpathar).
f)	Postal Address	To follow
SITE CONDITIONS		
a)	Max. temp.	42.8°C
b)	Min. temp.	0.3°C
c)	Design ambient temp.	50°C
d)	Latitude/Longitude	30° 31’ 00” N/ 77° 53’ 00” E
e)	Maximum Relative humidity	100 %
f)	Minimum Relative humidity	8%
g)	Pollution Severity	Less Polluted
h)	Seismic acceleration	0.18g
i)	Seismic zone	Zone-IV
j)	Wind Velocity & Zone	47 m/s Zone IV
k)	Normal Rain fall in Catchment	1250-2000MM

SYSTEM PARAMETERS

Nominal system voltage	**220 kV**
Highest system voltage	245 kV
Rated Normal Current at Nominal System Voltage	1250A
Basic Impulse level	1050kVP
Power frequency withstand voltage	460kVrms
Switching Impulse voltage	850kV -
Maximum Permissible Switching Over Voltage to Earth (kV)	487kV
Frequency	50 Hz ± 5%
Rated short time current	50 kA for 1 sec
Creepage distance	25mm/kV
System Earthing	Solidly Grounded

Note:-**Seismicity**:-The project is situated in a seismic zone and falls within Zone IV of the seismic zoning Map of India. Value of peak ground acceleration has been recommended as 0.36g for maximum Credible Earthquake (MCE) and 0.18g for Design basis Earthquake (DBE).

Wind Load:- The basic wind load as per IS875 (part-3) shall be applied on the vertical projected area, multiplied with the applicable factor for different type of structures.

AUXILIARY POWER SUPPLY

3 phase A.C power supply	415V, 50 Hz, 3-phase 4 wire, solidly earthed with variation in frequency of +/-5% and variation in voltage +/-10%.
1 phase A.C power supply	240V, 50 Hz, 1-phase, AC supply with variation in frequency of +/-5% and variation in voltage +/-10%.
D.C. power supply	220V(variation under worst condition from 198V to 242V) , 2-wire ungrounded, 50V, 2 wire system (+) earthed , 48V +/-20%

Transportation Limitations:- For shipments, the Manufacturer shall pack the items to meet size and weight restrictions of the Indian railways and road systems. Shipments from Manufacturer's work (in case of foreign manufacturer) shall travel to the Port of entry in India, from where these will be transported, after necessary port clearances etc., by the Contractor to Dehradun , which shall be the nearest rail head for the Project, and further transported to site. However, in certain cases the Contractor may be required to transport the materials from Port of entry to Dehradun and further to Vyasi HE Project site directly by road transport. However, Indian contractors shall be

responsible in all respects for transportation of all materials and equipment up to the project site. Manufacturers shall consult with the concerned authorities of railways and highways to ensure that their packaging will be such as to permit them to transport the plant and equipment within such imposed limits. Manufacturers shall arrange to deliver the maximum size subassemblies consistent with safe and convenient transport. All materials and equipment etc. arrived at Dehradun will be unloaded from rail wagons and reloaded on to road transport for shipment to project site by the Contractor. The roads and bridges enroute shall be made suitable for 70R loading capacity.

3.2 GENERAL TECHNICAL REQUIREMENT

3.2.1 QUALIFYING REQUIREMENT

As per section-1 of item Specific QR

3.2.2 TYPE TESTS

For all the items of equipment's, bidder shall furnish copies of Type Tests Certificates for the equipment's of the type and ratings similar to those specified. Type Tests Certificates furnished shall be as per the provisions of relevant standards for such equipment's. In case the contractor is not in position to furnish, such type tests certificates or the type tests certificate furnished by him are not as per the relevant standard for such equipment and, therefore, not acceptable to the Employer, Type Test for such items and equipment's will have to be got conducted by the contractor at his cost.

All the switchyard equipment's shall be type and routine tested as per relevant IS / IEC- Publication or Type tests certificate shall be furnished to prove that the equipment fulfils all characteristics defined in Specifications. The contractor is required to carry out all type tests on one apparatus of each type and routine tests on all apparatus and submit the reports to the Employer. If approved by the Employer, type test certificates can be accepted in place of type tests in case of the same have been carried out on same type & similar capacity. 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 in within last **ten years from the date of bid opening (i.e. 08.05.2017)** 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 ten 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. All design calculations, materials, works, manufacturing and testing shall conform to the latest applicable standards.

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 modem 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. In 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

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 steel structures, plates etc shall be painted with non-corrosive plant on a suitable primer. It may be noted that normally all electrical equipment in switchyard are painted with shade RAL 7032. All The indoor cubicles shall be of same colour scheme 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 FUNGISTATIC 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 surfaces that are so indicated on the drawings or those that require machining for their intended function, or those that are usually machined according to good workshop practice shall be machined. Surface finish qualities shall be adequate for the intended use and shall be indicated on the Contractor's Drawings. Suitable measuring device such as scatter meter or other acceptable measuring device will be used to determine compliance with specified surface finish.

All interiors and exteriors of tanks, control cubicles and other metal parts shall be throughly 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 otherwise 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. All external painting shall be as per RAL 7032.

Before delivery, all exposed, unfinished metal surfaces shall be cleaned and shop painted. Cleaning and Preparation of steel surfaces shall be in accordance with relevant standards and they shall be given at least one prime coat the same day. Paint shall be in accordance with applicable portions of relevant Indian and International standards. The colours of the paint will be selected at the Employer’s option. All interior surfaces of the crane those are accessible for maintenance inspections shall also be completely painted. All other interior surfaces shall be painted with only the 1 coat of primer. The inside of all gear housings shall be painted with 2 coats of oil resisting enamel as recommended by the gearhousing manufacturer. A

quantity and type of paint equal to 15% of the paint used for the second and third coats shall be provided for field touchup work. Monorail hoists shall be painted with the manufacturer's standard finish. The colour of the paint will be subject to approval of the Employer/Customer.

3.8 GALVANIZING

All structural steel including ladders, platforms, hand rails and the like and all exterior and interior steel surfaces of outdoor Works, as well as bolts and nuts associated with galvanised parts shall be hot-dip galvanised, electrolytic galvanised or serialised, as may be appropriate to the particular case. Galvanising shall be performed in accordance with VDE Standard 0210 (Verband Deutscher Elektrotechniker) or IS 4795:1996.For galvanizing, only original blast furnace raw zinc shall be applied, which shall have a purity of 98.5%.The thickness of the zinc coat shall be for bolts and nuts, approx. 60 micrometer.

Conforming to latest version of IS:2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvasized. Minimum weight of zinc coating shall be **610 gms. per square meter** and minimum thickness of coating shall be 85microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM.

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 equipment's 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. All electrical parts shall be carefully protected from damage by sand, moisture, heat or humid atmospheric conditions by packing them in high-pressure polyethylene foil.

All the cable shall be supplied on nonreturnable wooden drums with adequate barrel diameter so as to avoid any damage to the cables and to withstand rough handling during transportation and storage. A layer of waterproof paper shall be applied to the surface of the drums and over the outer cable layer.

A circular space of at least 40mm shall be left between the cable and the lagging. Each drum shall carry the name of the manufacturer, the name of the Employer, his address, order number, item number, type, size length of cable, net and gross weight duly stencilled thereon.

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 supplier shall propose following Degree of protection for those equipment/Items for which the degree of protection has not been specified in the specification for the approval of BHEL/UJVNL The decision of BHEL/UJVNL shall be final. The enclosures of the Control Cabinet, Junction boxes and Marshalling boxes panels etc. to be installed shall be provided with degree of protection as detailed here under:

a) Installed outdoor: 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. If necessary the cubicles shall be equipped with automatically controlled heating elements for protection against internal condensation and moisture. All panels/cubicles shall have approximately 20% space for mounting of future devices. Door operated interior illuminating lamps, power socket for 240V 5 /15A and communication socket shall be provided in all panels.

3.12 RATING PLATES, NAME PLATES AND LABELS

The switchyard equipment shall have a rating plate with the information required by relevant IEC i.e. at least the following:

- Manufacturer's name
- Type number
- Serial number
- Rated Voltage
- Rated impulse withstand voltage
- Rated power frequency withstand voltage
- Rated frequency
- Rated current
- Rated short circuit breaking current
- Rated short time current (r.m.s), & duration Each instrument transformer must have its own rating plate with the information as required in IEC 600441 and IEC 60186.

3.13 EARTHING

The operating mechanism housing, control cabinets, support structure etc. shall be provided with two separate earthing terminals suitable for bolted connection to 50x6mm mild steel flat to be provided for connection to station earth mat.

Circuit breakers, LA, Isolator, CVT, CT, BPI shall be provided with two grounding pads suitable for connection to galvanized steel flat of Size 75X12 mm. 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.

The Contractor shall connect all equipment included in the scope of delivery to the grounding system. In addition to the grounding through cable screens, all equipment such as cubicles, motors, etc. shall be connected directly to the grounding system using copper wire of area not less than 50 mm sq. at two different points. In general, all iron parts such as supports, covers, railing, etc. shall be connected to the grounding system. Each conductor shall have its own separate connection point. Pressed on closed shoes shall be used for connections to bars.

3.14 TERMINAL BLOCKS AND WIRING

Wiring within cubicles and equipment enclosures shall conform to requirements of this section unless otherwise specified. Control wiring shall be stranded copper and shall be not smaller than 1.5 mm sq. except as otherwise agreed by the Engineer.

Larger size wiring shall be used where needed for the current carrying capacity requirements. Cables shall have at least 1000 V grade PVC insulation except for 110V DC and telemetering or communication system equipment for which 650V and 300 V ratings respectively may be acceptable.

For current and potential transformer secondary circuits the minimum cross section of the conductors shall not be less than 2.5mm sq. Wiring shall terminate at terminal blocks at one side only. Where tap connections are required, they shall be made on terminal blocks. Wiring shall be neatly arranged and laid in plastic conduits accessible from the front door. The conduits shall not be filled more than 70 %.

Each cubicle shall be provided with an earthing bar (PE) of sufficient cross section carrying any possible fault current without undue heating. All metallic parts of the cubicle not forming part of the live circuits, all instrument transformer terminals to be earthed and other earthing terminals as well as all cable screens and PE-wires shall be connected to the earthing bar.

The terminal blocks shall be located to allow a neat and easy connection work and shall be safely accessible while the equipment is in service. Control circuits and power circuits shall be completely separated by use of divided or separate terminal blocks. Power terminal blocks shall be rated in accordance with applicable standards and shall be provided with covers. Control wiring terminal shall be equipped with facilities for opening the circuit. It shall be possible to interchange a single terminal block for a new one without dismantling a whole row. Current transformer terminal blocks shall have provisions for short-circuiting and disconnecting. Not more than two wires shall be connected to any one terminal. Terminal blocks using screws acting directly on the wire will not be accepted. At least **20%** spare terminals shall be provided. Terminals shall be marked with printed labels.

Terminal blocks shall be 1100 V grade and have continuous rating to carry the maximum expected current

on the terminals. Those shall be of moulded piece complete with insulated barriers stud type terminals, washers nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But preferably the terminal blocks shall be non-disconnecting stud type equivalent to Elmex type CATM4, Phoenix cage clamp type of Wedge or equivalent. The Insulating material of terminal block shall be nylon 6.6 which shall be free of halogens, fluorocarbons etc.

Terminal block for current transformer and voltage transformer secondary leads shall be provided with test links and isolating facilities. The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

The terminal shall be that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the terminal clamp unless it is done intentionally. The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable. The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

The terminal blocks shall be fully enclosed with removable covers of transparent, non deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.

The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live. At least 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

There shall be a minimum clearance of 250mm between the first bottom row of terminal block and the associated cable gland plate. Also the clearance between two rows of terminal blocks shall be a minimum of 150 mm. The Supplier shall furnish all wire, conduits and terminals for the necessary inter-phase electrical connection (where applicable) as well as between phases and common terminal boxes or control cabinets.

All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publictions, in both longitudinal and transverse modes. The supplier shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment.

3.15 CONTROL CABINETS, JUNCTION BOXES, TERMINALS BOXES AND MARSHALLING BOXES FOR OUTDOOR EQUIPMENTS

All types of boxes, cabinets etc. shall generally conform to and be tested in accordance with IS-5039, IS-8623 or IEC-439, as applicable and the clause given below.

Control cabinet, Junction boxes, Marshalling boxes & Terminal boxes shall be made of sheet steel or aluminium and shall be dust, water and vermin proof. Sheet used shall be least 2.0 mm cold rolled or 2.5mm hot rolled. The box shall be properly braced to prevent wobbling. There shall be sufficient

reinforcement to provide level surfaces, resistance to vibrations and rigidity during transportation and installation. In case of aluminium enclosed box the thickness of aluminium shall be such that it provides adequate rigidity and long life as comparable with sheet of specified thickness. Cabinet/boxes shall be free standing floor mounting type, wall mounting type or pedestal mounting type as per requirements.

Removable plates with gaskets shall be fitted at the top and bottom of the box to provide the entry for conduit or cable. The door shall be provided with suitable gasket and fitted with a lock type handle. The door shall be hung on hinges having brass bodies and stainless steel pins. Each cable junction box shall be provided with terminals of adequate rating on the terminal strip of suitable thickness. Disconnecting (sliding) type terminal blocks shall be provided, to facilitate testing & maintenance without disconnecting the cables.

Multi block terminal board of 15 A, 500 V rating shall be provided to form in assembly of number of terminal block. Assembly may be secured with only two screws on the surface. There shall be provision on the strips to add more terminal in case of further requirement.

Cabinet /boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. The quality of gaskets shall be such that it does not get damaged/cracked during the operation of the equipment.

All door, removable covers and plates shall be gasketed all around with suitably profiled EPDM gaskets. The gasket shall be tested in accordance with approved quality plan. The quality of gasket shall be such that it does not get damaged /cracked during the years of the equipment or its major overhaul whichever is earlier. All gasketed surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

All boxes/cabinets shall be designed for the entry of cables from bottom by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate projecting atleast 150 mm above from the base of the Marshalling Kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland. The gland shall project at least 25mm above gland plate to prevent entry of moisture in cable crutch. Gland plate shall have provision for some future glands to be provided later, if required

3.16 SPACE HEATERS

The space heaters shall be suitable for single phase 50 Hz AC supply from an independent source, which should automatically switch off before starting of unit. However, once the dehumidification unit is switched ON, it shall be controlled automatically with a thermostat. The dehumidification unit shall be designed to avoid hot spot. The heater shall be suitable for continuous operation at 240 V AC supply voltage and shall be provided with on – off switch and fuse shall be provided for heater.

One or more adequately rated, thermostatically connected heaters shall be supplied to prevent

condensation in any compartment. The heater shall be installed in the lower portion of the compartment and electrical connections shall be made from below the heater to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

The heaters shall be suitably designed to prevent any contact between the heater wire and air and shall consist of coiled resistance wire centered in metal sheath and completely encased in a highly compacted powder of Magnesium Oxide or other material having equal heat conduction and electrical insulation properties, or they shall consist of a resistance wire wound on a ceramic and completely covered with a ceramic material to prevent any contact between the wire and air. Alternatively, they shall consist of resistance wire mounted into a tubular ceramic body built into an envelop of stainless steel or the resistance wire is wound on a tubular ceramic body and embedded in glaze the surface temperature of the heaters shall be restricted to a value which will not shorten the life of the heater sheaths or that of insulated wire or other component in the compartments

3.17 QUALITY

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

3.18 **GUARANTEE**:

The supplier shall guarantee that the goods under the Contract are new, unused of the most recent or current models and incorporated all recent improvements in design and materials unless provided otherwise in the Contract. The supplier shall further guarantee that the goods supplied under this Contract shall have no defects arising from design, materials or workmanship, installation and erection, if that may develop under normal use of the supplied goods. The supplier shall also guarantee the performance of the works executed by him including the performance of all the materials/goods supplied by him.

BHEL shall promptly notify supplier in writing of any claims arising under guarantee in respect of goods. Upon receipt of such notice, the supplier shall, with all reasonable speed, repair or replace the defective works or parts thereof, free of cost at site. All the expenses towards transportation of defective parts to supplier’s works and of repaired/replaced parts to site shall be borne by the Supplier.

If the Supplier, having been notified, fails to remedy the defects within 14 days, the BHEL will proceed to take such remedial action as may be necessary, at the supplier’s risk and expenses. All expenses in this regard will be recovered from Supplier.

3.19 DOCUMENTATION

3.19.1 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 anything 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.

3.19.2 **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 equipment's and materials, clearances and spaces required for installation and interconnection between various portions of equipment's 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, 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.

3.19.3 **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 finalized 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 2 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.

Title Block

Customer	**M/s Uttarakand Jal Vidyut Nigam Ltd.**
Project:	**2X60 MW Vyasi HEP**
Contractor	**BHEL**

3.19.3 **DOCUMENTS TO BE SUBMITTED ALONGWITH OFFER**

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

3.20 DOCUMENTATION SCHEDULE

S. No.	DESCRIPTION	TENDER STAGE	CONTRACT STAGE FOR APPROVAL	FINAL DOCUMENTATION	
			Prints	Prints	CDs
1	Drawings and Data Sheets	1	10	13	-
2	Drawings "As Built "	-	-	13	05
3	Type Test Reports	1	05	13	-
4	Erection Manuals	-	11	13	-
5	Operation and Maintenance Manuals	-	11	13	-
6	Manufacturing Quality Plan	1	11	13	-
7	Field Quality Plan	1	11	13	-
8	Inspection Test Reports	-	-	13	-

Drawings will also be submitted in mini cartridges in AUTOCAD Release -14 package or any other CAD package along with conversion files for all major items.

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

SECTION-4
GUARANTEED TECHNICAL PARTICULARS

	LINE TRAPS	:
1	Name of manufacturer and country	:
2	Type Model and Catalogue No	:
3	System Voltage Rating	:
4	Continuous current rating at 50^{o} C ambient	:
5	Continuous current rating at 65^{o} C ambient	:
6	Maximum Symmetrical short circuit current rating for 1 sec Duration	:
7	Asymmetric peak value of first half wave of rated short time current	:
8	Rated Inductance	:
9	Blocking Range	:
10	Minimum Guaranteed Resistive Component in Blocking frequency range	:
11	Type of Tuning	:
12	Variation in 50Hz Impedance per Degree Centigrade variation in ambient temperture	:
13	Variation in Resonant frequency band per degree centigrade variation in ambient temperature	:
14	Details of protection of capacitors and coils against voltage surges indicate type of protective device.	:
15	Basic Insulation level	:
16	Standard Nominal Discharge Current of Protective Device for 8/20 Micro second wave impulse	:
17	Rated voltage of the Arrestor (Protective device)	:
18	Min. value of power frequency sparkover voltage (Dry and wet) of protective devices	:
19	Maximum 1.2/50 usec Impulse Sparkover voltage of protective device	:
20	Virtual steepness and max front of wave impulse sparkover voltage of protective device	:
21	Max. residual discharge voltage of protective device for 8/20 usec impulse discharge current of	
	(a) 5000 Amps	:
	(b) 10000 Amps	:

GUARANTEED TECHNICAL PARTICULARS

22	Class of Insulation of line traps as per table - 1 of IEC 353	:
23	Temperture Rise in line trap under rated continuous current	:
24	Visual corona Extinction voltage	:
25	Radio Interference voltage	:
26	Type of incoming and outgoing terminals	:
27	Visual corona Extinction voltage for terminal concurrence	:
28	Radio interference voltage in terminal connectors	:
29	Continuous current rating of terminal connector at 50^{o} C ambient	:
30	Short time current rating of terminals connectors	:
31	Temperature rise in terminal connector under rated continuous current over 50^{o} C ambient	:
32	Type of Mounting	:
33	Maximum working stress	:
34	Ultimate tensile strength	:
35	Material of main coil	:
36	Material of terminal connector	:
37	Material of pedestal	:
38	Material of mounting hardware	:
39	Net weight (Approx)	:
40	Whether corona rings are provided	:
41	Whether Bird Barries are provided	:
42	Overall Dimensions provided	
	(a) Diameter	:
	(b) Height	:
43	Any other feature	:
44	No of turns in theline trap main coil	:
45	Type of conductor whether solid or standard	:
46	Overall conductor size	:
47	Cross sectional area of conductor of one layer	:
48	Type of construction (no of coils and whether open type or covered with insulating material	:

SECTION-V

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

PLEASE NOTE:

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

BHEL ENQUIRY. NO:

BIDDER OFFER REFERENCE:

EQUIPMENT: 220kV LINE TRAP

S. No.	Parameters	Data	Yes /No	Remarks
1.	Applicable Standards	IEC: 60353(latest), IS:8792,IS 8793, IEC: 60099 (Part I&IV), IS : 3072 (Part - I) and IS : 5561	Yes/No	
2.	Type	Outdoor Type , Air cored , pedestal/suspension Mounted	Yes/No	
3	System Voltage (Indenter to tick)	220kV √	Yes/No	
4	Max. operating voltage of system	245kV √	Yes/No	
5	Rated Inductance for 220kV Line Trap	1mH	Yes/No	
6	Rated Frequency	50 Hz	Yes/No	
7	Rated current	1600A	Yes/No	
S. No.	**Parameters**	**Data**	**Yes /No**	**Remarks**
8	Rated Short Circuit Current	220kV LT-50kA/sec	Yes/No	
9	Tuning device type	Field adjustable	Yes/No	
10	Type of tuning	Broad Band tuned	Yes/No	
11	Blocking Bandwidth	50 to 500 kHz.	Yes/No	
12	Minimum blocking Impedance or resistance	220kV/132kV system : Not less than 570 ohm	Yes/No	
13	Visual Corona discharge: The line trap shall show no visual corona discharge at following Power frequency falling voltage	Not less than 156kV (rms)	Yes/No	
14	Corona Rings for 220kV Line Trap	Corona rings provided	Yes/No	
15	Radio Interference voltage	Not exceed 500μV at 163 kV (rms)	Yes/No	
16	Lightning Arrestor :	Shall be station class current limiting active gap type	Yes /No	
		In case of gapless type metal oxide arrestor. The full justification for the same has been attached along with the offer.	Yes/No	

17	Rated discharge current of lighting arrestor	10kA		
18	Coordination shall be done by taking 20kA at 8/20 micro-sec discharge current into account		Yes/No	
19	Material of main coil	Non magnetic	Yes/No	
20	Mounting arrangement	Pedestal/suspension mounting	Yes/No	
21	Max. wind pressure the pedestal mounted Line trap can withstand	260kg/m^2	Yes/No	
22	Material of fixing bolts, hardware and all accessories.	Non magnetic material	Yes/No	
23	Bird barriers	Provided	Yes/No	
S. No.	**Parameters**	**Data**	**Yes /No**	**Remarks**
24	a) 220kV WT -Terminal connectors for line side	Provided	Yes/No	
	b) 220kV WT -Terminal connectors for station side	Provided	Yes/No	
25	Visual Corona Extinction voltage for clamps and connectors (Indenter to tick)	Not less than 156 kV (rms) (for 220 kV) √	Yes/No	
26	Radio Interference voltage for clamps and connectors (Indenter to tick)	Not exceed 500 µV at 163 kV (rms) (for 220 kV)	Yes/No	
27	Material of clamp and connector	Non magnetic	Yes/No	
28	Valid Type test reports as per Section-III, is attached along with this offer.	Line Trap –as per Section-II	Yes/No	
		Terminal connectors –as per clause 13 (Section-II)	Yes/No	
29	Confirmation to Section –III pertaining to TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE		Yes/No	
30	List of Deviations if any , is attached along with offer		Yes/No	
31	List of all special tools and tackles if any which are specifically required for the equipment offered and are proprietary in nature . The list shall be on Equipment manufacturers letter head and duly signed . (to be attached with offer)		Yes/No	
32	Following Documents are attached			

	along with the offer :			
	a. Filled Checklist.		Yes/No	
	~~**b. Filled GTP**~~		~~Yes/No~~	
	~~c. **Drawings**~~		~~Yes/No~~	
	d. List of special Tools and tackles on company letter Head, duly signed and stamped.		Yes/No	
33	Bidder to confirm if UJVNL standard approved drgs/ previously approved UJVNL drgs are available for approval extension .		Yes /No	

B) TYPE TESTS

i) Whether valid type test reports of the type test as per relevant IS/IEC conducted earlier on identical or similar material are available (test reports are of the test conducted not earlier than 10 (ten) years prior to the originally scheduled date of bid opening).

(YES)

ii) If type test reports are not acceptable to BHEL/Customer then above tests shall be conducted by the bidder free of cost.

(YES)

Date: **Signature of the authorized representative of Bidder**

Company Seal