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	TITLE 220kV Post Insulator with accessories (For 245kV Voltage Class) <i>(Suitable for highly corrosive environment of process/ petrochemical industry)</i>					SIGN	-sd-	-sd-	-sd-
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	CONSULTANT		TATA Consulting Engineers Limited (TCE)						
	PROJECT		LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery						
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Bharat Heavy Electricals Limited

Project: LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery

Technical Specification: 220kV Post Insulator with accessories

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SECTION 1:

SCOPE, PROJECT SPECIFIC TECHNICAL REQUIREMENTS & BILL OF QUANTITIES

1. Scope

The scope of work under this requisition shall include but not be limited to design, engineering, manufacturing, inspection including third party inspection and testing at manufacturer's works before supply, proper packing and delivery to project site, of the equipment (220kV Post Insulator) complete with all fittings, accessories and mandatory spares for efficient & trouble-free working mentioned under this specification.

It is not the intent to specify completely herein all the details of design and construction of the equipment. However, the equipment shall conform in all respects to the high Standards of design and workmanship and be capable of performing in continuous commercial operation in a manner acceptable to BHEL/ Customer. The equipment offered shall be complete with all components necessary for its effective and trouble-free operation. Such components shall be deemed to be within the scope of supply, irrespective of whether those are specially brought out in this specification and/or commercially ordered or not. All similar parts particularly movable ones shall be interchangeable.

This section covers the specific technical requirements of the equipment. This constitutes minimum technical parameters for the above item as specified by the BHEL/ Customer. The offered equipment shall also comply with the Section-3 (Project Details and General technical requirements for all equipment under the Project) and Section-2 (Equipment Specification Under Scope of Supplies) of this specification.

The specification comprises of following sections:

Section-1	:	Scope, Project Specific Technical Requirements & Bill of Quantities
Section-2	:	Equipment Specification under scope of Supplies
Section-3	:	Project Details & General Technical Requirements (For All Equipment under the Project)
Section-4	:	Annexures
		Annexure A- Compliance Certificate
		Annexure B- Schedule of Technical Deviations
		Annexure C- Guaranteed Technical Particulars
		Annexure D- Technical Checklist

The following order of priority shall be followed. In case of conflict between requirements specified in various documents, the more stringent one shall be followed. BHEL/Customer concurrence shall, however, be obtained before taking a final decision in such matters.

1. Statutory Regulations

In particular, the latest version of the following statutory regulations, as applicable, shall be followed for system,

- o Indian Electricity Act
- o CEA regulations
- o The Factory Act
- o The Petroleum Rules

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- o OISD standards
 - o Requirements of other statutory bodies as applicable, e.g. CEA, CCE, LPCB.
2. Section-1
 3. Section-2
 4. Section-3
 5. Codes & Standards

Bidder shall furnish list of conflicts/ ambiguities/ deviations, if any, along with their technical offer and also furnish the basis that is considered for submitting technical offer. BHEL/ Customer will resolve listed conflicts prior to award. In case of ambiguity, bidder shall inform BHEL/ Customer of their interpretation. In case bidder fails to convey the same prior to award, BHEL/ Customer decision on interpretation shall be considered final if need arises during the execution. No additional cost or extra time on account of conflicts/ ambiguities/ deviations shall be admissible.

In general, no deviation from the requirements specified in various clauses of this specification shall be allowed and hence, a certificate to this effect shall have to be furnished along with the offer (Annexure-A), however bidder shall furnish list of conflicts/ ambiguities/ deviations (Annexure-B), if any. Any conflicts/ ambiguities/ deviations mentioned elsewhere in technical offer shall not be reviewed.

The equipment with its Accessories is required for the following project:

Name of the Customer	:	Indian Oil Corporation Limited (IOCL)
Name of Consultant	:	Tata Consulting Engineers Limited
Name of Main Contractor	:	Bharat Heavy Electricals Limited
Name of the Project	:	LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the notice inviting tender/ enquiry.

2. Codes & Standards

1. The rating as well as performance and testing of the equipment shall comply with the latest editions and amendments of the following standards as applicable, unless otherwise specified elsewhere in this specification,

IS:2544/1973 Insulators.

IS:2147 (P-II)/1971 Dimensions of Indoor and Outdoor Porcelain Post Insulators and Post Insulator Units for Systems with Nominal Voltages Greater Than 1000 V, Part II: Outdoor Cylindrical Post Insulators

IS:2147 (P-III)/1973 Dimensions of Indoor and Outdoor Porcelain Post Insulators and Post Insulator Units for Systems with Nominal Voltages Greater Than 1000 V, Part III: Outdoor Pedestal Post Insulators

IEC:273/1971 Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V

2. For the purpose of this specification all technical terms used hereinafter shall have the

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meaning as per IEC/ISS specification.

3. The equipment meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standards mentioned above shall also be acceptable. Where the equipment offered by the bidder confirms to other standards, salient points of difference between the standards adopted and the specified standards shall be clearly brought out in the offer.
4. In case of imported equipment, standards of the country of origin shall be applicable, if these standards are equivalent or stringent than the applicable Indian standards.
5. The equipment shall also conform to the provisions of Indian Electricity Rules, 1956 and other statutory regulations currently in force in the country.
6. In case Indian standards are not available for any equipment, standards issued by IEC/ BS/ VDE/ IEEE/ NEMA or equivalent agency shall be applicable.

3. Specific Technical Requirements

1. The equipment shall perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.
2. The 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.
3. The equipment shall also comply with the following,
 - a. To facilitate erection of equipment, all items to be assembled at site shall be “match marked”.
4. In addition to this, the other specific technical requirements for the equipment shall be as follows,

Sl. No.	Technical Parameters	Unit	Particulars
1	Equipment		220kV Post Insulator with accessories
2	Type		Silicon rubber polymer/ composite type Post Insulator
3	Installation		Outdoor type
A	Meteorological data		
1.1	Maximum ambient temperature	°C	50
1.2	Minimum ambient temperature	°C	-5
1.3	Average ambient temperature	°C	35
1.4	Design ambient temperature	°C	45
2	Average no. of thunder storm days	Days	45
3.1	Maximum Relative humidity	%	95
3.2	Maximum Relative humidity	%	26
4	Average Annual Rain Fall	mm	900
5	Maximum Wind Pressure	Kg/ sqm	195
6	Maximum Altitude above Mean Sea Level	m	1000

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7	Isoceraunic Level	Days/ Year	45
8	Seismic Level (Horizontal Acceleration)	Zone	4
9	Average no. of rainy day per Year	Days/ Year	120
B	System Parameters		
1	Nominal/ rated system voltage	kVrms	220
2	Highest system voltage	kVrms	245
3	Rated Frequency (Hz)	Hz	50± 2.5
4	One-minute power frequency withstand voltage (Dry & wet)	kVrms	460
5	Lightning impulse withstand voltage (1.2/50micro sec.) (dry)	kVp	± 1050
6	Switching surge withstand voltage (250/2500micro sec.) (wet)	kVp	--
7	Maximum radio interference voltage	μV	500 at 156kV
8	Corona extinction voltage (min)	kVrms	156 (min)
9	Pollution level as per IEC: 815		Heavy (III)
C	Technical parameters		
1	Type of Insulator		Silicon rubber polymer/ composite type
2	Total minimum creepage distance	mm	6125
3	Strength of insulator		
	- Cantilever strength of insulator	kN/kg	6/ 600
	- Torsion strength	nm	3000/ As per IEC:60273
	- Bending strength	N	4000
	- Tensile strength	N	70000
	- Compressive strength	N	140000
4	Height of insulator	mm	2300
5	No. of Insulator per stack	No.	2
6	Pitch Circle Diameter (PCD)		
	- Top		127mm
	- Bottom		275mm
7	Holes on top	No.	4XM16
8	Holes on bottom	No.	8X18dia

5. Aluminum used for Corona Ring, if applicable shall be grade 63401/ 19501 confirming to IS: 5082.
6. Insulators shall also meet requirement of IEC-60815, as applicable having alternate long & short sheds. Insulator shall be type and routine tested as per IEC: 60168.

4. General Technical Requirements

The general technical requirements for the equipment shall be as follows,

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1. Post Insulator shall be silicon rubber polymer/composite type complete with all fittings and accessories required for holding single bus bar conductor ACSR Moose conductors. The Post Insulator pedestal shall be suitable for fixing on the supporting structure to be provided by BHEL/ Customer. The Post Insulator shall be provided with a completely galvanized steel base designed for mounting on the support structure to be provided by BHEL/ Customer.
2. The base and mounting arrangement shall be such that the insulator shall be rigid and self-supporting and no guying or cross bracings between phases shall be necessary. Cap to be provided on top of the insulator shall be of high-grade cast iron or malleable steel casting. It shall be machine faced and hot dip galvanised.
3. The cap shall have four nos. of tapped holes spaced on a pitch circle diameter to accommodate the terminal clamp for supporting bus bars/ conductors. The holes shall be suitable for bolts with threads having anticorrosive protection. The effective depth of threads shall not be less than the nominal diameter of the bolt.
4. The Post Insulator clamps shall be fitted on the top of the bus Post Insulator for holding Twin/ single conductor ACSR Moose tightly and rigidly.
5. The insulators shall be entirely free from sharp edges, ridges or points and shall not exhibit appreciable corona formation during service.
6. Castings shall be free from blow holes, flaws, cracks and other defects and shall be smooth, close grained and of true forms and dimensions.

5. General Requirements

The general requirements for the equipment shall be as follows,

1. Schedule
 - a. Bidder shall submit detailed bar chart indicating all the milestones from engineering till manufacturing/ testing, dispatch to site.
 - b. Bidder to submit list of consumables with shelf life of less than one year. It shall be supplied before erection after clearance from BHEL/ Customer/ Consultant.
2. Any special tools and tackle, which are specifically required for the equipment and are proprietary in nature shall be included in offer. List of such special tools and tackle should be clearly listed along with the technical offer. Any special tool which is not listed in the list but required during the erection/ testing/ commissioning of equipment shall also be deemed in bidder's scope.
3. The bidder must fill up all the details required for offered item/s. Instead of indicating "refer drawing, or as per IS/IEC", the exact value/s must be filled in.

6. Bill of Quantities

1. Quantities for supply and services for the equipment shall be as per Annexure- 220kV Post Insulator with accessories. However, any item not appearing herein but required for completeness of the work is deemed to be included in bidder's scope.
2. Post Insulators shall be supplied with hot dip galvanized hardwares for inter unit jointing and fixing to structure (both top and bottom).
3. The quantities in BOQ may vary up to $\pm 30\%$ in line with quantity variation clause. However, individual quantities may be deleted or vary up to any extent.

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7. Drawings / Documents required for Engineering Manufacturing Clearance

1. The drawings/ documents, as follows shall be used for providing engineering manufacturing clearance of the equipment and furthermore, it shall be used for delay analysis, if any from bidder. The schedule for submission and resubmission shall be in line with details provided in section-3.

1	220kV Post Insulators- Drawings & Guaranteed Technical Particulars
2	220kV Post Insulators- Type Test Reports
3	220kV Post Insulators- Quality Assurance Plan & Inspection Test Schedule

2. Date of Submission of first lot of drawings/ documents shall be counted only from the date of submission of reasonably correct drawings/ documents.
3. The successful bidder shall ensure vendor approvals, if required as well as approvals of all requisite drawings/ datasheets/ type test reports/ QAP etc, wherever required, for the offered equipment as per this specification from Customer/IOCL.
The successful bidder shall have to extend all possible supports like timely submission/ resubmission of drawings, visit to end customer to facilitate documents approval without any commercial implications to BHEL. Acceptance of bidder's documents shall be subject to end customer approval.

8. Type Testing

1. Bidder shall ensure that the equipment being procured shall be of proven design and should have valid type test certificates as per specified in IS/ IEC standards (amended up to date) at any ISO/IEC/NABL accredited laboratories.
2. Type test certificates shall not be more than seven (7) years old as on original scheduled date of technical bid opening. In those cases, where type test certificates are more than seven (7) years old from original scheduled date of technical bid opening, bidder shall carry out the type tests at any ISO/ IEC accredited laboratories prior to dispatch of equipment with no commercial implication to BHEL/Customer.
3. In case any of Type tests have not been conducted on the offered design or there has been a change in the design after the type tests. The requisite tests shall be conducted by bidder on the offered design without any extra cost and delivery impact to BHEL/ Customer.

9. Quality Plan

1. The successful bidder shall submit Quality Assurance Plan with in-process inspection methods, tests, records, etc. for BHEL/ Customer approval. Customer hold points will also be included in the plan, which shall be mutually agreed by the BHEL/ Customer. In case bidder has reference Quality Assurance Plan agreed with BHEL/ Customer, same shall be submitted for specific project to BHEL/ Customer approval. There shall be no commercial implication to BHEL/ Customer on account of Quality Plan approval.
2. Superior quality control system shall be adopted to assure high product quality. Raw materials of the best commercial grade quality and high reliability shall be used in the manufacture of the equipment. All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan. The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards

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and comply with the requirements of the specification. Charges for all tests for the equipment shall be deemed to be included in bidder's scope.

10. Inspection & Testing

1. The equipment shall be subject to inspection by BHEL/ Customer or authorized representative at bidder/manufacturers' works. Hence, Bidder shall furnish all necessary information concerning the supply to BHEL/ Customer.
2. The inspector shall have free access to the manufacturer's/ supplier's works for the purpose of inspecting the process of manufacture in all its stages and he will have the power to reject any material, which appears to him to be of unsuitable description or of unsatisfactory quality.
3. Bidder shall give at least 2 weeks' advance notice to BHEL/ Customer, regarding the date of testing to enable him or his representative to witness the tests. All the tests must be done as per the approved QAP.
4. Bidder shall ensure that the hazardous area equipment provided shall have the necessary test certificates and valid CCOE approval certificates.
5. Bidder shall also furnish factory acceptance test (FAT) for BHEL/ customer approval in line with specific requirements mentioned in Section-2.
6. **Testing as per HVPNL guidelines/ specification, at designated third party laboratories/ any ISO/IEC/NABL accredited laboratories, shall be carried out without any commercial implications to Customer/ BHEL.**
7. **Arranging and coordinating HVPNL for witnessing routine/ acceptance/ type tests at their works or at designated third party laboratories/ any ISO/IEC/NABL accredited laboratories is in the scope of bidder.**

11. Makes of Equipment/ Components

1. The offered equipment shall be brand new with state of art technology and proven field track record. No prototype equipment shall be offered.
2. Bidder while ordering shall ensure the availability of spare parts and maintenance support services for the equipment at least for 10 years from the date of supply.
3. Bidder shall give a notice of at least one year to the BHEL/ Customer before phasing out the products/spares to enable the owner for placement of order for spares and services.
4. The equipment offered by the Bidder shall be complete in all respects. Any material and component not specifically stated in this specification but which are necessary for trouble free operation of the equipment and accessories specified in this specification shall be deemed to be included unless specifically excluded. All such equipment/ accessories shall be supplied without any extra cost. In addition to this, all similar components shall be interchangeable and shall be of same type and rating for easy maintenance and low spare inventory.
5. Specific reference in this specification and documents to any material by trade name, make or catalogue number shall be construed as establishing quality and performance requirements.

12. Packing and Dispatch

1. The equipment shall be properly packed for selected mode of transportation i.e. sea, rail and road in such a manner that it is protected against the climatic conditions and for any damage during transportation, transit and storage. The panels shall be wrapped in polyethylene sheets

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before being placed in wooden crates/cases to prevent damage to the finish. Crates/cases shall have skid bottoms for handling. Special notations such as 'Fragile', 'This side up', 'Weight', 'Owner's particulars\ 'PO nos.' etc., shall be clearly marked on the package together with other details as per purchase order.

2. The equipment may be stored outdoors for long periods before installation. The packing should also be suitable for outdoor storage areas with heavy rains/ high ambient temperature unless otherwise agreed and hence, Packing shall be suitable for long storage (minimum 1 year).

13. Definitions Used

The following expressions hereunder and elsewhere in the technical specification used and their grammatical variations shall unless repugnant to the subject or context thereof, have the following meanings hereunder respectively assigned to them, namely:

1. Battery Limit: The demarcated area within which the Unit is to be located.
2. Bid/Bidding Documents: The totality of the documents comprising the Bidding Document for the notice inviting tender.
3. Contract: The totality of agreement between Customer/ Purchaser/ Owner/IOCL and the Contractor/ LSTK Contractor/ BHEL as derived from the contract documents.
4. Contractor/ LSTK contractor: The bidder selected by the Customer/ Purchaser/ Owner/IOCL for the performance of the work and supply of materials. In this case, it is BHEL.
5. Customer/ Purchaser/ Owner: Indian Oil Corporation Limited.
6. Consultant: Any person(s)/ Firm nominated/ assigned by the Contractor/ LSTK Contractor/ BHEL for providing the engineering consultant services. In this case, it is TCE.
7. Bidder/ vendor: The bidder selected for this intended work shall be known as vendor.

14. Abbreviations Used

The following terminology/ acronym hereunder and elsewhere in the technical specification used and their grammatical variations shall unless repugnant to the subject or context thereof, have the following full form hereunder respectively assigned to them, namely,

PI:	Post Insulator
PCD:	Pitch Circle Diameter
AC:	Alternating Current
DC:	Direct Current
HV:	High Voltage
EHV:	Extra High Voltage
kV:	Kilovolt
Hz:	Hertz
FAT:	Factory Acceptance Testing
OEM:	Original Equipment Manufacturer
kV:	Kilovolt
Hz:	Hertz
IP:	Ingress Protection

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PE:	Poly Ethylene
ANSI:	American National Standards Institute
ASTM:	American Society for Testing and Materials
IEC:	International Electro Technical Commission
IEEE:	Institute of Electrical & Electronics Engineers
IS:	Indian Standards
NEMA:	National Electrical Manufactures Association
NABL:	National Accreditation Board for Testing and Calibration
CEA:	Central Electricity Authority
DIN:	Deutsches Institiut fur Normung
CCE:	Continuous and Comprehensive Evaluation
LPCB:	Loss Prevention Certification Board
CCOE:	Chief Controller of Explosives
OEM:	Original Equipment Manufacturer
BHEL:	Bharat Heavy Electricals Limited
OISD:	Oil Industry Safety Directorate
IOCL:	Indian Oil Corporation Limited
HVPNL:	Haryana Vidyut Prasaran Nigam Limited
TPI:	Third Party Agency
ISBL:	Inside Battery Limit
OSBL:	Outside Battery Limit
LSTK:	Lump sum Turnkey
PRPC:	Petroleum Refining and Petrochemical
PNC:	Panipat Naphtha Cracker Complex
PR:	Panipat Refinery Complex
GIS:	Gas Insulated Sub-station
QAP:	Quality Assurance Plan
BOQ:	Bill of Quantities
ASTM:	American Society for Testing and Materials
BIS:	Bureau of Indian Standards
BS:	British Standard
DGMS:	Director General of Mines and Safety
PEM:	Project Engineering Management

Annexure- 220kV Post Insulator with accessories

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Sl. No.	PEERS Sl. No.	Item Description	PEERS Sl. No.	Material Code Description	Material Code	Unit	Qty.	Remarks
A.1		Supply Item- Main Items						
1	1	220kV (Voltage Class 245kV), 6kN, 25 mm/kV , 1 Phase, Outdoor type, Silicon rubber polymer/ composite type Post Insulator- Insulator for 220kV Isolator complete with all accessories, mounting hardware	1	SUPPLY- POST INSULATORS : 220KV, 25MM/KV CREEPAGE, 6KN, POST INSULATOR FOR ISOLATOR WITHOUT CORONA RING - POLYMER TYPE	TB9272260152	Set	12	Technical specification shall In line with Section-2/ Annexure-S-3/C-4/8.
2	2	220kV (Voltage Class 245kV), 6kN, 25 mm/kV , 1 Phase, Outdoor type, Silicon rubber polymer/ composite type Post Insulator- Insulator for 220kV Isolator complete with all accessories, mounting hardware	2	SUPPLY- POST INSULATORS : 220KV, 25MM/KV CREEPAGE, 6KN, POST INSULATOR FOR BUS SUPPORT WITH CORONA RING - POLYMER TYPE	TB9272260141	Set	2	Technical specification shall In line with Section-2/ Annexure-S-3/C-4/8.
A.2		Supply Item- Mandatory Spare Items						
1	3	220kV (Voltage Class 245kV), 6kN, 25 mm/kV , 1 Phase, Outdoor type, Silicon rubber polymer/ composite type Post Insulator- Insulator for 220kV Isolator complete with all accessories, mounting hardware	3	SPARES- POST INSULATORS : 220KV, 25MM/KV CREEPAGE, 6KN, POST INSULATOR FOR ISOLATOR WITHOUT CORONA RING - POLYMER TYPE	TB8272260152	Set	2	Technical specification shall In line with Section-2/ Annexure-S-3/C-4/8 and Section-1, Chapter-2 and Clause 16.4.1.
2	4	220kV (Voltage Class 245kV), 6kN, 25 mm/kV , 1 Phase, Outdoor type, Silicon rubber polymer/ composite type Post Insulator- Insulator for 220kV Isolator complete with all accessories, mounting hardware	4	SPARES- POST INSULATORS : 220KV, 25MM/KV CREEPAGE, 6KN, POST INSULATOR FOR BUS SUPPORT WITH CORONA RING - POLYMER TYPE	TB8272260141	Set	2	Technical specification shall In line with Section-2/ Annexure-S-3/C-4/8 and Section-1, Chapter-2 and Clause 16.4.1.
	Note:							

1. The quantities in BOQ may vary up to $\pm 30\%$ in line with quantity variation clause. However, individual quantities may be deleted or vary up to any extent.

2. Post Insulator for Isolator & Wave Trap shall be without Corona Ring.

3. Post Insulator for Post Insulator shall be with Corona Ring.

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SECTION 2:

EQUIPMENT SPECIFICATION UNDER SCOPE OF SUPPLIES

1. Technical Specification for 220kV Post Insulator
2. Technical Specification for 220kV Post Insulator/ HVPNL- For reference purpose

Technical Specification for 220kV Post Insulator

Annex-S-3/C-4/1

245 kV BUS POST INSULATOR

1. SCOPE

This specification covers design, Engineering, manufacture, stage testing, inspection and testing before supply packing, forwarding and delivery at site/store of 245 kV, outdoor type bus Post Insulators and its clamps as per quantities given in the schedule of requirement for use on the 245 kV Grid S/Stns. To support the bus bar at new 220 KV switchyard under IOCL PR. It is not the intent to specify completely all the details of design and construction of the insulator. However, the insulator shall conform in all respects to the high standard of engineering design and workmanship and shall be capable of performing in continuous commercial operation up to the LSTK contractor's guarantee in a manner acceptable to the Purchaser. The equipment offered shall be complete with all components necessary for its effective and trouble free operation. Such components shall be deemed to be within the scope of supply irrespective of whether those are specially brought out in this specification or not. All similar parts particularly movable ones shall be interchangeable.

2. STANDARD

The Post Insulators and their hardware shall comply as regards general requirements, test voltages and test with the latest edition of IS 2544/1973 IS-5350 (P-II) 1973 IS-5350 (P-III) 1971/IEC-168/1979 except in so far as the same may be modified by this Specification.

3. TYPE AND RATING

The 245 kV Bus Post Insulators are required for outdoor-system conforming to IS 2544/1973 or latest version thereof suitable for heavily polluted atmosphere. The Post Insulators shall be specifically suitable to meet the particular requirements of ultimate torsional strength and cantilever loads etc. which they will be called upon to resist during service at the rated voltage.

The principal rating of bus Post Insulators shall be as under: -

Sr.No.	Particulars	Unit				
i.	Nominal system voltage	kV	220	132	66	33
ii.	Highest system voltage	kV	245	145	72.5	36
iii.	Rated frequency 50+/-2.5H					
iv.	Minimum creepage distance	mm	6125	3625	1813	900
iv.	One minute power frequency withstand voltage	kV(rms)	460	275	140	70
v.	Impulse withstand voltage (+ve & -ve)	kV(peak)	900	550	325	170
vi.	Minimum visual discharge voltage level (extinction)	kV(rms)		154 - - -	146	
viii.	Radio interference voltage (Micro volt at 1 MHz) at a system voltage		>1000	>500	>500	>500
ix.	Cantilever strength	Kg.	600	400	400	400
x.	Torsion strength	nm	3000	3000	2000	1200
xi.	Bending strength	N	4000	4000	4000	1000
xii.	Tensile strength	N	70000	50000	35000	25000
xiii.	Compressive strength	N	140000	100000	70000	50000
xiv.	Pitch Circle Dia:					

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	a.	Top mm	127	127	127	76
	b.	Bottom mm	225	178	127	76
xvi.	Height of insulator	mm	2300	1500	770	508
xvii.	No. of Insulator per stack	No.	2	1	1	1

4. CLIMATIC CONDITION

The climatic conditions are of extreme nature varying from extreme cold to dry to tropical humid and to hot. The relative humidity may vary from 26% to 100% and the temperature may vary from –5°C to 50°C with maximum to minimum condition of humidity stated above. The equipment is required to operate satisfactorily under the following site condition:

i) Max. Ambient air temp.	50°C
ii) Min. Ambient air temp.	-5°C
iii) Daily average temp.	35°C
iv) Average number of dust storm days per annum	45
v) Max. relative humidity	100%
vi) Min. relative humidity	26%
vii) Average annual rain fall	900mm
viii) Max. Wind pressure	195 kg/sqmt
ix) Max. Altitude above man sea level	1000 mt.
x) Isoceraunic level	45
xi) Seismic level (horizontal acceleration)	0.3g
xii) Average number of rainy days per annum	120 days

Note: Moderately hot and humid tropical climate conducive to rust and fungus growth. The climate conditions are also prone to wide variations in ambient condition. Smoke is also present in the atmosphere. Heavy lightening also occurs from June to October.

5. GENERAL REQUIREMENT

- a) 245 kV Bus Post Insulator shall be silicon rubber polymer/composite type complete with all fittings and accessories required for holding single bus bar conductor ACSR Moose Conductors. The bus Post Insulator pedestal shall be suitable for fixing on the supporting structure to be provided by the purchaser. The bus Post Insulator shall be provided with a completely galvanised steel base designed for mounting on the support structure to be provided by the purchaser.
- b) The base and mounting arrangement shall be such that the insulator shall be rigid and self supporting and no guying or cross bracings between phases shall be necessary. Cap to be provided on top of the insulator shall be of high grade cast iron or malleable steel casting. It shall be machine faced and hot dip galvanised.
- c) The cap shall have four nos. of tapped holes spaced on a pitch circle diameter to accommodate the terminal clamp for supporting the purchaser's bus bars. The holes shall be suitable for bolts with threads having anticorrosive protection. The effective depth of threads shall not be less than the nominal diameter of the bolt.
- d) The Post Insulator clamps are to be fitted on the top of the bus Post Insulator for holding single conductor ACSR Moose tightly and rigidly. The clamps shall be made of Aluminium alloy and shall comply with relevant ISS. The clamps shall be supplied with galvanised steel studs of the suitable size and maintain the requisite pressure to ensure good and tight joint of low resistance.
- e) The insulators shall be entirely free from sharp edges, ridges or points and shall not exhibit appreciable corona formation during service.

- f) Castings shall be free from blow holes, flaws, cracks and other defects and shall be smooth, close grained and of true forms and dimensions.

6. GALVANISING

All the ferrous metal parts shall be hot dip galvanised smoothly, as per IS 3638 (as amended up to date). IS 2633 or any other equivalent authoritative standard. The material shall be galvanized only after shop operations upon it have been completed. The metal parts before galvanizing should be thoroughly cleaned of any paint, grease, rust, scales or alkalis, or any foreign deposit which are likely to come in the way of galvanising process. The metal parts coating shall withstand minimum four for one minute dips in copper sulphate solution as per IEC-168.

The bus Post Insulator unit shall be assembled in a suitable jig to ensure correct positioning of the top and bottom metal fittings relative to one another. The faces of the metal fittings shall be parallel and at right angles to the axis of the insulator and the corresponding holes in the top and the bottom metal fittings shall be in a vertical plane containing the axis of the insulator.

All nuts, bolts and spring washers etc. required for the assembly of the complete insulator stack shall be in tenderer's scope of supply. The bolts and nuts shall be hot dip galvanized and shall be of high strength generally conforming to IS-136 or any other equivalent international standard.

7. INSPECTION & TESTS

The inspection may be carried by the owner's approved TPI agency. The successful tenderer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this Specification by the purchaser shall not relieve the LSTK contractor of his obligation of furnishing equipment in accordance with the Specification and shall not prevent subsequent rejection if the equipment is found to be defective.

7.1 Type Tests

The following tests shall constitute the type tests in line with IS: 2544:

- a) Visual examination
- b) Verification of dimensions
- c) Visible discharge test
- d) Impulse voltage withstand test
- e) Dry power-frequency voltage withstand test
- f) Wet power-frequency voltage withstand test
- g) Temperature cycle test
- h) Test for mechanical strength
- i) Puncture test (for insulators Type B only)
- j) Porosity test
- k) Galvanizing test

7.2 Acceptance Test:

The test samples after having withstood the routine tests shall be subjected to the following acceptance tests in the order indicated below:

- a) Verification of dimensions
 - b) Temperature cycle test
-

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- c) Mechanical strength test
- d) Puncture test
- e) Porosity test
- f) Galvanizing test

7.3 Routine Tests

The following shall be carried out as routine tests on each post insulator or post insulator unit:

- a) Visual examination
- b) Routine electrical test in line with IS: 2544
- c) Routine Mechanical test with IS: 2544

8.0 DOCUMENTATION: The document schedule for this section shall follow the following vendor data requirement schedule. The LSTK contractor shall have to produce the following drawing in 6 sets of hard copy and 2 sets of CDs for soft copy during different stages of the job execution.

Sr No	Description with bids	With Bids	Post order		Final documents with equipments	
			For review	For records	soft copy	Prints
1	Dimensional / Assembly Drawings		x	x	x	x
2	a.GA drawings (Elevation and Plan)		x	x	x	x
	b. Installation Plan including mounting details		x	x	x	x
	c. Name plate Drawing		x	x		x
3	Inspection Plan and testing procedure (For review by inspection)		x			x
4	Type Test Certificate		x	x		x
5	List Of special Tools & Tackles	x	x		x	x
6	Data Book/ Manual					
	a. Intallation manual			x		x
	b. Operating/Maintenance manual					
	c. Technical Literature Catalogues/ Brochures	x		x		x
7	Equipment storage procedure at site					x
8	Final Test Reports (FAT, SAT, Type tests along w commissioning checklist)					x

HARYANA VIDYUT PRASARAN NIGAM LIMITED.

Technical Specification for 220kV Post Insulator/ HVPNL- For reference purpose

TECHNICAL SPECIFICATION NO. HGD/S-789/R-1/DGM-326

**TECHNICAL SPECIFICATION OF 245 kV, 145 kV, 72.5 kV AND 36 kV
BUS POST INSULATOR**

**CHIEF ENGINEER/MM,
SHAKTI BHAWAN, SECTOR-6,
HVPNL, PANCHKULA.**

DECEMBER, 2010

HARYANA VIDYUT PRASARAN NIGAM LIMITED
TECHNICAL SPECIFICATION NO. HGD/S-789/R-1/DGM-326

**TECHNICAL SPECIFICATION OF 245 kV, 145 kV, 72.5 kV
AND 36 kV BUS POST INSULATOR**

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TECHNICAL SPECIFICATION OF 245 kV, 145 kV, 72.5 kV AND 36 kV BUS POST INSULATOR

1. SCOPE

This specification covers design, Engineering, manufacture, stage testing, inspection and testing before supply packing, forwarding and delivery at site/store of 245 kV, 145 kV, 72.5 kV & 36 kV outdoor type bus Post Insulators and its clamps as per quantities given in the schedule of requirement for use on the 245 kV, 145 kV, 72.5 kV & 36 kV Grid S/Stns. to support the bus bar at various switchyards under Haryana Vidyut Prasaran Nigam Limited.

It is not the intent to specify completely all the details of design and construction of the insulator. However, the insulator shall conform in all respects to the high standard of engineering design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser. The equipment offered shall be complete with all components necessary for its effective and trouble free operation. Such components shall be deemed to be within the scope of supply irrespective of whether those are specially brought out in this specification or not. All similar parts particularly movable ones shall be interchangeable.

2. STANDARD

The Post Insulators and their Hardware shall comply as regards general requirements, test voltages and test with the latest edition of IS 2544/1973 IS-5350 (P-II) 1973 IS-5350 (P-III) 1971/IEC-168/1979 except in so far as the same may be modified by this Specification.

3. TYPE AND RATING

The 245 kV, 145 kV, 72.5 kV & 36 kV Bus Post Insulators are required for outdoor-system conforming to IS 2544/1973 or latest version thereof suitable for heavily polluted atmosphere. The Post Insulators shall be specifically suitable to meet the particular requirements of ultimate torsional strength and cantilever loads etc. which they will be called upon to resist during service at the rated voltage.

The principal rating of bus Post Insulators shall be as under: -

Sr. No.	Particulars	Unit				
i.	Nominal system voltage	kV	220	132	66	33
ii.	Highest system voltage	kV	245	145	72.5	36
iii.	Rated frequency	50+/-2.5H				
iv.	Minimum creepage distance	mm	6125	3625	1813	900
v.	One minute power frequency voltage withstand	kV(rms)	460	275	140	70
vi.	Impulse voltage withstand (+ve & -ve)	kV(peak)	900	550	325	170

vii.	Minimum discharge voltage level (extinction)	visual level	kV(rms)	154	-	-	-
viii.	Radio interference voltage (Micro volt at 1 MHz) at a system voltage of 156 kV.		Micro Volt	>1000	>500	>500	>500
ix.	Cantilever strength (Upright)		Kg.	600	400	400	400
x.	Torsion strength		nm	3000	3000	2000	1200
xi.	Bending strength		N	4000	4000	4000	1000
xii.	Tensile strength		N	70000	50000	35000	25000
xiii.	Compressive strength		N	140000	100000	70000	50000
xiv.	Applicable standard		IS: 5350, IS:2544, IEC 168				
xv.	Pitch Circle Dia:						
	a. Top		mm	127	127	127	76
	b. Bottom		mm	225	178	127	76
xvi.	Height of insulator		mm	2300	1500	770	508
xvii.	No. of Insulator per stack		No.	2	1	1	1

4. CLIMATIC CONDITION

The climatic conditions are of extreme nature varying from extreme cold to dry to tropical humid and to hot. The relative humidity may vary from 26% to 100% and the temperature may vary from -2.5° C to 50° C with maximum to minimum condition of humidity stated above.

The equipment is required to operate satisfactorily under the following site condition:

i)	Location	In the state of Haryana
ii)	Max. Ambient air temp.	50°C
iii)	Min. Ambient air temp.	-2.5°C
iv)	Daily average temp.	35°C
v)	Average number of dust storm days per annum	45
vi)	Max. relative humidity	100%
vii)	Min. relative humidity	26%
viii)	Average annual rain fall	900mm
ix)	Max. Wind pressure	195 kg/sqmt
x)	Max. Altitude above man sea level	1000 mt.
xi)	Isoceraunic level	45
xii)	Seismic level (horizontal acceleration)	0.3g
xiii)	Average number of rainy days per annum	120 days

Note: Moderately hot and humid tropical climate conducive to rust and fungus growth. The climate conditions are also prone to wide variations in ambient condition. Smoke is also present in the atmosphere. Heavy lightening also occurs from June to October.

5. GENERAL REQUIREMENT

245 kV, 145 kV, 72.5 kV & 36 kV Bus Post Insulator shall be either solid core or polycon type insulators complete with all fittings and accessories required for holding single bus bar conductor ACSR 0.4 Sq. inch Zebra. The bus Post Insulator pedestal shall be suitable for fixing on the supporting structure to be provided by the purchaser.

The bus Post Insulator shall be provided with a completely galvanised steel base designed for mounting on the support structure to be provided by the purchaser. The base and mounting arrangement shall be such that the insulator shall be rigid and self supporting and no guying or cross bracings between phases shall be necessary.

Cap to be provided on top of the insulator shall be of high grade cast iron or malleable steel casting. It shall be machine faced and hot dip galvanised. The cap shall have four nos. of tapped holes spaced on a pitch circle diameter to accommodate the terminal clamp for supporting the purchaser's bus bars. The holes shall be suitable for bolts with threads having anticorrosive protection. The effective depth of threads shall not be less than the nominal diameter of the bolt.

The Post Insulator clamps are to be fitted on the top of the bus Post Insulator for holding single conductor ACSR Zebra tightly and rigidly. The clamps shall be made of Aluminium alloy and shall comply with relevant ISS. The clamps shall be supplied with galvanised steel studs of the suitable size and maintain the requisite pressure to ensure good and tight joint of low resistance.

The insulators shall be entirely free from sharp edges, ridges or points and shall not exhibit appreciable corona formation during service.

Castings shall be free from blow holes, flaws, cracks and other defects and shall be smooth, close grained and of true forms and dimensions.

The porcelain shall be white, finished brown glazed, non-porous of high di-electric, mechanical and thermal strength, free from defects and thoroughly vitrified. Cement used shall be of high quality, durable and high strength Portland cement. Cement is not to be treated as an adhesive medium between the porcelain and metal parts of an insulator. Preference will be given to a fixing medium of an approved metal alloy.

Cement shall be a replenishment material for filling gap between the porcelain and metal parts to fix them.

6. GALVANISING

All the ferrous metal parts shall be hot dip galvanised smoothly, as per IS 3638 (as amended up to date). IS 2633 or any other equivalent authoritative standard. The material shall be galvanised only after shop operations upon it have been completed. The metal parts before galvanising should be thoroughly cleaned of any paint, grease, rust, scales or alkalis, or any foreign deposit which are likely to come in the way of galvanising process. The metal parts coating shall withstand minimum four for one minute dips in copper sulphate solution as per IEC-168.

The bus Post Insulator unit shall be assembled in a suitable jig to ensure correct positioning of the top and bottom metal fittings relative to one another. The faces of the metal fittings shall be parallel and at right angles to the axis of the insulator and the corresponding holes in the top and the bottom metal fittings shall be in a vertical plane containing the axis of the insulator.

All nuts, bolts and spring washers etc. required for the assembly of the complete insulator stack shall be in tenderer's scope of supply. The bolts and nuts shall be hot dip galvanised and shall be of high strength generally conforming to IS-136 or any other equivalent international standard.

7. TESTS

7.1 Type Tests

All the equipments offered shall be fully type tested as per the relevant standards. In case the equipment of the type and design offered, has already been type tested, the tenderer shall furnish four sets of the type test reports along with the offer. The purchaser reserves the right to demand repetition of some or all the type tests in the presence of purchaser's representative. For any change in the design/type, already type tested viz-a-viz the design/type offered against this Specification the purchaser reserves the right to demand repetition of tests without any extra cost. In case the equipments have not been type tested earlier all the type tests as per relevant standards shall be carried out by the successful tenderer in the presence of purchaser's representative without any extra cost.

7.2 Acceptance and Routine Tests

7.2.1 All the acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of purchaser's representative. No material shall be dispatched without the approval of test certificates.

8. INSPECTION

The inspection may be carried by the purchaser at any stage of manufacture. The successful tenderer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this Specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the Specification and shall not prevent subsequent rejection if the equipment is found to be defective.

The supplier shall keep the purchaser informed in advance about the manufacturing programme so that arrangement can be made for inspection.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items.

9. GUARANTEED DATA

Guaranteed technical particulars and other technical data in respect of equipment/material offered should be furnished duly signed along with the tender in the performa given in Vol-III. Any other particulars considered necessary may also be given in addition to those listed in the schedule.

10. DRAWING AND LITERATURE

The bidder shall submit four sets of final version of all the above drawings for Purchaser's approval alongwith the tender in a separate seal cover. These drawings will be opened in the event of order. The Purchaser shall communicate his comments/approval on the drawings to the Supplier within four weeks of the issue of LOI. The successful bidder will re-submit such drawing(s) duly reflecting the purchaser's comments within two weeks of their receipt, which will be approved by the purchaser within two weeks. The successful bidder shall supply 6 copies each of the approved drawing and descriptive literature containing handling, erection & maintenance instructions CE/D&P, HVPNL, Panchkula for distribution amongst field organisation. Reproducible(s) of the approved drawing(s) will also be supplied by the successful bidder.

Also, a copy each of the drawing(s) & descriptive literature will accompany the equipment for use by the stores/field offices drawing it for application on Nigam's power system.

11. MARKING

Each porcelain insulator unit shall legibly and indelibly be marked to show the following: -

- a) Name or Trade Mark of the manufacture.
- b) Month and year of manufacture.
- c) Country of manufacture.

Marking on the porcelain shall be printed and shall be applied before firing.

12. PACKING AND FORWARDING

12.1 The equipments shall be packed in crates suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

12.2 Each consignment shall be accompanied by a detailed packing list containing the following information: -

- a) Name of the consignee.
- b) Details of the consignment.
- c) Destination.
- d) Total weight of consignment.
- e) Sign showing upper/lower side of the crate.
- f) Handling and unpacking instructions.
- g) Bill of material indicating contents of each package.

ANNEXURE 'A'

SCHEDULE OF REQUIREMENT

Sr.No.	Description of material	Total Requirement
1	245 kV Post Insulators as per technical details specified	Nos.
2	145 kV Post Insulators as per technical details specified	Nos.
3	72.5 kV Post Insulators as per technical details specified	Nos.
4	36 kV Post Insulators as per technical details specified	Nos.

NOTE: The purchaser reserves the right to increase or decrease the number of post insulators than those provided above at the time of placing the order.

ANNEXURE 'B'**SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS & OTHER
TECHNICAL DATA**

			245 KV	145 KV	72.5 KV	36 kV
1.	Height	mm				
2	Power frequency dry one minute withstand voltage	KV Rms				
3	Impulse withstand voltage	KV Peak				
4	Total creepage distance	mm				
5	Protected creepage distance	mm				
6	Cantilever strength inverted	Kg.				
7	Cantilever strength upright	Kg.				
8	Tensile strength	N				
9	Torsional Strength	Nm				
10	Compression strength	N				
11	Bending strength	N.				
12	Type and make					
13	Total weight	Kg.				
14	Pitch circle diameter					
	a. Bottom	mm				
	b. Top					
15	Max. diameter of insulator	mm				
16	Drawing Reference No.					

Bharat Heavy Electricals Limited

Project: LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery

Technical Specification: 220kV Post Insulator with accessories

Doc No. TB-411-316-008 Rev 00

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SECTION 3:

PROJECT DETAILS & GENERAL TECHNICAL REQUIREMENTS (FOR ALL EQUIPMENT UNDER PROJECT)

1. General

1. This section stipulates the general technical requirements under the contract and will form integral part of the technical specification.
2. The provisions under this specification are intended to supplement requirement for the materials, equipment and services covered under this specification and is not exclusive. However, in case of conflict between requirements specified in this section and requirements specified in other sections the requirements specified under respective sections shall hold good.

2. Project Details

Panipat Refinery is a PSU Refinery and is having capacity of 15 MMTPA, catering the customers of northern India and is strategically important as per national interest. The refinery is located at Panipat, Haryana and was commissioned in the year 1998.

Presently 132KV supply to Panipat Refinery is provided from 2 sections of grid (one from PTPS and one from Munak) and point of supply is at Panipat Refinery 132KV switchyard Panipat Refinery complex is consisting of Refinery (will be marked as PR here onwards) and Naphtha cracker complex (will be marked as PNCP here onwards). As a strategic initiative, Panipat Refinery is planning for Bulk power import from HVPNL (Haryana Vidyut Prasaran Nigam Limited) at 220 KV level of 70 MW.

In view of this, Indian Oil Corporation Ltd. (IOCL) - Panipat Refinery is in the process of developing infrastructure to import 70 MW power from grid at 220 KV. Infrastructure development for grid power import at 220KV jobs consists of Inside Battery Limit (ISBL) jobs, Outside Battery Limit (OSBL) jobs.

Sl. No.	Description	Particulars
1	Customer	Indian Oil Corporation Ltd.
2	Consultant	TATA Consulting Ltd.
3	Project	LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery
4	Project location	Panipat (City): 16 Km (approx.) Chandigarh Highway: 11 Km (approx.) Noida (Advant)/ Delhi: 150 Km/ 80 Km (approx.)
5	Transport facilities	Well connected by road, rail & air with other parts of the country.

3. Meteorological Data

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions,

Bharat Heavy Electricals Limited

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Sl. No.	Technical Parameters	Unit	Particulars
1	Location	Panipat, Haryana, India	
1.1	Maximum ambient temperature	°C	50
1.2	Minimum ambient temperature	°C	-5
1.3	Average ambient temperature	°C	35
1.4	Design ambient temperature	°C	45
2	Average no. of thunder storm days	Days	45
3.1	Maximum Relative humidity	%	95
3.2	Maximum Relative humidity	%	26
4	Average Annual Rain Fall	Mm	900
5	Maximum Wind Pressure	Kg/ sqm	195
6	Maximum Altitude above Mean Sea Level	M	1000
7	Isoceraunic Level	Days/ Year	45
8	Seismic Level (Horizontal Acceleration)	Zone	4
9	Average no. of rainy day per Year	Days/ Year	120

NOTE: Moderately hot and humid tropical climate conducive to rust and fungus growth. The climate conditions are also prone to wide variations in ambient condition. Smoke is also present in the atmosphere. Heavy lightening also occurs during June to October. Switchyard is inside the refinery premise which is also prone to other corrosive gases like sulphur, H₂S, Chlorine etc.

4. Instruction to Bidders

1. The bidders shall submit the technical requirements, data and information as per the technical specifications provided in the bid documents.
2. The bidders shall furnish catalogues, engineering data, technical information, design document, drawings etc fully in conformity with the technical specification.
3. It is recognised that the contractor may have standardised on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to the owner. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously; All deviations from the specification shall be clearly brought out in the respective schedule of deviations. Any discrepancy between the specification and the catalogues or the bid, if not clearly brought out in the schedule, will not be considered as valid deviation.

Bharat Heavy Electricals Limited

Project: LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery

Technical Specification: 220kV Post Insulator with accessories

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4. Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories 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 unless include in the list of exclusions. Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the switchyard shall be deemed to be included in the scope of the specification. All similar standard components/parts of similar standard equipment provided, shall be interchangeable with one another.
5. Unless brought out clearly in the respective schedule of deviations, it will be considered that, the bid proposal scrupulously confirms compliance to the specification. The bidder must bring out all the deviations in the bid proposal.
6. In case there is a discrepancy between the data offered equipment and catalogue furnished, and unless the deviations are brought out clearly in the Technical Deviation Schedule, the equipment will be deemed to conform compliance to the specification scrupulously.

5. Standards

1. The works covered by the specification shall be designed, engineered, manufactured, built tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.
2. The equipment to be furnished under this specification shall conform to latest issue with all amendments of standard specified of this section as well as under respective Sections/Chapters of the specification.
3. In addition to meeting the specific requirement called for in the respective sections of the Technical Specification, the equipment shall also conform to the general requirement of the relevant standards and shall form an internal part of the specification.
4. The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intend to complement each other.
5. The Contractor shall also note that list of standards presented in this specification is not complete. Wherever necessary the list of standards shall of the specification shall take precedence.
6. When the specific requirements stipulated in the specification exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.
7. Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards referred shall also be accepted.
8. In case governing standards for the equipment is different from IS or IEC, the salient points of difference shall be clearly brought out in deviation sheets along with English language version of standard or relevant shall be subject to Owner's approval.

Bharat Heavy Electricals Limited

Project: LSTK job for ISBL work of 220KV Grid Power Import at IOCL, Panipat Refinery

Technical Specification: 220kV Post Insulator with accessories

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6. Services to be Performed by the Equipment being furnished

1. The 220/33 kV system is being designed to limit the switching surge over voltage and the power frequency over voltage within limits of IEC. The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, re-strike etc. under such over voltage conditions and in system where line lengths would extend up to 200 km.
2. All equipment shall also perform satisfactorily under various Electro-mechanical and meteorological conditions of the site of installation.
3. All the Equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, short circuit etc for the equipment.
4. The bidder shall design the various forces for terminal connectors of the equipment are required to withstand.
5. The equipment shall also comply to the following:
 - All outdoor EHV equipment shall be suitable for hot line washing.
 - To facilitate erection of equipment, all items to be assembled as site shall be "match marked". All piping, if any between equipment control cabinet operating mechanism to marshalling box of the equipment shall bear proper identification to facilitate the connection at site.

7. Engineering Data

1. The furnishing of engineering data by the Contractor shall be in accordance with the schedule for each set of equipment as specified in the technical specifications.
2. The review of these data by the owner will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the owner may not indicate a thorough review of all dimensions, quantities and accuracy of the information submitted. This review and/or approval by the owner shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviation from the requirements, specified under these specifications and documents.
3. All engineering data submitted by the Contractor after final process including review and approval by the owner shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the owner in Writing.
4. LIST OF DOCUMENTS
 - 4.1 The bidder must furnish a detailed list of drawings/documents along with the bid proposal which he intends to submit to the owner after awarded of the contract.
 - 4.2 The supplier shall necessarily submit all the drawings/ documents unless anything is waived. The supplier shall submit required sets of drawings/design documents/test

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reports as may be required for the approval of the owner.

- 4.3 All engineering data submitted by the Contractor after final process including review and approval by the Owner shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the owner in Writing.

5. DRAWINGS

- 5.1 All drawing 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 and materials, clearances and spaces required for installation and interconnection between various portions of equipment and any other information specifically requested in the specifications.
- 5.2 Each drawing submitted by the Contractor shall be clearly marked with the name of the Owner, the unit designation, the specifications title, the specification number 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.
- 5.3 Further work by the Contractor shall be in strict accordance with these drawing and no deviation shall be permitted without the written approval of the Owner if so required.
- 5.4 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 Owner. Approval of Contractor's drawing or work by the Owner shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

5.5 APPROVAL PROCEDURE

The scheduled dates for the submission of these as well as for, any data/information to be furnished by the Owner would be discussed and finalised at the time of award. The supplier shall also submit six (6) copies of all drawings/design documents/test report for approval of the Owner. The following tentative schedule shall be followed in general for approval. However final schedule shall be prepared with approval of Engineer in-charge post award of approval.

1	Submission, comments, by resubmission and approval recommended agency	Within 4 weeks of receipt
2	Approval/ comments/ by Owner on initial submission	Within 4 weeks of receipt.
3	Resubmission	Within 3 (three) weeks (whenever from date of comments required) including both ways postal time.

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4	Approval or comments	Within 3 weeks of receipt of commented drawing/ documents.
5	Furnishing of distribution copies	1 weeks from the date of last approval.

NOTE: The contractor may please note that all resubmission must incorporate all comments given in the submission by the Owner failing which the submission of documents is likely to be returned.

5.6 The drawing which are required to be referred frequently during execution should be submitted on cloth lined paper.

5.7 OTHER REQUIREMENTS OF DOCUMENTATION

5.7.1 One set of soft copy of all drawings, manual, catalogues to be submitted along with 6 sets of hardcopies during submission of as built documents.

5.7.2 6 copies of instruction/operation manuals for complete project shall also be furnished. The instruction Manuals shall contain full details of drawing of all equipment being supplied under this contract, their exploded diagrams with complete instruction for storage, handing, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.

5.7.3 If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/additions/changes, the same shall be incorporated and the updated final instruction manual in the form of one (1) reproducible original and twelve (12) copies shall be submitted by the Contractor to the Owner.

The Contractor shall furnish to the Owners, twelve (12) sets of spare part catalogue.

5.8 TITLE BLOCK

Title block for project shall be as follows,

Customer:	Indian Oil Corporation Ltd.
Consultant:	TATA Consulting Ltd.
LSTK Contractor:	Bharat Heavy Electricals Ltd.
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SECTION 4:

Annexure-A: Compliance Certificate of Technical Specification

The bidder shall confirm compliance to the following by signing and stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation(s) with respect to specification other than those furnished in the schedule of deviations.
3. Only those technical submittals which are specifically asked for in Notice Inviting Tender (NIT) to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of technical offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ' of the specification shall not be considered (i.e., technical description & quantities as per the specification shall prevail).

Date:

Bidder's Stamp & Signature

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SECTION 4:

Annexure-B: Deviation/ Change Request of Technical Specification

Bidder shall list out all technical potential deviation/ change request (s) along with clause with respect to technical specifications.

Sl. No.	Page No.	Clause No.	Deviation	Reason/ Justification(s)
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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:

Bidder's Stamp & Signature

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SECTION 4: Annexure-C: Technical Checklist

Sl. No.	Particulars	Confirmation by Bidder	
1	Technical Qualifying Requirement, if applicable		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/ No
1.2	The technical bid shall be submitted by the Manufacturer of the equipment (220kV Post Insulator and accessories) in case of Indian Manufacturer; however, agent may submit the technical offer in case of foreign manufacturer.	Confirmed	Yes/ No
1.3	All the documents shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/ No
2	Un-priced BOQ		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof, else offer shall be liable for rejection).	Confirmed	Yes/ No
2.2	Any other supply required for the execution for the complete work of equipment is deemed to be included in the offer, whether specifically mentioned in the specification or not. Bidder to submit list of items along with their respective quantities required for completeness of equipment.	Confirmed (List is attached)	Yes/ No
2.3	Bidder to submit list of consumables with shelf life of less than one year. It shall be supplied before erection after clearance from BHEL/ Customer/ Consultant.	Confirmed (List is attached)	Yes/ No
2.4	Any special tools and tackle, which are specifically required for the equipment and are proprietary in nature shall be included in offer. List of such special tools and tackle should be clearly listed along with the technical offer. Any special tool which is not listed in the list but required during the erection/ testing/ commissioning of Surge Arrestor shall also be deemed in bidder's scope.	Confirmed (List attached)	Yes/ No
3	Technical		

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3.1	Post Insulator shall be silicon rubber polymer/composite type complete with all fittings and accessories required for holding single bus bar conductor ACSR Moose conductors. The Post Insulator pedestal shall be suitable for fixing on the supporting structure to be provided by BHEL/ Customer. The Post Insulator shall be provided with a completely galvanized steel base designed for mounting on the support structure to be provided by BHEL/ Customer.	Confirmed	Yes/ No
3.2	The base and mounting arrangement shall be such that the insulator shall be rigid and self-supporting and no guying or cross bracings between phases shall be necessary. Cap to be provided on top of the insulator shall be of high-grade cast iron or malleable steel casting. It shall be machine faced and hot dip galvanized.	Confirmed	Yes/ No
4	Technical Deviations		
4.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Technical Deviation sheet has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/ No
5	Bar-chart		
5.1	Bidder shall submit detailed bar chart indicating all the milestones from engineering till manufacturing/ testing, dispatch to site.	Confirmed	Yes/ No
6	Type Test Requirements		
6.1	Bidder shall ensure that the equipment, being procured shall be of proven design and should have valid type test certificates as per specified in IS/ IEC standards (amended up to date) at any ISO/IEC/NABL accredited laboratories.	Confirmed	Yes/ No
6.2	Type test certificates shall not be more than seven (7) years old as on original scheduled date of technical bid opening. In those cases, where type test certificates are more than seven (7) years old from original scheduled date of technical bid opening, bidder shall carry out the type tests at any ISO/ IEC accredited laboratories prior to dispatch of equipment with no commercial implication to BHEL/Customer.	Confirmed	Yes/ No
6.3	In case any of Type tests have not been conducted on the offered design or there has been a change in the design after the type tests. The requisite tests shall be conducted by bidder on the offered design without any extra cost and delivery impact to BHEL/ Customer.	Confirmed	Yes/ No
7	Quality Plan		
7.1	The successful bidder shall submit Quality Assurance Plan in	Confirmed	Yes/ No

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	line with reference QAP attached in Section-2 for the equipment, etc. with in-process inspection methods, tests, records, etc. for BHEL/ Customer approval. Customer hold points will also be included in the plan, which shall be mutually agreed by the BHEL/ Customer.		
7.2	In case bidder has reference Quality Assurance Plan agreed with BHEL/ Customer, same shall be submitted for specific project to BHEL/ Customer approval. There shall be no commercial implication to BHEL/ Customer on account of Quality Plan approval.	Confirmed	Yes/ No
8	Inspection & Testing		
8.1	The equipment (220kV Post Insulator and accessories) shall be subject to inspection by BHEL/ Customer or authorized representative at bidder/manufacturers' works. Hence, Bidder shall furnish all necessary information concerning the supply to BHEL/ Customer.	Confirmed	Yes/ No
8.2	The inspector shall have free access to the manufacturer's/ supplier's works for the purpose of inspecting the process of manufacture in all its stages and he will have the power to reject any material, which appears to him to be of unsuitable description or of unsatisfactory quality.	Confirmed	Yes/ No
9	Makes of Equipment/ Components		
9.1	The offered equipment shall be brand new with state of art technology and proven field track record. No prototype equipment shall be offered.	Confirmed	Yes/ No
9.2	Bidder while ordering shall ensure the availability of spare parts and maintenance support services for the equipment at least for 10 years from the date of supply.	Confirmed	Yes/ No
9.3	Bidder shall give a notice of at least one year to the BHEL/ Customer before phasing out the products/spares to enable the owner for placement of order for spares and services.	Confirmed	Yes/ No

Date:

Bidder's Stamp & Signature