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T E N D E R S P E C I F I C A T I O N

TENDER NO. BHEL: NR (SCT): BAWANA: 11 KV RING MAIN: 579

FOR

Supply of Equipments, Installation, Testing, Commissioning and Operation & Maintenance of 11 KV Ring Main System at 1500 MW Pragati III Combined Cycle power Project, Bawana, Delhi

PART I – TECHNICAL BID

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA

ISO 9001-2000, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA
Phone: 0091-0120-2515476 / 2515464 / 2515479
Fax 091-0120-2515464 / 2515467
Email: sku@bhelpsnr.co.in / pshiv@bhelpsnr.co.in

TENDER NO. BHEL: NR (SCT): BAWANA: 11 KV RING MAIN: 579

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

INDEX

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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the "Supply of Equipments, Installation, Testing, Commissioning and Operation & Maintenance of 11 KV Ring Main System at 1500 MW Pragati III Combined Cycle power Project, Bawana, Delhi."

TENDER NO. BHEL: NR (SCT): BAWANA: 11 KV RING MAIN: 579

QUALIFYING REQUIREMENTS:

1. Tenderers who wish to participate should have carried out, during last seven years.

1.1 Similar nature of Work of around Rs. 55 lacs against a single contract in power plant / industrial unit/ switchyard.

'OR'

1.2 Similar nature of Work of around Rs. 35 lacs each against two contracts in power plant / industrial unit/ switchyard.

'OR'

1.3 Similar nature of Work of around Rs. 30 lacs each against three contracts in power plant / industrial unit/ switchyard.

'AND'

2.0 Party should also have an average annual financial turnover of minimum of Rupees 25 lacs during last three years (05-06, 06-07 and 07-08).

'AND'

3.0 The party should have a valid 'A' class license as an electrical contractor.

NOTES:

(i) The Tender Documents comprise of following;

(a) General Conditions of Contract

(b) Special Conditions of Contract, Tender Notice, Project Synopsis etc.
(c) Rate Schedule

(ii) Tender Documents with complete details are hosted in this web page. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer

(iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e ***upto 15.12.2008*** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.

(iii) Tenders must be submitted to the undersigned in Room No. 104 **latest by 15:00 Hrs. on 16*.12.2008.*** Technical bids shall **be opened at 15.30 Hrs. on 16*.12.2008***.

(iv) Earnest Money Deposit (EMD) : Refundable, Non-interest bearing **EMD of *Rs 1,50,000/-*** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA . Those bidders who have already deposited 'One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.

(v) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.

(vi) All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in this web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.

(vii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.

(viii) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.

(ix) Purchase Preference will be given to CPSUs as per Govt. Guidelines.

(x) Unsolicited rebate / discount shall not be accepted after bid opening.

DGM/SCP

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DOMESTIC NOTICE INVITING TENDER

LAST DATE OF SALE : *15.12.2008*
DUE DATE OF SUBMISSION : *16.12.2008 (15:00 Hrs.)*
DATE OF OPENING : *16.12.2008 (15:30 Hrs.)*

NIT NO. / NAME OF WORK
TENDER NO. BHEL: NR (SCT): BAWANA:11 KV RING MAIN:579 **Sealed tenders are invited from the contractors fulfilling qualifying requirements for the "Supply of Equipments, Installation, Testing, Commissioning and Operation & Maintenance of 11 KV Ring Main System at 1500 MW Pragati III Combined Cycle power Project, Bawana, Delhi."**

NOTES

1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at www.bhel.com for details of NIT including Qualifying Requirements.

DGM/SCP

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(A Govt. Of India Undertaking)
Power Sector – Northren Region,
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Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA

PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

The tenderers must submit their tenders as required in **two parts** in separate sealed covers **prominently superscribed as Part-I Technical bid and Part-II ,Price bid** also indicating on each of the cover tender specification no., date and time as mentioned in tender notice.

TECHNICAL BID (COVER-I)

Except **Price bid Part-II**, complete set of tender document consisting of General conditions of Contract, "Technical specification & Special terms and condition" (Part-I) issued by BHEL shall be enclosed in **Part I Technical Bid only**. All schedules, data sheets and details called for in the specification shall also be submitted along with technical bid. All details / Data / Schedules including offer letter duly signed and stamped are to be **submitted in duplicate**.

PRICE BID (COVER-II)

Tenderers may please note that price bid is **to be submitted only in original copy** of Tender i.e. Price bid (Part-II) issued by BHEL and no duplicate copy of same is required.

These Two separate covers i.e. cover I & II shall together be enclosed in a **third envelope (Cover-III)** and this sealed cover shall be superscribed with tender specification No., due date, time and submitted to officer inviting tender as indicated in tender notice on or before due date as indicated.

PROJECT SYNOPSIS

1.	Name of the Owner	:	Pragati Power Corporation Limited (PPCL)
2.	Address	:	Pragati III CCPP Bawana Delhi
3.	Installed capacity	:	New project
4.	New Installation	:	1500 MW (Nominal)
5.	Nearest Railway station	:	Delhi
6.	Nearest City	:	Delhi
7.	Nearest Airport	:	Delhi
8.	Maximum Temperature	:	48 Deg C
9.	Minimum temperature	:	Appx 2 Deg C

SPECIAL CONDITIONS OF CONTRACT

34.0 GENERAL

34.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.

34.2 The contractor shall carry out the work in accordance with standard practices / codes/ instructions /drawings/ documents/ specification supplied by BHEL from time to time to the satisfaction of owner of the project.

34.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies/ departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

34.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:

(a) Provision of all types of labour, supervisors, Engineers, watch and ward as required, tools & tackles, calibrated inspection, measuring and test equipment as specified and otherwise required for the work and consumables for erection, testing and commissioning including material handling.

(b) Proper out-turn as per BHEL plan and commitment.

(c) Completion of work as per BHEL Schedule.

(d) Good quality and accurate workmanship for proper performances of equipment.

(e) Repair and rectification.

(f) Re-conservation / preservation of all components during storage / erection till handing over.

34.5 BHEL-Power Sector (NR) is ISO 9001-2000, ISO14001-1996 and OHSAS 18001 certified company. Work quality to customer's satisfaction, system requirements, health, safety & environmental protection are the basic essence of these certification. The contractor in all respects will organize his work, systems, process control documentation, T&P, inspection, measuring and testing equipment etc. meeting above requirement as per instructions of BHEL Engineer. The contractor shall also comply with applicable legislation and regulations with regards to

Health, safety and environmental aspects for minimising risk arising from occupational health, safety hazards, controlling pollution and wastage.

35.0 SCOPE OF WORK

The intent of this specification is divided in two parts as under:

a) Supply of Equipments/Materials/items (Refer Part-II: Price Bid – Section-A)

To Supply all materials / equipments for 4 nos 11 / 0.433 KV substations including 11 KV ring main system at 1500 MW Pragati III Combined Cycle power Project, Bawana Delhi including overhead lines, HT cabling etc with all accessories, consumables, hardware etc. excepting the following equipments which will be supplied by BHEL:

A. Power transformers – 630 KVA – 4 nos.

B LT distribution board 800 A – 4 nos.

C. 3 core x 185 sqmm. 11 KV XLPE cable – as requirement

D. 1 core x630 sqmm. LT XLPE cable – as per requirement.

This part shall also include all spares and consumables required for operation and maintenance of the substations and other installations (the second part of this specification).

b) Installation, Testing and Commissioning and Operation & Maintenance (Refer Part-II: Price Bid – Section-B & C

To handle, transport to site, install, test and commission all equipments supplied by bidder, operate and maintain the 11 KV ring main system at 1500 MW Pragati III Combined Cycle power Project, Bawana, including maintenance of existing 11 KV ring main, as complete system. The detailed responsibilities of the above parts are enumerated in subsequent specifications.

This is a divisible contract comprising of :

(i) supply (Refer Part-II: Price Bid – Section-A)

(ii) Installation and operation and Maintenance of the system (Refer Part-II: Price Bid – Section-B & C respectively).

Separate Letters of Award will be issued for each of the above parts. It is to be noted, however, that the offers will be evaluated on the sum total value of two parts.

35.1 Details of scope of work of Part-a (Part-II Price Bid – Section-A):

35.1.1

The supplies shall be FOR / FOT site inclusive of all excise, packing and forwarding charges, Import duty if any, sales tax ,freight, octroi etc. The Contractor shall be responsible for proper packaging & transportation of all the fragile material to avoid any damage during transit. The transit insurance will be arranged by BHEL.

35.1.2

The consignments have to be despatched directly to Construction Manager, BHEL Site Office, Pragati-III, Bawana.

35.1.3

Contractor shall procure the materials/ equipment as per technical specification (Annexure-A) and from the List of proposed vendors (Annexure-B). The successful bidder shall submit manufacturer's test report, technical specification of the major items like poles, AB Switch, DO Fuse, LA, etc. All the items shall conform to relevant IS code & bear ISI mark. List of applicable codes and standards is given in Annexure-C.

35.1.4

All material, equipment etc, to be used in this system shall be brand new. Old /used materials etc will not be allowed to be installed/used. BHEL will have right to reject any or all such materials, equipment. Contractor shall replace at his own cost all such items with those acceptable to BHEL as per BHEL's instructions. Otherwise, BHEL may take suitable action at contractor's cost & risk.

35.2. Details of scope of work of Part-b (Refer Part-II: Price Bid : Section-B & C

35.2.1 Handling at stores/ yard, transportation of supplied items to site of work.

35.2.2 Carrying out the route survey of 11 KV line (over head), marking location of poles, stay etc. and submission of revised BOQ as per survey report. On completion of installation of all the sub-stations and overhead lines contractor shall submit the As-built drawing.

35.2.3 Installation, testing and commissioning of all equipments supplied by the contractor.

35.2.4 Operation and maintenance of complete system 11 KV construction power distribution network after commissioning of the system.

35.2.5 The terminal points as decided by BHEL shall be final and binding on the contractor.

35.2.6 All incidental civil works e.g. grouting of poles/stays/ posts, foundations, including necessary earthwork, provision of all requisite materials e.g. cement, sand & grit, reinforcements etc, T&P, shuttering etc is within the scope of contractor.

35.2.7 If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost..

35.2.8 Contractor shall carry out route survey for locating the sub-station, 11 KV transmission line, poles, earthing location and road crossing etc.

The contractor shall carry out preparation of layout, sub-station drawing etc taking into account Statutory requirements and clearances etc as per Indian Electricity Acts 1956 and amendments thereof, if any.

35.2.9 Contractor shall obtain approval from appropriate statutory authority for the installations at all stages including the renewal etc as per requirement. Contractor shall bear all the statutory fees/levies/charges in connection with the approval of installations.

35.2.10 The work covered under this specification is of high voltage 11 KV system, requiring the best quality of workmanship, engineering and construction management. The contractor shall execute the entire work according to most modern and proven techniques and codes. The omission of specific reference to any method and/or equipment or materials necessary for the proper and efficient services in connection with this work shall not relieve the contractor of the responsibility of providing such services, facilities etc.

35.2.11 The contractor shall ensure timely completion of work. Parallel and simultaneous working in multiple fronts will be required to meet the schedule. The contractor must deploy adequate quantity of tools, & testing instruments. He must also have on his rolls adequate qualified, trained and experienced engineers, supervisory staff and skilled personnel. Contractor shall deploy the manpower as instructed to match the Project schedule.

35.2.12 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of project work as a whole.

35.2.13 All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

35.2.14 Contractor shall be holding valid ‘A’ class license as electrical contractor, copy of which shall be furnished along with the offer. If the license is of any state other than Uttar Pradesh, then he will have to obtain electrical license/permission from appropriate authority as may be applicable.

35.2.15 The sub-stations are to be installed in two stages. In first stage the entire work of erection / commissioning of for one 630 KVA substation (near 11 KV feeder supply feeder) and 11 KV overhead line for all substation shall

have to be completed. In second stage balance 3 substations have to be completed. For time schedule refer Cl-45. Contractor shall plan the work accordingly.

36.0 GENERAL & INDICATIVE TECHNICAL FEATURES

36.1 GENERAL

The information herein is not intended to list the complete technical requirement. It is only for general information. However, contractors have to make their own study/ assessment of work & requirement prior to submission of offer. Omissions from mention of any/all equipment, material, services etc; herein shall not relieve the contractor from providing all such equipment, materials, services etc within the quoted rates.

36.2 INCOMING SUPPLY & OTHER GENERAL DETAILS

One number 11 KV feeder shall be provided by Customer Pragati Power Construction Limited PPCL / NDPL from their existing 11 KV indoor sub- station. Beyond this point, power shall be drawn through under ground cables / over head 11 KV line. A number of 415 volt sub-station shall be created by tapping 11 KV over head line through drop out fuses, AB switch gang operated, lightning arrestors and 630 KVA transformers. The transformer secondary connection shall be through armoured cable to 415-volt distribution boards. Beyond the LT distribution board the power shall be drawn by BHEL erection agencies for their use.

SUB –STATION EARTHING SYSTEM

Earthing of all the sub- station equipments and over head line shall be carried out as per IS:3043. Earthing system shall consist of a number of earth electrodes of 50 mm dia. Galvanised steel pipe, buried in earth pit.

Each LT sub-station shall have minimum two earth electrodes for natural earthing, two electrodes for body earthing and two electrodes for lightning arrestor earthing.

All non-current carrying metal parts shall be connected to earth system at two points, each of 100 % rating. Metallic supports, fencing, etc. shall be connected to earth system.

630 KVA, 11/0.433 TRANSFORMER SUB- STATION

INSLLATION OF TRANSFORMER & SUB STATION

1) 630 KVA, 3 phases, 50c/s. Oil immersed and naturally cooled transformers. The transformers are generally supplied in assembled condition with oil filled upto normal level in conservator level, however any accessories/ oil supplied loose due to transport limitation, contractor shall assemble such accessories and carry out oil filling , dehydration of oil by using adequate capacity of oil filter machine. The oil filter machine shall be arranged by contractor at his own cost for erection and operation & maintenance purpose. The transformer shall be mounted on suitable plinth foundation.

2) The substation area shall be fenced as per Indian electricity rules & regulation and shall have provision of lockable door. Fencing shall be of chain link wire mesh on mild steel angle iron posts to a height of not less than 2500 mm. The 11 KV & LT sub-station area shall be graded and sloped to prevent any water stagnation of rainwater. Surface shall be covered with ballast of 15 to 20 mm size.

3) Each substation shall have double pole structure with all accessories, mountings such as lighting arrestors, AB switch gang operated, HG/ drop out fuse, stay wire assay; etc. Near the transformer foundation.

4) Transformer primary shall be connected either by 3 cores 185 sqmm size, 11 KV XLPE cables (in case transformer is located away from line) or by overhead conductor (in case transformer is located just near the line). Cable termination at transformer sub-station and at over head line end shall be done by providing heat shrinkable end termination kit which should be suitable for out door application.

5) Connection from transformer secondary to the LT distribution board shall be done by two runs of cable size 1 core, 630-sqmm Aluminium.

6) Earthing shall be carried out in accordance of IA rules .

7) LT DISTRIBUTION OUT DOOR KISOK : This shall be mounted on plinth foundation keeping sufficient clearance from ground for incoming /out going cable lifting and termination

36.3 11 KV HT & 415 VOLTS LT CABLING REQUIREMENT

36.3.1 **General : -**

The cable installation including necessary joints shall be carried out in accordance with the specification IS 1255-1967

Cable route shall be decided prior to cable laying work is under taken. While shortest possible route should be preferred, cable runs shall generally follow fixed development such as roads, foot paths etc; with proper off set so that future maintenance, identification etc. are rendered easy.

While selecting cable route, corrosive soils, surrounding sewage effluent etc. shall be avoided. Where this is not feasible, special precaution as decided by Engineer-In-Charge, particularly for HT cable, shall be taken.

Power and communication cable shall cross at right angles. Where power cables are laid in proximity to communication cables, horizontal and vertical clearance shall not normally be less than 60 cm.

During the preliminary stages of cable laying, consideration should be given to proper location of the joint position so that when cable is laid the joints are made in

most suitable places. As far as possible water logged location, carriageways, pavements, proximity to telephone cables, gas or water mains, inaccessible places, ducts, pipe racks etc, shall be avoided for joint position.

36.3.2 CABLE LAYING DIRECT IN GROUND

The method shall be adopted where the cable route is through open country, along road / lanes etc, and where no frequent excavations are encountered and re-excavation is possible without affecting the other work.

Width of Trenches: -The minimum width of trench for laying single cable shall be 35 cms. Where more than one cable are to be laid in the same trench in horizontal formation, width of trench shall be increased such that the inter axial spacing between the cables, for 415 volts shall be 20 cm, and for 11 KV l shall be 35 cm.

Depth of Trenches: - Where cables are laid in single formation, the total depth of trench shall not be less than 75 cm for cable up to 1.1 KV grade and shall not less than 120 cm for cable above 1.1 KV grade. Whenever more than one tier formation of cable is unavoidable and vertical formation is adopted, the depth of trench shall be increased by 30 cm for each additional tier to be formed.

Excavation of Trenches: - The trenches shall be excavated in reasonably straight lines. Wherever there is change in direction, the minimum safe bending radius for all type of PVC cables shall be 12 times the overall diameter of the cable. A larger radius shall be adopted at joints and termination; it shall not be less than 15 times of its overall diameter.

Adequate precaution shall be taken while excavating for trenches, to avoid damages to existing cables, pipes or such installations in the proposed route. Wherever bricks, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without the approval of Engineer –In-Charge.

Where there is any danger of trench collapsing /endangering adjacent structures, the side should be well shored up with timbering and/or sheeting as excavation proceeds. This shall be followed by back filling, wherever necessary.

The bottom of the trench shall be level and free from stone, brickbats etc. The trench shall be provided with a layer of clean and dry sand cushion of not less than 8 cm in depth.

36.3.3 **Laying of cables in trenches:-**

Continuity and insulation measurement test shall be performed for cable core before and after laying in the trenches. If any abnormality is observed, the same shall be brought to the notice of Engineer- in -Charge. End of the cables shall be sealed with suitable moisture seal tape in case of PVC cables and XLPE cables shall be sealed with end seal caps.

Cable laid in trenches in single tier formation shall have covering of clean dry sand of not less than 17 cm above the base cushion of sand before the protective cover is laid.

In case of vertical multi tier formation after the first cable has been laid, a sand cushion of 30 cm shall be provided over the initial bed before the second tier is laid. If additional tiers are formed, each of the subsequent teirs also shall have sand cushion of 30 cm as stated above. The top most cable shall have final sand covering not less than 17 cm before protective cover is laid.

Protective Covering: - Unless otherwise specified, the cables shall be protected by B class/ second class brick of not less than 20 cm x 10 cm x 10cm (nominal size) as per CPWD building specification or protective cover placed on the top of the sand and both sides of cable (bricks shall be laid breadth wise for cable top protection / height wise for cable side protection) for full length of cables to the satisfaction of Engineer-in-charge. Where more than one cable is laid in the same trench, this protective covering shall cover all the cables and project at least 5 cm over the sides of the end cables. A layer of bricks shall be laid in between two cables when more than one cable are laid in same trench.

Back filling: -The trenches shall be then back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered, if necessary, in successive layer s not exceeding 30 cm, unless otherwise specified. A crown of earth not less than 50 cm in the centre and tapering towards the sides of the trench shall be left to allow for subsidence. The crown of earth however should not exceed 10 cm, so as not to be a hazard to vehicular traffic. The temporary reinstatements of road ways should be inspected at regular intervals, particularly during wet weather and any settlement should be made good by further filling as may be required.

Where road berms or lawns have been cut or kerbed stones are displaced, the same shall be repaired and made good.

Route Marker: -Route marker shall be provided along straight runs of cables and at points of change in direction as approved by Engineer-in-charge and in general, at intervals not exceeding 100 meter in straight run.

Route marker shall be made out of 100 mm x 100 mm x 5 mm GI/Aluminium plate bolted or welded on 35mm x 35mm x 6 mm MS angle iron of 600 mm long. Such route markers shall be mounted and grouted parallel to and 0.5 meter away from the side of trench.

The word “Cable” with voltage grading and size of cable shall be inscribed on the marker.

Cable Laying in pipe: In location such as road crossing, entry to building, on poles, in paved area etc. cable shall be laid in pipe.

Stone ware pipe, GI /CI or spun reinforcement pipe shall be used for such purpose. The size of the pipe shall be not less than 10 cm dia. for single core cable and not

less than 15 cm for more than one cable. In a pipe. These pipe shall be laid directly in the ground without any special bed except for SW pipes which shall be laid over 10 cm thick cement concrete 1:5:10 bed. No sand cushion or tiles shall be used in such situation, unless otherwise specified. The top surface of pipe shall be at minimum depth of 1 meter from ground level when laid under road, pavements etc.

Loops in Cable: - Approximately 3 meter of surplus cable shall be left at each end of cable and on each side of under ground joint. Surplus cable may be left in form of loop.

36.4 TECHANICAL SPEICIFICATION OF 11 KV OVER HEAD RING MAIN SYSTEM

This specification cover the requirement for installation, testing and commissioning of overhead lines and material used therein.

36.4.1 11 KV OVERHEAD RING MAIN

HT 11 KV supply shall be extended from the 11 KV indoor switchgear to 11 KV ring main feeders by Aluminium XLPE cable.

Conductor for 11 KV line shall be made of galvanised steel core surrounded by stranded aluminium wires (ACSR “DOG”)

Steel core shall be coated with suitable corrosion preventive grease to mitigate galvanic action and galvanic corrosion.

The size of conductor shall not be less than 6/36.72 +1.57 mm^2.
Each reel of conductor shall be of minimum 1.0 Km length.

36.4.2 HANDLING / STRINGING/ JUMPERS OF ACSR CONDUCTOR

The general precautions during storage and handling shall be taken in accordance with relevant IS code.

While laying, the conductor shall be taken from top of the drum and the drum repeated in the direction of arrow on it.

Care shall be taken during paying off to avoid contact with steel works, fence etc by giving soft wood protection, using wooden rollers.

Proper tools shall be used during stringing work.

During stringing operation standard sag table or chart shall be followed and care shall be taken to ensure that there are no kinks in the conductor.

Joints in conductors shall be staggered. Mid span joints in conductor shall be avoided. After stringing the conductor, it shall be clamped permanently with shackle or strain clamps. An angle or section points shall be selected while pulling up conductors. All strands of the conductors must be gripped securely when pulling the conductors.

When the work is being carried out adjacent to and for connecting to an existing system in operation or along parallel to an existing line is involved, adequate safety precautions for isolation, discharging, earthing etc; shall be taken to ensure that line do not inadvertently get charged from live supply. Where permit to work system is in vogue, regular safety procedure prescribed should be complied with.

Jumpers: - While stringing, sufficient length of conductors be kept at shackle termination for making jumpers. Jumper shall be neat and as far as possible symmetrical to the run of conductors. These shall be so made to prevent occurrence of fault due to wind or birds.

Where necessary jumpers shall be with insulated conductor or insulated as per instruction of Engineer –In – Charge.

Parallel greave (PG) clamps may be preferred to binding of conductors at jumper location or service taps.

Jumper used shall normally be of the same material as the line conductor and be of adequate current carrying capacity. If the material of the jumper wire is different from that of the line conductor, suitable bimetallic clamps should be used. if copper to aluminium bimetallic clamps are to be used , it should be ensured that the aluminium conductors is suited above the copper conductor so that no copper contaminated water comes in contact with aluminium.

For High voltage lines with the jumpers should be so arranged that there is a minimum clearance of 30 cm; under maximum deflection condition due to wind, between the live jumpers and other metallic parts. This may involve erection of pin insulators specially for fixing the jumpers.

36.4.3 **CROSS ARM**

Cross arm shall be made of MS structural steel as per requirement. The length of cross arm shall be suitable for accommodating the number of insulators on them with spacing of conductor. A minimum distance of 1120 mm for the line shall be left from the centre of pin hole of insulator on either end of the cross arm. A gap of 50 mm shall be left from the centre of pin hole to end of cross arm in either side. The cross arm shall be complete with pole clamp made of MS flat of size not less than 50x6 mm with necessary nuts bolts washers. The cross arm shall pin holes as required. The length of cross arm for carrying guard wire s shall always run not less than 30 cm beyond outer most bare conductor of configuration. The cross arm and pole clamps shall be treated with one coat of red oxide metal primer before erection and finished with two coats of approved aluminium paint.

Cross arms shall be properly clamped to the support taking into consideration the orientation of the lines.

36.4.4 **PORCELAIN INSULATORS & FITTING**

The porcelain insulators shall be confirming to IS 731-1971 for over head lines with a nominal voltage greater than 1000 volts. This shall be glazed, crack / burr free.

Insulator shall have adequate mechanical strength, high degree of resistance to electrical puncture and resistance to climatic and atmospheric attack.

Insulators shall be pin type for straight run and up to maximum of 10 deg. angle deviations and disc type for pole position having more than 10 deg. angles or for dead end lines.

All iron parts shall be hot dip galvanised & all joints shall be airtight.

Pin insulators / shackle insulators / disc insulator shall be erected on cross arm and "D" iron clamp shall be used or as specified by the Engineer -In –Charge
Shackle insulators shall be used in conjunction with "D" iron clamp when configuration of conductor is vertical. These shall also be erected on cross arm at intermediate support in case of long lines, deviation from straight line. Care shall be taken that insulators are not damaged during erection.

36.4.5 **BINDING MATERIAL**

Binding of conductor with the insulator shall be done with 12 SWG soft aluminium wire / conductor.

The binding of conductor to insulators shall be sufficiently firm and tight to ensure that no intermittent contact develops.

The end of binding wire shall be tightly twisted in a close spaced spiral around the conductor to ensure good electrical contact and strengthen the conductor.

36.4.6 **SUPPORTS & SPACING OF POLES**

Supports for overhead line shall be of adequate strength conforming in all respects to rules 76 of Indian electricity rules.

The minimum permissible span shall be limited to 40 M.

Pole spacing and clearance between lowest conductor above the ground level across / along the street shall be in accordance with rule 85 of Indian electricity rule.

The minimum clearance between building and line shall be in accordance with rule 79 & 80 of Indian electricity rule.

When two overhead line cross, the crossing shall be made at right angle as for as possible. The vertical clearance between LV/MV and 11 KV lines shall not be less than 1.25 M.

The minimum clearance between guard wire and LV/MV line shall be10 cm and between guard wire and 11 KV line shall be 80 cm

The clearance between power and telecommunication lines shall be in accordance with the ie rules 86 & 87 and it shall not be less than 1.5 meter for 11 KV line.

Poles for O/H line shall be selected for the worst combination of dead load, live load, short circuit forces, and change in temperature etc .the length of pole shall be as specified in rate schedule.

Factor of safety for poles shall not be less than 2.0. Suitable foundation shall be provided for erection of poles. The foundation shall include excavation in all types of soil and rocks back filling, RCC, reinforcement, formwork.

36.4.7 **EXCAVATION FOR FOUNDATION FOR POLES/ STAY /STRUT**

After the location of supports/ stay are pegged accurately, the excavation work shall be taken up and care should be taken while excavation that pits are not oversized.

The pit should be excavated in the direction of the line. The depth and size of pit shall be such that normally $1/6^{th}$ of the length of pole is buried in the ground and suitable for foundation of support.

For stay the position of the pit shall normally be such stay makes as large an angle as possible with the support and it shall be in the range of 40 to 60 degree.. The length of stay rod shall project 45 cm above the ground level.

The pit for struts shall be located at a distance not less than 1.8 M from the pole. The depth of pit shall be such that at least 1.2 M of the strut is buried in the ground.

36.4.8 **STAY/ STRUTS**

Stay set shall consist of stay rod, anchor plate, bow tightener / turn buckle, thimbles, stay wire and stain insulators.

The stay rod shall be with stay grip in case of turnbuckle is used instead of bow tightener. The entire stay set assembly shall be galvanised. The stay wire shall be either 7/3.6 mm dia or 7/3.15 mm dia GI having tensile strength of not less than 70 kgf/mm^2 and conforming to is 2141-1968/1979 grade 2.

The anchor plate shall be of MS galvanised and not less than 300 mm x 300 mm x 6.4 mm thick.

The stay rod / buckle rods shall be of minimum 16/19 mm dia galvanised steel rod having tensile strength not less than 42 kgf/mm^2. Minimum length of stay rod and buckle rod shall be 1800 mm and 450 mm respectively.

Guy insulator to be fixed at middle of stay wire shall be ‘C’ type having minimum failing load 88 KN

A strut shall be of a pole of same size grouted to support the line pole wherever required. The foundation shall be same as of line poles.

36.4.9 **ERECTION STAY SET**

The anchor plate shall be galvanised MS plate. The stay rod to be set in position in excavated pit. The correct positioning and setting of stay is essential. The stay rod with the anchor plate shall be embedded in cement concrete 1:3:6 ensure that top layer on concrete foundation is well below the ground level to prevent uprooting of the stay rod prior to loading the stay sufficient curing shall be done by watering/ moist gunny bag. The stay clamp shall be located near about the centre of gravity of the pull of the overhead line conductor. The stay clamps shall be galvanised. One end of stay wire shall be shall be fixed to the bow tighter or the stay grip of the stay rod and other end to the stay clamp fixed to the pole, by means of spliced joints using GI thimbles. The strain insulator shall be provided approximately at the middle of the stay wire. Turn buckle, when used, shall be installed at top of the stay wire.

A stay shall be provided at all angle and terminal poles. Double stay shall be provided at all dead ends and in such case, these shall be as far as possible, to be set parallel to each other.

If the stay rod cannot be erected in accordance with the above due to roadways or obstructions of building etc; bow stay or strut which ever is suitable to the location shall be used.

Bow Stay: - Bow stay shall consist of a brace with 5cm pulley on the outer end to allow for free motion of stay wire in addition to other access cries required for stay set as mentioned in stay. The stay wire shall be clamped to the pole on the top and the other end to a stay rod, passing over the pulley of the brace. The brace shall be clamped at 2/3rd height of the pole from ground level. The stay rod shall be embedded in cement concrete foundation in the usual manner as near as possible to the pole.

Fly Stay: - The fly stay shall consist of a fly pole stay wire running over the obstructions and usual stay arrangement for the fly pole. The stay wire crossing the obstruction shall be clamped at one end to the top of the pole carrying conductors and on the other end to top of the fly pole with turnbuckle. The fly pole shall be provided with a stay in usual manner. The fly stay shall be taken at such a height as feasible at location. When a fly stay is taken across road, it shall conform to traffic regulation.

Strut: - The strut shall be buried in the ground and erected in same manner as line pole. It shall rest on the pole squarely and shall be firmly secured.

36.4.10 INSTALLATION OF POLES

All the poles shall be correctly aligned, suitable formwork prior to be made prior to concreting and back filling.

All support shall be erected over a cement concrete 1:3:6 (1 cement, 3 coarse sand, 6 graded stone aggregate of 40 mm size) bed of 15 mm thick either cast in situ or pre-cast and laid in the excavated pit irrespective of the use of base plate. The area of this concrete bed shall is 0.35 M^2

Pole shall be fixed in cement concrete 1:3:6 foundation with not less than 30 cm thick layer of the cement concrete all around the support and foundation being continued upto 15 cm above the ground level and tapered suitably into collar.. After concerting the excavated earth shall be back filled and shall be consolidated in layers of 20 cm. Watering of concrete foundation and curing shall be done prior to loading the poles.

36.4.11 EARTH WIRE & CAGE GUARD

All metal supports of overhead lines and metallic fitting attached shall be permanently and effectively earthed.

Over head lines shall be earthed by continuous galvanised steel over head earth wire fastened to each pole through suitable straight arm and connected with earth at minimum three points in every kilometre length. Cross section of earth wire shall not be less than 25 mm^2.

Earthing installation shall confirm various clause of IS 2052.

Cage guard/ cradle guard shall be made of 6 SWG GI wire confirming to is 2633 including netting, stretching and jointing of cage and lacing by SWG 10/12 SWG GI wire, binding by 16/18 SWG GI wire.

36.4.12 SAFETY & PROTECTIVE DEVICES

Danger Boards: - All supports carrying HV lines shall be fitted with danger plates confirming to IS 2551 –1963 at height of 3 M from ground indicating the voltage of line. The script shall be both in “English / Hindi”.

Anti - Climbing Device: -Necessary arrangement, for preventing un – authorised person from ascending any of the supports or structure carrying HV line without the add of ladder or special appliance, shall be made as per instruction of Engineer-In-charge.

Unless other wise specified barbed wire confirming to IS 278-1969, having 4 points barbs spaced 75 +/- 12 mm apart shall be wrapped helically with a pitch of 75 mm around the limb of support and firmly commencing from the height of 3.5 M and up to height of 5 or 6 M as directed by Engineer -In - charge.

36.4.13 LIGHTENING ARRESTER

Pallet or thyrite type lightening arrester suitable for HT line shall be installed one unit per phase at terminations, transformer station etc. as directed by Engineer-In-Charge.

These devices shall be connected ahead of fuse provided if any. Independent earth electrode shall be provided for lightening arrester. The earth lead from earth electrode to lightening arrester shall be continuous and if desired through out earth surface by alkanthine pipe.

The lightening arrester shall be confirming to IS- 3070 part –II and shall be station type.

The lighting arrester shall be non-linear type, distribution class, out door type suitable for effectively earthed system.

The lightening arrester shall consist of line terminal stud, earth terminal stud, no. Of spark gaps in series with non-linear resistor, the whole assembly housed inside a hermetically sealed porcelain bushing. Neoprene rubber gasket shall be provided between metal caps and porcelain bushing.

Non-leaner resistor shall be of silicon carbide blocks metalised at both ends to ensure good electrical contact. Compression spring shall be provided to keep good electrical contact between terminals, non-linear resistor & spark gaps. Mounting bracket shall be hot dipped galvanised suitable for mounting lighting arrester on structure.

36.4.14 TRIMMING / CUTTING / PRUNING OF TREES

Construction of over head line shall also include cutting/ trimming of branches of trees or clearing of any other obstruction that may come in the way of over head line, however this must be done with the approval of PPCL / BHEL.

36.4.15 NUMBERING OF SUPPORTS

All the poles / supports shall be numbered as directed by Engineer-In -charge.

36.4.16 TESTING OF OVERHEAD LINES

Prior to energising the line or equipment a pressure test of appropriate standard shall be carried out on line as per instruction of Engineer-In-Charge. Wherever it is not feasible to carry out pressure test, the line shall be tested with 2500/5000 KV insulation testers for measurement of insulation.

The line installation shall generally be carried out as per Indian electricity rules and acts.

For road crossing protective guarding shall be provided. The clearance for the lowest conductor from ground shall be seen in view the vertical clearance required for movement of crane/vehicle etc.

36.4.17 Code & Standard

All the equipment and system installation shall be confirming to relevant “Indian standards, Indian electricity rules etc.” List of such standard is as per appendix-ii.

37.0 Testing and Commissioning

37.1

Prior to commissioning and energizing of system, following tests shall be carried out:

1) Insulation resistance measurement
2) High voltage test on HT cables.

38.0 Maintenance

38.1 After satisfactory commissioning of the system & readiness for continuous operation, the system has to be maintained. It should be noted that the construction activities of the project will be dependent on the availability of this system. Hence the consistent and continuous availability of the system is of paramount importance. Contractor shall, therefore, endeavour to ensure highest availability of the system.

Contractor shall submit the following along with the offer

A. Manpower deployment chart indicating the each category of manpower to be deployed in each shift operation, relieving staff, maintenance staff and for overall co-ordination.

B. List of Tools & Tackles to be deployed for Maintenance.

38.1.1

The contractor shall operate and maintain the system in shift operation as per the instruction of BHEL Engineer-in-charge. Contractor shall deploy adequate electricians and helpers in each shift for uninterrupted operation. Electrician should have valid license for handling 11 KV HT over headline and sub-station. In addition to shift operation, the contractor shall deploy a supervisor for over all co-ordination purpose.

38.1.2

During this period, various reports have to be generated and records maintained as per the requirements of BHEL. The engineer will specify the formats for these at site.

38.1.3

While operating the system, Contractor shall intimate BHEL engineer immediately on noticing any abnormalities, which requires immediate attention.

38.1.4

All work, including any preventive and breakdown maintenance work in the system shall be taken up only after obtaining necessary permit/ clearance from BHEL engineer.

38.2 Maintenance of 11 KV Overhead line.

38.2.1

The contractor shall arrange all spares required for preventive maintenance and break down maintenance of all equipments supplied by him. Contractor shall keep sufficient stock of such spares to meet any emergencies. However, for such spares separate item rates are to be quoted as per price bid. The payment for such spares will be based on their consumption certified by BHEL engineer.

BHEL shall provide, as free issue, the spares required for the preventive and breakdown maintenance of equipments provided by BHEL.

38.2.2 Planned and preventive maintenance

The main activities to be carried out during the planned and preventive maintenance are generally as under:

1. General inspection and cleanliness of the entire system.

2. Insulation resistance measurements.

3. Noting down the defects noticed in the system in the period between shutdowns. These shall be brought to the notice of BHEL engineer. These shall be attended to during the forthcoming planned shutdown and got verified from BHEL.

38.2.3 Breakdown Maintenance

The contractor shall attend the breakdown of the system most expeditiously and bring the system back to normalcy at the earliest, as per instructions of BHEL. Contractor shall have to deploy additional resources for rectifying the faults within the shortest possible time. Contractor may note that no compensation shall be payable for deployment of such additional resources.

38.2.4

Contractor shall provide all resources (labour, T&P, consumables etc.) For preventive and breakdown maintenance of entire system. This shall include the preventive and break down maintenance of existing 11 KV ring main system also.

38.2.5

Contractor shall provide necessary resources for attending to the repair / replacement of HT cable failures. For such works contractor shall be paid at an all-inclusive average rate of Rs.200/ (rupees two hundred only) per man-day. This shall include all exigencies like overtime payments, supervision charges etc. Contractor shall obtain certification from BHEL engineer for man-days spent.

39 Contractor's Materials

39.1

Contractor shall make own arrangement, for receipt, storage, verification, safe custody, watch & ward and transportation of material from store to site, for all equipments of the system.

39.2

The contractor should take all reasonable care to protect equipment and materials under his custody whether in his stores or at site

It will be the responsibility of contractor to arrange for adequate security round the clock for protection of the installation from damages/ pilferage/ theft/losses etc.

40.0 Painting

All the poles and structure shall first be painted with one coat of primer paint (metal red oxide) after thoroughly cleaning the surface for dust, rust, scale, grease, oil etc; by wire brushing, scrapping and afterwards the above parts painted with two coats of aluminium paint. The quoted rates should be inclusive of supply & application of red oxide primer and application of aluminium paint. All the consumables such as wire brush, brush, metal red oxide paint etc.are to be arranged by the contractor at his own cost.

41.0 Miscellaneous items

Miscellaneous items and works not specifically described herein but required for transmission line and substations shall be provided as per relevant IS and REC Specifications & Construction Standards and shall constitute part of scope of contract.

42.0 Obligations of the contractor

42.1 Tools and Plants

42.1.1

Contractor shall provide all tools and plant required for the installation, operation & maintenance of the complete set up .in this connection it may be noted that BHEL will not provide any tools and plants.

42.1.2

The contractor shall provide all the necessary steel/wooden scaffolds, working platforms for working at elevations, temporary structures etc; required for this work.

42.1.3

In the event of contractor failing to arrange the required tools and plants and testing equipments and non-availability of the same owing to breakdown, or otherwise, BHEL will take appropriate action at contractor's risk and cost.

42.1.4 The T&P and testing equipments arranged by the contractor shall be in proper working condition, which shall not lead to unsafe conditions.

42.2 Consumables

42.2.1 The contractor shall provide all consumables required for carrying out the work covered under this scope of work.

42.2.2 If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability of consumables from the contractor's side BHEL will take appropriate action at his cost and risk.

42.3 Field office and stores

42.3.1 No office accommodation will be provided by BHEL. Only open space will be provided by BHEL free of cost for contractor's office on a temporary basis.

42.3.2 The contractor shall make his own arrangements for field office cum stores. Open land for the same will be provided by customer/ BHEL free of charge. After the completion of work, contractor shall dismantle the above structure and handover the vacant land to BHEL/customer.

42.4 Lighting

42.4.1 The contractor at his cost should arrange for temporary lighting. This arrangement is besides the local lighting that may be required for the execution of the work, which shall also be arranged by the CONTRACTOR.

42.4.2 All temporary wiring must comply with regulations and will be subjected to engineer’s inspection and approval before connecting to supply point.

42.5 LABOUR COLONY

Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him at his own cost.

42.6 SUPERVISORS AND LABOUR

42.6.1 Contractor shall deploy adequate strength of labour, technicians and engineers/ supervisors for this work.

42.6.2 It is the responsibility of the contractor to engage his workmen in shifts and or on overtime basis for achieving the target set by BHEL. This target may be set to suit BHEL's commitments to its customer or to advance date of completion of events or due to other reasons. The decision of BHEL in regard to setting the target will be final and binding on the contractor.

42.6.3 Contractor shall employ only qualified and experienced engineers/ supervisors for this job. They shall have professional approach in executing the work having adequate knowledge and experience in the fields of erection, erection

methodology, calibration, testing and commissioning, quality control and quality assurance procedures, planning, safety etc. Required to undertake the type of work as per this tender.

42.7 SAFETY ASPECTS AT SITE

42.7.1 Contractor shall ensure adherence to the requirement of safety connected with this work. He shall provide necessary safety appliances to his workmen and supervisors and ensure use of the same to prevent loss of human lives, injuries to men engaged and damage to property and environment. Safety Guidelines of BHEL's customer shall be applicable.

42.7.2 Contractor shall obtain necessary work permits from BHEL/ customer prior to taking up any work on the system. He shall arrange for display of due and necessary caution notices/ boards etc.

42.7.3 All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian electricity act and rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carryout all types of electrical work. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

42.7.4 The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or another contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations shall be borne by the contractor.

42.7.5 The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. **It may be noted that non-compliance to HSE requirements will result in penal action. In case of violations of safety requirements, the Contractor shall be liable for a penalty of Rs. 200/- for the first violation and Rs. 500/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 5000/- at a time can be imposed.**

The amount towards penalties as above will be deducted from running bills of the Contractor. The amount so collected above will be utilized for supporting the safety activities at site. The decision of BHEL on above will be final and binding on the Contractor.

42.7.6 In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

42.7.7 In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

42.7.8 If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

42.7.9 The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL. In addition, periodic reports on safety shall also be submitted by the contractor to the authorised BHEL official from time to time as prescribed.

42.8 Industrial relations and labour laws

42.8.1 Contractor shall implement local labour laws, maintain necessary records and co-ordinate with the local labour authorities on all aspects of labour and industrial relations.

42.8.2 The contractor shall comply with the applicable law, rules and regulation etc; with regard to employment of labour. He shall obtain labour license.

42.9 Statutory Inspection

42.9.1 The scope includes getting the approvals from the statutory authorities. This includes arranging for inspection visits of electrical inspector periodically as per BHEL engineer's instructions, submitting documents etc. And following up the matter with them as and when necessary for the work involved in this scope. All expenses, fees, levies etc have to be borne by the contractor.

42.10 **The contractor shall comply with following towards Social Accountability;**

(a) The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged , the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
(b) The contractor shall not engage Forced/Bonded Labour and shall abide by abolition of Bonded Labour System(Abolition) Act, 1976.
(c) The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour(Regulation & Abolition) Act,1970.
(d) The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimation/Corporal punishment for failure in meeting with relevant requirements.
(e) The Contractor shall abide the requirement of Contract Labour(Regulation & Abolition) Act,1970 for working hours.
(f) The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.

(g) The Contractor shall arrange potable drinking water to its employees & workers.

43.0 OBLIGATIONS OF BHEL

43.1 FACILITIES TO BE PROVIDED BY BHEL

43.1.1 WATER

For construction purpose, water shall be provided free of charge at a single point. The contractor shall arrange further distribution and connection.

43.1.2 ELECTRICITY

Construction power for all the works including Civil Works will have to be arranged by the contractor for work within the quoted rates. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply.

44.0 DRAWINGS AND DOCUMENTS

44.1 The technical details of the equipments and system given in this tender specification is only for guidance and only indicative of the requirement. The contractor shall take note of all the aspects of technical details furnished while arranging the required equipments/ materials.

44.2 Contractor shall prepare as built drawing for 11 KV ring main feeders incorporating the statutory requirements as per Indian Electricity rules and the location of poles, DP structures, earthing, cables etc the layout and route drawing of 11 KV line and sub-station incorporating. Lay out drawing shall be based on initial survey conducted jointly along with BHEL/NTPC engineers. It is responsibility of contractor to get the entire installations approved from the statutory authority.

44.3 Contractor shall ensure that all the material to be procured by him should bear ISI mark and conform to the latest IS specification.

44.4 If any error or ambiguity is discovered in the specification/ information contained in the documents/drawings and tender, the contractor shall forthwith bring the same to the notice of BHEL before commencement of the work. BHEL's interpretation in such cases will be final and binding on the contractor.

44.5 In case of any conflict between general instructions to tenderers and general conditions of contract and special conditions of contract, provisions contained special conditions of contract shall prevail.

45.0 TIME SCHEDULE, QUANTITY VARIATION, PRICE VARIATION ETC.

45.1 TIME SCHEDULE

The contractor shall mobilize his resources so that the entire work shall be completed to meet the following schedule.

45.1.1 Supply of equipments, installation and commissioning of substation and transmission lines shall be completed in the following manner

Sl.no	Description of activity	Completion by
01	Completion & finalization of 11 KV line route survey, location of sub-station, submission of revised BOQ in line rate schedule Part-II of tender document	Within 15 days of award of work.
02	Completion of supply of equipments, installation & commissioning of 11 KV over head line	Within 75 days of award of work.
03	Operation & Maintenance	30 months after successful commissioning of entire system.

45.1.2 Operation & maintenance period shall start after commissioning of entire 11 KV transmission network and period shall be 30 (thirty) months. **The contractor shall maintain the 11 KV network and sub station at his own cost, till commissioning of the system as a whole i.e. Prior to start of O & M period as above.**

45.1.3 The number of sub-stations to be operated and maintained will vary depending on the project requirements. This will taper off toward the end of project. Taking these variations into account, contractor shall quote an average monthly rate for operation and maintenance of overhead transmission lines and substations as per Part-C of price bid.

45.2 Contract period

Total contract period shall be 33 months from date of award of work (3 months for Supply, installation & commissioning and 30 months for Operation & maintenance).There will be no grace period.

45.3 Quantity variation

The quantities of various items indicated in the Price Bid are only initial estimates and therefore, are indicative only. The quantity of material to be actually supplied shall be based on the BOQ frozen with BHEL engineer after route survey as indicated above in the schedule. There may be variation between these quantities. Payments will be released based on the actual quantity supplied for supply part and quantity actually installed for the installation part. All these quantities have to be got certified from BHEL Engineer. No variation in the accepted item rates for both parts of this contract will be permitted for any quantity variation. The quantities indicated against each item may vary to any extent and No compensation will be payable in

variation of Individual quantity. **However in case of over all variation in Contract value (as indicted in LOI), beyond (minus) 30%, the contractor will be eligible for compensation as per the following provision:**

"The total executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value"

For Operation and maintenance, actual service as certified by BHEL engineer shall be paid on the basis of accepted item rate. No variation in the accepted item rate will be permitted for any quantity variation.

45.4 Price variation

The price quoted by the contractor shall remain firm throughout the contract period and extended period if any. No price variation is applicable in this contract.

45.5 Extension of contract

BHEL at its discretion may extend the contract depending on the project/customer need on existing terms and conditions of contract without any additional payment/compensation. However, such extension will be limited to six months from the end of contract period.

45.6 The construction plan for installation of the system shall be finalized jointly with BHEL. This shall be reviewed regularly and contractor shall take necessary action based up on the review and as per instruction of BHEL.

46.0 INCOME TAX AND OCTROI CHARGES

46.1 **TDS under Income Tax, Sales Tax, Vat etc,** if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished.

46.2 For supply of materials, bidders to quote their prices on FOR site basis inclusive of all taxes/ duties or any other expenses i.e. inclusive of Excise duty, sales tax, freight charges, octroi charges etc. However, contractor shall submit 'Tax Invoice' along with other compliances as per VAT act applicable for Delhi.

For installation and operation & maintenance portion, **Price quoted shall be inclusive of all taxes, duties except service tax.** The service tax, as legally leviable & payable by the contractor under the provisions of applicable law/act, shall be paid by BHEL as per contractor's bill. However, contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by contractor on BHEL for this project The contractor shall obtain prior approval of BHEL before billing the service tax amount.

46.3 Contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay

on this account and delay in bringing the material shall be to contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.

46.4 Contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax Authorities, for bringing his materials, plants and equipment at site for the execution of the work under this contract. No road permit shall be issued by BHEL for contractor's materials/equipments.

47.0 TERMS OF PAYMENT

47.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

47.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

47.3 Subject to any deduction which BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder on prorata basis:

47.3.1 FOR SUPPLY (Refer Part-II: Price Bid – Section-A)

(A) FOR SUPPLY OF ITEMS / EQUIPMENTS ETC

i) 90% of accepted item rate with 100% applicable taxes/duties, freight etc. on receipt of materials at site and verification by BHEL engineer.

ii) 10% of accepted item rate on completion of commissioning & acceptance of entire system for further Operation of the System.

(B) FOR SUPPLY OF SPARES DURING OPERATION AND MAINTENANCE PERIOD

i) 100% of accepted rate(s) along with applicable taxes/duties for the spare item(s) consumed on certification by BHEL engineer

47.3.2 FOR INSTALLATION, TESTING AND COMMISSIONING AND OPERATION & MAINTENANCE OF THE SYSTEM

(A) PAYMENT FOR INSTALLATION, TESTING AND COMMISSIONING

i) 90% of accepted rate on pro-rata basis on completion of installation

ii) 10% of accepted rate on pro-rata basis on commissioning of entire system.

(B) PAYMENT FOR OPERATION & MAINTENANCE

i) 100% of accepted rate on monthly basis on certification by BHEL engineer.

48.0 Security Deposit:-The contractor shall submit Security Deposit within 15 days from the date of issue of LOI as per clause no. 16.2 of the General Conditions of Contract (GCC) for Part – b under scope of work (Clause 35.0) which covers Installation, Commissioning and Operation & maintenance work. In case the contractor opts to furnish Bank Guarantee as a part of Security Deposit, the BG shall be issued as per the Performa enclosed as per Annexure-H of the GCC and also that the BG should be issued preferably through any of the Member Banks. For BG through any other Nationalized Bank (Not covered in the list of Member Banks of GCC), the discretion of its acceptance shall lie solely with BHEL. The BG shall be returned within 30 Days of completion of O&M period of the contract.

49.0 **LIQUIDATED DAMAGES (LD)**

49.1 For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the contract value as mentioned under clause no.25.5 of the GCC of the tender.

50.0 Others

50.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.

50.2 The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation / Techno-commercial bids. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

50.3 INSURANCE: Besides provisions under clause no. 29.0 of GCC regarding insurance, the following shall also be applicable. The contractor shall also take care of the same while submitting their offer.

50.3.1 Insurance for all materials pertaining to the Contractor (T&Ps, Construction Materials etc.) during transit, storage and during construction shall be in his (Contractor's) scope.

Annexure- A

Technical specification for Contractor supplied Materials

aa) POLES & POLE FITTINGS

Poles for 11 kV Overhead Lines shall be Steel Tubular, Swaged Welded type as per IS-2713 Part-II. The poles have following sizes and sections:

	Total Lengtl of Pole	Type of Pole as per IS-2713-Part-II	Section	Length mm	Dia -meter mm	Thick -ness mm
11kV Single Circuit Line	12 m	410 SP-62	Bottom	5800	193.7	5.4
			Middle	3100	165.1	4.5
			Top	3100	139.7	4.5
11kV Double Circuit Line	13m	410 SP-72	Bottom	5800	219.1	5.9
			Middle	3600	193.7	4.85
			Top	3600	165.1	4.5

The pole shall be complete with base plate and cap.

The properties of material and load withstand parameters shall be as per IS-2713 part-II.

The portion of the pole to be planted in earth/concrete shall be coated with black bitumen paint. The remaining portion of the pole shall be coated with red oxide on its external surface. After installation of the line, the pole shall be painted with two coats of Aluminum paint.

The pole fittings like cross arms, clamps etc. shall be of M.S Channel/Angle/Strip of cross section as specified. These shall be coated with red oxide and finally painted with two coats of Aluminum paint. The clamps & brackets shall be made of size to suit the pole section with required holes for the fittings to give clearances and conductor spacing as shown in the drawings of the line formation with 11m and 13m poles.

bb) 11 KV AIR BREAK SWITCH

The Air Break Switches shall conform to IS:9920(Part-I to IV)

The rated voltage shall be 12 kV.

The rated normal current shall be 800/400 Amps. as specified.

RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE KV (PEAK)

(i)	To earth and between poles	75 kV
(ii)	Across the terminals of open switch	85 kV

RATED ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE (LOW)

(i)	To earth and between poles	28 kV
(ii)	Across the terminals of open switch	32 kV

The withstand values shall be the standard reference atmosphere (temperature, pressure humidity) specified in IS:2071 (Part-I)

TEMPERATURE RISE

The temperature rise shall not exceed the limits specified below :

	Temperature rise like Ambient temperature exceeding 40°C
Copper contacts (Silver faced) in air	65°C
Terminals of the switch intended to be connected to external conductors by bolts	50°C

RATED SHORT TIME CURRENT

The rated short time current shall be 16 KA.

RATED PEAK WITHSTAND CURRENT

The value of peak current that the switch can withstand in the closed position shall be 40 KA.

RATED MAINLY ACTIVE LOAD BREAKING CAPACITY

The rated mainly active load breaking capacity shall be 10 A

RATED TRANSFORMER OFF-LOAD BREAKING CAPACITY

The rated transformer off-load breaking capacity shall be 6.3A (rms).

RATED LINE CHARGING BREAKING CAPACITY

The rated line charging breaking capacity shall be 2.5A(rms)

RATED CABLE CHARGING BREAKING CAPACITY

The rated cable charging breaking capacity shall be 10A(rms)

CONSTRUCTIONAL FEATURES

The AB switch shall have triple-pole construction and shall be suitable for horizontal or vertical mounting as required by purchaser. The switch shall have two 11 kV post insulators per phase suitably mounted on angle irons to enable easy movement insulators. The angle supports shall be mounted on a 70mm^2 hollow beam suitable for fixing on the double pole structure. Alternatively, the angles shall be mounted on a steel frame made of two angle/channel supports. The switch shall be manually operated with a rocking type arrangement through a 30mm^2 G.I. coupling rod.

All current carrying parts shall be made of silver or nickle-plated 90% electrolytic copper. The arcing horns shall be made of phosphor bronze and shall have spring-assisted operation. Switch shall have a spring mechanism so as to ensure that the speed of opening of contacts is independent of the speed of speed of manual operation.

The spacing between the phases shall be adjustable between 600 to 760 mm. Total length of the square beam/base frame shall be kept as 2650mm. The switch assembly shall be suitable for mounting on a H-pole structure with centre-to-centre distance between poles upto 2440 mm.

The vertical operating rod shall comprise of 25mm (nominal class) galvanised steel tube (medium class) as per IS:1161.Length of the operating tube shall vary from 4800mm to 6000mm depending upon the mounting position of the switch on the structure.

Suitable arrangement shall be provided to pad-lock the operating handle in 'ON' and 'OFF' positions.

The switch shall be provided with bimetallic connectors on the incoming side to accommodate ACSR of sizes 100mm^2.On the side, about 1 metre long flexible coil type cable not less than 100mm^2 aluminium section shall be provided.

All iron parts shall be hot dip galvanised. The tubes shall be galvanised in accordance with IS;4736.

TYPE TESTS

The AB Switch shall be subjected to the following tests in accordance with IS:9920.

Dielectric test (impulse and one minute wet power frequency withstand voltage tests)

Temperature rise test (for contacts and terminals)

Short time current and peak withstand current tests

Mainly active load breaking capacity test

Transformer off-load breaking capacity test

Line charging breaking capacity test

Cable charging breaking capacity test

Operation and Mechanical Endurance test

ROUTINE TESTS

The AB Switches shall be subjected to the following routine tests :

Power frequency voltage dry test

Measurement of the resistance of main circuit

Operating test

cc) 11 KV DROP-OUT FUSE CUTOUTS

The distribution fuse cutouts shall be outdoor, open, drop-out expulsion type Fuse Cutouts suitable for installation in 50 Hz, 11 kV distribution system.

The cutout shall conform to IS:9385 (part-I to III).

The rated voltage shall be 12 kV.

The rated current shall be 100 A.

RATED LIGHTNING IMPULSE WITHSTAND VOLTAGE VALUES FOR THE FUSE BASE

The rated lightning impulse withstand voltages both for positive and negative polarities shall be as given below :

a.	To earth and between poles	75 kV (Peak)
b.	Across the isolating distance of fuse base	86 kV (Peak)

RATED ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE (DRY & WET) VALUES FOR THE FUSE BASE

To earth and between poles	28 kV (rms)
Across the isolating distance	32 kV (rms)

TEMPERATURE RISE LIMIT (In Air)

Copper contacts silver faced	65°C

Terminals	50°C
Metal parts acting as spring	The temperature shall not Reach such a value that Elasticity of the metal is Changed

RATED BREAKING CAPACITY

The rated breaking capacity shall be 8 KA (Asymmetrical).

GENERAL REQUIREMENTS/CONSTRUCTIONAL DETAILS

The cutouts shall be of single vent type (downward) having a front connected fuse carrier suitable for angle mounting.

All ferrous parts shall be hot dip galvanised in accordance with the latest version of IS:2632. Nuts and bolts shall conform to IS:1364. Spring washers shall be electrogalvanised.

FUSE BASE TOP ASSEMBLY

The top current carrying parts shall be made of a highly conductive copper alloy and the contact portion shall be silver plated for corrosion resistance and efficient current flow. The contact shall have a socket cavity for latching and holding firmly the fuse carrier until the fault interruption is completed within the fuse.

The top assembly shall have an aluminium alloy terminal connector (refer clause 19).

The top assembly shall be robust enough to absorb bulk of the forces during the fuse carrier closing and opening operations and shall not over-stress the spring contact. It shall also prohibit accidental opening of the fuse carrier due to vibrations or impact.

FUSE BASE BOTTOM ASSEMBLY

The conducting parts shall be made of high strength highly conductive copper alloy and the contact portion shall be silver plated for corrosion resistance and shall provide a low resistance current path from the bottom fuse carrier contacts to the bottom terminal connector.

FUSE CARRIER TOP ASSEMBLY

The fuse carrier top contact shall have a solid replaceable cap made from highly conductive, anti-corrosive copper alloy and the contact portion shall be silver plated to provide a low resistance current path from the Fuse Base Top Contact to the Fuse Link. It shall make a firm contact with the button head of the fuse link and shall provide a protective enclosure to the fuse link to check spreading of arc during fault interruptions.

The fuse carrier shall be provided with a cast bronze opening eye (pull ring) suitable for operation with a hook stick from the ground level to pull-out or close-in the fuse carrier by manual operation.

FUSE CARRIER BOTTOM ASSEMBLY

The fuse carrier bottom assembly shall be made of bronze castings with silver plating at the contact points to efficiently transfer current to fuse base. It shall make smooth contact with the fuse base bottom assembly during closing operation.

The bottom assembly shall have a lifting eye for the hook stick for removing or replacing the fuse carrier.

FUSE BASE (PORCELAIN)

The fuse base shall be a bird-proof, single unit porcelain insulator with a creepage distance (to earth) not less than 320 mm. The top and bottom assemblies as also the middle clamping hardwares shall be either embedded in the porcelain insulator with sulphur cement or suitably clamped in position. For embedded components, the pull our strength should be such as to result in breaking of the porcelain before pull out occurs in a test. For porcelain insulators, the beam strength shall not be less than 1000 kg.

FUSE TUBE

The fuse tube shall be made of fibre glass coated with ultraviolet inhibitor on the outer surface and having arc quenching bonefibre liner inside. The tube shall have high bursting strength to sustain high pressure of the gases during fault interruption. The inside diameter of the fuse tube shall be 17.5 mm. The solid cap of the fuse carrier shall clamp the button head of the fuse link, closing the top end of the fuse tube and allowing only the downward venting during fault interruption.

TYPE TESTS

The cutout shall be subjected to the following type tests :

i. Dielectric tests (rated impulse withstand and rated one minute power frequency withstand test voltages)

ii. Temperature rise test

The above tests shall be carried out in accordance with IS:9385 Part I & II.

For Porcelain Fuse Base only

iii. Pull out test for embedded components of the fuse base

iv. Beam strength of porcelain base

MOUNTING ARRANGEMENT

The cutouts shall be provided with a suitable arrangement for mounting these on 75x40 mm or 100x50 mm channel cross arm in such a way that the centre line of the fuse base is at an angle of 15° to 20° from the vertical and shall provide the necessary clearances from the support. Mounting arrangement shall be made of high strength galvanised steel flat and shall be robust enough to sustain the various stresses encountered during all operating conditions of the cutout.

Strength of the component marked 1 shall be determined by clamping the member with the shorter leg at the top to a rigid support by M-10 carriage bolts. A downward force shall be applied along the axis of M-14 carriage bolt parallel to the longer leg and in the direction of longer leg of the member under test. A load of 50 kg. Shall be applied and then removed to take up any slack in the mounting arrangement before the measurement of position is taken, the permanent set measured at the axis of the M-14 carriage bolt shall not exceed 1.6mm when a load of 425 kg is applied and removed.

The strength of the M-14 bolt shall in no case be less than 1900 kg and the strength of M-10 bolts not less than 3500 kg.

11 KV LIGHTNING ARRESTER

The lightning arresters shall be substation type comply with the Indian Standards Specification IS:3070 (Pt-II).

VOLTAGE RATING

The rated voltage of lightning arresters shall be 9kV (rms). This will be applicable to the effectively earthed 11 kV system co-efficient of earth not exceeding 80 percent as per IS:4004 with all the transformer neutrals directly earthed.

NOMINAL DISCHARGE CURRENT RATING

The nominal discharge current rating of the lightning arresters shall be 10 KA.

TESTS

The following routine and type tests as laid down in IS:3070 (Part-I) shall be carried out.

Routine Test

Dry Power frequency spark over test.

Type Tests

Voltage withstand tests of arrester insulation.

Power frequency spark over test

Hundred per cent 1.2/550 microsecond impulse spark over test

Front-of-wave impulse spark over test.

Residual voltage test.

Impulse current withstand test.

Operating duty test.

Temperature cycle test on porcelain housing.

Porosity test on porcelain components.

Galvanizing test on metal parts.

dd) 11 KV PORCELAIN INSULATORS

The insulators shall comply with IS:731 and IS:3188.

The porcelain shall be sound, free from defects, thorough verified and smoothly glazed.

Unless otherwise specified, the glaze shall be *brown* colour. The glaze shall cover all the porcelain parts of insulators except those areas which serve as support during firing are left unglazed for the purpose of assembly.

The design of insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration. The porcelain shall not engage directly with hard metal.

Cement used in construction of insulators shall not cause fracture by expansion or loosening by contraction and proper care shall be taken to locate the individual parts correctly during cementing. The cement shall not give rise to chemical reaction with metal fittings and its thickness shall be as uniform as possible.

The insulators should preferably be manufactured in automatic temperature controlled kilns to obtain uniform baking for better electrical and mechanical properties.

Both pin and strain insulators shall conform to Type B of IS:731.

The strain insulators shall be of Tongue and Clevis type

TEST VOLTAGES
The test voltages of insulators shall be as under :

Highest system voltage	Visible Discharge Test	Wet Power Frequency Withstand Test	Power Frequency Puncture Withstand Test		Impulse Voltage Withstand Test
			Pin Insulator	Strain Insulator	
KV (rms)	KV (rms)	KV (rms)	KV (rms)	KV (rms)	KV (Peak)
12	9	35	105	1.3 times the actual dry flash over voltage of the insulator	75

FAILING LOAD

Mechanical Failing Load (For Pin Insulators only)

The insulators shall be suitable for a minimum failing load of 10 KN applied in transverse director.

Electro-Mechanical Failing Load (For Strain Insulators)

The insulators shall be suitable for a minimum failing load of 70 KN applied axially.

CREEPAGE DISTANCE

The minimum creepage distance shall be as under :

Highest System Voltage	Heavily Polluted Atmosphere	
	Pin Insulator	Strain Insulator
KV	Mm	Mm
12	320	400

TESTS

The insulators shall comply with the following tests as per IS:731.

Type Tests

Visual examination

Verification of dimensions

Visible discharge test

Impulse Voltage withstand Test

Wet Power Frequency Voltage withstand Test

Temperature Cycle Test

Mechanical Failing Load Test

24 hour Mechanical Strength Test for Strain Insulators

Puncture Test

Porosity Test

Galvanising Test

Electro-Mechanical Failing Load Test

Routine Tests

Visual examination

Mechanical routine test

Electrical routine test

Acceptance Test

Verification of Dimensions
Temperature Cycle Test
Electro-Mechanical Failing Load Test
Puncture Test
Porosity Test
Galvanising Test

MARKING

Each insulator shall be legibly and indelibly marked to show the following :
Name or trade mark of manufacturer
Month and year of manufacture
Minimum failing load in KN
ISI certificate mark, if any
Markings on porcelain shall be printed and shall be supplied before firing.

PACKING

All insulators (without fittings) shall be packed in wooden crates suitable for easy but rough handling and acceptable for rail transport. Where more than one insulator is packed in a crate, wooden separators shall be fixed between the insulators to keep individual insulators in position without movement within the crate.

INSULATOR FITTINGS

Pins shall comply with the requirements of IS:2486 (Pt.I to II). Helically formed fittings shall comply with IS:12048.

Fittings for strain insulators shall comply with the requirement of IS:2486, Pt.I to IV.

PINS FOR INSULATORS

General Requirements

The pins shall be of single piece obtained preferably by the process of forging. They shall not be made by joining, welding, shrink fitting or any other process using more than one piece material. The pins shall be of good finish, free from flaws and other defects. The finish of the collar shall be such that sharp angle between the

collar and the shank is avoided. Aluminium ferrous pins, nuts and washers, except those made of stainless steel, shall be galvanised. The threads of nuts and taped hole when cut after galvanising shall be well oiled or greased.

Dimensions

Pins shall be of small steel head type S 165 P as per Is:2486 (Part-II) having stalk length of 165 mm and shank length of 150 mm with minimum failing load of 10 KN. Details of the pins are shown in Fig.3.

Tests

Insulator pins shall comply with the following test requirements as per IS:2486 (Part-I) or latest version thereof :

Type Tests

Checking of threads on heads

Galvanising test

Visual examination test

Mechanical test

Acceptance Tests

Checking of threads on heads

Galvanising test

Mechanical test

Routine Test

Visual examination test

HELICALLY FORMED PIN INSULATOR TIES

Helically formed ties used for holding the conductor on the pin insulator shall be made of aluminium alloy or aluminised steel or aluminium clad steel wires and shall conform to the requirements of IS:12048.

The ties shall be suitable for pin insulator dimensions of Pt.I and conductor sizes specified.

Elastomer pad for insulator shall be used with the ties to avoid abrasion of the conductor coming into direct contact with the insulator.

Tests

The ties shall be subjected to the tests specified in IS:12048.

FITTINGS FOR STRAIN INSULATORS WITH HELICALLY FORMED CONDUCTOR DEAD-END GRIPS

Fittings for Strain Insulators of Tongue & Clevis Type.

The fittings shall consist of the following components :

Cross arm strap conforming to IS:2486 (Pt.II).

Aluminium alloy die cast thimble-clevis for attaching to the tongue of strain, insulator on one end and for accommodating the loop of the helically formed dead-end fitting at the other end in its smooth internal contour. The thimble shall be suitable for all sizes of ACSR conductors as specified. The thimble clevis shall be attached to the insulator by a steel cutting pin used with a non-ferrous split pin of brass or stainless steel. The thimble shall have clevis dimensions as per IS:2486 (Pt.II).

Helically formed dead-end grip having a prefabricated loop to fit into the grooved contour of the thimble on one end and for application over the conductor at the other end. The formed fitting shall conform to the requirement of IS:12048-198

Fittings for strain Insulators of Ball & Socket Type

The fittings shall consist of the following components :

Cross arm strap conforming to IS:2486 (Pt.II).

Forged steel ball eye for attaching the socket end of the strain insulator to the cross arm strap. Forgings shall be made of steel as per IS:2004.

Aluminium alloy thimble-socket made out of permanent mould cast, high strength aluminium alloy for attaching to the strain insulator on one end and for accommodating the loop of the helically formed dead-end fittings at the other end in its smooth internal contour. The thimble socket shall be attached to the strain insulator with the help of locking pin as per the dimensions given in IS:2486 (Pt.II).

Tests

The helically formed fittings for strain insulators shall be subjected to tests as per IS:12048. The other hardware fittings shall be tested as per IS:2486 (Part-I).

PACKING

For packing of GI pins, strain clamps and related hardware, double gunny bags or wooden cases shall be used. The heads and threaded portions of pins and the fittings shall be properly protected against damage.

The gross weight of the packing shall not normally exceed 50 kg. Helically formed fittings shall be packed in cardboard/wooden boxes. Fittings for different sizes of conductors shall be packed in different boxes and shall be complete with their minor accessories fitted in place and colour codes on tags/fittings shall be maded to identify suitability for different sizes of conductors as per IS:12048.

ee) GUY STRAIN INSULATORS

The insulators shall comply with IS:5300 the latest version thereof.

The porcelain insulator shall be sound, free from defects, throughly verfied and smoothly glazed.

The design of the insulator shall be such that the stresses to expansion and contraction in any part of the insulator shall not lead to its deterioration.

The glaze, unless otherwise specified, shall be *brown* in colour. The glaze shall cover the entire porcelain surface parts except those areas that serve as supports during firing.

TYPE OF INSULATORS

The standard guy strain insulators shall be designations ‘A’ and ‘C’ as per IS:5300.

The recommended type of guy strain insulators for use on guy wires of overhead lines of different voltage levels are as follows :

Power line voltage	**Designation of Insulators**
11000 V	C

BASIC INSULATION LEVELS

The test voltage of the insulators shall be as under :

Designation of Insulator	Dry one minute Power Frequency withstand voltage	Wet one minute Power Frequency withstand voltage
	KV (rms)	KV (rms)
C	27	13

MECHANICAL STRENGTH

The insulators shall be suitable for the minimum of loads specified as under :

Designation of Insulator	Minimum failing load (KN)
C	88

TESTS

The insulators shall comply with the following routine type acceptance tests as per IS:5300.

Routine Test

Visual examination

Type Tests

Visual examination

Verification of dimensions

Temperature cycle test

Dry one-minute power frequency voltage withstand test

Wet one-minute power frequency voltage withstand test

Mechanical strength test

Porosity test

Acceptance Tests : (to be conducted in the following order)

Verification of dimensions

Temperature cycle test

Mechanical strength test

Porosity test

MARKING

Each insulator shall be legibly and indelibly marked to show following :

Name or trade mark of the manufacturer

Year of manufacture

ISI certificate mark, if any

Marking on porcelain shall be applied before firing.

PACKING

All insulators shall be packed in wooden crates suitable easy but rough handling and acceptable for rail trams wooden separators shall be fixed between the insulators to keep individual insulators in position without movement within the crate.

Annexure-B

TECHNICAL SPECIFICATION OF MAJOR COMPONENTS & TENTATIVE LIST OF VENDORS

SL.NO.	DESCRIPTION	VENDORS
01	Porcelain Insulators Pin Type Insulators 10 KN Disc Insulators 70 KN	WS Insulators Chennai Jayshree Industries , Kolkata Morden Industries Abu Road BHEL Bangalore
02	Lighting Arrester Station Type 11 KV, 9KA	Crompton Elpro International Pune Oblum Electrical Pvt Ltd Hyderabad
03	1) Gang Operated AB Switches 12 KV, continuous rating, 3 ph, 800 Amps, single break, short time rating 16 KA (Main line) 2) Gang Operated AB Switches 12 KV, continuous rating, 3 ph, 400 Amps, single break, short time rating 16 KA (Sub-station)	Banani Switchgear & Electrical Industries, Kolkata Power & Control Transformer Industries, Mumbai Eastland Switchgear Pvt. Ltd, Kolkata Alliance Engineers Pvt , Ltd. Kolkata
04	Drop Out Fuse Assembly set with 30 Amps	Vendor as given in Sl. No. 03
05	11 KV out door type cable end, termination kit heat shrinkable for 3 core x 185 sqmm / 1 x core 300 sqmm XLPE cable	Raychem, CCI, Mahendra, Denson
06	11 KV straight through cable jointing kit heat shrinkable for cable size for 3 core x 150 sqmm / 1 x core 300 sqmm XLPE cable	Raychem, CCI, Mahendra , Denson
07	11 KV out door, push on type, for tapping with trifurcate box & transformer end, heat shrinkable size 3 core x 150 sqmm	Raychem, CCI, Mahendra , Denson
08	Steel Tubular poles Swaged welded 12 Mtrs long as IS 2713 part –II Type 410 SP 72	Kundan Ispat Pvt. Ltd. Faridabad K.L.Industries Mumbai Fabrica Industries Pvt. Ltd , Merut Associated Strips Pvt, Ltd, Fridabad Bansal Mechanicals works Kolkata Jindal , ASTL
09	Structural Steel	SAIL/ Tata

Annexure-C

LIST OF STANDARDS APPLICABLE FOR 11/0.433 KV CONSTRUCTION POWER SUPPLY SYSTEM

Sl.No	ISS Amendment	IEC PUB	Description
01	585/1962 Amd 1,2,3	38/1967	AC transmission line
02	1818/1972 Amd.1 to 6	129/1961	Ac current Isolators & earth switch
03	2607/1967	129/1986	AB isolator upto 1000 volts
04	2099/1986 Amd. 1to 4	137/1962	HV porcelain bushing
05	3347/1965 & 67		-------Do------- for transformer
06	4257/1967		-------Do-------clamping arrangement for transformer bushing
07	2516/1985		Ac Circuit breaker < 1000 volts
08	398/1976	209	ACSR conductor
09	2121/1962 Part 1 to 5		Fittings for ACSR conductor & over head line accessories
10	3835/1966		Aluminiumised steel core wire for AL conductor
11	2147/1972	144/1963	LT SWGR enclosure
12	4237/1967		LT SWGR <1000 volts
13	3427/1069		SWGR >1000 volts
14	6262/1971		Di-eclectric for Ins.oil
15	6209/1971		Distribution pillar <1000 volts
16	3043/1966		Earthling
17	5792/1970		HT fuses
18	4770/1968		Rubber gloves
19	335/1983		Ins. Oil for transformer & SWGR
20	731/1971		Porcelain Insulators for O/H lines.>1000 volts
21	1445/1977		Porcelain Insulators for O/H lines.<1000 volts
22	2486/1963 part 1 to 4		Insulator fitting for O/H lines >1000 volts
23	2544/1963		Porcelain post insulators 3.3 KV and above.
24	3188/1980		Disc Insulator/string insulators for O/H line
25	5613/1970 Part 1 to 4		Installation & maintenance of O/H lines
26	5216/1982 Part 1 & 2		Safety procedure in electrical works
27	375/1963		SWGR
28	3072/1965		SWGR Installation & Maintenance
29	4067/1967		Normal duty AB switch upto 1000 volts
30	1886/1967		Installation & Maintenance of Transformers
31	2026/1962 Part 1 to 4		Power transformers
32	3639/1966		Fitting & accessories of power transformer.
33	3043		Earthing.

ANNEXURE-I

CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS

We,…… Hereby declare and confirm that we have visited the project site under the subject namely, ……and acquired full knowledge and information about the ***site conditions, wage structure, Industrial climate and total work involved***. We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site condition.

Tenderers Name and Address

Place: (Signature of the Tenderer with stamp)

Date:

ANNEXURE-II

NON DISCLOSURE AGREEMENT
Memorandum of Understanding

BHEL PSNR is committed to Information Security Management System as per Information Security Policy.

M/s……, providing……..service to BHEL PSNR, Noida hereby undertake to comply with the following in line with Information Security Policy of BHEL PSNR;

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.
- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PSNR.

( ) ( )
M/s. BHEL, PSNR M/s……..

ANNEXURE - III

FORMAT OF UNDERTAKING

(To be submitted in the bidder's letter head)

REF: **Dt.**

Bharat Heavy Electricals Limited
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar,
NOIDA – 201 301.INDIA

Sub.: **Supply of Equipments, Installation, Testing, Commissioning and Operation & Maintenance of 11 KV Ring Main System at 1500 MW Pragati III Combined Cycle power Project, Bawana, Delhi**

TENDER NO. BHEL: NR (SCT): BAWANA: 11 KV RING MAIN: 579

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited Bawana site before submission of our offer and noted the job content & site conditions etc.

We also confirm that we have not changed / modified the tender documents as appeared in the website and in case of observance at any stage; it shall be treated as null and void. We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT and confirm our acceptance to reverse auctioning process and we hereby convey our unqualified acceptance to all terms and conditions as stipulated in the tender and NIT. In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer strictly in accordance with tender instructions.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized representative of the bidder)