

TECHNICAL PRE- QUALIFICATION REQUIREMENT

Name of customer: NATIONAL THERMAL POWER CORPORATION LTD (NTPC)

Name of Project: 3 x 660 MW NORTH KARANPURA STPP – 400/ 220 KV SWITCHYARD

Name of Item: Fire Fighting System

Sr. No	PQR Description	Supporting Document to be attached
1.	<p>The bidder/its sub-vendor should have designed, supplied, erected and commissioned at least two (2) Numbers of Fire Protection Systems, each of contract value not less than Rs. 35.0 million or equivalent in foreign currency (exchange rate applicable as on 28.11.2013), in industrial installations. Each of the above fire protection systems should have comprised of:</p> <ol style="list-style-type: none"> Fire hydrant system High Velocity Water (HVW) Spray or Medium Velocity Water (MVW) Spray or Sprinkler system. Fire water pumping and pressurizing arrangement <p>The system mentioned above should have been designed to the recommendations of Tariff Advisory Committee of India or Oil Industry Safety Directorate (OISD) or any other International reputed authority (like LPC-U.K. or NFPA, USA) and these systems should have been in (#) successful operation for at least two (2) years prior to 28.11.2013.</p> <p>In addition, the analogue addressable type fire alarm system proposed to be supplied shall be sourced from a firm who has supplied at least two (2) similar systems which have been approved or listed by UL-USA/ FM-USA/ LPC-UK/ similar agency and should have been in operation for at least two (2) years prior to the 28.11.2013.</p> <p>(#) Successful operation means certificate issued by the end Customer certifying the operation without any adverse remark.</p>	<ol style="list-style-type: none"> Copy of two Purchase Orders / Work Orders each value equal to or more than 3.5 crore. Performance Certificate / Letter / MOM from end customer against 2 years' successful operation for the same projects for which PO/WO are being submitted. The above documents must have information about the type of system designed, supplied and erected and date of work completion wherefrom 2 years' successful operation could be established. Also it must be mentioned that system have been designed as per TAC/OISD/NFPA or any other international reputed make. Bidder should arrange copy of at least two nos. Purchase orders / work orders in the name of FDA's Original equipment manufacturer or it's Indian distributor. Bidder should submit copy of the performance certificates of FDA's OEM against 2 years' successful operation from end customer for the same projects of which PO/WO are being submitted. Performance certificate must have information about the FDA equipment installed & erected including make and date of work completion wherefrom two years successful operation could be established.

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9.6.22



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LIMITED
 पारेषण व्यापार अभियांत्रिकी प्रबंधन
TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

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	ग्राहक/ CUSTOMER	NATIONAL THERMAL POWER CORPORATION LTD (NTPC)						
	परियोजना/ PROJECT	3 x 660 MW NORTH KARANPURA STPP – 400/ 220 KV SWITCHYARD						
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SECTION 1

INTENT, SYSTEM REQUIREMENT, DESIGN CRITERIA AND SCOPE

1.0 INTENT OF SPECIFICATION

- 1.0.0 This specification is intended to cover following activities and services in respect of all the equipment of the **Fire detection and protection System to be provided for 400/ 220 kV Switchyard of 3 x 660 MW North Karanpura Super Thermal Power Plant of National Thermal Power Corporation (NTPC).**
- i) Detailed design of all the equipment and equipment system(s).
 - ii) Complete manufacturing including shop testing.
 - iii) Providing engineering data, drawings, and O & M manuals as per specified format etc. for owners/purchaser's review, approval and records.
 - iv) Packing and transportation from the manufacturer's works to the site including customs clearance/port clearance, if required.
 - v) Fabrication, pre-assembly, if any, erection testing and putting into satisfactory operation all the equipment including successful completion of trial operation.
 - vi) **Performance and Guarantee tests after successful completion of trial operation.**
 - vii) **The system shall be designed, erected & commissioned in accordance with TAC/ NFPA guidelines.**
- 1.0.1 The requirements specified under SECTION 2, SECTION 3, SECTION 4 & SECTION 5 of the specification shall be considered as part of this section. In the event of any conflict between the various sections/sub-sections of this specification, SECTION 1 shall prevail. *SEC 2 shall be referred strictly for equipment specification.*
- 1.0.2 It is not the intent to specify herein all the details of design and manufacture. However, the equipment and the system shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to Purchaser/ Owner, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgment is not in full accordance herewith.
- 1.0.3 **The Contract shall be on unit rate basis for the quantities furnished by BHEL. Variations (upward/ downward) in quantities during contract stage shall be settled on the basis of unit rates furnished in the bid.**
- 1.0.4 **During contract stage, quantities of various items of BOQ may vary to any extent and same rates will be applicable so far the resultant variation in total contract value is within $\pm 30\%$. Variations beyond $\pm 30\%$ shall be negotiated mutually.**
- 1.0.5 The Bidder shall deem to have understood completely all the tender drawings and documents and quoted accordingly.
- 1.0.6 **Deviation:** There shall preferably be no deviation on technical specification. The bidder shall sign and stamp the "Certificate for No Deviation" enclosed in Schedule-1, Section-5 towards confirmation. Except for these deviations/ variations covered under Deviation Schedules which are accepted by the Purchaser before the award of the Contract, it will be the responsibility of the Bidder to fully meet the intent and the requirements of the



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specification within the quoted price. *Deviations in any other form including clarifications / assumptions / etc will not be considered and it will be construed that the bid conforms strictly to the specification.*

- 1.0.7 The Bidder to note carefully that the parameters, estimated capacities of equipment indicated and the tender drawings in the specification are only for the guidance of the Bidder. The system shall be designed as per relevant standards/ codes and exact capacities and quantities are to be estimated by the Bidder. All such estimations and design calculations shall be submitted for Purchaser's approval.
- 1.0.8 It is the responsibility of the successful Bidder to obtain necessary approval/ clearance from statutory organizations wherever applicable for the equipment/ systems under the scope specified.
- 1.0.9 The term 'Owner' appearing in this specification shall refer to **National Thermal Power Corporation (NTPC)**, the term 'Purchaser' shall refer to **BHEL** and the term 'Contractor' shall refer to the **successful Bidder**.

2.0 FIRE FIGHTING REQUIREMENTS FOR VARIOUS AREAS

The makes/models and technical features offered for various firefighting system components/ equipment shall comply with the standards of TAC/ BIS/ UL/ VDs and FM / NFPA/ FOC as applicable. The key elements of fire protection cum detection scheme and the related areas are presented as under:

System	Areas Protected
HVW Spray System	315 MVA Transformer (1 no.)
Addressable Fire Detection & Alarm System	Integration of HVWS system annunciation to existing FAP as defined in technical specification.

Note: 315 MVA Transformer (1 no.) shall be supplied by BHEL.

3.0 SYSTEM REQUIREMENT & DESIGN PHILOSOPHY

This system shall be designed to provide fire detection and protection services for Switchyard and its control Building. Design criterion shall be based on "**Ordinary Hazard Occupancies**" classification as described in Tariff Advisory Committee's (TAC) guidelines. All equipment or systems in the designed fire detection cum protection arrangement shall be completely in compliance with the regulations of Tariff Advisory Committee (TAC) of India/ Loss Prevention Association (LPA) / National Fire Protection Association (NFPA)/ LPCB/ VDs.

3.1 DETECTION SYSTEM FOR INTERFACING WITH HVWSS FOR ONE NO. 315 MVA TRANSFORMER

- a. **Existing Fire alarm panel of the switchyard is in ring topology with nearest FAP of the main plant through optical Fiber Cable. All the FAP of plants are in a ring and whenever there will be fire anywhere in plant, all the panels will get signal. It shall be two way communication in switchyard FAP under ring topology. The make of existing FDA equipment & FAP is SCHRACK SECONET.**
- b. **Contractor shall make all necessary arrangement to have additional communication on account of HVWSS for one no. 315MVA ICT as defined in this specification.**



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- c. Contractor shall supply and installed input/output module (BX-OI3, Make-Schrack Seconet) and control relay module (BX-O1, Make-Schrack Seconet) for the above purpose.
- d. The model no. for existing FAP is Integral IP CXF (Make-Schrack Seconet).
- e. HVW spray system shall have has one no. inlet gate valve and one no. outlet gate valve for operation through DV.
- f. Limit switches shall be used here for the valve position 'fully close' annunciation for FAP. According to the system requirements, there will be 2 nos. limit switches for HVW spray system 2nos. pressure switches and 1no. Solenoid valve. Hence we may require total 04 nos. input and 1no. output for the operation and complete annunciation.
- g. Here we have considered 2 nos. module BX-OI3, i.e. total inputs - 6nos. and output - 2nos. So that each module has 1no. spare input & 1no. spare output for future used in case of any disturbance of the used input & output circuit of the modules.

Note: Bidder should refer the drawing of DVLCP and P&I diagram of existing system attached to section-2 of this specification for reference and better understanding. Bidder shall also refer the typical schematic of HVWSS attached to section-2 of this specification.

3.2 Protection System

a. General Data for Pipes etc.:

- i) Mild steel as per IS: 1239 (Part-I) medium grade (upto 150 NB) & as per IS: 3589 Gr 410 (above 200 NB) or Equivalent for pipes normally filled with water.

Piping Thickness: Pipes for sizes 200 NB & above shall conform to IS: 3589 Grade 410. The final thickness shall not be less than that specified as per IS: 3589.

- ii) Mild steel as per IS: 1239 (Part-I) medium grade (upto 150 NB) & as per IS: 3589 Gr.410 (above 200 NB) or Equivalent and galvanized as per IS: 4736 for pipes normally empty and periodically charged with water and foam system application.

- iii) Pipe protection shall be as follows:

To prevent soil corrosion buried pipes shall be properly lagged with two coat and two wrap coal tar enamel and fibre glass/kraft paper as per IS:10221. Or corrosion protective tapes of minimum thickness of 4 mm (in two layers) of coal tar type as per AWWA C 203.

Over ground pipes shall be provided with one coat of primer and three coats of chlorinated rubber paint.

- iv) Strainer area shall be atleast 4 times the cross section at the pipe end.

Strainer shall be of 30 SWG & 30 mesh and pressure drop across the strainer at design flow shall be limited to 10 MWC in clean condition. Strainer wire shall be SS (AISI316).

- v) All valves shall be as per applicable IS/ BS codes & approved by TAC for specific fire protection system and shall be provided with locking arrangement (with locks) in open or close condition.

- vi) All the flanges and counter flanges shall conform to ANSI B 16.5 CI 150.

- vii) Strainer Body as per IS: 2062 (tested).



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viii) Pipe Fittings

- Unless otherwise specified all elbows/bends shall be long radius type.
- The material shall conform to ASTM A 234 Gr. WPB or ASTM A 105 or equivalent and dimensional standard conforming to ANSI B 16.11 (socket & threaded type), ANSI B 16.9 (for butt welded fittings) and ANSI B 16.5 (for flanges and flanged fittings) as the case may be. Further, galvanized malleable cast iron fittings as per IS: 1879 in cast iron fitting as per BS -1641 are also acceptable.
- Grooved couplings: Mechanical grooved couplings type fittings in GI pipe lines for HVW / MVW spray system may also be used. All materials and products shall be either Underwriters Laboratories (UL) Listed or Factory Mutual (FM) Approved and installed in accordance with NFPA Standard 13 /equivalent Standard.
- The fittings shall be galvanized as per IS: 4736 for galvanized pipe application. In case of branching connections from GI mains for spray piping network, socket may be welded for more than two pipe reduction instead of standard tees.
- Fabricated fittings shall not acceptable up to pipe size to 300 NB. For sizes 350 NB and above, fittings may be fabricated as per BS: 2633/ BS: 534.

ix) Welding of galvanized iron pipes/fittings would be permitted provided the same is carried out by means of special electrodes suitable for the above application and the same shall be approved by Employer. After, welding welded portions shall be applied with three coats of zinc silicate treatment/ rich paint over one coat of suitable primer. Further, the Contractor shall provide proper zinc paint at the point of welding.

b. Overground pipes normally empty, but periodic charge of water and for detector line for spray system shall be of mild steel galvanized pipes as per IS: 1239, Part-I medium grade (for pipes of sizes 150 NB and below) or IS: 3589, Fe 410 grade (for pipes of sizes 200 NB and above).

c. For MS pipeline, welded construction should be adopted unless specified otherwise.

d. All piping system shall be capable of withstanding the maximum pressure (1.5 times of the maximum working pressure) arising from any condition of operation and testing including water hammer effects.

e. Cast iron gate/sluice valve will be used for isolation of flow in pipe lines and shall be as per BS-5150. Valves shall be of rising spindle type. PN 16 class.

3.2.1 HVW Spray System

- HVW Spray System is envisaged for the following equipment in the switchyard:
 - i. Transformer 315 MVA (1 no.)

Locations of transformer is marked in the Layout Plan of 400/220KV Switchyard at NKSTPP End (Drg. No: TB-0-369-318-002 Rev08) provided under enclosures in section-5 of this technical specification.



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General

- a. System shall be pressurized continuously to normal working pressure up to the Deluge valves.
- b. It shall consist of spray main tapped from the main header of power plant, Deluge valve, Isolation valves, Y-type strainer, spray nozzles/ projectors, spray nozzles piping network, detection system, instrumentation, junction boxes, cables etc.
- c. **Switchyard Spray System shall be tapped off from the nearest spray header of switchyard. The nearest spray header has been indicated in existing Piping Layout for 400/220KV Switchyard at NKSTPP End (Drg No: 4410-001-572-PVM-F-030, Rev02) provided under enclosures in section-5 of this technical specification.**
- d. **It shall be contractor's responsibility to supply and extend the pipe from tap-off upto the transformer for the purpose of HVWSS design.**

Spray system shall mainly comprise of the following: -

Automatic deluge valve (DV) assembly suitable size and trims
 Isolation (butterfly) valve at the upstream & downstream of each DV
 Y-strainer of suitable size at upstream of each DV
 S.S Spray nozzles
 QB Detectors
 Solenoids valve for each DV
 One (01) no. pressure switch each in detection line & spray discharge
 One (01) no. limit switch for each isolation valve\Butterfly valve
 Local control Panel with relays and interface units for each DV
 GI piping for spray network at downstream of DV
 25NB M.S. Black wet detection piping network.

Design Criteria

- e. The system shall consist of water supply system, suitable number of spray nozzles, deluge valve, strainers, pipes and necessary valves.
- f. Minimum running water pressure at any projector/spray nozzle shall be not less than 3.5 Kg/cm² and not greater than 5.0 kg/ cm² for HVW spray system
- g. Design discharge density for HVW Spray system shall be 10.2 lpm/ sqm as per the rules of water spray system of Tariff Advisory Committee (TAC).
- h. An isolation valve shall be provided at upstream and downstream of each of the deluge valve. The size shall be same as that of the deluge valve.
- i. Fast acting butterfly valves will be provided on the bypass line of deluge valve, so that this valve can be kept closed and can be operated manually, if there is any malfunction of deluge valves.
- j. Limit switches shall also be provided with isolation and butterfly valve to have monitoring of its position at remote end. Accordingly, suitable arrangement shall be made available.
- k. The deluge valve (auto-resetting type) assembly shall consist of accessories such as water motor gong, alarm test valves, drain valves, strainers, hydraulic releasing system, solenoid valves, etc.



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- l. A strainer ('Y' type) shall be provided at upstream of deluge valve. Strainer wire shall be SS (AISI 316), 30 SWG and 30 mesh. Strainer area shall be at least 4 times the pipe cross section at the pipe inlet. Pressure drop across strainer in clean condition shall not exceed 1.5 Kg/cm² at design flow of deluge valve.
- m. Pressure gauges and pressure switches at upstream and downstream of deluge valves shall be provided.
- n. The alarm valve assembly shall consist of accessories like water motor gong, alarm test valves, alarm valves, strainer ahead of these valves etc. the test valves shall be provided to facilitate the periodical testing of alarm valve.
- o. The design features and make of all the projectors/ spray nozzles shall be UL/ FM or equivalent approved / listed.
- p. Pressure switches shall be provided in spray and detector piping to exhibit "FIRE" and "SPRAY ON" annunciations and interlock for tripping of respective equipment wherever applicable.
- q. Wet type detector network with venting arrangement shall be provided for spray system using quartzoid bulb detectors. For wet type detection employed for equipment located above 20 meters elevation from deluge valve, additional pressure switch shall be provided to actuate the deluge valve.
- r. Remote manual operation of the deluge valves shall be possible from the existing fire alarm cum control panel (Schrack Make) installed in switchyard control room building. It shall be contractor's responsibility to integrate the necessary module of Deluge valve circuit to existing FAP and perform the function to the satisfaction of purchaser/customer. Apart from the automatic operation of the deluge valve, the system shall have provision for manual operation of the deluge valve by means of hand operated lever close to the deluge valve assembly. There shall also be a provision to operate deluge valve electrically from a nearby local panel.
- s. Each outdoor deluge valve housing shall be provided with brick wall housing on three sides and RCC roof. The fourth side of the enclosure shall be in a direction away from protected equipment. Indoor deluge valve(s) which are within 6 meters of the protected equipment shall also be separated from the latter by a brick wall enclosure.
- t. Piping for all fire protection systems shall generally be laid underground. At rail/road crossings, fire water pipes shall be laid inside hume pipes of suitable ratings. Underground pipe shall be provided with coating and wrapping as per specification and IS: 10221 /TAC norms.

3.3 Painting

All Steel Surfaces (external) exposed to atmosphere (outdoor installation)

(i) Surface Preparation: The steel surfaces to be applied with painting shall be thoroughly cleaned before painting by wire brushing, air blowing, etc.

(ii) Painting: One (1) Coat of red oxide primer of thickness 30 to 35 microns followed up with three (3) coats synthetic enamel paint, with 25 microns as thickness of each coat.

All Steel Surfaces (external) inside the building (indoor installation)



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(ii) Painting: One (1) Coat of red oxide primer of thickness 30 to 35 microns followed up with three (3) coats synthetic enamel paint, with 25 microns as thickness of each coat.

Deluge Valves etc.

Painting of all equipment /components shall be as per manufacturer's standard practice or as detailed below whichever is superior in quality:

Environment	Paint scheme	Total DFT
Normal / Mild/ Corrosive Environment	Primer- zinc filled epoxy Finish – Aliphatic Polyurethane (shade RAL 3000) (P.O Red)	Min 125 microns

4.0 SCOPE OF SUPPLY & SERVICES

4.1. Bill of Quantities as Annexure-X to Section - 1 clearly indicates list of material and its quantity required at site.

4.2. Bidder is required to quote in his offer for the supply of items required and their ETC listed in Annexure-X.

4.3. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

4.4. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The exact quantity of each items shall be finalised during detailed engineering.

4.5. A rate or price shall be entered against each item in the priced Bill of Quantities. Cost of items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

4.6. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

4.7. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.

4.8. Miscellaneous items like hardware, fixtures, u bolt, t or angle pipes for joining two pipes etc. shall be deemed to be included under the relevant BOQ items and bidders shall consider the same while quoting for BOQ items.

4.9. Exact requirements shall be worked out during detailed engineering after award of contract. The scope of the work under the contract shall be deemed to include all such items, which although not specifically mentioned in the bid documents and/or in the bidder's proposal, but are required to make the equipment/system complete for its safe,



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efficient, reliable and trouble free operation, unless the same is specifically excluded from the Bidder's scope of work.

4.10. Bidders shall consider makes for various equipments as per Annexure B which shall be subjected to Owner's approval during design engineering stage. Price implication to BHEL later on account of non-acceptance of proposed vendors by Owner shall not be considered.

4.11. Bidder shall also consider the following while quoting for the system:

- i) Power & Control cables for fire protection system (except for cable of size 2CX1.5 sqmm. for detection and alarm system) will be supplied on free issue basis to contractor. BHEL shall procure various sizes of cables (as per Annexure 'A' of this section) for the complete requirement of sub-station. Contractor shall have to choose their cables from the available sizes only and necessary modifications in their equipment for termination of these cables shall be made by contractor.
- ii) Since laying & termination of all power & control cables is in contractor's scope, supply of cable accessories such as lugs, glands, cable tags & markers etc. shall be included by the bidders in their offers alongwith supply of cable (2C X 1.5 sq.mm, FRLS, twisted pair, armoured Cu cable) for fire detection and alarm system.
- iii) Necessary cable trays will be supplied on free issue basis to the contractor, however necessary hardware for fixing the same on walls or elsewhere shall be included by the bidders in their offers.
- iv) Earthing material viz. GS flat & wire will also be supplied on free issue basis to contractor; however requirement shall be given by the bidders in their respective bids.
- v) Bidder shall ensure that sufficient quantities of commissioning spares are made available for timely completion of commissioning of the system. The bidder shall furnish a list of Commissioning spares that will be brought by him. The unused commissioning spares shall be returnable to the bidder.
- vi) The contractor shall supply and lay the underground piping alongwith wrapping coating for hydrant or spray system, if required.
- vii) Pipe size for pylon, size of Anchor fasteners etc. shall be adequate for the support to provide sufficient rigidity against vibration & load during operation. The whole arrangement shall be in bidder's scope. The contractor shall justify adequacy of design during engineering.
- viii) Conducting performance guarantee tests as per approved procedure to the satisfaction of Owner / Purchaser and handing over an operational system to the owner. Procedure for performance guarantee test shall be submitted by contractor for customer review and approval.
- ix) Contractor shall submit valid Type test report for approval by owner. Fresh type test of equipment is not envisaged. It is presumed that equipment offered is duly type tested.

Type Test Certificate for degree of protection shall be submitted for DVLCP (IP-55) shall be as per customer specification.

In case the type test reports are found un-satisfactory, tests shall be carried out afresh by contractor without any additional cost implication to BHEL.



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4.12. Scope of services

Erection, Testing & Commissioning (ETC) requirements

- i) The scope of ETC shall include handling of equipment/ material at site, erection of equipment /material at site including fabrication, equipment and system testing, commissioning of the entire system, conducting performance guarantee tests to the satisfaction of Owner / Purchaser and final handing over to the owner of the entire system.
- ii) Furnishing technical calculations in support of equipment selection or sizing as and when required.
- iii) Preparations of cable interconnection diagram for equipment supplied under this contract and accordingly offer guidance to the purchaser for laying necessary cables. Termination details shall also be furnished in the said interconnection table.
- iv) **Fire detection loop cable (2CX1.5 sqmm.) required for connecting addressable input/output module and control relay module in HWSS system for necessary annunciation and control through existing FAP placed inside switchyard control room. Contractor shall also supply junction boxes for the above purpose, if required to have continuity and smooth signal transmission from input/output & control relay module to FAP to achieve the purpose.**
- v) **Cable size of 2CX2.5 sqmm. required for deluge valve circuit (pressure switch, DVLCP etc.) and power supply circuit to CMR (control relay module) shall be supplied by BHEL as free issue item to contractor.**
- vi) Laying & Termination of above Power and Control cables for the equipment under the scope of this specification shall be under contractor scope. Bidders shall include all cable accessories like lugs, glands, cable tags, markers etc. in their respective bids.
- vii) Earthing of all equipments (to the nearest earth mat/ earthing pad) supplied under the scope of this specification, if required.
- viii) ***Road, Rail crossing of fire water piping shall be through RCC Hume pipes duly covered with coating and wrapping as per specification. Contractors shall provide the requirement alongwith the size in the layout, however supply and laying of these hume pipes shall be done by BHEL, however wrapping coating material shall be supplied by contractor.***

Pipe structure for pylon support around transformer shall be fixed to the bottom of sump with the help of Anchor fasteners. The structure will be in two pieces with a flanged joint at around Zero level above chequered plate. Pipe size for pylon, size of Anchor fasteners etc. shall be adequate for the support to provide sufficient rigidity against vibration & load during operation. Also pylon support pipe encasing on the bottom side shall be done as per standard to avoid any rusting. The whole arrangement shall be in bidder's scope. The contractor shall justify adequacy of design during engineering.

Civil pedestals for above ground yard piping is under BHEL scope however contractor shall supply all fixing hardware like plate, angle, U bolts etc. for laying aboveground yard pipes over pedestals.

Underground pipes, if any, shall be suitably covered with wrapping and coating material and is to be supplied and laid by contractor.



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All machinery tools & tackles and consumables required for erection/testing / commissioning of the system shall be arranged by the Bidder.

Minor modifications, alterations in system installation as per customer's specific requirements shall be done without any extra cost to purchaser.

Bidders to ensure that sufficient quantity of spares are made available for timely completion of commissioning of the system. The bidder shall furnish a list of commissioning spares that will be brought by him. The unused commissioning spares shall be returnable to the bidder.

Obtaining approval from TAC/ TAC accredited agency on documents & installations.

- i) Obtaining, "As Built" certification from purchaser or owner on applicable drawings. Completing documentation as per specification requirement.
- ii) Obtaining customer's written acceptance of satisfactory completion of job. (Acceptance of PG + handing over of plant and mandatory spares (if any)).
- iii) Any other service not explicitly illustrated herein but which may be required to complete the system with its desired functionality or in the spirit of contract shall also deemed to be under the scope of bidder.

5.0 Exclusions

- a) Supply of power & control cables except for fire detection loop cable (2CX1.5 sqmm.) for connecting addressable input/output module and control relay module in HVWSS system for necessary annunciation and control through existing FAP placed inside switchyard control room. However laying and termination of all cables used under this scope shall be in contractor's scope.
- b) Supply of necessary cable trays for laying power and control cables, if required. However hardware for fixing the same on wall trenches or elsewhere shall be included by the bidder in his bid.
- c) Supply of GI flat for earthing of equipments, if required.
- d) **Construction of civil pedestals to support the above ground yard piping for spray system.**
- e) **Construction of housing for deluge valve for each transformer and painting the same on outside & inside. The housing shall have RCC roof.**
- f) **Receipt of material at site, Unloading and safe storage of material.**
- g) **Excavation and Backfilling for underground piping, if required.**

6.0 Utilities Available

Construction water and electricity shall be available at one point each. Contractor shall be required to make own arrangement for taking supplies from there. However bidder may see the detailed scope of electricity/water supply for construction work in NIT terms and conditions.

7.0 Engineering Drawings/ Documents

Engineering shall start immediately after the award of the contract.



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Submission of all drg. / data sheet – as per activity schedule given in NIT

Approval of all drg. / data sheet – as per activity schedule given in NIT

7.1 OPERATION & MAINTENANCE (O&M) MANUAL

Operation and Maintenance manuals shall be specifically compiled for the project by the bidders. The draft O&M manual shall be submitted along with the supply of the items. The O&M manual shall contain the following information:

- a. Description of the system and equipment with design particulars.
- b. Instruction for erection.
- c. Instruction for operation, maintenance and repair.
- d. Recommended inspection practices and inspection schedule.
- e. Ordering information for all replaceable parts.
- f. Recommendation for type of lubricants and frequency of lubrication.

8.0 Handing & Taking Over

It is the responsibility of the contractor to maintain the plant till it is handed over. Any defect noted during the period shall be rectified by the contractor without any price implication to BHEL. Also suitable PG tests shall be conducted by the contractor to show the achievement of guaranteed parameters in line with the requirements of specification/ standards/ codes and to the satisfaction of Purchaser/ Owner.

8.1 Inspection & Testing

All the equipments shall be inspected prior to dispatch in line with relevant IS, approved GTP/ drawing and technical specification, BHEL/ customer approved QAP. Contract shall follow quality assurance plan as stipulated in Annexure-E to section-1 of this technical specification.



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BILL OF QUANTITY		(ANNEXURE-X)		
FIRE FIGHTING SYSTEM FOR ONE NO. 315MVA ICT IN SWITCHYARD, 3 x 660 MW NORTH KARANPURA STPP – 400/ 220 KV AS PER TECHNICAL SPECIFICATION				
Supply and ETC of Main Items as listed below				
Sl. No.	Item Description	Qty.	Unit	Remarks
1	MS PIPE 200NB (FE410 GRADE)	50	Meter	As per IS: 3589 Gr 410, including pipe fittings and accessories
2	MS ERW PIPE 150NB (MEDIUM GRADE)	20	Meter	As per IS: 1239 (Part-I), including pipe fittings and accessories
3	MS ERW PIPE 80NB (MEDIUM GRADE)	212	Meter	As per IS: 1239 (Part-I) including pipe fittings and accessories. For Pylon support
4	MS ERW PIPE 65NB (MEDIUM GRADE)	12	Meter	As per IS: 1239 (Part-I) including pipe fittings and accessories. For Pylon support
5	WRAPING & COATING MATERIAL	50	Sqmt.	
6	GATE VALVE 150NB	2	Nos.	
7	LIMIT SWITCH	2	Nos.	
8	DELUGE VALVE - 150NB	1	No.	Deluge valve with trim assy. and pressure gauge-150NB
9	Y-TYPE STRAINER - 150NB	1	No.	
10	BUTTERFLY VALVE- 150NB	1	Nos.	
11	HVW SPRAY NOZZLE	136	Nos.	K-18, spray angle-80 degree
12	Q.B DETECTOR	87	Nos.	
13	SOLENOID VALVE	1	Nos.	
14	LOCAL CONTROL PANEL FOR DELUGE VALVE	1	Nos.	
15	PRESSURE SWITCH	2	Nos.	
16	GI PIPE 150NB (MEDIUM GRADE)	24	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories
17	GI PIPE 100NB (MEDIUM GRADE)	96	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories



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18	GI PIPE 80NB (MEDIUM GRADE)	84	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories
19	GI PIPE 65NB (MEDIUM GRADE)	54	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories
20	GI PIPE 50NB (MEDIUM GRADE)	24	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories
21	GI PIPE 25NB (MEDIUM GRADE)	228	Meter	As per IS: 1239 (Part-I), Galvanized as per IS 4736, including pipe fittings and accessories
22	2CX1.5 SQMM ARMOURED DETECTION CABLE	500	Meter	
23	INPUT/OUTPUT MODULE	2	Nos.	Addressable Input / Output Module (BX-OI3, Make-Schrack Seconet)
24	CONTROL MODULE	1	No.	Addressable Control Relay module (BX-O1, Make-Schrack Secone)
25	CABLE LAYING ALONGWITH ACCESSORIES	1000	Meter	ETC Scope

Supply of Mandatory Spares as listed below

Sl. No.	Item Description	Qty.	Unit	Remarks
1	SOLENOID COIL FOR DELUGE VALVE 150NB	1	No.	Make HD Fire
2	SOLENOID COIL FOR DELUGE VALVE 100NB	1	No.	Make HD Fire
3	BUTTERFLY VALVE - 150NB	1	No.	Complete Butterfly Valves-150NB - Make Intervale Poonawalla/NTPC approved make
4	BUTTERFLY VALVE - 100NB	1	No.	Complete Butterfly Valves-150NB - Make Intervale Poonawalla/NTPC approved make
5	DISC FOR BUTTERFLY VALVE 150NB	1	No.	Make Intervale Poonawalla/NTPC approved make



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6	DISC FOR BUTTERFLY VALVE 100NB	1	No.	Make Intervale Poonawalla/NTPC approved make
7	STEM FOR BUTTERFLY VALVE 150NB	1	No.	Make Intervale Poonawalla/NTPC approved make
8	STEM FOR BUTTERFLY VALVE 100NB	1	No.	Make Intervale Poonawalla/NTPC approved make
9	SEAL RING FOR BUTTERFLY VALVE 150NB	1	No.	Make Intervale Poonawalla/NTPC approved make
10	SEAL RING FOR BUTTERFLY VALVE 100NB	1	No.	Make Intervale Poonawalla/NTPC approved make
11	GASKET	1	No.	Make Intervale Poonawalla/NTPC approved make
12	BEARING FOR BUTTERFLY VALVE 150NB	1	No.	Make Intervale Poonawalla/NTPC approved make
13	BEARING FOR BUTTERFLY VALVE 100NB	1	No.	Make Intervale Poonawalla/NTPC approved make
14	GATE FOR GATE VALVE 150NB	1	No.	Make H Sarkar
15	GATE FOR GATE VALVE 100NB	1	No.	Make H Sarkar
16	GATE FOR GATE VALVE 80NB	1	No.	Make H Sarkar
17	STEM FOR GATE VALVE 150NB	1	No.	Make H Sarkar
18	STEM FOR GATE VALVE 100NB	1	No.	Make H Sarkar
19	STEM FOR GATE VALVE 80NB	1	No.	Make H Sarkar
20	SEAL RING FOR GATE VALVE 150NB	1	No.	Make H Sarkar
21	SEAL RING FOR GATE VALVE 100NB	1	No.	Make H Sarkar
22	SEAL RING FOR GATE VALVE 80NB	1	No.	Make H Sarkar
23	LIMIT SWITCH	1	No.	Make Jai Balaji
24	PRESSURE SWITCH	1	No.	Make Switzer
25	2CX1.5 SQMM ARMoured DETECTION CABLE	128	Meter	Make Delton/NTPC approved make
26	FO CABLE	75	Meter	Make FINOLEX (DMAXE)

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ANNEXURE-'A'**Cable Sizes being procured by BHEL for Sub-Station**

SI No.	Item Description
1	2C x 2.5 sq mm PVC/Copper, Armoured Control cable
2	5C x 2.5 sq mm PVC/Copper, Armoured Control cable
3	10C x 2.5 sq mm PVC/Copper, Armoured Control cable
4	14C x 2.5 sq mm PVC/Copper, Armoured Control cable
5	19C x 2.5 sq mm PVC/Copper, Armoured Control cable

Bidder shall choose make of materials strictly from list enclosed in Annexure-B to this section. However final applicable make is subject to ultimate customer approval without any cost implication to BHEL.

LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL FOR NTPC NORTH KARANPUR S/Y PKG.						
OWNER: NATIONAL THERMAL POWER CORPORATION LTD. (NTPC)						
CONTRACTOR: BHEL- TBG, NOIDA						
PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD						
TIPL DOC. NO.:						
NTPC DOC. NO.: 4410-001-S/Y-FDPS REV:00 DATE: 12.04.2018.						


SL. NO.	ITEM DESCRIPTION	MAKE LIST	UNIT	Qty	INSPECTION CATEGORY	REMARKS
A.	FIRE PROTECTION SYSTEM					
1.0	MS BLACK PIPE					
	200 NB PIPES					
1.1	150 NB	JINDAL HISAR				
1.2	100 NB					
1.3	80 NB					
2.0	WRAPPING & COATING TAPE	MP TAR PRODUCT				
3.0	GATE VALVE					
3.1	150 NB	H. SARKAR				
3.2	100 NB	H. SARKAR				
3.3	80 NB	H. SARKAR				
4.0	HYDRANT VALVE					
4.1	EXTERNAL	NEW AGE FIRE FIGHTING CO.LTD				
4.2	INTERNAL	SURENDRANAGAR				
5.0	HOSE BOX					
5.1	EXTERNAL	MAIN CONTRACTOR APPROVED				
5.2	INTERNAL	SOURCES				
6.0	FIRE HOSE WITH COUPLING					
6.1	15 MTR. LONG					
6.2	7.5 MTR. LONG	BIS APPROVED SOURCES WITH				
		VALID LICENCE				
7.0	BRANCH PIPE WITH NOZZLE					
4.0	DELUGE VALVE WITH TRIM ASSEMBLY & PRESSURE GAUGE					
4.1	150 NB	HD FIRE JALGAON				
4.2	100 NB	HD FIRE JALGAON				
5.0	Y-STRAINER					
5.1	150 NB	SOROJINI ENTERPRISE HOWRAH				
5.2	100 NB					
6.0	BUTTERFLY VALVE					
6.1	150 NB					
6.2	100 NB	INTER VALVE (PUNE)				
7.0	HVWS NOZZLE (K-FACTOR- 18 & SPRAY ANGLE- 80°)	HD FIRE THANE				
8.0	QB DETECTOR	HD FIRE THANE				
9.0	SOLENOID VALVE	ROTEX, VADODARA				
10.0	DVLCP					
11.0	PRESSURE SWITCH	SWITZER, CHENNAI				
12.0	GI PIPE					
12.1	150 NB					
12.2	100 NB	JINDAL (GHAZIABAD), TATA STEEL-				
12.3	80 NB	(JAMSHEDPUR)				
12.4	65 NB					
12.5	50 NB					
12.6	25 NB					
13.0	MS BLACK PIPE FOR PYLON SUPPORT					
13.1	80 NB					
13.2	65 NB	JINDAL HISAR				
13.3	50 NB					
1.0	4.5 KG CO2 TYPE FIRE EXTINGUISHER					
2.0	6 KG DCP (ABC) TYPE FIRE EXTINGUISHER					
3.0	9 LTR WATER CO2 TYPE EXTINGUISHER	BIS APPROVED SOURCES WITH				
		VALID LICENCE				
4.0	9 LTR MECHANICAL FOAM TYPE FIRE EXTINGUISHER					
5.0	22.5 KG CO2 TYPE FIRE EXTINGUISHER					
B.	FIRE DETECTION & ALARM SYSTEM (REF. NTPC DRG. NO.: 4410-001-572-PVM-L-030, REV. 01)					
1.0	2 LOOP ADDRESSABLE FAP WITH ADDITIONAL CARD FOR RING TOPOLOGY AS PER SPECIFICATION AND BATTERY & BATTERY CHARGER OF SUITABLE RATING	SCHRACK SECONET				
2.0	ADDRESSABLE MULTISENSOR SMOKE DETECTOR	SCHRACK SECONET-AUSTRIA				
4.0	ADDRESSABLE MANUAL CALL POINT	SCHRACK SECONET-AUSTRIA				
5.0	HOOTER CUM STROBE	SCHRACK SECONET-AUSTRIA				
6.0	RESPONSE INDICATOR	TECHNICO				
7.0	DETECTION CABLE (2C X 1.5 SQ. MM.)	DELTON				
8.0	FIBER OPTIC CABLE	FINOLEX-GOA/MUMBAI				
9.0	ADDRESSABLE INPUT OUTPUT MODULE	SCHRACK SECONET-AUSTRIA				
10.0	ADDRESSABLE CONTROL MODULE (RELAY)	SCHRACK SECONET-AUSTRIA				
11.0	LIMIT SWITCH	SIEMENS				

NOTE- CAT I : For these items the quality plans are approved by NTPC and final acceptance will be after physical inspection witness by NTPC.
 CAT II : For these items the quality plans are approved by NTPC. However no physical inspection will be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents as per QP.
 CAT III: For these items Main Supplier approves quality plans. The final acceptance by NTPC shall be on the basis of certificate of conformance by Main Supplier

M. Khaliquezama
 [Signatures]



Annexure - E

CLAUSE NO.	QUALITY ASSURANCE 		
	<u>FIRE DETECTION & PROTECTION SYSTEM</u>		
1.01.00	HYDRANT SYSTEM : Shop Tests		
1.01.01	Hydrant Valve : <ul style="list-style-type: none"> a) All valves shall be hydro tested for body and seat. b) Capacity test / flow test shall be done as per relevant standard. 		
1.01.02	Water Monitor, Hoses, Branch Pipes, Couplings and Nozzles <ul style="list-style-type: none"> a) All tests including hydraulic test shall be done as per relevant Indian / International standard. 		
1.01.03	For Pumps, Diesel Engine, Gear-Box refer the requirements indicated separately.		
1.02.00	HIGH / MEDIUM VELOCITY WATER SPRAYS SYSTEM : Shop Tests		
1.02.01	For Pipes, Fittings, Valves and specialties, requirements are indicated separately.		
1.02.02	Deluge Valve and Spray Nozzles <ul style="list-style-type: none"> a) All valves shall be hydro tested for body and seat. b) Performance test / functional test of 'Deluge Valve' and 'Spray Nozzles' shall be carried out. 		
1.02.03	Detectors <ul style="list-style-type: none"> a) All 'Detectors' shall be tested as per relevant Indian / International Standards. Detectors shall also meet the requirements of UL / FM / LPC etc. 		
1.03.00	INERT GAS EXTINGUISHING SYSTEM: Shop Tests		
1.03.01	a) Complete system selection / Major components shall be approved by TAC / UL / FM / LPC etc. <ul style="list-style-type: none"> b) Storage Cylinders / Containers with all accessories, all piping, valves, fittings and nozzles shall be subjected to all tests as per the design code to which they are supplied and shall also meet the requirements of TAC / UL / LPC / FM / NFPA etc. c) Storage Containers shall also meet the statutory requirements of approval / acceptance by CCE. d) Test for fill density, weight, leakage etc. shall be done for charged cylinders / containers. 		
1.04.00	VERTICAL / HORIZONTAL CENTRIFUGAL PUMP: Shop Tests <ul style="list-style-type: none"> a) UT on Pump Shaft (>= 50mm dia) and MPI / DPT on Pump Shaft and Impeller shall be carried out. b) All rotating components of the pumps shall be statically and dynamically balanced as per ISO : 1940 Gr. 6.3 or better. 		
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	<p>e) Hydraulic test shall be conducted on pump casing with water at 1.5 times the shut off pressure or twice the head pressure whichever is higher for a minimum duration of 30 minutes.</p> <p>d) Performance test and Standard Running test:</p> <p>(i) All the pumps shall be tested in the manufacturer's works for capacity, efficiency, head and brake horse power. Pump shall be given running test over the entire operating range covering the shut off head to the maximum flow. The duration of test shall be minimum one hour. A minimum of five readings approximately eqidistant shall be taken for plotting the curves with one point at design flow. Testing of pump shall be in accordance with stipulations of Hydraulic Institute Standard (HIS) and / or as per applicable Indian Standard or equivalent. Tolerance on parameters shall be as per HIS.</p> <p>(ii) The test shall be conducted at the rated speed preferably with the type tested contract drive motor being furnished . However, in case of any limitation , test bed motor duly calibrated can also be used.</p> <p>(iii) Noise and Vibration shall be measured.</p> <p>(iv) Pumps shall be subjected to strip down examination visually to check for mechanical damages after testing at shop in case abnormal noise level / vibration are observed during the shop test.</p>		
1.05.00	COMPRESSION IGNITION DIESEL ENGINE		
1.05.04	<p>Shop Tests:</p> <p>a) All pressur parts shall be subjected to Hydraulic pressure tests at 1.5 times the design pressure.</p> <p>b) All Diesel engine shall be performance tested as per relevant IS / equivalent code.</p> <p>c) All gear boxes shall be tested at No load for back lash , gear ratio, noise vibration and temp. rise.</p>		
1.05.02	<p>Performance Test:</p> <p>a) Performance test of diesel engine shall be carried out as per BS-5514/ IS or equivalent international code to determine the rated power and specific fuel consumption and governor's function. Performance test of engine in shop shall be done with actual job accessories for minimum four hours (three hours for full load and one hour for over load at 110% of full load). All the engine parameters like RPM, inlet air temp. and pressure, water inlet and outlet temp. And pressure, lub oil pressure, fuel consumption, ambient condition shall be measured and recrded for every half an hour. No positive tolerance shall be allowed on the specific fuel consumption (contractor to specify in the offer.)</p>		
1.06.00	PRESSURE AND STORAGE VESSELS: Shop Test		
1.06.01	<p>Atmospheric Tank</p> <p>a) All weld joints shall be DP Tested and complete tanks shall be water fill tested.</p>		
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1.06.02	<p>b) All atmospheric storage tanks fabricated and erected at site shall be subjected to all tests (Hydro, NDT , Vacuum) according to design code as applicable.</p> <p>Pressure Vessel</p> <p>a) Each finished vessel shall be Hydraulically tested to 150% of the design pressure for a duration of 30 minutes.</p> <p>b) NDT on weld joint shall be as per respective code requirements or the minimum as specified as below :</p> <p>(i) 100 % DPT on root run of butt weld.</p> <p>(ii) 10% DPT on all finished butt welds and fillet welds..</p> <p>(iii) 10% RT (covering all 'T' / cross joints) of butt welds.</p>		
1.06.03	Butt welds of dished ends shall be stress relieved and subjected to 100% RT.		
1.07.00	PACKAGE AIR COMPRESSOR		
	a) In addition to Hydraulic tests of pressure parts, performance run test of the compressor shall be done for FAD, pressure , power consumption, as per relevant code.		
1.08.00	PIPING, VALVE AND SPECIALITIES		
1.08.01	<p>Shop Tests</p> <p>a) All pipes and fittings shall be tested as per applicable code.</p> <p>b) DPT of pipe welds (in case of rolled and welded pipes only) shall be carried out for root and finished welds.</p> <p>c) All strainers shall be subjected to Hydraulic pressure test for leakage and Pressure drop v/s Flow for each type and size.</p> <p>d) All valves shall be hydraulically tested for body, seat and back-seat (if applicable) as per relevant standard. Check valves shall also be tested for leak tightness test at 25% of the specified seat test pressure.</p> <p>e) Valves shall be offered for hydro test in unpainted condition.</p> <p>f) Functional checks of the valves for smooth opening and closing shall also be done.</p> <p>g) Anti-corrosive protection shall be tested as per applicable code.</p>		
1.09.00	FOAM SYSTEM :-		
1.09.01	Shop Test		
	a) For tanks , pipes , fittings, valves and specification refer respective section of the specifications.		
	b) System shall meet test requirements as specified in TAC / UL / FM / NFPA etc.		
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CLAUSE NO.	QUALITY ASSURANCE		
1.10.00	PORTABLE & MOBILE FIRE EXTINGUISHERS		
1.10.01	Shop Test		
	<ul style="list-style-type: none"> a) All Fire Extinguishers shall be tested as per relevant standard. b) Performance / function test shall be carried out on sampling basis as per relevant code / standard. 		
1.11.00	EOT/HOT Crane <ul style="list-style-type: none"> a) Chain pulley Blocks shall be tested as per IS: 3832. b) Electrical wire rope hoists shall be tested as per IS : 3938 c) Following NDT requirements shall be met : <ul style="list-style-type: none"> (i) 100% RT of Butt welds in tension and 10% RT of butt welds in compression. (ii) DP at random on all weldments. d) Deflection, load, overload & travel check on EOT/ HOT crane assembly shall be carried out as per IS:3177. 		
1.12.00	SITE TESTS : <ul style="list-style-type: none"> a) Fire Extinguishers : A performance demonstration test at site of five (5) percent or one (1) number, whichever is higher , of each type and capacity of the extinguisher shall be carried out by the contractor. All consumables and replaceable items require for this test would be supplied by the contractor without any extra cost to employer. b) Foam System : <ul style="list-style-type: none"> (i) The operation of the foam generation shall be demonstrated by the vendor after installation either in the tank to be protected or in the dyke area. (ii) Any other equipment found necessary for the demonstration of the above testing like portable foam water monitor hose etc. shall be provided by the contractor during testing. c) Piping Protection : <ul style="list-style-type: none"> (i) Thickness , Holiday by spark test, Adhesion test shall be carried out as per relevant standard. (ii) Complete piping shall be Hydro pressure tested , at 1.5 X DP or 2 X MWP whichever is higher , before protection. d) Welding of Pipes : <ul style="list-style-type: none"> (i) ERW Black / rolled welded <p>100% DPT on root of butt and finish weld of butt and fillet.</p> 		
NORTH KARANPURA STPP (3X660 MW) EPC PACKAGE	TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:CS-4410-001-2	SUB-SECTION-E-22 FIRE DETECTION & PROTECTION SYSTEM	Page 4 of 5

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TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

Page | 20

CLAUSE NO.	QUALITY ASSURANCE			
	<p>RT on 10% randomly selected joints shall be carried out (for underground piping).</p> <p>(ii) GI Pipes</p> <p>Welding on GI Pipes in general shall not be done. Welding of GI Pipes, if permitted by design , (butt / socket / fillet weld) shall be done strictly as per approved drawing and procedure approved by NTPC – Engg.</p>			
<p>NORTH KARANPURA STPP (3X660 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION-VI, PART-B BID DOC NO.:CS-4410-001-2</p>	<p>SUB-SECTION-E-22 FIRE DETECTION & PROTECTION SYSTEM</p>	<p>Page 5 of 5</p>	

883487/2022



CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC)
 PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
 TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

TB-369-552-031N

Rev. 1

Page | 1

SECTION - 2

EQUIPMENT SPECIFICATION

2.0 CODES AND STANDARDS

The design, manufacture, inspection and testing of complete system shall comply with the latest applicable Indian/British/American standards. The equipment shall conform to the latest edition to the following standards:

- "Fire Protection Manual" - Issued by the Regional Committees of Tariff Advisory Committee (TAC).
- Underwriters Laboratories of USA
- LPCB – United Kingdom
- National Fire Codes of National Fire Protection Association (NFPA) of USA.

2.1 GENERAL DESIGN AND CONSTRUCTIONAL REQUIREMENT

It is not the intent to specify herein all the details of design and manufacture. However the equipment and the system shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser /Owner who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgment is not in full accordance herewith.

2.3 EQUIPMENT DETAILS OF EQUIPMENTS

Data sheet of equipment are attached to this section for reference. Also details of existing FAP is provided for ready reference of Bidders.

2.4 SHOP & SITE TESTS

2.5.1 SHOP TESTS

All acceptance and routine tests in accordance with relevant IS codes/standards shall be carried out by the contractor/manufacturer as per BHEL/ Customer approved QAP. Charges for all these routine and acceptance tests for all the equipment & components shall be deemed to be included in the bid price.

Contractor shall submit the QP for all such equipments calling inspection/ testing for purchaser's approval in the prescribed format inline with Annexure-E to section-1 of the technical specification. This Owner/Purchaser approved QP shall be the basis of inspection/ testing.

2.5.2 SITE TESTS

The Contractor shall prepare and submit detailed field quality plans in the format prescribed, setting out the quality practice and procedures to be adopted by him for assuring quality of each equipment/material from the receipt of material at site, during storage erection, pre-commissioning to final commissioning of the system. These procedures shall necessarily include all checks/tests conducted at site for preservation, assembly, alignment, positioning of equipment, foundation preparation, welding/bolting heat treatment, non-destructive examination, hydraulic test, running test, performance



test etc.

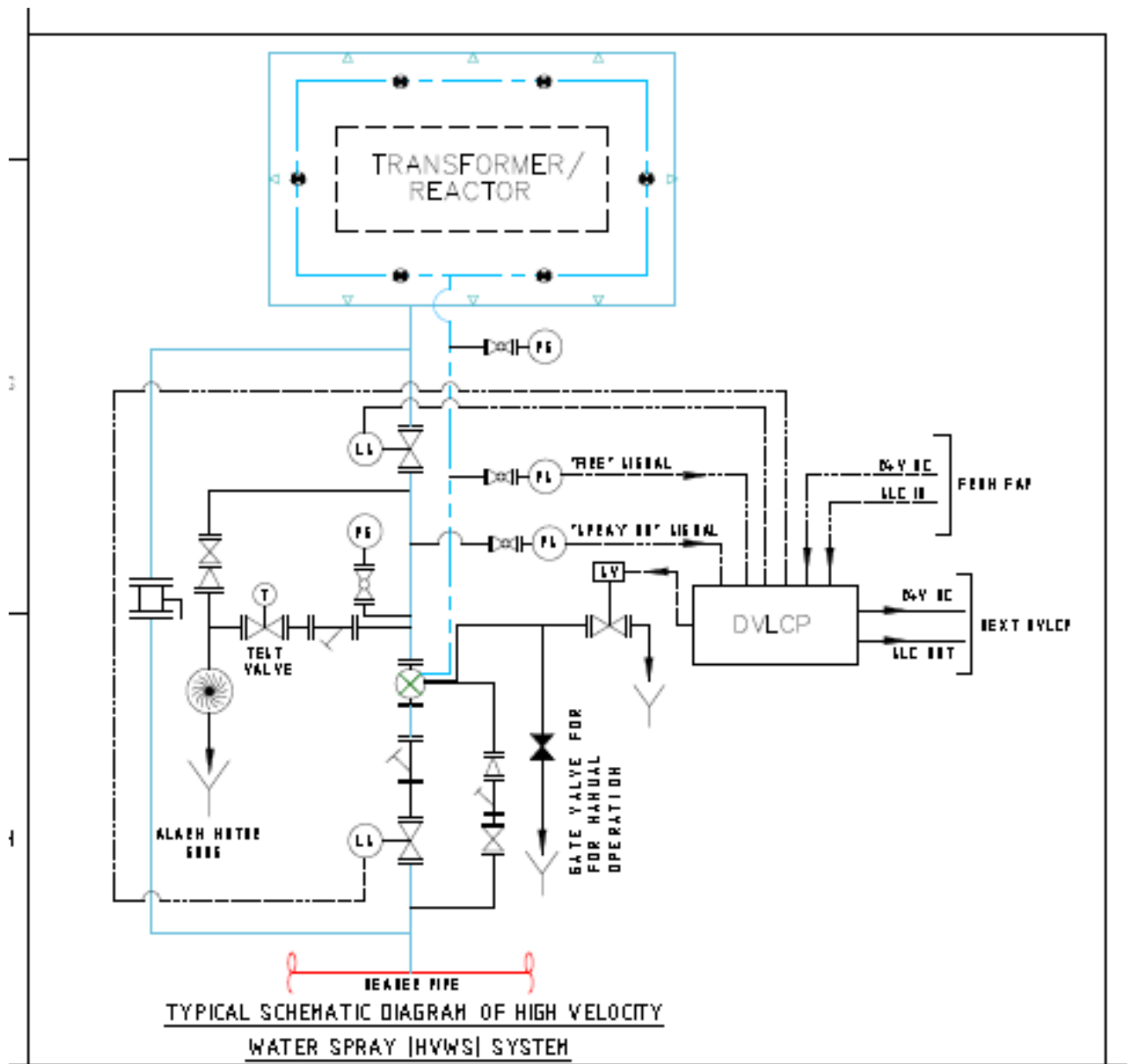
Performance test and guarantee

After erection at site, the Fire Protection system shall be subjected to tests to show achievement of guaranteed parameters in line with the requirements of specification/ standards/ codes and to the satisfaction of Purchaser/ Owner.

The Contractor shall take full responsibility for the safe and efficient operation of each of the equipment as well as the whole system. If the shop/ site tests indicate failure of the equipment or if the system does not meet the guarantee in any respect, the Contractor may be required to make alterations in the system/ equipment. Such alterations shall be carried out after purchaser's/ Owner's approval at no extra cost to purchaser. Additional tests required to show the effect of such alterations should also be performed at no extra cost to Purchaser. Above mentioned tests shall be carried out separately for each sub-system. All the testing instruments shall be tested/ calibrated in accordance with the applicable codes & standards. Under PG testing, interlocks, protections, vibrations & noise levels shall also be checked. Detailed procedure for PG test shall be submitted by the contractor in advance. The Contractor shall give guarantee of satisfactory and trouble free operation of the equipment/ systems for a duration described in Section-3 of this specification.

The following codes and standards shall be applicable for conducting test unless otherwise modified or supplemented by the enclosed procedure and mutually agreed to between the purchaser and contractor.

1. NFPA – 72 E3: Standard on Automatic Fire Detectors.
2. Fire Protection manual of TAC (Latest edition) IS 3034: Fire safety



TECHNICAL DATA SHEET

883187/2022/TBG-TB_ENG_SR

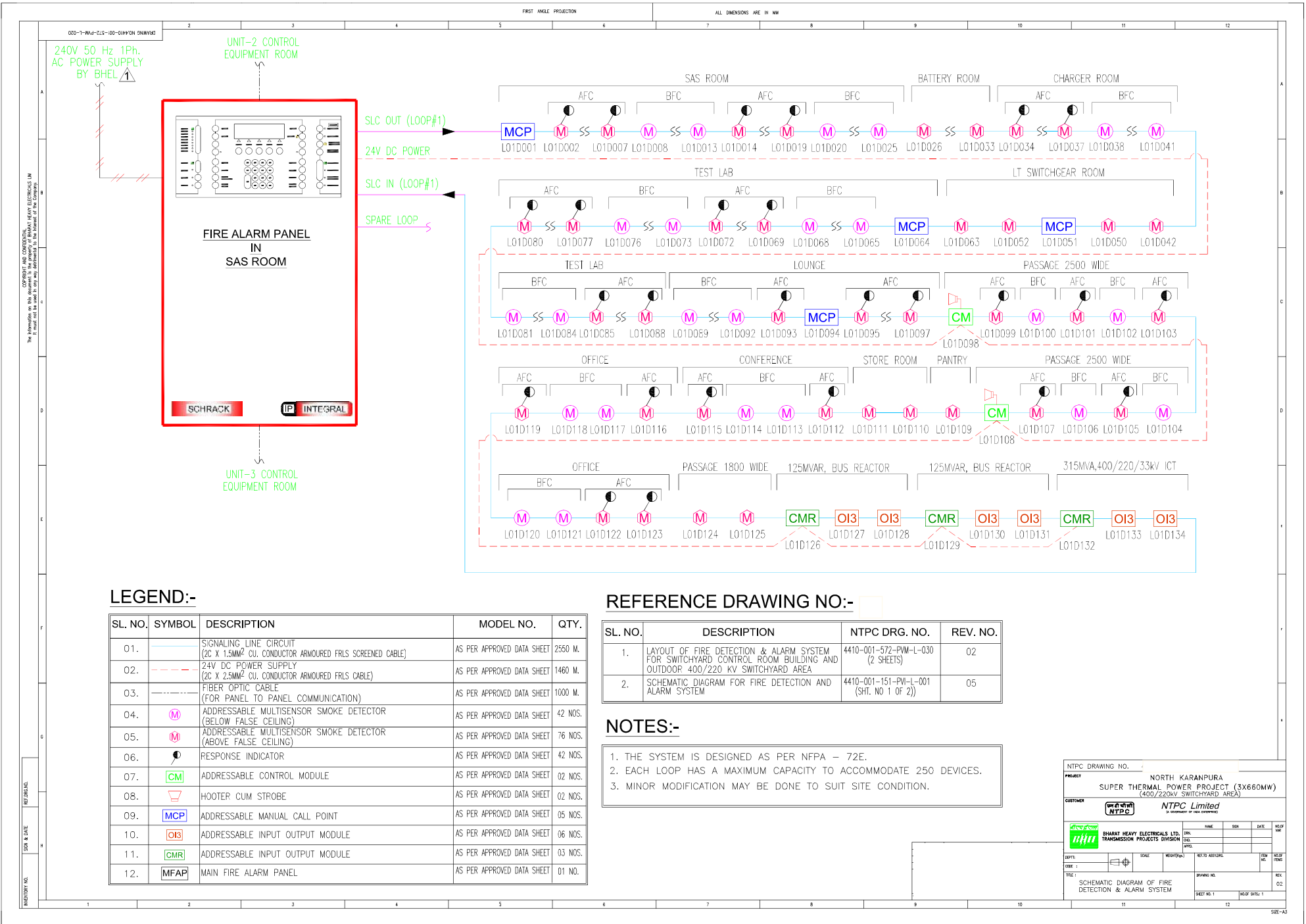
PIPE & PIPE FITTINGS

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS		
1.	PIPE	MS BLACK PIPE (Pipes from tap-off point to upstream of deluge valve for water Spray system & up to hydrant valve for Hydrant system)	MS BLACK PIPE (Pipes for pylon support for High Velocity Water Spray system)	MS GALVANIZED PIPE (Pipes after downstream of deluge valve for water Spray system)
a)	SERVICE	Normally filled with clear water	-	Normally empty but periodically filled with water
b)	CODE / STANDARD	Up to 150NB- IS: 1239, Part-1 medium grade & 200NB and above- IS: 3589 Gr. FE-410	Up to 150NB- IS: 1239, Part-1 medium grade	Up to 150NB- IS: 1239, Part-1 medium grade
c)	MAKE			
d)	TYPE	Electric resistance welded (ERW)	Electric resistance welded (ERW)	Electric resistance welded (ERW)
e)	TYPE OF JOINT	Butt welded / Flanged	Butt welded / Flanged	Butt welded / Screwed
f)	THICKNESS OF PIPE	Up to 150NB- IS: 1239, Part-1 (Medium Grade) 200NB and above- IS: 3589, Gr. FE 410 Pipe thickness shall be 6.3mm for 200NB & 250NB, 7.1mm for 300NB and 8.0mm for 350NB to 600NB	Up to 150NB- IS: 1239, Part-1 (Medium Grade)	Up to 150NB- IS: 1239, Part-1 (Medium Grade) & Galvanized- as per IS: 4736
g)	MATERIAL	MS Black	MS Black	MS GALVANIZED
2.	PIPE FITTINGS			
a)	MAKE	MS FITTINGS / METAL LLOYDS / BHARAT FORGE / TUBE PRODUCTS / NITIN PROFILE / ENGINEERING SERVICE ENTERPRISE		
b)	ELBOWS, COUPLINGS, SOCKETS, REDUCERS ETC.			
i)	STANDARD	i) Up to 300NB: butt welded fittings as per ANSI B16.9 ii) Above 350 NB: fabricated from parent pipe	-	IS: 1879
ii)	MATERIAL	Carbon steel / Mild steel	-	Galvanized malleable cast iron
iii)	END CONNECTION	Butt welded	-	Screwed
c)	FLANGE / BLIND FLANGE			
i)	TYPE & STANDARD	Slip-on plain face plate type flanges, drilling as per ANSI B 16.5		
ii)	MATERIAL	MS as per IS: 2062	MS as per IS: 2062	MS as per IS: 2062, Galvanized
d)	NUTS & HEX BOLTS			
i)	MATERIAL & STANDARD	MS as per IS: 1367 (Galvanized), dimension as per IS: 1364		
e)	GASKETS			
i)	MAKE	CHAMPION		
ii)	TYPE	3mm thick self cantering type		
iii)	MATERIAL & STANDARD	Compressed asbestos to IS: 2712-79		
3.	PAINTING	a) 1 Coat of Red Oxide Primer of thickness 30 to 35 micron b) 3 Coats of Synthetic Enamel Paint with 25 micron thickness of each coat of P.O. Red (Shade- 538) as per IS: 5 c) Total DFT- 105 microns c) Make: SHALIMAR / ASIAN PAINTS / BERGER		

To prevent soil corrosion buried pipes/pipe in trench shall be properly lagged with corrosion protective types of min. thickness of 4mm (one layer)/2mm (two layer) of coal tar type as per IS:15337 or AWWA C 203.

Fabricated fitting shall not be acceptable upto pipe size to 300NB. for pipe sizes 350NB and above fittings may be fabricated as per BS 2633/BS:534

PROJECT	3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
PACKAGE	FIRE FIGHTING SYSTEM
OWNER	NTPC LTD.
CLIENT	BHEL- NOIDA
NTPC DOC. NO.	



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REVISIONS

DATE & DATE

ISSUE NO.

NTPC DRAWING NO. _____

PROJECT: NORTH KARANPURA SUPER THERMAL POWER PROJECT (3X660MW) (400/220KV SWITCHYARD AREA)

CUSTOMER: NTPC Limited

SHARAD HEAVY ELECTRICALS LTD. TRANSMISSION PROJECTS DIVISION

SCALE: _____

DATE: _____

DESIGNER: _____

CHECKED: _____

DATE: _____

PROJECT NO. _____

DRAWING NO. _____

SHEET NO. 1

TOTAL SHEETS: 1

FIRE ALARM PANEL

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	Model	Integral IP CXF
2.	Make	Schrack Seconet
3.	No of panel & Location	1 (one), Switchyard Control building
4.	Module (Part Nos.)	1. B6-X2A-C: Consist of (i) B6-BCU-X2A - Main processor unit with electronic circuit for 2 loops, (ii) B9-CII: LC Display 2. B9-NET-FX4 with single mode plug-in module: Single Mode Network Card, 3. BE-PSU03-OF: External power supply having inbuilt battery charger (For 2 x 100% battery charger) -1 no.
5.	Type	32 bit Microprocessor based addressable type
6.	Type of display	240 Character (6 line x 40 characters) LCD display
7.	Alarm verification capability	Yes
8.	Primary power supply	230 VAC \pm 10%, 47-63 Hz
9.	Networking	Peer to Peer networking with main panels in Ring Topology on Single Mode OFC.FAP. can be communicated two other nearest MFAP#1 & MFAP #2 of main plant through OFC.
10.	Wiring termination	Plug in terminal strip
11.	Dimension	400 x 445 x 140 mm (HxWxD)
12.	Listing/ Approvals	Vds/ EN54



PROJECT	3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD	REV	DATE	PREPARED	
PACKAGE	FIRE FIGHTING SYSTEM			CHECKED	
P.O. NO. & DATE				APPROVED	
OWNER	NTPC LTD.				
CLIENT	BHEL- NOIDA				
NTPC DOC. NO.					
TIPL DOC. NO.		00			

4 Integral IP CX compact control unit

4.1 Integral IP CXF fire alarm control panel

The Integral IP CXF is a compact fire alarm control panel to which two loop circuits can be connected with a maximum of 500 elements in the basic configuration. In addition, it has an expansion slot, which can optionally hold a network module, a module for two more loop circuits, a universal interface module or an input/output module.

Features

- 2 loops with max. 500 devices
- Software redundancy to TRVB S 123, Annex 6/1, Sec. 2.2.
- Continuous automatic test routines for all system components and programs
- Six-line plain text display for the current system status (alarm, fault, etc.)
- Audible and visual alarm devices for alarms and faults
- Alarm buffering
- Manual testing of control panel functions
- Plain text display of individual detectors or display areas
- Control panel language (labelling and display) can be selected, up to 4 languages are switchable on the fly
- External device bus for up to 15 display or control units, max. distance 1,200 m
- Serial, emergency powered log printer with event log memory and message filter
- Suitable for connection to the fire brigade's public alarm notification system
- Connection for fire brigade control panel in accordance with DIN 14661
- Central networking via local mesh network:
 - Up to 16 control panels can be networked to one logical unit without a superordinate control system
 - Local mesh network with up to 4 connections per sub-control unit - in the event of a device or connection fault, it is possible to maintain communication via redirection (routing) of data
 - Flexible topology - stub connection to loop is possible
 - Ethernet protocol - uses the existing IT infrastructure
 - Access to the control panel via intranet & internet
 - Use of standardised IT components
 - Data transmission via TCP/IP (Ethernet 100 Base TX copper) at max. 100 Mbit/s
- System configuration can be saved using flexible flash memory technology
- Event log memory with capacity for up to 10,000 events
- Emergency power supply for a supply interruption period of up to 72 hours

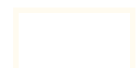


Options

- Expandable to 4 loops with a maximum of 1,000 devices
- Central networking via local mesh network:
 - Data transmission via TCP/IP (Ethernet 100 Base TX optical fibre) at max. 100 Mbit/s
 - Data transmission via RS-485 (copper) at 625 to 2,500 Kbit/s
- Serial interfaces for connection to alarm management systems, external log printers, etc.
- Connection for fire brigade control panels in accordance with ÖNORM F3031, DIN 14661, SN 054002 and DIN 14662
- Day/night mode, individually programmable for each detector zone and day of the week
- Intervention mode
- Software-controlled free assignment and connection of detectors to the activation criteria
- Software-controlled two-zone dependency or two-detector dependency for alarm notification and control
- Recognition and evaluation of the detector state (contamination)
- Individual detector shutdown
- Can be networked with all Schrack fire alarm control panels

Approvals

- VdS device and system approval: G200081, S200081, G206045
- Declaration of Performance (DoP): CPR-20-13-002
- Austrian Testing Centre for Fire Safety Technology: No. FT 14/159/03/10, FT 14/622/03/10
- VB Cert Austria: No. 002/BM-PSys/014/015/016
- Country-specific approvals in Austria, Germany, Denmark, Italy, Netherlands, Poland, Romania, Russia, Sweden, Switzerland, Slovak Republic, Czech Republic, Turkey, Ukraine, Hungary, and many more.





No.: 20-1110100-01



No.: 20-1110101-01



No.: 20-1110102-01

Integral IP CXF cabinet models

All Integral IP CXF versions include the following basic configuration:

- Cabinet made of sheet steel
- B9-CII built-in operating panel (except for B6-X2A model)
- B6-BCU-X2A main processor unit
- B9-PSU power supply unit
- Connection for two loop circuits (max. 500 elements)
- 2 monitored outputs for transmission and alarm systems
- Connection for two monitored inputs
- Five relay outputs (24 V/3 A)
- Connection for fire brigade control panel in accordance with DIN 14661
- Connection for external operating and indicator panels
- Interface for network or extension modules
- Mounting space for batteries (max. battery size 2 x 12 V/18 Ah)
- Power clips and battery cable

Mains voltage:	110 VAC -15% to 230 VAC +10%
Mains frequency:	47-63 Hz
Input power:	max. 160 W
Output power:	max. 115 W
Output voltage:	26.3 VDC (50°C) to 28.3 VDC (0°C)
Output current:	4 A
Quiescent current:	72 mA (with operating panel, without printer)
Usable batteries:	2 pcs. 12 V/15...18 Ah in series
Emergency power supply with batteries:	72 h normal operation plus 0.5 h alarm
Protection class:	IP 30
Ambient temperature:	-5° to +50°C
Relative air humidity:	5 to 95%, excluding condensation
Air pressure:	≥ 80 kPa, up to 2,000 m above sea level
Case:	sheet steel, red RAL 3000
Dimensions:	400 x 445 x 140 mm (HxWxD)
Weight:	19 kg incl. batteries
VdS-Approval:	G200081
Decl. of Performance (DoP):	CPR-20-13-002

Description	Type	Item No.
Integral IP CXF basic configuration with full door	B6-X2A	20-1110100-01
Integral IP CXF basic configuration with cut-out for built-in control panel	B6-X2A-C	20-1110101-01
Integral IP CXF basic configuration with cut-out for built-in control panel and log printer	B6-X2A-CP	20-1110102-01
B9 MAP internal operating panel (neutral)	B9-CII	20-1131001-01
Labelling panel for Integral MAP - German	MAPTXT-RA DE01	20-1032001-01
Labelling panel for Integral MAP - German Alarm counter & display test keys labelled	MAPTXT-RA DE02	20-1032001-02
Labelling panel for Integral MAP - English	MAPTXT-RA EN01	20-1032002-01
Labelling panel for Integral MAP - other languages	MAPTXT-RA ...	upon request



No.: EG072934

B6-NET2-485 network module

For redundant networking of Integral IP CXF control panels or connection of PC applications. The module has two network connections (based on RS-485) and one 100 Base TX interface. The module is plugged into the B6-BCU-X2A main processor unit.

Power supply:	internal via B6-BCU-X2A
Current uptake:	53 mA
Transmission type:	TCP/IP
Mechanical:	RJ-45 connector plug
Direction:	bidirectional, full-duplex
LAN interface:	Ethernet 100 Base TX
Speed:	max. 100 Mbit/s
Range:	max. 100 m
RS-485 interfaces:	2 x RS-485 with line redundancy, of which 1 is galvanically isolated
Speed:	max. 2.5 Mbit/s
Range:	max. 1,200 m
Cable:	UTP Cat5
Ambient temperature:	-5° to +50°C



No.: 20-1100030-01



No.: 20-1400005-01



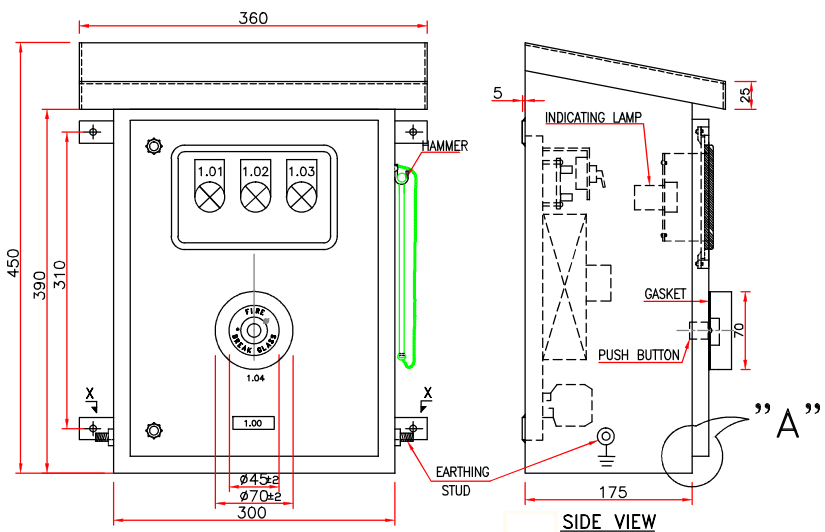
No.: 20-1400006-01

B9-NET-FX4 network module

For networking of Integral IP control panels or redundant connection of PC applications. The module has four optical fibre ports for use with pluggable SFP optical modules (multimode version with 2-km range or singlemode version with up to 10-km range) and one 10/100 Base TX interface with port redundancy. The module is connected to the B6-BCU-X2A main processor unit and includes the connection plug; the singlemode/multimode plug-in modules must be ordered separately.

Power supply:	internal via B6-BCU-X2A
Current uptake:	
without SFP module:	87 mA
1 SFP module multimode:	31 mA typ.
1 SFP module singlemode:	30 mA typ.
LAN interface:	1 x Ethernet 10/100 Base TX
Mechanical:	RJ-45 connector, 8-pin
Speed:	max. 100 Mbit/s
Range:	max. 100 m
FX interface:	4 x SFP plug-in modules, multimode and/or singlemode
Speed:	max. 100 Mbit/s
Range:	
SFP module multimode:	max. 2 km
SFP module singlemode:	max. 10 km
Optical fibre:	
SFP module multimode:	62.5/125 µm or 50/125 µm
SFP module singlemode:	9/125 µm
Connector type:	LC 2x5
Ambient temperature:	-5° to +50°C

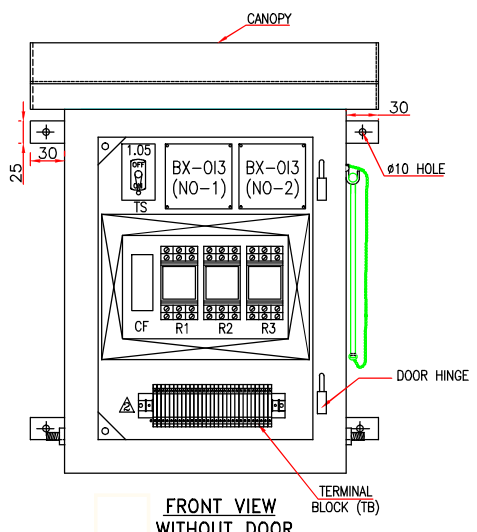
FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM



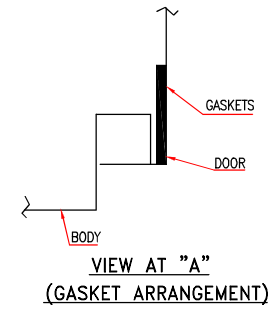
FRONT VIEW

SIDE VIEW

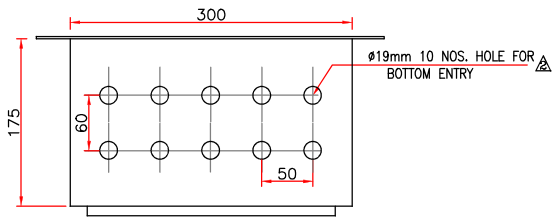
"A"



FRONT VIEW WITHOUT DOOR



VIEW AT "A" (GASKET ARRANGEMENT)



VIEW-XX

GENERAL ARRANGEMENT OF DELUGE VALVE LOCAL CONTROL PANEL (DVLCP)

LEGEND (FOR ONE EACH OF DVLCP)

SL.NO.	TAG NO.	POSITION NO.	INSCRIPTION	LETTER SIZE
1	-	1.00	DELUGE VALVE LOCAL CONTROL PANEL	6MM.
2	TS	1.05	ON/OFF	3MM.
3	h1	1.01	CONTROL ON	3MM.
4	h2	1.02	FIRE	3MM.
5	h3	1.03	SPRAY ON	3MM.
6	Pb	1.04	DV OPEN	3MM.

BILL OF MATERIAL (FOR ONE EACH OF DVLCP)

SL.NO.	TAG NO.	DESCRIPTION	MAKE	RATING	QTY.
1	Pb	PUSH BUTTON ACTUATOR WITH 1 NO CONTACT & PRESS TO LOCK & PRESS TO RELEASE (BREAK GLASS TYPE)	TEKNIC	10A	1NO.
2	TS	DP ON/OFF TOGGLE SWITCH	KAYCEE	10A	1NO.
3	h1, h2 & h3	24V DC INDICATING LAMP	TEKNIC/C&S	6W	3NOS.
4	CF	HRC CONTROL FUSE BASE (20A) WITH LINK (6A)-3NW+NS	SIEMENS+GE	6A	2NOS.
5	R1, R2 & R3	AUX. RELAY WITH BASE (3C/O) CONTACT & 24V DC COIL	OEN	8A	3NOS.
6	BX-013	ADDRESSABLE INPUT/OUTPUT MODULE	SCHRACK SECONET	12 TO 30V DC	2NOS.
7	TB	2.5 SQ.MM. CLIPON TYPE TERMINAL	ELEMEX	25A	30NOS.

NOTE:-

- DOOR WILL BE CONCEALED HINGES AND DOOR KNOB.
- REMOVABLE GLAND PLATE OF 3MM THICKNESS FOR INCOMING AND OUTGOING CABLE.
- TERMINAL SCREW/STUD TYPE WITH 20% SPARE.
- ALUMINIUM ENGRAVE NAME PLATE WILL BE PROVIDED ON ALL FRONT MOUNTED EQUIPMENTS.
- PANEL WILL BE SUPPLIED AS PER SPECIFICATION REQUIREMENT.
- SUITABLE STICKERS LABELS WILL BE PROVIDED FOR EASY IDENTIFICATION OF ALL EQUIPMENTS LOCATED INSIDE THE PANEL.
- CONTROL WIRING WITH 1100V GRADE PVC INSULATED 1.5 SQ.MM. COPPER FLEXIBLE CONDUCTOR WIRES WITH CRIMPING LUGS (DOWELLS) AND NUMBERING FERRULES.
- FABRICATION OF PANEL: DOORS : 1.6MM. CRCA SHEET. BODY : 2MM. CRCA SHEET.
- PAINTING : POWDERED COATED, SHADE : INTERNAL & EXTERNAL : FIRE RED
- CABLE ENTRY : BOTTOM
- PROTECTION : IP-55 AS PER IS-13947 & MOUNTING : WALL/STRUCTURE.
- QUANTITY OF DVLCP : 3NOS.
- MINOR MODIFICATION OF GA OF EQUIPMENTS MAY BE CHANGED FOR OPTIMUM RESULT.
- ADDRESSABLE INPUT/OUTPUT MODULES WILL BE FITTED INSIDE THE DVLCP AT SITE BEFORE INSTALLATION OF DVLCP.
- DIMENSIONS OF ADDRESSABLE INPUT/OUTPUT MODULES (BX-103) - 67X67X20 MM

NTPC DRAWING NO. _____

PROJECT: NORTH KARANPURA SUPER THERMAL POWER PROJECT (3X660MW) (400/220KV SWITCHYARD AREA)

CUSTOMER: NTPC Limited

DEPT: TBM

SCALE: 1/10

WEIGHT(g):

REF. TO ASSY.:

ITEM NO.:

NO. OF ITEMS:

TITLE: GA & SCHEMATIC DIAGRAM OF DELUGE VALVE LOCAL CONTROL PANEL

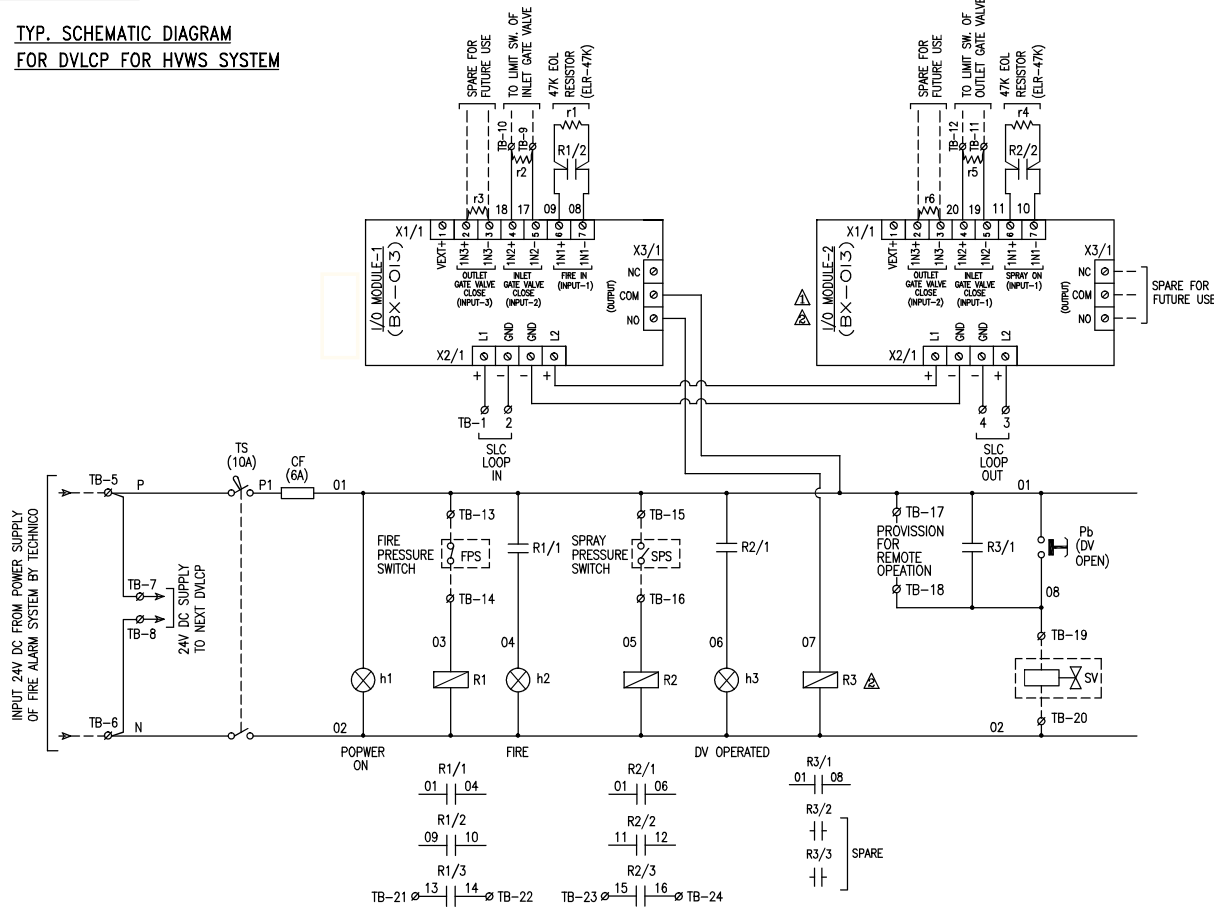
DRAWING NO.:

SHEET NO. 1

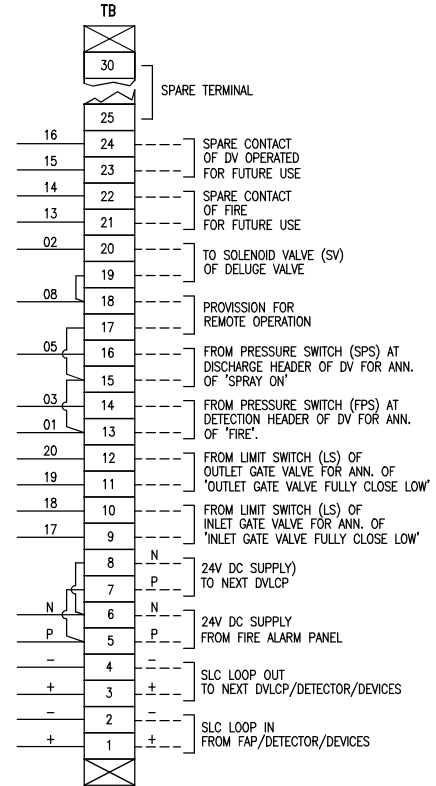
NO. OF SHEETS: 2

REV. 02

TYP. SCHEMATIC DIAGRAM FOR DVLCP FOR HVWS SYSTEM



TYP. TERMINAL PLAN OF DVLCP FOR HVWS SYSTEM



SYMBOL	DESCRIPTION
TS	POWER ON/OFF TOGGLE SWITCH
CF	CONTROL FUSE-6A
Pb	PUSH TO LOCK & AGAIN PUSH TO RELEASE PUSH BUTTON-GREEN, BREAK GLASS TYPE
h1	POWER ON INDICATION (RED)
h2	FIRE INDICATION (RED)
h3	DV OPERATED INDICATION (RED)
R1, R2 & R3	8A, 24V DC, 3C/O RELAY WITH BASE
BX-013	INPUT/OUTPUT ADDRESSABLE MODULE
TB	TERMINAL BLOCK
SLC	SIGNALLING LINE CIRCUIT
r1 & r6	END LINE RESISTOR (EOL) - 47K

NOTE :-
 1. QTY. SHOWN FOR 1 DVLCP IDENTICAL FOR OTHER DVLCPS.
 2. SLC 'LOOP OUT' FROM 1ST DVLCP SHALL BE CONNECTED TO SLC 'LOOP IN' OF 2ND DVLCP AND SO ON TO 3RD DVLCP.

NTPC DRAWING NO. _____

PROJECT: NORTH KARANPURA
 SUPER THERMAL POWER PROJECT (3X660MW)
 (400/220kV SWITCHYARD AREA)

CUSTOMER: NTPC Limited
 (A GOVERNMENT OF INDIA ENTERPRISE)

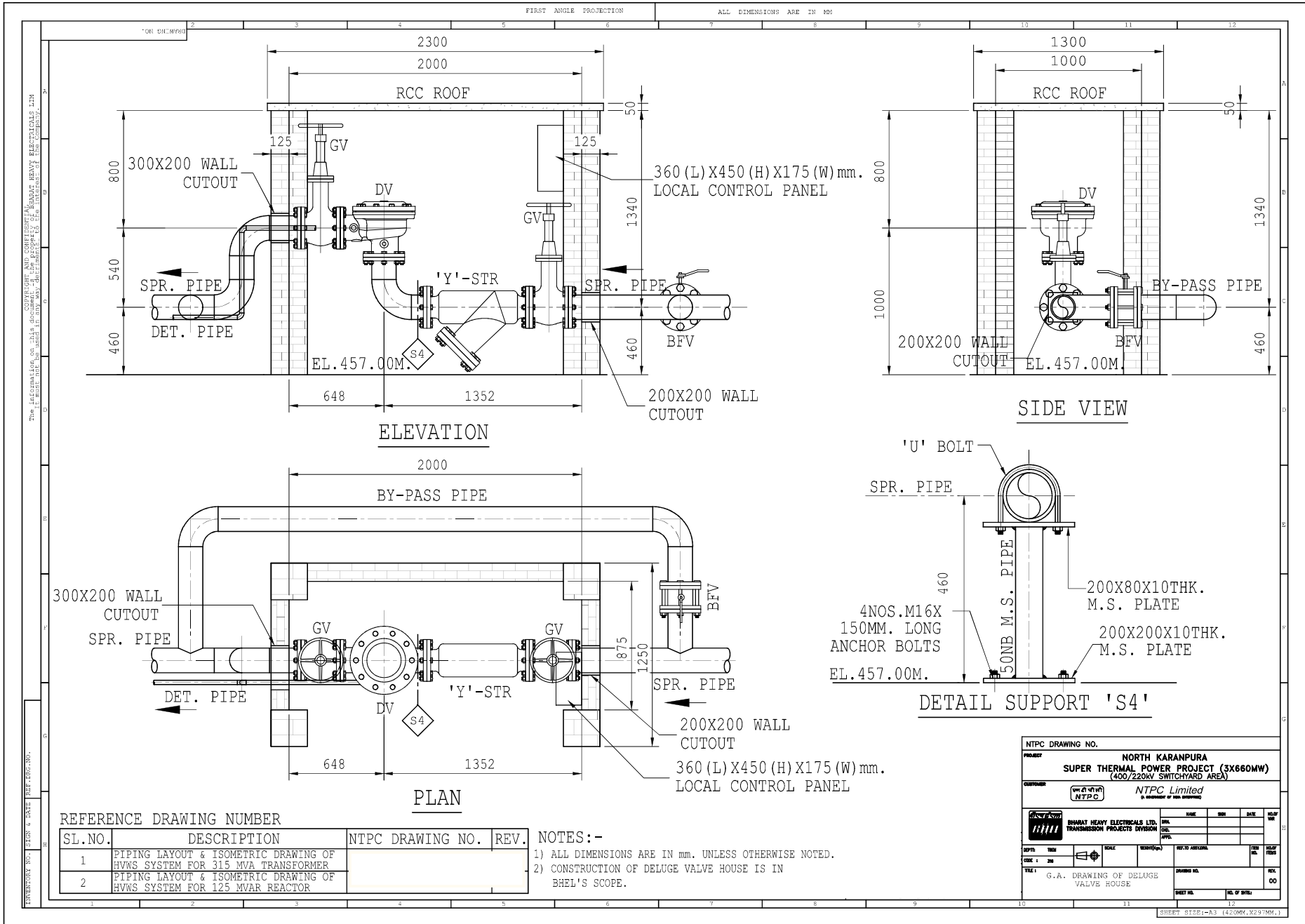
BHARAT HEAVY ELECTRICALS LTD. BHEL
 TRANSMISSION PROJECTS DIVISION

DEPT: TDEM	SCALE: 1:15	WEIGHT(gm):	REF. TO ASYMBOL:	ITEM NO.:	NO. OF REAS:
CODE: 306					

TITLE: GA & SCHEMATIC DIAGRAM OF DELUGE VALVE LOCAL CONTROL PANEL

DRAWING NO. _____ REV. 02

SHEET No. 2 NO. OF SHEETS: 2



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REFERENCE DRAWING NUMBER

SL.NO.	DESCRIPTION	NTPC DRAWING NO.	REV.
1	PIPING LAYOUT & ISOMETRIC DRAWING OF HVAS SYSTEM FOR 315 MVA TRANSFORMER		
2	PIPING LAYOUT & ISOMETRIC DRAWING OF HVAS SYSTEM FOR 125 MVAR REACTOR		

NOTES :-

- 1) ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE NOTED.
- 2) CONSTRUCTION OF DELUGE VALVE HOUSE IS IN BHEL'S SCOPE.

NTPC DRAWING NO.		NORTH KARANPURA			
PROJECT		SUPER THERMAL POWER PROJECT (3X660MW)			
		(400/220KV SWITCHYARD AREA)			
CUSTOMER		NTPC Limited			
		(A MEMBER OF IGC GROUP)			
DRAWN BY		CHK.	DATE	REV.	NO.
DESIGNED BY		CHK.	DATE	REV.	NO.
APPROVED BY		CHK.	DATE	REV.	NO.
DEPTH	THICK	SCALE	REVISIONS	REV. TO APPROVAL	REV. NO.
CASE 1	200	1:1			
TITLE		DRAWING NO.		REV. NO.	
G.A. DRAWING OF DELUGE VALVE HOUSE				00	
SHEET NO.		NO. OF SHEETS			

DELUGE VALVE

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	HANDLING MEDIA	Clean Water
3.	SIZE & QUANTITY	QTY SHALL BE AS PER APPROVED DRG.
4.	MODEL	MODEL-A
5.	TRIM MODEL & TYPE	MODEL – A (Vertical) & TYPE - Basic Wet Pilot Trim with Test & Alarm Trim and Drip & Drain Trim
6.	APPROVAL	UL listed
7.	MOUNTING TYPE	90° pattern inlet to outlet vertical mounting
8.	PROCESS CONNECTION	Flanged end to ANSI B16.1 FF #125 (Flange drilling matching to ANSI B16.5 #150)
9.	TRIM DESCRIPTION	Wet pilot trim (hydraulic release) & electric release trim based on the area of application.
10.	MATERIAL OF CONSTRUCTION	
a)	HOUSING / BODY	Cast iron, IS: 210 Gr. FG-260
b)	COVER	Cast steel
c)	CLAPPER	Ductile iron
d)	CLAMP RING	Ductile iron
e)	DIAPHRAGM	Neoprene rubber
f)	RUBBER SEAT	Neoprene rubber
g)	BOLTS	Carbon steel
11.	HYDROSTATIC TEST PRESSURE	25 Kg/cm2
12.	MAXIMUM SERVICE PRESSURE	12 bar
13.	PAINTING	Primer- Zinc filled epoxy Finish- Aliphatic polyurethane (Shade RAL 3000) (P.O. Red) Total DFT- Min. 125 microns
14.	ACCESSORIES	Wet pilot basic trim assembly for DV- A with test & alarm, drip & drain valves, water motor gong bell, 2 nos. pressure gauge
15.	RECOMMENDED FLOW RATE	a. 80 NB: 275 LPM - 1150 LPM b. 100 NB: 400 LPM - 5000 LPM c. 150NB: 900 LPM -13,500 LPM
16.	MARKING	Mfg. Trade Name, Year of Mfg. & Sr. No., Size & Model, "UL" Listed Mark
17.	WHETHER CAPABLE OF RESETTING	Yes
18.	TYPE OF ACTUATION	Hydraulically actuated by QBD and electrically actuated by solenoid valve
19.	CATALOGUE ENCLOSED	Yes

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VALVE

GATE VALVE			
SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS	
1.	MAKE		
2.	AREA OF APPLICATION	Associate with Hydrant System network (External & Internal) <input type="checkbox"/>	Associate with Spray System network including Deluge Valve <input type="checkbox"/>
3.	SERVICE FLUID	Clean water	
4.	SIZE	150 NB / 100 NB / 80 NB <input type="checkbox"/>	
5.	QUANTITY	As per approved drawing	
6.	STANDARD	BS 5150	
7.	TYPE	Rising stem type (Without limit switch) <input type="checkbox"/>	Rising stem type (Along with provision for mounting limit switch) <input type="checkbox"/>
8.	PRESSURE RATING	PN- 16 <input type="checkbox"/>	
9.	END CONNECTION	Flanged end	
10.	FLANGE DRILLING STANDARD	Drilling as per ANSI B 16.5 (Class-#150) SOFF	
11.	WORKING PRESSURE	12 kg/cm2 <input type="checkbox"/>	
12.	MATERIAL OF CONSTRUCTION		
a)	BODY	Cast iron, IS: 210 FG-200	
b)	BONNET	Cast iron, IS: 210 FG-200	
c)	SEAT RING	Bronze, IS: 318 LTB-2	
d)	WEDGE	Cast iron, IS: 210 FG-200	
e)	STEM	13% Cr. SS, Type- 410	
f)	GLAND	Cast iron, IS: 210 FG-200	
g)	BOLTS & NUTS	Carbon steel, IS:1367 CL 4.6 &4	
h)	PACKING	Jute & hemp	
i)	HAND WHEEL	Cast iron, IS: 210 FG-200	
13.	HYDROSTATIC TEST PRESSURE		
a)	BODY	24 kg/cm2	
b)	SEAT	16 kg/cm2	
14.	INSPECTION & TESTING	As per approved QAP of NTPC <input type="checkbox"/>	
15.	PAINTING DETAILS	Primer- Zinc filled epoxy Finish- Aliphatic polyurethane (Shade RAL 3000) (P.O. Red) Total DFT- Min. 125 microns	
16.	GA DRAWING / CATALOGUE ENCLOSED	Yes, Anx.-1. (Drg. No.: HS/OSSV/01/17-18) <input type="checkbox"/>	Yes, Anx.-2. (Drg. No.: HS/OSSV/18-19/02) <input type="checkbox"/>

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VALVE

BUTTERFLY VALVE		
SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	AREA OF APPLICATION	In bypass line of water spray system (HVWS)
3.	SERVICE FLUID	Clean water
4.	SIZE	150 NB / 100 NB / 80 NB
5.	QUANTITY	As per approved drawing
6.	END CONNECTION	Wafer type
7.	STANDARD	BS: EN: 593 / API-609 / AWWA C-504
8.	OPERATION	By hand lever
9.	FLOW DERECTION	Bidirectional
10.	PRESSURE RATING	PN- 16
11.	WORKING PRESSURE	12 kg/cm2
12.	MATERIAL OF CONSTRUCTION	
a)	BODY	Cast iron, IS: 210 FG-260
b)	DISC	SGI
c)	SHAFT	SS, AISI-410
d)	FLOW CONTROL LEVER	MS
e)	BONDED SEAT	EPDM
13.	HYDROSTATIC TEST PRESSURE	
a)	BODY	24 kg/cm2
b)	SEAT	17.6 kg/cm2
14.	FINISH	Primer- Zinc filled epoxy Finish- Aliphatic polyurethane (Shade RAL 3000) (P.O. Red) Total DFT- Min. 125 microns
15.	INSPECTION & TESTING	As per approved QAP of NTPC
16.	GA DRAWING / CATALOGUE ENCLOSED	Yes, Anx.-3 & 4. (Drg. No.: PD42208/MDS007)

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Y-STRAINER

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	AREA OF APPLICATION	Along with deluge valve in high velocity water spray (HVWS) system
3.	SERVICE FLUID	Clean water
4.	SIZE	150 NB / 100 NB / 80 NB
5.	QUANTITY	As per approved drawing
6.	END CONNECTION	Flanged end. Flange as per ANSI B16.5 Class #150 (SOFF)
7.	TYPE	M.S. Fabricated " Y" Type Strainer
8.	DEGREE OF FILTRATION	30 Mesh / 30 SWG
9.	PRESSURE DROP CLEAN & 50% CLOGGED	6.3MWC (Max.) & 6.8MWC (Max.)
10.	RATIO OF INLET TO STRAINER SURFACE OPENING	1:4
11.	WORKING PRESSURE	10.2 kg/cm2
12.	DESIGN PRESSURE	12 kg/cm2
13.	MATERIAL OF CONSTRUCTION	
a)	BODY	Fabricated from M.S. ERW pipe as per IS: 1239, Part-1 & IS: 3589, material- IS: 2062
b)	NOZZLE (END FLANGE)	MS to IS:2062 Gr. B, Drilling ANSI B 16.5 Class 150#
c)	WIRE MESH	Stainless Steel to SS-316
d)	COVER	Bolted type
e)	GASKET	Rubber, IS : 638, TYPE "B" / Neoprene Rubber
f)	DRAIN PLUG	Carbon steel
g)	FASTNERS	CS as per IS: 1367 Class 8/8.8
14.	HYDROSTATIC TEST PRESSURE	21 Kg/cm2
15.	PAINTING	Inside: 2 coats of Heavy Duty Bituminous Paint (30-35 micron) each Outside: 1 coat of Red Oxide primer (30-35 micron) each followed by 3 Coats of Synthetic Enamel (25 micron) each P.O. Red Total DFT- 125 micron (minimum)
16.	INSPECTION & TESTING	As per approved QAP of NTPC
17.	GA DRAWING ENCLOSED	Yes, Anx.-1.
18.	TAG LIST ENCLOSED	Yes, Anx.-2.

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HVWS NOZZLE

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	TYPE	High velocity water spray nozzles are internal swirl plate type open nozzles HV-BS, with inbuilt strainer
3.	MODEL	HV-BS, with inbuilt strainer
4.	END CONNECTION	¾" BSPT
5.	NOZZLE K-FACTOR & SPRAY ANGLE	K-18 & Spray angle-80°
6.	MAXIMUM WORKING PRESSURE	12 bar (175 PSI)
7.	EFFECTIVE WORKING PRESSURE	3.5 bar to 10.5 Bar (50 to 150 PSI)
8.	MATERIAL OF CONSTRUCTION	
a)	HOUSING	CF8M (SS-316)
b)	SCROLL	CF8M (SS-316)
c)	STRAINER	CF8M (SS-316)
9.	FINISH	Natural finish
10.	INSPECTION & TESTING	As per approved QAP of NTPC
11.	MARKING	Manufacturer trade name, K-factor, spray angle, model no. etc. & UL listed Mark
12.	WEIGHT	0.200 Kg (Approx)
13.	APPROVAL	UL listed
14.	GA DRAWING / CATALOGUE ENCLOSED	Yes

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QB DETECTOR

SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	MODEL	HD101
3.	TYPE	Pendent & standard response type
4.	QUANTITY	As per approved drawing
5.	END CONNECTION	½" BSPT
6.	MAX. WORKING PRESSURE	12 bar
7.	TEMP. RATING	79° C
8.	BODY COLOUR	Yellow
9.	K-FACTOR	80
10.	MATERIAL OF CONSTRUCTION	
a)	BULB	Glass
b)	FRAME	Brass
c)	DEFLECTOR	Brass
11.	FINISH	Chrome plated
12.	INSPECTION & TESTING	As per approved QAP of NTPC
13.	APPROVAL	UL listed
14.	HYDRO-TEST PRESSURE	35 bar
15.	CATALOGUE / GA DRAWING ENCLOSED	Yes

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INSTRUMENT

PRESSURE SWITCH		
SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	SERVICE FLUID	Clean water
3.	QUANTITY	As per approved drawing
4.	MODEL / SERIES	GH-903-2-C-33
5.	AMBIENT TEMPERATURE	(-)10°C to (+)60°C
6.	PRESSURE SWITCH RANGE	0.7 to 7 bar
7.	MAX. WORKING PRESSURE	18 bar
8.	ON-OFF DIFFERENTIAL	Wideband adjustable
9.	REPEATABILITY	± 0.5% of FSR
10.	SENSING ELEMENT	Bellow
11.	MATERIAL OF SENSOR & WETTED PARTS	316L SS Bellows with 316 SS wetted parts
12.	HOUSING	Aluminium pressure die cast
13.	DEGREE OF PROTECTION	Weather proof to IP-66
14.	CONTACT	2 x SPDT
15.	CONTACT RATING	15A, 250V AC
16.	CABLE ENTRY	½" NPT (F) nylon cable gland / single
17.	PROCESS CONNECTION	¼" NPT (F)
18.	MOUNTING	Direct on line
19.	INSPECTION & TESTING	As per approved QAP of NTPC
20.	CATALOGUE ENCLOSED	Yes, Anx.-1.

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INSTRUMENT

SOLENOID VALVE		
SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	SERVICE FLUID	Clean water
3.	QUANTITY	As per approved drawing
4.	MODEL	20126-3.5-4R-B2-S2+24V DC-25-H
5.	TYPE	2/2 way direct acting, normally closed solenoid valve
6.	MOUNTING	Inline mounted (in any position)
7.	ORIFICE	NW = 3.5 mm
8.	WORKING TEMPERATURE	(-)20 ⁰ C to (+)80 ⁰ C
9.	WORKING PRESSURE	Up to 15 Kg/cm2
10.	PROCESS CONNECTION	1/2" NPT (F)
11.	COIL OPERATING VOLTAGE	24 V DC
12.	ELECTRICAL CONNECTION	½" NPT, plug & socket type
13.	COIL INSULATION	Class 'H'
14.	MATERIAL OF CONSTRUCTION	
a)	BODY	Extruded Brass
b)	SEAT & SEAL	Viton
15.	INSPECTION & TESTING	As per approved QAP
16.	CATALOGUE ENCLOSED	Yes, Anx.-2.

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INSTRUMENT

LIMIT SWITCH		
SL. NO.	GENERAL DESCRIPTION	TECHNICAL PARTICULARS
1.	MAKE	
2.	AREA OF APPLICATION	Along with DV's Gate valve for HVWS System (To get annunciation of gate valve for fully close condition)
3.	TYPE	Snap action micro limit switch
4.	SWITCH MODEL	3SE3 100-1E
5.	CONTACT	SPDT (1NO+1NC)
6.	CONTACT RATING	10A at 500V AC
7.	PROCESS CURRENT RATING	It will be used as a potential free contact with FDA input module. It will operate under maximum 1A at 24V DC
8.	AMBIENT TEMPERATURE	(-)40°C to (+)85°C
9.	HOUSING MATERIAL	Aluminium die cast
10.	DEGREE OF PROTECTION	Weather proof to IP-67
11.	ACTUATOR	Integral Lever (Roller lever type)
12.	CABLE ENTRY	M 20 tapped
13.	CATALOGUE ENCLOSED	Yes, Anx.-3.

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SECTION - 3

PROJECT DETAILS GENERAL TECHNICAL REQUIREMENTS

3.0 GENERAL

This section stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.

The provisions under this section are intended to supplement general requirements for the materials, equipments and services covered under other respective sections and are not exclusive. However in case of conflict between the requirements specified in this section and requirements specified under other sections, the requirements specified under respective sections shall hold good.

PROJECT INFORMATION AND SYSTEM PARAMETERS

	Particular	Details
a)	Customer/ Owner	NTPC Ltd.
b)	EPC Vendor	NTPC Ltd.
c)	Project Title	North Karanpura Super Thermal Power Project (3x660 MW) : 400/220kV Switchyard at NKSTPP end & 220kV Sub-station at Mine end
d)	Project Location	Place: Near Tandwa town District: Hazaribagh & Chatra State: Jharkhand
e)	Latitude & Longitude	400/220kV S/s at NKSTPP: North: 23°50' to 23°52' and East: 84°59' to 85°2' 220kV S/s at Chatti Bariatu & Kerandari-A mine: North: 23°52'35" and East: 85°05'25"
f)	Nearest Railway Station	Khalari Railway Station Ranchi-Garhwa section of Eastern Railways
g)	Distance of project location from the Railway station	40 Km (approx.)
h)	Nearest Major Town	Hazaribagh city
i)	Distance of the town from the project site	50 Km.
j)	Nearest commercial airport	Ranchi
k)	Distance of airport from the project site	150 Km
	<u>SITE CONDITIONS</u> (for design purposes)	
a)	Design ambient temperature	50°C
b)	Maximum Relative humidity	95 %
c)	Height above mean sea level	Less than 1000 meters

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CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC) PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM	TB-369-552-031N
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d)	Pollution Severity	Heavily polluted (With Coal dust & Fly ash) and Highly Corrosive environment.
e)	Criteria for Wind Resistant design of structures and equipment	Standard Applicable - IS 875 (Part 3) 1987
f)	Basic Wind speed "Vb" at ten meters above the mean ground level.	39 m/ sec
g)	Category of terrain	Cat -2
h)	Risk Coefficient "K1"	1.06

SYSTEM PARAMETERS

Nominal system voltage	400 kV	11kV
Highest system voltage	420 kV	12kV
Basic Impulse level(dry /wet)	1425kVP	75kVP
Power frequency withstand voltage	630kVrms	28kVrms
Switching Impulse withstand voltage	1050 kVP	NA
Rated short time current	50 kA for 3 sec	40 kA for 1 sec
Frequency	50 Hz	50 Hz
Creepage distance	31mm/kV	31mm/kV
System Earthing	Effectively Earthed	Effectively Earthed

AUXILIARY POWER SUPPLY

3 phase A.C power supply	415V \pm 10%, 50 Hz, 3-phase 4 wire, solidly earthed with variation in frequency of \pm 5%
1 phase A.C power supply	240V \pm 10%, 50 Hz, 1-phase , 2 wire , AC supply with variation in frequency of \pm 5%
D.C. power supply	220V \pm 15%, 2-wire ungrounded 48V \pm 10%, 2 wire system positively earthed

Combined variation of voltage and frequency shall be +/- 10%

3.1 INSTRUCTION TO BIDDERS:

The bidders shall submit the technical requirements, data and information as per the technical data sheets, provided in Section-4.

The bidders shall furnish catalogues, engineering data, technical information, design documents, drawings etc fully in conformity with the technical specification.

It is recognized that the bidders may have standardized on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to the Purchaser. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously. All deviations from the specification shall be clearly brought out in the respective schedule of deviations. Any discrepancy between the specification and the catalogues or the bid, if not clearly brought out in the schedule, will not be considered as valid deviation.

Except for lighting fixtures, wherever a material or article is specified or defined by the name of a



particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.
 For lighting fixtures, makes shall be as defined in Section-Lighting System.

Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/ or needed for erection, completion and safe operation of the equipment as required by applicable codes, though they may not have been specifically detailed in the Technical Specifications unless included in the list of exclusions. Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the switchyard unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/parts of similar standard equipment under supply shall be inter-changeable with one another.

The bidder shall supply type tested (including special tests as per tech. specification) equipment and materials. The test reports shall be furnished by the bidder along with equipment/ material drawings. In the event of any discrepancy in the test reports, (i.e., if any test report is not acceptable due to any design/ manufacturing changes or due to non-compliance with the Technical Specification and/ or applicable standard), the tests shall be carried out without any additional cost implication to the BHEL. BHEL reserves the right to get any or all type/tests conducted/repeated.

3.2 CODES AND STANDARDS

The supplier is required to follow local statutory regulations stipulated in the latest amended Electricity Supply Act 1948 and Indian Electricity Rules 1956 (latest), and other local rules and regulations.

The equipment to be furnished under this specification shall conform to latest issue with all amendments of standards and/ or codes specified under respective section heads. The standards mentioned in the specification are not mutually exclusive or complete in them, but intended to complement each other. The supplier shall also note that list of standards presented in this specification is not complete. Whenever necessary the list standards shall be considered in conjunction with specific IS/IEC. When the specified requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

Other internationally accepted standards which ensure equivalent or better performance than specified in the standards referred under section shall also be acceptable.

In case governing standards for the equivalent for the equipment is different from IS/ IEC, the salient points of difference shall be clearly brought out in additional information schedule along with English language version of standard of relevant extract of the same. The equipment conforming to standards other than IS/ IEC shall be subject to Purchaser's approval.

In addition to codes and standards specifically mentioned in the relevant technical specifications also refer Annexure G3.

The full names of the codes and standards mentioned in abbreviations under various equipment heads are as follows:

BS	British Standards
IEC/ CISPR	International Electro-technical Commission
IS	Bureau of Indian Standards



ISO International Organization for Standards
 NEMA National Electric Manufacturers Association

3.3 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

The 400 kV systems is being designed to limit the power frequency over voltage of 1.5 p.u. and the switching surge over voltage to 2.5 p.u. In 400 kV system the initial value of temporary over voltage could be 2.0 p.u. for 1-2 cycles. All the equipment/materials covered in this specification shall perform all its function satisfactorily without undue strain, restriking etc. under such over voltage conditions. All equipment shall also perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation. All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (not applicable for this project) short circuit etc for the equipment .

The equipment shall also comply with the following:

- a) All equipments shall be suitable for hot line washing.
- b) To facilitate erection of equipment, all items to be assembled at site shall be "match marked".
- c) Piping, if any, between equipment control cabinet or operating mechanism to marshalling box of the equipment shall bear proper identification to facilitate the connection at site.
- d) All equipment shall be supplied with necessary inter-pole cabling, and its cost shall be included in the cost of equipment.

3.4 ENGINEERING DATA

3.4.1 Drawings

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

Each drawing submitted by the Contractor (including those of sub-vendors) shall bear a title block at the right hand bottom corner with clear mention of the name of the Employer, the system designation, the specifications title, the specification number, the name of the Project, drawing number and revisions. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

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

The review of these data by the purchaser will cover only general conformance of the data to the specification and documents, interfaces with the equipment provided under specification, external connections and of the dimensions which might affect substation layout. This review by the purchaser may not indicate a thorough review of the dimensions, quantities and details of the equipment, material, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the purchaser shall not be considered by the contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.



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

All engineering data submitted by the contractor after final process including review and approval by the purchaser shall form part of the contract document and the entire work performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the purchaser in writing.

3.4.2 Approval Procedure

The following procedure for submission and review/approval of the drawings, data, reports, information, etc. shall be followed by Contractor:

- a. All data/information furnished by Vendor in the form of drawings, documents, Catalogues or in any other form for NTPC's information/interface and/or review and approval are referred by the general term "drawings".
- b. The 'Master drawings list' shall be submitted for review and approval of Employer before award of contract. The Contractor shall have to prepare and submit any other drawings and reference documents in addition to the drawings contained in the list, if so required during engineering stage as felt necessary by the Employer. Number of copies of the list for the distribution shall be as mutually agreed between Contractor and Employer.
- c. All drawings (including those of sub vendors') shall bear at the right hand bottom corner the 'title block' with all relevant information duly filled in. The format of title block shall approved by Engineer within thirty (30) days after the letter of award. The Contractor shall give this format to his sub vendor along with his purchase order for sub vendor's compliance. The size of title block basic format and its contents shall not be changed. All drawings shall be in English language. All dimensions shall be in metric units.
- d. Contractor shall submit all the drawings in five (5) copies for review of Employer. Employer shall forward their comments within four (4) weeks of receipt of drawings.
- e. Upon review of each drawings, depending on the correctness and completeness of the drawings, the same will be categorised and approval accorded in one of the following categories:

CATEGORY I	Approved
CATEGORY II	Approved subject to incorporation of comments/modification as noted. Resubmit revised drawing incorporating the comments
CATEGORY III	Not approved. Resubmit revised drawings for Approval after incorporating comments/modifications as noted
CATEGORY IV	For information and records

- f. Contractor shall resubmit the drawings approved under Category II and III within one (1) week of receipt of comments on the drawings, incorporating all comments. Every revision of the drawing shall bear a revision index wherein such revisions shall be highlighted in the form of description or marked up in the drawing identifying the same with relevant revision number enclosed in a triangle (e.g 1.2.3. etc.)
- g. In case Contractor does not agree with any specific comment, he shall furnish the explanation for the same to Employer consideration. In all such cases Contractor shall necessarily enclose explanations along with the revised drawing (taking care of balance comments) to avoid any delay and/or duplication in review work.
- h. It is the responsibility of the Contractor to get all the drawings approved in the Category I or IV (as the case may be) and complete engineering activities within the agreed schedule. Any delay



arising out of submission and modification of drawings shall not alter the contract completion schedule.

- i. Contractor shall not make any changes in the portion of the drawing other than those commented. If changes are required to be made in the portions already approved, the Contractor shall resubmit the drawings identifying the changes (along with reasons for changes) for Employer's review and approval. **Drawings resubmitted shall show clearly the portions where the same are revised marking the relevant revision numbers and Employer shall review only such revised portion of documents.**
- j. Approval of drawings will not in any way relieve the Contractor of his obligations of furnishing the equipment in accordance with the specification and shall not prevent subsequent rejection if such equipment is later found to be defective.
- k. The drawing approval progress report shall be submitted in at least three (3) copies within one (1) week from the last date of the every month.

3.4.3 Erection Drawings.

- a. Contractor shall furnish erection drawings for the guidance or commencement of erection or the first shipment, whichever is earlier. These shall generally comprise of fabrication/assembly drawings, various component/part details drawing, assembly, clearance data requirements, etc. The drawings shall contain details of components/ equipment with identification number, match marks, bill of materials, assembly procedures etc.
- b. For all major equipment apart from above details, assembly sequence and instructions with check-lists shall be furnished in the form of erection manuals.

3.4.4 Instruction Manual

- a. The Contractor shall submit to the Employer preliminary instruction manuals for all the equipments for review. The final instructions manuals incorporating Employer's comments and complete in all respect shall be submitted at least sixty (60) days before the first shipment of the equipment. The instruction manuals shall contain full details and drawings of all the equipments, the transportation, storage, installation, testing, operation and maintenance procedures, etc. separately for each component/equipment along with log record format. These instruction manuals shall be submitted in five (5) copies for approval.
- b. If after commissioning and initial operation of the plant, the instruction manuals require any modifications/additions/changes, the same shall being corporate and the updated final instruction manuals shall be submitted.
- c. The operating and maintenance instructions together with drawings (other than shop drawings) of the equipment, as completed, shall have sufficient details to enable the Employer to maintain, dismantle, reassemble and adjust all parts of the equipment. They shall give a step by step procedure for all operations likely to be carried out during the life of the plant/equipment, including erection, testing, commissioning, operation, maintenance dismantling and repair. Each manual shall also include a complete set of approved drawings together with performance/rating curves of the equipment and test certificates, wherever applicable. The contract shall not be considered completed for purpose of taking over until such instructions and drawings have been supplied to the Employer.
- d. A separate section of the manual shall be for each size/type of equipment and shall contain a detailed description of construction and operation, together will all relevant pamphlets.
- e. The manuals shall include the following
 - a) List of spare parts along with their drawing and catalogues and procedure for ordering spares.
 - b) Lubrication Schedule including charts showing lubrication checking, testing and replacement procedure to be carried daily, weekly, monthly & at longer intervals to ensure trouble free operation.



- f. Where applicable, fault location charts shall be included to facilitate finding the cause of mal-operation or break down.
- g. A collection of the manufacturer's standard leaflets will not accepted to be taken as a compliance of this clause. The manual shall be specifically compiled for the concerned project.

3.4.5 Final Submission of drawings and documents:

The Contractor shall furnish the following after approval of all drawings /documents and test reports:

- a. List of drawings bearing the Employer's and Contractor's drawing number.
- b. Two (2) bound sets alongwith 4 CD-ROMs of all drawing.
- c. All documents/designs in two (2) copies as noted above.
- d. Contractor shall also furnish two (2) bound sets of all as-built drawings including the list of all as-built drawings bearing drawing numbers. The Contractor shall also furnish one (1) sets of film reproducibles or CD-ROMs of all as-built drawings as decided by the Employer.
- e. The Contractor shall also furnish three (3) copies of instruction manuals (after approval) for all the equipments.

3.5 TEST REPORTS

Two (2) copies of all test reports shall be supplied for approval before shipment of Equipment. The report shall indicate clearly the standard value specified for each test to facilitate checking of the reports. After final approval seven bound copies of all type and routine test reports shall be submitted to Employer.

3.6 MATERIAL /WORKMANSHIP

Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended and shall ensure satisfactory performance throughout the service life.

In case where the equipment, materials or components are indicated in the specification as "similar" to any special standard the purchaser shall decide upon the question of similarity. When required by the specification or when required by the purchaser the contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it being understood that the cost as well as the time delay associated with the rejection shall be borne by the Contractor.

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

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



The equipment offered in the bid only shall be accepted for supply, with the minimum modifications as agreed/accepted.

3.7 LIMIT OF CONTRACT

All the equipment, materials and services furnished by the manufacturer shall be complete in every respect with all mountings, fitting, fixtures and standard accessories normally provided with such equipment, and needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in technical specification and unless included in the list of exclusions. The manufacturer shall supply at no extra cost to Employer any additional material/service not covered specifically but which are found to be required for fulfillment of the scope of work under specification.

3.8 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Degree of Protection

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

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

The degree of protection shall be in accordance with IS: 13947 (Part –I) / IEC-947 (Part-I) / IS 12063/IEC 529. Type test report for degree of protection test, on each type of the box shall be submitted for approval.

3.9 RATING PLATES, NAME PLATES AND LABELS

- 3.9.1 Each equipment shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the Employer.
- 3.9.2 The equipment nameplate should preferably be of stainless steel. In case of aluminium, it should be at least 2mm thick. The inscription on the nameplate shall be engraved and no punching shall be accepted except for equipment serial number and year of manufacture. These nameplates shall be black with white engraved lettering.
- 3.9.3 The rated current, extended current rating and rated thermal current shall be clearly indicated in the name plate in case of current transformer.
- 3.9.4 Rated voltage, voltage factor and intermediate voltage shall be clearly indicated on the nameplate in case of capacitor voltage transformer.
- 3.9.5 Name plates of cubicles and panels may be made of non-rusting metal or 3 ply lamicoid.
- 3.9.6 Each switch shall a clear inscription identifying its function. Switches shall also have a clear inscription of each position indication.
- 3.9.7 All such plates, instruction plates, etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.



3.10 GALVANISING:

- 3.10.1 The galvanised surface shall consist of a continuous film adhering to the steel. The finished surface shall be clean and smooth, and shall be free from defects like dissolved patches, base, spot, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surfaces, flaking or peeling off, etc. The presence of any of these defects shall render the material liable to rejection.
- 3.10.2 All exposed ferrous parts shall be hot dip galvanised as per IS: 2629 & IS: 2633, Galvanising shall be uniform, smooth continuous and free from acid spots. Should the galvanising of the sample be found defective, the entire batch of steel shall have to be re-galvanised at Contractor's cost. The amount of zinc deposit shall be not less than 610 gms. per sq.m. of surface area and in addition, the thickness of zinc at any spot shall not be less than 85 microns. The Employer reserves the right to measure the thickness of zinc deposit by Elkometer or any other instrument acceptable to Employer and reject any component which shows thickness of zinc at any location less than 85 microns. The testing on the galvanised materials shall be carried out as per IS: 2633.
- 3.10.3 The amount of zinc deposit over threaded portion of the bolts, nuts and screws shall not be less than 300 gms. per sq. meter of surface area. The amount of zinc deposit on washers shall not be less than 340 gms. per sq. meter of surface area. The threads having extra deposit of zinc shall be removed by die cutting after the completion of galvanising. The removal of extra zinc shall be carefully done so that threads shall have minimum deposits of zinc on them as specified.

3.11 PAINTING

The sheet steel to be painted shall be pre-treated in tanks in accordance with IS: 6005. Degreasing shall be done by alkaline cleaning. Rust and scales shall be removed by pickling with acid. After pickling, the parts shall be washed in running water. Then these shall be rinsed in slightly alkaline hot water and dried. The phosphate coating shall be "class-C" as specified in IS: 6005. The phosphated surfaces shall be rinsed and passivated prior to application of stoved lead oxide primer coating. After primer application, two coats of finishing synthetic enamel paint on panels shall be applied. Electrostatic painting shall also be acceptable. Finishing paint on outside of the panels shall be as required otherwise by the Employer. The inside of the panels shall be glossy white. Each coat of finishing shall be properly stoved. The paint thickness shall not be less than 50 microns. Finished parts shall be coated by peelable compound by spraying method to protect the finished surfaces from scratches, grease, dirt and oil spots during testing, transportation, handling and erection.

3.12 QUALITY ASSURANCE PROGRAMME

- 3.12.1 The Contractor shall adopt suitable quality assurance programme to ensure that the equipment and services under the scope of contract whether manufactured or performed within the Contractor's works or at his subcontractor's premises or at the Employer's site or at any other place of work are in accordance with the specifications. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Employer/authorised representative after discussions before the award of the contract. The QA programme shall be generally in line with ISO-9001/IS- 14001.

A quality assurance programme of the contractor shall generally cover the following:

- i. His organisation structure for the management and implementation of the proposed quality assurance programme
- ii. Quality System Manual
- iii. Design Control System
- iv. Documentation Data Control System
- v. Qualification data for Bidder's key Personnel.



- vi. The procedure for purchase of materials, parts, components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- vii. System for shop manufacturing and site erection controls including process, fabrication and assembly.
- viii. Control of non-conforming items and system for corrective actions and resolution of deviations.
- ix. Inspection and test procedure both for manufacture and field activities.
- x. Control of calibration and testing of measuring testing equipments.
- xi. System for Quality Audits.
- xii. System for identification and appraisal of inspection status.
- xiii. System for authorising release of manufactured product to the Employer.
- xiv. System for handling storage and delivery.
- xv. System for maintenance of records, and
- xvi. Furnishing quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component'

3.13 GENERAL REQUIREMENTS - QUALITY ASSURANCE

- 3.13.1 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive programme as it is the contractor's responsibility to draw up and implement such programme duly approved by the Employer. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder and will be submitted to Employer for approval. Schedule of finalisation of such quality plans will be finalised before award.
- 3.13.2 Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's/ Sub-contractor's/ sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing. The Quality Plan shall be submitted on electronic media e.g. floppy or E-mail in addition to hard copy, for review. Once the same is finalised, hard copies shall be submitted for approval. After approval the same shall be submitted in compiled form on CD ROM.
- 3.13.3 Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control Organisation, during various stages of site activities starting from receipt of materials/equipment at site.
- 3.13.4 The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality Plans and reference documents/standards etc. will be subject to Employer's approval without which manufacturer shall not proceed.
- 3.13.5 These approved documents shall form a part of the contract. In these approved Quality Plans, Employer shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the Employer's Project Manager or his authorised representative and beyond which

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CLIENT: NATIONAL THERMAL POWER CORPORATION (NTPC)
 PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
 TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

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the work will not proceed without consent of Employer/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Employer along with technical justification for approval and dispositioning.

- 3.13.6 No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Employer's Project Manager/Authorised representative and duly authorised for despatch by issuance of MDCC.
- 3.13.7 All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties, chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details.
- 3.13.8 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the Employer.
- 3.13.9 All welding/brazing procedures shall be submitted to the Employer or its authorised representative for approval prior to carrying out the welding/brazing.
- 3.13.10 All brazers, welders and welding operators employed on any part of the contract either in Contractor's/his sub-contractor's works or at site or elsewhere shall be qualified as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the Employer.
- 3.13.11 Test results or qualification tests and specimen testing shall be furnished to the Employer for approval. However, where required by the Employer, tests shall be conducted in presence of Employer/authorised representative.
- 3.13.12 For all pressure parts and high pressure piping welding, the latest applicable requirements of the IBR (Indian Boiler Regulations) shall also be essentially complied with. Similarly, any other statutory requirements for the equipments/systems shall also be complied with. On all back-gauged welds MPI/LPI shall be carried before seal welding.
- 3.13.13 All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.
- 3.13.14 No welding shall be carried out on cast iron components for repair.
- 3.13.15 Unless otherwise proven and specifically agreed with the Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
- 3.13.16 All non-destructive examination shall be performed in accordance with written procedures as per International Standards. The NDT operator shall be qualified as per SNT-TC-IA (of the American Society of non-destructive examination). NDT shall be recorded in a report which includes details of methods and equipment used, result/evaluation, job data and identification of personnel employed and details of co-relation of the test report with the job.

In general all plates of thickness greater than 40mm & for pressure parts plates of thickness equal



to or greater than 25mm shall be ultrasonically tested otherwise as specified in respective equipment specification. All bar stock/Forging of diameter equal to or greater than 50mm shall be ultrasonically tested.

The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the subcontractor proposed by the Contractor for procurement of major bought out items including castings, forging, semi-finished and finished components/equipment etc., list of which shall be drawn up by the Contractor and finalised with the Employer, shall be subject to Employer's approval. The contractor's proposal shall include vendor's facilities established at the respective works, the process capability, process stabilization, QC systems followed, experience list, etc. along with his own technical evaluation for identified subcontractors enclosed and shall be submitted to the Employer for approval within the period agreed at the time of pre-awards discussion and identified in "DR" category prior to any procurement. Such vendor approval shall not relieve the contractor from any obligation, duty or responsibility under the contract.

- 3.13.17 For components/equipment procured by the contractors for the purpose of the contract, after obtaining the written approval of the Employer, the contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the subcontractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc.
- 3.13.18 Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub vendor's quality management and control activities. The contractor shall provide all necessary assistance to enable the Employer carry out such audit and surveillance.
- 3.13.19 The contractor shall carry out an inspection and testing programme during manufacture in his work and that of his sub-contractors and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. Contractor shall carry out all tests/inspection required to establish that the items/equipments conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan.
- 3.13.20 Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Employer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.
- 3.13.21 For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.
- 3.13.22 Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Employer/ authorised representative.



3.14 QUALITY ASSURANCE DOCUMENTS

The Contractor shall be required to submit two hard copies and two sets on CDROM of the following Quality Assurance Documents as identified in respective quality plan with tick () mark.

Each QA Documentation shall have a project specific Cover Sheet bearing name & identification number of equipment and including an index of its contents with page control on each document.

The QA Documentation file shall be progressively completed by the Supplier's sub-supplier to allow regular reviews by all parties during the manufacturing.

The final quality document will be compiled and issued at the final assembly place of equipment before dispatch. However CD-Rom may be issued not later than three weeks.

3.14.1 Typical contents of Quality Assurance Document are as below:-

- i) Quality Plan,
- ii) Material mill test reports on components as specified by the specification and approved Quality Plans.
- iii) Manufacturer / works test reports/results for testing required as per applicable codes and standard referred in the specification and approved Quality Plans.
- iv) Type test report (wherever applicable).
- v) Non-destructive examination results /reports including radiography interpretation reports. Sketches/drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- vi) Heat Treatment Certificate/Record (Time- temperature Chart)
- vii) All the accepted Non-conformance Reports (Major/Minor) / deviation, including complete technical details / repair procedure). CHP / Inspection reports duly signed by the Inspector of the Employer and Contractor for the agreed Customer Hold Points.
- viii) Certificate of Conformance (COC) whoever applicable.
- ix) MDCC

3.14.2 Similarly, the contractor shall be required to submit two hard copies and two sets on CD ROM of Quality Assurance Documents (in line with above) pertaining to field activities as per Approved Field Quality Plans and other agreed manuals/ procedures, prior to commissioning of individual system.

3.14.3 Before dispatch/ commissioning of any equipment, the Supplier shall make sure that the corresponding quality document or in the case of protracted phased deliveries, the applicable section of the quality document file is completed. The supplier will then notify the Inspector regarding the readiness of the quality document (or applicable section) for review.

- i) If the result of the review carried out by the Inspector of the Quality document (or applicable section) is satisfactory. The Inspector shall stamp the quality document (or applicable section) for release.
- ii) If the quality document is unsatisfactory, the Supplier shall endeavour to correct the incompleteness, thus allowing finalizing the quality document (or applicable section) by time compatible with the requirements as per contract documents. When it is done, the quality document (or applicable section) is stamped by the Inspector.



iii) If a decision is made for dispatch, whereas all outstanding actions cannot be readily cleared for the release of the quality document by that time, the supplier shall immediately, upon shipment of the equipment, send a copy of the quality document Review Status signed by the Supplier Representative to the Inspector and notify of the committed date for the completion of all outstanding actions & submission. The Inspector shall stamp the quality document for applicable section when it is effectively completed. The submission of QA documentation package shall not be later than 3 weeks after the dispatch of equipment.

3.15 TRANSMISSION OF QUALITY DOCUMENTS

As a general rule, two hard copies of the quality document and Two CD ROMs shall be issued to the Employer not later than 1 month after the delivery date for the corresponding equipment. One set of quality document shall be forwarded to Corporate Quality Assurance Department and other set to respective Site.

For the particular case of phased deliveries, the complete quality document to the Employer shall be issued not later than 1 month after the date of the last delivery similarly as stated above.

3.16 INSPECTION, TESTING & INSPECTION CERTIFICATE

- 3.16.1 The word 'Inspector' shall mean the Project Manager and/or his authorised representative and/or an outside inspection agency acting on behalf of the Employer to inspect and examine the materials and workmanship of the works during its manufacture or erection.
- 3.16.2 The Project Manager or his duly authorised representative and/or an outside inspection agency acting on behalf of the Employer shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Project Manager and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.
- 3.16.3 The Contractor shall give the Project Manager/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.
- 3.16.4 The Project Manager or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall inform in writing to the Project Manager/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.
- 3.16.5 When the factory tests have been completed at the Contractor's or subcontractor's works, the Project Manager /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Project Manager /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Project Manager /Inspector. Project Manager /Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of



- these tests or the issue of the certificates shall not bind the Employer to accept the equipment should it, on further tests after erection be found not to comply with the contract.
- 3.16.6 In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, material, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Project Manager /Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the Project Manager/Inspector or to his authorised representative to accomplish testing.
- 3.16.7 The inspection by Project Manager / Inspector and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the contract.
- 3.16.8 To facilitate advance planning of inspection in addition to giving inspection notice, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at Customer Hold Point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.
- 3.16.9 All inspection, measuring and test equipments used by contractor shall be calibrated periodically depending on its use and criticality of the test/measurement to be done. The Contractor shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by NTPC. Wherever asked specifically, the contractor shall re-calibrate the measuring/test equipments in the presence of Project Manager / Inspector.

3.17 PACKAGING & TRANSPORTATION

3.17.1 Packing, Marking and shipping

The packing and shipping shall be carried out in accordance with the standard practice of Contractor and with the following additional requirements:

- a) The equipment shall be prepared in such a manner as to protect the equipment from damage or deterioration during shipping or storage. The shipments can be exposed to heavy rains, hot sun, high humidity and sudden extreme changes of temperature. The equipment shall be packed and shipped so as to protect it from all such conditions and any other abnormal conditions, generally expected during shipping & storage.
- b) The metallic containers, if any, shall be considered as the property of the Contractor and he will be allowed to remove them from site once the contents are unpacked, inspected, documented and placed in temporary storage or in final position.
- c) The equipment shall be shipped in such a manner as to facilitate unloading, handling and storage enroute and at the site. The Contractor shall provide lifting lugs and special lifting devices for proper handling and erection.
- d) The Contractor shall be liable for any damage or loss resulting due to careless, improper, poor or insufficient packing and handling.
- e) Spare parts and spare equipment shall be packed separately in containers adequate for long term storage, plainly marked "Spare Parts Only". They shall be crated individually or in kits to be used in one single renewal or overhaul operation. Other spare part kits shall not be disturbed when using one set or kit.
- f) The Contractor shall at all times protect and preserve from damage, loss, corrosion and all other forms of damage, all parts of the works.



3.17.2 Transportation

- a) The Contractor shall make a careful examination of access rail/roadways to the site in order to confirm the practical maximum transport weight and dimensions as well as a careful examination of the ports of disembarkation particularly with respect to the capacity of the cranes installed and access roads.
- b) All instruments and computer/microprocessor based equipment imported into India from overseas for the purpose of this contract shall be air freighted to the nearest possible point and further by rail/road taking due precautions as per manufacturer's recommendations. Employer shall have the right to decide the items that should be air freighted and Employer's decision shall be binding on Contractor.

3.17.3 Insurance

- a) The Contractor shall insure all shipments and works at his own expense for not less than the full replacement cost plus any additional cost for accelerated manufacturing of the replacement parts.
- b) Loss or the damage to equipment during shipping or transportation to the site(s) or otherwise shall not constitute groups for claims for extension in time or for extra payment.

3.18 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES & MARSHALLING BOXES FOR OUTDOOR EQUIPMENT.

- 3.18.1 All types of control cabinets, junction boxes, marshaling boxes, lighting panels, terminal boxes, operating mechanism boxes, Kiosks etc. shall generally conform to IS:5039, IS:8623 and IEC:439 as applicable.
- 3.18.2 They shall be of painted sheet steel or aluminium. The thickness of sheet steel shall be 2mm cold rolled or 2.5mm hot rolled. The thickness of aluminium shall be 3mm and shall provide rigidity. Top of the boxes shall be sloped towards rear of the box. The paint shall be of grey RAL 9002 on the outside and glossy white inside. However, the junction and switch boxes shall be of hot dip galvanised sheet steel of 1.6mm thickness.
- 3.18.3 The cabinets/boxes/kiosks/panels shall be free standing or wall mounting or pedestal mounting type. They shall have hinged doors with padlocking arrangement. All doors, removable covers and plates shall be gasketed all around with neoprene gaskets.
- 3.18.4 The degree of protection of of all the outdoor boxes shall not be less than IP 55 as per IS 2147.
- 3.18.5 The cable entry shall be from bottom, for which removable gasketed cable gland plates shall be provided.
- 3.18.6 Suitable 240V, single phase, 50Hz ac heaters with thermostats controlled by switch and fuse shall be provided to maintain inside temperature 10deg. above the ambient.
- 3.18.7 The size of enclosure and the layout of equipment inside shall provide generous clearances. Each cabinet/box/kiosk/panel shall be provided with a 15A, 240V ac, 2 pole, 3 pin industrial grade receptacle with switch. For incoming supply, MCB of suitable rating shall be provided. Illumination of each compartment shall be with door operated incandescent lamp. All control switches shall be of rotary switch type.
- 3.18.8 Each cabinet/box/kiosk/panel shall be provided with two earthing pads to receive 75mmx12mm GS flat. The connection shall be bolted type with two bolts per pad. The hinged door shall be connected to body using flexible wire. The cabinets/boxes/kiosks/panels shall also be provided with danger plate, and internal wiring diagram pasted on inside of the door. The front label shall be on a 3mm thick plastic plate with white letters engraved on black background



3.19 CABLE GLANDS AND LUGS

- 3.19.1 Cable glands shall be Double compression type, tinned/Nicked plated (coating thickness not less than 20 microns in case of tin and 10 to 15 microns in case of nickel) brass cable glands for all power and control cables. They shall provide dust and weather proof terminations. They shall comprise of heavy duty brass casting, machine finished and tinned to avoid corrosion and oxidation. Rubber components used in cable glands shall be neoprene and off tested quality. Required number of packing glands to close unused openings in gland plates shall also be provided.
- 3.19.2 The cable glands shall be tested as per BS: 6121. The cable glands shall also be duly tested for dust proof and weather proof termination.
- 3.19.3 Cables lugs shall be tinned copper solder less crimping type conforming to IS: 8309 and 8394 suitable for aluminium or copper conductor (as applicable). The cable lugs shall suit the type of terminals provided. The cable lugs shall be of Dowell make or equivalent.

3.20 CONDUITS, PIPES AND ACCESSORIES

- 3.20.1 The bidder shall supply and install all rigid conduits, mild steel pipes, flexible conduits, hume pipes, etc. including all necessary sundry materials, such as tees, elbows, check nuts, bushing reduces, enlargers, wooden plugs, coupling caps, nipples, gland sealing fittings, pull boxes, etc.
- 3.20.2 Rigid conduits shall be flow-coat metal conduits of Nagarjuna Coated Tubes or equivalent make. The outer surface of the conduits shall be coated with hot-dip zinc and chromate conversion coatings. The inner surface shall have silicone epoxy ester coating for easy cable pulling. Mild steel pipes shall be hot-dip galvanised. All rigid conduits/ pipes shall be of a reputed make.
- 3.20.3 Flexible conduits shall be heat-resistant lead coated steel, water-leak, fire and rust proof, and be of PLICA make or equivalent.



SECTION 4 LIST OF DOCUMENTS

1.0 LIST OF TECHNICAL DATASHEETS

In this section Technical Datasheets (TDS) of various equipment/items and system drawings that are required to be generated is furnished herewith. List of datasheets/drawings and numbers to be accorded is also given below.

The list furnished here is tentative and additional documents may be required during detailed engineering.

S No.	Item Description
A	DATA SHEETS
1.	TDS for M.S Pipes & Fittings
2	TDS for Wrapping Coating
3.	TDS for Gate Valves
4.	TDS for Deluge valve
5.	TDS for Q.B. detector
6.	TDS for Y - Strainer
7.	TDS for Twisted Pair Control Cable
8.	TDS for Fire Detection items
9.	TDS for Pressure Gauge & Pressure Switch
10.	TDS for Solenoid Valve
11.	TDS for Limit Switch
B.	DRAWINGS
1.	P & I Diagram for HVWSS
2.	HVW Spray system of 315 MVA Transformer- Elevation & Side View (Sheet 1 of 2)
3.	HVW Spray system of 315 MVA Transformer- Isometric View (Sheet 2 of 2) (with hydraulic calc)
4.	LCPDV Drawing

883487/2022



CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC)
PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

TB-369-552-031N

Rev. 1

Page | 1

SECTION- 5

ENCLOSURES TO SPECIFICATION

SCHEDULES TO BE FILLED UP BY THE BIDDER

- | | |
|------------|--|
| Schedule 1 | Schedules of Deviations |
| Schedule 2 | Copy of Unpriced BOQ |
| Schedule 3 | Schedule of type test and special tests |
| Schedule 4 | Details of contact persons (technical & commercial) |
| Schedule 5 | Enclosures to Specification (Drawings) |

883487/2022



CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC)
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TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

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Page 2

SCHEDULE-1

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations / variations / exceptions from the specification:

Section	Clause No. / Page No.	Statement of deviation/ Variations/Exceptions
---------	-----------------------	---

- 1) In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract are deemed to be in compliance with the specification.
- 2) If there is NIL deviation, even then the format to be filled as **NIL DEVIATION**
- 3) Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

Place _____ Signature of the authorized representative of Bidder

Name -----

Date _____ Designation-----

Company seal-----

883487/2022



CLIENT - TBG-ENG-SR

NATIONAL THERMAL POWER CORPORATION (NTPC)
 PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
 TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

TB-369-552-031N

Rev. 1

Page | 3

SCHEDULE-2

Bidders shall attach signed and stamped **unpriced** copy of this BOQ with their technical offer:

Sl. No.	Item Description	Whether unit Rates have been furnished in priced bid?
1A	Supply of main items as per BOQ attached as Annexure-X to Section-1 of technical specification	YES
2.	Erection, Testing & commissioning of the firefighting system scope excluding Mandatory Spares	YES

Signature of the authorized representative of Bidder

Name : _____

Designation : _____

Place : _____

Date : _____

Company Seal



SCHEDULE-3
SCHEDULE OF TYPE TESTS AND SPECIAL TESTS

The following type tests and special tests as called for in the Specification shall be conducted (all type tests / special tests as mentioned in the relevant clauses of the Specification shall be listed here):

Sl no.	Clause no/ page no of Specification	Details of test	Lab in which to be conducted	Whether test to be conducted free or on chargeable basis. Mention 'FREE' or 'CHARGEABLE'	If charges per test have been quoted for in the price bid. YES / NO
		A. Type Tests			
		1.			
		2.			
		B. Routine Tests			DO NOT
		1.			MENTION
		2.			ANY PRICE
		C. Site Tests			IN THIS
		1.			COLUMN
		2.			
		D. Special Tests (specified)			
		1.			
		2.			
		E. Other tests at works / site recommended by the Bidder			
		1.			
		2.			

NOTE:

- 1) Details have to be furnished on cables as well as accessories, each separately.
- 2) **NO PRICE SHALL BE FURNISHED IN THIS FORMAT.**

Place

Signature of the authorized representative of Bidder

Name-----

Date

Designation-----

Company seal-----

883487/2022



CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC)
PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

TB-369-552-031N
Rev. 1
Page 5

SCHEDULE-4

DETAILS OF CONTACT PERSON BOTH TECHNICAL AND COMMERCIAL

Name

Address for correspondence

Phone No.

Fax No.

Email

Place

Signature of the authorized representative of Bidder

Date

Name-----

Designation-----

Company seal -----

Note: Continuation sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

883487/2022



CLIENT - NATIONAL THERMAL POWER CORPORATION (NTPC)
 PROJECT: 3X660 MW NORTH KARANPURA STPP- 400/220 KV SWITCHYARD
 TECHNICAL SPECIFICATION FOR FIREFIGHTING SYSTEM

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SCHEDULE -5

ENCLOSURES TO SPECIFICATION

DRAWINGS

1. PLAN LAYOUT OF 400/220 KV SWITCHYARD AT NKSTPP END.

DRG. NO. TB-0-369-318-002, REV-08

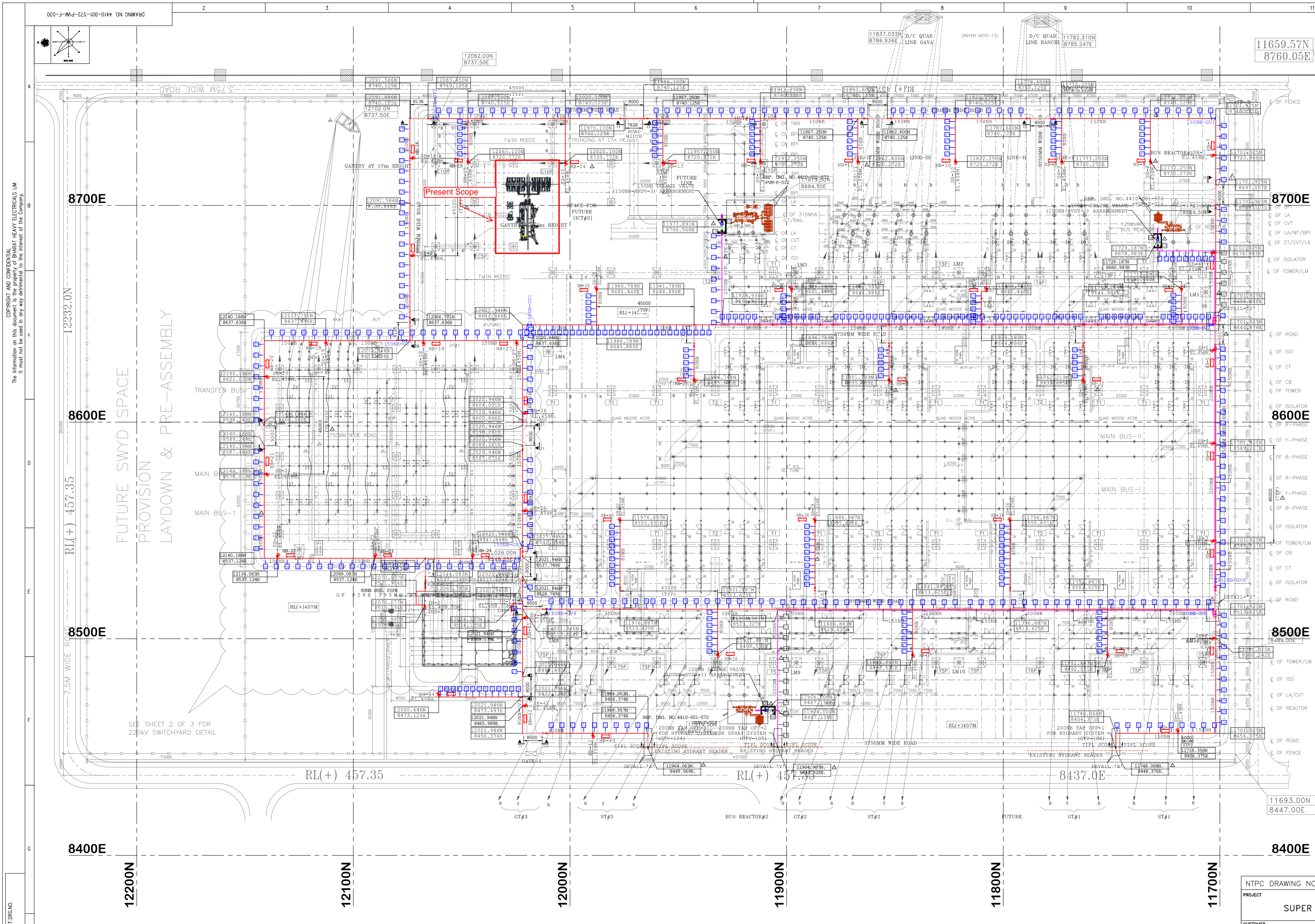
2. PIPING LAYOUT OF EXISTING FIRE PROTECTION SYSTEM

DRG. NO. 4410-001-572-PVM-F-030 REV.02

3. OGA OF 315 MVA TRANSFORMER

DRG. NO. 3 464 00 01800 REV.00

FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM



SR.No.	SYMBOL	DESCRIPTION
1	[Symbol]	HYDRANT HEADER PIPE (ABOVE GROUND)
2	[Symbol]	HYDRANT HEADER PIPE (UNDER GROUND)
3	[Symbol]	SPRAY HEADER PIPE (ABOVE GROUND)
4	[Symbol]	SPRAY HEADER PIPE (UNDER GROUND)
5	[Symbol]	GATE VALVE
6	[Symbol]	Y TYPE STRAINER
7	[Symbol]	DELUGE HWWS/MWS SYSTEM
8	[Symbol]	SINGLE HEADED EXTERNAL FIRE HYDRANT
9	[Symbol]	SINGLE HEADED INTERNAL FIRE HYDRANT
10	[Symbol]	EXTERNAL HOSE BOX
11	[Symbol]	INTERNAL HOSE BOX
12	[Symbol]	HUME PIPE
13	[Symbol]	LIMIT SWITCH
14	[Symbol]	PIPE SUPPORT

SL.NO.	ITEM	SIZE	QTY.
1	M.S. PIPE (ABOVE GROUND)	200NB	2.00M
		150NB	1334.00M
2	M.S. PIPE (UNDER GROUND)	200NB	238.00M
		150NB	174.00M
3	SINGLE HEADED EXTERNAL FIRE HYDRANT (SH-1 TO SH-2)	150NB	37.00M
		80NB	179.00M
4	SINGLE HEADED INTERNAL FIRE HYDRANT (IH-1 TO IH-2)	150NB	44.00M
		80NB	42.00M
5	HOSE BOX (EXTERNAL)	150NB	02.00M
		80NB	02.00M
6	RRL HOSE 15M. (EXTERNAL)	150NB	04.00M
		80NB	04.00M
7	BRANCH PIPE (EXTERNAL)	150NB	44.00M
		80NB	02.00M
8	BRANCH PIPE (INTERNAL)	150NB	08.00M
		80NB	02.00M
9	GATE VALVE	150NB	02.00M
		80NB	03.00M
10	WRAPPING & COATING		158SQ.M.

SL.NO.	ITEM	SIZE	QTY.
1	M.S. PIPE (ABOVE GROUND)	200NB	614.00M
		150NB	34.00M
2	M.S. PIPE (UNDER GROUND)	200NB	36.00M
		150NB	90.00M
3	HWWS SYSTEM DELUGE VALVE	150NB	01.00M
		80NB	02.00M
4	GATE VALVE	150NB	02.00M
		80NB	04.00M
5	Y TYPE STRAINER	150NB	01.00M
		80NB	02.00M
6	BUTTERFLY VALVE	150NB	01.00M
		80NB	02.00M
7	WRAPPING & COATING		63SQ.M.
8	LIMIT SWITCH		06NOS.

SL.NO.	SIZE OF HEADER PIPE (CLASS-80)	SIZE OF HUME PIPE (CLASS-80)	QTY. (Mtr.)
1.	250NB	450NB	22
2.	200NB	400NB	16
3.	150NB	300NB	12
4.	100NB	200NB	12
5.	80NB	150NB	62

SL.NO.	ITEM	TAG NO.	QTY.
1	AFTER SH-1 IN HYDRANT HEADER PIPE	150NB-GV1	
2	AFTER SH-8 IN HYDRANT HEADER PIPE	150NB-GV2	
3	BEFORE SH-12 IN HYDRANT HEADER PIPE	150NB-GV3	
4	BEFORE SH-15 IN HYDRANT HEADER PIPE	150NB-GV4	
5	AFTER SH-21 IN HYDRANT HEADER PIPE	150NB-GV5	
6	AFTER SH-23 IN HYDRANT HEADER PIPE	150NB-GV6	
7	AFTER SH-7 IN HYDRANT HEADER PIPE	150NB-GV7	
8	BEFORE SH-11 IN HYDRANT HEADER PIPE	150NB-GV8	
9	BEFORE SH-20 IN HYDRANT HEADER PIPE	100NB-GV1	02 NOS.
10	BEFORE SH-24 IN HYDRANT HEADER PIPE	100NB-GV2	
11	BEFORE IH-1 IN HYDRANT PIPE	80NB-GV1	
12	BEFORE IH-2 IN HYDRANT PIPE	80NB-GV2	
13	BEFORE SH-14 IN HYDRANT PIPE	80NB-GV3	

SL.NO.	ITEM	TAG NO.	QTY.
1	BEFORE HDV-3 FOR 315 MVA TRN.	150NB-GV1	
2	AFTER HDV-3 FOR 315 MVA TRN.	150NB-GV2	02 NOS.
3	BEFORE HDV-1 FOR 125 MVA TRN. NO.1	100NB-GV5	
4	AFTER HDV-1 FOR 125 MVA TRN. NO.1	100NB-GV6	
5	BEFORE HDV-2 FOR 125 MVA TRN. NO.2	100NB-GV7	04 NOS.
6	AFTER HDV-2 FOR 125 MVA TRN. NO.2	100NB-GV8	

SL.NO.	ITEM	TAG NO.	QTY.
1	150NB DV FOR 315 MVA TRN.	150NB-HVD-3	01 NO.
2	100NB DV FOR 125 MVA TRN. NO.1	100NB-HVD-1	02 NOS.
3	100NB DV FOR 125 MVA TRN. NO.2	100NB-HVD-2	

SL.NO.	ITEM	TAG NO.	QTY.
1	150NB Y STRAINER FOR 315 MVA TRN.	150NB-ST#3	01 NO.
2	100NB Y STRAINER FOR 125 MVA TRN. NO.1	100NB-ST#4	02 NOS.
3	100NB Y STRAINER FOR 125 MVA TRN. NO.2	100NB-ST#2	

SL.NO.	ITEM	TAG NO.	QTY.
1	150NB BUTTERFLY FOR 315 MVA TRN.	150NB-BFV-3	01 NO.
2	100NB Y STRAINER FOR 125 MVA TRN. NO.1	100NB-BFV-3	01 NO.
3	100NB Y STRAINER FOR 125 MVA TRN. NO.2	100NB-BFV-2	02 NOS.

SL. NO.	DRG. TITLE	NTPC DRG. NO.	REV.
1	LAYOUT PLAN & SECTION OF 400/220KV SWITCHYARD AT WEST END	4410-001-572-PVE-F-0013	REV-06
2	400/220 KV - CABLE TRENCH LAYOUT AT WEST END	4410-001-572-PVC-F-0054	REV-01
3	LAYOUT OF HYDRANT & SPRAY SYSTEM FOR TRANSFORMER YARD & BUILDING AREA-II	4410-001-151-PVM-P-001	REV-03

SL. NO.	DRG. TITLE	NTPC DRG. NO.	REV.
1	P & I DIAGRAM OF FIRE PROTECTION SYSTEM FOR 400/220 KV SWITCHYARD	4410-001-572-PVM-L-003A	
2	HYDRAULIC CALCULATION WITH NODAL DIAGRAM OF FIRE PROTECTION SYSTEM FOR 400/220 KV SWITCHYARD	4410-001-572-PVM-F-030 SH-3 OF 3	

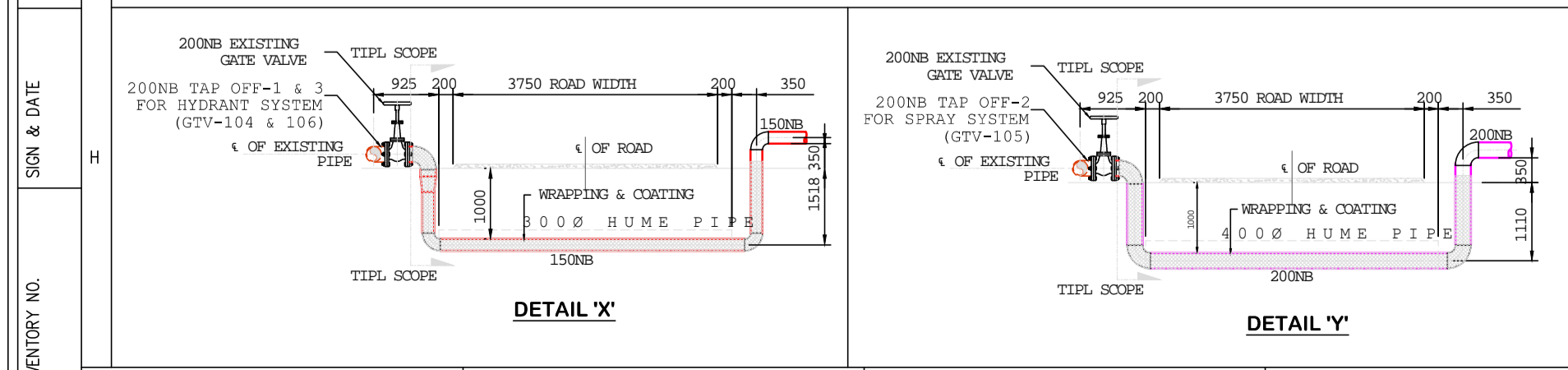
NTPC DRAWING NO. 4410-001-572-PVM-F-030
 PROJECT NORTH KARANPURA
 SUPER THERMAL POWER PROJECT (3X660MW)
 (400/220KV SWITCHYARD AREA)

CUSTOMER **NTPC Limited**
 (A GOVERNMENT OF INDIA ENTERPRISE)

DEPT.	TBM	SCALE	WEIGHT(Kg.)	REF. TO ASSY.DWG.	ITEM NO.	NO. OF ITEMS
		1:600				

TITLE: PIPING LAYOUT OF FIRE PROTECTION SYSTEM FOR 400/220 KV SWITCHYARD
 DRAWING NO. 02
 SHEET NO. 1 NO. OF SHEETS: 3

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 It must not be used in any way detrimental to the interest of the Company.



NOTES:-

- 1) THE HYDRANT SYSTEM HAS BEEN DESIGNED AS "ORDINARY HAZARD OCCUPANCY" AS TECHNICAL SPECIFICATION AND TAG MANUAL.
- 2) ALL DIMENSIONS ARE IN MM.
- 3) MINOR MODIFICATION SHALL BE DONE DURING ERECTION TO SUIT SITE CONDITION.
- 4) ALL PIPES & FITTINGS SHALL BE MS BLACK AS PER APPROVED DATA SHEET.
- 5) ALL UNDERGROUND PIPES FOR ROAD CROSSING SHALL BE COATED & WRAPPED WITH ANTICORROSION TAPS AND ABOVE GROUND PIPES SHALL BE PAINTED AS PER APPROVED DATA SHEET.
- 6) THE SPACING OF RCC SUPPORTS FOR PIPE SHALL BE AS PER CLAUSE No. 5.3 OF TAG MANUAL AND CONSTRUCTION OF THE SAME IS UNDER RHEL'S SCOPE.
- 7) SUPPLY AND LAYING OF HUME PIPE FOR UNDER GROUND PIPES SHALL BE RHEL'S SCOPE.
- 8) EL. 457.00M IS THE REFERENCE OF F.O.L. 0.00M.
- 9) ORIFICE PLATE SHALL BE PROVIDED WHERE EVER PRESSURE OF HYDRANT POINT EXCEED '70KGCM.

FIRST ANGLE PROJECTION										(ALL DIMENSIONS ARE IN mm)																																																																																																																					
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INVENTORY NO. 34640000980
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DRG. NO. 3 464 00 01800

DRG. NO. 3 464 00 01800
 SHEET 01 OF 07
 REV. 00

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

101 102 103 104 105 106 107 108 109 110

DRG. NO. 3 464 00 01800

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34640000980 REF.DRG.NO.

SIGN. DATE

INVENTORY NO.

CUSTOMER'S REFERENCE DRAWINGS

SL.NO.	TITLE	SHEET	DRAWING NO.
001	COVER SHEET, OGA, OGA PART LIST	SHT. 1 TO 7	3 464 00 01800
002	FOUNDATION PLAN	SHT. 1 TO 1	3 464 00 01801
003	HV, IV, LV, HVN BUSHING	SHT. 1 TO 4	3 464 00 01802
004	INTERNAL SKETCH	SHT. 1 TO 3	3 464 00 01803
005	RATING AND DIAGRAM PLATE	SHT. 1 TO 1	3 464 00 01804
006	OVER FLUXING CURVE	SHT. 1 TO 1	4 464 00 00157
007	320 DIA TWIN BIDIRECTIONAL ROLLER	SHT. 1 TO 1	3 464 00 01805
008	VALVE SCHEDULE PLATE	SHT. 1 TO 1	3 464 00 01806
009	LOADING GAUGE DIAGRAM	SHT. 1 TO 1	3 464 00 01807

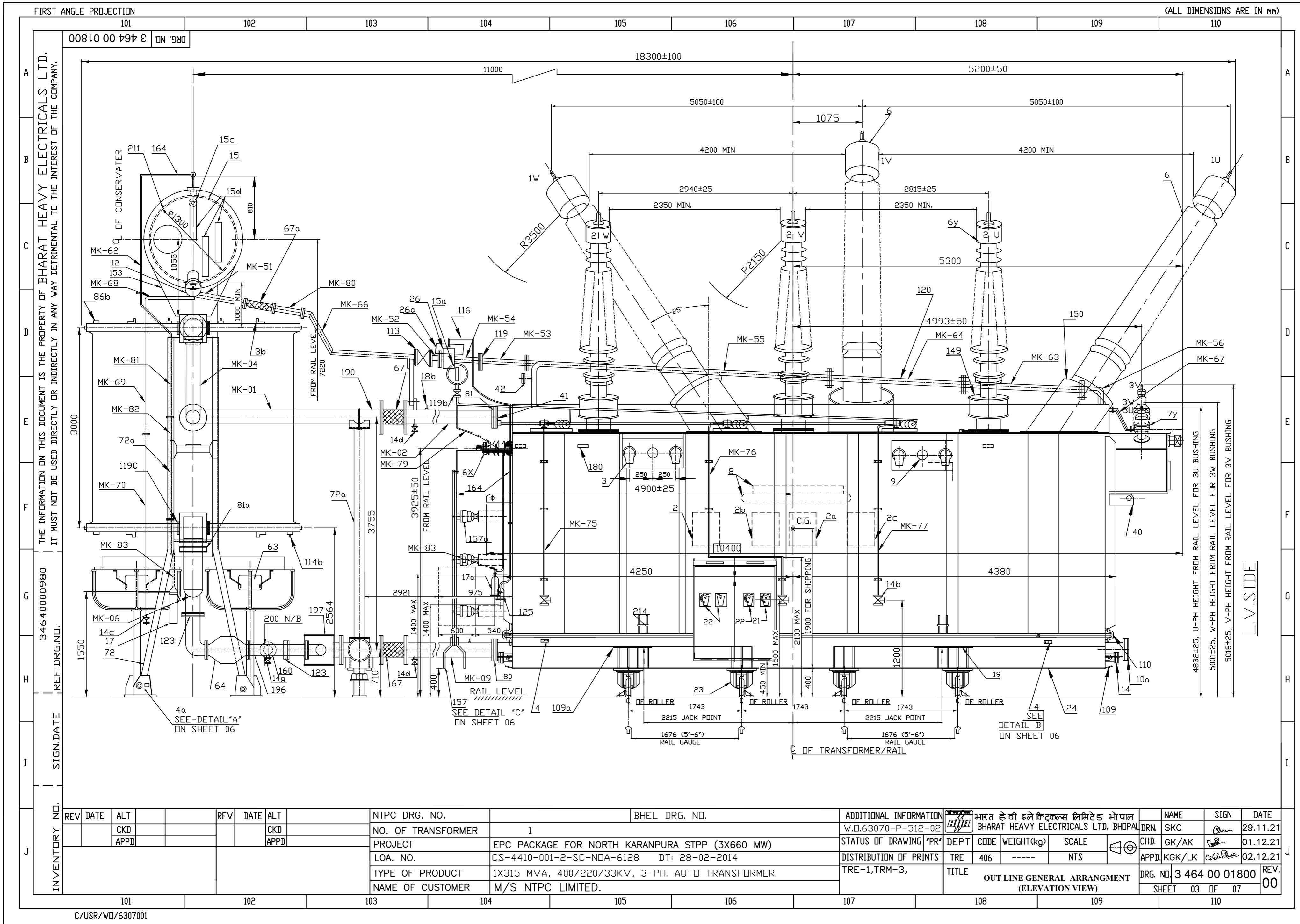
NOTES:-

1. THE DESIGN FEATURES SHOWN ON THIS DRAWING (GENERALLY IN LINE WITH I.S. 2026 & CUSTOMER SPECIFICATION) MEETS THE STATUTORY, REGULATORY & SAFETY REQUIREMENTS WITH RESPECT TO EARTHING ARRANGEMENT, DANGER AND OTHER LABELS, CLEARANCES IN AIR, PROVISION FOR PRESSURE RELIEF DEVICE, GAS & OIL ACTUATED RELAY AND ANTI EARTH QUAKE CLAMPING ARRGT.
2. ALL HEIGHTWISE DIMENSIONS ARE GIVEN FROM RAIL LEVEL.
3. WHEN REFERRING THE O.G.A. DRG. PLEASE QUOTE MVA & W.O. NO.
4. DIMENSIONS SHOWN THUS ARE OVERALL SHIPPING DIMENSION.
5. WIRING FROM INSTRUMENTS C.T.S ETC. NOT SHOWN FOR CLARITY.
6. JACK POINTS ARE FOR UNLOADING FROM WAGON.
7. FOR O.G.A. ELEVATION, PLAN, END VIEW & PART LIST REFER DRG. SHEETS 3, (4, 5), 6 & 7.
8. ALL VALVES ARE LOCATED IN SUCH A WAY THAT IT'S FUNCTIONAL (O&M) WILL NOT BE OBSTRUCTED BY RADIATOR PIPES ETC.
9. ALL BOLTS AND NUTS SHALL BE HOT DIP GALVANISED/SS.
10. SLOPE IS PROVIDED FOR TANK, M.BOX ETC. TO AVOID RAIN WATER ACCUMULATION.
11. ALL MAKES SHALL BE NTPC QA APPROVED.
12. ALL GASKETS (IN CONTACT WITH OIL) SHALL BE O-RING NITRILE RUBBER (AS PER TECHNICAL SPECIFICATION).
13. EARTHING LINK SHALL BE PROVIDED AT ALL NON ELECTICALLY CONNECTED JOINTS INCLUDING M.BOX, DM BOX, RADIATOR PIPES ETC.
14. OIL SHALL BE AS PER TECHNICAL SPECIFICATION.
15. PROVISION SHALL BE THERE FOR CONNECTING RADIATOR BANKS ON BOTH SIDE OF THE TANK, BUT NO CHANGE IN TERTIARY POCKET LOCATION.
16. OUTSIDE PAINT SHADE SHALL BE RAL 5012.

TABLE FOR WEIGHTS	
DESCRIPTION	APPROX. WEIGHTS IN KGS.
CORE AND WINDING	138000
TANK AND FITTINGS	31000
BUSHING	5700
COOLER CONTROL CABINET & WIRING	1300
RADIATOR BANK (INCLUDING CONSERVATORS, RADIATORS, HEADERS, HEADER SUPPORTS, PUMPS, FANS, FITTINGS & P/W ETC)	52000
OIL IN TRANSFORMER TANK & FITTING	74820
OIL IN RADIATOR BANK, CONSERVATORS & PIPE WORK	
TOTAL WEIGHT INCLUDING OIL	302820
SHIPPING WT. OF TRANSFORMER (N2 GAS FILLED)	192000
UNTANKING WEIGHT (UPPER TANK)	20000
APPROXIMATE OIL CAPACITIES	
OIL IN TANK INCLUDING TURRETS, BUSHING, RADIATOR BANK, CONSERVATORS & PIPE WORK	86000

HIGHEST VOLTAGE	AIR CLEARANCE (MIN) mm		
		LINE TO EARTH	LINE TO LINE
420 KV	H.V.	3500	4200
245 KV	I.V.	2150	2350
52 KV	L.V.	480	530
36 KV	H.V.N.	320	-

REV	DATE	ALT	REV	DATE	ALT	NTPC DRG. NO.	BHEL DRG. NO.	ADDITIONAL INFORMATION	NAME	SIGN	DATE
		CKD			CKD			W.D.63070-P-512-02	DRN. SKC		29.11.21
		APPD			APPD			STATUS OF DRAWING 'PR'	CHD. GK/AK		01.12.21
								DISTRIBUTION OF PRINTS	APPD. KGK/LK		02.12.21
								TRE-1, TRM-3,	DRG. NO. 3 464 00 01800		REV. 00
									OUT LINE GENERAL ARRANGMENT		
									SHEET 02 OF 07		



FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

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3464000980 REF.DRG.NO.
 SIGN. DATE
 INVENTORY NO.

DRG. NO. 3 464 00 01800

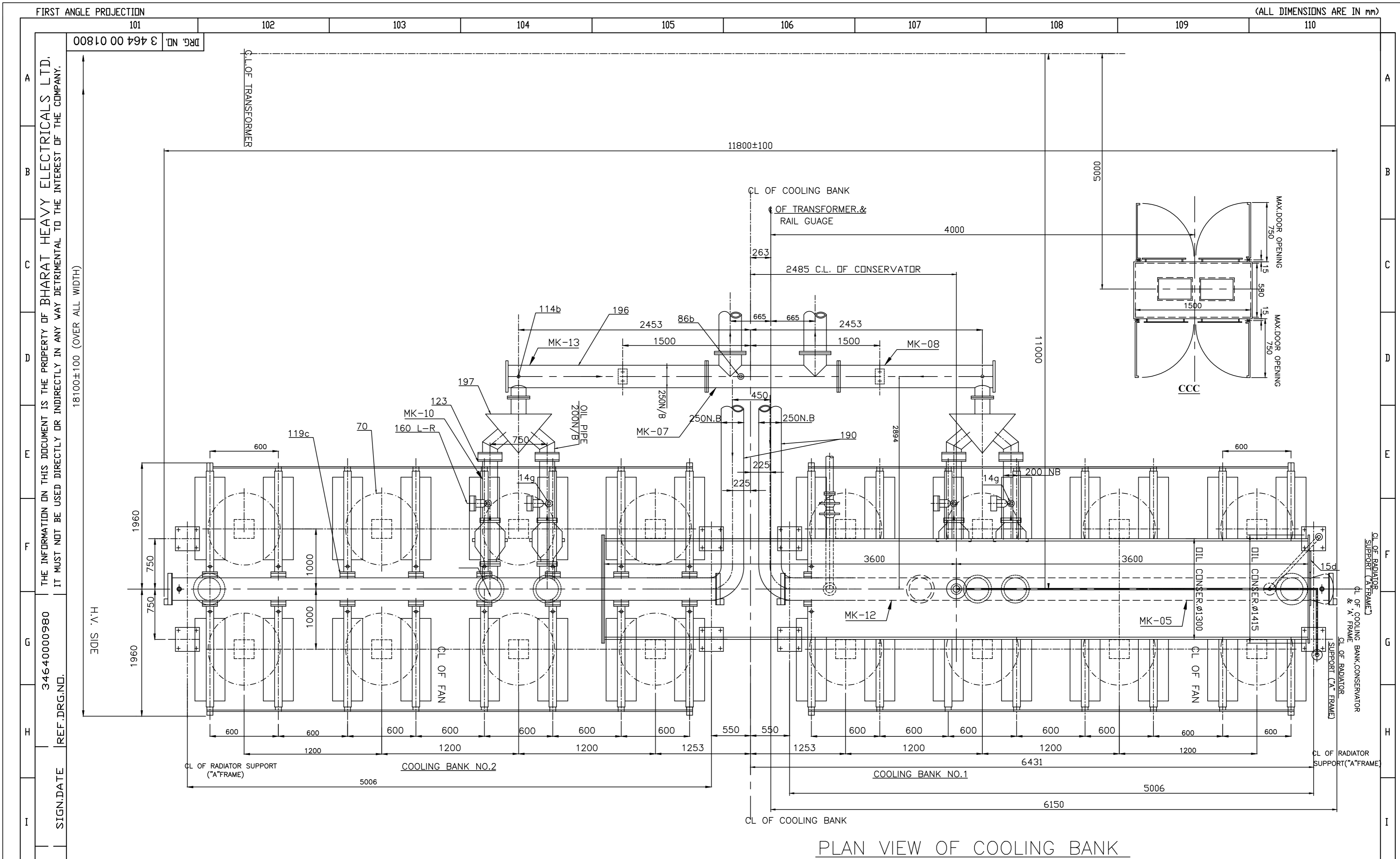
4a SEE-DETAIL "A" ON SHEET 06

157 SEE DETAIL "C" ON SHEET 06

4 SEE DETAIL-B ON SHEET 06

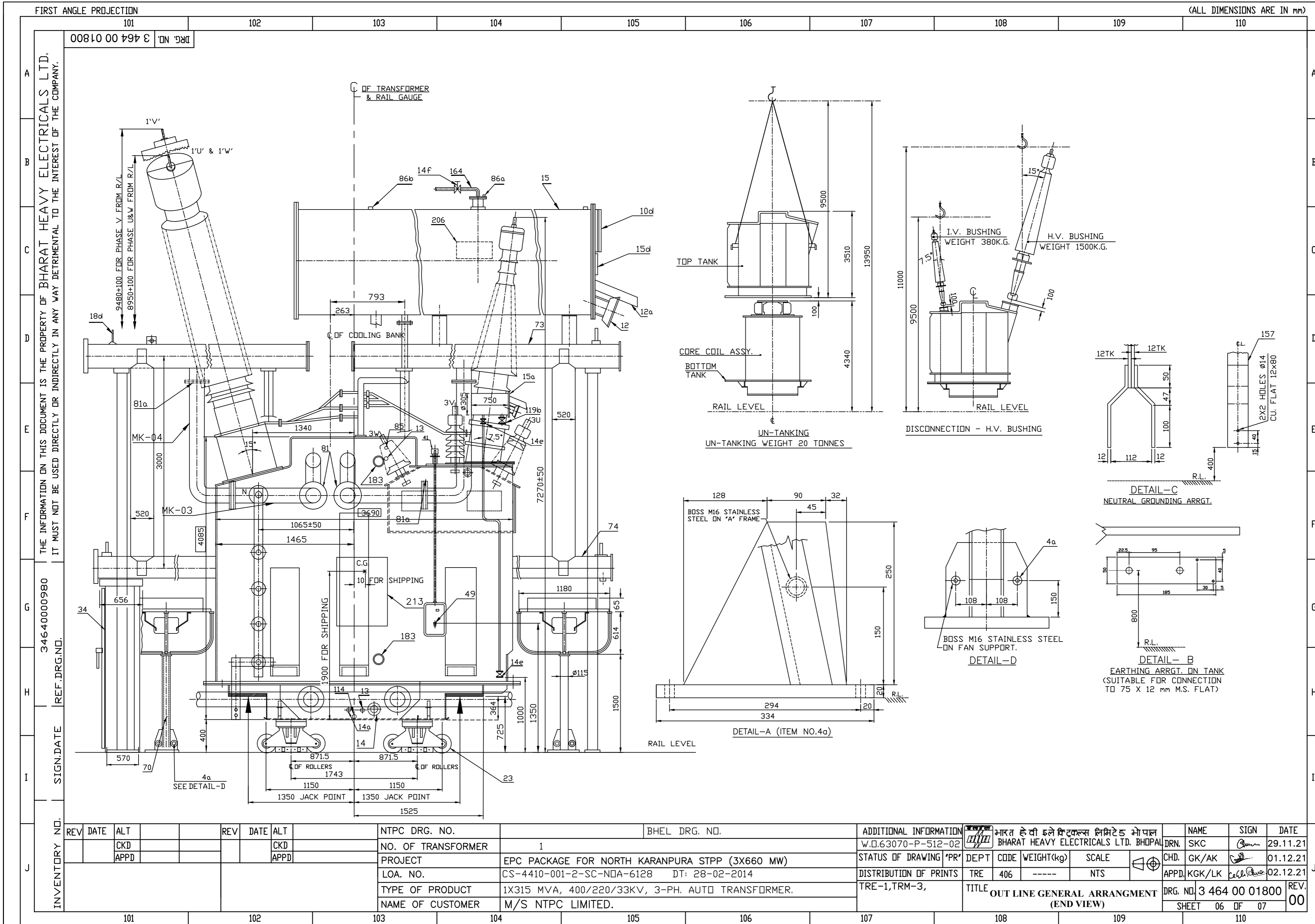
L.V. SIDE

REV	DATE	ALT	REV	DATE	ALT	NTPC DRG. NO.	BHEL DRG. NO.	ADDITIONAL INFORMATION	NAME	SIGN	DATE				
		CKD			CKD	NO. OF TRANSFORMER	1	W.D.63070-P-512-02	DRN.	SKC	29.11.21				
		APPD			APPD	PROJECT	EPC PACKAGE FOR NORTH KARANPURA STPP (3X660 MW)	STATUS OF DRAWING 'PR'	DEPT	CODE	WEIGHT(kg)	SCALE	CHD.	GK/AK	01.12.21
						LOA. NO.	CS-4410-001-2-SC-NDA-6128 DT: 28-02-2014	DISTRIBUTION OF PRINTS	TRE	406	-----	NTS	APPD.	KGK/LK	02.12.21
						TYPE OF PRODUCT	1X315 MVA, 400/220/33KV, 3-PH. AUTO TRANSFORMER.	TRE-1,TRM-3,	TITLE			DRG. NO.	3 464 00 01800	REV.	00
						NAME OF CUSTOMER	M/S NTPC LIMITED.	OUT LINE GENERAL ARRANGMENT (ELEVATION VIEW)			SHEET	03 OF 07			



PLAN VIEW OF COOLING BANK

INVENTORY NO.	REV	DATE	ALT	REV	DATE	ALT	NTPC DRG. NO.	BHEL DRG. NO.	ADDITIONAL INFORMATION	NAME	SIGN	DATE	
			CKD			CKD	NO. OF TRANSFORMER	1	W.D.63070-P-512-02	DRN.	SKC	29.11.21	
			APPD			APPD	PROJECT	EPC PACKAGE FOR NORTH KARANPURA STPP (3X660 MW)	STATUS OF DRAWING 'PR'	DEPT	CODE	WEIGHT(kg)	SCALE
							LOA. NO.	CS-4410-001-2-SC-NDA-6128 DT: 28-02-2014	DISTRIBUTION OF PRINTS	TRE	406	-----	NTS
						TYPE OF PRODUCT	1X315 MVA, 400/220/33KV, 3-PH. AUTO TRANSFORMER.	TRE-1,TRM-3,	TITLE			OUT LINE GENERAL ARRANGMENT	
						NAME OF CUSTOMER	M/S NTPC LIMITED.	TITLE			OUT LINE GENERAL ARRANGMENT		
									TITLE			PLAN VIEW OF COOLING BANK	
									TITLE			DRG. NO. 3 464 00 01800	
									TITLE			REV. 00	
									TITLE			SHEET 05 OF 07	



FIRST ANGLE PROJECTION

CALL DIMENSIONS ARE IN mm

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DRG. NO. 3 464 00 01800

INVENTORY NO. SIGN. DATE REF. DRG. NO. 34640000980

REV	DATE	ALT	REV	DATE	ALT	NTPC DRG. NO.	BHEL DRG. NO.	ADDITIONAL INFORMATION	भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल	NAME	SIGN	DATE
		CKD			CKD	NO. OF TRANSFORMER	1	W.D.63070-P-512-02	BHARAT HEAVY ELECTRICALS LTD. BHOPAL	DRN.	SKC	29.11.21
		APPD			APPD	PROJECT	EPC PACKAGE FOR NORTH KARANPURA STPP (3X660 MW)	STATUS OF DRAWING 'PR'	DEPT	CHD.	GK/AK	01.12.21
						LOA. NO.	CS-4410-001-2-SC-NDA-6128 DT: 28-02-2014	DISTRIBUTION OF PRINTS	TRE	APPD, KGK/LK	Cell	02.12.21
						TYPE OF PRODUCT	1X315 MVA, 400/220/33KV, 3-PH. AUTO TRANSFORMER.	TRE-1, TRM-3,	TITLE	DRG. NO.	3 464 00 01800	REV.
						NAME OF CUSTOMER	M/S NTPC LIMITED.		OUT LINE GENERAL ARRANGMENT (END VIEW)	SHEET	06 OF 07	00

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

00810 00 494 3 DRG. NO. 3 464 00 01800

TABLE OF FITTINGS

ITEM	DESCRIPTION	QTY.
2	RATING AND DIAGRAM PLATE (BILINGUAL)	1
2a	DO'S AND DON'T PLATE	1
2b	VALVE SCHEDULE PLATE	1
2c	OIL FILLING INSTRUCTION PLATE	1
3	LIFTING BOLLARD (FOR TRANSFORMER WITH OIL) Ø200	8
3a	LIFTING LUG FOR TANK (HOLE Ø70)	4
4	EARTHING TERMINALS WITH BOLTS,NUTS,PLAIN WASHERS SPRING WASHER (M10) DIAGONALLY OPPOSITE.	2
8	NAME PLATE (HINDI & ENGLISH) ONE EACH	2
9	INSTRUCTION PLATE FOR LIFTING	4
10	INSPECTION COVER ON TANK COVER/TANK WITH HANDLES.	11
10a	BLANKING PLATES (BOTTOM TANK) FOR BLANKING OF 250 NB PIPE FLANGE OPPOSITE TO COOLING BANK (NOT IN USE)	2
13	FILTER GATE VALVE WITH THREADED MALE ADAPTOR TOP AND BOTTOM 50 N.B.	2
14	DRAIN GATE VALVE FOR TOTAL DRAINAGE Ø100	1
14a	15NB SAMPLING GATE VALVE FOR BOTTOM TANK WITH PROVISION FOR FIXING RUBBER HOSE 10mm SIZE	1
18	POCKET FOR OIL TEMPERATURE INDICATOR & 1 SPARE POCKET	2
18a	POCKET FOR WINDING TEMPERATURE INDICATOR	3
18b	ORDINARY THERMOMETER WITH POCKET	1
18c	R.T.D. FOR REMOTE INDICATION	3
19	JACKING PADS (SUITABLE FOR TOTAL WT. WITH OIL)	4
21	OIL TEMP.INDICATOR (150mm DIAL TYPE) MOUNTED IN M.KIOSK	1
22	WINDING TEMPERATURE INDICATOR MOUNTED IN M.KIOSK	3
23	TWIN BI DIRECTIONAL ROLLERS Ø320 WITH ANTI-EARTHQUAKE CLAMP	8
24	SKIDS (FOR PULLING IN BOTH DIRECTION WELDED ON BOTTOM TANK BASE)	1
27	PRESSURE RELIEF VALVE AUTO RECLOSING TYPE WITH PROVISION FOR DISCHARGE OF OIL WITH PIPES	2
34	MARSHALLING KIOSK	1
40	WAGON ANCHORING LUGS (HOLE DIA 70)	4
50a	SUDDEN PRESUURE RELAY	1
50b	40 NB GATE VALVE FOR SUDDEN PRESUURE RELAY	1
50c	RAIN HOOD FOR SUDDEN PRESUURE RELAY	1
79	LADDER WITH LOCKING DEVICE	1
80	OIL INLET BUTTERFLY VALVE Ø250 BOTTOM	2
81	OIL OUTLET BUTTERFLY VALVE Ø250 TOP	2
85	15NB SAMPLING GATE VALVE FOR TOP TANK WITH PROVISION FOR FIXING RUBBER HOSE 10mm SIZE	1
86	AIR RELEASE VALVE 1/2" (B.S.P.)	1
109	HAULAGE LUG CUM TURNING EYE LONGITUDINAL Ø50	4
109a	HAULAGE LUG CUM TURNING EYE TRANSVERSAL Ø50	4
110	TOP TANK-BOTTOM TANK SHORTING LINK	2
114	DRAIN PLUG FOR BOTTOM TANK (1" B.S.P.)	2
115	HOLE FOR CLAMPING CORE & COIL TO TOP TANK (Ø480)	2
183	40 NB GUN METAL VALVE FOR ON LINE GAS MONITRING SYSTEM.	2
212	EARTHING CONNECTION (CORE/CLAMP/TANK 10kv ISOLATION)	1
215	IOD BOX	1
216	COOLER CONTROL CABINET (CCC) BOX	1

TRANSFORMER

ITEM	DESCRIPTION	QTY.
6	H.V. LINE 420KV,1250Amp OIP CONDENSER BUSHING	3
6X	H.V.NEUTRAL 36KV, 3150Amp PORCELAIN BUSHING	1
6Y	I.V. 245KV,1250Amp OIP CONDENSOR BUSHING	3
7Y	L.V. 52KV,3150Amp OIP CONDENSER BUSHING	3
122	CONNECTION BOX FOR C.T. TERMINAL (H.V. SIDE)	3
122a	CONNECTION BOX C.T. TERMINAL (I.V. SIDE)	3
122b	CONNECTION BOX C.T. TERMINAL (L.V. SIDE)	1
148	CONNECTION BOX C.T. TERMINAL (NEUTRAL SIDE)	1
149	I.V. TURRET	3
150	H.V. TURRET	3
151	L.V. TURRET	1
157	NEUTRAL GROUNDING CONNECTION WITH 36KV CLASS INSULATOR (2 NOS COPPER FLAT SIZE 8TKX80 WIDE)	1
157a	36 KV POST INSULATOR	4
180	TERMINAL MARKING PLATE	ADEQUATE

TAPCHANGER

ITEM	DESCRIPTION	QTY.
14b	25 N.B. GATE VALVE FOR DIVERTER SUCTION VALVE	3
14e	DRAIN VALVE 15 N.B. FOR AUX. CONSERVATOR TOP & BOTTOM	2
41	BEVEL GEAR BOX	1
43	O.L.T.C. OIL CONS. CONNECTION PIPE 25 DIA.	1SET
44	O.L.T.C. PROTECTIVE RELAY	3
44a	RAIN HOOD FOR O.L.T.C. PROTECTIVE RELAY	3
44b	O.L.T.C. EQUILIZER PIPE	1
48	O.L.T.C. DRIVING UNIT	1
49	O.L.T.C. MOTOR DRIVING HANDLE	1
50	ON LOAD TAP CHANGER	3
119a	25 NB ISOLATING GATE VALVE (FOR OLTC)	3
119b	25 NB ISOLATING GATE VALVE FOR AUX.CON.S. OLTC EQ. PIPE	1

CONSERVATOR & ITS PIPE WORK

ITEM	DESCRIPTION	QTY.
10d	INSPECTION COVER FOR CONSERVATOR BOLTED (SIZE Ø 500)	1
12	OIL GAUGE MAGNETIC TYPE WITH LOLA	1
12a	RAIN HOOD FOR OIL GAUGE MAGNETIC TYPE	1
14c	DRAIN GATE VALVE 50 DIA. MAIN CONSERVATOR (TOP & BOTTOM)	2
14f	15 NB GATE VALVE FOR BREATHER PIPE WORK	1
15	OIL CONSERVATOR 1300 DIA (ATMOSEAL TYPE) WITH AIR CELL , PRISMATIC OIL GAUGE AND WELDED LADDER	1
15a	AUX. CONSERVATOR 300 DIA WITH PRISMATIC OIL GAUGE FOR OLTC	1
15c	AIR CELL LEAK DETECTOR FOR MAIN CONSERVATOR	1
15d	PRISMATIC OIL LEVEL GAUGE (3 OVER LAPPED WINDOWS)	1
17	ONLINE REGENERATIVE MAINTENANCE FREE BREATHER (COBALT FREE INDICATING TYPE) FOR MAIN CONSERVATOR	1
17a	DEHYDRATING BREATHER (COBALT FREE INDICATING TYPE) FOR AUX. CONSERVATOR IN SERIES (2 Nos.)	1
26	BUCHHOLZ RELAY 80 DIA.	1
26a	RAIN HOOD FOR BUCHHOLZ RELAY	1
42	VACCUM PULLING PIPE 50 N. B.	1
67a	FLEXIBLE HOSE Ø80 (SS)	1
86a	AIR RELEASE PLUG 1/4" BSP FOR MAIN CONSERVATOR	1
113	ISOLATING GATE VALVE FOR BUCHHOLZ RELAY (80 NB)	1
116	BUCHHOLZ GAS RELEASE DEVICE PIPE (COPPER TUBE 6 O/D, 4 I/D)	1
119	ISOLATING BUTTERFLY VALVE FOR BUCHHOLZ RELAY 80 NB	1
120	MAIN CONSERVATOR PIPE 80 NB (1SET)	1SET
125	GAS COLLECTING DEVICE	1
153	CONSERVATOR SUPPORT	2
164	BREATHER PIPE FOR MAIN & AUX. CONSERVATOR (15 NB)	2
206	MONOGRAM ON MAIN CONSERVATOR	1
211	AIR CELL ARRANGEMENT INSIDE MAIN CONSERVATOR	1
213	ON LINE DGA (TANK MOUNTED)	1
214	JACKING PAD ABOVE BELL JOINT FOR GASKET REPLACEMENT	4

COOLING SYSTEM

ITEM	DESCRIPTION	QTY.
3b	LIFTING LUG FOR RADIATORS/HEADERS (2NO. ON EACH RADIATOR)	72
4a	BOSS FOR EARTHING M12 WITH BOLT, PLAIN WASHER & SPRING WASHER M16 ON 'A' FRAME AND FAN SUPPORT & PIPE SUPPORT (2 NOS EACH)	ADEQUATE
14d	DRAIN/FILTER GATE VALVE FOR COOLING SYSTEM Ø50	4
14g	DRAIN/FILTER GATE VALVE FOR COOLING SYSTEM Ø25	4
18d	THERMOMETER ON COOLING SYSTEM (2 ON P/W & 4 ON HEADERS)	6
60	BANK OF RADIATORS (16 RADIATORS PER BANK) 2 X 50%	2
63	FAN AND MOTOR 8 NO. PER BANK WITH GI WIRE MESH GUARD (7 WORKING + 1 STANDBY IN PER BANK)	16
64	OIL PUMP & MOTOR 2 NO. PER BANK (1 WORKING + 1 STANDBY) EACH OF 100% CAPACITY WITH EARTHING AND DRAIN.	4
67	FLEXIBLE HOSE Ø250 (SS)	4
70	FAN SUPPORTS	16
72	A FRAME SUPPORT	4
72a	PIPE SUPPORT	4
73	TOP HEADERS (284 SQ. INSIDE)	2
74	BOTTOM HEADERS (284 SQ. INSIDE)	2
81a	ISOLATING BUTTERFLY VALVE 250 NB FOR TOP & BOTTOM HEADER	6
86b	3/4"BSP AIR RELEASE PLUG FOR RADIATOR, HEADER & CONSERVATOR	38
114b	DRAIN PLUG FOR RADIATORS,PIPE WORKS & HEADERS 3/4"BSP.	40
119c	ISOLATING BUTTERFLY VALVE FOR RADIATORS Ø80	64
123	ISOLATING BUTTERFLY VALVE 200 NB FOR RADIATOR BANK,PUMP&MOTOR SET	8
160	OIL FLOW INDICATOR (SEE O.G.A. FOR DIRECTION)	4
190	TOP OIL PIPE (RADIATOR BANK) 250NB	2
196	BOTTOM OIL PIPE (RADIATOR BANK) 200 & 250 NB	1SET
197	REVERSE FLOW BLOCKING DEVICE	2

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34640000981

REF.DRG.NO.

SIGN.DATE

INVENTORY NO.

REV	DATE	ALT	NTPC DRG. NO.	BHEL DRG. NO.	ADDITIONAL INFORMATION	भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल	NAME	SIGN	DATE				
		CKD	NO. OF TRANSFORMER	1	W.D.63070-P-512-02	BHARAT HEAVY ELECTRICALS LTD. BHOPAL	DRN.	SKC	29.11.21				
		APPD	PROJECT	EPC PACKAGE FOR NORTH KARANPURA STPP (3X660 MW)	STATUS OF DRAWING	'PR'	DEPT	CODE	WEIGHT(kg)	SCALE	CHD.	GK/LK	01.12.21
			LOA. NO.	CS-4410-001-2-SC-NDA-6128 DT: 28-02-2014	DISTRIBUTION OF PRINTS	TRE	406	-----	NTS		APPD.	KGK/LK	02.12.21
			TYPE OF PRODUCT	1X315 MVA, 400/220/33KV, 3-PH. AUTO TRANSFORMER.	TRE-1,TRM-3,	TITLE	O.G.A. PART LIST			DRG. NO.	3 464 00 01800	REV.	00
			NAME OF CUSTOMER	M/S NTPC LIMITED.						SHEET	07 OF 07		