



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
पारेषण व्यापार समूह
Bharat Heavy Electricals Limited
Transmission Business Group
Plot No. 25, Sector-16A, Noida, UP - 201 301

CORRIGENDUM-1 to GEM/2025/B/6311422 dtd. 05-06-2025

Item : Tender for supply and ETC of Fire Fighting Equipment's for NTPC SINGRAULI-III Project
NIC Tender ID : GEM/2025/B/6311422 Dated: 05-06-2025
BHEL NIT Ref. No. : NIT_91921
Enquiry : Open Tender (Through GeM)

Bidders to consider attached Technical specification No. TB-429-552-036. All other terms & conditions of the NIT shall remain unchanged.

-Sd-

For and on behalf of BHEL
Ved Prakash Meena
Sr. Manager, TBMM
BHEL TBG Noida
Phone no. 120-6748462
Email Id: ved@bhel.in



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

COPYRIGHT AND CONFIDENTIALITY
The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD.
It must not be used directly or indirectly in anyway detrimental to the interest of the company

Doc No.	TB-429-552-036	Rev. No.	0		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION			NAME	TDT	TDT	VK
TITLE FIRE FIGHTING SYSTEM (SWITCHYARD AREA)							
				DATE	04.12.24	04.12.24	04.12.24
				GROUP	TBEM	W.O. No	429
CUSTOMER	NTPC LTD.						
PROJECT	SINGRAULI THERMAL POWER PROJECT STAGE-III (2X800 MW) - 400 KV GIS						

Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS			

	CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.	TB-429-552-036
	PROJECT: SINGRAULI THERMAL POWER PROJECT STAGE-III (2X800 MW) - 400 KV GIS	R0
	TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)	PQR

PRE- QUALIFYING CRITERIA (PQR) FOR BIDDERS

Fire Detection and Protection System:

The bidder should have designed, supplied, erected and commissioned at least one (1) number of Fire protection Systems, each of contract value not less than INR 35.0 million or equivalent in foreign currency (exchange rate applicable as on date of Techno-commercial bid opening), in industrial installations. Each of the above fire protection systems should have comprised of:

- a) Fire hydrant system.
- b) High velocity water (HVW) spray or medium velocity water (MVW) spray or sprinkler system.
- c) Fire water pumping and pressurizing arrangement.

The systems 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-UK or NFPA, USA) and these systems should have been in successful operation for at least one (1) year prior to the date of techno-commercial bid opening i.e. 22-12-23.

In addition, the analogue addressable type fire alarm system proposed to be supplied shall be sourced from a firm who has supplied at least one (1) similar system which have been approved or listed by UL-USA/ FM-USA/ LPC-UK/ Similar agency and should have been in successful operation for at least one (1) year prior to the date of techno- commercial bid opening i.e. 22-12-23.

In support of the above credentials, the bidder should submit copy of Purchase order along with performance certificate from customer.

(#) Successful operation means certificate issued by the Customer/ end user certifying the operation without any adverse remark.

Only Bidders qualifying PQR requirements will be made technically acceptable for further bid evaluation activity.



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 kV Substation of Switchyard area of 2x800 MW Singrauli Thermal Power Station, Distt, Sonebhadra, UP of NTPC Ltd.**
- Detailed design of all the equipment and equipment system(s).
 - Complete manufacturing including shop testing.
 - Providing engineering data, drawings, and O & M manuals as per specified format etc. for owners/purchaser's review, approval and records.
 - Packing and transportation from the manufacturer's works to the site including customs clearance/port clearance, if required.
 - Fabrication, pre-assembly, if any, erection testing and putting into satisfactory operation all the equipment including successful completion of trial operation.
 - Performance and Guarantee tests after successful completion of trial operation.
- 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. ***NTPC contract specification attached with SECTION 2 shall be adhered strictly and requirements of the same regarding systems applicable for switchyard part shall be provided by the contractor.***
- 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 package. In case of change in the input after placement of order the additions / deletions to the scope shall be settled on the basis of unit rates agreed between the Purchaser and Contractor.
- 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 the limits stipulated in GCC/SCC provided with this specification.
- 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-2, 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 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 NTPC Ltd., 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
Hydrant System	i. GIS Control Building ii. GIS Building iii. Outdoor 400 kV Switchyard
HVW Spray System	i. 125 MVAr Reactor (1 no.)
Addressable Fire Detection & Alarm System	i. GIS Control Building ii. GIS Building along with fan rooms
Portable Fire Extinguisher	i. GIS Control Building ii. GIS Building along with fan rooms

3.0 SYSTEM REQUIREMENT, DESIGN PHILOSOPHY & CONTRACTOR'S SCOPE

This system shall be designed to provide fire detection and protection services for Switchyard and its control Building. The Fire detection, Protection & Alarm system shall be designed in line with the guideline stipulated in NFPA-850 & IS-3034. 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.

The responsibility of getting approval from statutory body & TAC accredited professionals rests exclusively on Bidder. This include discussions with authorised approving agencies, arranging inspection at site, revision / modifications as suggested by the authorities for obtaining complete approval of the system and ensure maximum discount for insurance premium to Owner. The Fire Protection, detection and Alarm System shall comply with NFPA -72/72E and IS: 2189 standards.

3.1 DETECTION SYSTEM

- a) The Fire Detection and Alarm System will comprise of a network of Addressable intelligent multisensor detectors (fire/ smoke), Microprocessor based Fire Alarm Control Panel, Manual Call Points, Modules, Notification Appliances, Cables and other accessories required to form a network (i.e. Terminal Boxes and Junction Boxes).
- b) Switchyard fire alarm panel located in control room of switchyard will be connected with other fire alarm panels of main plant areas through fiber optic cable.

Fire detection, alarm & control system to be provided by the bidder shall adhere strictly to all applicable technical particulars laid down in Cl. No. 5.00.00 of Sub-section-A-18 - Fire Protection & Detection system, Sec-IV-Part B of NTPC Technical specification provided as annexure to section-2 of this specification.

- c) Addressable multi-sensor type smoke detectors shall be provided for both above false ceiling and below false ceiling area in all the air-conditioned areas of Control Building except for the Battery rooms & Pantry where Addressable corrosion proof rate of rise heat detector with fixed temperature element shall be provided.
- d) Manual call points shall be located as per Cl. no. 6.3.8 of IS 2189. The manual call points will normally be provided for every 30 m distance in indoor areas.
- e) The number of Detectors and their location will be so selected such that the internal area of the building is completely covered by the detectors. The zones of individual Detectors will overlap and no blind zone will be left. The quantity of multi - sensor detectors in each zone shall be based on the coverage factor of 25 sq. meter per detector. However, the actual quantity of detectors required, taking into consideration obstructions due to floor beams, ventilation, doors, windows etc., shall be worked out and supplied (based on the actual layout) and installed by the contractor.
- f) Detector shall not be mounted within 500 mm of obstruction. However, in case of minor obstruction, like light fittings etc. the distance may be reduced to 250 mm. Wherever beam depth exceeds 450 mm and center to center of beam exceeds 2500 mm, separate detector shall be provided for each pocket.
- g) For Detectors mounted above false ceiling, a separate response Indicator shall be mounted directly below the detector (on the false roof). When the detector is mounted below the false floor



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 4

or in inaccessible position, response indicator for each of the detector shall be mounted on a separate box which shall be suitable for mounting on the wall.

- h) In view of very large height of GIS building Beam smoke detectors shall be provided there because regular spot type smoke detectors will not be effective in detecting the smoke to the required sensitivity levels. Spacing of beam detectors shall be as per NFPA – 72 guidelines.
- i) Beam detectors and additional accessory kit (if required) to provide coverage for present GIS building length shall be provided and the same will be considered as an integral part of beam detectors.
- j) All the detectors in the GIS cum control building shall be looped into a Fire Alarm Panel situated in the GIS control building.
- k) Two loop Fire Alarm Panel (1 working + 1 spare loop) of analogue addressable type shall be dedicated to Switchyard control building which shall evaluate the signals received from the detectors, transmit the fire or trouble alarms (audio-visual) to pre-arranged points, supervise and monitor the complete fire detection circuits.
- l) The 100% hot standby redundant micro-processor-based fire detection and fire alarm panel shall be designed such as to have built in redundancy to ensure availability at all times.
- m) One set of 24V DC redundant power supply system comprising of 2 x 100% chargers and 1 x 100% batteries shall be provided for each fire alarm panel. The batteries for fire alarm system shall be sealed maintenance free lead acid type. The battery backup for each fire alarm panel and repeater alarm panel shall be 24 hours and 30 minutes (in alarm conditions). At least 25% of the devices shall be considered to be active in alarm conditions. Each of the redundant chargers shall be sized to meet connected load requirements and keep the connected batteries full charged (Float Mode). Furthermore, the charger shall be sized to enable the boost charge of a fully discharged battery in 10 hours while feeding the load.
- n) The batteries shall be sized as per relevant IEEE standard. For battery sizing calculation, an aging factor of 0.8, a temperature correction factor (based on temperature of 4 deg. C), voltage drop of 2V in cables. Capacity factor, Float Correction Factor, as per Battery Supplier Standard, shall be taken into consideration, if applicable and ambient temperature shall be considered as the electrolytic temperature. The sizing of the battery shall be as approved by purchaser during detailed engineering.
- o) The detector cable and other control cable shall be armored, screened and twisted, PVC Cu. FRLS cables type “S” in external areas and for inside building. Type “S” cable shall satisfy requirements of Article 760 NFPA 70. Refer Cl. No. 5.15.00 of Sub-section-A-18 - Fire Protection & Detection system of NTPC Technical specification.
- p) Fire alarm panel of the switchyard will be in ring topology with various FAPs of the main plant. All the panels will be in a ring, when there will be fire anywhere, all the panels will get signal.
- q) Adequate no. of Back-lit maintained type emergency exit signs as per TAC shall be provided.
- r) Hooters shall be provided as per Fire detection layout to be finalized during detailed engineering.



➤ **INTERFACES**

Fire detection & alarm system will have following interfaces-

- i) Interface with air conditioning & ventilation system of GIS control building to shut down the AHU equipment in building.
- ii) Interface with Ventilation system of GIS building to shut down the ventilation fans in building.
- iii) Interface with fire dampers to close it in case of fire.
- iv) Interface with Main fire alarm panel in the power plant main control room.

- ❖ ***Dual redundant optical fiber data highway shall be used to wire switchyard FAP with main plant FAP located in main plant control room. Switchyard fire alarm panel will be put in a ring topology with other panels of main plant FDA, hence necessary network cards, LIUs, convertors etc. requirement shall be ensured accordingly by contractor for two-way transfer of signals for information sharing.***

3.2 Protection System

3.2.1 Hydrant System

- a. Hydrant systems for the switchyard area shall be tapped off from main hydrant header for main plant. Double feed or two nos. water tap-off points will be provided to the switchyard hydrant ring mains. Each of the tap-off point of various sizes will be along with a gate valve as indicated in the switchyard layout drawing provided with this specification. These tap-off points will be provided by the purchaser. Minimum water pressure at the tap-off point will be 8.8 Kg/ cm² (approx.).
- b. **Hydrant system is designed for Ordinary Hazard Classification.**
- c. The hydrant and spray lines shall be overground in general. Pipe ring shall be formed around switchyard. Isolation gate valves shall be provided in the ring main so that a portion of the loop can be taken out for maintenance without any loss of system in the balance part. Hydrants valves & water monitors shall be provided in the switchyard fire water piping network as per requirement inline with TAC guidelines.
- d. Hydrant piping network in switchyard shall consist of hydrants valves & water monitors and shall be provided in the periphery of the switchyard area.
- e. System shall be designed in a way so that minimum terminal pressure of 3.5 kg/cm² can be maintained at the farthest/ remotest hydrant point of the switchyard.
- f. All the outdoor hydrants shall be provided with a front glass type hose carrying 2 nos. 15 mtrs hose along with branch pipe coupling and nozzle.
- g. Hydrants shall not be located less than 2m from building. No building shall be deemed to be protected by a hydrant unless such hydrant is within 15 m of the building.
- h. Velocity in Fire water Pipes shall be as per TAC recommendation. The velocity in the hydrant/ Spray header shall not exceed 5 m/sec.
- i. All hydrant pipe ring mains/ pipe lines shall be routed overground on RCC pedestals. Road, Rail or pipe trench crossing shall be through RCC Hume pipes duly covered with coating and



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 6

wrapping as per specification. Hume pipe for road crossing shall be NP3 class and that for rail crossing shall be NP4.

- j. While preparing fire water piping layout, contractor shall take care of any possible fouling underground pipe with drain, cable trench, box culverts etc. Its responsibility of contractor to ask for related inputs, drawings from the purchaser.

3.2.1.0 Specific Data

- i) Hydrant valves shall be single headed, oblique female type having stainless steel construction (SS to IS: 3444) conforming to IS: 5290.

3.2.2 MATERIAL OF CONSTRUCTION (MOC) OF MAJOR EQUIPMENTS:

SL. NO.	ITEM	MOC/ DESIGN CODE
1.	Fire Water Pipes	Mild steel, ERW to IS:1239, Part-I, Heavy grade (Pipe size upto 150NB) IS:3589, Fe 410 grade (Pipe size- 200NB & above) or Equivalent, For 200 NB, Thickness – 6.35 mm (min)
2.	Pipes (Galvanized)	Mild steel, ERW to IS:1239, Part-I, Heavy grade Galvanised as per IS:4736
3.	Pipe fittings	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). Mechanical grooved couplings type fittings in GI pipe lines for HVW spray system. The fittings shall be galvanised as per IS: 4736. 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.
4.	Gate Valves	Body/bonnet/Yoke/Wedge: CI to IS:210 FG-200 Spindle: SS to ASTM-A-276 type 410. Design Code: a) BS:5150 (for valves at other locations) - Pressure rating: PN1.6 (as per IS:14846) / PN16 (as per BS:5150) -Working Pr. :12 Kg/cm ²
5.	Spray nozzles	SS-304
6.	Hydrant valves	Body/bonnet/stop valve/valve seat/ trim: SS304/ SS316
7.	Water branch pipe & nozzle	Branch pipe: SS316 (Gr 4 of IS:3444) (both ends) Nozzle: SS316 (Gr 4 of IS:3444), Size: min 16mm & max 25mm. As per IS:903/ IS:2871



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 7

8.	Hose pipe	IS-636 Type A, BIS marked
9.	Hose reels, Hose box & accessories	BIS marked
10	Water Monitor	Water barrel/reducer/elbow: CS (seamless)/SS Nozzle: Copper alloy / SS confirm in to IS:3444. Design code: As per IS:8442 Type-I, Size: 75mm, Nozzle dia: 38mm
11	Butterfly Valve	Body & Disc: Cast Iron, Shaft: SS 410 / SS 420 Seat Rings: EPDM. Design Code: Double flanged or Lugged wafer type of low leakage rate confirming to BS: EN:593/API- 609/AWWA C-504 Pressure class: PN 16
12	Deluge Valve	Ductile Iron ASTM A536 (UL listed)
13	HVWS Nozzle	S.S 304
14	Hydrant Valve	S.S 304
15	Y Strainer	Body is MS fabricated as per IS 2062 and internal is S.S (AISI 316)
16	Flanges	As per IS 2062 ANSI B 16.5 CI 150.
17	Structural steel	As per IS 2062

ii) **PIPING**

Specific features of piping for Fire Protection System shall be as follows: -

1. The pipe protection shall be as follows: To prevent soil corrosion, buried pipes shall be properly lagged with 4 mm thick (2 Layer of 2mm thickness) wrapping and coating corrosion protection tape of coal tar type as per IS:15337 or AWWA C 203.
2. 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.

3.2.3 HVW Spray System

- HVW Spray system is envisaged for reactors, 125 MVA – 1 no.
- One no. tap-off point for HVW spray system of 250 NB size along with a gate valve will be provided as indicated in switchyard layout enclosed. This tap-off point will be provided by the purchaser.

I. 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 spray 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 the main spray header of power plant.

II. Design Criteria

- a. The system for HVW spray system shall consist of water supply system, suitable number of spray nozzles, deluge valve, quartzoid bulb detectors, strainers, pipes and necessary valves, instrumentation, junction boxes, cables etc.
- b. Minimum running water pressure at any projector/spray nozzle shall be not less than 3.5 Kg/ Sq.cm and not greater than 5.0 Kg/ sq.cm.
- c. Design discharge density shall be as per the rules of water spray system of Tariff Advisory Committee (TAC). Discharge density for HVW spray system shall be 10.2 lpm /sqm. The velocity in feed pipes shall not be more than 10m/s as per cl. No. 3.2.3.6.2.7 of TAC manual for Spray System.
- d. Gate valve shall be provided at upstream & downstream of each of the deluge valve. The size shall be same as that of the deluge valve.
- e. Fast acting butterfly valves will be provided in 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.
- f. Water motor gong shall form part of accessories to be provided with deluge valve. Local audible alarm is produced by water motor gong.
- g. A strainer ('Y' type) shall be provided at upstream of deluge valve.
- h. 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 1.0 kg/cm² at design flow of deluge valve.
- i. Limit switch (open & close) for Deluge valves shall be provided for upstream & downstream isolation valve.
- j. Pressure gauges at both upstream and downstream of deluge valves, and in the detector pipe network shall be provided.
- k. Pressure switches shall be provided in spray and detector piping to exhibit "FIRE" and "SPRAY ON" annunciations and as well as for interlock.
- l. Wet type detection shall be provided for actuating the Deluge system. QB detectors are set at 79°C. At the preset temperature the detector burst and releases the pressure with the detector piping network around the reactor & actuating the flow of water across deluge valve.
- m. Sprayers/ projectors/ nozzles shall be arranged in the form of a ring around reactor and number of such rings/ tiers shall be decided considering maximum gap between two (2) consecutive tiers of rings shall be as per TAC. The distance of the deluge valves from the protected equipment shall be 6 m (min.) in line with TAC manual.
- n. **Pipe structure for pylon support around reactor 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. Subsequent to fixing the pylons, lower part of pylon which would be within filled up gravel portion shall be encased with concrete by Contractor for corrosion protection.



- o. As per the modern practice of fire detection system, all Deluge Valves (DV's) will be networked to Micro-processor analogue addressable Fire Alarm Panel.
- p. Facility for manual initiation of deluge valves locally, through hand operations (manually by operating the push button) shall also be provided.
- q. Each of the outdoor deluge valves and its accessories shall be provided with deluge valve housing. (As per TAC). RCC roof shall be provided for deluge valve housing.
- r. Local control panel for deluge valves shall be provided. Remote actuation of the deluge valve shall be provided.

3.2.4 Portable Fire Extinguishers

- The switchyard control building including cable spreader room shall be provided with:
 - a. Carbon dioxide of 4.5 kg capacity portable fire extinguisher conforming to IS 15683.
 - b. Dry chemical powder type 6 kg capacity portable fire extinguishers conforming to IS 15683.
 - c. Trolley mounted DCP extinguisher.
 - d. Trolley mounted 60L mechanical Foam type extinguisher shall be provided inline with the requirements as per TAC guidelines.
- Mobile extinguishers shall be provided with a wheeled trolley for movement. Trolley mounted extinguishers shall be provided with 6 or 9-meter-long high-pressure discharge hose with horn/telescopic applicator.
- As required by Tariff Advisory Committee (TAC), 20% spare charge of the total no. of extinguishers installed, with a minimum of six recharges, shall be supplied for each type of extinguishers.
- Selection of type and location of installation of fire extinguishers for the various rooms of the switchyard control building shall be done in accordance with TAC guidelines.
- All extinguishers shall be mounted at strategic locations in bunches and/or individually to TAC approval.

4.0 MANDATORY SPARES

1.0	FIRE HOSES WITH COUPLINGS	Qty.
1	15 m long fire hoses with end connectors	10% of population
2.0	BRANCH PIPES WITH NOZZLES	
1	Nozzles with branch pipes quick coupling ends	10% of population
2	Nozzles of water monitors	10% of population
3.0	DELUGE VALVE ASSEMBLIES	
1	Complete deluge valve assembly along with internals	1 set
2	Clapper assembly complete (consisting of clapper seat rubber, screws, etc.)	1 set
3	Solenoid coils	1 set



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 10

4.0	VALVES (GLOBE/BUTTERFLY/NRV)	
1	Complete valves	5% of population of each type and size with minimum 1 No.
2	Reduction gear operator (gate/butterfly)	10% -do-
3	Flap/Door with pin (NRV)	10% -do-
4	Disc (butterfly/globe)	5% -do-
5	Gate (gate valve)	5% -do-
6	Stem (all types)	5% -do-
7	Seal rings (all types)	10% -do-
8	Flap rings (NRV)	10% -do-
9	Gaskets	10% -do-
10	Bearing/ bushing (butterfly valve)	10% -do-
5.0	Y-TYPE STRAINERS	
1	Strainers elements with O-rings and stiffeners.	1 set
6.0	HVW SPRAY SYSTEM	
1	Spray nozzles	5% -do-
2	QB Detectors	5% -do-
7.0	HYDRANT VALVE	
1	Hydrant valve complete (internal) single headed with instantaneous female coupling	20% of population
2	Hydrant valve complete (external) single headed with instantaneous female coupling	20% -do
3	Hydrant valve complete (double headed) with instantaneous female coupling	10% -do-
4	Water monitor sets with nozzle branch pipe etc.	1 no.
5	Spindle with nuts of Hydrant valve	10% -do-
6	Bonnet, gland nut, rubber assembly of hydrant valve	10% -do-
7	Seat, check nut, washer assembly of hydrant valve	10% -do-
8	Rubber washer for female coupling	20% -do-
9	Instantaneous female coupling assembly complete for hydrant valve	20% -do-
10	Lock pin assy. for hydrant valve	20% -do-
8.0	SMOKE / HEAT DETECTORS	
1	Multisensor type detector (Addressable)	10% of population
2	Manual pull station	10% -do-
3	Indicators assembly for smoke detectors provided in false ceiling	5% -do-
9.0	FIRE ALARM AND REPEATER FIRE ALARM PANELS (Addressable)	
1	Power supply modules	2 No. of each type & rating
2	Processor modules, Control modules, loop cards modules, isolator cards	2 No. of each type



3	Interface unit / modules for non-addressable devices, auxiliary / output relay modules, control modules, supervisory control modules and any other electronic modules.	5 No. of each type
4	LCD display of each type unit of panels	1 No.
5	Power supervision relay	4 No. of each type
6	Fire screen / alarm buzzer	1 No. of each type
7	Limit switches for isolation valves	2 Nos. of each type
8	Fiber optic cable	500 mtr of each type, pair/ core and size.
9	Batteries	2 No. of each type & rating
10.0	PORTABLE EXTINGUISHERS	
1	Portable extinguishers	10% of each type & size
	a) Water Type	
	b) Foam Type	
	c) CO ₂ Type	
	d) Dry Chemical Type	

Note: Quantity of mandatory spare items shall be decided during detailed engineering with end client.
Above mentioned quantities are provisional and indicative.

5.0 SCOPE OF SUPPLY & SERVICES

5.1. 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, efficient, reliable and trouble-free operation, unless the same is specifically excluded from the Bidder's scope of work under clause 5.0 of this section.

5.2. 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.

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

- Power & Control cables for fire protection system (except for cable for detection and alarm system & FO cable) 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.
- 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 & FO 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 lay the underground piping required for hydrant system and also shall construct RCC pedestals & pylon supports for above ground pipe as per the final piping layout drawing.
- 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 all the electrical panels 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.

5.4. Scope of Services

A. 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.

B. With Other Electrical System

- i) 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.
- ii) Laying & Termination of Power and Control cables for the equipment under the scope of this specification. Bidders shall include all cable accessories like lugs, glands, cable tags, markers etc in their respective bids.



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 13

iii) Earthing of all installations (to the nearest earth mat/ earthing pad) supplied under the scope of this specification.

C. With Civil System

i) Making RCC pedestals for above ground piping wherever required.

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

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

F. 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.

G. Obtaining approval from TAC/ TAC accredited agency/ Equivalent body 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.

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.

H. Civil Works

Major civil works such as foundations, cut outs etc, shall be in Purchaser's scope. The Bidder shall however supply foundation bolts & hardware and undertake minor civil works such as grouting, filling up of crevices/ cut outs etc. Any damage caused to civil works during ETC work of the equipment/system shall have to be made good to the original finish by the Contractor at no extra cost to the Purchaser.

In addition, the following shall be in the scope of Contractor:

i) Laying of underground piping and construction of RCC pedestals to support the above ground piping for hydrant wherever required.

ii) RCC supports to the base of pylon pipes (if required) of HVW system of various transformers/ reactors.

iii) Each of the outdoor deluge valves and its accessories shall be provided with deluge valve housing. (As per TAC). Construction of deluge valve housing with RCC roof and its painting (inside & outside).

6.0 Exclusions

a) Supply of power & control cables except for detection cable. However laying and termination of these cables shall be in contractor's scope. **The bidder shall furnish quantity and type of cables required complete system in their respective bids. Laying & termination is in**



contractor scope.

- b) Supply & laying of underground Hume pipes.
- c) Supply of necessary cable trays for laying power and control cables, however hardware for fixing the same on wall trenches or elsewhere shall be included by the bidder in his bid.
- d) Supply of GI flat for earthing of equipments.
- e) Unloading, receipt & storage of items at site.

7.0 Painting

The pipes and applicable firefighting items shall be painted inline with Cl. 9 of NTPC Fire detection & protection system Technical specification provided as Annexure to Sec-2 of this specification.

8.0 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.

9.0 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.

10.0 Various Heads to be quoted for

Based on the above input it is recommended that the bidders shall submit their Unit rate offers in the prescribed format only as per Tender BOQ provided as Annexure to this section.

11.0 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. Tentative inspection category of some items is given in Annexure-C to Sec-1 of this technical specification.



ANNEXURE- 'A'

LIST OF THE CABLES THAT CAN BE PROVIDED BY BHEL (FREE ISSUE BASIS)

2C x 2.5 sq mm PVC/Copper, Armoured
5C x 4 sq mm PVC/Copper, Armoured
5C x 2.5 sq mm PVC/Copper, Armoured
7C x 2.5 sq mm PVC/Copper, Armoured
14C x 2.5 sq mm PVC/Copper, Armoured
19C x 2.5 sq mm PVC/Copper, Armoured
2C x 10 sqmm XLPE/Aluminum, Armoured
4C x 10 sqmm XLPE/Aluminium, Armoured
4C x 16 sqmm XLPE/Aluminium, Armoured
3.5C x 35 sqmm XLPE/Aluminium, Armoured
3.5C x 70 sqmm XLPE/Aluminium, Armoured



ANNEXURE- B TO SECTION-1

11.0 Sub-Vendor List

Bidder shall choose make of materials from list enclosed in Annexure-B to this section only. ***However final applicable make is subject to ultimate customer approval.*** Bidder can provide any other make that is not included in the list only if it is acceptable to ultimate customer without any cost implication to BHEL.

SUB-VENDOR LIST FOR FIRE FIGHTING SYSTEM

S.N.	ITEMS	APPROVED SUB-VENDOR	PLACE	REMARK
1	HYDRANT VALVES & BRANCH PIPE, NOZZLES & COUPLINGS	SHAH BHOGILAL NEWAGE H SARKAR VENUS SUKAN ASCO	AHMEDABAD SURENDRA NAGAR KOLKATA AHMEDABAD KOLKATA	BIS APPROVED SOURCES WITH VALID BIS LICENSE
2	WATER MONITOR	HD FIRE SHAH BHOGILAL NEWAGE NAFFCO	JALGAON AHMEDABAD SURENDRA NAGAR UAE	BIS APPROVED SOURCES WITH VALID BIS LICENSE
3	STRAINERS (Y-TYPE & BASKET TYPE)	SAROJNI ENTERPRISES FILTRATION ENGINEERS MULTITEX	NEW DELHI MUMBAI NOIDA	ISI MARKED
4	FITTINGS & FLANGES	EPP COMPOSITES PVT LTD M S FITTINGS METAL LLOYDS BHARAT FORGE TUBE PRODUCTS NITIN PROFILE	RAJKOT KOLKATA MUMBAI PUNE BARODA BARODA	
5	MS/ GI ERW PIPES	JINDAL SURYA ROSHINI TATA SAIL	GHAZIABAD BAHADUR GARH JAMDESHPUR ROURKELA	BIS MARKED, MANUFACTURERS WITH VALID BIS LICENSE)
6	FIRE HOSES	NEWAGE CHATTARIA RUBBER	SURENDRA NAGAR BARUCH	ISI MARKED ISI MARKED
7	DELUGE VALVES	HD FIRE	THANE	UL/FM
8	HV SPRAY NOZZLE	HD FIRE	THANE	UL/FM
9	QUARTZOID BULB SPRINKLERS	TYCO/ HD FIRE MINIMAX	USA GERMANY	UL/FM/ LPCB/ VDS



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 17

10	SOLENOID VALVE	ROTEX AVCON	BARODA MUMBAI	
12	COATING & WRAPPING MATERIAL/TAPE	MP TAR PRODUCTS RUSTECH PORWAL IND.	BHILAI KOLKATA RAIPUR	
13	CAST IRON GATE VALVE & AIR RELEASE VALVE	SHAH BHOGILAL HAWA ENGINEERS NEWAGE H SARKAR VENUS LEADER ADVANCE VALVES FLOW CHEM INDUSTRIES L&T VALVES LIMITED	KOLKATA AHMEDABAD KOLKATA GR. NOIDA KALOL COIMBATORE	ISI MARKED
14	PRESSURE GAUGE	AN INSTRUMENTS H GURU	KOLKATA KOLKATA	
15	PRESSURE SWITCH	INDFOS SWITZER SOR INC. DRESSER INDUSTRIES INC.	GHAZIABAD CHENNAI USA USA	
16	MICROPROCESSOR BASED FIRE ALARM PANEL, DETECTORS & OTHER ALARM DEVICES	SIMPLEX SCHRACK BOSCH ESSER HONEYWELL NOTIFIER EST (EDWARD SIGNATURE SERIES) HONEYWELL LIFE SAFETY - HIIPL AUTRONICA SHIELD FIRE SAFETY JHONSON CONTROLS	USA AUSTTRIA GERMANY FRANCE FRANCE USA GURUGRAM NORWAY UK USA	UL/FM/ VDS APPROVED
17.	PAINT	SHALIMAR ASIAN PAINTS BERGER		
18.	FIRE EXTINGUISHER	KANEX SAFEX		BIS APPROVED SOURCES WITH VALID BIS LICENSE

	CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.	TB-429-552-036
	PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS	Rev. 0
	TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)	Page | 1

ANNEXURE – BOQ

SL. NO.	DESCRIPTION	UNIT	QTY	SUPPLY	ETC
1.0	MS PIPE, Fe 410 Gr. - 300 NB	MTR	10	YES	YES
2.0	MS PIPE, Fe 410 Gr. - 200 NB	MTR	770	YES	YES
3.0	MS PIPE, ERW HEAVY GRADE - 150 NB	MTR	378	YES	YES
4.0	MS PIPE, ERW HEAVY GRADE - 100 NB	MTR	120	YES	YES
5.0	MS PIPE, ERW HEAVY GRADE - 80 NB	MTR	50	YES	YES
6.0	GI PIPE, ERW HEAVY GRADE - 100 NB	MTR	22	YES	YES
7.0	GI PIPE, ERW HEAVY GRADE - 80 NB	MTR	39	YES	YES
8.0	GI PIPE, ERW HEAVY GRADE - 65 NB	MTR	10	YES	YES
9.0	GI PIPE, ERW HEAVY GRADE - 50 NB	MTR	80	YES	YES
10.0	GI PIPE, ERW HEAVY GRADE - 40 NB	MTR	10	YES	YES
11.0	GI PIPE, ERW HEAVY GRADE - 32 NB	MTR	12	YES	YES
12.0	GI PIPE, ERW HEAVY GRADE - 25 NB	MTR	150	YES	YES
13.0	GATE VALVE - 100 NB	NO	7	YES	YES
14.0	GATE VALVE - 100 NB WITH LIMIT SWITCH	NO	2	YES	YES
15.0	GATE VALVE - 200 NB	NO	4	YES	YES
16.0	GATE VALVE - 150 NB	NO	2	YES	YES
17.0	BUTTERFLY VALVE - 100 NB	NO	1	YES	YES
18.0	Y-TYPE STRAINER - 100 NB	NO	1	YES	YES
19.0	DELUGE VALVE - 100 NB	NO	1	YES	YES
20.0	SINGLE HEADED HYDRANT VALVES	NO	14	YES	YES
21.0	15 MTR FIRE HOSE WITH COUPLING	NO	28	YES	YES
22.0	BRANCH PIPE WITH NOZZLE	NO	14	YES	YES
23.0	HOSE BOX - EXTERNAL	NO	14	YES	YES
24.0	WATER MONITOR 100 NB	NO	7	YES	YES
25.0	HVW SPRAY NOZZLE - 20 NB	NO	56	YES	YES
26.0	QB DETECTOR 79°	NO	40	YES	YES
27.0	PYLON PIPE - MS PIPE- 65 NB	MTR	84	YES	YES
28.0	PYLON PIPE - MS PIPE - 50 NB	MTR	10	YES	YES
29.0	PRESSURE SWITCH	NO	2	YES	YES
30.0	SOLENOID VALVE	NO	1	YES	YES
31.0	LOCAL CONTROL PANEL FOR DELUGE VALVE	NO	1	YES	YES
32.0	WRAPPING & COATING MATERIAL	SQMTR	175	YES	YES
33.0	FIRE EXTINGUISHER - 4.5 KG CO2 TYPE	NO	14	YES	YES



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM (SWITCHYARD)

TB-429-552-036

Rev. 0

Page | 2

34.0	FIRE EXTINGUISHER - 6 KG DCP TYPE	NO	12	YES	YES
35.0	FIRE EXTINGUISHER - TROLLEY MOUNTED 50 KG DCP TYPE	NO	1	YES	YES
36.0	FIRE EXTINGUISHER - TROLLEY MOUNTED 60L MECHANICAL FOAM TYPE	NO	1	YES	YES
37.0	FIRE ALARM PANEL	NO	1	YES	YES
38.0	MULTISENSOR DETECTOR	NO	106	YES	YES
39.0	RESPONSE INDICATOR	NO	47	YES	YES
40.0	MANUAL CALL POINT (BREAK GLASS TYPE)	NO	7	YES	YES
41.0	CONTROL MODULE	NO	8	YES	YES
42.0	MONITOR MODULE	NO	10	YES	YES
43.0	HOOTER CUM STROBE	NO	5	YES	YES
44.0	BEAM DETECTOR WITH REFLECTOR	NO	4	YES	YES
45.0	LOOP CABLE (2CX1.5 sq.mm)	MTR	2800	YES	YES
46.0	POWER CABLE (2CX1.5 sq.mm)	MTR	600	YES	YES
47.0	FIBER OPTIC CABLE	MTR	2500	YES	YES
48.0	MANDATORY SPARES (AS PER CL. NO. 4)	LOT	1	YES	NO
49.0	RCC PEDESTAL	NOS.	250	NO	YES
50.0	DELUGE VALVE HOUSING	NO.	1	NO	YES

➤ **NOTE:**

- The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Technical Specifications, and Drawings.
- The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Purchaser and valued at the rates and prices bid in the priced Bill of Quantities.
- A rate or price shall be entered against each item in the priced Bill of Quantities. The 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.*
- 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.*
- 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.
- Miscellaneous items like Pipe fittings, paints, structural steel, hardware, fixtures, bolts, angles etc. shall be deemed to be included under the relevant BOQ items and bidders shall consider the same while quoting for BOQ items.



Project/ परियोजना : Singrauli-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ब्रवालिटि प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				ANNEXURE - C TO SECTION-1 OF TECHNICAL SPEC (TB-429-552-036)				
Item / मद		QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems
PIPE-SS ASTM A 312		H			~~BHANDARI FOHS & TUBES~~	DEWAS	A		~~ERW UP TO 300NB~~	
					~~LIMITED APEX~~	BEHRORE	A		~~ERW UPTO 400 NB, SEAMLESS UPTO- 50 NB.~~	
					~~PRAKASH STEELAGE~~	SILVASA	A		~~ERW UP TO 203NB~~	
					~~SHUBHLAXMI METALS AND TUBES-~~	UMBERGAON	A		~~SEAMLESS UP TO 150MM and ERW UP to 250 NB Sch 40S~~	
PIPE-CS SEAMLESS- ASTM A 106		H			~~ISMT~~	AHMADNAGAR	A		~~UPTO 273 MM OD-~~	
					~~ISMT~~	BARAMATI	A		~~UPTO 273 MM OD-~~	
					~~REMI~~	BHARUCH	A		~~UPTO 177.8 MM OD~~	
					~~MAHARASHTRA SEAMLESS-~~	RAIGAD	A		~~UPTO 500 NB~~	
HCSD-PUMP		I			~~WEIR MINERALS~~	NETHERLANDS	A			
					~~ABEL~~	GERMANY	A			
					~~FELUWA~~	GERMANY	A			
I MAIN CONTRACTOR / BIS APPROVED SOURCES.										
BRANCH PIPE , COUPLING & NOZZLE (SS & GN		II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
FIRE EXTINGUISHER		II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
WATER MONITOR		II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					
PIPES-MS- (BLACK/ GI) AS PER IS:1239 & IS:3589 UPTO 1000 NB		II			(BIS MARKED, MANUFACTURED BY BIS APPROVED SOURCES WITH VALID BIS LICENSE)					WTP,CW,CT,CPU,FDP S,AC&VENTILATION, CHP,LHP&GHP,AHP

Page 22 of 105



	Project/ परियोजना : Singrauli-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:	INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL व्रगलिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 18.04.2023 PAGE/ पृष्ठ :				
S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems
5	FIRE HOSE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
6	HYDRANT VALVE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE					
7	PIPES FOR IDLERS IS 9295	III			BIS APPROVED SOURCES WITH VALID BIS LICENSE					FDPS
8	~~BLOWERS -CENTRIFUGAL >=5KW~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP
9	~~ClO2-GENERATOR~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP
10	~~JOINT /FITTING COATING- MATERIAL(SLEEVE) FOR 3 LPE PIPES~~	H			~~MAIN CONTRACTOR TO PROPOSED VENDOR FOR NTPC- APPROVAL~~					MUW
11	~~PIPING FABRICATION -HP>300PSI~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP,CPU
12	~~PUMP-METERING/DOSING~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP,CPU
13	~~PUMP -PP- ACID/ ALKALI UNLOADING~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP,CPU
14	~~PUMPS-SCREW TYPE~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP,CPU,FOH
15	~~RUBBER LINING OF TANKS/ VESSELS/ PIPES/ VALVES/FITTINGS~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP,CPU
16	~~RO -PRESSURE TUBE~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP
17	~~TUBE SETTLER MEDIA~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					WTP
18	WRAPPING & COATING MATERIAL -ANTI CORROSIVE TAPE	II			MAIN CONTRACTOR APPROVED SOURCES					CW,CT,LP PIPING, FDPS
19	~~FAN CYLINDER SEGMENTS FRP-COOLING TOWER~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					CT
20	~~FILLS (PVC)~~	H			~~MAIN CONTRACTOR APPROVED SOURCES~~					CT



एनटीपीसी NTPC		Project/ परियोजना : Singrauli-III Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL ब्रवालिटी प्लान तथा सब –वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 18.04.2023 PAGE/ पृष्ठ :				
S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems				
21	SHAFT CARDON TYPE CW PUMP	H			MAIN CONTRACTOR APPROVED SOURCES						CW			
22	DUST EXTRACTION SYSTEM	I			MAIN CONTRACTOR's APPROVED SOURCES					BOIs SHALL BE FROM NTPC APPROVED SOURCES		GHP, LHP/GHP		
23	DUST SUPPRESSION SYSTEM (PLAIN WATER)	I			MAIN CONTRACTOR's APPROVED SOURCES					BOIs SHALL BE FROM NTPC APPROVED SOURCES		GHP, LHP/GHP		
24	DUST SUPPRESSION SYSTEM (DRY FOG)	I			MAIN CONTRACTOR's APPROVED SOURCES					BOIs SHALL BE FROM NTPC APPROVED SOURCES		GHP, LHP/GHP		
Note-1	Items for which Sub-QR is enviisaged, vendors are accepted subject to Sub-QR clearance from NTPC Engg.													
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any./ इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, , यदि कोई हो, के साथ-साथ पत्र “क” में इंगित किया जाए ।														
DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए “विस्तृत ब्यौरे की आवश्यकता” होगी। सूची में “DR” पत्र में इंगित किया जाना चाहिए।														
QP / INSPECTION CATEGORY:														
CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी।														
CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है। हालाँकि एनटीपीसी द्वारा कोई भौतिक निरीक्षण नहीं किया जाएगा। एनटीपीसी द्वारा अंतिम स्वीकृति अनुमोदित क्यूपी के अनुसार दस्तावेजों की समीक्षा के आधार पर दी जाएगी।														
CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.														
UNITS/WORKS इकाईयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयों / कार्यों के मुख्य सप्लाइर का स्थान.														
FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0														
Engg. Div. / QA&I														



Project/ परियोजना : Singrauli-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

REV. NO.:

DATE/ तिथि : 18.04.2023

PAGE/ पृष्ठ :

S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems
					~~PRECISION ENGG CO VALVES- PVT LTD~~	~~NASIK~~	~~A~~		~~FCS UP TO 50NB CLASS 800, CCS UP TO 400NB CLASS 150.~~	
					~~BELGAUM AQUA VALVE PVT LTD.~~	~~BELGAON~~	~~A~~		~~FCS UP TO 50NB CLASS 800, CCS UP TO 200NB CLASS 150.~~	
					~~G-M ENGINEERING PRIVATE LTD~~	~~RAJKOT~~	~~A~~		~~UP TO 400 NB AND CLASS #600~~	
9.C	VALVE-BUTTERFLY > 600MM OR CLASS>150 (VALVE-BUTTERFLY UP TO 600MM & CLASS 150::CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			INTERVALVE POONAWALA LTD	PUNE	A		SGI / CI / D2 1400MM PN10, SGI / CI 1000MM PN16,CS/SS 500MM PN16, SS 400MM CLASS#300, MS FABRICATED ~~UP TO 200NB PN 10~~	WTP, CW,CT,CPU,FDPS,CA S, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					SWIMS TECHNOLOGIES	HUBLI	A		CI/ DI BUTTERFLY VALVE UP TO 1000MM AND PN16 AND UP TO 1800MM AND PN10,CCS UP TO ~~1000MM CLASS 150 AND UP TO~~	
					PENTAIR VALVES	HALOL	A		FOR SS UP TO 500 NB PN-10, CI- UP TO 900NB PN-10, UP TO 500NB PN-16, 450MM CLASS#300., MS FABRICATED ~~UP TO 200NB PN 10~~	
					FOURES ENGINEERING	BANGALORE	A		CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16 ,2400 MM PN6/CLASS150 ~~SS UP TO 200NB PN 10 MS~~	
					KIRLOSKAR BROTHERS LTD	KONDHAPURI	A		CAST SGI/CI/CS 1400 MM PN16 , SS 300 MM PN16 , 1800MM CLASS 150, MS FABRICATED 900 NB PN40,MS ~~FABRICATED UP TO 200NB PN 10~~	
					R & D MULTIPLE	VALSAD	A		CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75, ,1100MM PN25,1400MM CLASS#150 ,MS ~~FABRICATED UP TO 200NB CLASS 150~~	
					ADVANCE VALVES PVT LTD	GREATER NOIDA	A		METAL SEATED, TRIPLE ECCENTRIC, SS BFV OF SIZE UPTO 100NB, AND PRESSURE RATING UPTO CLASS #300.	
					BRAY CONTROLS INDIA PVT. LTD	KANCHIPURAM	A		UPTO 450 MM AND CLASS#600	
					INSTRUMENTATION LTD.	PALAKKAD	A		UPTO 2200NB CLASS # 75	
					HAWA ENGINEERS	AHMEDABAD	A		CI/ CS & FABRICATED UPTO 1200MM, CLASS #150, SS UPTO 250MM, CLASS#150	
					CRANE PROCESS FLOW	SATARA	A		UP TO 900MM PN10	
					L & T VALVES LIMITED	COIMBATORE	A		UP TO 900MM CLASS 150	
					DEMBLA VALVES	CHANE	A		UP TO 2200MM CLASS#75	



Project/ परियोजना : Singrauli-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

REV. NO.:

DATE/ तिथि : 18.04.2023

PAGE/ पृष्ठ :

S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems
9.D	VALVE-CONVENTIONAL GATE / GLOBE / CHECK > 600NB OR CLASS > 300	II			LEADER VALVES	JALANDHAR	A		CS GATE 600MM CLASS#600, SS GLOBE 600MM CLASS#600, CS CHECK 600MM AND CLASS#600	WTP, CW,CT,CPU,FDPS,CA S, AC& VENTILATION, MUW,CHP, LHP&GHP,LP PIPING,AHP
					HAWA ENGINEERS	AHMEDABAD	A		FCS / FSS 50 NB CLASS 800.	
					FOURES ENGINEERINGS	THANE	A		400NB CLASS 600 AND 50NB CLASS 800.	
					BHEL IVP	GOINDWAL	A		GATE UP TO 300 NB CLASS 600. GLOBE 250 NB CLASS 400, CHECK 150NB CLASS 600.	
					HITECH ENGG PVT LTD	AHEMDABAD	A		50 NB CLASS 800.	
					KSB PUMPS LTD	COIMBATORE	A		300NB CLASS 2500.	
					NITON VALVES INDIA PVT LTD	NAVI MUMBAI / AURANGABAD	A		CS GATE 900 NB CLASS 600, CHECK 300 NB CLASS 600.	
					L&T VALVES LIMITED	COIMBATORE	A		650 MM CLASS 600, 50 NB CLASS 800.	
					SWIMS TECHNOLOGIES	HUBLI	A		CONVENTIONAL CCS GATE / GLOBE / CHECK VALVES UP TO 600MM AND CLASS # 1500, CSS GATE/ GLOBE/ SUPER VALVES UP TO 600MM AND CLASS # 1500	
9.E	VALVE- DIAPHGRAGM TYPE	I			CRANE PROCESS FLOW	SATARA	A		UP TO 300NB PN10	WTP,CPU
					SWIMS TECHNOLOGIES	HUBLI	A		UPTO 250 NB - PN 10, 350MM PN6	
					PROCON ENGINEERS	MUMBAI	A		UPTO 200 NB AND PN 10/CLASS #150	
9.F	VALVE-PLUG > 100 MM OR CLASS > 800(VALVE- PLUG UP TO 100 MM & CLASS 800-CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			SWIMS TECHNOLOGIES	HUBLI	A		SOFT SEATED 400MM AND CLASS #150, 300NB CLASS#300	WTP,CPU,CHP, LHP&GHP, FOH,AHP
					XOMOX SANMAR	TRICHY	A		UP TO 600MM AND CLASS#300	
					FLOWSERVE INDIA CONTROLS	CHENNAI	A		METALLIC SEATED 400NB CLASS#150, 300NB CLASS #300, 50NB CLASS #800	
					KSB	KOLKATA	A		130 KW	WTP,CT, CPU,CHP, LHP&GHP, FOH,AHP.LP PIPING,FDPS



Project/ परियोजना : Singrauli-III
Package/ पैकेज : EPC
Supplier/ आपूर्तिकर्ता:
Contract No./ अनुबंध सं.:

INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN
AND SUB-SUPPLIER APPROVAL
व्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची
SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS (MECHANICAL)

DOC. NO./ दस्तावेज सं.:

REV. NO.:

DATE/ तिथि : 18.04.2023

PAGE/ पृष्ठ :

S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसू चि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub- supplier Details submission schedule/ उप आपूर्तिकर्ता	Remarks/ टिप्पणी	Applicable Systems
17	~~ELECTRO-HYDRAULIC ACTUATOR FOR CW- PUMP DISCHARGE BUTTERFLY VALVE~~	I			~~BOSCH-REXROTH (INDIA) PVT- LTD~~	SANAND	A		~~HYDRAULIC POWER-PACK AND- HYDRAULIC CYLINDER (320-MMM- BORE DIA) , ACCUMUATOR FORM~~	CW
					~~HYDAC (INDIA) PVT- LTD~~	GOIMBATORE	A		~~HYDRAULIC POWER-PACK-HYDAC GOIMBATORE, HYDRAULIC CYLINDER- HYDAC BANGLORE, ACCU MULATOR~~	
18	~~IMPELLER CASTING -CW-PUMP~~	H			ISGEC	MUZAFER NAGAR	A		~~FINISHED CASTING UP TO 4.0 MT-~~	CW
					THE KOLHAPUR STEEL LTD,	KOLHAPUR	A		APPROX ~~FINISHED CASTING UP TO 4.0 MT-~~	
					~~WESTERN PRECICAST PVT LTD-~~	SANGLI	A		APPROX ~~FINISHED CASTING UP TO 3.5 MT-~~	
					HINDUSTAN UDYOG LIMITED	NAGPUR	A		APPROX ~~FINISHED CASTING UP TO 3.0 MT-~~	
					HI-MET CORPORATION	S.KOREA	A		APPROX ~~FINISHED CASTING UP TO 3.0 MT-~~	
					TULIP CASTING	KOHLAPUR	A		APPROX ~~WEIGHT UPTO 3.0 MT , DIA 1600 MM~~	
					MATHER FOUNDARY LTD	UK	A		~~FINISHED CASTING UP TO 3.6 MT-~~	
									APPROX	
19	~~SHAFT FORGING -CW-PUMP~~	II			GORADIA SPECIAL STEELS LTD	KHAPOLI	A			CW
					BHARAT FORGE	PUNE	A			
					GFPB,BHEL	HARIDWAR	A		~~UP TO DIAMETER 290MM AND- LENGTH APPROX. 3000MM, GRADE- SS410~~	
20	~~THRUST BEARING FOR CW-PUMP~~	I			MICHEL	BANGLORE	A			CW
					KMP	GREATER NOIDA	A			
21	DELUGE VALVE WITH TRIMS	I			HD FIRE	THANE/JALGAON	A			FDPS
					CARRIER	JALGAON	A		FOR PISTON TYPE DELUGE VALVE	
									ONLY	

 एन टी पी सी एक महारत्न कंपनी		PROJECT : SINGRAULI STPP STAGE-III (2X800 MW)					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00
		PACKAGE : EPC PACKAGES									DATE :10.07.2023
		CONTRACTOR:									SUB SECTION: C&I
		CONTRACT NO :									
Sr No	Item Description	QP Inspection Category	QP No	QP submis sion SCH	QP approv al SCH	Proposed Sub Supplier	Country	SS Approval_Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		III				~~Baldota Control and Equipment Pvt Ltd~~	Navi Mumbai	A			PT & DPT of LD 301 Series (SMAR)
		III				Yokogawa India Limited	Bengaluru	A			~~EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condonction (sensor assembly as a single unit) shall be soureed from M/S Yokogawa Japan~~
		III				~~M/s Endress + Hauser India Automation Instrument Pvt Ltd~~	Aurangabad	A			
		III				~~Emerson (Rosemount)~~	USA	A			
		III				~~Yokogawa~~	Japan	A			
		III				ABB	Germany / Italy	A			2600T & critical item from ABB Italy/ Their approved source;
		III				Siemens	France	A			Sitrans P-DSIII Series
		III				Fuji Electric	France	A			FCX-AIII SERIES
		III				Fuji	Japan	A			
13-B	~~Electronics Transmitter-Field Bus Based (Pressure, DP and DP-based Flow/Level-)~~										
		I				~~ABB India Ltd~~	Bengaluru	A			~~One no of Transmitter will be sent at DDCMIS supplier for function testing of field bus communication with DDCMIS during FAT~~
		I				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condonction (sensor assembly as a single unit) shall be soureed from M/S Yokogawa Japan
14	EQMS										
		I				SWAN	Hyderabad	A			1- Conductivity analyser, pH analyser and Temperature Transmitter will be of M/s ABB, UK make. 2- TSS analyser will be of M/s Daeyoon, South Korea make. 3- Oil in water analyser will be of M/s TriOs, Germany make. 4- Online BOD/COD analyser will be of M/s Shimadzu, Japan make. 5- Flow meter will be of M/s Khrone-Marshall, Maharashtra make. 6- Data Aquisition System will be procured from Knowledge Lens, Karnataka.
15	Fiber optic cable										
		Note-3				U M Cables Ltd	Silvassa (Daman)	A			
		Note-3				KEC International Ltd	Mysore	A			
		Note-3				Apar Industries Limited	Valsad (Gujrat)	A			
		Note-3				HFCL	Goa	A			
		Note-3				Aksh Fibre	Bhiwadi (Rai)	A			

		PROJECT : SINGRAULI STPP STAGE-III (2X800 MW) PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO :					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :10.07.2023 SUB SECTION: C&I
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		Note-3				Finolex Cable Ltd	Goa	A			
		Note-3				Birla Cable Limited	Rewa	A			
		Note-3				R&M	Switzerland	A			
		Note-3				Molex	UK	A			
		Note-3				Corning	USA	A			
16	Fire alarm Panel										
		II				Toshniwal Industrial Pvt Ltd	Ajmer	A			1.M/S Notifier Make Fire alarm Panel 2.PI Refer Note-07
		II				Bosch Security system	Bengaluru	A			1.Detector , Hooter, MCP, Modules, Panel shall be M/s Bosch Make
		II				Notifier	USA	A			
		II				Autronica	Norway	A			
		II				Schrack	Austria	A			
		II				Edwards	Mexico	A			
		II				Shield Fire safety and security Ltd	UK	A			
		II				Jhonson Controls	Mexico	A			Simplex Brand
17	Flame Monitoring System (Scanner)										
		I				~~Lucent Marcons Pvt Ltd (- System Integrator of M/S Forney Corporation USA-)~~	~~Noida~~	~~A~~			~~1.Flame detector, amplifier, light guide, fiber optic, smart display programming unit, test kit & simulator will be supplied from M/S Forney Corporation USA- 2.Other components like outer carrier, IDD cable with connector, expander, Y-connector with adapter gasket, fastners & signal isolators will be supplied from M/S Forney Corporation USA approved sources- 3.PI Refer Note-7~~
		I				~~HI Teeh System & services Ltd (- System Integrator of BFI Germany-)~~	~~Kolkata~~	~~A~~			~~1.For BFI Germany make system 2. PI Refer Note-7~~
		H				~~Durag India Instrumentation Pvt Ltd~~	~~Bengaluru~~	~~A~~			~~For Durag Germany make system~~
		H				~~Forney Corporation~~	~~USA~~	~~A~~			
		H				~~BFI~~	~~Germany~~	~~A~~			
		H				~~Durag GmbH~~	~~Germany~~	~~A~~			
		H				~~Emerson (COEN)~~	~~USA~~	~~A~~			
		H				~~BHEL~~	~~Trichurapalli~~	~~A~~			
18	Flow nozzle assembly										
		I				~~Microprecision Product Pvt Ltd~~	~~Palwal~~	~~A~~			~~Up to Alloy steel material grade P-92 & other conditions as per approval letter~~
		I				~~Mineo India Flow Elements Pvt. Ltd.~~	~~Goa~~	~~A~~			~~Up to size 26 Inches for Alloy steel/- Stainless steel pipe SA335 P-11, P-22 and SA 335 P-91 & other conditions as per approval letter~~
		I				~~Instrumentation Limited~~	~~Palakkad (Kerala)~~	~~A~~			~~Up to alloy steel grade P-92 subject to qualified WPS & other conditions as per approval letter~~

Note-3 - For fiber optic cable less than 10Km, Insp category is Cat-III, for Greater than 10km, insp category is Cat-II.

Note - 7 - If FAT is conducted indigenously, empty cabinets, signal isolator, multiplier & TB shall also be acceptable from owner accepted in QP.



SECTION-2

EQUIPMENT SPECIFICATION

Customer contract document is enclosed as part of this specification, and all details specification of applicable equipments covered under section-1 shall be adhered to customer's requirement given in section-2. Regarding quantities and type of Fire Detection & Protection System, section-1 shall be referred. In case of variance between section-1 and section-2, the requirement of Section-1 shall prevail **(except those points where specifically mentioned to follow customer specification strictly in this specification).**

Customer specification as annexure to section-2 shall strictly to be followed by contractor.

ANNEXURE - 2 TO SECTION - 2

**FIRE PROTECTION AND
DETECTION SYSTEM**

**SINGRAULI SUPER THERMAL POWER PROJECT
STAGE-III (2X800 MW)
EPC PACKAGE**

**TECHNICAL SPECIFICATION
SECTION-VI, PART-B
BID DOC. NO. CS-1150-001R-2**

CLAUSE NO.	TECHNICAL REQUIREMENTS												
	FIRE PROTECTION AND DETECTION SYSTEM 1.00.00 GENERAL DESCRIPTION 1.01.00 A comprehensive fire detection and protection system covering all the equipments/system/ buildings/areas of entire power plant under scope of the Bidder. 1.02.00 The complete Fire Detection and Protection Systems shall be as per the guidelines/ codes/ standards / rules of TAC/ NFPA / IS: 3034 /OISD, etc. 1.03.00 ~~Fire Water Source~~ ~~Water for the Fire Protection system shall be drawn from fire water storage tanks to be provided by the Bidder. Water for filling up the fire water storage tanks shall be drawn from the following two sources:~~ ~~a) From Circulating System blow down~~ ~~b) From raw water header as second source.~~ ~~Fill in line from above two sources shall be in the scope of Bidder. Bidder shall interconnect the same to each of the fire water tank through individual motorized isolation valve. Raw water make-up line to tanks shall be provided with Basket strainer & an isolation valve (Gate Valve) of suitable size.~~ ~~1.04.00 Pressurization System~~ ~~This system consists of electric motor driven jockey pumps.~~ 1.05.00 Minimum pipe size to be considered for hydrant and spray mains/ring headers shall be as follows: <table border="1" data-bbox="466 1034 1388 1227"> <thead> <tr> <th>Area</th><th>Minimum Pipe size in</th></tr> </thead> <tbody> <tr> <td>Along CD bay hydrant/spray</td><td>300NB</td></tr> <tr> <td>Along A row hydrant/spray</td><td>300NB</td></tr> <tr> <td>Between boiler &ESP hydrant/spray</td><td>300NB</td></tr> <tr> <td>Main ring from switchyard to ESP hydrant/spray</td><td>300NB</td></tr> <tr> <td>CHP area main ring hydrant/spray</td><td>300NB</td></tr> </tbody> </table> 2.00.00 HYDRANT SYSTEM Hydrant system shall consist of hydrant pumps, pressurization arrangement, water mains network, hydrant valves, landing valve, water monitors, hoses, branch pipes, nozzle, hose boxes, central hose houses etc. 3.00.00 HVW AND MVW SPRAY SYSTEM 3.01.00 General It shall consist of spray pumps, pressurization arrangements, water mains network, deluge valves, alarm valves, flow switches, isolation valves, Y-type strainers, spray nozzles/projectors, spray nozzles piping network, detection system, instrumentation, local control panels, cables etc. 3.02.00 Spray system shall mainly comprise of the following: - Automatic deluge valve (DV) assembly suitable size and trims - Isolation Valve (Gate Valve) with limit switch at the upstream & downstream of each DV. - Y-strainer of suitable size at upstream of each DV - S.S Spray nozzles - QB Detectors	Area	Minimum Pipe size in	Along CD bay hydrant/spray	300NB	Along A row hydrant/spray	300NB	Between boiler &ESP hydrant/spray	300NB	Main ring from switchyard to ESP hydrant/spray	300NB	CHP area main ring hydrant/spray	300NB
Area	Minimum Pipe size in												
Along CD bay hydrant/spray	300NB												
Along A row hydrant/spray	300NB												
Between boiler &ESP hydrant/spray	300NB												
Main ring from switchyard to ESP hydrant/spray	300NB												
CHP area main ring hydrant/spray	300NB												
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B SUB SECTION-A-18 Fire Detection & Protection System Page 1 of 16												

CLAUSE NO.	TECHNICAL REQUIREMENTS	
3.03.00 3.04.00 3.05.00 3.05.01 4.00.00 4.01.00 5.00.00 5.01.00	- 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 - 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. ~~For Stacker-Reclaimer machines: Water for spray system shall be tapped from hydrant header running along the stock-yard. For this, combination of butterfly valves & quick cam couplings (SS-304 construction) with one end flanged shall be provided at every 20M interval in the hydrant header running along the stock yard. Whenever, stacker-reclaimer is in stationary condition, a flexible hose (SS-304 construction) with suitable end coupling shall be connected to quick cam coupling installed on hydrant header. The other end of flexible hose shall be permanently connected to deluge valve.~~ ~~Criteria for taking two (2) spray pumps in service: While designing the HVW/MVW spray system for crusher house, LDO tanks, cable galleries TG Building & ESP Building where flow of one spray pump of 410m³/hr may not be adequate, operation of two (2) spray pumps shall be considered.~~ BLADDER TYPE FOAM PROTECTION SYSTEM GENERAL ~~The fixed foam system of bladder tank foam proportioning type consist of skid mounted foam bladder tank assembly, foam makers, discharge outlets, interconnection piping, valves, fittings and instrumentation. Semi-fixed system consisting of a separate foam solution ring main around the tank with foam hydrant valves at regular intervals shall also be provided in addition to the water hydrants.~~ ~~The operation of the fixed foam system shall be automatic with the aid of dedicated fire detection system provided in the tank. The semi-fixed system shall be operated through the foam hydrants/ monitors, portable type foam water monitors (wheeled type with in-built foam maker), hoses and nozzles for extinguishing spill fire in and around the tank area.~~ FIRE EXTINGUISHERS As indicated in Bidder's Scope (Refer Relevant Sub-section, Part A, Section VI). FIRE DETECTION, ALARM AND CONTROL SYSTEM Codes and Standards - The design, manufacture, testing, performance, etc. of the various components of the analog addressable Fire Detection and Alarm System shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the contractor of this responsibility. - Unless otherwise specified, the Fire Detection and Alarm System and the components shall conform to the latest applicable Indian or IEC Standards. Equipment complying with any other authoritative National Standards such as British, USA, VDE, etc. will also be considered, provided the parameters specified are equivalent or better than the corresponding IS. - The Contractor shall be solely responsible for obtaining the required approval and clearance for the different components and systems of the Fire Detection and Alarm System from the following authorities, as applicable:	
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 2 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS										
5.02.00	i. Department of Atomic Energy (Certification of safety from Radioactivity). ii. Central Building Research Institute, Roorkee. iii. Central Mining Research Station, Dhanbad. iv. Local Fire Authorities. The equipment and the system shall be of types approved by any of the following bodies, as applicable: a. Loss Prevention Council, (LPC), U.K. b. National Fire Protection Association, (NFPA), USA c. Under-writers laboratories, (UL), USA d. Factory mutual (FM)										
5.03.00	General requirements for all types of Detectors										
5.03.01	Detectors shall be provided with the necessary compression type cable terminating glands for the incoming cables of flameproof type or PVC/metallic flexible/rigid conduits.										
5.03.02	The detector shall be located where the largest combustion gas concentration can be expected.										
5.03.03	Adequate compensation and considerations shall be made for effects for wind velocities such as air-conditioning system and exhaust fans where dilution of particles of combustion is greater.										
5.03.04	The exact location of detectors shall be coordinated with other services like air-conditioning grills, light fittings, cable trays etc. to provide aesthetically pleasing appearance. The return air paths of air-conditioning shall be avoided for detector location.										
5.03.05	The detectors shall not be affected by temperature, humidity; air flow or by drift failures and shall not give any false alarm due to above.										
5.03.06	The detectors shall not be sensitive to vibrations. Any special mounting arrangements required to counteract vibration shall be included in the contractor scope.										
5.03.07	The quantity of multi- sensor detectors in each zone shall be based on the coverage factor of 25-sq. meter per detector. However, the actual quantity of detectors required, taking into consideration obstructions due to floor beams, ventilation, doors, windows etc., shall be worked out and supplied (based on the actual layout) and installed by the contractor.										
5.03.08	The detectors shall not give false alarm due to high humidity, temperature, and velocity of air in the surroundings and static electricity conditions.										
5.03.09	Process actuated switch devices such as pressure switches, flow switches, level switches, etc. shall be provided with suitable individual addressable interface (local or remote) units or modules so that these devices are addressable from the panel.										
5.04.00	~~Infra-red Detectors~~ <table border="1"> <tr> <td>~~Application~~</td><td>~~Detection of Moving Fire on Coal Conveyors/Biomass conveyor as well as hot spot beneath the surface~~</td></tr> <tr> <td>~~Sensor type~~</td><td>~~Infrared~~</td></tr> <tr> <td>~~Working voltage(detection)~~</td><td>~~24 V DC~~</td></tr> <tr> <td>~~Working voltage(purging)~~</td><td>~~230 V AC / 24V DC as applicable~~</td></tr> <tr> <td>~~Purging type~~</td><td>~~Air purging~~</td></tr> </table>	~~Application~~	~~Detection of Moving Fire on Coal Conveyors/Biomass conveyor as well as hot spot beneath the surface~~	~~Sensor type~~	~~Infrared~~	~~Working voltage(detection)~~	~~24 V DC~~	~~Working voltage(purging)~~	~~230 V AC / 24V DC as applicable~~	~~Purging type~~	~~Air purging~~
~~Application~~	~~Detection of Moving Fire on Coal Conveyors/Biomass conveyor as well as hot spot beneath the surface~~										
~~Sensor type~~	~~Infrared~~										
~~Working voltage(detection)~~	~~24 V DC~~										
~~Working voltage(purging)~~	~~230 V AC / 24V DC as applicable~~										
~~Purging type~~	~~Air purging~~										
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B SUB SECTION-A-18 Fire Detection & Protection System Page 3 of 16										

CLAUSE NO.	TECHNICAL REQUIREMENTS			एनटीपीसी NTPC	
5.05.00	Purging Unit		Either inbuilt blower or separate blower for purging		
	Location		Head of the conveyor		
	Features	1.	Ability to detect both black body and diffusion flame radiation.		
		2.	Reject electric arc, heaters, artificial light sources and sunlight etc		
		3.	Ability to function in heavily coal-dust prone atmosphere without regular maintenance		
		4.	Insensitive to vibrations		
	Annunciations		Trouble in purging, Fault Alarm, Trip LED, Power supply ON		
	Output Controls		Two nos. Change over contacts for Alarm & Trip		
	Accessories		Air purge unit including blowers, starter for blowers, hose pipe etc		
	Linear Heat Sensor Cables				
Application		Detection of Stationary fire			
Type		Digital			
Operating voltage		24 V DC			
Operating Temperature (Alarm):		70 Deg C for cable gallery 90 Deg C for conveyors			
Approval		FM/UL			
Conductor material		Steel			
Insulation		Heat sensitive polymer			
Outer Sheath		Black or colored PVC or flouropolymer suitable for the application environment			
5.06.00	Installation features for LHSC/IR detectors				
	1.	Mounting arrangement have been indicated in tender drawing.			
	2.	The detection zone/loop divisions of LHSC system shall match with MVW spray zones. Conveyors where LHSC shall be installed shall be divided into no. of various zones whereas conveyor for which IR detector is installed shall be considered as one zone.			
	3.	Linear heat sensing cable detector shall run in a zigzag fashion (with an included angle of 90 deg) on each top cable tray, bottom tray and every alternate intermediate trays of each section of cable tray without undue sagging and interfering the normal operations. All supporting materials for mounting of LHSC shall be provided by the bidder.			
	4.	Further, linear heat sensing (LHS) cable detector shall run in a zigzag fashion (with an included angle of 90 deg) in all vertical trays.			
	Addressable Analog Intelligent Detectors				
	In addition to the features specified under the item General requirements for all types of Detectors, the Addressable Analog Intelligent Detectors shall be provided with the following features:				
	a) Detectors not specifically listed for sensitivity testing from the control panel are not acceptable due to the expense involved with manual testing as required by NFPA 72E.				
	b) Each detector in a loop shall have short circuit isolator suitable for style-7 wiring as per NFPA-72.				
	c) The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system.				
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI PART-B		SUB SECTION-A-18 Fire Detection & Protection System	Page 4 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS	
5.07.00	Multi sensor Detectors	
5.07.01	Multi sensor detectors shall incorporate a heat detection element and a photoelectric detection element. Both the elements shall be incorporated in a single unit. Both the elements shall be operative at all times and the fire signal shall be available from any or both elements combined together.	
5.07.02	The detectors shall be sensitive to very low smoke densities of the order of say 0.05 g/m ³ . Also it shall be possible to adjust this sensitivity on a step less basis over a range so that the optimum sensitivity could be selected at site to suit the conditions of installations. The coverage area of the smoke detection under standard NFPA test conditions shall not be less than 80-90m ² .	
5.07.03	In areas such as false ceiling where detectors themselves are not easily accessible, the remote response indicators outside the enclosed areas shall be provided to indicate the fire condition.	
5.08.00	System Configuration	
5.08.01	Each of the Addressable Fire Alarm panel shall be able to communicate with one another as well as with repeater annunciation panel and PLC based control panels located at different places. The detectors or other devices of any other unit/area shall be addressable only from the respective Addressable Fire Alarm Panel, so that each of the Addressable Fire Alarm Panel is under the control of designated operating personnel at that location. Facility to operate pumps of booster pump house and fire water pump house shall be provided from PC based monitoring station.	
5.08.02	At least one spare loop shall be provided in each of the addressable type fire alarm panel located in control equipment room and in CHP control room with complete loop card and all other accessories so that Employer can expand the system in future. Further, at least 10% of loop capacity be left free in each of the connected loop in all the panels, so that, additional devices may be connected to the system in any of the loop by Employer in future.	
5.08.03	Fire system (as a whole including PLC control systems) shall be provided with necessary interface hardware and software for dual fibre optic connectivity & interconnection with station wide LAN for two –way transfer of signals for information sharing. The information shall be made available through Ethernet link following TCP/IP standard. The system shall be OPC compliant. All required plant data shall be transferred ensuring complete security. The exact number of points shall be finalized during detailed engineering.	
5.09.00	Analog Addressable Fire Detection and Alarm System	
5.09.01	General Requirements	
5.09.02	This specification in general covers the functional requirements, and general design aspects of Microprocessor based, Analog Addressable Fire Detection Alarm / Annunciation and Control System.	
5.09.03	The following description intends to describe only the brief hardware and functional requirements, scope of hardware requirements etc. but the actual configuration of the system shall be in line with the prevalent normal practices in the industry and shall conform to latest product range of selected manufacturer. The fire detection and control system offered shall be complete in all respects for the safe and reliable operation of the entire system. Any additional hardware/software than those	
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 5 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS	
	mentioned herein required to make the system complete shall be included in the scope of the Bidder.	
5.09.04	Conventional detectors with interface modules are not acceptable. Each zone of LHSC detector and each IR detector shall be provided with interface module.	
5.09.05	All the fire detection systems, process actuated switch devices such as pressure/ flow/temperature switches and relays of control functions shall be hooked up with the analogue addressable fire detection and alarm system. Required addressable interface units shall be provided for various switch devices by the bidder to make them addressable.	
5.09.06	Bidder shall provide isolators at the start & end of the loop.	
5.09.07	The complete system shall include, but not be limited to the following: - Master system CPU. - Analog Addressable Fire Detection and Alarm System panels including alarm modules, system supervisory control modules, auxiliary output control modules etc. ~~PC based monitoring station with colour graphic display terminal with programming and historical archiving facility along with laser printer.~~ - Power supplies, batteries and battery chargers. - Analog addressable type smoke detectors. ~~Non addressable type conventional detectors (Linear heat sensing cable detector/ infra red type heat detector) and switching devices each with its own addressable interface modules.~~ - Software and hardware as required for complete operation of the system. - Complete Wiring/cabling including its conduits/trays/fixtures etc.	
5.10.00	System Functional Requirements	
5.10.01	The fire alarm panel shall evaluate the signals received from the detectors and shall handle the following functions: - System self monitoring and fault signaling. - Transmission of alarm and fault signals to the respective fire alarm panels and as well as in the repeater panel in fire station. Further, the panel shall activate a hooter/sounds in each of the area locally provided with fire/smoke detection system. Further, the system shall enable operation of spray system from the panel through monitoring station when the system operation is selected under remote, manual mode. - Initiate control functions like stoppage of conveyor, closure of fire doors, shutdown of draft fans, air-conditioning and ventilation plant/ equipment, opening smoke extraction vents, switching on smoke extraction equipment, emergency lighting etc. - Triggering stationary extinguishing systems such as clean agent system. - Supervising of unauthorised removal of a detector head from its base and giving a fault alarm on the control panel. - Supervising and monitoring the detection cabling, to indicate fault conditions in case of open/short circuit in the wiring. - Supervising by a separate annunciation window, changeover from mains supply to battery supply. "Mains On" indication shall be continuously on, as long as the main supply is available. - Facilitating simulation of fire conditions to enable the testing of circuits (without creating actual fire) under the test mode from the fire Alarm panel. - The control unit shall contain all the systems main switches lamps and fuses. Switches and lamps shall be easily identified even in closed casings.	
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 6 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS			
5.10.02	10. All the circuits from the detectors to the panels and the circuits from panels to the actuating/operating devices of the respective extinguishing system shall be of closed loop type and shall be supervised for open-circuiting and short-circuiting of cables. The cable fault shall be audio-visually annunciated on the panels. Separate hooters with different tones shall be provided for 'fault' alarms and 'fire' alarms. 11. Actuate solenoid valve in spray system in case of fire from respective fire alarm panel. For achieving this if any additional hardware is required like relays, power supply and cables, the same may be provided.			
	Analog Addressable Fire Detection and Alarm System shall also meet the following functional requirements:			
	i.	Each of the system shall support analog addressable detectors of all types, non-addressable type detectors/devices along with its addressable interface units/modules, Video display units etc.		
	ii.	Each of the devices and/or detectors shall be individually, uniquely and continuously addressable by the panel to which it is connected.		
	iii.	Detectors shall be interrogated for sensitivity settings from the control panel, logged for sensitivity changes indicating the requirement for cleaning and tested by a single technician using the field test routine. Sensitivity of each of the detectors made available in the panel shall be adjustable from the panel.		
	iv.	The system shall be capable of self-adjustment to compensate for the accumulation of contaminants that would change the detector sensitivity in either a more or less sensitive direction to prevent false indications or failure to alarm in the actual fire conditions. The system shall annunciate a trouble condition when any analog addressable smoke detector reaches 80% of its alarm threshold due to gradual contamination, signaling the need for service and eliminating unwanted alarm.		
	v.	Continuous supervision/monitoring of all the circuits and its components shall be made available from the panel for open, short circuits and grounding.		
	vi.	The system shall be able to recognize and indicate and alarm condition in a degraded mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.		
	vii.	The system shall be programmable at site and required hardware shall be included in the scope of supply. The system software Programs shall be password protected and shall include full upload and download capability. During program upload or download the system shall retain the capability for alarm reporting. The system shall download to a PC for program editing. The software shall eligible employer to add the spare loop provided in the fire alarm panel or addition of additional devices/detectors in and of loop in any of the fire alarm panel.		
	viii.	The system shall support the use of color interactive History Reporting video display terminal for the display of information in an appropriate format.		
	ix.	The system shall include software for system database, historical event log, logic and operating system. The system shall require no manual input to initialize in the event of a complete power down condition. It shall return to an on line state performing all programmed functions upon power restoration.		
	x.	Software logic modules and system database shall be programmable using a windows compatible program on PC. It shall be possible to program or edit the system database off site after down loading from the panel.		
	xi.	All detectors shall incorporate internal automatic temperature compensation to overcome the effects of either high or low ambient temperatures in the installed environment on the detector sensitivity. The detectors shall be tested at a specified frequency by raising the detector sensitivity level to the alarm threshold, to check the operation of the detector without system alarming automatically by the control panel.		
	xii.	In an alarm or trouble condition the following shall occur on the monitoring		
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI PART-B		SUB SECTION-A-18 Fire Detection & Protection System Page 7 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS			
5.11.00		station:		
	1.	Sound an audible.		
	2.	Write details of the actuation to a system log file on the PC.		
	3.	Print the details of the actuation to the system printer.		
	4.	Activate the color graphic display system controls, providing functions such as zooming, scrolling of Alarms, troubles, etc.		
	xiii.	System configuration shall be menu driven and capable of being operated by a person with no previous computer programming experience.		
5.11.00	Panel Display Requirements. System display shall consist of minimum 80 character back lighted alphanumeric LCD display readable at any angle. Thirty-two character customer defined custom messages shall describe the location of the active device. In addition to the above, the following features shall be available. a. The system shall be capable of programming to allow troubles occurred and restored in the system to be automatically removed from the display queue, eliminating the necessity for individual acknowledging of these events. This feature shall not affect the historical logging of events as programmed. b. As a minimum an LED display for “Alarm”, “Audible Silenced”, “Supervisory”, “Trouble”, “Security”, “Power On”, And “Partial System Disabled”. c. Touch activated membrane switches for “Alarm Acknowledge”, “Audible Silence”, “Supervisory Acknowledge”, “Security Acknowledge”, “Reset”, “Display Hold”, And “Display Next”. d. All membrane switches shall be tactile with audible feedback when pressed.			
5.13.00	Power Supply for Fire Alarm Panels & Repeater Alarm Panel			
5.13.01	One set of 24V DC redundant power supply system comprising of 2 x 100% chargers and 1 x 100% batteries shall be provided for each fire alarm panel and repeater alarm panel. The batteries for fire alarm system shall be sealed maintenance free lead acid type. The battery backup for each fire alarm panel and repeater alarm panel shall be 24 hours and 30 minutes (in alarm conditions). At least 25% of the devices shall be considered to be active in alarm conditions. Each of the redundant chargers shall be sized to meet connected load requirements and keep the connected batteries full charged (Float Mode). Furthermore, the charger shall be sized to enable the boost charge of a fully discharged battery in 10 hours while feeding the load.			
5.13.02	The batteries shall be sized as per relevant IEEE standard. For battery sizing calculation, an aging factor of 0.8, a temperature correction factor (based on temperature of 4 deg. C), voltage drop of 2V in cables. Capacity factor, Float Correction Factor, as per Battery Supplier Standard, shall be taken into consideration, if applicable and ambient temperature shall be considered as the electrolytic temperature. The sizing of the battery shall be as approved by Employer during detailed engineering.			
5.13.03	The battery chargers and batteries shall be placed at a suitable location inside the fire alarm panel with partitions.			
5.13.04	The detailed specification related to power supply system of fire detection & protection system shall be as specified in other sections of the technical specification.			
5.14.00	Control & Instrumentation requirements			
5.14.01	The specification for PLC control system for fire protection system shall be as specified in other sections of the technical specification.			
5.14.02	The specification for PC, printer and other HMI items shall be as specified in other sections of the technical specification.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI PART-B		SUB SECTION-A-18 Fire Detection & Protection System
				Page 8 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS		एनटीपीसी NTPC																	
5.14.03	The specification related to Basic design criteria, Measuring Instruments, Process connection & piping, Control panels, Type test requirements etc shall be as specified in other sections of the technical specification.																			
5.15.00	Cabling for fire alarm system All instrumentation cables twisted & shielded, FRLS PVC insulated and sheathed data highway / fibre optical cables, short term fire proof cables including prefabricated cables (with plug-in connectors) etc shall be provided by Contractor. The contractor shall follow the cable philosophy as below: <table><tr><th colspan="2">Application</th><th rowspan="2">Type of cable</th></tr><tr><th>From</th><th>To</th></tr><tr><td>PLC cabinets</td><td>PC, Printers etc.</td><td>As Mfr.'s Standard. However, connection between PLC and the remote I/Os shall be through fibre optic cable by Bidder if length is>300 M & coaxial cable if length<300 M</td></tr><tr><td>Detectors (including detectors mounted inside panels) /Any loop device</td><td>Detector (including detectors mounted inside panels) / Isolator/ Interface unit</td><td>Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.</td></tr><tr><td>Detectors (including detectors mounted inside panels) / Isolator / Interface Unit</td><td>JB</td><td>Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.</td></tr><tr><td>JB</td><td>Fire alarm Panel</td><td>Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.</td></tr></table> Notes: 10% spare pair shall be provided for all cables having more than four pairs. - Type "S" cable shall be multicore control cable having overall shielding & specification similar to instrumentation cable except insulation thickness and voltage grade which shall be 1100 V. Type "S" cable shall also satisfy requirements of Article 760 of NFPA 70. - Over and above, contractor may note that short term fire proof cables shall be provided for coal handling plant and inert gas protected areas. Short term fire proof cables shall be Mineral insulated copper conductor and copper sheathed type satisfying requirements of Fire resistance, safety in the industrial application areas mentioned in the specification and also, shall be approved by UL standards and certified by LPCB. The contractor shall provide all the cables so as to complete the system - Cable size of 2 core 1.5 sq.mm shall be used for loop wiring in-case of both control cable and short term fire proof cable. - Cable size of 2 core 2.5 sq.mm shall be used to provide power supply to various devices in the loop in-case of both control cable and short term fire proof cable. - The detailed specification of instrumentation cables and optical fiber cable shall be as specified in other sections of the technical specification. - Detector cables outside the building shall be corrugated steel taped armoured laid through cable trays wherever available and for rest of the areas, cable shall be buried at 600 mm depth with sand filling and brick covering at the top. - Detector cable within the building shall be either unarmoured & laid through galvanized iron (GI) conduits or armoured cables, as per the standard and proven practice of the manufacturer.			Application		Type of cable	From	To	PLC cabinets	PC, Printers etc.	As Mfr.'s Standard. However, connection between PLC and the remote I/Os shall be through fibre optic cable by Bidder if length is>300 M & coaxial cable if length<300 M	Detectors (including detectors mounted inside panels) /Any loop device	Detector (including detectors mounted inside panels) / Isolator/ Interface unit	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.	Detectors (including detectors mounted inside panels) / Isolator / Interface Unit	JB	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.	JB	Fire alarm Panel	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.
Application		Type of cable																		
From	To																			
PLC cabinets	PC, Printers etc.	As Mfr.'s Standard. However, connection between PLC and the remote I/Os shall be through fibre optic cable by Bidder if length is>300 M & coaxial cable if length<300 M																		
Detectors (including detectors mounted inside panels) /Any loop device	Detector (including detectors mounted inside panels) / Isolator/ Interface unit	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.																		
Detectors (including detectors mounted inside panels) / Isolator / Interface Unit	JB	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.																		
JB	Fire alarm Panel	Shielded, Twisted, PVC Cu. FRLS cables type "S" Refer Note 2, 3, 4 and 5 below.																		
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 9 of 16																	

CLAUSE NO.	TECHNICAL REQUIREMENTS	
5.16.00	Detection System for Conveyors i) ~~Linear Heat Sensor Cables for coal/biomass/limestone & gypsum conveyors:~~ a) ~~The LHS cable detector for each conveyor to be provided for both forward and return conveyors and shall be mounted as per the standard practice of the manufacturer/supplier. Suspension of LHSC through flexible chains is a preferred arrangement. Further, LHS cable shall also be provided for return side of conveyors inside the bunker house.~~ b) ~~The detection zone/loop divisions of LHSC system shall match with the MVW spray system.~~ c) ~~Upon detection of fire either by QB detector or LHSC detector, the spray system shall be initiated. It shall also initiate spray system for the two adjacent zones after a time delay settable at site.~~ d) ~~The LHSC detector shall be provided with suitable interface unit, which shall generate/ make the signal compatible with fire alarm panel.~~ ii) ~~Infra Red Detector for coal/biomass conveyors:~~ (a.) ~~The infra red type (IR) detectors shall be suitable for detecting moving fires in conveyors. The IR detector shall stop the conveyor upon detection of fire and give audio-visual annunciation locally and in fire alarm panel.~~ (b.) ~~Each of the IR detector shall be provided with its own purging arrangement using blowers, hoses, etc and required power supply shall be derived from the fire alarm panel. Alternatively, bidder may offer separate blowers (2x100%) for purge air supply for all the detectors and the complete air piping from the blowers to each of the IR detector shall be provided by the bidder.~~	
5.17.00	Detection System of Cable Galleries & Cable Trestles i) ~~In cable galleries, MVW spray system shall be actuated either by detection of fire by Linear Heat sensing cable detectors or by fire signal from Multisensor detection system. Apart from the automatic operation of spray system in the detected zone, the adjacent two zones shall also be sprayed with water automatically after a set time delay simultaneously.~~ ii) ~~In cable trestle, MVW spray system shall be actuated by detection of fire by Linear Heat sensing cable detectors. Apart from the automatic operation of spray system in the detected zone, the adjacent two zones shall also be sprayed with water automatically after a set time delay simultaneously.~~ iii) ~~The detection zone/ loop divisions shall match with MVW spray zones.~~	
5.18.00	Multisensor Detection System i) Upon detection of fire, multisensor detector shall be annunciated in the respective panels and shall activate a local hooter/sounder in the areas where fire is activated and this fire signal shall be employed to initiate the fire extinguishing system of that area such as automatic MVW spray system of cable galleries, fire extinguishing system of Control rooms/Control Equipment Rooms. ii) Cross zoning of the signal from two adjacent multisensor detectors shall be employed to initiate the fire extinguishing system of inert gas protected areas and MVW spray system of cable galleries. iii) Multisensor detector shall be provided for return air ducts of main plant, which shall consist of intake probe, detector housing, and exhaust pipe etc. The detector shall be mounted outside the duct. iv) The design coverage area for detectors (to be considered) shall not exceed 25 Sq.M. for each detector.	
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 10 of 16

CLAUSE NO.	TECHNICAL REQUIREMENTS			
8.00.00 8.01.00	xii) ~~Main fire water storage tanks: Two numbers each of 50% capacity vertical cylindrical column supported fixed cone roof type fire water storage tanks made of MS alongwith foundation shall be provided by the bidder. To avoid vacuum creation inside the tank, two (2) nos. vents each of size 300 NB shall be provided on the roof of the tanks. Bidder shall ensure that the total capacity of fire water storage tank shall be as per the recommendation of TAC with a minimum capacity of each tank equal to 2300 m³. Each tank shall be provided with ultrasonic type level transmitter and level indicators, etc.~~ PIPING AND VALVES General Data for Pipes etc. i) Mild steel as per IS:1239 (Part-I) heavy grade (upto 150 NB) & as per IS:3589 Gr 410 (above 200 NB) or Equivalent for pipes normally filled with water. ii) Mild steel as per IS:1239 (Part-I) heavy grade (upto 150 NB) & as per IS:3589 Gr.410 (above 200 NB) or Equivalent and galvanised 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 / pipes in trench shall be properly lagged with corrosion protective tapes of coal tar type as per IS:15337 or AWWA C 203. The total thickness of protective tapes to be applied on buried pipes / pipes in trench shall be 4.0mm. This can be achieved by using 4.0mm thick tape in single layer or 2.0mm thick tape in double layer. iv) Pipe thickness: a) For Pipe sizes upto 150 NB: As per IS:1239 Part-I heavy grade. b) For Pipe sizes 200 NB and above refer Annexure-I. 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. Further, all gate/butterfly valves of size 200 mm & above shall be provided with spur gear reduction unit. vi) All the flanges and counter flanges shall conform to ANSI B 16.5 CI 150. vii) Strainer Body as per IS: 2062 (tested). viii) Pipe Fittings 1) 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, galvanised malleable cast iron fittings as per IS:1879 in Cast iron fitting as per BS-1641 are also acceptable. 2) Grooved couplings: Vendor may also use mechanical grooved couplings type fittings in GI pipe lines for HVW / MVW spray system. 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. 3) The fittings shall be galvanised as per IS: 4736 for galvanised 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. 4) 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 galvanised 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.			
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System	Page 12 of 16	

CLAUSE NO.	TECHNICAL REQUIREMENTS										
9.00.00	PAINTING										
9.01.00	All the Equipments shall be protected against external corrosion by providing suitable painting.										
9.02.00	The surfaces of stainless steel, Gunmetal, brass, bronze and non-metallic components shall not be applied with any painting.										
9.03.00	Fire Water Storage Tanks: - The Contractor shall clean the tank plates and structure steel before erection by wire brushing and air blowing. After erection of tank and hydro testing, tanks are subjected to surface preparation and painting as per procedure detailed below: Surface Preparation: Outside/inside surface preparation shall be carried out by shot blasting as per SA2 ½. Inside surface painting: One coat of epoxy zinc phosphate primer of min. DFT of 30-35 micron followed by three (3) coats of epoxy resin based finish paint with 25 micron as thickness of each coat. Outside surface painting: One coat of epoxy zinc phosphate primer of min. DFT of 30-35 micron followed by three (3) coats of epoxy resin based finish paint with 25 micron as thickness of each coat. Outside bottom surface painting: One coat of epoxy zinc phosphate primer of min. DFT of 30-35 micron followed by three (3) coats of coal tar epoxy paint with 25 micron as thickness of each coat.										
9.04.00	All Steel Surfaces (external) exposed to atmosphere (outdoor installation) Surface Preparation: The steel surfaces to be applied with painting shall be thoroughly cleaned before painting by wire brushing, air blowing, etc. 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. For plant at coastal area, epoxy resin based zinc phosphate primer followed by epoxy resin based paint pigmented with titanium di-oxide shall be used in place of enamel paints.										
9.05.00	All Steel Surfaces (external) inside the building (indoor installation) Surface Preparation: The steel surfaces to be applied with painting shall be thoroughly cleaned before painting by wire brushing, air blowing, etc. Painting: One (1) Coat of red oxide primer of thickness 30 to 35 microns followed up with two (2) coats synthetic enamel paint, with 25 microns as thickness of each coat. For plant at coastal area, epoxy resin based zinc phosphate primer followed by epoxy resin based paint pigmented with titanium di-oxide shall be used in place of enamel paints.										
9.06.00	Deluge Valves, Alarm Valves, Foam monitors, Water monitors, Foam Proportioning equipments, Foam makers, etc. Painting of all equipments/.components of FDPS package shall be as per manufacturer's standard practice or as detailed below whichever is superior in quality. <table border="1" data-bbox="355 1765 1409 1926"> <thead> <tr> <th>Environment</th><th>Paint scheme</th><th>Total DFT</th></tr> </thead> <tbody> <tr> <td>Normal / Mild Corrosive Environment</td><td>Primer- zinc filled epoxy Finish – Aliphatic Polyurethane (shade RAL3000)(P.O Red)</td><td>Min 125 microns</td></tr> <tr> <td>Corrosive Environment</td><td>Primer- zinc filled epoxy</td><td>Min 200 microns</td></tr> </tbody> </table>	Environment	Paint scheme	Total DFT	Normal / Mild Corrosive Environment	Primer- zinc filled epoxy Finish – Aliphatic Polyurethane (shade RAL3000)(P.O Red)	Min 125 microns	Corrosive Environment	Primer- zinc filled epoxy	Min 200 microns	
Environment	Paint scheme	Total DFT									
Normal / Mild Corrosive Environment	Primer- zinc filled epoxy Finish – Aliphatic Polyurethane (shade RAL3000)(P.O Red)	Min 125 microns									
Corrosive Environment	Primer- zinc filled epoxy	Min 200 microns									
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION-VI PART-B	SUB SECTION-A-18 Fire Detection & Protection System Page 13 of 16									

CLAUSE NO.	TECHNICAL REQUIREMENTS			एनटीपीसी NTPC
10.00.00	(as in coastal areas)	Intermediate – Epoxy MIO Finish – Aliphatic Polyurethane (shade RAL3000)(P.O Red)		
	The hydrant and spray lines shall be overground. It shall be laid either on pedestals, trestles etc. However, if the layout does not permit laying of overground pipe in that case it shall be laid underground with the approval of Engineer.			
	MULTIPURPOSE NOZZLE			
	The multipurpose nozzle should be such that water under pressure is applied on fire in the form of a jet, spray or fog. Material of construction for multipurpose nozzle shall be as per manufacturer’s standard.			
11.00.00				
12.00.00	TYPE OF BUILDINGS			
	Sl. No.	Area/Facility	Type of building	
	1.	Fire Water Pump House	The fire water pump house shall be single storeyed and single bay RCC superstructure. The building shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and supply & exhaust air fans.	
	2.	Fire Water Booster Pump House	The fire water Booster pump House shall be housed in a shed. Sides shall be fully covered with external brick wall with provision for doors, windows, rolling shutters and supply & exhaust air fans.	
	3.	Foam System Shed	Shed with roof covering and side walls shall be provided for foam system including associated civil works for foam bladder tank foundations, grade slab, pipe pedestals, etc.	
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE				
TECHNICAL SPECIFICATIONS SECTION-VI PART-B				
SUB SECTION-A-18 Fire Detection & Protection System				
Page 14 of 16				

PIPING THICKNESS:

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

Nominal pipe Size (mm)	Outside Diameter (mm)	Wall Thickness (mm)
200 NB	219.1	6.3
250 NB	273	6.3
300 NB	323.9	7.1
350 NB	355.6	8.0
400 NB	406.4	8.0
450 NB	457	8.0
500 NB	508	8.0
600 NB	610	8.0

CLAUSE NO.	TECHNICAL REQUIREMENTS					एनटीपीसी NTPC
	Annexure-II					
	Technical Data:					
	1. Main Fire Water Pumps					
	Description	Hydrant	Spray	Hydrant Booster	Spray Booster*	Jockey
	Number of pumps	4(3 motor driven & 1 diesel engine driven)	3 (2 motor driven & 1 diesel engine driven)	2 (1 motor driven & 1 diesel engine driven)	2 (1 motor driven & 1 diesel engine driven)	2 (both motor driven)
	Design Capacity	410 m³/hr	410 m³/hr	171 m³/hr	410 m³/hr	75 m³/hr
	TDH of pump (MWC)	105 (min) or as per system reqt.	105 (min) or as per system reqt.	45 (min) or as per system reqt.	45 (min) or as per system reqt.	105 (min) or as per system reqt.
	MOC	Casing: IS:210 Gr. FG 260 (2.5% Ni), Impeller: Bronze IS:318 Gr.II, Impeller shaft, coupling: SS316				
	2. Hydrant Valve	Oblique female type as per IS:5290				
		MOC: Body/bonnet/stop valve/valve seat/trim : SS304/SS316				
	3. Water monitor	As per IS:8442 Type-I, Size: 75mm, Nozzle dia: 38mm				
		MOC: Water barrel/reducer/elbow: CS (seamless)/SS Nozzle: Copper alloy / SS confirm in to IS:3444				
	4. Water branch pipe & nozzle	As per IS:903 / IS:2871				
		MOC: Branch pipe: SS316 (Gr 4 of IS:3444) (both ends) Nozzle : SS316 (Gr 4 of IS:3444), Size: min 16mm & max 25mm				
	5. Water line Gate / Sluice Valve	- Design Code: a) IS:14846 or BS:5150 (for valves coming inside fire water pump house) b) BS:5150 (for valves at other locations) - Pressure rating: PN1.6 (as per IS:14846) / PN16 (as per BS:5150) -Working Pr. :12Kg/cm2				
		MOC: Body/bonnet/Yoke/Wedge: CI to IS:210 FG-200 Spindle: SS to ASTM-A-276 type 410				
	6. Check Valve	Below 50NB size			50NB & above	
		Design Code; IS:778 (below 50NB)			IS:5312 / BS:5153	
		MOC: Body/cover/flap: Lead tin bronze to IS:318 Gr. LTB-2			CI to IS:210 FG-200	
	7. Butterfly Valve	Design Code: Double flanged or lugged wafer type of low leakage rate confirming to BS:EN:593/API-609/AWWA C-504 Pressure class: PN 16				
		MOC: Body & Disc: Cast Iron, Shaft: SS 410 / SS 420 Seat Rings: EPDM				
	Note: *In case of front mill configuration, fire water spray booster pumps shall not be provided if found not required during detailed engg. However, in that case, TDH of main spray shall be 120MWC (minimum).					
SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2X800 MW) EPC PACKAGE		TECHNICAL SPECIFICATIONS SECTION-VI PART-B		SUB SECTION-A-18 Fire Detection & Protection System		Page 16 of 16



SECTION- 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

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, equipment and services covered under other sections of tender documents 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 prevail.

3.1 PROJECT DETAILS

	Particular	Details
a)	Customer	NTPC Ltd.
b)	Project Title	Singrauli Super Thermal Power Project Stage- III (2x800MW): 400kV GIS Switchyard at Singrauli STPP
c)	Project Location	Place: Singrauli District: Sonebhadra State: Uttar Pradesh
d)	Latitude & Longitude	Latitudes and Longitudes of the site are as follows: Latitude: 24.1990° N Longitude: 82.6676° E
e)	Nearest Railway Station	Shaktinagar Station (3.0 Km)
f)	Distance of project location from the Railway station	Nearest Railway Station is Shaktinagar Station which is About 3Km from Singrauli STPP. Other Nearby Important Stations are Renukoot Junction About 60 Km, Mirzapur Station About 198 Km, Mughal Sarai Junction About 196 Km and Varanasi Cantt About 202Km.
g)	Nearest Major Town	Nearest major city is Renukoot, located at a distance of 60Km to the project.
h)	Distance of the town from the project site	60Km
i)	Nearest commercial airport	Lal Bahadur Shastri International Airport, Varanasi
j)	Distance of airport from the project site	220km by Road
<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 1000meter
d)	Pollution Severity	Heavily polluted
e)	Criteria for Wind Resistant design	Standard Applicable - IS 875 (Part 3)



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 3

	of structures and equipment	
f)	Basic Wind speed “Vb” at ten meters above the mean ground level.	47m/sec
g)	Category of terrain	Category-2
h)	Risk Coefficient “K1”	1.07
i)	Seismic acceleration	0.3g

3.1.1 SYSTEM PARAMETERS:

Sl.No.	Parameters	400kV
1	Highest system voltage	420kVrms
	Rated/ nominal system voltage	400kVrms
2	Lightning Impulse voltage (Phase to earth & between phases)	±1425kVp
	Across isolating distance	1425(+240)kVp
3	Switching impulse voltage (Phase to earth)	±1050kVp
	Across isolating distance	900(+345)kVp
4	Power frequency withstand for 1 min (rms) (Phase to earth & between phases)	815kVrms
	Across isolating distance	815kVrms
5	Max. fault level (1 sec.)	63 kA
6	Minimum creepage distance (31mm/kV)	13020 mm

3.1.2 AUXILIARY POWER:

Sl.No.	Nominal Connection Voltage	Variations in Voltage	Frequency	Phase	Neutral
1	415V	±10%	50 (+3% -5%)	3Phase, 4 Wire	Solidly Earthed
2	240V	±10%	50 (+3% -5%)	1 phase	Solidly Earthed

Combined variation of voltage and frequency shall be + 10%. Design fault level of 415V system shall be restricted to 50kA rms for 1 second.

The operational limits for variation of DC voltage are (+) 10% to (-) 15%.

- 3.1.3 The towers and gantries shall be suitable for a normal conductor tension of minimum 2T/conductor in case of twin moose and 1.5T/conductor in case of quad moose conductor. The foundations and structures etc. shall be designed accordingly.

The minimum vertical distance from the bottom of the lowest porcelain part of the bushing, porcelain enclosures or supporting insulators to the bottom of the equipment structure, where it rests on the foundation pad shall be 2550 mm. All gantries and towers (including intermediate/required for turning etc.) as required for GT & ST O/H stringing & its anchoring on A-Row column of TG Building and line take off, are to be provided by the contractor. Minimum height of 400KV gantry for AIS shall be 16M+8.5MPeak however intermediate gantry height for O/H connection for GT shall be min. 22m+8.5m. Minimum



height of 400KV AIS equipment level shall be 8.0M from the plinth level. The gantry width for 400kV AIS shall

be min. 27 mt. In case of space constraint in the switchyard, the bidder may design considering the bay width of <27mtr for 400KV Level subjected to meet the statutory electrical clearances etc.

Various minimum heights of the 400KV AIS switchyard shall be as given below from plinth level:

Voltage	Equipment /1 st Level	2 nd Level	3 rd Level
400KV (1½ breaker scheme)	8000mm	16000mm	2300mm

3.1.4 The minimum clearances for 400kV switchyards shall be as given below:

	400kV
Phase to earth clearance	3500 mm
Phase to phase clearance	4000 mm
Section clearance	6500 mm

3.2 INSTRUCTION TO BIDDERS:

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

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

The supplier should be approved by Customer/ Employer. If not, it is the responsibility of the bidder/ vendor to be assessed and approved Customer/ Employer, before placement of order by BHEL. Any cost involved in bidder/ vendor assessment/approval must be borne by the bidder/ vendor himself.

The Bidder's proposal shall be based upon the use of equipment and material complying fully with the requirements specified herein. It is recognized that the Bidder 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 the base offer is in line with technical specifications and such proposals meet the specified design standards and performance requirement and are acceptable to the Purchaser. Sufficient amount of information for justifying such proposals shall be furnished to Purchaser along with the bid to enable the Purchaser to determine the acceptability of these proposals.

Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Bidder/ vendor, the specific name mentioned shall be understood to be indicative of the function and quality desired and not restrictive. Other manufacturer's



products may be considered provided sufficient information is furnished to enable the Customer/ Employer to determine that the products proposed are equivalent to those named.

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.

3.3 CODES AND STANDARDS

In addition to the codes and standards specifically mentioned in the relevant technical specifications for the equipment/ plant/ system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following:

- a) Indian Electricity Act
- b) Indian Electricity Rules
- c) Indian Explosives Act
- d) Indian Factories Act and State Factories Act
- e) Indian Boiler Regulations (IBR)
- f) Regulations of the Central Pollution Control Board, India
- g) Regulations of the Ministry of Environment & Forest (MoEF), Government of India
- h) Pollution Control Regulations of Department of Environment, Government of India
- i) State Pollution Control Board.
- j) Rules for Electrical installation by Tariff Advisory Committee (TAC).
- k) Building and other construction workers (Regulation of Employment and Conditions of services) Act, 1996
- l) Building and other construction workers (Regulation of Employment and Conditions of services) Central Rules, 1998



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 6

- m) Explosive Rules, 1983
- n) Petroleum Act, 1984
- o) Petroleum Rules, 1976,
- p) Gas Cylinder Rules, 1981
- q) Static and Mobile Pressure Vessels (Unified) Rules, 1981
- r) Workmen's Compensation Act, 1923
- s) Workmen's Compensation Rules, 1924
- t) NTPC Safety Rules for Construction and Erection
- u) NTPC Safety Policy
- v) CERC (Indian Electricity Grid Code) Regulations, 2023
- w) CEA (Flexible Operation of Coal Based Thermal Power Generating Units) Regulations, 2023
- x) Any other statutory codes / standards / regulations, as may be applicable.

Unless covered otherwise in the specifications, the latest editions (as applicable at the date fifteen (15) days prior to the date of bid submission), of the codes and standards given below shall also apply,

- a) Bureau of Indian standards (BIS)
- b) Japanese Industrial Standards (JIS)
- c) American National Standards Institute (ANSI)
- d) American Society of Testing and Materials (ASTM)
- e) American Society of Mechanical Engineers (ASME)
- f) American Petroleum Institute (API)
- g) Standards of the Hydraulic Institute, U.S.A.
- h) International Organization for Standardization (ISO)
- i) Tubular Exchanger Manufacturer's Association (TEMA)
- j) American Welding Society (AWS)
- k) National Electrical Manufacturers Association (NEMA)
- l) National Fire Protection Association (NFPA)
- m) International Electro-Technical Commission (IEC)
- n) Expansion Joint Manufacturers Association (EJMA)
- o) Heat Exchange Institute (HEI)
- p) IEEE standard
- q) JEC standard

Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Customer/ Employer's approval, for which the Bidder shall furnish, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English.

As regards highly standardized equipment such as Steam Turbine and Generator, National/ International standards such as JIS, DIN, VDI, ISO, SEL, SEW, VDE, IEC & VGB shall also be



considered as far as applicable for Design, Manufacturing and Testing of the respective equipment. However, for those of the above equipment not covered by these National / International standards, established and proven standards of manufacturers shall also be considered.

In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.

In case of any change in codes, standards & regulations between 06-June -2022 and the date when bidder/ vendors proceed with fabrication, the Customer/ Employer shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the Customer/ Employer such changes and advise Customer/ Employer of the resulting effect.

3.4 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

The 400kV system 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, restrike 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.

3.5 ENGINEERING DATA

3.5.1 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 bidder (including those of sub-bidder/ vendors) shall bear a title block at the right-hand bottom corner with clear mention of the name of the Customer/ 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 bidder 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 document/data/drawings by the purchaser will cover only general conformance of the document/data/drawings to the specification and contract, interfaces with the equipment provided under specification, external connections and of the dimensions which might affect plan 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. The review and/or approval by the purchaser shall not be considered by the bidder, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

All manufacturing, fabrication and execution of work in connection with the equipment/system prior to the approval of the drawings shall be at the bidder's risk. The bidder is expected not to make any changes in the design of the equipment /system, once they are approved by the Purchaser. However, if some changes are necessitated in the design of the equipment/system at a later date, the bidder may do so, but such changes shall promptly be brought to the notice of the Purchaser indicating the reasons for the change and get the revised drawing approved again in strict conformance to the provisions of the Technical Specification. Approval of bidder's drawing or work by the Purchaser shall not relieve the bidder 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 with technical specification, unless otherwise expressly requested by the purchaser in writing.

3.5.2 Bidder's Drawing Submission and Approval Procedure

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

- a. All data/information furnished by Bidder/ vendor in the form of drawings, documents, Catalogues or in any other form for Customer/ Employer's information/interface and/or review and approval are referred by the general term "drawings".
- b. The 'Master drawings list' indicating titles, Drawing Number, Date of submission and approval etc. shall be furnished by the bidder. This list shall be updated if required at suitable interval during detailed engineering.
- c. All drawings (including those of sub-bidder/ vendor) shall bear at the righthand bottom corner the 'title plate' with all relevant information duly filled in. The bidder shall furnish this format to his sub-bidder/ vendor along with his purchase order for sub-bidder/ vendor's compliance.



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 9

- d. Contractor shall submit all the drawings in five (5) copies for review of Customer/ Employer. Customer/ Employer shall forward their comments within four (4) weeks of receipt of drawings.
- e. Upon review of each drawing, 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. Bidder shall resubmit the drawings approved under Category II, 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 Bidder does not agree with any specific comment, he shall furnish the explanation for the same to Customer/ Employer for consideration. In all such cases Bidder 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 Bidder 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. Bidder shall not make any changes in the portions of the drawing other than those commented. If changes are required to be made in the portions already approved, the Bidder shall resubmit the drawings identifying the changes (along with reasons for changes) for Customer/ Employer's review and approval. **Drawings resubmitted shall show clearly the portions where the same are revised marking the relevant revision numbers and Customer/ Employer shall review only such revised portion of documents.**

j. As Built Drawings

After final acceptance of individual equipment / system by the Customer/ Employer, the Bidder will update all original drawings and documents for the equipment / system to "as built" conditions and submit no. of copies as per clause 3.5.5.

- k. Approval of drawings will not in any way relieve the Bidder 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.



3.5.3 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.

3.5.4 Instruction Manual

- a. The Contractor shall submit to the Customer/ Employer preliminary instruction manuals for all the equipments for review. The final instructions manuals incorporating Customer/ 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, commissioning, 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 be incorporated 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 Customer/ 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 Customer/ 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 with 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.

The Instruction Manuals shall comprise of the following:

3.5.4.1 Erection Manuals

The erection manuals shall be submitted atleast three (3) months prior to the commencement of erection activities of particular equipment/system. The erection manual should contain the following as a minimum.

- a) Erection strategy.
- b) Sequence of erection.
- c) Erection instructions.
- d) Critical checks and permissible deviation/tolerances.
- e) List of tools, tackles, heavy equipments like cranes, dozers, etc.
- f) Bill of Material
- g) Procedure for erection and General Safety procedures to followed during erection/installation.
- h) Procedure for initial checking after erection.
- i) Procedure for testing and acceptance norms.
- j) Procedure / Check list for pre-commissioning activities.
- k) Procedure / Check list for commissioning of the system.
- l) Safety precautions to be followed in electrical supply distribution during erection.

3.5.4.2 Operation and Maintenance Manuals

- a) The manual shall be a two rim PVC bound stiff sided binder able to withstand constant usage or where a thicker type is required it shall have locking steel pins, the size of the manual shall not be larger than international size A3. The cover shall be printed with the Project Name, Services covered and Volume / Book number Each section of the manual shall be divided by a stiff divider of the same size as the holder. The dividers shall clearly state the section number and title. All written instructions within the manual not provided by the manufacturers shall be typewritten with a margin on the left-hand side.
- b) The arrangement and contents of O & M manuals shall be as follows,
 - 1) Chapter 1 - Plant Description: To contain the following sections specific to the equipment/system supplied,
 - (a) Description of operating principle of equipment / system with schematic drawing / layouts.



- (b) Functional description of associated accessories / controls. Control interlock protection write up.
 - (c) Integrated operation of the equipment along-with the intended system. (This is to be given by the supplier of the Main equipment by taking into account the operating instruction given by the associated suppliers).
 - (d) Exploded view of the main equipment, associated accessories and auxiliaries with description. Schematic drawing of the equipment along-with its accessories and auxiliaries.
 - (e) Design data against which the plant performance will be compared.
 - (f) Master list of equipment, Technical specification of the equipment/ system and approved data sheets.
 - (g) Identification system adopted for the various components, (it will be of a simple process linked tagging system).
 - (h) Master list of drawings (as built drawing - Drawings to be enclosed in a separate volume).
- 2) Chapter 2 - Plant Operation: To contain the following sections specific to the equipment supplied,
- (a) Protection logics provided for the equipment along-with brief philosophy behind the logic, Drawings etc.
 - (b) Limiting values of all protection settings.
 - (c) Various settings of annunciation/interlocks provided.
 - (d) Start-up and shut down procedure for equipment along-with the associated systems in step mode.
 - (e) Do's and Don'ts related to operation of the equipment.
 - (f) Safety precautions to be taken during normal operation. Emergency instruction on total power failure condition/lubrication failure/any other conditions.
 - (g) Parameters to be monitored with normal value and limiting values.
 - (h) Equipment isolating procedures.
 - (i) Trouble shooting with causes and remedial measures.
 - (j) Routine testing procedure to ascertain healthiness of the safety devices along-with schedule of testing.
 - (k) Routine Operational Checks, Recommended Logs and Records
- (l) Change over schedule if more than one auxiliary for the same purpose is given.
- (m) Preservation procedure on long shut down.
- (n) System/plant commissioning procedure.
- 3) Chapter 3 - Plant Maintenance: To contain the following sections specific to the equipment supplied,
- (a) Exploded view of each of the equipments. Drawings along-with bill of materials including name, code no. & population.
 - (b) Exploded view of the spare parts and critical components with dimensional drawings (In case of Electronic cards, the circuit diagram to be given) and spare parts catalogue for each equipment.



- (c) List of Special T/ P required for Overhauling /Trouble shooting including special testing equipment required for calibration etc.
- (d) Stepwise dismantling and assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained etc. Clearance to be maintained etc.
- (e) Preventive Maintenance schedules linked with running hours/calendar period along-with checks to be carried out.
- (f) Overhauling schedules linked with running hours/calendar period along-with checks to be done.
- (g) Long term maintenance schedules
- (h) Consumables list along-with the estimated quantity required during normal running and during maintenance like Preventive Maintenance and Overhauling.
- (i) List of lubricants with their Indian equivalent, 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 and quantity required for complete replacement.
- (j) Tolerance for fitment of various components.
- (k) Details of sub bidder/ vendors with their part no. in case of bought out items.
- (l) List of spare parts with their Part No, total population, life expediency & their interchangeability with already supplied spares to NTPC.
- (m) List of mandatory and recommended spare list along with manufacturing drawings, material specification & quality plan for fast moving consumable spares.
- (n) Lead time required for ordering of spares from the equipment supplier, instructions for storage and preservation of spares.
- (o) General information on the equipment such as modification carried out in the equipment from its inception, equipment population in the country / foreign country and list of utilities where similar equipments have been supplied.

After finalization and approval of the Customer/ Employer, the O & M Manuals shall be submitted as indicated in table below. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals (both erection and O & M manuals have been supplied to the Customer/ Employer.

If after the commissioning and initial operation of the plant, the instruction manuals (Erection and /or O &M manuals) require modifications/additions/ changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Customer/ Employer for records and number of copies shall be as mentioned in table below:

Sl. No.	Description of Drawings/Documents	No. of Prints	No. of CD ROMs/DVDs/Portable Hard Disk/ Pen Drives
1	Erection Manual	4 Sets	2
2	Operation & Maintenance manual	1 Set	1
	i) First Submission		
	ii) Final Submission	4 Sets	2



3.5.5 Final Submission of drawings and documents:

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

- a. List of drawings bearing the Customer/ Employer's and Contractor's drawing number.
- b. Six (6) bound sets along-with two (2) sets of CD-ROMs/ DVD/Portable hard disk of all final drawings/documents.
- c. Bidder shall also furnish six (6) bound sets of all as-built drawings including the list of all as-built drawings bearing drawing numbers. The Contractor shall also furnish two (2) sets of CD-ROMs/ DVD/Portable hard disk of all as-built drawings as decided by the Customer/ Employer.
- d. The Bidder shall also furnish four (4) copies and two (2) sets of CD-ROMs/ DVD/Portable hard disk of instruction/ operations & maintenance manuals (after approval) for all the equipments.

3.5.6 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 six (6) bound copies and two (2) sets of CD-ROMs/ DVD/Portable hard disk of all type and routine test reports shall be submitted to Customer/ 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 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity' heavy rainfall and environment favorable to the growth of fungi and mildew. The indoor equipment located in non-air-conditioned areas shall also be of same type.

SPACE HEATERS

The heaters shall be suitable for continuous operation at 240 V as supply voltage. On –off switch and fuse shall be provided.

One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

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



Control cubicles installed in air-conditioned area need not be provided with space heaters. These cubicles shall, however, have space heaters in case of storage of cubicles for long duration.

FUNGI STATIC VARNISH

Besides the space heaters, special moisture and fungus resistance varnish shall be applied on parts which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

Ventilation opening

In order to ensure adequate ventilation, compartments shall have ventilation openings provided with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust. Outdoor compartment openings shall be provided with shutter type blinds.

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-32
- 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): Indoor: IP-52, Outdoor: IP-54

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.

PRESERVATIVE SHOP COATING

All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall be treated beforehand and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and prepared in the shop. The surfaces that are to be finish-painted after installation or require corrosion protection until installation, shall be shop painted as per the requirements covered in the relevant part of the Technical Specification.



Transformers and other electrical equipments, if included shall be shop finished with one or more coats of primer and two coats of high-grade resistance enamel. The finished colors shall be as per manufacturer's standards, to be selected and specified by the Customer/ Employer at a later date.

Shop primer for all steel surfaces which will be exposed to operating temperature below 95 degrees Celsius shall be selected by the Bidder after obtaining specific approval of the Customer/ Employer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperature higher than 95 degrees Celsius and such primer shall also be subject to the approval of the Customer/ Employer.

3.8 RATING PLATES, NAME PLATES AND LABELS

- 3.8.1 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 Customer/ Employer.
- 3.8.2 Such nameplates or labels shall be of white non-hygrosopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back.
- 3.8.3 Each equipment shall be provided with nameplate or label designating the service of the particular equipment. The inscriptions shall be approved by the Customer/ Employer or as detailed in appropriate section of the technical specifications.
- 3.8.4 The rated current, extended current rating and rated thermal current shall be clearly indicated in the name plate in case of current transformer.
- 3.8.5 Rated voltage, voltage factor and intermediate voltage shall be clearly indicated on the nameplate in case of capacitor voltage transformer.
- 3.8.6 Each switch shall a clear inscription identifying its function. Switches shall also have a clear inscription of each position indication.
- 3.8.7 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.
- 3.8.8 All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system.

3.9 GALVANISING:

- 3.9.1 All exposed ferrous parts shall be hot dip galvanised as per IS:2629 & IS:2633, Galvanising shall be uniform, clean, 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 bidder's cost.



- 3.9.2 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 or a minimum of 30 microns. The threads shall have extra deposit of zinc which 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 the required deposits of zinc on them as specified.

3.10 PAINTING

Unless explicitly stated in relevant chapters of the specification, the painting of all electrical equipment shall be as follows:

Epoxy based with suitable additives. The thickness of finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns). However, in case electrostatic process of painting is offered for any electrical equipment, minimum paint thickness of 50 microns shall be acceptable for finish coat. Paint shade shall be as per technical specification.

3.11 QUALITY ASSURANCE PROGRAMME

- 3.11.1 The Bidder shall adopt suitable quality assurance programme to ensure that the equipment and services under the scope of contract whether manufactured or performed within the Bidder's works or at his subcontractor's premises or at the Customer/ 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 Customer/ 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 subcontractor's services including bidder/ vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- vii. System for shop manufacturing and site erection controls including process controls and fabrication and assembly controls.
- 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 Customer/ Employer.
- xiv. System for handling storage and delivery.
- xv. System for maintenance of records, and
- xvi. Furnishing quality plans for manufacturing detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed as Annexure-I.

3.12 GENERAL REQUIREMENTS - QUALITY ASSURANCE

- 3.12.1 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 Bidder 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 Bidder's responsibility to draw up and implement such programme duly approved by the Customer/ Employer. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder and will be submitted to Customer/ Employer for approval.
- 3.12.2 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 Bidder'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. 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 ROMs/ Pen drives.
- 3.12.3 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 Customer/ Employer's approval without which manufacturer shall not proceed.
- 3.12.4 These approved documents shall form a part of the contract. In these approved Quality Plans, Customer/ Employer shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the Customer/ Employer's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Customer/ Employer/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Customer/ Employer along with technical justification for approval and dispositioning.



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 20

- 3.12.5 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 Customer/ Employer's Project Manager/Authorised representative and duly authorised for despatch by issuance of Material Dispatch Clearance Certificate (MDCC).
- 3.12.6 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.
- 3.12.7 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 Customer/ Employer.
- 3.12.8 All welding/brazing procedures shall be submitted to the Customer/ Employer or its authorised representative for approval prior to carrying out the welding/brazing.
- 3.12.9 All brazers, welders and welding operators employed on any part of the contract either in Bidder'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 Customer/ Employer.
- 3.12.10 Test results or qualification tests and specimen testing shall be furnished to the Customer/ Employer for approval. However, where required by the Customer/ Employer, tests shall be conducted in presence of Customer/ Employer/authorised representative.
- 3.12.11 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.
- 3.12.12 All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.
- 3.12.13 No welding shall be carried out on cast iron components for repair.
- 3.12.14 Unless otherwise proven and specifically agreed with the Customer/ Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
- 3.12.15 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 40mm shall be ultrasonically tested.



- 3.12.16 The Bidder 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 Bidder and finalised with the Customer/ Employer, shall be subject to Customer/ Employer's approval. The Bidder's proposal shall include bidder/ 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 Customer/ Employer for approval within the period agreed at the time of pre-awards discussion and identified in "DR" category prior to any procurement. Such bidder/ vendor approval shall not relieve the Bidder from any obligation, duty or responsibility under the contract.
- 3.12.17 For components/equipment procured by the Bidders for the purpose of the contract, after obtaining the written approval of the Customer/ Employer, the Bidder'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 bidder/ vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc.
- 3.12.18 Customer/ Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Bidder's or their sub-contractor's quality management and control activities. The Bidder shall provide all necessary assistance to enable the Customer/ Employer carry out such audit and surveillance.
- 3.12.19 The Bidder shall carry out an inspection and testing programme during manufacture in his work and that of his sub-contractor's 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. Bidder 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.
- 3.12.20 Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Customer/ 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 Bidder in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.
- 3.12.21 For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.
- 3.12.22 Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Customer/ Employer/ authorised representative.
- 3.12.23 Environmental Stress Screening



All solid-state electronic system / equipment / sub assembly shall be free from infant mortile components. For establishing the compliance to this requirement, the Bidder / sub – contractor should meet the following.

1. The Bidder / Sub – contractor shall furnish the established procedure being followed for eliminating infant mortile components. The procedure followed by the Contractor / Sub – contractor should be substantiated along with the statistical figures to validate the procedure being followed. The necessary details as required under this clause shall be furnished at the stage of QP finalization.

Or

In case the Bidder / Sub – contractor do not have any established procedure to eliminate infant mortile components then two or 10% whichever is less, most densely populated Panels shall be tested for Elevated Temperature Cycle Test as per the following procedure.

Elevated Temperature Test Cycle

During the elevated temperature test which shall be for 48 hours, the ambient temperature shall be maintained at 50° C. The equipment shall be interconnected with devices and kept under energized conditions so as to repeatedly perform all operations it is expected to perform in actual service with load on various components being equal to those which will be experienced in actual service.

During the elevated temperature test the cubicle doors shall be closed (or shall be in the position same as they are supposed to be in the field) and inside temperature in the zone of highest heat dissipating components / modules shall be monitored. The temperature rise inside the cubicle should not exceed 10° C above the ambient temperature at 50° C.

In case of any failure during the test cycle, the further course of action should be mutually discussed for demonstrating the intent of the above requirement.

Burn In Test Cycle

The test shall be conducted on all the panels fully assembled and wired including the panels having undergone the above-mentioned elevated temperature test.

The period of Burn in Test Cycle shall be 120 hrs and process shall be similar to the elevated temperature test as above except that the temperature shall be reduced to the ambient temperature prevalent at that time.

During the above tests, the process I/O and other load on the system shall be simulated by simulated inputs and in the case of control systems, the process which is to be controlled shall also be simulated. Testing of individual components or modules shall not be acceptable.

During the Burn in Test the cubicle doors shall be closed (or shall be in the position same as they are supposed to be in the field) and inside temperature in the zone of highest heat



dissipating components / modules shall be monitored. The temperature rise inside the cubicle should not exceed 10° C above the ambient temperature.

The Bidder / Sub-contractor shall carry out routine test on 100% item at Bidder's / sub-contractor's works. The quantum of check / test for routine & acceptance test by Customer/ Employer shall be generally as per criteria / sampling plan defined in referred standards. Wherever standards have not been mentioned quantum of check / test for routine / acceptance test shall be as agreed during detailed engineering stage.

3.13 QUALITY ASSURANCE DOCUMENTS

The Contractor/ bidder shall be required to submit two hard copies and two sets on CDROMs/ pen drive 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 despatch. However, soft copies will be furnished not later than two (2) weeks.

3.13.1 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) 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.
- v) Heat Treatment Certificate/Record (Time- temperature Chart)
- vi) All the accepted Non-conformance Reports (Major/Minor) / deviation, including complete technical details / repair procedure).
- vii) CHP / Inspection reports duly signed by the Inspector of the Customer/ Employer and Contractor for the agreed Customer Hold Points.
- viii) Certificate of Conformance (COC) whoever applicable.
- ix) MDCC



3.13.2 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 to finalize 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.

3.14 TRANSMISSION OF QUALITY DOCUMENTS

As a general rule, two hard copies of the quality document and Two CD ROMs/ Pen drive shall be issued to the Customer/ Employer on release of QA Documentation by Inspector. 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 Customer/ Employer shall be issued not later than 3 weeks after the date of the last delivery similarly as stated above.

3.15 INSPECTION, TESTING & INSPECTION CERTIFICATE

3.15.1 The word 'Inspector' shall mean the Project Manager and/or his authorised representative and/or an outside inspection agency acting on behalf of the Customer/ Employer to inspect and examine the materials and workmanship of the works during its manufacture or erection.

3.15.2 The Project Manager or his duly authorised representative and/or an outside inspection agency acting on behalf of the Customer/ 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 Bidder 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 Bidder's own premises or works.



- 3.15.3 The Bidder shall give the Project Manager/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Bidder's account except for the expenses of the Inspector's. The Project Manager/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, 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 Bidder 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.
- 3.15.4 The Project Manager or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Bidder, 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 Bidder 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.
- 3.15.5 When the factory tests have been completed at the Bidder'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 Bidder from proceeding with the works. The completion of these tests or the issue of the certificates shall not bind the Customer/ Employer to accept the equipment should it, on further tests after erection be found not to comply with the contract.
- 3.15.6 In all cases where the contract provides for tests whether at the premises or works of the Bidder or any sub-contractor, the Bidder, 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 Bidder and shall give facilities to the Project Manager/Inspector or to his authorised representative to accomplish testing.
- 3.15.7 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.
- 3.15.8 To facilitate advance planning of inspection in addition to giving inspection notice, the Bidder 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.

- 3.15.9 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 Bidder 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.

3.16 PACKAGING & TRANSPORTATION

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The Bidder shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting despatch of equipment. Before despatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & preassembly to bare minimum. The Customer/ Employer's Inspector shall have right to insist for completion of works in shops before despatch of materials for transportation.

Bidder shall ensure to affix RFID tags/Trackers on the item & punch the same before dispatch with RFID reader/BLE beacon & enter details of item associating with RFID tag no./Tracker no. For low value items QR code-based solution shall also be acceptable. Exact selection of type of tagging based on type & size of equipment/consignment/package will be decided during detail engineering.

Bidder to provide RFID tags/Trackers/QR code for all items being supplied to the Contractor under the contract of this project.

- Each item identifiable with KKS / PGMA-DU / other identification scheme of the bidder/OEM/OES shall have a RFID/QR.
- Even if the BOQ is identified in tonnage/ cumulative of multiple items, unique identification shall be provided for each item as mentioned above (Eg – GIS Duct, Gis bay module, Panels etc., however each sub item shall have its own RFID/equivalent).
- For items which are interchangeable and dispatched together (eg Foundation bolts in a box / Identical beams in a single consignment), the entire consignment can be tagged with a single RFID if the software system has the capability to track partial consumption (eg 100 bolts consumed from a package of 1000 bolts) from a consignment.



3.17 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS

- 3.17.1 The material of clamps and connectors shall be Aluminium alloy casting conforming to designation A6 of IS:617 for connecting to equipment terminals and conductors of aluminium. In case the terminals are of copper, the same clamps/connectors shall be used with 2mm thick bimetallic liner.
- 3.17.2 The material of clamps and connectors shall be Galvanised mild steel for connecting to G.S. shield wire.
- 3.17.3 Bolts, nuts and plain washers shall be hot dip galvanised mild steel for sizes M12 and above. For sizes below M12, they shall be electro-galvanised mild steel. The spring washers shall be electro-galvanised mild steel.
- 3.17.4 All castings shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be rounded off to meet specified corona and radio interference requirements.
- 3.17.5 They shall have same current rating as that of the connected equipment. All current carrying parts shall be at least 10 mm thick. The connectors shall be manufactured to have minimum contact resistance.
- 3.17.6 Flexible connectors, braids or laminated strips shall be made up of copper/aluminium.
- 3.17.7 Current rating and size of terminal/conductor for which connector is suitable shall be put on a suitable sticker on each component which should last atleast till erection time.

3.18 SPACERS

- 3.18.1 Spacers shall conform to IS: 10162. They shall be of non-magnetic material except nuts and bolts, which shall be of hot dip galvanised mild steel.
- 3.18.2 Spacers shall generally meet the requirements of clamps and connectors as specified above. Its design shall take care of fixing and removing during installation and maintenance.
- 3.18.3 In addition to the type tests as per IS: 10162, clamp slip test should have been conducted. In this test the sample shall be installed on test span of twin/quad bundle string at a tension of 44.2kN (4500 kg). One of the clamps when subjected to a longitudinal pull of 2.5kN (250 kg) parallel to the axis of conductor shall not slip, i.e. permanent displacement between conductor and clamp after test shall not exceed 1.0 mm. This test should have been performed on all other clamps of the sample.

3.19 BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS, AND DISC INSULATORS

- 3.19.1 Bushings shall be manufactured and tested in accordance with IS: 2099 & IEC: 60137 while hollow column insulators shall be manufactured and tested in accordance with IEC62155/IS 5284. The support insulators shall be manufactured and tested as per IS: 2544/IEC 60168/IEC 60273. The insulators shall also conform to IEC 60815 as applicable having alternate long and short sheds.
- Support insulators/ bushings/ hollow column insulators shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.



- 3.19.2 Porcelain used shall be homogenous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.
- 3.19.3 Glazing of the porcelain shall be uniform brown in colour, free from blisters, burns and other similar defects.
- 3.19.4 The design of the insulator shall be such that stresses due to expansion and contraction in any part of the insulator shall be lead to deterioration. All ferrous parts shall be hot dip galvanised.
- 3.19.5 Post type insulators shall consist of a porcelain/polymer part permanently secured in metal base to be mounted on supporting structures. They shall be capable of being mounted upright. They shall be designed to withstand all shocks to which they may be subjected to during operation of the associated equipment.
- 3.19.6 Bushing porcelain shall be robust and capable of withstanding the internal pressures likely to occur in service. The design and location of clamps, the shape and the strength of the porcelain flange securing the bushing to the tank shall be such that there is no risk of fracture. All portions of the assembled porcelain enclosures and supports other than gaskets, which may in any way be exposed to the atmosphere shall be composed of completely non-hygroscopic material such as metal or glazed porcelain.
- 3.19.7 All iron parts shall be hot dip galvanised and all joints shall be air tight. Surface of joints shall be trued, porcelain parts by grinding and metal parts by machining. Insulator/ bushing design shall be such as to ensure a uniform compressive pressure on the joints.
- 3.19.8 In accordance with the requirement stipulated elsewhere, bushing, hollow column insulators and support insulators shall conform to type tests and shall be subjected to routine tests and acceptance test/sample test in accordance with relevant standards.

3.20 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES & MARSHALLING BOXES FOR OUTDOOR EQUIPMENT

- 3.20.1 All types of control cabinets, junction boxes, marshalling boxes, lighting panels, terminal boxes, operating mechanism boxes, Kiosks etc. shall generally conform to IS:5039, IS:8623 and IEC:60439 as applicable.
- 3.20.2 They shall be of Stainless steel or Aluminium. The thickness of Stainless steel shall be minimum 1 mm. The thickness of aluminium shall be minimum 3 mm and shall provide rigidity. Top of the boxes shall be sloped towards the rear of the box.

3.20.3 BAY MARSHALLING BOX

Bay Marshalling Box located at a convenient location to receive and distribute cables shall be provided as required. It shall meet all the requirements as specified for cabinets/boxes.

It shall have three separate distinct compartments for following purposes:



- To receive two incoming 415V, three phase, AC supplies controlled by 100A four pole MCBs with auto changeover provision, and to distribute five (5) three phase ac supplies controlled by 32A four pole MCBs. It shall also be provided with 63A, 3 phase 4 pin industrial grade receptacle with rotary switch.
- To receive three phase incoming from first compartment and to distribute ten (10) single phase ac supplies controlled by 16A two pole MCBs.
- 150 nos. terminal blocks in vertical formation for interlocking facility.

3.20.4 AUXILIARY SWITCH

The auxiliary switch shall conform of following type tests:

- a) Electrical endurance test - A minimum of 1000 operations for 2A. D.C. with a time constant greater than or equal to 20 milliseconds with a subsequent examination of mV drop/ visual defects/ temperature rise test.
- b) Mechanical endurance test - A minimum of 5000 operations with a subsequent checking of contact pressure test/ visual examination
- c) Heat run test on contacts
- d) IR/HV test, etc.

3.21 CABLE GLANDS AND LUGS/FERRULES

- 3.21.1 Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy-duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 microns. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.
- 3.21.2 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.
- 3.21.3 Cable lugs/ferrules for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper type. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipments. Cable lugs and ferrule shall conform to DIN standards.
- 3.21.4 Cables lugs shall be tinned copper solder less crimping type conforming to IS:8309 and 8394 suitable for aluminum 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.



3.22 CONDUITS, PIPES AND ACCESSORIES

- 3.22.1 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.
- 3.22.2 The size of the conduit/pipe shall be selected to limit the fill to a maximum of 40%. All conduits/pipes shall have their ends closed by caps until cables are pulled. After cables are pulled, the ends of conduits/pipes shall be sealed in an approved manner to prevent damage to threaded portions and entrance of moisture and foreign materials.
- 3.22.3 PVC conduits shall be of high impact, heavy gauge (at least class 2) conduit conforming to BS-4607.
- 3.22.4 The outer surface of the steel 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 galvanized. All rigid conduits/pipes shall be of a reputed make.
- 3.22.5 The hume pipes and accessories shall be of reinforced concrete conforming to class NP2 of IS-458. All tests on hume pipes shall be conducted as per IS-458.
- 3.22.6 Rigid conduits shall be flow-coat metal conduits. 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 galvanized. All rigid conduits/ pipes shall be of a reputed make.
- 3.22.7 Flexible conduits shall be heat-resistant lead coated steel, water-leak, fire and rust proof, and be of PLICA make or equivalent.

3.23 MOTORS

The voltage level for motors shall be as follows:

- | | |
|----------------------------------|--|
| a) Upto 0.2 KW | : Single phase 240V AC / 3 phase 415V AC |
| b) Above 0.2 KW and upto 200 KW | : 3 phase, 415V AC |
| c) Above 200 KW and upto 1500 KW | : 3 phase, 3.3 kV AC |
| d) Above 1500 KW | : 11 kV |

The bidder may adopt 415V/3.3 KV for the drives rated in the range of 160-210 KW.

The voltage rating of the drives indicated above is for basic guideline.

- 3.23.1 All motors shall conform to IEC-60034-5 / IS Standard and with principal dimensions in accordance with IEC 60072-1 (1991), IEC 60072-2 (1990) and IEC 60072-3 (1994).
- 3.23.2 All equipment shall be suitable for rated frequency of 50 Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification
- 3.23.3 Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.
- 3.23.4 Degree of Protection
Degree of protection for various enclosures as per IEC60034-05 shall be as follows:
Indoor motors - IP 55



Outdoor motors - IP 55 (additional canopy to be provided)

Cable box-indoor area - IP 55

Cable box-Outdoor area - IP 55

3.23.5 Type:

AC Motors:

- Squirrel cage induction motor suitable for direct-on-line starting.
- Continuous duty LT motors upto 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC:60034-30.
- Crane duty motors shall be squirrel cage Induction motor as per the requirement.
- Motor operating through variable frequency drives shall be suitable for inverter duty. Also these motors shall comply the requirements stipulated in IEC: 60034-18-41 and IEC: 60034-18-42 as applicable.

DC Motors Shunt wound

3.24 AUXILIARY SWITCH

The auxiliary switch shall conform of following type tests:

- Electrical endurance test - A minimum of 1000 operations for 2A. D.C. with a time constant greater than or equal to 20 milliseconds with a subsequent examination of mV drop/ visual defects/ temperature rise test.
- Mechanical endurance test - A minimum of 5000 operations with a subsequent checking of contact pressure test/ visual examination
- Heat run test on contacts
- IR/HV test, etc.

3.25 LAMPS AND SOCKETS

3.25.1 Lamps:

All incandescent lamps shall use a socket base as per IS-1258, except in the case of signal lamps.

3.25.2 Sockets

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

3.25.3 Hand Lamp:

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

3.26 SWITCHES AND FUSES

Each control panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signaling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with switch-fuse units. Selection of the main and sub-circuit fuse ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.



All fuses shall be of HRC cartridge type conforming to IS 9228 mounted on plug-in type fuse bases. Miniature circuit breakers with thermal Protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.

All control switches shall be of rotary type. Toggle/piano switches shall not be accepted.

3.27 TYPE, ROUTINE & ACCEPTANCE TESTS:

3.10.1 TYPE TEST REQUIREMENTS FOR EQUIPMENTS OTHER THAN GIS

- a) All equipments to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification. The validity period of reports shall be as per CEA Guidelines for the validity period of Type test(s) conducted on Major Electrical Equipment in power Transmission- May 2020 & with latest amendments for the from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a Client.
- b) However if contractor is not able to submit report of the type test(s) conducted as per CEA Guidelines for the validity period of Type test(s) conducted on Major Electrical equipment in power Transmission-May2020 & with latest amendments from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/ owners representative and submit the reports for approval.
- c) All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.



SECTION- 4

LIST OF DOCUMENTS AND ENGINEERING INPUTS

1.0 LIST OF TECHNICAL DATASHEETS & DRAWINGS

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.

List of Data Sheets		
Sl. No.	Item Description	NTPC Doc. No.
01.	D.S. For Water based Fire Protection System	
02.	D.S. For Portable extinguisher	
03.	D.S. For Fire Detection items	
04.	BOQ - FPS switchyard	
05.	D.S. For Solenoid Valve	
06.	D.S. of Fiber Optic Cable	
07.	D.S. of Cable	
08.	D.S. of Instruments	
List of Drawings		
09.	Schematic Diagram for Fire Protection system of Switchyard	
10.	Fire Water Piping Layout for Switchyard	
11.	HVW Spray system of 125MVar Reactor- Side View, Isometric View (with Hydraulic Calc)	
12.	Distribution of Extinguisher inside Switchyard control room	
13.	Schematic of Fire detection system for Switchyard Control building	
14.	Fire Alarm & Detection system inside Switchyard control room building	
15.	LCPDV Drawing	



2.0 INPUT DRAWINGS

On receipt of order, it shall be solely the bidder's responsibility to spell out the requirement of the base engineering drawings/documents required by him to go ahead with the engineering of the package, and shall not expect the Purchaser to automatically supply the same after order placement – the required base drawings/documents shall be furnished to the Bidder within reasonable period of receipt of such requisition from Bidder. Any ultimate delay arising out of the delay by the successful bidder in putting up such a requisition shall solely be to the bidder's account. The issues related to engineering input data shall be settled within 30 days from the date of purchase order.

A kick off meeting shall be organized at BHEL within 7 days after the award of contract to bidder. All the issues related to project like, engineering input exchange, communication procedure etc, shall be discussed and mutually agreed upon.

Drawings attached with this specification are preliminary in nature & are not exhaustive. These drawings may get revised and /or new drawings will be furnished to bidder during detail engineering. Bidder to however note that they will not be eligible to raise any extra charges on account of this.

All relevant input drawings will be made available to the bidder during detail engineering stage as when they are revised or prepared.

Bidder to note that they won't be eligible to raise any extra claim on account of furnishing of new drawings or revised drawings by BHEL during offer execution stage.

❖ REVIEW MEETINGS & KICK OFF MEETING:

A kick off meeting shall be held at Purchaser's office, preferably within 7 days of receipt of order.

An agenda shall be prepared for this meeting and would include the following points related to technical aspects.

- a. Any clarifications required by the Bidder on purchaser's order.
- b. Bidder Data Index & Schedule.
- c. Bidder Data Review/approval modalities.
- d. Sub-Bidder lists proposed by Bidder.
- e. Utility requirements.
- f. List of input drawings required from BHEL
- g. Preliminary General Arrangement & layout drawings

As and when required, the bidder will be called upon to attend design co-ordination meeting / review meeting with the end customer/PMC /BHEL during the period of the Contract. The Contractor shall attend such meetings at his own cost at venues decided by BHEL.



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 35

❖ **AS BUILT DRAWINGS**

As built drawings and documents will be generated within one month of completion of activities on respective items of work.

Bidder shall furnish reproducible and electronic files of all the drawings under their scope to Owner/ certified as "As Built Issue".



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 36

SECTION- 5

ENCLOSURES TO SPECIFICATION

SCHEDULES TO BE FILLED UP BY THE BIDDER

- | | |
|------------|---|
| Schedule 1 | Schedule of makes of Equipments |
| Schedule 2 | Schedules of Deviations |
| Schedule 3 | Schedule of past experience and qualifying requirements |
| Schedule 4 | Schedule of performance certificates |
| Schedule 5 | Schedule of type test and special tests |
| Schedule 6 | Details of contact persons (technical & commercial) |
| Schedule 7 | Enclosures to Specification |



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 37

SCHEDULE-1

MAKES OF IMPORTANT ITEMS / COMPONENTS OF EQUIPMENTS AND THEIR DETAILS

ITEM NAME	NAME OF MANUFACTURER	PLACE OF MANUFACTURE OF ITEM	PLACE OF TESTING AND INSPECTION	COMPLIANCE WITH ISO 9001 (YES/NO)

Place

Signature of the authorized representative of Bidder

Name -----

Date

Designation-----

Company seal-----



SCHEDULE-2

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-----



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 39

SCHEDULE – 3

SCHEDULE OF PAST EXPERIENCE AND QUALIFYING REQUIREMENT

Following is the list of earlier orders executed by us for supply of equipment / material of similar nature over the last past five years:

S.No.	Item	Brief rating	Qty	customer	Date	Date Of order	Order of supply	value
-------	------	--------------	-----	----------	------	------------------	--------------------	-------

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.



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 40

SCHEDULE – 4

SCHEDULE OF PERFORMANCE CERTIFICATE

Bidder shall furnish the performance certificate of the similar equipment having
The following details:

S.No.	Item	Brief rating	Qty	Customer	Date Of supply
-------	------	--------------	-----	----------	----------------

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.



SCHEDULE-5

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
		A. Type Tests	
		1.	
		2.	
		B. Routine Tests	
		1.	
		2.	
		C. Site Tests	
		1.	
		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-----



CLIENT – NATIONAL THERMAL POWER CORPORATION LTD.
PROJECT: SINGRAULI STPP STAGE-III (2X800 MW) - 400 KV GIS
TECHNICAL SPECIFICATION FOR FIRE FIGHTING SYSTEM

TB-429-552-031

Rev. 0

Page | 42

SCHEDULE-6

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.



SCHEDULE –7

ENCLOSURES TO SPECIFICATION

DRAWINGS

1. 3K DOCUMENTS (TO ESTABLISH TENDER PRE-QUALIFYING REQUIREMENT (PQR)) – TO BE FILLED & SUBMITTED BY THE BIDDER ALONG WITH HIS OFFER.
2. ARCHITECTURAL DRAWING - PLAN, ELEVATION AND SECTION FOR GIS CONTROL BUILDING
3. SWITCHYARD LAYOUT – PLAN SECTION AND ELEVATION VIEW (LOCATION, SIZE OF TAP-OFF POINTS INDICATED).
4. OGA DRAWING OF 125 MVAR REACTOR – FOR HVWS SCOPE

Sub : Sub-Qualifying Requirements for the Fire Detection and Protection System

To satisfy the requirements specified in Clause No. 4.4 of Sub-Section-IA, Part-A, Section-VI of Bidding Document, we furnish following details:

1.We/ sub-vendor declare that we have designed, supplied, erected and commissioned at least One (1) fire protection system of Contract value not less than Rs.35.0 million or equivalent in foreign currency (exchange rate applicable as on date of Techno-commercial Bid Opening), in industrial installation. The Fire Protection System comprise of

- a) fire hydrant system
- b) high velocity water (HVW) spray or medium velocity water (MVW) spray or sprinkler system.
- c) fire water pumping and pressurizing arrangement.

We further declare that the systems mentioned above 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 is in successful operation for a period of not less than one (1) year. The details of Fire Protection system executed by us are furnished below: -

Details pertaining to Technical Qualification of the Sub-vendor.

Sl.No.	Description	Plant No. 1
A.	DATA OF FIRE PROTECTION SYSTEMS EXECUTED: (To be filled up for contracts having order value not less than Rs. 35.00 million or equivalent in foreign currency (exchange rate applicable as on date of techno-commercial bid opening)	
1.	Client name and address	.....
2.	Name and Address of the plant/ installation	.....
3.	Whether Fire protection system executed is for industrial installation ?	Yes*/No*
4.	Date of order	.....
5.	Date of commissioning	.....

Signature of authorized signatory.....

Sl.No.	Description	Plant No. 1
6.	Period of operation	.....
7.	Value of the order in Rs. Million	.....
8.	The Scope included :	
	a) Design	Yes*/No*
	b) Supply	Yes*/No*
	c) Erection	Yes*/No*
	d) Commissioning	Yes*/No*
9.	The fire protection system have been designed as per TAC/OISD/any other International reputed authority (like LPC-UK or NFPA, USA) (Please indicate the name of the authority)	Yes*/No*
10.	The above contract included :	
	a) Fire Hydrant system	Yes*/No*
	b) High velocity water spray (HVW) system	Yes*/No*
	c) Medium velocity water spray (MVW) System	Yes*/No*
	d) Sprinkler System	Yes*/No*
	e) Fire water pumping and pressurizing arrangement	Yes*/No*
11.	Documentary evidence/certificate from client in support of above is enclosed	Yes*/No*

Note : (1) Continuation sheets of like size and format may be used as per Sub-vendor requirement and be annexure to this attachment.

* **Please Strike off whichever is not applicable.**

Signature of authorized signatory.....

2. We/ Sub-Vendor furnish the following details of the firm from whom the analogue addressable type fire alarm system is proposed to be supplied for this package.

We / sub-vendor further declare that the analogue addressable type fire alarm system proposed to be supplied shall be sourced from a firm M/S_____ who has supplied at least One (1) similar system and these system has been approved or listed by UL-USA / FM-USA / LPC-UK / similar agency and are in successful operation for at least One (1) year. The details of the proposed firm are furnished below:

Sl.No.	Description	Plant No. 1
1.	Name of supplier	.....
2.	Address of supplier	.....
3.	Experience details of supplier	
a)	Name of the client	.....
b)	Address of the client	.....
c)	Address of the installation	.....
d)	Type of the installation (Industrial / commercial)	.....
e)	Whether the installed system has been approved by UL- USA/FM-USA/LPC-UK/Similar agency ? (please specify agency)	Yes*/No*
f)	Whether the installed system has been listed by UL-USA/ FM-USA/LPC-UK / Similar agency? (please specify agency)	Yes*/No*
g)	Date of order / award for analogue addressable type fire alarm system	.....
h)	Date of commissioning of the above system	.....
i)	Number of years for which the system is in operation	.....

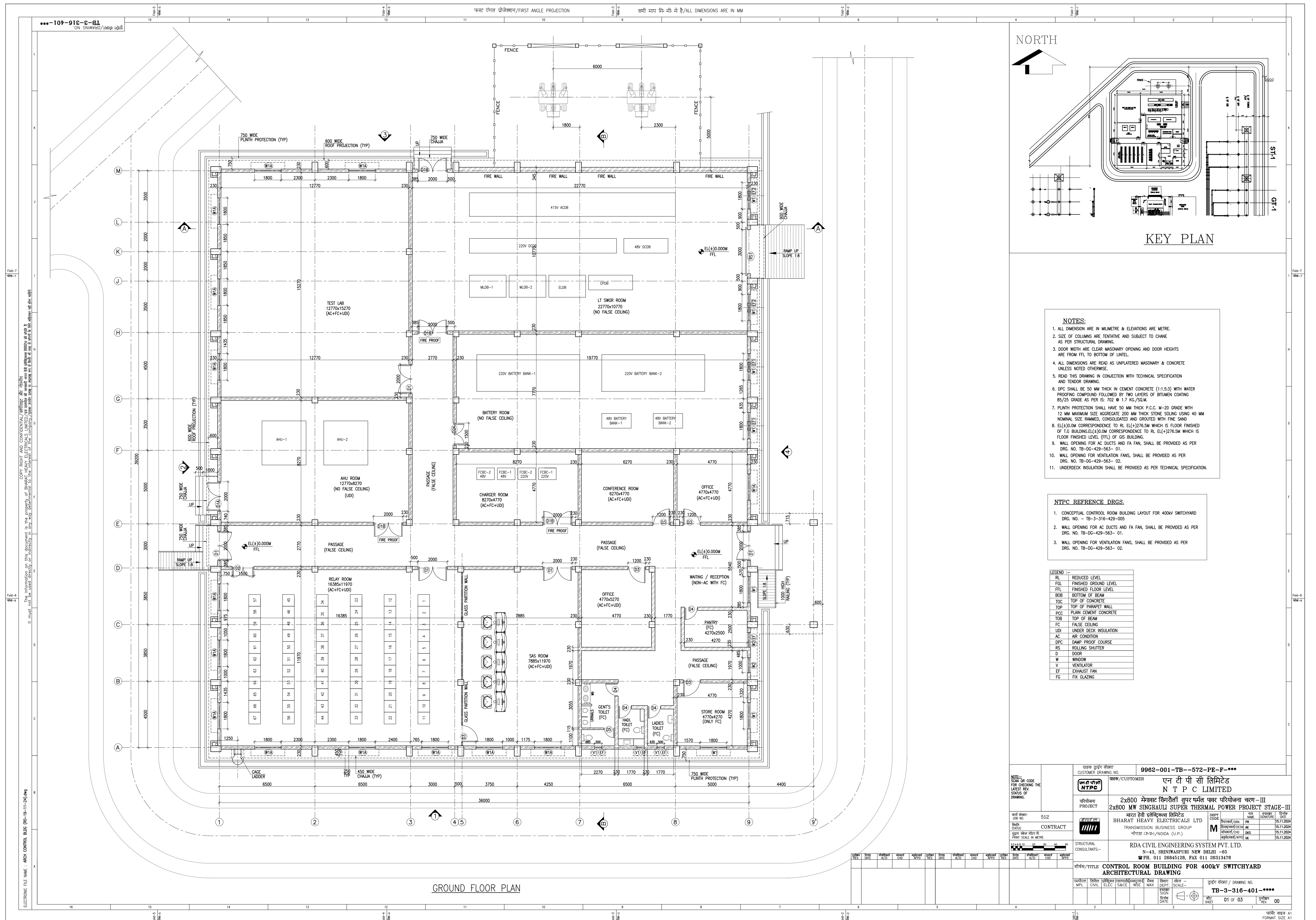
Signature of authorized signatory.....

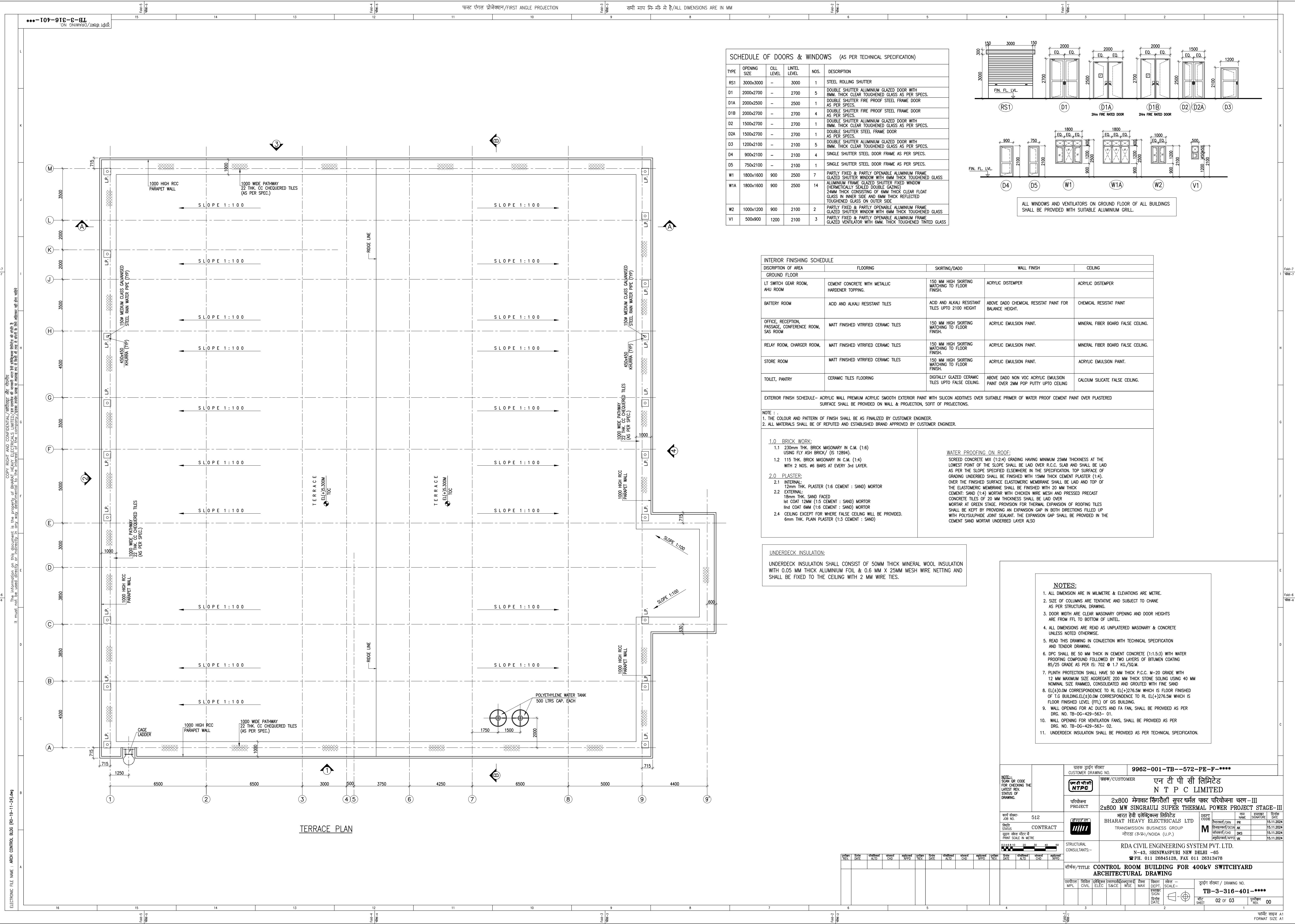
Sl.No.	Description	Plant No. 1
j)	Documentary evidence/certificate in support of above system to be enclosed	.....

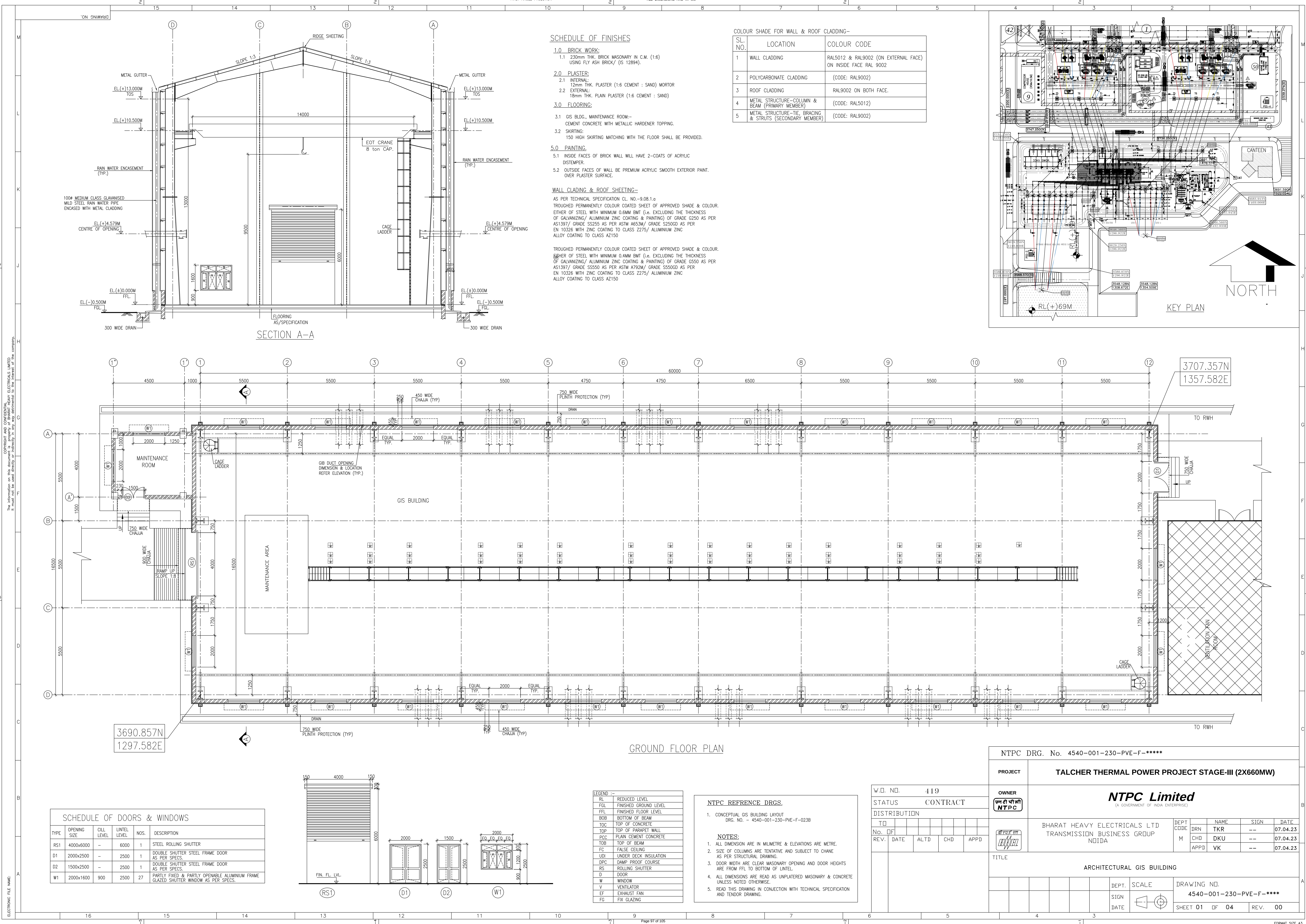
*** Please strike off whichever is not applicable.**

Note : If a Sub-vendor proposed more than one firm for the supply of analogue addressable type fire alarm system, separate data shall be submitted in the above format for each of the proposed suppliers.

Signature of authorized signatory.....







SCHEDULE OF FINISHES

- 1.0 BRICK WORK:
1.1 230mm THK. BRICK MASONRY IN C.M. (1:6) USING FLY ASH BRICK/ (IS 12894).
- 2.0 PLASTER:
2.1 INTERNAL:
12mm THK. PLASTER (1:6 CEMENT : SAND) MORTAR
2.2 EXTERNAL:
18mm THK. PLAIN PLASTER (1:6 CEMENT : SAND)
- 3.0 FLOORING:
3.1 GIS BLDG., MAINTENANCE ROOM:-
CEMENT CONCRETE WITH METALLIC HARDENER TOPPING.
3.2 SKIRTING:
150 HIGH SKIRTING MATCHING WITH THE FLOOR SHALL BE PROVIDED.

- 5.0 PAINTING.
5.1 INSIDE FACES OF BRICK WALL WILL HAVE 2-COATS OF ACRYLIC DISTEMPER.
5.2 OUTSIDE FACES OF WALL BE PREMIUM ACRYLIC SMOOTH EXTERIOR PAINT. OVER PLASTER SURFACE.

WALL CLADDING & ROOF SHEETING-

AS PER TECHNICAL SPECIFICATION CL NO.-9.08.1.0
TROUGHED PERMANENTLY COLOUR COATED SHEET OF APPROVED SHADE & COLOUR.
EITHER OF STEEL WITH MINIMUM 0.6MM BMT (i.e. EXCLUDING THE THICKNESS OF GALVANIZING/ ALUMINIUM ZINC COATING & PAINTING) OF GRADE G250 AS PER ASI397/ GRADE S255 AS PER ASTM A653M/ GRADE S250GD AS PER EN 10326 WITH ZINC COATING TO CLASS Z275/ ALUMINIUM ZINC ALLOY COATING TO CLASS AZ150

TROUGHED PERMANENTLY COLOUR COATED SHEET OF APPROVED SHADE & COLOUR.
EITHER OF STEEL WITH MINIMUM 0.6MM BMT (i.e. EXCLUDING THE THICKNESS OF GALVANIZING/ ALUMINIUM ZINC COATING & PAINTING) OF GRADE G250 AS PER ASI397/ GRADE S255 AS PER ASTM A792M/ GRADE S550GD AS PER EN 10326 WITH ZINC COATING TO CLASS Z275/ ALUMINIUM ZINC ALLOY COATING TO CLASS AZ150

COLOUR SHADE FOR WALL & ROOF CLADDING-

SL. NO.	LOCATION	COLOUR CODE
1	WALL CLADDING	RAL5012 & RAL9002 (ON EXTERNAL FACE) ON INSIDE FACE RAL 9002
2	POLYCARBONATE CLADDING	(CODE: RAL9002)
3	ROOF CLADDING	RAL9002 ON BOTH FACE.
4	METAL STRUCTURE-COLUMN & BEAM (PRIMARY MEMBER)	(CODE: RAL5012)
5	METAL STRUCTURE-TIE, BRACING & STRUTS (SECONDARY MEMBER)	(CODE: RAL9002)

GROUND FLOOR PLAN

LEGEND :-	
RL	REDUCED LEVEL
FGL	FINISHED GROUND LEVEL
FFL	FINISHED FLOOR LEVEL
BOB	BOTTOM OF BEAM
TOC	TOP OF CONCRETE
TOP	TOP OF PARAPET WALL
PCC	PLAIN CEMENT CONCRETE
TOB	TOP OF BEAM
FC	FALSE CEILING
UDI	UNDER DECK INSULATION
DPC	DAMP PROOF COURSE
RS	ROLLING SHUTTER
D	DOOR
W	WINDOW
V	VENTILATOR
EF	EXHAUST FAN
FG	FIX GLAZING

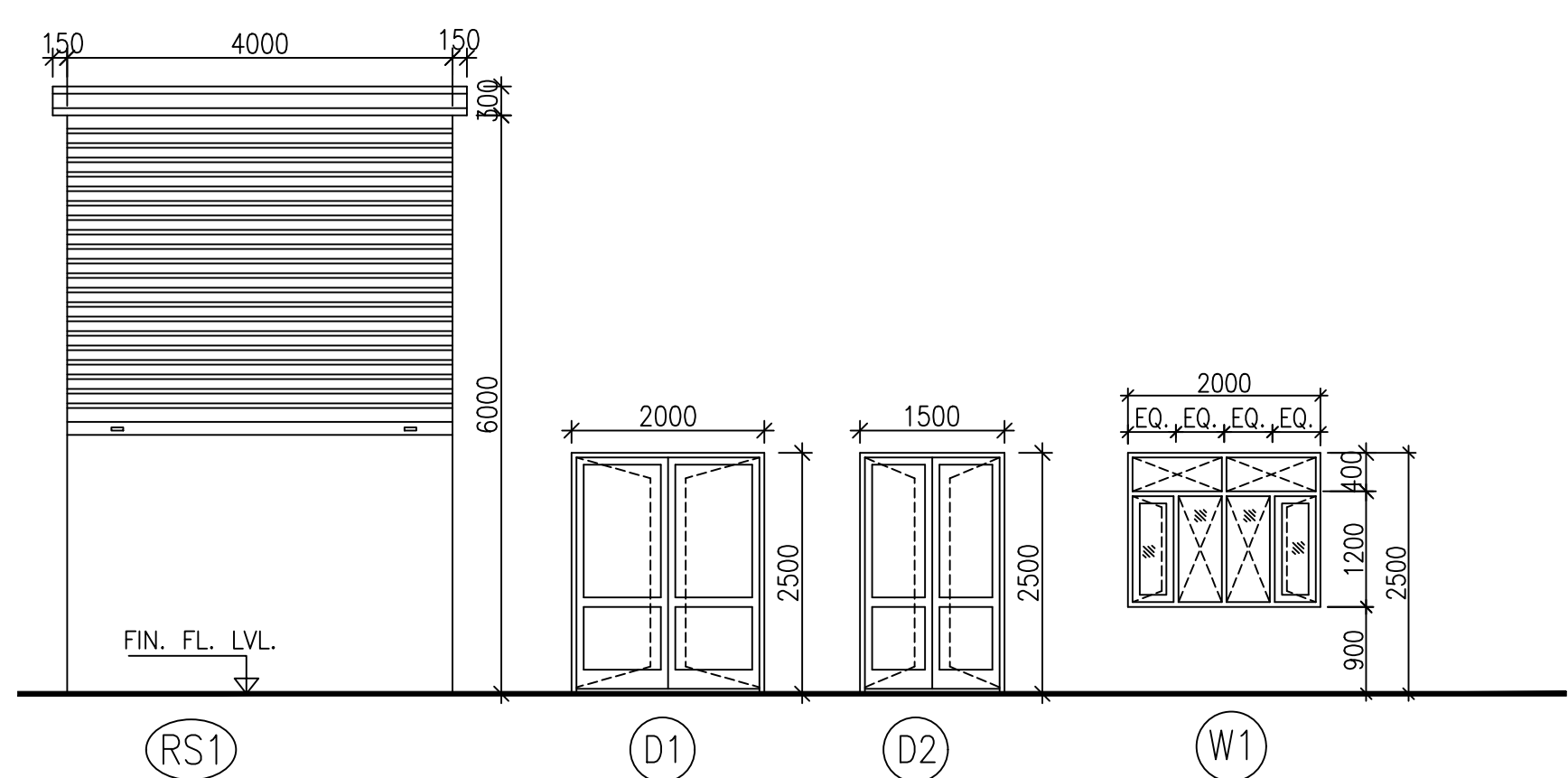
- NTPC REFERENCE DRGS.
1. CONCEPTUAL GIS BUILDING LAYOUT
DRG. NO. - 4540-001-230-PVE-F-0238

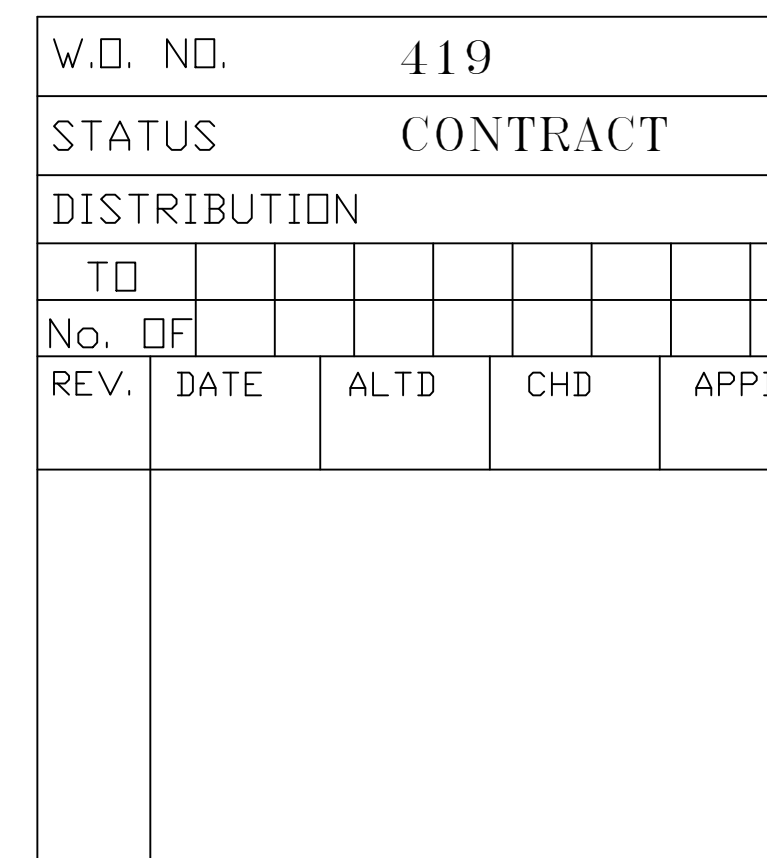
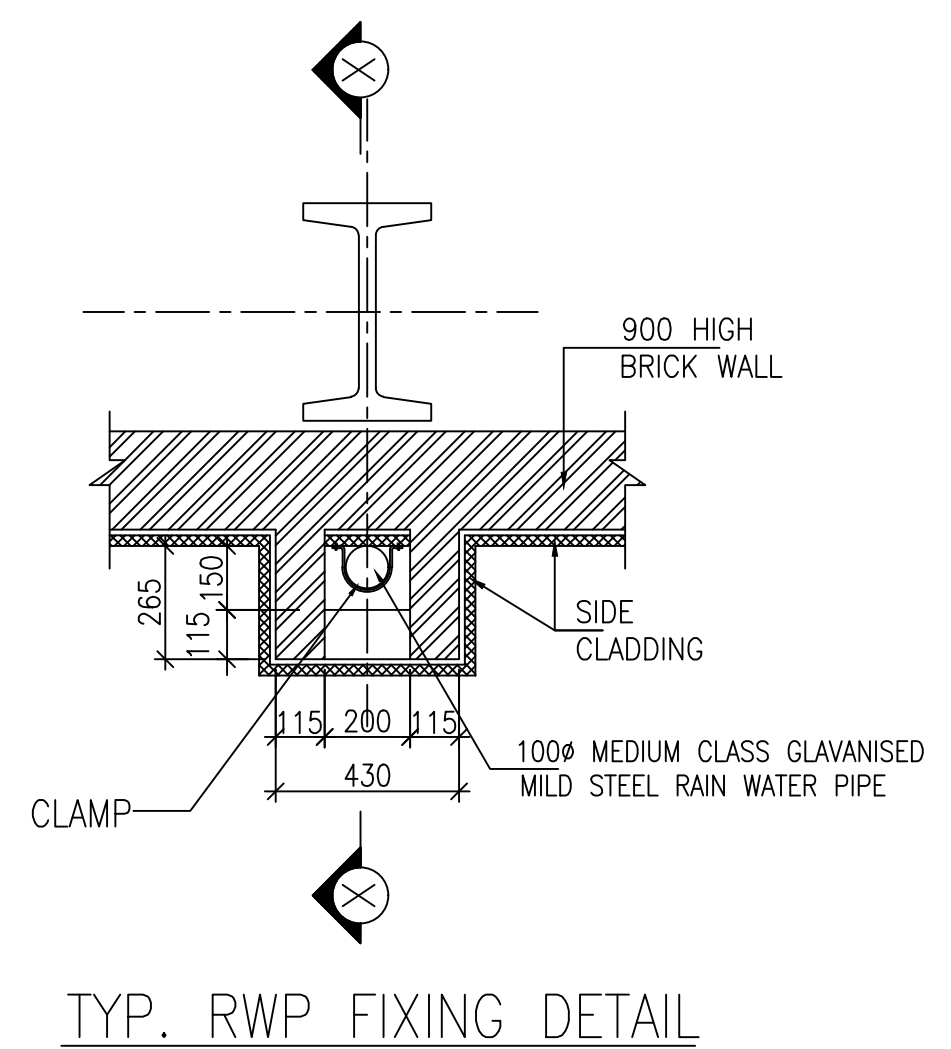
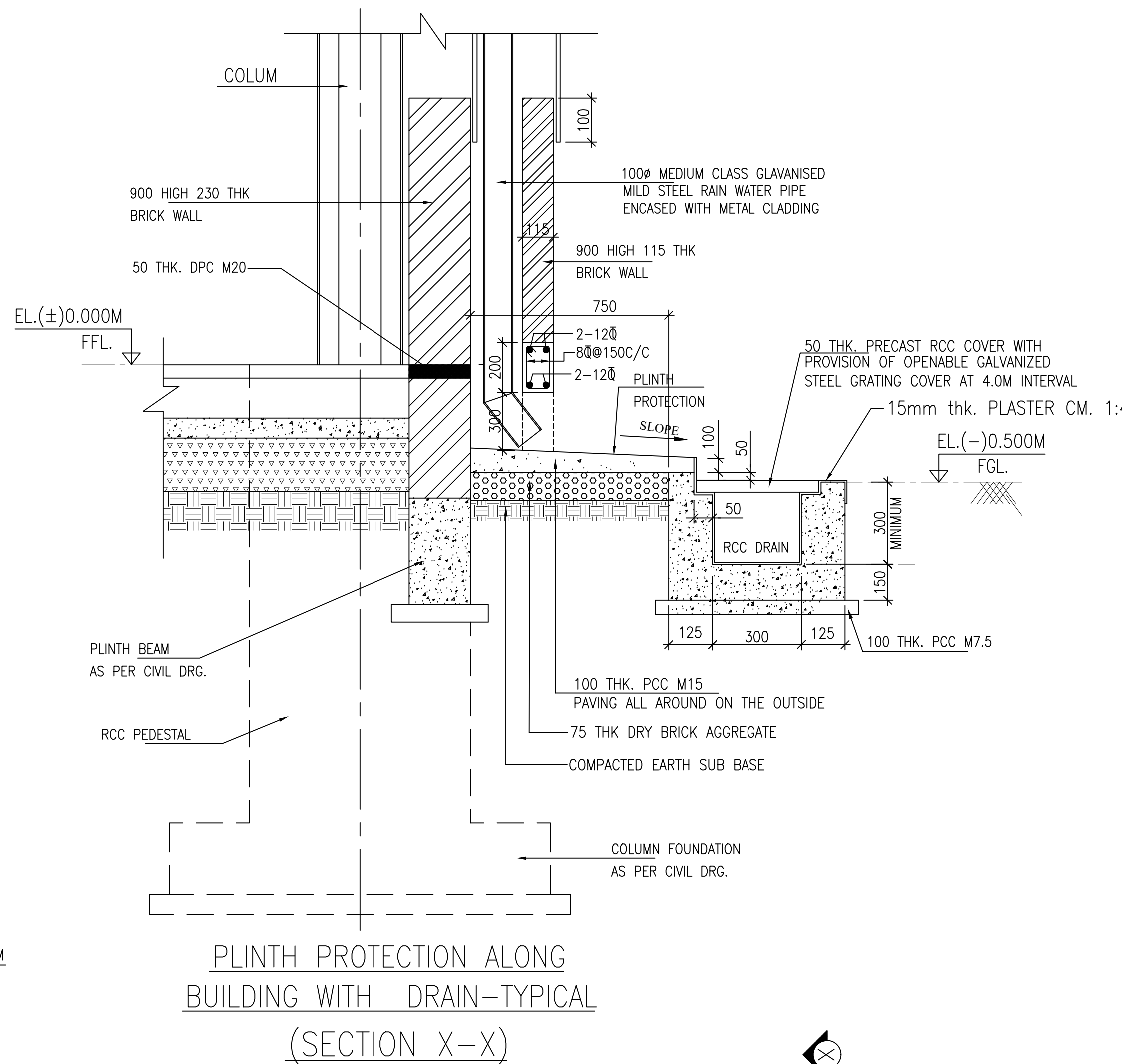
- NOTES:
1. ALL DIMENSION ARE IN MILLIMETRE & ELEVATIONS ARE METRE.
2. SIZE OF COLUMNS ARE TENTATIVE AND SUBJECT TO CHANE AS PER STRUCTURAL DRAWING.
3. DOOR WIDTH ARE CLEAR MASONARY OPENING AND DOOR HEIGHTS ARE FROM FFL TO BOTTOM OF LINTEL.
4. ALL DIMENSIONS ARE READ AS UNPLATERED MASONARY & CONCRETE UNLESS NOTED OTHERWISE.
5. READ THIS DRAWING IN CONNECTION WITH TECHNICAL SPECIFICATION AND TENDOR DRAWING.

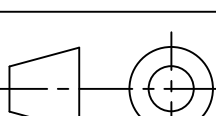
W.D. NO.		419
STATUS		CONTRACT
DISTRIBUTION		
TO		
No. OF		
REV.	DATE	ALTD CHD APPD

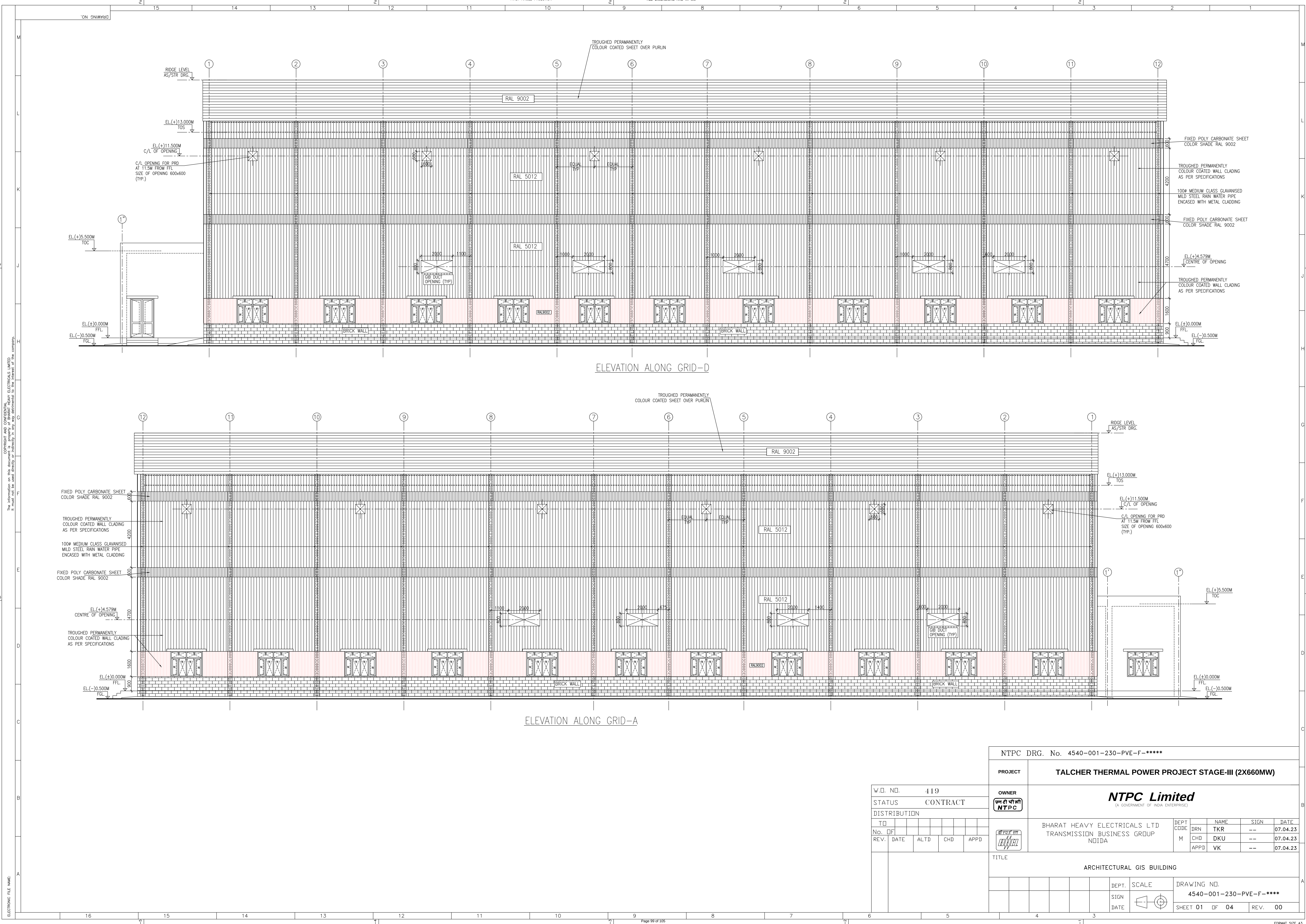
NTPC DRG. No. 4540-001-230-PVE-F-*****	
PROJECT	TALCHER THERMAL POWER PROJECT STAGE-III (2X660MW)
OWNER	NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)
BHARAT HEAVY ELECTRICALS LTD TRANSMISSION BUSINESS GROUP NOIDA	
DEPT CODE	NAME SIGN DATE
DRN	TKR -- 07.04.23
CHD	DKU -- 07.04.23
APPD	VK -- 07.04.23
ARCHITECTURAL GIS BUILDING	
DEPT.	SCALE
SIGN	DRAWING NO.
DATE	4540-001-230-PVE-F-*****
SHEET 01 OF 04	
REV. 00	

SCHEDULE OF DOORS & WINDOWS					
TYPE	OPENING SIZE	CLL LEVEL	UNTEL LEVEL	NOS.	DESCRIPTION
RS1	4000x6000	-	6000	1	STEEL ROLLING SHUTTER
D1	2000x2500	-	2500	1	DOUBLE SHUTTER STEEL FRAME DOOR AS PER SPECS.
D2	1500x2500	-	2500	1	DOUBLE SHUTTER STEEL FRAME DOOR AS PER SPECS.
W1	2000x1600	900	2500	27	PARTLY FIXED & PARTLY OPENABLE ALUMINIUM FRAME GLAZED SHUTTER WINDOW AS PER SPECS.





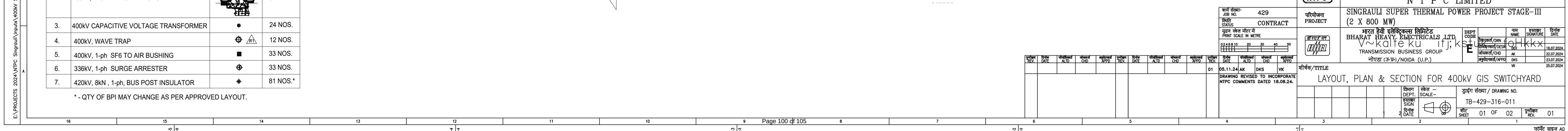
NTPC DRG. No. 4540-001-230-PVE-F-*****									
PROJECT		TALCHER THERMAL POWER PROJECT STAGE-III (2X660MW)							
OWNER जन ही पी हरी NTPC		NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)							
भारती भारती 		BHARAT HEAVY ELECTRICALS LTD TRANSMISSION BUSINESS GROUP NOIDA		DEPT CODE M		NAME		SIGN	DATE
						DRN TKR		--	07.04.23
						CHD DKU		--	07.04.23
						APPD VK		--	07.04.23
TITLE									
ARCHITECTURAL GIS BUILDING									
				DEPT.	SCALE	DRAWING NO.			
				SIGN		4540-001-230-PVE-F-****			
				DATE		SHEET 01	OF 04	REV.	00



Copyright and Confidentiality: The information on this drawing is the property of the company. It must not be used directly or indirectly for any purpose other than the interest of the company.

Electronic File Name: [Blank]

NTPC DRG. No. 4540-001-230-PVE-F-****									
PROJECT		TALCHER THERMAL POWER PROJECT STAGE-III (2X660MW)							
OWNER		NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)							
W.D. NO. 419		STATUS CONTRACT		DISTRIBUTION		BHARAT HEAVY ELECTRICALS LTD TRANSMISSION BUSINESS GROUP NOIDA		DEPT CODE M	
TO		No. OF		REV. DATE		ALTD CHD APPD		NAME TKR DKU VK	
SIGN		DATE		SCALE		DRAWING NO. 4540-001-230-PVE-F-****		SHEET 01 OF 04	
TITLE		ARCHITECTURAL GIS BUILDING							
REV. 00		REV. 00							



LEGEND: =	
	TOWER WITH PEAK
	SUSPENSION INSULATOR STRING (1X31 DISCS)
	DOUBLE TENSION INSULATOR STRING (2X31 DISCS)
	4.0 INCH IPS AL. TUBE
	ACSR MOOSE CONDUCTOR
	SHIELD WIRE
	PRESENT/ NOT IN BHEL TBG SCOPE
	FUTURE/ NOT IN BHEL TBG SCOPE.

*. QUAD CONDUCTOR CONSIDERED FOR TOWER & BEAM DESIGN. HOWEVER, FOR DROPPERS TO LINE SIDE EQUIPMENT, NTPC TO CONFIRM THE ACTUAL LINE SIDE CONDUCTOR DETAILS.

- | | | | | | |
|--|------------------------|---|--|------------------|-----------------------|
| <u>REFERENCE DRGS.</u> | | | | | |
| S/N | NTPC Div. No. | DESCRIPTION | | | |
| 1 | 1150-001-301-PQC-F-001 | PLOT PLAN (GPL) | | | |
| 2 | 1150-001-230-PVE-F-001 | SINGLE LINE DIAGRAM FOR SWITCHYARD | | | |
| आश्रक ड्राइंग संख्या
ORDER DRAWING NO. | | 1150-001-230-PVE-F-023 | | | |
|  एन टी पी सी लिमिटेड
N T P C LIMITED | | | | | |
| परियोजना PROJECT | | SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III
(2 X 800 MW) | | | |
|  भारत भारी वैल्टिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LTD
<i>Vvkale ka no ifj;ksE</i>
TRANSMISSION BUSINESS GROUP
नोर्टेफ़ (अ०) / एन० (उ०) | | DEPT CODE | डाटाबेस/प्लान
ऑर्डर/गैजेटिंग/चिह्न
संकेत/वर्क/आयुर्विज्ञान | नाम
SIGNATURE | इस्तेमाल तिथि
DATE |
| | | E | 01/07/2007 | gkxxxxx | 16.02.2007 |
| | | | 22.07.2007 | | 22.07.2007 |
| | | | 22.07.2007 | | 22.07.2007 |
| प्रौद्योगिकी विभाग प्र. | | | 22.07.2007 | | 22.07.2007 |

फाईल नं./का. JSD No.		429		परिचयिका PROJECT		SINGRAULI SUPER THERMAL POWER PROJECT STAGE-III (2 X 800 MW)							
मुहूर्त SEAL		CONTRACT		भारतीय भारती भारत हेवी इलेक्ट्रिकल्स लिमिटेड BHARAT HEAVY ELECTRICALS LTD. INDIA		DEPT. CODE E		जमा नं./क्रमांक संग्रहण/पं.सं. 01/01/00		इजाजत नं./क्रमांक 01/01/00		निर्माण DATE 18.07.2004	
कालीन नंबर से समय SCALE IN मिनट		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK		05		01 11 24 AK	
01 11 24 AK		05</											

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

REF.DRG.NO.

SIGN.DATE

INVENTORY NO.

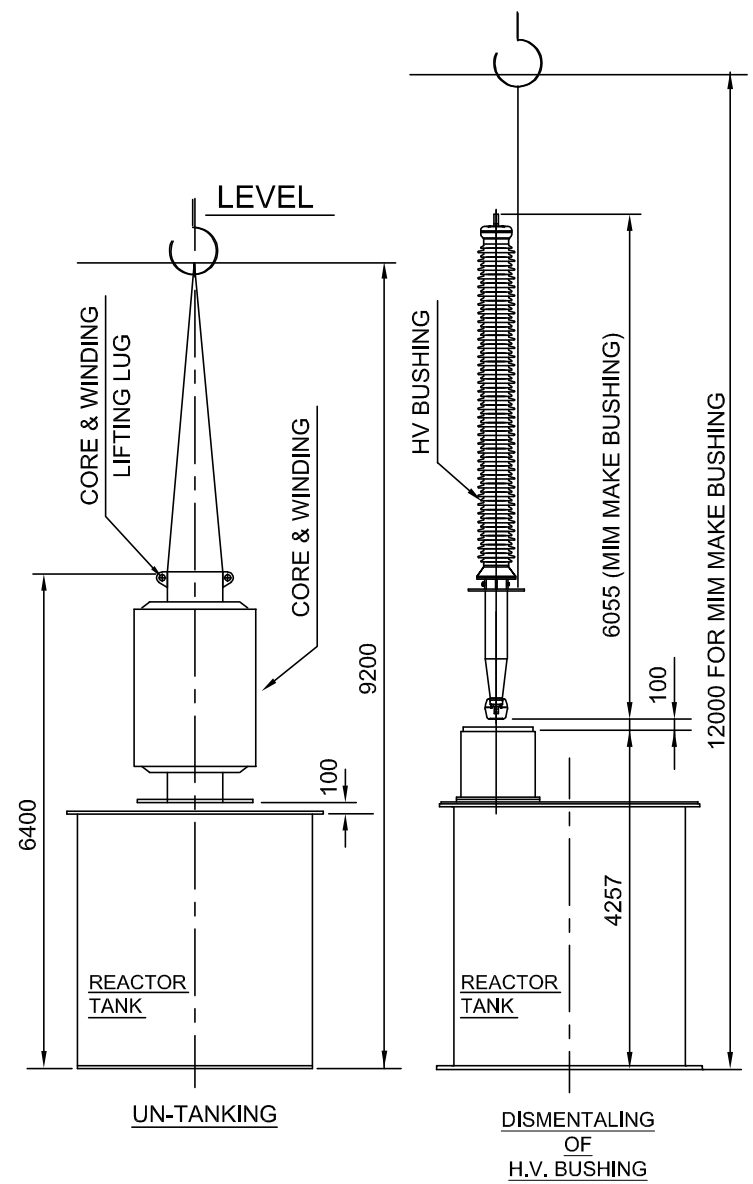
NOTES :-

1. WHEN REFERRING THIS DRAWING PLEASE QUOTE MVAR & W.O. NO.
2. 320 DIA. TWIN BI-DIRECTIONAL ROLLERS MOUNTED AT 1676 mm
RAIL GAUGE IN BOTH DIRECTION ARE PROVIDED FOR MOVEMENT
OF REACTOR AT SITE AND ROLLERS ARE TO BE REMOVED BEFORE ERECTION .
3. PAINT SHADE SHALL BE RAL 5012 BLUE.
4. WIRING FROM INSTRUMENT CTS. ETC. ARE NOT SHOWN FOR CLARITY.
5. FOUNDATION BOLTS ARE IN THE SCOPE OF BHEL SUPPLY.
6. FOR PART LIST OF OUTLINE GENERAL ARRANGEMENT REFER DRAWING NO. 3 469 00 02296.
7. DIMENSIONS SHOWN THUS  ARE OVERALL SHIPPING DIMENSIONS
EXCLUSIVE OF PACKING.
8. DIMENSIONS SHOWN ARE WITH REF.TO PLINTH LEVEL.
9. FOR TANK COVER BOLTED REFER DETAIL 'B' SHEET NO. 03.
10. HV, HVN BUSHING ARE BOUGHT OUT ITEM. HENCE, DIMENSION / WEIGHT RELATED TO THESE
BUSHINGS ARE TENTATIVE. IT WILL BE FINALIZED (IF REQUIRED) AFTER VENDOR FINALIZATION.
11. FOR CRITICAL DIMENSIONS TOLERANCES ARE INDICATED IN THE DRAWING. FOR OTHER
DIMENSION, GENERAL TOLERANCE MAY BE TREATED AS $\pm 3\%$.

IMPORTANT NOTE :-

1. THE DESIGN FEATURES SHOWN ON THIS DRAWING (GENERALLY INLINE WITH
IS:5553/IEC: 60076-6 APPLICABLE STANDARD & AGREED CUSTOMER SPECIFICATION)
MEETS THE STATUTORY, REGULATORY & SAFETY REQUIREMENTS WITH RESPECT
TO EARTHING ARRANGEMENT, DANGER & OTHER LABELS, CLEARANCES IN AIR
PROVISION FOR PRESSURE RELIEF DEVICE, BUCHHOLZ RELAY AND
ANTI-EARTHQUAKE CLAMPING ARRANGEMENT.

MIN. AIR CLEARANCES		
	420 KV	145 KV
PHASE TO PHASE	4000	NA
PHASE TO EARTH	3500	1050

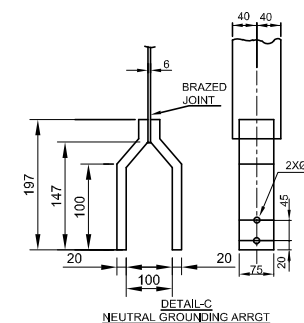
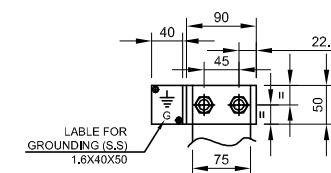
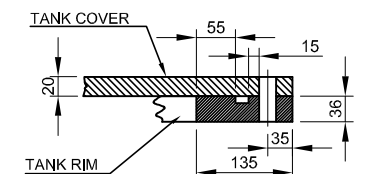
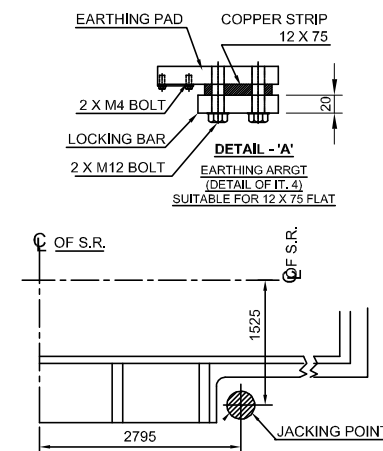
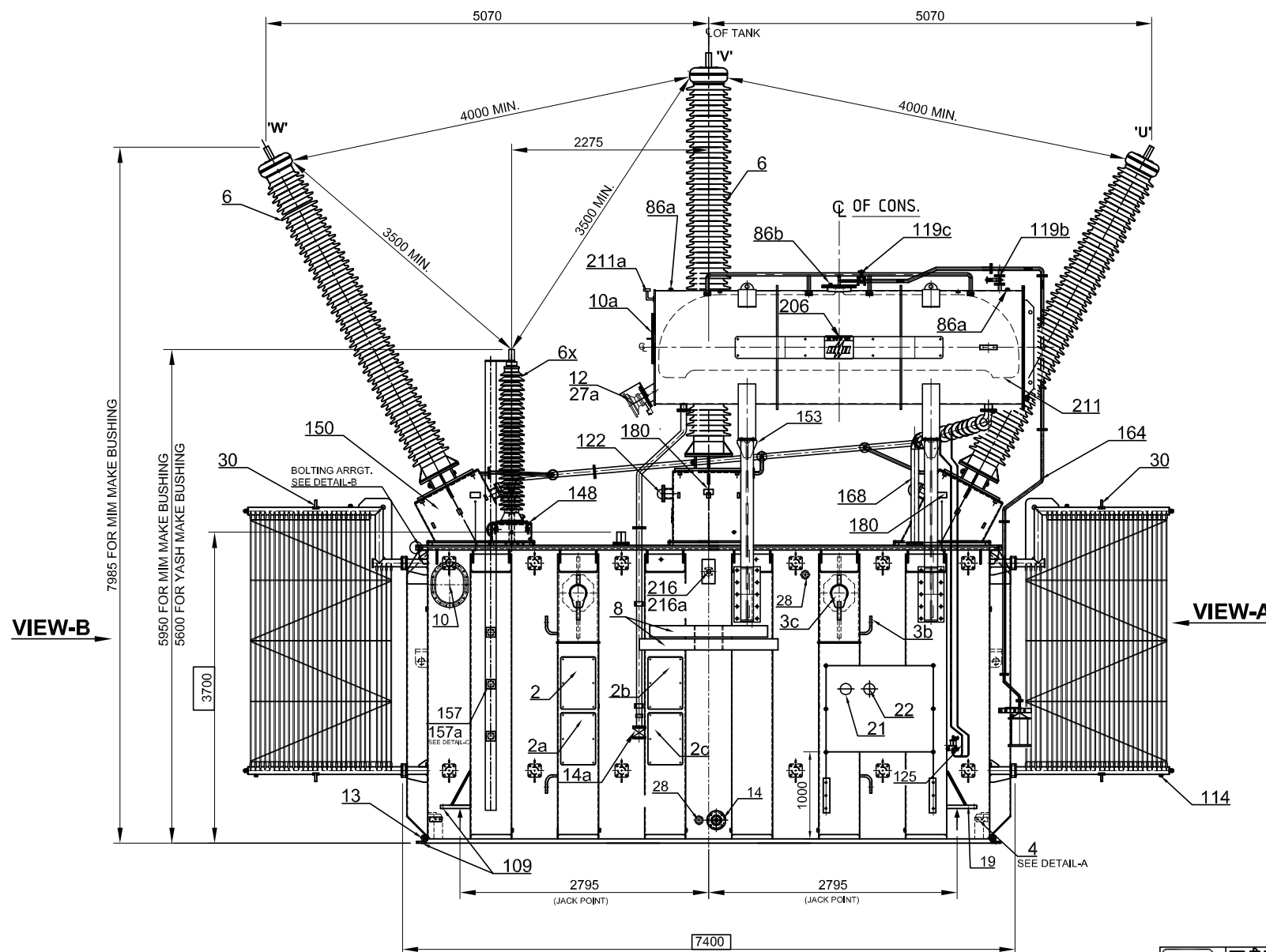


REV	DATE	ALT.		REV	DATE	ALT.	MKP		NTPC DRAWING NO.	4540-001-110-BP-PVE-B-175	ADDITIONAL INFORMATION	गारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल W.O.- 62213-A-517-01					NAME	SIGN	DATE	
		CKD.		01	06.04.2023	CKD.	KD/SK		TYPE OF PRODUCT	1X125 MVAR, 420KV, 3-PHASE, SHUNT REACTOR.	STATUS OF DRAWING "PR"	DEPT	CODE	WEIGHT(kg)	SCALE		DRN.	MKP		10.03.2023
		APPD.				APPD.	KD/SK		PO NO.	CS-4540-001A-2-FC-NOA-7227 DTD. 27/09/2022.	DISTRIBUTION OF PRINTS	TRE	406	----	COMP,SCALE-1:1		CHD.	KD/SK		20.03.2023
ZONE				ZONE					NAME OF CUSTOMER	M/S NTPC TALCHER.	TRE-1, TRM-3	TITLE				DRG. NO	3 469 00 02296	REV.	01	
										Page 101 of 105	OUTLINE GENERAL ARRANGEMENT				SHEET 01 OF 05					

एन टी पी सी लिमिटेड NTPC LIMITED		एन टी पी सी लिमिटेड NTPC LIMITED	
PROJECT		TALCHER THERMAL POWER PROJECT STAGE-III (2 X 660MW) EPC PACKAGE.	
BHARAT HEAVY ELECTRICALS LTD. BHOPAL		DRN.	
M/KP		M/KP	
CDK		CDK	
KD/SK		KD/SK	
APPD.		APPD.	
KD/SK		KD/SK	
DRG. NO. 3 469 00 02296		REV. 01	
SHEET 01 OF 05			

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF **BHARAT HEAVY ELECTRICALS LTD.**
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

Page 3 of 6



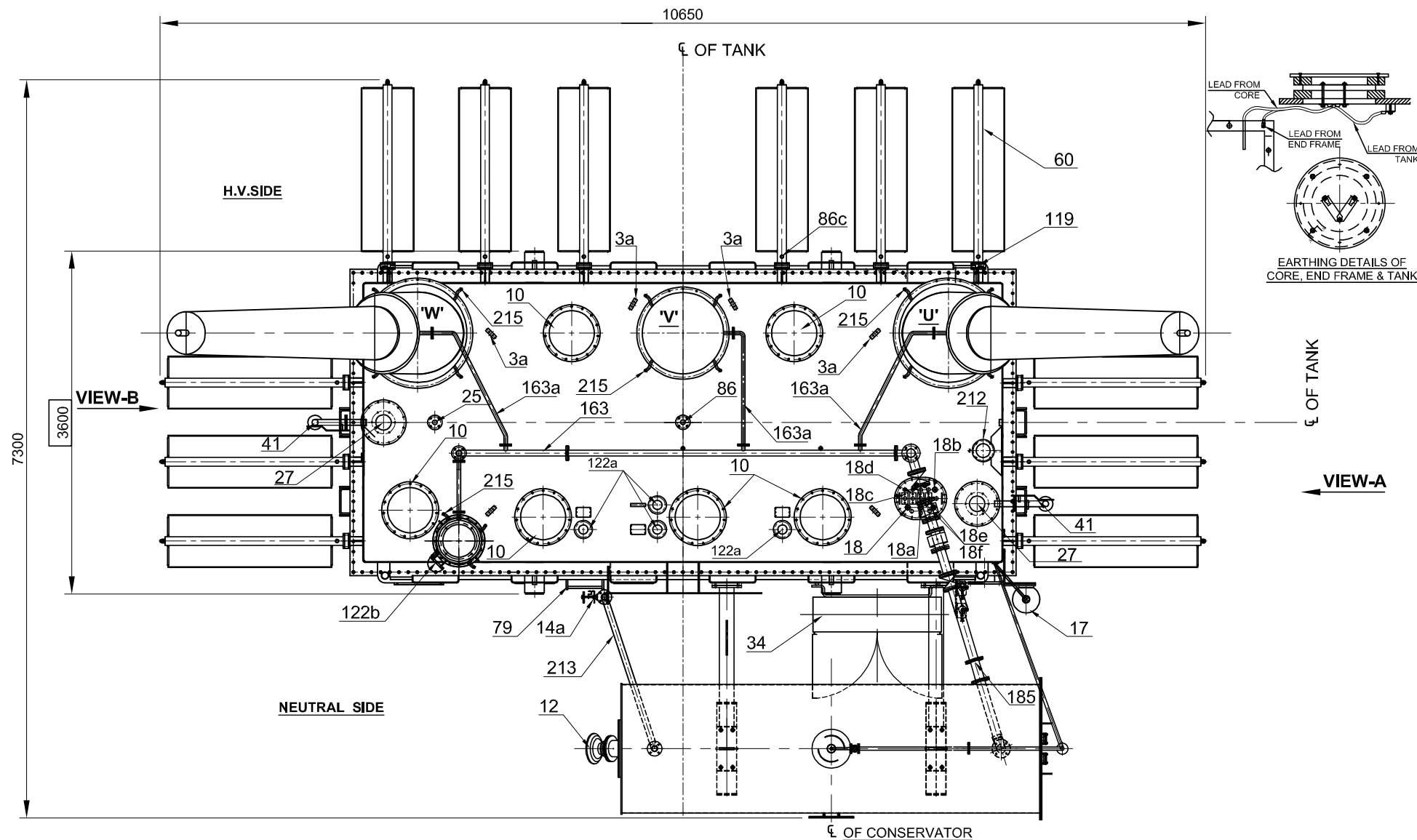
F	REV	DATE	ALT.			REV	DATE	ALT.	MKP		NTPC DRAWING NO.	4540-001-110-BP-PVE-B-175
			CKD.			01	06.04.2023	CKD.	KD/SK		TYPE OF PRODUCT	1X125 MVAR, 420KV, 3-PHASE, SHUNT REACTOR.
			APPD.					APPD.	KD/SK			
ZONE						ZONE		CUSTOMER COMMENTS INCORPORATED.			PO NO.	CS-4540-001A-2-FC-NOA-7227 DTD. 27/09/2022.
											NAME OF CUSTOMER	M/S NTPC TALCHER.

ADDITIONAL INFORMATION	
W.O.- 62213-A-517-01	
STATUS OF DRAWING	"PP"
DISTRIBUTION OF PRINTS	
TRF-1, TRM-3	

एन टी पी सी लिमिटेड NTPC LIMITED		नालावर थर्मल पावर प्रॉजेक्टिंग चरण- III (2x660 MW गंगावटी) इंपोसी पैकेज | TALCHER THERMAL POWER PROJECT STAGE-III (2 X 660MW) EPC PACKAGE.			
PROJECT	मासत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL		NAME	SIGN	DATE
DEPT	CODE	WEIGHT(kg)	SCALE	CHN.	MKP
R ²	TRE	406	-----	CDL.	KD/SK
S			COMP. SCALE: 1:1	APPD.	KD/SK
TITLE				DRG. NO.	
OUTLINE GENERAL ARRANGEMENT (ELEVATION VIEW)				3 469 00 02296	
				SHEET	
				NO. OF SHEETS	
				OF	
				REVISION	

THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF **BHARAT HEAVY ELECTRICALS LTD.**
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

Page 4 of 6

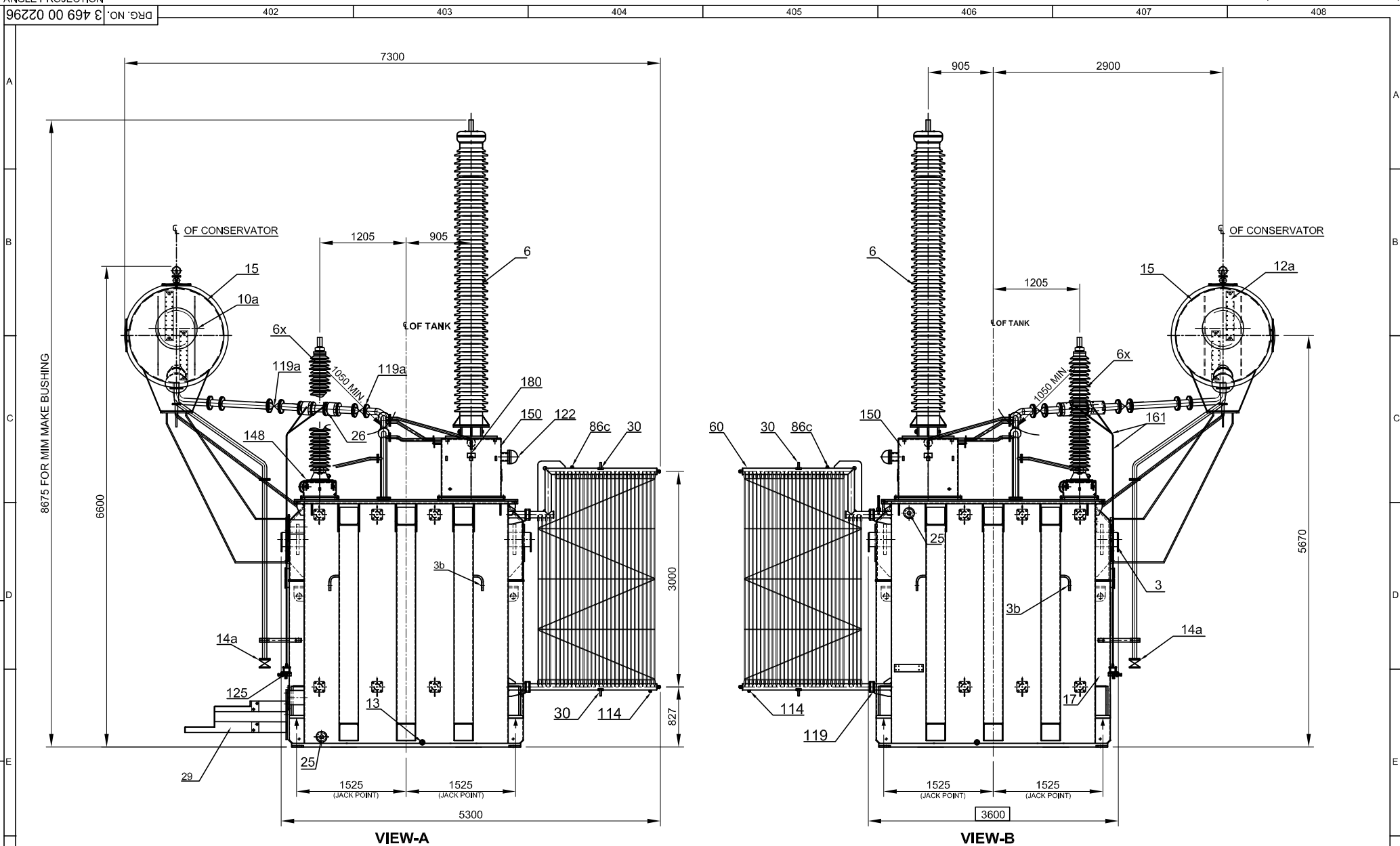


REV	DATE	ALT.			REV	DATE	ALT.	MKP	
		CKD.			01	06.04.2023	CKD.	KD/SK	
		APPD.					APPD.	KD/SK	
ZONE					ZONE	CUSTOMER COMMENTS INCORPORATED.			

NTPC DRAWING NO.	4540-001-110-BP-PVE-B-175
TYPE OF PRODUCT	1X125 MVAR, 420KV, 3-PHASE, SHUNT REACTOR.
PO NO.	CS-4540-001A-2-FC-NOA-7227 DTD. 27/09/2022.
NAME OF CUSTOMER	M/S NTPC TALCHER.

ADDITIONAL INFORMATION	
W.O.- 62213-A-517-01	
STATUS OF DRAWING	"PR"
DISTRIBUTION OF PRINTS	
TRE-1, TRM-3	

 एन टी पी सी लिमिटेड NTPC LIMITED			
PROJECT तात्परि यन्त्रि पवित्र परियोजना चरण - III (2-660 मेगावॉट) इंधनी पैकेज। TALCHER THERMAL POWER PROJECT STAGE-III (2 & 660MW) EPC PACKAGE.			
 भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL		NAME	SIGN
DEPT	CODE	WEIGHT(kg)	SCALE
TRE	406	----	COMP.SCALE:1-1
		DRN.	M/KP
		CHD.	KD/SK
		APPD.	KD/SK
TITLE		DRG. NO	REV
OUTLINE GENERAL ARRANGEMENT (PLAN VIEW)		3 469 00 02296 SHEET OF 05	01



REV	DATE	ALT.			REV	DATE	ALT.	MKP		NTPC DRAWING NO.	4540-001-110-BP-PVE-B-175	ADDITIONAL INFORMATION		भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल W.O.- 62213-A-517-01	DRN.	MKP		10.03.2023	F			
		CKD.			01	06.04.2023	CKD.	KD/SK		TYPE OF PRODUCT	1X125 MVAR, 420KV, 3-PHASE, SHUNT REACTOR.	STATUS OF DRAWING "PR"	DEPT	CODE	WEIGHT(kg)	SCALE	CHD.	KD/SK			20.03.2023	
		APPD.					APPD.	KD/SK		PO NO.	CS-4540-001A-2-FC-NOA-7227 DTD. 27/09/2022.	DISTRIBUTION OF PRINTS	TRE	406	----	COMP.SCALE:1:1		APPD.		KD/SK		31.03.2023
ZONE					ZONE	CUSTOMER COMMENTS INCORPORATED.				NAME OF CUSTOMER	M/S NTPC TALCHER.	TRE-1, TRM-3	TITLE	OUTLINE GENERAL ARRANGEMENT (END VIEW)				DRG. NO.		3 469 00 02296	REV.	01
																		SHEET	04	OF	05	

[illegible]