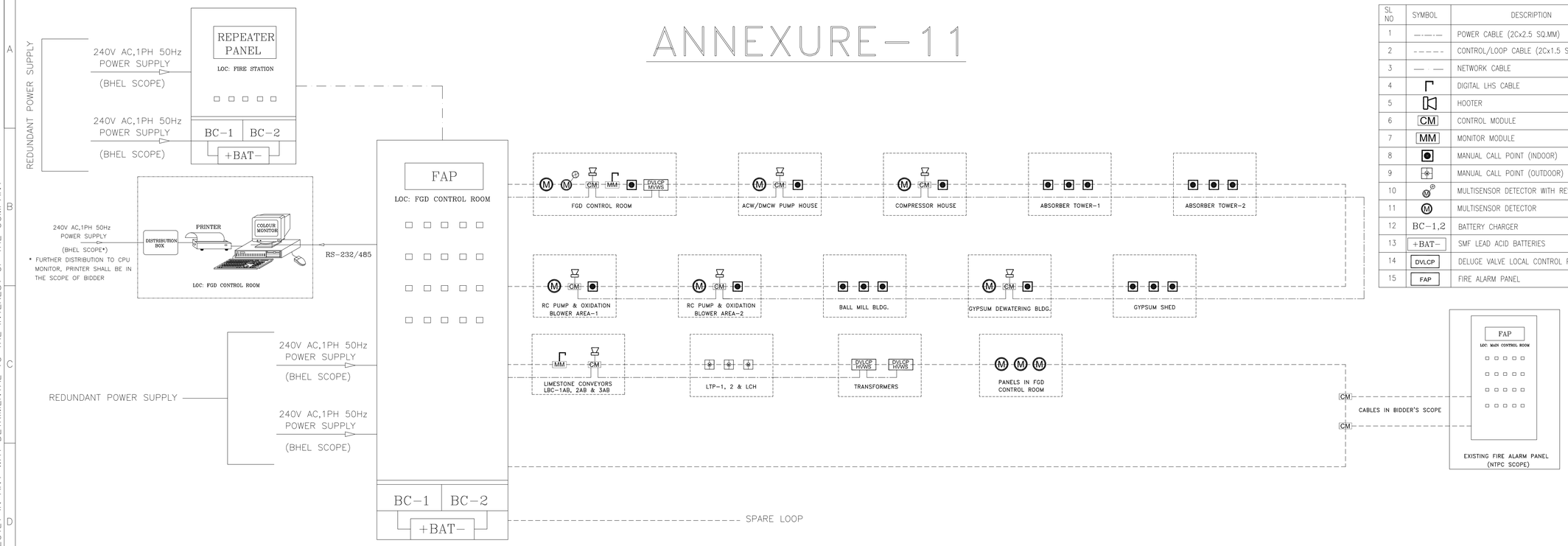
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. PY-FL-1-M103-8316-01

SH. 01 OF 01

ANNEXURE-11



LEGEND:-

SL NO	SYMBOL	DESCRIPTION
1	—·—·—	POWER CABLE (2Cx2.5 SQ.MM)
2	- - - - -	CONTROL/LOOP CABLE (2Cx1.5 SQ.MM)
3	— —	NETWORK CABLE
4		DIGITAL LHS CABLE
5		HOOTER
6	CM	CONTROL MODULE
7	MM	MONITOR MODULE
8		MANUAL CALL POINT (INDOOR)
9		MANUAL CALL POINT (OUTDOOR)
10	M	MULTISENSOR DETECTOR WITH RESPONSE INDICATOR (FOR DETECTORS ABOVE FALSE CEILING)
11	M	MULTISENSOR DETECTOR
12	BC-1,2	BATTERY CHARGER
13	+BAT-	SMF LEAD ACID BATTERIES
14	DVLCP	DELUGE VALVE LOCAL CONTROL PANEL
15	FAP	FIRE ALARM PANEL

NOTES:-

1. FIRE ALARM PANEL SHALL BE PROVIDED WITH 24 V D.C BATTERY BACKUP, COMPRISING OF 2x100% CHARGERS AND 1x100% SMF BATTERIES
2. ALL DETECTORS SHALL BE LOOPED AS STYLE 7 WIRING AS PER NFPA-72
3. DELUGE VALVE, HOOTERS ARE INTERFACED WITH THE FIRE ALARM SYSTEM THROUGH CONTROL MODULE (CM).
4. 20% OF EACH LOOP CAPACITY SHALL BE LEFT FREE IN EACH OF THE LOOP FOR FUTURE ADDITION. TWO LOOPS SHALL BE PROVIDED AS SPARE FOR EACH PANEL.
5. LOOP & POWER CABLES SHALL BE TWISTED, SHIELDED, PVC CU FRLS CABLES.
   (a) LOOP CABLE:- 2Cx1.5MM^2
   (b) POWER CABLE:- 2Cx2.5MM^2
6. MAIN FIRE ALARM PANELS SHALL BE PROVIDED WITH NECESSARY CONTACTS / INTERFACING MODULES FOR INITIATING REQUIRED ALARM / OPERATION OF DELUGE VALVE AND TRIPPING OF HVAC, PACKAGE AIR CONDITIONER, CONVEYOR MOTOR, ETC.
7. THE ABOVE DRAWING IS ONLY A CONCEPTUAL SCHEME. ACTUAL DETAILS OF NO. OF LOOPS, DEVICES AND DETECTORS SHALL BE FINALIZED DURING DETAIL ENGINEERING BY VENDOR (REFER CL. NO. 9, NOTE-3 of PY51354).
8. EACH DETECTOR SHALL HAVE SHORT CIRCUIT FAULT ISOLATOR.
9. DETECTOR COVERAGE AREA SHALL BE 25 SQM.
10. HOOTER SHALL BE PROVIDED AT ALL FLOOR EXITS.
11. SELF ILLUMINATING EXIT SIGN BOARDS SHALL BE PROVIDED AT ALL BUILDING AND FLOOR EXITS.
12. THE FOLLOWING SIGNALS SHALL BE REPEATED IN EXISTING MAIN FIRE ALARM PANEL THROUGH POTENTIAL FREE CONTACTS:-
    (a) SYSTEM HEALTHY/TROUBLE
    (b) SYSTEM ON FIRE
    (c) SPARE
13. INSTALLATION OF LHS CABLE SHALL BE AS MENTIONED BELOW:-
    (a) IN CABLE GALLERIES - ZIG-ZAG IN THE TOP TRAY, BOTTOM TRAY AND ALTERNATE TRAY IN BETWEEN
    (b) IN GYPSUM & LIMESTONE CONVEYORS - STRAIGHT LINES FOR BOTH FORWARD & RETURN CONVEYOR

FOR TENDER PURPOSE ONLY

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

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD			CHD/APPD
	ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		

INVENTORY NO | SIGN. AND DATE | REF. DRG. NO. | COMPUTER FILE NAME

CUSTOMER: NTPC Limited (A GOVERNMENT OF INDIA ENTERPRISE)

PROJECT: NCTPP (2x490MW) DADRI STAGE-II (FGD PACKAGE)

BHARAT HEAVY ELECTRICALS LTD. HYDERABAD PROJECT ENGG & SYSTEMS DIVISION

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	RAVTEJA	-SD-	10.04.18	N.A.
CHD.	PRASHANT	-SD-	11.04.18	
APPD.	SEKHAR	-SD-	12.04.18	

DEPT. PED	UNTOL. DIMS. GR.	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
CODE 450	G/M/F	N.T.S	N.A.	N.A.	N.A.	N.A.

TITLE: SCHEMATIC DIAGRAM FOR FIRE DETECTION AND ALARM SYSTEM

CARD CODE: NA

DRG. NO. PY-FL-1-M103-8316-01

CUST. DRG. NO.

REV. 00

SHT. No 01 | No. OF SHT. 01 | SIZE - A1

BOQ OF ADDRESSABLE COMPONENTS TO BE INTEGRATED WITH FIRE ALARM PANELS

Annexure - [12] for PY51354

Detectors & Devices BOQ for Fire Alarm Panels

Project: 2 x 490 MW FPS system - NTPC Dadri (FGD Package)

			Conveyor	*LTP-1*	*LBC 1A, 1B*	*LCH*	*LBC 3A, 3B*	*LBC 2A, 2B*	*LTP-2*	*Gypsum Shed*	*Gypsum De-Watering Building*	*Ball Mill Building*	*RC Pump Area & Oxidation Blower Area-1*	*Absorber-1*	*RC Pump Area & Oxidation Blower Area-2*	*Absorber-2*	*Compressor House*	*ACW/DMCW Pump House*	*Cable Vault of FGD Control Room*	*MCC Room of FGD Control Room*	*Battery Room of FGD Control Room*	*Control Room of FGD Control Room*	*Panels in FGD Control Room*	*Third Party Interfaces*	*Refer Plot Plan(Annexure - 14) for locations*	
1	MSD below False Ceiling	:																				10			10	No's
2	MSD above False Ceiling	:									40	40	40	15	36	15	10	20	64	55	6	9	50		400	No's
3	Response Indicator	:																				9			9	No's
4	Duct Mounted Smoke Detector With Module	:																				2			2	No's
5	Manual Call Points	:		3		3			4	4	4	2	2	2	2	2	2	2	2	2	2	2			40	No's
6	Hooter (Note - 2)	:									2	2	2	2	2	2	2	2	2	2					20	No's
7	Control Module	:																						20	20	No's
8	Exit	:									2	2	2	2	2	2	2	2	2	2					20	No's
9	Digital LHS	:	700		1100		700	750											1750						5000	Mts.
10	Indoor Loop Cable	:	150	50	300	50	150	200	50	250	150	110	120	80	120	80	80	100	200	200	100	100	100	1000	3740	Mts.
11	Outdoor Loop Cable	:																							3260	Mts.
12	Indoor Power Cable (Note - 2)	:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	0	0	0	200	400	Mts.
13	Outdoor Power Cable (Note - 2)	:																							2600	Mts.

NOTE:-

1) In addition to above devices, modules for deluge valve shall be included.

2) Additional control modules and power cable shall be considered if bidder proposes non-loop powered hooters.

ANNEXURE-13

SUB-SECTION-I-M4

FIRE DETECTION & PROTECTION SYSTEM

FIRE PROTECTION AND DETECTION SYSTEM

1.00.00 GENERAL DESCRIPTION

1.01.00 A comprehensive Fire Detection and Protection System covering all the areas of the power plant including Employer's facilities/ system /buildings (if applicable) is included in the scope of the Contract.

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. and all the systems, equipments and installation shall be got approved from TAC accredited professional(s)-India.

2.00.00 HYDRANT SYSTEM

Hydrant system shall consist of piping, hydrant valves, landing valve, water monitors, hoses, branch pipes, nozzle, hose boxes, etc.

2.01.00 **Areas to be Covered**

Complete FGD area, ZLD area (as provided) and other auxiliary buildings / areas under the scope of the Bidder.

3.00.00 HVW AND MVW SPRAY SYSTEM

3.01.00 **General**

It shall consists of water mains network, deluge valves, isolation valves, Y type strainers, spray nozzles/ projectors, spray nozzles piping network, detection system, instrumentation, local control panels, cables etc.

3.02.00 **Areas to be covered by HVW Spray System**

i) All transformers For FGD and ZLD (as provided) System having oil capacity above 2000Ltrs & located with-in plant boundary.

3.03.00 **Areas to be covered under MVW Spray System**

i) All cable galleries/ cable vault/ cable spreader room in Bidder scope of work under FGD and ZLD (as provided) System.

4.00.00 FIRE EXTINGUISHERS AND FIRE STATION EQUIPMENTS

4.01.00 **Fire Extinguishers**

As indicated in Bidder's Scope, Part-A.

5.00.00 FIRE DETECTION, ALARM AND CONTROL SYSTEM

5.01.00 **Codes and Standards**

a. 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.

b. 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.

c. 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:

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.

d. The equipment and the system shall be of types approved by any of the following bodies, as applicable:

1. Loss Prevention Council, (LPC), U.K.
2. National Fire Protection Association, (NFPA), USA
3. Under-writers laboratories, (UL), USA
4. Factory mutual(FM)

5.02.00 **Areas to be covered under Fire detection and alarm System**

a) **Multisensor type detection system (Above and below the false ceiling or below the false flooring as the case may be)**

i) All switchgear / MCC/battery rooms of FGD and ZLD (as provided) control room building, various auxiliary buildings (if applicable), etc.

ii) Cable galleries of FGD and ZLD (as provided) control room building protected by MVW spray system. Further, multisensory detectors shall also be provided inside all cubicles/panels of control room, control equipment room and UPS / Battery charger areas.

iii) Above and Below false ceiling areas of all air-conditioned rooms of FGD and ZLD (as provided) control room building, various control rooms of auxiliaries as defined in Sl. No. (i) above.

b) **Linear heat sensing cable detection system**

Gypsum and lime conveyor of FGD system. Cable Galleries covered under MVW Spray System.

c) **Quartzoid bulb heat detection system**

Equipments protected by HVW spray system, conveyors protected by MVW spray system.

5.03.00 General requirements for all types of Detectors

5.03.01 Detectors shall be housed or mounted in suitable enclosure in such a way that their performance is in no way affected. Special maintenance procedures if any required for the satisfactory operation of the detectors shall be clearly stated in the bid.

5.03.02 Necessary mounting accessories shall be provided for all the detectors.

5.03.03 In case the detectors are offered with their output (on sensing a fire) in the form of an electrical contact, it shall be noted that the contact shall be 'NC' type such that under fire conditions, this contact will open to initiate the fire alarm system.

5.03.04	Detectors shall preferably be designed as plug-in units, which fit into various bases according to place and type of mounting. This would also enable interchangeability.
5.03.05	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.
5.03.06	Depending upon the environmental conditions in which detectors are installed, chlorinated rubber based or epoxy or equivalent paint shall be used for finishing the surface of the enclosure.
5.03.07	The coverage or the zone of protection afforded by the detector and recommended height of mounting shall be furnished by the Bidder. The bidder shall furnish the test certificate in support of this.
5.03.08	Any metal parts used for detector construction shall be inherently resistant to corrosion or shall be plated or otherwise suitably treated to afford protection against corrosion. The plating or treatment shall in no way affect the detector performance.
5.03.09	Any plastic material or any sealing compound used in the detector shall be such as it will not deform or fail under the maximum temperature to be expected.
5.03.10	No detector shall contain any moving parts subject to wear and tear and must be able to operate afresh after each alarm release, without its exchange or adjustment.
5.03.11	The detector shall be located where the largest combustion gas concentration can be expected.
5.03.12	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.
5.03.13	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.
5.03.14	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.
5.03.15	The detectors shall not be sensitive to vibrations. Any special mounting arrangements required to counteract vibration shall be included in the contractor scope.
5.03.16	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.
5.03.17	The detectors shall not give false alarm due to high humidity, temperature, and velocity of air in the surroundings and static electricity conditions.
5.03.18	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.

5.05.00

Linear Heat Sensor Cables

Application	Detection of Stationary fire
Type	Digital
Operating voltage	24 V DC
Approval	FM/UL
Conductor material	Steel
Insulation	Heat sensitive polymer
Outer Sheath	Black or colored PVC or flouropolymer suitable for the application environment

~~**Installation features for LHSC**~~

~~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.~~

5.06.00

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) The detector shall be suitable for two-wire operation and two-way communication on the intelligent analog signaling circuit.

c) The detector shall display a steady LED when in the Alarm State. The LED shall flash when in stand by or normal mode.

d) Each detector in a loop shall have short circuit isolator suitable for style-7 wiring as per NFPA-72.

e) Address and sensitivity assignments shall be set preferably electronically. However, dip switches / rotary switches for the same are acceptable. The detectors shall be assigned a sensitivity level based on environment, time of day or any programmable function as required by the system user, and shall respond at that level whether in the “on line” or “default” mode.

f) The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system.

g) The detectors furnished shall be listed for use in environments as covered by Factory Mutual and UL and shall be installed according to the requirements of NFPA 72E for open area coverage.

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 The detectors shall be complete with a mounting base that includes a terminal box into which the detector can be plugged in. Terminals for looping of the cables shall be provided.

5.07.04 All detectors shall be provided with built-in response and indicating lamps which shall give local visual indication, when it has operated in dense smoke conditions. The failure of lamp shall not prevent the function of detector.

5.07.05 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.

5.07.06 It shall be possible to replace any type of detector head by a different type detector without requiring change in cabling/panel wiring and condition of the zone, originally covered by the detector.

5.08.00 **System Configuration**

5.08.01 The Addressable Fire Alarm panel shall be able to communicate with repeater annunciation panel 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.

5.08.02 At least one spare loop shall be provided in each of the addressable type fire alarm panel located in FGD and ZLD (as provided) control equipment 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 FGD and ZLD (as provided) Fire alarm system shall be provided with necessary interface hardware and software for communicating fire alarms from this fire alarm panel to the main plant fire alarm control panel through potential free contacts.

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 mentioned herein required to make the system complete shall be included in the scope of the Bidder.

5.09.04 All the system and its equipment specifically detectors, interface modules, panels, power supply, battery chargers etc. shall be furnished from a single source and the same shall be new and latest state of the art products of manufacturer engaged in the manufacture of Integrated Microprocessor based Analog Addressable Fire Detection and Alarm System.

5.09.05 All equipments such as detectors, panels etc shall be approved and listed by UL/FM/LPCB/VDS.

5.09.06 All types of smoke detectors shall be of analogue addressable type. Conventional detectors with interface modules are not acceptable. Each zone of LHSC detector and each IR detector shall be provided with interface module.

5.09.07 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.

5.09.08 The wiring shall be of class-A as per NFPA-72.

5.09.09 ~~Bidder shall provide isolators at the start & end of the loop.~~

5.09.10 The complete system shall include, but not be limited to the following :

a) Master system CPU.

b) Analog Addressable Fire Detection and Alarm System panels including alarm modules, system supervisory control modules, auxiliary output control modules etc.

c) Power supplies, batteries and battery chargers.

d) Analog addressable type smoke detectors.

e) 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.

f) Software and hardware as required for complete operation of the system.

g) ~~Complete Wiring/cabling including its conduits/trays/fixtures etc.~~

i) The fire alarm control panel shall function as a communication interface between central processing unit and sensors. This panel shall have facility to process the input signal and to control all the input data received from initiating and indicating devices.

j) Fire alarm control panel shall have filters to ignore false alarm and increase sensitivity to real fire from sensors. The sensitivity of each detector should be automatically raised if detectors are gradually polluted due to dust and dirt entering inside the detector. If detectors are more polluted the control panel shall give a warning. The trouble report shall indicate the location of device requiring service.

k) Fire alarm control panel shall have printer to print out the alarm/ trouble occurrences.

l) The CPU shall serve as the systems central processor. Software shall be designed especially for fire alarm annunciation system applications and shall monitor status of processing alarms according to priorities, controlling/processing communications and synchronizing all system activities.

n) The system shall be able to recognize and indicate an alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.

o) All devices shall be individually identifiable for its type, its zone location, alarm set value, alarm and trouble indication by an unique alpha numerical label.

p) The software logic modules and system database shall be programmable using a MS - Windows compatible program (latest version) on PC at site and required hardware shall be included in scope of supply. The system software programme shall be password protected and shall include full upload and download capability and during program upload or download through the PC, the capability of alarm reporting shall be retained. The software shall be downloaded to a PC for editing. The software shall enable Employer to add the spare loop provided in the fire alarm panels or addition of additional devices/detectors in any of the fire alarm panel.

q) The system shall support the use of Color Graphic display terminal for the display of information in an appropriate format.

r) The system shall include software for system data base, historical event log, logic, and operating system. The system shall require no manual input to initialise in the event of a complete power down condition. It shall return to an on line state as an operating system performing all programmed functions upon power restoration.

s) Activation of any fire alarm initiating device shall display (LCD alpha numeric display) message in describing the device originating the alarm condition at the Central monitoring station, at alarm panel, simultaneously at the repeater annunciation panel and shall initiate the associated protection systems & other related control functions. Similarly activation of any supervisory circuit, (supervised valve closure, air pressure abnormal, fire pump trouble, water pressure low, etc.) or receipt of trouble report (primary power loss, open or grounded initiating or signaling circuit wiring, battery disconnect etc) shall display at the fire alarm control panel the origin of supervisory condition or origin of trouble condition as the case may be. It shall also record the occurrence of the event, the time of occurrence and the device initiating the same.

t) System configuration shall be menu driven and capable of being operated by, a person with no previous computer programming experience.

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:

1. System self monitoring and fault signaling.
2. 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.
3. 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.
4. Triggering stationary extinguishing systems such as clean agent system.
5. Supervising of unauthorised removal of a detector head from its base and giving a fault alarm on the control panel.
6. Supervising and monitoring the detection cabling, to indicate fault conditions in case of open/short circuit in the wiring.
7. 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.
8. Facilitating simulation of fire conditions to enable the testing of circuits (without creating actual fire) under the test mode from the fire Alarm panel.
9. The control unit shall contain all the systems main switches lamps and fuses. Switches and lamps shall be easily identified even in closed casings.
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.

5.10.02 **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 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.

5.12.00 **System Software Requirements**

i) The software shall control the operation, function and display of the graphic system and provide for automatic boot up and run from the hard disk drive of the computer.

ii) All project specifics actuating device programming shall be capable of being carried out on site via password access.

iii) The system shall monitor all alarm, supervisory; trouble and security conditions detected by the fire alarm control panel and provide separate disk based files, for each condition. These logs may be enabled, disabled, or cleared with password access.

This log information is not to be lost upon power failure or fire alarm control panel reset. A utility file shall be provided to sort the log data by date or by device and display this information either on the screen or the system printer.

iv) Selective memory storage up to 800 events, shall be stored in flash memory and displayed, printed or downloaded by classification for selective event reports.

a. Software shall allow selection of events to be logged, including; inputs as alarms, troubles, supervisors, securities, status changes and device verification; out puts, as audible control and output activation; action, as reset, set sensitivity, arm/disarm, override, password, set time and acknowledge.

b. Audible and visual indications shall be generated when memory is 80% and 90% full to allow downloading of data. The system shall be programmable circular logging, assuring that at least the last 400 events will always be stored in non-volatile memory.

v) Software has driven logic for adjusting the alarm threshold windows on detectors to compensate for accumulating contamination and keep detector response sensitivity constant. The software shall compensate for either over-sensitized or desensitized units, raising a system flag when a detector approaches the allowable limits of adjustment, indicating a requirement for cleaning.

a. Values shall be stored in non-volatile memory allowing activation of all tracking functions within 90 sec of system initiation from a "cold boot". During the boot sequence, alarms from detectors programmed with the feature shall be suppressed.

When the full data history is active all devices shall be checked and any active alarms displayed.

b. The control panel shall place each detector in the system in an alarm condition, transparent to the system user, every twenty-four hours as a dynamic check of the accuracy of the alarm threshold setting. Upon reception of the alarm report, the system detector shall be restored to its pretest state.

c. The system shall be capable of monitoring the stage of detectors and displaying a message when a detector is approaching the limits of adjustment as a result of contaminates. A second message shall be displayed when the detector reaches the limits of adjustment due to these contaminate.

d. The system shall be capable of recognizing that a detector has been cleaned, initiating a series of tests to determine if the cleaning was successful and display a detector cleaned message, readjusting that detectors normal sensitivity setting reference.

vi) When an alarm or trouble is registered at the fire alarm control panel the graphics system shall display the first screen image for the first actuated device. The system shall be capable of zooming in for further information if required. At all times when in the alarm or trouble mode the fire control panel status i.e. number of current alarms and or troubles is to be displayed on the graphics screen.

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 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 Not Used.

5.14.02 Not Used.

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:

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.

Notes:

1. 10% spare pair shall be provided for all cables having more than four pairs.
2. 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.

3. 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

4. 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.

5. 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.

6. The detailed specification of instrumentation cables and optical fiber cable shall be as specified in other sections of the technical specification.

7. 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.

8. 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.

5.16.00 **Detection System for Conveyors**

~~i) **Linear Heat Sensor Cables:**~~

~~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.~~

(e.) Type: Digital, Operating Voltage: 24V DC, Conductor Material: Steel, Approval: FM/UL

5.17.00 ~~**Detection System of Cable Galleries**~~

~~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) LHSC detector shall run in a zig-zag fashion (with an included angle of minimum 90° atleast) in each of the top tray, bottom tray and in every alternate trays. The mounting arrangement of LHSC detector shall be as per manufacturer's standard practice.~~

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.~~

6.00.00 PIPING AND VALVES

6.01.00 **General Data for Pipes etc.**

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

ii) Mild steel as per IS:1239 (Part-I) medium grade (upto 150 NB) & as per IS:3589 Gr.410 (above 200 NB) or Equivalent and 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 and above: As per IS:1239 Part-I medium 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 Cl 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.

7.00.00 PAINTING

7.01.00 All the Equipments shall be protected against external corrosion by providing suitablepainting.

7.02.00 The surfaces of stainless steel, Gunmetal, brass, bronze and non-metallic components shall not be applied with any painting.

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

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

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

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

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

(ii) **Painting:** One (1) Coat of red oxide primer of thickness 30 to 35 microns followed up with 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.

7.06.00 **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.

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 (as in coastal areas)	Primer- zinc filled epoxy Intermediate – Epoxy MIO Finish – Aliphatic Polyurethane (shade RAL3000)(P.O Red)	Min 200 microns

ANNEXURE-I

PIPING THICKNESS:

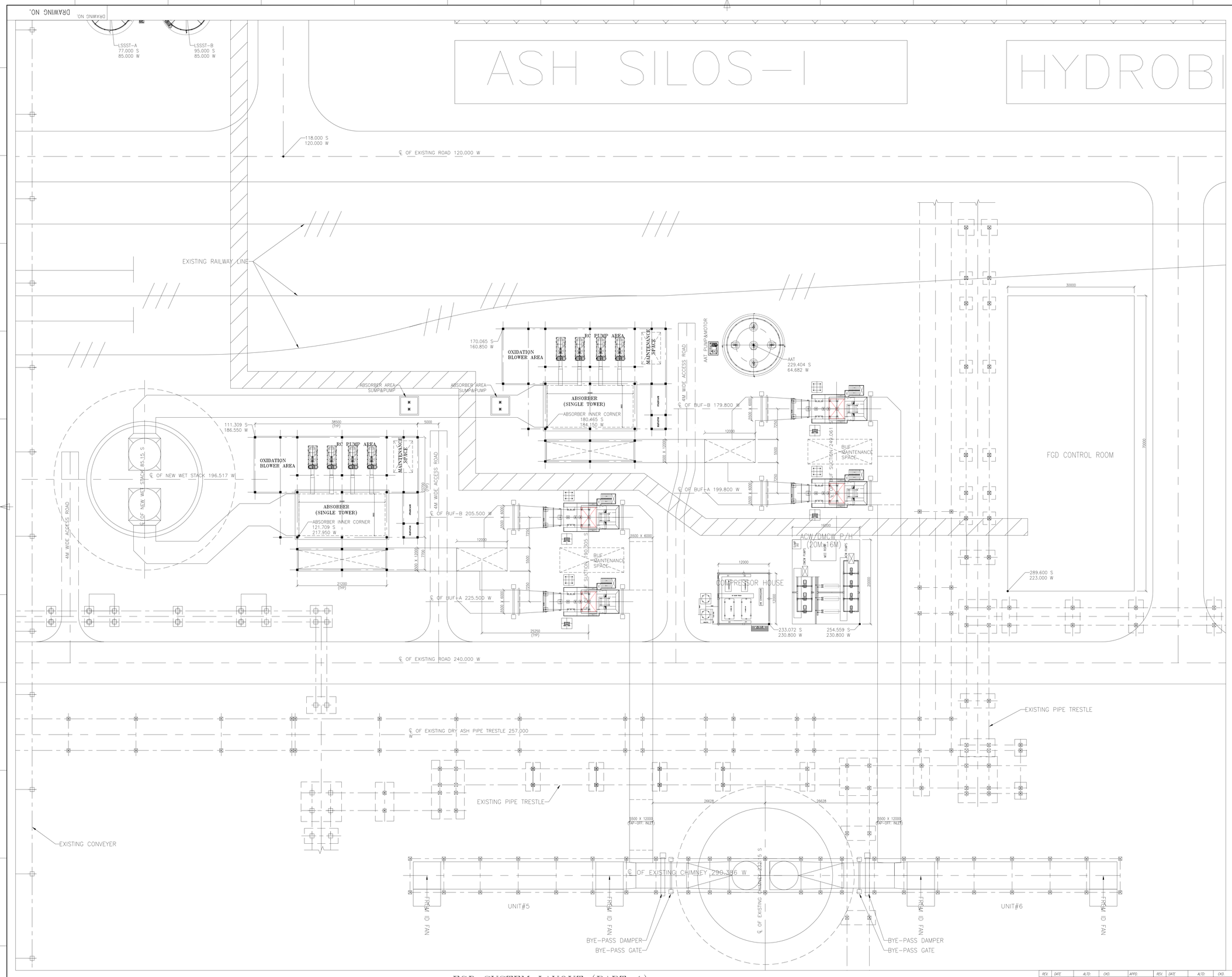
Pipes for sizes 200 NB & above shall confirm to IS: 3589 Grade 410. The final thickness shall not be less than that specified as per IS: 3589 as indicated below.

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

Annexure-II

Technical Data:

1. **Hydrant Valve**	Oblique female type as per IS:5290
	MOC: Body/bonnet/stop valve/valve seat/trim : SS304/SS316
2. **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
3. **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
4. **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
5. **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



LEGEND:-

FGL	- FINISHED GROUND LEVEL
FFL	- FINISHED FLOOR LEVEL
BMB	- BALL MILL BUILDING
GDW	- GYPSUM DEWATERING BUILDING
FWT	- FILTER WATER TANK
LSSST	- LIMESTONE SLURRY STORAGE TANK (REAGENT TANK)
AAT	- AUXILIARY ABSORBENT TANK
BUF	- BOOST UP FAN
WWT	- WASTE WATER TANK
SHFT	- SECONDARY HYDRO CYCLONE FEED TANK
PWT	- PROCESS WATER TANK
CLWT	- CLARIFIED WATER TANK

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES
2. EL(±)0.000 IS THE GROUND FLOOR LEVEL OF POWER HOUSE BUILDING WHICH CORRESPONDS TO RL(+)209.750
3. FGL (FINISHED GRADED LEVEL) OF ABSORBER, BUF & DUCTING AREA IS EL(-)0.500 AND RL(+)209.25 M
4. THE BUILDING AND EQUIPMENT SIZES SHOWN IN THIS DRAWING IS INDICATIVE ONLY AND WILL BE FINALIZED DURING DETAIL ENGINEERING

REF. DWGS

1. 6130-999-POC-F-001-REV 000 : NCTPP GENERAL LAYOUT PLAN
2. 6130-109-PVM-F-001-SH2 : FGD SYSTEM LAYOUT-SH2

FGD SYSTEM LAYOUT (PART-1)
(ABSORBER, BUF, DUCT AND CHIMNEY AREA)

REV.	DATE	ALTD.	CKD.	APPD.	REV.	DATE	ALTD.	CKD.	APPD.
--	-	---	---	---	--	---	---	---	---

CUSTOMER NOS: G501 & G502

NTPC DRG NO: 6130-109-PVM-F-001

CUSTOMER: NTPC LIMITED.

PROJECT: NCTPP (2X490MW) DADRI STAGE-II

FGD SYSTEM PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET:632 406.

DEPT CODE		NAME	SIGN	DATE
M	DRN	FA	-sd-	15.02.18
	CHD	SKD/KBP	-sd-	15.02.18
	APPD	RL	-sd-	15.02.18

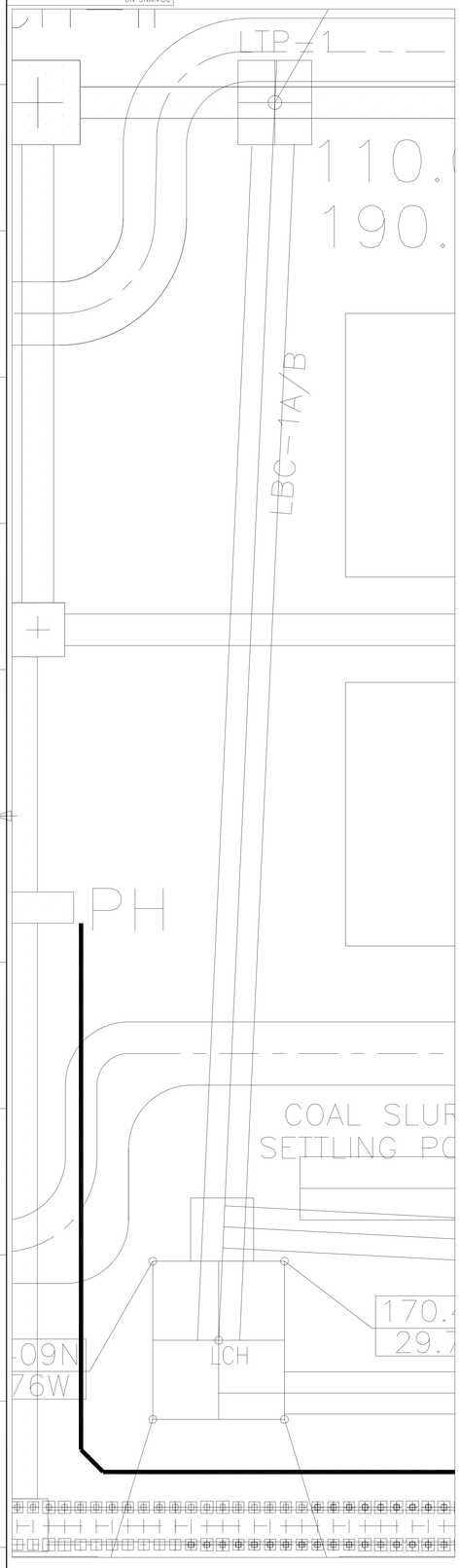
TITLE: PLANT LAYOUT OF FGD SYSTEM SH-1 OF 2

SCALE : NTS

DRAWING NO. 0-FW-000-00143 SH 01 OF 02 REV. 00

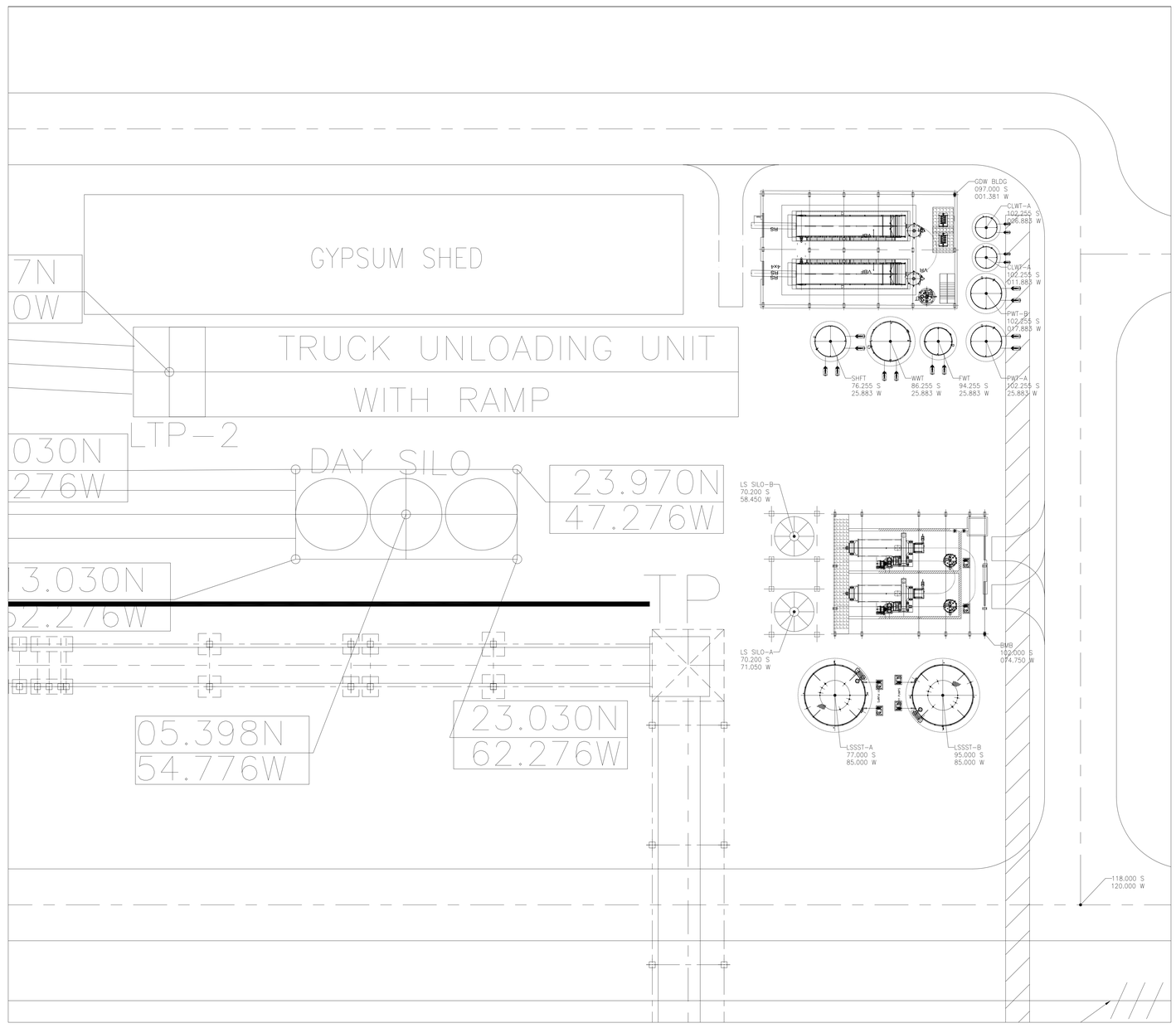
Size A0

CAUTION: THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. AND IS NOT TO BE REPRODUCED OR USED TO PERSONS ANY INFORMATION FOR WARNING OF DRAWINGS OR APPARATUS EXCEPT WHERE PROVIDED FOR AGREEMENT WITH BAD COMPANY.



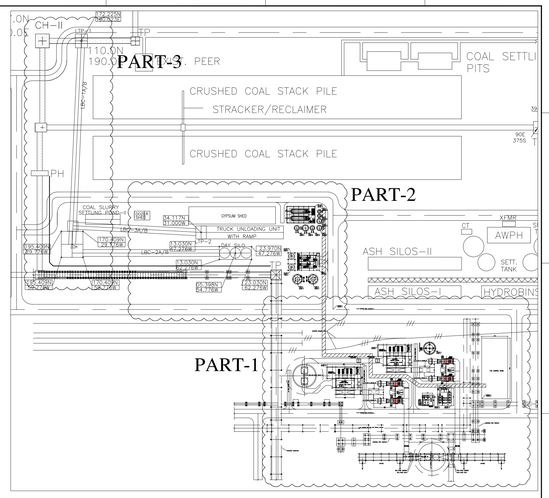
FGD SYSTEM LAYOUT (PART-3)

(LCH AREA AND CONVEYER LAYOUT)



FGD SYSTEM LAYOUT (PART-2)

(BALL MILL AREA, GDW AREA, TRUCK UNLOADER AREA AND SILO AREA)



KEY PLAN

LEGEND:-

FGL	- FINISHED GROUND LEVEL
FFL	- FINISHED FLOOR LEVEL
BMB	- BALL MILL BUILDING
GDW	- GYPSUM DEWATERING BUILDING
FWT	- FILTER WATER TANK
LSSST	- LIMESTONE SLURRY STORAGE TANK (REAGENT TANK)
AAT	- AUXILIARY ABSORBENT TANK
BUF	- BOOST UP FAN
WWT	- WASTE WATER TANK
SHFT	- SECONDARY HYDRO CYCLONE FEED TANK
PWT	- PROCESS WATER TANK
CLWT	- CLARIFIED WATER TANK

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES
2. EL(±)0.000 IS THE GROUND FLOOR LEVEL OF POWER HOUSE BUILDING WHICH CORRESPONDS TO RL(+)209.750
3. FGL (FINISHED GRADED LEVEL) OF ABSORBER, BUF & DUCTING AREA IS EL(-)0.500 AND RL(+)209.25 M
4. THE BUILDING AND EQUIPMENT SIZES SHOWN IN THIS DRAWING IS INDICATIVE ONLY AND WILL BE FINALIZED DURING DETAIL ENGINEERING

REF. DWGS

1. 6130-999-POC-F-001-REV 000 : NCTPP GENERAL LAYOUT PLAN
2. 6130-109-PVM-F-001-SH21 : FGD SYSTEM LAYOUT-SH1

REV.	DATE	AUTD.	CKD.	APPD.	REV.	DATE	AUTD.	CKD.	APPD.
--	--	---	---	---	--	---	---	---	---

CAUTION: THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD.,AND IS NOT TO BE REPRODUCED OR COPIED OR TRANSMITTED OR DISCLOSED TO ANY PERSON WITHOUT WRITTEN AUTHORISATION OF BHEL

CUSTOMER NOS: G501 & G502

NTPC DRG NO: 6130-109-PVM-F-001

CUSTOMER: NTPC LIMITED.

PROJECT: NCTPP (2X490MW) DADRI STAGE-II

FGD SYSTEM PACKAGE

BHARAT HEAVY ELECTRICALS LIMITED, UNIT: BOILER AUXILIARIES PLANT, RANIPET-632 406.

DEPT CODE		NAME	SIGN	DATE
M	DRN	FA	-sd-	15.02.18
	CHD	SKO/KBP	-sd-	15.02.18
	APPD	RL	-sd-	15.02.18

TITLE: PLANT LAYOUT OF FGD SYSTEM SH-2 OF 2

SCALE : NTS

DRAWING NO. 0-FW-000-00143

SH 02 OF 02

REV. 00

Size A0

ANNEXURE - 15						
LIST OF DEVIATIONS						
Project: 2 x 490 MW FPS system - NTPC Dadri (FGD Package)						
Sl. No.	Part No./ Volume	Page no.	Clause No.	Subject	Deviation/Clarification	Reason for Deviation
1						
2						
3						
4						
5						
6						

NOTES:

1. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
2. Additional sheets in the same format can be attached by the vendor, if necessary.
3. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
4. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
5. Reasons for the deviations shall be specified in the Remarks column.
6. If there are no deviations from the specifications, bidder still has to submit the signed copy of this format by writing “NO Deviations” on this format.
7. If the “Deviation Schedule” is not submitted along with the offer, the bidder’s offer is likely to be rejected without any further interaction with the bidder. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder

ANNEXURE-16

WORK INSTRUCTION

for

Storage and Handling of Mandatory Spares

PROJECT MANAGEMENT GROUP

Date of Issue	Rev 01 dated 27/12/2016	Signatures of Issuing Authority
Original Issue	Rev 00 dated 29/07/2016	

1. INTRODUCTION

1.1. There are instances of customer not accepting mandatory spares or taking them into their stock at the time of receipt at site. As such, materials are kept at BHEL stores and later on site offices are unable to handover all the items due to their loss/pilferage. As a result, customer refuses to close the contract till shortage of mandatory spares is made good or commercial settlement is agreed by BHEL.

1.2. In order to address above issue, during 339th MCM in May'16 it was decided to formulate guidelines on safe keeping and handing over of mandatory spares to ensure minimization of the incidence of missing mandatory spares.

1.3. Accordingly, a committee was constituted with the following members

(1) ED, HEEP

(2) GM I/c, PSTS & PCSG

(3) GM I/c, PSNR

(4) GM I/c, PEM

(5) GM I/c, PMG & CCG

(6) GM, CCG (Convener)

1.4. The committee after due deliberation has finalized the procedure to be adopted henceforth for handling of mandatory spares.

1.5. Work Instruction Rev 00 was issued on 29/07/2016 which was applicable for orders secured by PS- Marketing. During 342nd MCM, it was decided that work instruction are to be modified so as to include Industry Sector & International Projects also.

2. SCOPE

2.1. This Work Instruction details procedure for despatch, storage and handing over of mandatory spares. Following are covered under the scope of this procedure:

2.1.1. Composite contracts secured by Power Sector, Industry Sector & International operations involving manufacturing unit/s & execution by Power Sector Region.

2.1.2. All items, which as per terms of contract are to be handed over directly to the customer such as:-

2.1.2.1. Mandatory spares

2.1.2.2. Tools & Tackles / Special tools, which are to be supplied to customer in unused condition

2.1.2.3. Any other item(s) e.g., scaffolding, furnace platforms etc.

The term mandatory spares shall be used hereafter to represent all such items.

2.1.3. Contracts currently under execution/closure as well as future contracts.

Note:- PMG term used henceforth will mean Project Management Group or equivalent section of the concerned Business Group.

3. OBJECTIVE

3.1. Objectives of this document are:

3.1.1. To outline procedure for despatch of mandatory spares to project sites, their safe storage & handling at site and handing over to the customer.

3.1.2. To minimize physical loss and financial loss of mandatory spares till these are handed over and accepted by customer.

4. MANDATORY SPARES : STEPS FROM DESPATCH TO HANDING OVER

4.1. Clearance for despatch

4.1.1. Units shall submit to PMG, the despatch plan in terms of number of lots to be supplied, well before commencement of dispatches.

4.1.2. Before starting despatch, units will seek clearance from PMG. No mandatory spares shall be despatched without consent of PMG.

4.1.3. Upon receipt of request from units, PMG shall review the project status with respect to contractual conditions, availability of storage facilities, willingness of the customer to accept the mandatory spares, shelf life and preservation requirements, susceptibility to pilferage, validity and coverage of insurance policy, etc.

4.1.4. PMG may consult Project Construction Manager, Marketing Group & Customer, wherever necessary.

4.1.5. Accordingly PMG may advice units to dispatch / hold supply of mandatory spares.

4.2. Despatch modalities

4.2.1. Spares shall be sent in pre-decided lots in containers /secure boxes. This shall be applicable to both shop items as well as BOIs. Packing instructions are to be given to the concerned agency accordingly by the supplier Unit.

The containers/secure boxes should only contain spares and no other items which are part of main supply.

4.2.2. All boxes/containers are to be distinctly marked in Red color with boldly written "S" mark on each face of the containers /secure boxes as indication of items to be handed over directly to customer.

4.2.3. Unless technically not feasible, BBU number should be put on the item(s) in a durable manner (punching /painting, etc.), so that items can be easily linked with approved BBU for ease of handing over to customer.

4.2.4. Expiry date for short shelf life items (oils, chemicals, insulation material etc.) should be put on the item as well as on the packing box, to the extent feasible.

4.2.5. Units shall also provide approved spares' BBU to site so that site is aware of the costly items and can take special care of them.

4.3 Storage

4.3.1 Unloading, storage and maintaining requisite inventory records will be the responsibility of respective Power Sector Region. Accordingly Construction Manager/Site-incharge shall ensure safety of mandatory spares till their handing over to the customer.

4.3.2 Since, it may not be advisable to open the box containing mandatory spares at the time of its receipt from unit/vendor, it will not be expected to check the contents of intact boxes. Therefore, Site shall be responsible for the safety of the intact boxes and not the contents. Intact Boxes shall be opened in presence of Unit representative. If boxes are opened by site on its own for their requirement or received in broken condition, then Site will do the needful with respect to the insurance claim and raising of requisite document. MDR/CAR/SAR shall be raised within 01 month of opening /receiving of the damaged box, whichever is earlier.

4.3.3 As in the case of main plant items, units shall be required to resupply the items on receipt of MDR/CAR/SAR, without waiting for the insurance claim.

4.3.4 It is recommended that all containers/boxes of a particular unit are kept at same place.

4.3.5 Site/Regions & Units shall reconcile the spares before demobilization of site MM with customer. Site shall intimate to units and PMG well in advance before closing of site (minimum 3 months). However in all existing contracts, it is to be jointly ensured by Site & Units that physical reconciliation is done with customer forthwith. It will facilitate identification of missing/damaged items, their resupply and proper accountability of already supplied items.

4.3.6 Units shall make a periodic visit to check the safety of boxes/items, as the case may be, and report to site if any damage/loss is noticed. Frequency of the visit can be decided between unit and site depending upon the despatches, storage, preservation issues, likelihood of pilferage etc. However, it is recommended (except in case of IO projects) that one visit every six months should be made by medium and large manufacturing units.

4.4 Handing Over

4.4.1 Handing over, getting MRC from customer and physical reconciliation with customer shall be the joint responsibility of the site and concerned units in all situations. Region/Site will provide the logistic support for handing over till site establishment is there. Where site establishment has been demobilized, Units have to ensure that the spares are safely unloaded at customer stores and are taken over by customer.

4.4.2 Sites shall co-ordinate with customer for taking over of items already received from units and give a call to them for handover. On part of the unit representative visiting site, endeavor shall be to handover all items available at site store to the customer if the latter is ready to take over the same.

4.4.3 Once site is demobilized without completion of handing over of mandatory spares, region shall depute person to site, if requested, for helping the units for tracing and handing over the spares. In turn, the region can club such requests from different units to optimize the time and efforts.

4.4.4 It is required that Units as well as the Site should take special care of handing over of short shelf life item as a lapse on this account will result in rejection of the item by the customer near/after the expiry date.

4.5 Settlement of expenses on storage and handing over

4.5.1 In case of existing projects where site establishment is there, site shall arrange for storage of items not handed over till the issuance of these guidelines, 2% of BBU value of such mandatory spares shall be given to Region for meeting the expenses on Inter Unit Transfer basis. Quarterly debit shall be raised by the region based on the value of items handed over to customer on pro-rata basis.

4.5.2 No allocation is to be done where no site establishment is there, but handing over/supply of mandatory spares is not complete. Expenses incurred by region for

providing logistics to facilitate handing over will be borne by beneficiary Units on Inter Unit Transfer (IUT) basis.

4.5.3 Future projects

4.5.3.1 Where scope of mandatory spares is known at the time of tendering, Region will take into account the cost estimate for requirements in terms of storage and handing over of mandatory spares, which shall be submitted by region to Marketing. In case of mandatory spares not being identified at the time of tendering, the estimation will be done on average basis.

4.5.3.2 In both the above cases, Marketing will in turn decide the amount & timeframe for raising debit from units to region on IUT basis.

4.6 <u>Insurance & cost implication for losses/damages</u>

4.6.1 Loss/damage of mandatory spares will be covered by the guidelines issued vide Corporate Finance circular date 31/08/2010 and Corporate Finance Insurance Cell clarification dated 19/10/2011.

4.6.2 Mandatory spares insurance cover will be taken for marine, storage and handing over risks only. Policy shall be taken by Corporate Finance along with or as a part of MCE policy for the project.

4.6.3 Duration and value of excess clause can be decided by Corp Finance - Insurance Cell considering actual handing over and cost and benefit. The required inputs will be provided by PMG /CCG /PCSG /Region & Units, as the case may be.

4.7 <u>Inter-Unit Disputes</u>

4.7.1 In case of any dispute in interpretation, implementation of guidelines, etc., a committee constituting of members nominated by Head of Marketing, Corporate Finance and PMG will decide the matter. CCG/PCSG will convene the meeting after collection of all relevant facts.

5 RECORD OF REVISIONS

Rev. No.	***Date of Revision***	***Section/Clause/Page of WI***	***Brief description of Revision***
01	01/11/2016	-	Changes incorporated to cover all Business sectors of BHEL