







TTTD-106-1 Rev No. 5 Form No.		PROJECT ENGINEERING & SYSTEM DIVISION BHEL, HYDERABAD –32.			PY56182					
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<p style="text-align: center;"><u>TECHNICAL SPECIFICATION FOR</u> <u>FIRE DETECTION & ALARM SYSTEM</u></p> <p><u>PROJECT</u> : <u>KOTHAGUDEM THERMAL POWER STATION</u> <u>STAGE-VII, UNIT # 12, (1X800 MW)</u></p> <p><u>CUSTOMER</u> : <u>TSGENCO-HYDERABAD.</u></p> <p><u>CONSULTANT</u> : <u>M/s DCPL Pvt. Ltd.</u></p>										
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					Revisions :		Prepared by:	Checked by:	Approved By:	Date
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COPYRIGHT AND CONFIDENTIAL 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.	<u>CHECKLIST</u> [TO BE SUBMITTED ALONG WITH TECHNICAL OFFER]		
	Sl. No.	Description	Enclosed (Yes/ No)
	1.	Technical offer confirming to technical specification PY56154 & its associated Annexures, pre-bid clarifications etc., Bidder to confirm (Yes / No).	
	2.	Bidder to agree that Bill of materials /list of equipment furnished in the offer is only for information, vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification PY56154 & its Annexures, scope matrix etc., Bidder to confirm (Yes / No).	
	3.	Bidder to quote as per BHEL price format only. Bidder to attach unpriced price bid format by indicating "QUOTED" against each item and submit with technical offer duly signed & stamped. Bidder to confirm (Yes / No).	
	4.	Confirm that the quote includes training, commissioning spares, special tool & tackles, mounting hardware/ accessories, terminations, networking components etc. as required for commissioning activities are in Bidder scope. Bidder to confirm (Yes / No).	
	5.	Bidder to confirm that all networking components/hardware (except for FO cables), software, licenses as required for complete functional operation of the FDA system is included. Bidder to confirm (Yes / No).	
	6.	All the equipments / items / sensors / detectors etc., supplied by bidder is having a valid statutory approval certificate and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system. Bidder to confirm (Yes / No).	
7.	Signed and stamped copy of this specification along with annexures enclosed along with technical offer. Bidder to confirm (Yes / No).		
Ref. Doc	Signed & Stamp of the Bidder		


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COPYRIGHT AND CONFIDENTIAL 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.		<p>1.0 INTENT OF SPECIFICATION</p> <p>1.1 The intent of this document is to establish the minimum requirement of design, engineering, system integration, manufacture, assembly, inspection, shop testing, shop painting, delivery to site properly packed for transportation suitably protected from weather, supervision of Erection & Commissioning, final handing over as mentioned herein after for the Fire Detection and Alarm system (FDA), which form part of Kothagudem project.</p> <p>1.2 It is not the intent to completely specify all details of design, manufacture and construction. Nevertheless the equipment and installation shall conform to high standard of engineering and shall be capable of performing in continuous commercial operation in a manner acceptable to the Purchaser, statutory approval and end customer.</p> <p>2.0 SPECIAL NOTES TO BIDDERS</p> <p>2.1 This specification shall be read in conjunction with all its Annexures. In case of any discrepancy arising between this specification & its enclosures, the most stringent of all (as determined by purchaser) shall be followed. Further, if a requirement in this specification or any of the enclosures, calls for a decision from the Purchaser, it shall be bidder's sole responsibility to clearly bring out/highlight the same distinctively in his pre-bid queries, so as to enable purchaser to furnish their decision/clarification. If such issues/requirements are not duly addressed by bidder during the pre-bid stage and if such issues/requirements are observed later during order execution stage, it shall be binding on the bidder to comply with the final decision made by the purchaser subsequently, without any cost, delivery, or any other commercial implications.</p> <p>2.2 Compliance with this specification shall not relieve the bidder of the responsibility of furnishing equipment and accessories / auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.</p> <p>2.3 Bidders are advised to comply to specification in total, unless the requirement is not feasible. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market. Reasons for the deviations shall be specified in the Remarks column. All such deviations/queries shall be clarified from BHEL before submitting the techno-commercial bid. No deviations/clarification post-bid are allowed including any price impact.</p> <p>2.4 Bidder shall have to necessarily attend Pre-bid meeting at BHEL office for two complete days. Schedule for the pre-bid meeting shall be informed with in one week from the date of enquiry. Pre-bid meetings shall be conducted in 2nd week from the date of enquiry. Bidder to plan, intimate to BHEL and visit BHEL offices alongwith their Technical queries for across table clarifications. However, it is complete responsibility of bidder to clear all queries, clarity on scope of supplies & services, Intent of specification and quote techno-commercial bid accordingly.</p> <p>2.5 Pre-bid technical queries shall be submitted / offered only in one attempt. Multiple chances for prebid queries will not be entertained. Hence there shall not be any clarifications/ deviations in the posted technical bids. Offers with incomplete information, request for clarifications, technical deviations will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.</p> <p>2.6 The design information, specifications and drawings indicate the "Minimum" requirements and are intended to enable Bidders to ascertain the extent of the work involved.</p>		
	Ref. Doc	<p>2.7 The Bidder shall accept full responsibility for the completeness and for the faultless working of all the equipments and the FDA system as a whole. These shall be executed on the basis of proven design principle and in accordance with the</p>		

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COPYRIGHT AND CONFIDENTIAL 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.		<p>latest state of the art and good engineering practices. Standardization of equipment, materials etc. shall be employed in the design. Care shall be taken to ensure safe operation as well as simplicity of assembling and dismantling of all parts of the plant.</p> <p>2.8 Any technical features [over & above BHEL enquiry specification requirements] proposed by Bidder will not be given preference for the purpose of evaluation.</p> <p>2.9 Bidder shall submit duly filled “Check list format” as per attached format along with technical offer.</p> <p>2.10 Unsolicited requests from bidders like change in prices, change in model numbers, change in vendors etc., for alterations to their already submitted offer will not be entertained. These would not be taken cognizance, and offers will be evaluated without taking into account such requests/correspondence.</p> <p>2.11 In case of any conflict between this specification and above codes, standards and guidelines requirements, the most stringent requirement of these shall govern and the decision of purchaser in the resolution of the any such conflict shall be final. However same shall be brought to purchaser by bidder in pre-bid queries is must. If not same is understood as such requirement is obeyed by bidder.</p> <p>2.12 Contract includes this specification/amendments and pre-bid agreements.</p> <p>2.13 Purchase Order for the entire FDA system for the project shall be placed on lump sum fixed prices as per tender requirements. PO for supply part will be issued by PE&SD, BHEL Hyderabad. LOI for E&C supervision activities will be placed PE&SD, BHEL Hyderabad. While formal PO will be placed by our E&C group from project site office separately.</p> <p>3.0 CODES & STANDARDS</p> <p>3.1 Tariff Advisory Committee (TAC),</p> <p>3.2 Rules for Fire Alarm System of india,</p> <p>3.3 Underwriters Laboratories (UL)-USA,</p> <p>3.4 Central Building Research Institute (CBRI),</p> <p>3.5 National Fire protection Association(NFPA)-USA,</p> <p>3.6 Local Planning Authority of India (LPAI),</p> <p>3.7 Loss Prevention Certification Board (LPCB),</p> <p>3.8 Indian Statistical Institurte (ISI),</p> <p>3.9 International Electric Technical Commission (IEC),</p> <p>3.10 Environmental Rules of india (ERI),</p> <p>3.11 Factory Mutual (FM),</p> <p>3.12 Indian Electricity (Supply) Act (IEA) and</p> <p>3.13 IS 2189 (Selection, Installation and Maintenance of Automatic Fire Detection and Alarm System-Code of Practice).</p> <p>4.0 SYSTEM TECHNICAL REQUIREMENTS</p> <p>4.1 Fire Detection, Alarm and Protection system proposed through the Fire detection and Repeater panels shall provide continuous surveillance against fire in the areas of plant. All Fire detection and repeater panels shall be colored MIMIC based.</p> <p>4.2 Fire alarm panel & repeater panel consists of microprocessor based (with hot redundant processor) along with necessary software.</p> <p>4.3 The Main Objectives of the of these panels are as follows:</p> <p>4.3.1 To detect fire in its early stages and activate or alert for implementation of Emergency action, thus protecting personnel and equipment.</p> <p>4.3.2 To provide an appropriate level of monitoring in the event of fire and audiovisual annunciation at respective Fire detection alarm cum MIMIC panel Repeater panel and the PC based operator station.</p>		
	Ref. Doc			


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COPYRIGHT AND CONFIDENTIAL 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.		<p>4.3.3 Opening of the deluge valve in case of fire detection.</p> <p>4.3.4 The sensing of fire is accomplished through various types of fire detectors / LHS cable.</p> <p>4.3.5 To ensure high reliability and availability of the system with quick and exact identification of the fire location without false alarm.</p> <p>4.3.6 To provide contact output in the loop / from fire detection and protection panel & repeater panel for fire protection & other systems viz. opening of deluge valves, tripping of Ventilation System Fans / Dampers / Air Handling Units / tripping of belt conveyor / activating foam system / inert gas flooding system on detection of fire in specific area for effective fire protection.</p> <p>4.3.7 FDA system shall be designed to operate 24 hours per day and 365 days in a year.</p> <p>4.4 Fire detection and alarm & Repeater cum MIMIC panel shall be provided in accordance with all codes and standards to annunciate fire alarm signals from fire protection and detection systems provided for the facility, annunciate system / device fault and to provide supervisory functions as required.</p> <p>4.5 In case of fire, the audio-visual fire alarm shall be generated at Fire detection and alarm & Repeater panel and also initiate a signal to operate hooter(s) in the area where the fire signal is detected.</p> <p>4.6 Indication (bright LED type) and Graphic Display (LCD type) shall be provided in each Fire detection and alarm & Repeater panel . Information / data from these Fire detection alarm cum MIMIC panel s shall also be available in a dedicated computer based operator station in.. This computer shall be an UL/FM Listed PC used to display event information from the network in a text and graphical format. Graphic screens shall be created with a built-in drawing utility of the protected area and are linked to fire alarm devices. Should a device go into alarm, the appropriate graphic floor plan is displayed along with operator instructions. This shall provide a quick and easy way to inform operators of a fire's location in the buildings. The computer shall have features including event logging, event history tracking, fire panel programming and control.</p> <p>4.7 Each Fire detection alarm cum MIMIC panel shall be capable of operating in stand-alone mode. All Fire detection alarm cum MIMIC panel, Repeater panels and PC based operator stations shall be connected by a dedicated fault tolerant Local Area Network (LAN) through redundant Fiber optic communication cable.</p> <p>4.8 Fire detection alarm cum MIMIC panel shall have multiple loop processing capability. Each area / zone shall be monitored by one independent loop and a loop shall not be shared between different zones. Each Fire detection alarm cum MIMIC panel shall have additional capacity of handling at least ten alarms per zone, requiring only field wiring, as a spare for future modification or expansion.</p> <p>4.9 The Fire detection alarm cum MIMIC panel shall continuously monitor the status of the detectors and connecting lines. The panel shall evaluate the analogue information received from each addressable detector and compare with set value to check for alarm condition.</p> <p>4.10 Fire detection alarm cum MIMIC panel comprises of loop interface boards with specified loop capacity. The individual elements (detectors / sensors / control / fault isolation modules / interface modules) are looped together and connected to the loop interface board on the Fire detection alarm cum MIMIC panel on a 2-wire circuit (class B wiring).</p>		
	Ref. Doc	<p>4.11 Minimum indications to be provided on the Fire detection alarm cum MIMIC panel shall be Fire , Fault , Isolate , Pre-alarm, Multiple alarms.</p>		


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COPYRIGHT AND CONFIDENTIAL 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.		<p>4.12 Minimum controls to be provided on the Fire detection alarm cum MIMIC panel shall be Push button -Acknowledge , Push button- Reset , Push button -Test ,Push button - switch -Isolate.</p> <p>4.13 Minimum information to be provided on the panel shall be Detector identification number, Connecting line identification number, Zone / Area description, Detector in isolated condition</p> <p>4.14 Display of the status of the detector, sequence of the events, alarm and trouble summary etc. shall be displayed on the display unit of Fire detection alarm cum MIMIC panel and as well as on the operator station and printer.</p> <p>4.15 Alarms and indications of Fire detection alarm cum MIMIC panel s are repeated in the repeater panel. Repeater panels shall be provided with a 24" LCD display unit indicating major events, alarm, trouble etc., which shall repeat the information related to sector / area,zone, floor Elevation, room no. and detector no. etc., which are being displayed in the related Fire detection alarm cum MIMIC panel. Repeater panels shall allow acknowledgement of all alarm signals generated by fire alarm system.</p> <p>4.16 It shall be possible to utilize the PC from a remote location via modem, to interrogate the FAP for event history, Fault diagnosis, maintain history, and configure FAP/Devices/Detectors/equipments.</p> <p>4.17 The fire detection and alarm system shall be in normal operation even during mains 240V AC power failure. The stand by DC power supply from the battery in Fire detection alarm cum MIMIC panel shall be capable of maintaining the system in normal operation & in alarm condition for a period of not less than 48 hours after the failure of mains supply.</p> <p>4.18 The automatic fire detection and alarm system shall be designed with electronics having built-in redundancy to ensure availability at all times.</p> <p>4.19 Bidder shall offer microprocessor based Intelligent/ analogue addressable type fire detection and alarm system. Fire alarm system working on microprocessor based system shall have dual redundant fibre optic data highway.The fire detection and alarm system shall essentially consist of Fire detection alarm cum MIMIC panels with respective monitor, Key Board Stations located in CCR, Fire detection alarm cum MIMIC panel, Master Fire Alarm Panel with monitor, Key Board Station located in Fire Station, Satellite Fire Alarm panels located in various Plant areas, detectors, Manual Call stations, alarm devices, accessories, wiring and all connections to devices.</p> <p>4.20 The Fire detection alarm cum MIMIC panels in CCR and the Satellite Fire Alarm Panels shall be used for fire detection, associated annunciation system, power supply distribution etc. of the fire protection system. Satellite Fire Alarm panels shall be strategically located in different areas of the Power Plant considering zone-wise detection.The Fire detection alarm cum MIMIC panels in CCR and the Satellite Fire Alarm Panels shall be microprocessor based and their primary function shall be to raise an effective alarm by visual and audible means upon receipt of an alarm signal from any of its detection circuit(s) and to activate any device(s) that may be connected to the system(s). Each detection circuit shall be continuously monitored for fire and fault. Alphanumeric indications shall be provided for fire and fault. Facility shall also be provided for simulation, for test purposes, of these conditions by operation of a control switch, which shall also have a facility to isolate and reset the alarm-receiving group.</p> <p>4.21 The Fire detection alarm cum MIMIC panels located in CCR shall be used to hook-up with each Satellite Fire Alarm Panel to indicate group zone-wise fire annunciation from Satellite Fire Alarm Panels. Fire detection alarm cum MIMIC panels shall also supervise, monitor and annunciate the abnormal condition of the circuitry of the fire detection system through local panels.</p>		
	Ref. Doc			


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	Ref. Doc	<p>4.28.7 All detectors shall be provided with built-in response indicating Lamp/LED which shall give local visual indication, in dense smoke condition when it will operate. The failure of lamps shall not prevent the function of detector.</p>		


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COPYRIGHT AND CONFIDENTIAL 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.		<p>4.28.8 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.</p> <p>4.28.9 In such areas where detectors themselves are not easily accessible, the remote response indicators outside the enclosed areas shall be provided to indicate the fire condition.</p> <p>4.28.10 The indigenous detectors shall have the approval of ISI/ISO in addition to the approval of FM/UL/. Detectors and panels shall be preferably from the same manufacturer for compatibility.</p> <p>4.28.11 The detectors shall not be effected by temperature, humidity, air flows.</p> <p>4.29 Multi Criteria Smoke Detectors:</p> <p>4.29.1 The multi criteria smoke detectors shall be capable of sensing the fire in the incipient or smoldering stage itself, long before the fire matures to a visible flame. For achieving this requirement, the detector shall be capable of sensing visible combustion gases (in the form of smoke) or invisible combustion gases, which are the only clues for a long time in smoldering fires.</p> <p>4.29.2 The detectors shall be sensitive to very low smoke densities of the order of 0.05 gm/cu.m.</p> <p>4.29.3 The detectors shall be of Multisensor type with a combination of photoelectric and heat sensing elements. The multicriteria smoke detector provides photoelectric sensing and heat sensing combined in a single sensor/base assembly. The multisensor base provides two sequentially addressable points, automatically assigned with one address selection.</p> <p>4.29.4 The sensitivity of multicriteria smoke detectors shall be selected depending upon the environmental condition.</p> <p>4.30 Rate-of-Rise and Fixed Temperature Heat Detector (IC Type):</p> <p>4.30.1 The detector shall be solid thermal detector.</p> <p>4.30.2 It shall operate on electronic-principle to provide precise fire detection.</p> <p>4.30.3 The detector shall be of integrated circuit design enclosed in a robust moulded base.</p> <p>4.30.4 It shall be completely moisture proof and air tight with exposed metal part specially treated to allow the device to be used in particularly corrosive atmospheres.</p> <p>4.30.5 The detector should work on rate-of-rise and fixed temperature modes of operation.</p> <p>4.30.6 It shall have no moving mechanical parts.</p> <p>4.30.7 The detector shall be either surface mounted or with the body concealed above the ceiling and only the detecting element in view.</p> <p>4.30.8 The rate-of-rise detector shall function when the rate of temperature increase exceeds a pre-determined value, around 7 to 8 Deg C per min. This detector shall be designed to compensate with the normal changes in ambient temperature, less than 6.7 Deg C per min., which are expected under non-fire conditions.</p> <p>4.31 Detection System by Linear Heat Sensing Cable</p> <p>4.31.1 Linear Heat sensing cable shall be non-electrically operated optical fibre type.</p> <p>4.31.2 The detector system shall consist of an optical fibre sensor and the detection unit. The detector unit shall house the electronic circuitry that interfaces with the optical fiber sensor.</p> <p>4.31.3 The optical fibre shall be connected to the detector unit in a single continuous loop to ensure redundancy and full coverage of the protected zones even if the cable is broken/cut/damage at one point.</p> <p>4.31.4 The fire or excessive temperature condition shall be sensed by the fibre. The detector unit shall recognize the change in optical transmittance of the fiber and</p>		
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<div>COPYRIGHT AND CONFIDENTIAL</div> <div>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.</div>		<div><div><div>cable breaker Fire/Alarm condition shall be identified within 1 mtrs locational accuracy.</div><div>4.32 Infra red Spark/Ember Detector:<div><div>4.32.1 The detector must respond satisfactorily even when the lens, through which the detection is sensed are covered with coal dust or oily dust substance.</div><div>4.32.2 The detectors shall be designed to work satisfactorily in the event of vibration in any axis.</div><div>4.32.3 To prevent false alarms, the detectors shall be provided with purge air facility to keep the lines clean.</div><div>4.32.4 Facility for remote response indication shall be envisaged in each detector.</div></div></div><div>4.33 Infra Red Flame Detector:<div><div>4.33.1 The Dual wavelength Infrared Flame Detector shall be provided in Boiler Burner front and Turbine Oil tanks to provide an alarm in case of fire.</div></div></div><div>4.34 Detection System (Microprocessor Based)<div><div>4.34.1 Coverage of Frangible bulb type detectors, Infra red type heat detectors and multi criteria smoke detectors shall be considered. One smoke detector for every 100 m 2 or one heat detector for every 50m 2 of the compartment area shall be considered.</div><div>4.34.2 Solar blind IRD with inbuilt air purging unit shall be 3 nos. minimum for each conveyor, 1 no. each at a distance of 1-2 M from tail end and head end and 1 no. at middle. However, same shall be verified with the covering range indicated by the manufacturer.</div><div>4.34.3 Linear heat sensing cable shall be provided along the whole length of the top belt and bottom belt of each conveyor and on bearing and pulley of driving and non driving ends.</div></div></div><div>4.35 Manual Call System of Fire Alarm (Intelligent Addressable Type) :<div><div>4.35.1 Each Manual Call point unit shall comprise of a push button of reputed make enclosed in a M.S Box. The push button shall have minimum 1 NO and 1NC contact. The push button shall not be shrouded and the same shall be projected out from the surface the MS box. This whole assembly of push button in MS box shall again be enclosed in an external MS enclosure with all sides covered except the front side. The front side shall be sealed with breakable glass cover using neoprene or equivalent gasket. The glass cover shall be fixed in such a way that the actuating push button is kept depressed (with NC contact closed and NO contact Open) so long as the glass cover is intact. In case of fire, when glass cover is broken to give fire warning, the push button shall be released due to spring action hence giving remote fire alarm through NC contact which is now changed over. The status of the change over of contact may be conveyed digitally also.</div><div>4.35.2 The MS Box and the external MS enclosure shall be completely dust, weather and vermin proof. The housing of the electronic circuitry shall have minimum IP 65 protection.</div><div>4.35.3 The complete unit shall be suitable for wall/column mounting with necessary mounting accessories.</div><div>4.35.4 Clear inscription reading (in English) “FIRE ALARM - IN CASE OF FIRE BREAK GLASS” shall be provided for each manual call point unit, either on the MS enclosure or on a separate metal plate mounted behind the glass cover. The metal plate for inscription shall not tarnish under the atmospheric conditions.</div></div></div><div>4.36 Each manual call point unit shall be provided with the following accessories:<div><div>4.36.1 An iron hammer of sufficient weight, which could be used to break the glass cover. The iron hammer shall be suspended on a hook fixed to the external MS enclosure by</div></div></div></div></div>		
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COPYRIGHT AND CONFIDENTIAL 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.		<p>means of a non-corrodible iron chain of sufficient length and play to facilitate easy breaking of the glass cover.</p> <p>4.36.2 Two numbers diametrically opposite earthing studs located on the outside surface of the external MS enclosure.</p> <p>4.36.3 An identification number (on a number plate) which will be invariably same as the number given to the fire alarm, indicating point on the Zonal and Main Fire Alarm panel. The identification number shall match with the address of the intelligent addressable Manual call point for easy identifying the Call Point unit.</p> <p>4.36.4 A dust sealing gland or equivalent on the external MS enclosure for outgoing cable from the unit.</p> <p>4.36.5 A compression type cable terminating brass gland of reputed make for out going cable from the internal MS enclosure.</p> <p>4.36.6 In addition to this a red lamp Response Indicator shall be provided which will light up on actuation of manual call point to locate the manual call point station, which is operated.</p> <p>4.37 Control and Instrumentation For features and requirements of the control and instrumentation items including field instrument, Panels and Panel mounted instruments, relays, annunciators, selector switches, PLCs and other hardware and peripherals under scope of supply for the Fire Detection and Protection system.</p> <p>4.38 Battery:</p> <p>4.38.1 All controls, interlocks, indications, annunciation system etc. for each of the Fire detection alarm cum MIMIC panels (located in Central Control room) and the Repeater Panel (located in Fire Station), shall have power supply from 24 V (2 X 12V) Battery and Battery Charging Units.</p> <p>4.38.2 The Battery of each of the above Panels shall be located in the bottom portion of the same Panel. The PC with Printer in the central control room shall be powered up by the respective UPS Power of the Plant Instrumentation and Control System.</p> <p>4.38.3 The battery and charger of the respective panels shall be an integral part of each of the main fire panel / local fire panel / repeater panel.</p> <p>4.38.4 Bidder shall indicate his own layout of 24 volt Battery and Charger to suit the space available.</p> <p>4.38.5 Each battery shall be furnished with necessary accessories required.</p> <p>4.38.6 Battery and Battery Charger and components thereof shall be subject to shop tests as per relevant IS/IEC standards. The tests shall also include dielectric tests on Battery Charger.</p> <p>4.38.7 SMF batteries and battery chargers of adequate capacity shall be provided as integral part of the panel. The battery shall supply the normal power requirements for a period of 48 hours from the instant of charger AC supply failure, after which sufficient capacity would still be available to provide full load operation for atleast 30 minutes. Full load being defined as the load of all hooters sounding simultaneously and devices connected to the panel including its spare loop & spare devices/capacity along with operation of all the associated visual signals, interlocks etc.</p> <p>4.39 General:</p> <p>4.39.1 The life span to be considered in the design, equipment and component selection shall be a minimum of 30 years.</p> <p>4.39.2 For the design of the system, it is necessary to consider the requirements of operation and compatibility among the supplies like detectors / monitors / Panels / Network switches etc.,</p>		
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COPYRIGHT AND CONFIDENTIAL 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.		<p>4.39.3 Equipments installed outdoors shall be able to operate in all-weather conditions and to withstand the work site environment. For equipment in operation or in standby that may be influenced by direct sunshine, shelter or cover shall be provided.</p> <p>4.39.4 The system shall be capable of integration of new devices / items / loops / panels of minimum 30% during execution of job or future by end user. These integration shall be seamless and required wiring with in the panel along with necessary looping shall be arranged before testing of total system.</p> <p>4.39.5 One of the supplied PC will act like SERVER & the others as CLIENTS on the network. Necessary hardware, software & protocol shall be suitably selected for connectivity & communication among the HMIs & FAPs compatible to the redundant FO cable network.</p> <p>4.39.6 The FDA system has to be connected to customers DCS/PLC/SCADA on OPC at three locations of the plant. Hence the server HMI shall have OPC gateway on TCP/IP with necessary hardware (Firewall) OPC driver software. The connectivity shall be distributed using TCP/IP switches for establishing connectivity to the three upstream control systems. All these hardware & software are in bidder's scope.</p> <p>4.39.7 All materials supplied under this contract shall be new and unused. All equipments connected with the above systems shall be FM/UL/VDS/LPCB/ISI approved.</p> <p>4.40 The Hot redundant microprocessor based fire alarm panel shall incorporate the following features:-</p> <p>4.40.1 Continuous supervision of detector connecting lines, individual detector performance / operation and disconnection/ removal of detectors.</p> <p>4.40.2 Discrimination between a real fire alarm and false alarm.</p> <p>4.40.3 Pre alarm in case any detector requires maintenance.</p> <p>4.40.4 Automatic re-calibration of sensitivity levels of over / under sensitive detectors.</p> <p>4.40.5 Programmed activation of various interlocks with fire protection system and other associated system such as ventilation and air conditioning, dampers etc. Necessary modules shall be suitably wired in the tripping circuit of the A/C & ventilation drives and tripping of the coal conveyor motors.</p> <p>4.40.6 Programmed activation of sequence of events to be carried out in case of fire in any particular protective area., including activation of hooter, sirens, etc.</p> <p>4.40.7 Ground fault detection.</p> <p>4.40.8 The FDA system shall be intelligent redundant which means the microprocessor/controllers, Electronic elements in panel/network, system structure etc., are redundant. Hence all functions shall have seamless transfer in case of a system fault, wire breaks.</p> <p>4.40.9 The FACP shall incorporate a real time clock for time stamping of events in history log & for scheduling time related functions. An external master clock signal (NTP) at one point shall be provided for clock synchronization. The master clock time signal shall be used over the network for time synchronization of all devices.</p> <p>4.40.10 All the panels, network switches & components shall be on redundant LAN.</p> <p>4.40.11 Field programmable and configuration facility.</p> <p>4.40.12 The panel shall continuously communicate with the detectors and modules even when it is being programmed from its keyboard or when the program is being downloaded into the panel from the software utility.</p> <p>4.40.13 In areas where smoke is likely to spread out fast rather than getting accumulated at one place like corridors, the panel shall allow alarm decision to be taken based on the obscuration values in more than one detector. Thus, if more than one detector together signal the uniform existence of smoke over an area, then panel shall signal fire even if the smoke concentration is not sufficient to activate a single detector. Concurrently, if</p>		
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COPYRIGHT AND CONFIDENTIAL 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.		<p>smoke accumulates into one detector, the panel shall also consider the obscuration values in neighbouring detectors before signalling alarm.</p> <p>4.40.14 The intelligent device and the loop card of FACP shall provide increased reliability and inherent survivability through intelligent stand alone operation. The device shall automatically change to standalone conventional device operation in the event of a communications failure with the loop controller.</p> <p>4.40.15 In the standalone detector mode, the detector shall continue to operate using sensitivity and environmental compensation information stored in its microprocessor at the time of communications failure. The loop card shall monitor the loop and activate a loop alarm if any detector reaches its alarm sensitivity threshold.</p> <p>4.40.16 Each detector device shall be smart type and capable of automatic electronic addressing and / or custom addressing preferably without the use of DIP or rotary switches.</p> <p>4.40.17 Fire alarm panels shall be provided with necessary contacts for performing following functions on occurrence of fire in corresponding areas:-</p> <ul style="list-style-type: none"> • Initiating required alarm/indication in computer/repeater panel. • Operation of the deluge system (HVWS & MVWS combined) provided in the cable gallery / transformers. <p>4.41 Main fire alarm panel shall be complete with annunciator, necessary input modules, output modules, external hooter / lamp control, interface units wherever required for various control functions through relay contacts & communication modules, etc. for satisfactory operation of the system.</p> <p>4.42 The main fire panel shall continuously monitor the status of the detectors and the connecting lines. The annunciation system shall have visual and audible alarms, with acknowledge, test, reset, lamp test, etc. push buttons.</p> <p>4.43 The panel shall provide annunciation about the status of the Hydrant system, MVWS system, HVWS system and deluge valves signals for each area to be protected (i.e., for transformers, tanks, cable gallery, etc). The panel shall also indicate the status of various pumps, compressors etc. installed in the fire pump house.</p> <p>4.44 Following sub-system shall be tripped through following purchaser packages like:</p> <ul style="list-style-type: none"> 4.44.1 Air washer fans for ventilation system, 4.44.2 Air handling units for A/C system, 4.44.3 Package air conditioner, 4.44.4 VDB's, 4.44.5 Conveyor motor <p>4.45 Fire alarm panel shall have provision for repeating annunciation of following indications:</p> <ul style="list-style-type: none"> 4.45.1 Fire ON, 4.45.2 Water Spray ON, 4.45.3 DV on Test, 4.45.4 DV protected (i.e for transformer, tanks,cable gallery etc) by interfacing with the pressure switch / test switch provided by the fire protection vendor. 4.45.5 For deciding No. of loops refer table below 		
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Devices	Main Fire Alarm Panel (Central Control Room)	Satellite Fire Alarm Panel-1 (DM Plant)	Satellite Fire Alarm Panel-2 (Ash Handling Plant)	Satellite Fire Alarm Panel-3 (CHP Control Room)	Satellite Fire Alarm Panel-4 (CW Pump House)
Multisensor Detector	800	30	45	55	30
Air Sampling detectors	3				
Probe Type Detector	4			0	
Beam Detector	5				0
Infrared detector	0	0	0	75	0
Manual Call Points	150	5	8	60	7
Control Module	340	10	20	40	10
Total	1302	45	73	230	47

Note: Bidder to calculate the number of loops in each Fire Alarm Panel based on the following:

a) Number of devices mentioned above connected to each Fire Alarm Panel (1 to 5).

b) 10% of the each loop capacity shall be left free for addition of devices in future.

c) 10% on the total loops shall be provided extra for accomodating additional devices in future.

d) In addition to the above, 1 spare loop shall be provided in each Fire Alarm panel for future use.

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5.0 BIDDER'S SCOPE OF SUPPLY

5.1 One set of fore alarm main panels and one set of repeater panel.

5.2 Work station furniture: Modular work station furniture, suitable for mounting servers & historians, programmer stations,PC based systems, printers (A4/A3 color laserjet) etc. shall be provided.

5.3 Any specific hardware /software/item/ accessories/communication cables/ fittings / conduits/ cable tag plates/cable route makers,cable lugs(tinned copper), glands(Ni plated brass double compression type), JB for detector etc., which are not specifically mentioned in this specification, but required to make the FDA system complete in all respects, in accordance with the intent of this technical specification, contractual agreement, statutory requirements, relevant/applicable codes/standards, good engineering practices, and for safe and trouble-free operation, shall be deemed to be covered under the scope included in the quoted price.

5.4 One lot of optical Linear Heat Sensing (LHS) cable.


5.5 Operator work stations (with graphics software for dynamic graphic displays of detectors status) and printer along with UPS.


5.6 Pc Rack:PC Racks shall be provided to mount CPUs of workstations/PCs of OWS/LVS etc. in control room. For each PC / workstation / monitor at least one chair shall be included.


5.7 All termination kits for the equipments supplied by the bidder shall also be included in bidder's scope.


5.8 For the purpose of quoting for cable laying accessories, the overall cable package to be considered as 50 Km.(50% each for indoor & outdoor installation)


5.9 Networking hardware comprising of LIU & Media converter network switches,OPC links to establish communication link among the Fire detection alarm panel, Repeater panel, HMI and customer's DCS.

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COPYRIGHT AND CONFIDENTIAL 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.		<p>5.10 One lot of mandatory spares details specified else where in this specificaition.</p> <p>5.11 The bidder shall supply a complete set of all special tools & tackles for the offered items for E&C and O&M.Price of these items shall be included in the price quoted. No separate price for the same shall be offered.</p> <p>5.12 Erection and commissioning spares:</p> <p>5.12.1 All commissioning spares as required during erection and commissioning of the FDA system is included in bidder's scope & shall be supplied alongwith the main supply/package.</p> <p>5.12.2 Bidder to ensure that all the spares are procured from the original equipment manufacturers (as per their recommendation) and shall make them available at site well before the start of commissioning activities.</p> <p>5.13 For further details, refer to BOM for minimum supply of items. Other items not specified but required to complete the system in all respects to be supplied. scope of supply demarcation. The scope matrix is part of annexure to this specification.</p> <p>5.14 Price of above items shall be construed to be included in the main package price. No separate price for the same shall be offered.</p> <p>5.15 Software User Licence shall be valid for lifetime.</p> <p>5.16 Power supply unit with battery[Along with spike arrester cum distribution board for extending power supply to PC(CPU, Mintor), Printer, FAP].</p> <p>5.17 Bidder to note that min. potential free contacts (Quantity specified else where in the specification) shall be provided with each FAP for interfacing with purchaser's ventilation/air-conditioned/coal conveyor/panel in fire water pump house/panel in foam pump house/local fire alarm panel in CHP control room/repeater panel etc.</p> <p>5.18 Bidder to confirm that instruments required for performance testing of various equipments / systems of the package shall be arranged by bidder at site without any cost Implication to BHEL.</p> <p>5.19 Bidder to furnish certificates that all instruments for testing shall be calibrated before taking up testing.</p> <p>5.20 Bidder to confirm that entire FDA System shall be subject to approval by TAC accredited agency to qualify maximum premium discount. Responsibility to get approval from TAC Accredited agencies shall rest on BHEL. However all necessary documentation for obtaining such approvals are in bidder's scope.</p> <p>5.21 Painting to suit environment for all equipments/items for this package shall be in the scope of FDA system bidder.</p> <p>5.22 Please note that networking between fire alarm panel, repeater panel, panel in foam pump house (by others), panel in fire water pump house (by others) to be provided by bidder. In addition, MFAP shall also be communicated to plant control system through OPC contact/OEM protocol & the connectivity between the same is in bidder scope.</p> <p>5.23 Please note all the required hardware/ software/ erection accessories required for interface between the above panels shall be included in bidder's scope.</p> <p>5.24 FO Cables shall be usedby purchaser for communication among various FDA items/equipments.</p> <p>6.0 BIDDER'S SCOPE OF SERVICES</p> <p>6.1 Supervision of erection & commissioning, performance guarantee testing & trial run and final handing over to end customer for the supplied system.</p> <p>6.2 Number of man days and number of visits as specified in the price bid format shall be considered. However, either or both of the number of man days or no of visits may change on either side based on the actual site requirement. Bidder to mobilize concerned</p>		
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COPYRIGHT AND CONFIDENTIAL 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.		<p>10.3 Part number/Dispatch link-up of all the equipments/items supplied and also their co-relation with system/drawing/approved BOQ.</p> <p>10.4 Paint or ink for marking shall not contain any harmful metal or metal salts which can cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.</p> <p>10.5 The equipment shall be transported to site by the vendor in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site the vendor. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the vendor's scope. The vendor shall send each consignment to site with a detailed packing list.</p> <p>10.6 All the equipment shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship/rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in crates/cases to prevent damage to the finish. Crates/cases shall have skid bottom for handling.</p> <p>10.7 Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.</p> <p>10.8 The equipment/items may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.</p> <p>10.9 The following minimum packing procedures shall be followed:-</p> <p>10.9.1 All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds.</p> <p>10.9.2 All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling.</p> <p>10.9.3 Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.</p> <p>10.9.4 All electrical, instrumentation etc, shall be properly packed to prevent damage during transport, storage, handling at site.</p> <p>10.9.5 All the items which the Bidders considered liable to be damaged during shipment or storage, shall be packaged for separate shipment. If instruments are removed from the panel, they and their connection shall be suitably tagged to ensure simple re installation at the job site. Each instrument shall be sealed in plastic bags containing moisture absorbing dessicants.</p> <p>10.9.6 It shall be bidder's sole responsibility to protect all the material during period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and including delays in transit.</p> <p>10.9.7 Mandatory Spare parts shall be packaged separately and clearly marked as 'Mandatory Spares'.</p> <p>10.9.8 Commissioning spares, Tools & tackles to be packed separately & suitably tagged.</p> <p>11.0 DOCUMENTATION</p> <p>11.1 Documentation shall be in three steps, during offer submission, and next during drawing approval stage and Final documents/ approved submission.</p> <p>11.2 During Technical offer submission:</p> <p>11.2.1 Check list</p> <p>11.2.2 Un-priced price bid,</p>		
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COPYRIGHT AND CONFIDENTIAL 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.		<p>11.2.3 Signed and stamped copy of this complete specificaiotn along with annexures,</p> <p>11.2.4 Any other document though submitted shall not form part of evaluation. But only will be retained for information.</p> <p>11.3 During drawing approval after PO placement</p> <p>11.3.1 Complete documentation as per annexures</p> <p>11.4 Along with material, final documentation in 15 Copies separated and kept in separated folders. Two number of soft copies in DVD format of all the information mentioned above.</p> <p>12.0 DOCUMENTATION SCHEDULE</p> <p>12.1 After the award of contract, kick off meeting planned and the requirement documentation shall be finalized. Typical list of docuemntaiton is enclosed as annexure as Master Documentaiton List (MDL) for ready reference. Vendor shall clearly brought their input documentation requirement, project execution methodology etc., during this kick of meeting only.</p> <p>12.2 First submission of the set of documents shall be submitted within 2 weeks of LOI/ PO.</p> <p>12.3 Further BHEL with provide comments on vendor submitted document within 7 to 10 working days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals.</p> <p>12.4 Revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 07 days on receipt of these revised documents / drawings from vendor for approvals.</p> <p>12.5 Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates.</p> <p>12.6 It is vendor's responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordinly vendor to plan and execute the supplies in time.</p> <p>13.0 SUB VENDOR LIST</p> <p>13.1 The list of sub-vendors are specified in the respective data sheets for each detectors and equipments.</p> <p>13.2 Supply items for which no definite "make/brand" is indicated, shall be procured only from reputed makes & models having proven track records and requires purchaser approval.</p> <p>13.3 Further the supplied model of FAP, Repeater panel, Detectors, Devices, Modules etc. shall be under regular manufacturing range and have proven track record.</p>		
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	Rev. No.	Date	Revision Details	Prepared By	Checked By	Approved By	
	00	20.04.16	First Issue	K.Venkatesh	B.Naveen	PCS	
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