TENDER DOCUMENT

NIT No.- DLI / C&E / WI-675 / 851

FOR

‘Design, Engineering, Supply, installation, Testing & Commissioning of ‘PLC BASED AUTOMATION SYSTEM AND ASSOCIATED WORKS’ for the project of “Augmentation of Fuel & Flux Crushing Facilities (Package- 064) of Bhilai Steel Plant (SAIL)”.

VOLUME - 2B

(Scope of Work & Technical Specification)

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Technical Specifications and Scope

AUTOMATION SYSTEM (LEVEL-1)

(1.0) GENERAL:

01. This specification is intended to define the basic requirements for Automation (Level-1) system of the Coal Handling Plant (CHP) and Coke Sorting Plant (CSP) and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III (FFP) coming under the 7.0 MTPA Expansion of BHILAI Steel Plant (BSP) with a view to achieve smooth, efficient, safe, integrated and reliable operation of the process.

02. Monitoring, Control, Interlocking and Sequential functions for the entire Coal Handling Plant and Coke Sorting Plant and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III will be achieved through PLC based Level-1 automation system.

03. Coal Handling Plant

- A common dispatcher cum control room (D-2) under package no. - 062, is being arranged by the BSP for operating the entire coal blending, crushing and transportation from existing & new silos to existing batteries (10 nos.) and new battery (1 no.) with a provision to install the automation equipment of proposed CHP package-064 as shown in the attached Automation Configuration Drg. No.-MEC/S/9101/11/E9/55/01/064.01/R1. The bidder will provide PLC-4 with all hardware and software and integrate the offered system with that of Pkg 062(New Coal Handling Plant).

- To understand the interfacing points, enclosed Flow Diagram (Drg No-BSP-EPI-02-064-02-000-55-BE-00006_R2 & BSP-EPI-02-064-02-000-55-BE-00007 _R1) may be referred.

- The bidder will furnish assignment drawing and space requirement for Pkg-064 automation system of CHP to the BSP/MECON/EPI to keep the provision in the Despatcher-D2.

04. Coke Sorting Plant-

- Control, Monitoring, Interlocking and Sequential functions of new drives and equipment proposed for Coke sorting plant covered under this specification as per technological layout and material flow...
diagram with new automation. Proposed CSP will receive material from CDCP (for COB#11), Existing Coke Sorting Plants CSP-1 through Conveyor KA1 and KA2 which in turn after crushing & screening material will transport to Stock House of BF#8 and SP-III through C-line conveyor(Pkg064) in line with technological material flow diagram.

- For operation of Coke sorting plant, a separate new Dispatcher will be provided by the purchaser with dedicated PLC based automation system as per Automation Configuration Diagram (MEC/S/9101/11/E9/55/01/064.02_R1). To understand the interfacing points, enclosed Flow Diagram (Drg No-BSP-EPI-02-064-02-000-55-BE-00010_R2) may be referred.

- In the new Automation system, provision will be kept for interfacing BSP’s PLC and /or Remote I/O stations for all source and destination conveyors.

- The bidder will furnish assignment drawing and space requirement to EPI for control room of automation system of CSP (pkg-064)

## 05. Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III- Control, Monitoring, Interlocking and Sequential functions of new drives and equipment proposed for Augmentation of Flux and Fuel crushing and screening circuit as described below in line with material flow diagram:

i. Feeding of coke breeze from coke breeze bunker of coke sorting plant(CSP4) to existing conveyor C102

ii. BF fines from existing BFs through conveyor C7, new conveyor C3A-C1 to existing Conveyor F101 in junction house JH 127.

iii. Feeding of sinter /ore fines from BF8 fines storage bins to existing conveyor F101 in junction house JH 127

iv. Feeding of coke fines from BF8 fines storage bins to existing conveyor C102.

v. New Fuel & Flux Crushing and Screening system

vi. New Conveyor route starting from C104 through Rod Mill feeding to existing Proportioning building.

vii. New Conveyor route starting from L105 through Hammer Crusher feeding to existing Proportioning building.
The above will be achieved by providing new hot redundant PLC with suitable remote I/O station. New PLC will be integrated to the existing PLC based Automation system by providing suitable gateway as shown in the enclosed Automation Configuration Diagram. For interfacing with New Sinter machine suitable gateway also will be provided for establishing interlocking, signal, monitoring etc.

- The Automation system facilities will be generally offered inline with the basic ‘Automation System Configuration’ diagram (Drg. No: MEC/S/9101/11 /E9/55/01 /064.04_R3) enclosed with the tender technical specification for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III.

- Bidder will provide gateways, all hardware and software required for integrated operation of the new drives defined above along with the existing equipments for flux and fuel crushing & screening facility and the associated conveyors in existing Rockwell make 5-60/5-80 series PLC based Automation system.

- Conveyors feeding to Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III i.e. C7-3.5KW, C1-30KW & C2-45KW will be fed from new MCC under the scope of package-064. These Conveyors will be connected from new PLC of Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III. Suitable control cable and other accessories will be considered.

- Necessary modification, if required for laying of cables and mounting equipment in the existing control room CR1, the same will be provided by the bidder.

- The bidder will furnish assignment drawing and space requirement to BSP/MECON/EPI for automation system of Flux-Fuel plant (Pkg-064)

06. This specification should be read together with the General Technical Specification (No. GS-03 & GS-12) separately attached with this specification, General Conditions of Contract (GCC), tender documents and other commercial terms & conditions.

07. Automation equipment considered for the process will be complete in all respect in line with this specification. Any equipment / accessories, not explicitly indicated in this specification, but considered essential for proper functioning of technological
equipment and process (including utilities) will be included by bidder in their scope of work and supply.

08. All the automation equipment will be supplied brand new & from the latest product ranges of reputed manufacturers as per the List of Preferred Makes, furnished in this tender document. BSP/MECON/EPI reserve the right of selecting particular make and model of Automation equipment with a view of integration with BSP’s Automation system and standardization of the whole plant. Bidder will comply with such requirements.

09. Bidder will execute the entire automation work as part of turnkey package of the CHP and CSP, Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III to the satisfaction of BSP/MECON. Bidder will comply with all the requirements indicated under General; Salient Features of Automation system, Scope of Work and Supply; Submission of Drawings & Documents and other related clauses/annexure stipulated in this specification. Design aspects and selection criteria of PLC systems and also other hardware/peripheral units have been elaborated in GTS. The GTS (GS-03 & GS-08) is being issued as a separate document along with this tender, which will also be complied with.

10. Interfacing:

- **Coal Handling Plant**: Automation systems of CHP (Pkg-062), new Coke Oven Battery-11, etc. will be separately arranged by BSP along with its technological package. The proposed PLC based automation system of Coal Handling Plant (Pkg-064) will be interfaced with CHP (Pkg-062), new Coke Oven Battery-11 & existing plants/shops as per Technological Material Flow Diagram for information exchange, interlocking and monitoring of the plant. Bidder will provide required hardware & software for interfacing of the offered automation system with the automation system of the above plants. The required communication bus from the PLC of the above plants to respective Despatcher/Control Room of the bidder’s offered Coal Handling Plant are included in the scope of bidder. Details of interfacing requirement will be finalized during detailed engineering stage.

- **Coke Sorting Plant**: Automation systems of CDCP (for Coke Oven Battery-11), Stock House of Blast Furnace # 8, etc. will be separately arranged by BSP along with its technological package.
The PLC based automation system of CSP (Pkg-064) will be interfaced with CDCP (for Coke Oven Battery-11), Stock House of Blast Furnace # 8, Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III (Pkg-64) & existing CSP 1 plant as per Technological Material Flow Diagram for information exchange, interlocking and monitoring of the plant. Bidder will provide required hardware & software for interfacing of the offered automation system with the automation system of the above plants. The required communication bus from the PLC of the above plants to respective Despatcher / Control Room of the Bidder’s offered Coke Sorting Plant are included in the scope of bidder. Details of interfacing requirement will be finalized during detailed engineering stage.

- **Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III:** Automation systems of Blast Furnace #8, Sinter Plant#3 etc. will be separately arranged by BSP along with its technological package. The PLC based automation system of Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III (Pkg-064) will be interfaced with stock house of Blast Furnace #8, Sinter Plant #3, CSP (Pkg-64), Existing Coke handling, crushing and screening facility, Existing Flux crushing and screening facility, etc. as per Technological Material Flow Diagram for information exchange, interlocking and monitoring of the plant. Bidder will provide required hardware & software for interfacing of the offered automation system with the automation system of the above plants. The required communication bus from the PLC of the above plants to respective Despatcher / Control Room of the Bidder’s offered Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III are included in the scope of bidder. Details of interfacing requirement will be finalised during detailed engineering stage.

11. The Automation system facilities for CHP, CSP and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III of this package (064) will be generally offered in line with the basic ‘Automation System Configuration’ diagram (Drg. No: MEC/S/9101/11/E9/55/01/064.01_R1) for CHP & Drg. No: (MEC/S/9101/11/E9/55/01/064.02_R1) for CSP and (Drg. No: MEC/S/9101/11/E9/55/01/064.04_R3) MEC/ S/9101/11/E9/0/00/00/064.04/R3 for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III) enclosed with this specification. Client-server based architecture will be considered for automation. Bidder will submit configuration diagram
of the automation system provided by them accordingly. Requirements of Controllers & their division, Work-stations/Servers, Engineering stations, Printers etc. will be indicated in the configuration drawing.

12. Automation system of proposed plants will have three level Ring Architecture type communication buses as follows:

   a) HMI-level Ethernet for HMI Stations, MIS Servers, MIS Clients, Higher-level systems etc. Bidder to provide for CSP in line with Automation Configuration drawing.
   b) Control-level Ethernet for connecting PLCs, Servers, Emergency Work Stations, Engineering Stations etc. Bidder to provide for CSP in line with Automation Configuration drawing.
   c) I/O level communication bus. Bidder to provide for CHP & CSP in line with Automation Configuration drawing.

13. 1 No. field programming unit for CHP, 2 Nos. field programming units for CSP and 2 Nos. field programming units for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling For SP III will be in the scope of bidder. Apart from standard features, these field programming units will be capable of connection from every Remote I/O station for engineering and troubleshooting purposes.

14. 2 Nos. MIS servers each will be included in the Automation system of CSP and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III.

15. All printers provided with PCs will be laser jet type.

16. The design will be done in such a manner that involvement of cabling and wiring is minimum.

17. All the automation equipment will be configurable to a user configurable fail-safe state to avoid dangerous situations in case of any failures due to power failure, communication failure etc.

18. Different levels of networks will be inter-connected through intelligent devices which are capable of high speed switching at least at Layers 3 & 4 with access control. For all important systems firewall will be provided, taking care at Layers 3 to 7.
19. Temperature monitoring of all remote I/O stations will be provided through respective PLC.

20. Power & Control Supply monitoring of all mechanisms will be provided through PLC.

21. Status of UPS shall be monitored through PLC / HMI.

22. All other new PLCs of equipment of CHP/CSP/FFP will be interfaced to Main PLC on Ethernet. Apart from main PLC as described in automation configuration drg., other PLCs (if) coming for other equipment of CHP/CSP/FFP shall interface with main PLC of CHP/CSP/FFP.

23. The communication networks will be duly tested & certified by authorized agency to be appointed by bidder and test certificate will be submitted for the same.

24. For better co-ordination, the complete automation system will be supplied by one vendor i.e. the OEM of PLC system.

25. Ethernet network (FO and UTP)
   
   • GTS GS-12 shall be referred for specifications related to ethernet network
   • FO link from CSP IV control room to main control room of COB#11(Battery and CDCP) and from existing SP3 CR1 to main control room of SP 3 machine 2 for exchange of needed information.
   • FO link to be used (Not UTP) if link taken outside building or shop floor.
   • All FOC/UTP carrying conduits/pipes to be paint marked as per standard color code specified by BSP.

26. Required information related to bid submission has been provided in the tender documents. It is suggested that bidder should visit the CHP/CSP/FFP project site to satisfy himself with new requirements/existing facilities of the plant for automation system & collect the data/details of existing system, if required, by bidder for integration and interfacing of existing & new automation system for CHP, CSP & FFP and other related details prior to submission of the offer.
(2.0) SCOPE OF WORK AND SUPPLY

Bidder’s scope of work and supply will include design, engineering, manufacture/procurement, assembly, calibration, shop testing, inspection at works & at site, painting, packing, transportation to site including loading, unloading, storage & handling of all Automation equipment including electrical accessories, cables as required, erection accessories, panels/cabinets and all associated hardware, as required for completeness of Automation system in all respect along with site fabrication, erection, testing, commissioning of the complete automation system and interfacing with different PLCs as described elsewhere in the contract for completeness & satisfactory operation of the entire Coal Handling Plant, Coke Sorting Plant and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III as per technological layout and material flow diagram. The scope of work will also include liquidation of defect points, participation in tests for establishment of plant performance guarantee (PG) and post commissioning activities till issue of final acceptance certificate (FAC) by BSP.

The scope of work and supply will include but not limited to the following:

1. Automation system as per the facilities indicated in the Automation System Configuration diagram (Drg. No: MEC/S/9101/11/E9/55/01/064.01/R1) for CHP & Drg. No: (MEC/S/9101/11/E9/55/01/064.02_R1) for CSP and (Drg.No: EC/S/9101/11/E9/55/01/064.04_R3)MEC/S/9101/11/E9/0/00/0/064.04_R3 for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III and as described in ‘General’ and ‘Salient Features of CHP, CSP and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III’.

a. For CSP this will mainly include independent PLC systems with redundancy in: - processors, power supply modules, communication modules, network interface modules, MIS servers etc. for plants/units. Number of operator’s station and engineering work station shall be as automation configuration diagram. Communication bus will be ring architecture type. The automation system will be client-server based configuration. All the required facilities & features for interfacing of PLC systems will be considered and provided accordingly.
b. For CHP, the Bidder will provide PLC based automation system, with redundancy in: - processors, power supply modules, communication modules etc in line with GTS. Number of operator’s station and engineering work station shall be as automation configuration diagram. Remote I/O stations, I/O Level communication Bus, necessary gateway (associated hardware and software) for interfacing with BSP’s Automation network, engineering station, HMI shall be as shown in Automation Configuration drawing.

c. For Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III, the bidder will mainly provide PLC based automation system, with redundancy in :- processors, power supply modules, communication modules, network interface modules as per GTS. Number of operator’s station and engineering work station shall be as automation configuration diagram. operator’s and engineering workstations, Remote I/O stations, I/O Level communication Bus, Control-level bus, necessary gateway (associated hardware and software) for interfacing with BSP’s Automation network, Engineering station, HMI shall be as shown in Automation Configuration drawing.

2. Required nos. of local/remote I/O panels with adequate quantity of various types of I/Os cards, i.e. Digital, Analogue, RTD, Thermocouples, Pulse, power supply cards, communication cards, Relays with NO contacts for outputs etc. at different locations. Bidder will also consider input interposing relays for field mounted proximity switches in the I/O chassis.

3. Preferred Makes of individual equipment i.e. PLC systems, Workstations, Servers, Engineering stations, printers etc., will be in line with GS-13. All the Hardware in Individual Systems will be from the same product series.

4. All required software i.e. System software, HMI software, Application programmers etc. for PLC, Workstations, Servers, communication interface amongst various automation systems etc. Required number of software licenses will also be provided.

5. All maintenance, diagnostic tools & devices required for implementation, maintenance & trouble shooting.
6. 1No. field programming unit for CHP, 2 Nos. field programming units for CSP and 2 Nos. field programming units for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III will be in the scope of bidder. Apart from standard features, these field programming units will be capable of connection from every Remote I/O station for engineering and troubleshooting purposes.

7. All Network components like Gateways / interfacing modules, cables, multi-port switches (if applicable) etc., as required for interfacing. For gateway connectivity with third party automation/PLC system. All the required cables and hardware for networking shall be in the scope.

8. Optical Link Modules, Light Interface Unit, Redundant link modules, Power supply Cards, Converters, and Terminators etc. as per requirements.

9. PLC systems for operation of the auxiliary units of the proposed CHP, CSP and Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III, supplied by auxiliary unit suppliers, if any, will also be suitably interfaced with the main automation system.

10. All types of system cables, communication cables, special cables, etc. as required shall be in bidder’s scope. This will also include the required communication interface and cable for interfacing with the PLCs of conveying system of COB#11, Blast Furnace Stock House, Sinter Plant, CDCP etc. (as described above at clause no. 10 of 1.01-General, ‘Interfacing’) located at respective control rooms.

11. Necessary co-ordination with BSP / MECON for establishing interfacing and integration requirement by providing new PLC, multiplying relays as required, interconnecting cabling between BSP’s MCC/ other panels and bidder’s PLC/ Remote I/O stations etc.

12. Fully wired cabinets/ panels, etc with MCBs, Fuses, CFL Lamps, Universal type service sockets, Earth strips, etc.

13. Control room furniture for CSP dispatcher

III, existing 4 monitors will be replaced by new TFT monitor of size 22", identical to new monitors for aesthetic looks.

15. Submission of drawings and documents as mentioned at clause no. (11.0) of this technical Specification part of automation system.

16. a) In the automation system for CHP, few facilities from Pkg-062 are proposed to be used. These facilities include Fault-tolerant HMI server, Fault-tolerant history and process support server, Fault-tolerant MIS server, Network at Despatcher-D2, etc. Bidder will be responsible for all necessary activities, including coordination, with the supplier of Pkg-062 towards licensing requirements, development of application for Pkg-064, deployment of clients, network etc.

   b) Erection, testing, calibration and commissioning of the total Automation equipment / system of CHP, CSP and FFP included in this specification. Required interfacing with BSP’s PLCs by providing necessary hardware and software and interconnecting cables. This will also include laying and termination of system bus cables as required.

17. Bidder will arrange tools, tackles and consumables as required for erection, testing, calibration and commissioning activities.

18. Bidder will arrange inspection of Automation equipment by BSP/MECON/EPI. Inspection and Testing will be carried out in compliance with the Quality Assurance Plans and FAT document, to be approved during detailed engineering stage.

19. Successful Bidder will arrange visits by their Automation experts/sub-vendors at site, as & when required, during erection & commissioning, PG test and handing over of complete system.

20. Testing tools & equipment for automation system.

21. Special tools will be provided in sufficient number for tracing, location, testing, jointing, fault location & rectification, termination etc. for all cables including special cables.

22. Bidder will involve BSP / MECON/ EPI in control philosophy development, design of application software and hardware,
drawing up of software specifications, software development, off-line testing etc.

23. All tests on software, hardware, network, communication etc. will be carried on the basis of a pre-agreed protocol clearly listing out steps involved in testing with its responsibility and minimum expected results as per specifications, engineering and other documents.

24. Troubleshooting manual for all application software, system software, configuration, hardware, network etc. will be provided clearly spelling out possible causes, checks and measures for corrective action.

25. Bidder will arrange training for EPI/BSP/MECON personnel on the automation system at manufacturer’s works and also at site.

26. Two years maintenance spares, if the order is separately placed by BSP/MECON.

27. Commissioning spares and three months consumables.

28. Supply, Installation, testing & commissioning of RTU for wireless communication with installation kit including cables and other required hardware for communication between control room main PLC & Mobile Tripper local panel & required installation accessories.

29. Supply, laying, testing, commissioning of communication cables/ fibre optic cables in GI pipe (GI pipe is not in bidder’s scope) with required accessories providing hardware for network connectivity as per the automation system requirements.

30. Supply and providing suitable redundant gateway connectivity for interfacing of BSP’s PLC as shown automation configuration diagram CHP/CSP/FFP.

31. Supply and providing of required hardware, software and field bus interfacing devices/ module for interfacing of Radar Level Transmitters, which shall communicate on field bus cable with main PLC of CHP, Toatal-23 nos. Level Transmitters, CSP- total 4 nos Level Transmitters and FFP Total 7 nos Level Transmitters. Provision of connectivity shall
be provided at all the locations of automation system for CHP/CSP/FFP for control and monitoring inn control room.

32. Supply, laying, testing and commissioning of special cables, communication cable and fiber cables.

33. Supply of spare modules, components, equipments, cables, consumables etc as per the spares philosophy given in tender documents & as per system requirements.

34. Supply of consumables for the initial operation of the equipment and till handing over.

35. Supply of special tools & tackles

36. Painting of complete equipment (including final painting before handing over to the BSP.)

37. All drawings/documents along with operation & maintenance manuals as per requirements mentioned in the tender document.

38. Getting approval of design/drawings and any other design calculation related to the equipment from BSP/MECON/EPI.

(3.0) SALIENT FEATURES OF CONTROL & AUTOMATION SYSTEM FOR COAL HANDLING PLANT, COKE SORTING PLANT AND AUGMENTATION IN FLUX - FUEL PREPARATION AND PLANT RETURN FINES HANDLING FOR SP III

01. For monitoring, control, interlocking and sequential operation of CHP, CSP and FFP, PLC based automation systems will be provided. Considering information exchange & operational requirement all the systems will be suitably interfaced. All the printers will be provided with network connectivity.

02. In Client server based Automation system, hot redundant servers will be considered. This architecture will have 3 level ring type bus system .The PLC systems will communicate with each other and the servers through a common ring tropology bus. All the HMI stations will be interfaced with the servers through a separate higher level bus. Respective PLCs will have independent engineering station. Suitable communication cards will be provided in respective I/O panels for interfacing with HT
switch-boards; Intelligent MCCs, Remote I/O station, Weighing Controllers, TR controllers etc. HT substation side I/O panels with suitable interface module and communication cables shall be provided to communicate with main plant PLC of CHP/CSP/FFP.

03. Each Operator Workstations will have 22” Flat dual TFT Monitor as shown in Configuration drawings.

04. The automation system will be powered from UPS of suitable rating. Details of UPS have been separately indicated in this TS and GTS. Supply of UPS power shall be arranged by purchaser; however, UPS power distribution, distribution board etc. shall be in bidder’s scope. Bidder shall provide UPS power requirements at each location for automation system to decide rating of UPS system.

05. All the new MCCs of CHP and CSP and MCPs of CHP, CSP and FFP will be of Intelligent Type. i.e. every controller (DOL/RDOL feeder) will have an intelligent relay having capability to communicate directly with PLC Controller. Power supply feeders in MCC need not to communicate with PLC except of those feeders which feed to other Process MCCs & ACB/MCCB incomers. Bidder to refer specifications of electrical items given in TS part and GS-03 of GTS.

06. All the HT breakers & LT breakers in PCC will also have communication ability to Automation system. Bidder to consider in the scope the suitable interface devices for communication.

07. All the weighing controller/Indicator panels, VFD etc. will communicate directly with PLC Controller. Bidder to consider suitable interface devices.

08. Optical link module will be used for converting Electrical bus to Optical bus. Instrumentation system of the plant will be in general, Field Bus compatible and will be interfaced with the automation system having Field Bus Interface modules. However, in cases, where some instruments are not available with Field Bus compatible features, conventional instrumentation equipment (SMART & 4-20 mA DC signal output) will be supplied. Signals from these instruments will be interfaced through hardware input/output.
modules of the automation system

09. Bidder will consider Remote I/O panels at each electrical premises with all kinds of Remote I/Os.

10. Additional Engineering spare Remote I/Os will be carefully planned at each location in such a way that they can be used in the unlikely event of non-establishment of communication with field devices having bus communication.

11. One Remote I/O panel (with required numbers interface modules/types of I/Os) will be planned in each electrical premises, each electrical floor (in case of multi-story rooms) & junction houses / Technological Buildings for interfacing of field switches.

12. All the communication cables will be laid in GI pipes (GI pipes are not in bidder’s scope). Separate pipes with separate routes (to the extent possible) will be used for ring tropology type communication bus. Detailed specifications of GI pipes shall be provided by bidder for approval/ acceptance of BSP/MECON.

GENERAL CONTROL REQUIREMENT

13. All the drives will generally be provided with following modes of operation and control:
   - **Local De-interlock**
   - **Local interlock**
   - **Remote**
   
   Mode of selection will be carried out for all drives with the help of selector switch provided on the MCCs / MCPs and required nos. of wall mounted boards / boxes for HT motors.

14. For local operation of drives, permission from Operator at Despatcher Control room will be obtained which will be named as automation permission. For this purpose, specific menu will be provided with operator workstation for such drives.

15. Local De-interlock mode of operation will be used only for adjustment, maintenance and testing purpose. After the selector switch at MCC / MCP is selected to Local De-interlock mode and Operator/PLC permission is obtained from Control room, the drives/valves can be started/opened/closed from Local control
stations using start/open/close push buttons. Under this mode of operation, all safety interlocks (Pull Chord Switches, motor over load, Emergency switch etc.) will be provided through hardwire in the circuit.

The stop push button provided in Local Control station will stop the drive under all mode of operation. In case of emergency Stop, alarm will be provided at the Operator workstation at control room to warn the operator. Hooter PB will be provided in LCS for pre start warning.

16. Local interlock mode for running the drive in sequence interlocked mode from LCS. Selector switch will be put in local interlocked position and permission from operator / PLC will be pre requisite condition. In this mode start, stop, motor over load, emergency stop, Pull Chord & Belt Sway Switches, Zero Speed Switch, chute jamming switches will be in the circuit through hardwire in addition to interlock with successive conveyor / equipment.

17. Under remote mode of operation, following control modes for all drives will be provided through Operator workstation.
   i. Remote Manual
   ii. Automatic

Selection of remote manual or automatic mode of operation will be carried out using command menus through Operator workstations.

**Remote Manual mode**

Under remote manual mode of operation, individual drives will be started/stopped from Operator workstation. However, necessary safety interlocks will be provided by automation system. This mode can be used for testing of individual drives from Control room.

**Automatic mode**

Under Automatic mode, the plant/equipment will be controlled, started/stopped automatically in sequence by automation system using various command menus from any of the Operator workstations.
**4.0 CONTROL ROOM / DESPATCHER ROOMS**

**A. COAL HANDLING PLANT:-(CHP)**

Route wise operation of CHP (under Pkg-064) and Coal transportation system (under Pkg-062) of the BSP will be operated from a common dispatcher D2. The Despatcher D2 building is located near COB#11 and is in BSP scope covered under Package 062. The Bidder will supply PLC, Engineering Station, Work Station, Emergency Work Station etc. as per Automation Configuration Drawing (No.-MEC/S/9101/11/E9/0/00/00/064.01/R1) of CHP. The Bidder will furnish assignment drawing and space requirement to the BSP/EPI to keep the provision in the Despatcher-D2.

**B. COKE SORTING PLANT:-(CSP)**

Despatcher will be a new building near Coke Screening Station to control transportation of coke from JH-1 to various destinations as per material flow diagram & layout for CSP. The Bidder will furnish the assignment drawing and space requirement in CSP Control Room/Deaspatcher to decide control Room size.

**FUEL & FLUX PLANT :-(FFP)**

**C.** New PLC with RIO’s will be provided for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III which will be connected to existing PLC through suitable gateway. The new PLC & HMIs will be housed in existing Control Room 1(CR-1). The existing HMIs will suitably be upgraded to match the new HMIs for operation of the entire existing and new Flux & Fuel Crushing & Screening plant. The Bidder will furnish assignment drawing and space requirement in existing CR-1 Control Room for installation of new PLC system.

**D. COMMON POINTS**

1. Control Desk (for installation of HMIs & Engineering Stations etc) will be of most modern & aesthetic design with Cable Management system and shall be provided in control room of CHP, CSP and FFP. Control Desk shall be provided with lockable type emergency stop push button, start/stop pushbutton and path selector switch.

2. Plant Shut Down: Successful bidder to furnish Plant shut down
requirement for hooking-up/integration of the new automation systems with existing automation works/modification works with automation system of CHP, CSP and FFP as specified in technical specs. Bidder to furnish the schedule for the same, indicating the shut down requirement.

3. Bidder to indicate in price bid the addition/deletion prices for I/O modules, RI/O racks and accessories, set of radio communication equipment with required hardware & software & accessories, communication interface module, set of hardware for fibre cable connectivity etc.
(5.0) TENTATIVE PLC INPUT/OUTPUT LIST FOR CHP, CSP AND AUGMENTATION IN FUEL & FLUX CRUSHING.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Location- RI/O Panels/Racks (New)</th>
<th>Despatcher Room/Control Room</th>
<th>DI</th>
<th>DO</th>
<th>AI</th>
<th>AO</th>
<th>RTD</th>
<th>Soft</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RI/O panels for CHP in LTSS-1 (Near Conv Y11-207)</td>
<td>Existing Despatcher-2 (D2)</td>
<td>800</td>
<td>300</td>
<td>20</td>
<td>3</td>
<td>16</td>
<td>150</td>
<td>Successful Bidder shall submit the final I/O list &amp; no. of I/O racks, I/O rack location drawings for approval based on the detailed engineering.</td>
</tr>
<tr>
<td>2</td>
<td>RI/O panels for CHP in D2</td>
<td>Existing Despatcher-2 (D2)</td>
<td>440</td>
<td>110</td>
<td>25</td>
<td>2</td>
<td>16</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RI/O panels for CSP in LTSS-2 (Near conv. KA2)</td>
<td>New Despatcher C/R</td>
<td>1100</td>
<td>270</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RI/O panels for CSP in LTSS-3 (Near Conv K11-20)</td>
<td>New Despatcher C/R</td>
<td>450</td>
<td>200</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>RI/O panels for CSP-IV, Control Room</td>
<td>Near Coke Screening Building</td>
<td>250</td>
<td>100</td>
<td>7</td>
<td>0</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>RI/O panels for CSP/CHP in SS-48 (Near COBP#11)</td>
<td>New Despatcher C/R</td>
<td>100</td>
<td>30</td>
<td>5</td>
<td>0</td>
<td>16</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>RI/O panels for CSP in Stock House Electrical Building</td>
<td>New Despatcher C/R</td>
<td>300</td>
<td>140</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RI/O panels for C-line in LTSS-4 (Near conv C6-C1/C2)</td>
<td>Existing Control Room CR-1</td>
<td>550</td>
<td>240</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RI/O panels for Fuel &amp; Flux in LTSS-5</td>
<td>Existing Control Room CR-1</td>
<td>480</td>
<td>110</td>
<td>30</td>
<td>2</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>RI/O panels for Fuel &amp; Flux in existing CR-1</td>
<td>Existing Control Room CR-1</td>
<td>360</td>
<td>80</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>RI/O panels for Fuel &amp; Flux in SS-45 (Near existing SS-42)</td>
<td>Existing Control Room CR-1</td>
<td>80</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>RI/O panels for Fuel &amp; Flux in SS-43 (Near existing SS-42)</td>
<td>Existing Control Room CR-1</td>
<td>40</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
(6.0) **INTERFACING DETAILS OF EXISTING PLANT/OTHER PKG OF BSP WITH PKG -064 :**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Interfacing between packages</th>
<th>Existing PLC Location of Control Room</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CHP Control Station Pkg -64</td>
<td>CHP Control Station, Pkg-62 (existing)</td>
<td>Dispatcher building D2</td>
</tr>
<tr>
<td>2</td>
<td>CHP Control Station Pkg -64</td>
<td>Control Station for COBP # 11</td>
<td>Administrative cum Main Control Room of COBP#11</td>
</tr>
<tr>
<td>3</td>
<td>CSP Control Station Pkg -64</td>
<td>Control Station for CDCP for COB#11</td>
<td>Auxiliary Building</td>
</tr>
<tr>
<td>4</td>
<td>CSP Control Station Pkg -64</td>
<td>Control Station for BF#8 (Pkg # 10)</td>
<td>Stock House Electrical Building</td>
</tr>
<tr>
<td>5</td>
<td>C-Line Control Station Pkg -64</td>
<td>Control Station for BF#8(Pkg #10)</td>
<td>Stock House Electrical Building</td>
</tr>
</tbody>
</table>

In addition to the above, if any other information regarding interfacing details of existing plant/new pkg of BSP is required; bidder should visit the site and collect the required information.
(7.0) TENTATIVE COMMUNICATION CABLE LENGTH  (Bidder scope shall include supply of communication cable as per the actual requirement).

A) Cable length between Remote I/Os of New CHP, CSP & FFP

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Communication/Fiber Cable</th>
<th>Cable Length (Tentative) in meters</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RI/O at LTSS-1 to Despatcher-2</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RI/O at Despatcher -2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RIO at SS-48 to Despatcher-2</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RI/O at LTSS-2 TO RI/O LTSS- 3</td>
<td>1200</td>
<td>Bidder to check cable length w.r.t to CHP/CSP/FFP layout &amp; supply cables as per the actual requirement of the automation system</td>
</tr>
<tr>
<td>5</td>
<td>RI/O at LTSS- 3 TO CSP-IV Control Room</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>RI/O in CSP-IV Control Room to RI/O in S/H Electrical Building</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>RI/O at CSP-IV Control Room</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RI/O LTSS-4 TO RI/O LTSS-5</td>
<td>3200</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>RIO LTSS 5 TO RI/O SS-45</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>RI/O SS-45 TO RI/O SS-43</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>RI/O at SS-43 TO RI/O in Existing CR-1</td>
<td>1000</td>
<td></td>
</tr>
</tbody>
</table>

B) Interfacing Communication Cable length between New CHP, CSP & FF & Existing Plant

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Communication/Fiber Cable</th>
<th>Cable Length (Tentative) in meters</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control Station of CHP-Pkg-64 to Control Station CHP-Pkg-62</td>
<td>100</td>
<td>Bidder to check the cable length w.r.t. CHP/CSP/FFP layout &amp; shall supply cables as per the actual requirements without any additional price.</td>
</tr>
<tr>
<td>2</td>
<td>Control Station of CHP-Pkg-64 to to Control station of COBP #11</td>
<td>300</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>CSP-IV Control Station of CHP-Pkg-64 to Control Station of CDCP for COB #11</td>
<td>1100</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CSP-IV Control Station of CHP-Pkg-64 to BF# 8 (Pkg # 10) Control station</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>Sl No.</td>
<td>Item</td>
<td>Quantity</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>C-line Control station (pkg-064) to BF#8( Pkg #10) Control station</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>CSP -IV control room to Main control room of COB#11 (battery and CDCP)</td>
<td>1200</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Existing SP3 CR1 to Main Control Room of SP3 Machine 2</td>
<td>1300</td>
<td></td>
</tr>
</tbody>
</table>

**(8.0) LIST OF TOOLS AND TACKLES TO BE SUPPLIED BY BIDDER:**

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>True RMS Digital Multimeter (hand held)</td>
<td>8 Nos.</td>
</tr>
<tr>
<td>2.</td>
<td>Testing Jig for PLC (OEM supplied)</td>
<td>3 Nos</td>
</tr>
<tr>
<td>3.</td>
<td>Low range ohm meter</td>
<td>4 Nos</td>
</tr>
<tr>
<td>4.</td>
<td>Milli ohm meter</td>
<td>2 Nos</td>
</tr>
<tr>
<td>5.</td>
<td>Vibration monitor (hand held)</td>
<td>6 Nos</td>
</tr>
<tr>
<td>6.</td>
<td>Soldering / de-soldering station</td>
<td>3 Nos</td>
</tr>
<tr>
<td>7.</td>
<td>Testing table / bench for installation of testing / repair equipment complete with single phase / three phase power supply points and separate electronic earthing</td>
<td>1 No.</td>
</tr>
<tr>
<td>8.</td>
<td>Cable Preparation &amp; Termination Toolkit (for special cables), including Crimping Tool</td>
<td>1 set</td>
</tr>
<tr>
<td>9.</td>
<td>Radio communication Equipment testing Jig</td>
<td>1 Set</td>
</tr>
<tr>
<td>10.</td>
<td>F.O Cable Testing Kit including OTDR</td>
<td>1 Set</td>
</tr>
<tr>
<td>11.</td>
<td>Field bus Analyzer</td>
<td>1 Set</td>
</tr>
<tr>
<td>12.</td>
<td>Radio communication Analyzer</td>
<td>1 Set</td>
</tr>
<tr>
<td>13.</td>
<td>Tools for backup &amp; storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• DVD-RW</td>
<td>50 Nos</td>
</tr>
<tr>
<td></td>
<td>• Thumb drives</td>
<td>10 Nos</td>
</tr>
<tr>
<td></td>
<td>• Backup Tape for Servers</td>
<td>20 Nos</td>
</tr>
<tr>
<td></td>
<td>• Cleaning Tape</td>
<td>2 Nos</td>
</tr>
<tr>
<td></td>
<td>• Disk Imaging S/W for Server &amp; clients</td>
<td>1 Set</td>
</tr>
<tr>
<td>14.</td>
<td>Ethernet Analyzer</td>
<td>1 Set</td>
</tr>
<tr>
<td>15.</td>
<td>Portable Oscilloscope</td>
<td>1 Set</td>
</tr>
<tr>
<td>SL. NO.</td>
<td>DESCRIPTION</td>
<td>QUANTITY</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td><strong>PLC/automation</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Digital input module with connection unit if applicable.</td>
<td>10% of each type &amp; rating. (minimum 1 set/No. of each type &amp; rating)</td>
</tr>
<tr>
<td>2.</td>
<td>Digital output module with connection unit if applicable.</td>
<td>- DO -</td>
</tr>
<tr>
<td>3.</td>
<td>Analog input module with connection if applicable.</td>
<td>- DO -</td>
</tr>
<tr>
<td>4.</td>
<td>Analog output module with connection if applicable.</td>
<td>-DO-</td>
</tr>
<tr>
<td>5.</td>
<td>Processor card</td>
<td>-DO-</td>
</tr>
<tr>
<td>6.</td>
<td>Power supply unit for PLC</td>
<td>- DO -</td>
</tr>
<tr>
<td>7.</td>
<td>Memory board (Part of CPU Board)</td>
<td>-DO -</td>
</tr>
<tr>
<td>8.</td>
<td>Communication modules</td>
<td>- DO -</td>
</tr>
<tr>
<td>9.</td>
<td>Control modules of any other type</td>
<td>-DO-</td>
</tr>
<tr>
<td>10.</td>
<td>Control fuse set consisting of 3 nos.</td>
<td>- DO -</td>
</tr>
<tr>
<td>11.</td>
<td>Fan unit</td>
<td>-DO-</td>
</tr>
<tr>
<td>12.</td>
<td>Fused terminals with LED</td>
<td>-DO-</td>
</tr>
<tr>
<td>13.</td>
<td>Special connectors/cables/TERMINATORS</td>
<td>-DO-</td>
</tr>
<tr>
<td>14.</td>
<td>Racks / Chassis</td>
<td>-DO-</td>
</tr>
<tr>
<td>15.</td>
<td>Interposing relays / Relay Boards</td>
<td>-DO-</td>
</tr>
<tr>
<td>16.</td>
<td>Ethernet switches</td>
<td>-DO-</td>
</tr>
<tr>
<td>17.</td>
<td>Media converter</td>
<td>-DO-</td>
</tr>
<tr>
<td>18.</td>
<td>Radio comm. Equipment including antena</td>
<td>-DO-</td>
</tr>
<tr>
<td>19.</td>
<td>Load power supply</td>
<td>-DO-</td>
</tr>
<tr>
<td>20.</td>
<td>Special cards in PC / servers/ clients / PG</td>
<td>-DO-</td>
</tr>
</tbody>
</table>

**9.0) LIST OF COMMISSIONING SPARES**
(10.0) SYSTEM REQUIREMENTS/ INFORMATION FOR PLC BASED AUTOMATION SYSTEM TO BE CONSIDERED BY BIDDER IN THE SCOPE.

1. HTSS & LTSS Details

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Equipment</th>
<th>Location</th>
<th>Plant/Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HTSS-SS-48</td>
<td>Near COBP#11</td>
<td>Hammer Mill 5,6,7,8, Compressor-1,2,3, PCC-1, PCC-2, PCC-3</td>
</tr>
<tr>
<td>2</td>
<td>HTSS SS-45</td>
<td>Near SS- 42</td>
<td>PCC-4</td>
</tr>
<tr>
<td>3</td>
<td>HTSS SS-43</td>
<td>Near SS- 42</td>
<td>Rod Mill-1, 2, Primary Hammer Crusher, Secondary Hammer, PCC-5</td>
</tr>
<tr>
<td>4</td>
<td>LTSS- 1</td>
<td>Near Conv-Y11- 207</td>
<td>CHP Equipment &amp; Coveyors</td>
</tr>
<tr>
<td>5</td>
<td>LTSS- 2</td>
<td>Near Conv KA2</td>
<td>CHP Equipment &amp; Coveyors</td>
</tr>
<tr>
<td>6</td>
<td>LTSS- 3</td>
<td>Near Conv K11- 20</td>
<td>CSP Equipment &amp; Coveyors</td>
</tr>
<tr>
<td>7</td>
<td>LTSS- 4</td>
<td>Near Conv C6- C1/C2</td>
<td>FFP Equipment &amp; Conveyors</td>
</tr>
<tr>
<td>8</td>
<td>LTSS- 5</td>
<td>Near Conv C111A</td>
<td>FFP Equipment &amp; Conveyors</td>
</tr>
</tbody>
</table>
2. **Control & Monitoring of Equipment**

- The Controller unit (For CHP-14 nos. CSP, 35 nos. FFP-18 nos.) of addressable Belt protection switches (Pull Chord and Belt Sway Switch) will communicate with PLC in control room of CHP, CSP and FFP for control and monitoring. Communication protocol details of controller unit shall be provided to successful bidder during detailing.

The Controller unit (For CHP-1 no, CSP, 9 nos. FFP-2 nos.) of Belt Weighing System will communicate with PLC in control room of CHP, CSP and FFP for control and monitoring. Communication protocol details of Belt Scale controller unit shall be provided to successful bidder during detailing.

- The Controller unit (For CHP-4 nos, CSP, 2 nos. FFP-2 nos.) of CBM System will communicate with PLC in control room of CHP, CSP and FFP Control and monitoring. Communication protocol details of controller unit shall be provided to successful bidder during detailing.

The VFD unit (For CHP-5 nos CSP, 2 nos., FFP 2 nos.) will communicate with PLCS in control room of CHP, CSP and FFP Control and monitoring. Communication protocol details of VFD unit shall be provided to successful bidder during detailing.

- The Radar level transmitter (For CHP-28 nos., CSP 4 nos, FFP-8 nos.) connected on foundation field bus will communicate with PLC in respective control room of CHP, CSP and FFP Control and monitoring. Details for the same shall be provided to successful bidder during detailing.

- The Tripper Car (Total Qty- CHP-1 no. and CSP-1 no., will have interlocking of chute clogging switch with conveyor system through wireless radio communication system. Supply of wireless radio communication equipment for tripper cars will be in the scope of bidder.

- HT motor winding and bearings, temperature sensors, vibration sensors will be hooked up with PLC for monitoring.

- Motor Control Centres for Coal Handling Plant and Coke Sorting Plant area will be intelligent, draw out type with two incomers and bus coupler for control of drives of rating up to 90kW, of various technological units having communication with Plant Automation System. All Intelligent, Motor Control Centers will be interfaced with
plant automation system of respective plant/area.

- Motor Control Centres for Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III will be Conventional, drawout type with two incomers and bus coupler for control of drives of rating up to 90kW, of various technological units.

- For control of drives of rating from 110kW to 200kW of various technological units, Intelligent type Motor control panels (MCPs) for CHP, CSP and FFP area having communication with Plant Automation System. All Intelligent, Motor Control Panels shall be interfaced with plant automation system of respective plant/area.

- Conveyors feeding to Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III (FFP) C7-3.5KW, C1-30KW & C2-45KW will be fed from new MCC. These Conveyors will be connected and controlled by new PLC of FFP.

- Surge protection device will be provided at the incoming side of PLCs/Remote I/O stations etc. to protect the system/equipment as required.

- Tripper car will have interlocking of chute clogging switch with conveyor through wireless radio communication. Interlocking with the CRD control cable will be given as back-up.

- Multifunction meters of LT drives as indicated in electrical single line of shall communicate with PLC.

- ACB of LT drives as indicated in electrical single line diagram for PCC and IMCC shall communicate with PLC.

- Bidder to consider communication with Intelligent MCCs and Intelligent MCPs in line with requirement given in GS-03 of GTS.

- Bidder to consider communication with other communicable devices as indicated in electrical single line diagram for PCC and IMCC.

- UPS system installed in each LTSS/Control Room shall have interfacing for monitoring through PLC/HMI.

3. **Automation system:**

   a) PLC based Automation system of proposed Coal Handling Plant Pkg-064, will be interfaced with Automation system of Coal
Transportation Plant (Pkg-062) being arranged by the BSP through a separate package (as indicated in Automation Configuration Drawing enclosed) so that entire coal transportation from silos to all coal towers can be operated in an integrated way from a common despatcher / control room D2 (under BSP’s scope).

b) PLC based Level-1 automation system of proposed Coke Sorting Plant will be provided as mentioned in the automation chapter for running the new Coke Sorting Plant from a new control room/despatcher.

c) PLC based Level-1 automation system of Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III which will be connected to existing PLC through suitable gateway. The new PLC & HMIs will be housed in existing Control Room 1(CR-1). The existing HMIs will suitably be upgraded to match the new HMIs for operation of the entire existing and new FFCS plant.

All the items will be supplied as per the Make list given in GTS (GS-13) and list of preferred make enclosed. However, in case of non-availability or delay in delivery, the bidder will take prior approval of BSP/MECON for additional make before ordering.

4. Control Rooms:

1. Control for the proposed Coal Handling Plant will be from Despatcher (D2) building being arranged by BSP under separate package (62). The bidder will furnish space requirement and assignment to the BSP for making the provision in the Despatcher-D2.

2. Control of Augmentation in Flux - Fuel Preparation and Plant Return Fines Handling for SP III will be done from existing Control Room 1(CR-1). Necessary modification, if required for laying of cables and mounting equipment in the existing control room, the same will be provided by the bidder.

3. Control of Coke Sorting Plant will be done from a new control room/despatcher under the scope of Contract.

4. The tentative location of LTSS: **CHP** –LTSS opposite 5 silos, **CSP**-LTSS near JH-11 and Coke Screening station and **FFP**-LTSS near JH-117 and Coke breeze storage yard. The nos. of LTSSs may increases during Basic Engineering to suit the
5. **Earthing and Lightning Protection:**

Special earthing system (including earth pits, earth grid with GI strips, Copper Cables as required) for earthing of PLC, RIO panels, VFD, other Electronics equipment & automation system as per their manufacturer’s recommendation. It will be distinct and separate from the power and lightning equipment earthing system.

6. **Erection accessories, spares, safety items, documentation & other miscellaneous items:**

1. Supply of all erection accessories and materials, all steel members (angle, channel, plate, steel sheet, etc.) for installation of equipment, GI pipes, GI conduits, bends, clamps, nut, bolts, cable supporting structures, heat protection materials, flexible metallic hoses, sealing materials for openings/conduits, double compression cable glands, cable lugs, cable tags, cable fasteners, insulating tapes, ferrules, junction boxes, pull boxes, heat resistance paints and all consumable materials for complete laying & termination of cables, erection of electrical equipment and earthing system etc.

2. Submission of basic and detailed engineering drawings, design calculations etc.

3. Supply of As built drawings, operation and maintenance manuals. CD in duplicate and reproducible of all As built drawings.

4. Supply of all commissioning spares as required till the plant is commissioned and handed over to BSP. List of minimum commissioning spares will be supplied as given in tender documents.

5. List of two years Maintenance / operational spares.

6. Supply of Special tools & tackles, measuring instruments etc.

7. Canopy of all outdoor equipment, if any.

8. First fill of all consumables, printers, papers, cartridges,
floppy, CDs etc.

9. Furniture for the monitor, control rooms etc.

10. Training of BSP/EPI’s engineers at manufacturer's works/training centers for Automation system.

7. **Approval of Statutory Authorities**

   The successful bidder will obtain necessary approval of statutory authority as per rules of State Government and Central Electricity Authority for the work under his scope, before energizing/charging the equipment. However, BSP/EPI will extend all assistance in this regard, like submission of application, relevant documents and payment of statutory fees etc.

8. **Installation**

   For installation work at site, the bidder will be fully responsible for arranging the required tools and tackles, welding sets, pipe bending machine, cable crimping tools, gauges, scaffoldings, ladders, temporary water and power connections.

   On completion of the installation but before energisation of the system, all installation will be physically checked and properly tested. These checks and tests will be conducted by the bidder under the supervision of BSP / MECON. The contractor will furnish the final status and test results. Any defect observed during such check and tests will be rectified by the contractor free of cost within contract completion period.

   All clamps, brackets, bolts, nuts, screws, markers, ferrules, lugs and glands and other hardware necessary for erection work, will be included in the scope of work and will be arranged by the contractor. Equipment will be painted to withstand the heavily polluted and saline environment prevailing in at site.
9. Design Basis for equipments & installations

Ambient conditions of shop units

Generally following ambient temperature will be considered in Electrical / Control Rooms.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Area</th>
<th>Ambient Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Electrical Rooms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>LT Sub-station/ switchgear room (Pressurized ventilation)</td>
<td>+ 45 Deg. C</td>
</tr>
<tr>
<td>2.</td>
<td>MCC rooms (housing intelligent MCCs, VFD panels, TR controllers, RI/Os etc.)</td>
<td>+ 35 Deg. C</td>
</tr>
<tr>
<td>3.</td>
<td>Cable basements / tunnels</td>
<td>+ 50 Deg. C</td>
</tr>
<tr>
<td><strong>B. Control Rooms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Control rooms – Air conditioned</td>
<td>+ 24 Deg. C</td>
</tr>
</tbody>
</table>

- Equipment selection and derating will generally be based on ambient temperature of + 50 Deg.C. For specific areas and shops, the ambient temperature conditions indicated above will be taken into consideration and equipment suitably derated wherever necessary.

- Equipment installed in MCC rooms/Control rooms will be designed for + 50 deg C so that in case of failure of Air-conditioning/ventilation facilities also the equipment should not be affected.

- The equipment offered should be suitable for smooth, efficient and trouble free service in the tropical humid climate prevailing at plant site and under the ambient temperature conditions indicated above for the different shops and areas. In hot areas of higher temperature conditions, the equipment will be adequately protected against damage from radiant heat and hot air.

- The equipment will be designed to give efficient and
reliable performance under heavy steel mill conditions and will be such that the risks of accidental short-circuit due to animals, rodents and vermin are obviated.

- All equipment will strictly conform to the Technical Specification, except where any deviations have been explicitly spelt out, specifically discussed and mutually agreed upon between the Bidder and BSP/MECON/EPI.

- The detailed specification and schedule of quantities will be worked out based on the detailed engineering to be carried out by the bidder, for complete and proper execution of the specified tasks.

- PLC, CPU panels, Operator panel / HMIs, Engg stations, UPS, UPS battery will be located in the air-conditioned room in the control room floor.

- Lighting in conveyor gallery and junction houses (floors above ground) will be connected to separate lighting circuit and the same will be switched ON/OFF by PLC based control from HMI at Despatcher.

- Contact rating for Push Button will be AC15, 6A at 230V DC13 , 4A at 230 V

- MCB short circuit rating capacity will not be less than 10 KA at 0.8 power factor.

- Control terminal block will be ELMEX type suitable for terminating 2 cores of 2.5 sq mm size wire. in panels.

10. Control and Operational Requirement:

1. All the necessary controls, interlocks and annunciation as required for smooth, efficient and safe operation of the plant will be provided.

2. Bidder will provide suitable PLC based automation system including all hardwares and softwares to run the existing and new material handling plant in an integrated manner

   a) PLC based Automation system of proposed Coal Handling Plant Pkg-064, will be interfaced with Automation system of Coal Transportation Plant being arranged by the BSP through a separate package (Pkg -062) (as indicated in Automation Configuration Drawing enclosed) so that coal transportation
from silos to coal tower can be operated in an integrated way from a common despatcher / control room. The PLC based Level-1 automation system of CHP will be provided as mentioned in the automation chapter.

b) PLC based Level-1 automation system will be provided as mentioned in the automation chapter for running the new Coke Sorting Plant from a new control room/ dispatcher..

c) PLC based Level-1 automation system will be provided as mentioned in the automation chapter for running the Flux - Fuel Preparation and Plant Return Fines Handling for SP III from a existing Control room CR-1 as indicated in the automation configuration diagramer.

d) All HT drives will be provided with extensive monitoring facilities for fault detection and alarm annunciation. Alarm annunciation will be provided for over winding temperature, over bearing temperature, overload etc.

11. Mode of control :

i) Plant will have four modes of control.

   • Local de-interlock mode for control of individual drive motor from local push button station (LCS).

   • Local interlock mode for running the drive motor in sequence interlock mode from LCS.

   • REMOTE interlocked individual drive control from the HMI at Dispatcher/ Control room.

   • REMOTE interlocked route wise control of conveying system from the HMI at Dispatcher/ Control room.

ii) Mechanism selector switch for selection of above modes of operation of each drive motor will be provided in the MCC / Control Panel / MCP. A selector switch box will be provided near respective Remote I/O station for HT motors. Local selection of any drive will be shown on the HMI screen with some sort of caution.
iii) The local de-interlock mode is meant for testing and maintenance purpose only. However, all safety interlocks (Pull Chord Switches, motor Over Load & emergency stop etc.) will be connected in LOCAL de-interlock mode of operation. In local de-interlock mode the mechanism is not interlocked with other drive and after receive of permission from operator / PLC drive/equipment can be started from LCS independently.

The stop P.B. of local control station will be able to stop the drive mechanism selected for any mode of control. Hooter PB will be provided in LCS for pre start warning.

iv) In Local interlock mode the drive / equipment can be run in sequence interlock from LCS. Selector switch will be put in local interlocked position and permission from operator / PLC will be a condition for operation in this mode. Start, stop, motor Over Load, emergency stop, Pull Chord and Belt Sway Switches, Zero Speed Switch, chute jamming switches will be connected in the circuit in addition to sequence interlock with successive drives. All the above will be connected through hardwire.

v) In Remote interlocked individual mode of control the drives/mechanisms in the material flow path will be started in succession sequentially opposite to direction of material movement from operating station / HMI. On tripping of any conveyor/drive/mechanism, all the mechanisms feeding to the affected (tripped) mechanisms will stop according to material flow diagram. All the mechanism selector switches of the selected material flow path will be set to REMOTE position in this case. Programmable Logic controller will be used for the control, interlocking, operation, and monitoring of the equipment.

vi) In Remote interlocked Route-wise control, following operations is to be carried out from HMI by the operator before starting of a conveying route:
   a) Selection of material flow path including source and destination as per requirement.
   b) Selection of mechanisms within the selected material flow path.
   c) Selection of switching devices, flap gate etc. in a conveying route
d) Selection of control mode in REMOTE of master selector switch for each material flow path block chain.

On receiving start permissive signal from HMI, the operator will give ON command to start the desired conveying route.

vii) Normal stop and Emergency stop of mechanism for each material flow path, P.B, switches for pre-start warning signal for each material flow path, start & stop P.B. switches of drives with independent operation etc. will also be mounted on desk/ HMI.

viii) A pre-start audio warning signal through hooters will be given in the premises where the mechanisms are to be started before start of the mechanism. The duration of the pre-start audio signal will be as per requirement. Sequential start of the mechanism will be possible only after the pre-start audio signal is over.

ix) The conveying system will be integrated with the associated auxiliary / other system for interlocking, sequencing and monitoring.

x) Stopping of mechanisms:

a) For regular stop, the feeding equipment will be stopped first to stop the material flow in the conveying path and then after some time delay the equipment in the route will be stopped in sequence from feeding end ensuring no material is in the conveying path.

b) Emergency stop push button will be provided on the Control desk for emergency stop of material flow path.

b) In case of tripping due to fault of any drive, the part of the conveying route before the faulty drive will stop. There will have signaling of the stopped mechanisms by changing color in the graphic. This will give an indication of the fault.

12. Signaling:

A) Status of ON, OFF, Trip/Fault, Route selection etc. for all mechanisms of conveying system, dedusting system,
dust suppression system, weigh feeder etc. will be available in the operator work station.

B) When a drive in a conveying route is shifted to local controls, indication will be available in the HMI.

C) The annunciation will be provided on HMI for each drive fault and actuation of safety and limit switches.
   i) Annunciation for O/L & fault of each drive motor.
   ii) Individual annunciation for all HT motors trip due to high bearings and winding temperature.
   iii) Combined fault HT switch gear for Each HT motor including power supply to MPR failure separately.
   iv) Switching devices, flaps etc failed to close or open.
   v) Individual annunciation for HT motors bearings and winding temperature high alarm.
   vi) Individual annunciation for following conditions of electrical system:
      - 11KV and 6.6 kV switchgear trouble
      - 415 switchgear trouble
      - Transformer trouble alarm.
      - Combined fault/trouble in bag filter system of D.E
      - Unhealthiness of various machines
      - Any other failures
   vii) Every unplanned stoppage or abnormal condition will be brought to the notice of operator.

- Current readings of all HT and LT motors connected to Intelligent MCC will be available in HMI at Dispatcher. Current monitoring for drives of rating above 30KW.

- Drainage/sump/slurry pump will be provided with Auto/Local mode of operation. Under automatic mode of operation any one of the pump motors will start automatically at set level and if the level rises further the second/ reserve pump will start automatically at second set level and both the pumps will stop at set low level. If the first pump trips, second pump will start automatically. Emergency high level annunciation will be available in the control room.

Under local mode of operation, the pump motors will start/stop locally through local control boxes depending on level.
13. ELECTRICS AND AUTOMATION FOR EXISTING DRIVES

Scope of work for Electrics and Automation for up gradation, modification and integration of existing conveyors to be upgraded as per technological requirements and will consist of Complete new MCC, PLC, field switches, LCS, Power and control cables and New Brake panel and associated cables.

Bidder will provide new PLC based automation system for new and existing drives (to be upgraded as per technological requirements) for integrated operation of the overall CHP, CSP, and FFP with respective existing/new units as shown in configuration diagram and elsewhere.

The approval / clearance of BSP / their representative will be taken before carrying out new installation for up gradation for existing conveyors / equipment.

For the BSP’s approval / clearance, Bidder or will submit detailed shut down plan of the existing drives indicating temporary arrangement to be made by the Contractor for running suitable alternative conveying routes so that plant can maintain production level.

14. DUST SUPPRESSION SYSTEM

Control Panel for DS system will have necessary starter for Pump motors and 24V DC power supply arrangement for Solenoid valves. Valves will be energised either by Local Push button station or by under belt switch depend upon selection of control mode. Necessary electrics will be provided for desired operation of pumps, compressors, valves etc. for DS system. DS system will be interlocked with corresponding conveyors / technological equipment. DS system will have local manual and remote auto mode control. Compressor may be connected to nearest MCC considering location of Compressor house.

Control panel for outdoor application will have weatherproof enclosure.

15. DUST EXTRACTION SYSTEM
The Dust Extraction System will be started first and will be suitably interlocked with corresponding conveyors / technological equipment. The equipment of D.E. system will be operated in sequence as per requirement in the REMOTE mode from the HMI. Power supply to bag filter panel will be interlocked with the DE fan. Bypass arrangement will be provided such that technological equipment may be operated without operation of DE system in case need arises.

**Electrics for Bag Filter System of DE System.**

The bag filters of D.E. system will consist of pressure switches cum indicator in the compressed air line, differential pressure switches, solenoid valves, control panel and all other associated equipment. The brief specification of the major components will be as given below:

01 Control panel for Bag filter-
The control panel will be free standing floor mounting fabricated from 2.5 mm thick CRCA sheet steel on a base channel or 250 mm height provided with cable gland plates, having synthetic rubber gasketting provided with double door & canopy and enclosure conforming to IP-55. The control panel will be factory assembled, wired with 1.1 kV grade PVC flexible wire of copper conductor (minimum size 2.5 sq.mm), factory painted. The control panel will be provided with following major equipment:

a) Incoming switch (minimum 30A, AC23 duty) with operating handle inter-locked with the door, HRC fuses, contactors, MPCBs in the various circuits.

b) Control transformer or required VA rating having +/-5 percent and +/- 2.5 percent tapings in the primary side of the control transformer with Isolating switches/ MCBs in the primary & secondary sides.

c) 24V DC power pack complete with fitter and protective elements and also isolation cum short circuit protection both at AC and DC sides for power supply to solenoid valves.
d) Auxiliary contactor for control power supply monitoring interlocking, and controls etc.

e) Auto-manual selector switches, push button switches, indication lamps, various monitoring devices, terminals (with 20 percent spare terminals) and other circuit elements required for control and monitoring.

f) Solid State Bag filter timers.

02 The bag filter timer will be solid state device suitable for dusty, tropical and specified aggressive environment. The bag filter- timer will be provided with internal semiconductor fuse protection and will have provision for pulse frequency setting and pulse duration setting through independent operating knobs. The number of contacts in the timer will be equal to number of solenoid operated valves so that the timer will energise only one solenoid valve at a time.

03 The Bag Filter Timer will provide timed sequential energisation of 24V DC operated solenoid valves of bag filters LEDs for each solenoid energisation. Power ON in PCB feedback relay will be provided with potential free contacts which will close under following conditions:

i) Fault in the PCB.

ii) Open contact in the output side connected to individual solenoid valves. The contact will not close in the event of power failure to the controller.

iii) The sequential control (i.e. process) will start when the Differential Pressure (DP) switch is actuated at the first set point for normal operation. The process will continue till the pressure differential drops below the set value. When again the DP switch is actuated the process will continue from the previous position (i.e. next solenoid valve). However, when the power supply to sequential controller trips, the process will stop and sequential controller is reset to first load position enabling the process to start from the beginning.

iv) Sufficient space will be provided for installation of bag filter panel with required front clearances for operation
and maintenance including side and back clearances as required.

04  Differential Pressure Switch
i) The differential pressure switch will have two sets of independent micro switches. The first set will be used for normal sequential cleaning operation of the bag filters as per lower set value of differential pressure. This set point will be independently adjustable.

ii) The second set of N.O. contact will close at upper set value of differential pressure representing clogging condition of bag filter and will be used for signaling and monitoring. This set point will also be independently adjustable. The contacts will be rated for 5 Amp, 240V AC.

iii) The DP switch will be suitable for outdoor installation. The DP switch casing will be made of pressure die cast Aluminium with enclosure conforming to IP-65.

iv) One number differential pressure switch with two set points will be provided for each module of the Bag filter. Alternatively, two numbers of DP switches may be provided for each module one for initiation of bag cleaning operation and other for signaling and monitoring of clogging condition.

05  Solenoids
The solenoid coil will have encapsulated coil (class 'F' insulated with a water proof (IP-65) plug-on connector. The coil will be suitable for 24V DC. The coil will be made of copper conductor.

06  Air Pressure Switch cum indicator
One number compressed air pressure switch cum indicator will be provided for each DE system in the incoming compressed air pipe line of the bag filter. The pressure range will match with the operating pressure. The switches will be snap action type with 1 NO + 1 NC contacts of SA, 230 V AC. These contacts will be wired up to terminals in the bag filter control panel. The enclosure of the air pressure switch will be pressure die cast aluminium conforming to IP-55.

(11.0 )DRAWINGS AND DOCUMENTS
Bidder’s scope of work for all design drawings and documents will be as given below.

The successful bidder will submit a list of all drawings and documents as given in tender documents, other drawings required for the project. In addition to this, any drawing/documents required by BSP/MECON, same shall be submitted by the bidder. Each drawing/documents in the list will be identified with a serial number, description and scheduled date of submission. All the drawings will have complete forward & backward reference. Project title, Project drawing etc.

Bidder will also furnish soft copies of all the drawings indicated below.

All design, engineering and manufacturing drawings will be required to be approved by BSP/MECON.

Work will be carried out exactly as indicated on the approved drawings and specification. No alterations will be made without prior written approval by BSP/MECON.

The bidder will check all the drawings prepared by them and/or received from their vendors/supplier/sub-supplier and satisfy themselves about the correctness of drawings before issuing to BSP/MECON/EPI. After checking, properly stamped drawings will be sent to BSP/MECON for approval/clearance.

Comments on all drawings will be forwarded to the bidder for incorporation and resubmission.

The approval of drawings by BSP/MECON or their authorized representative does not absolve or relieve the supplier from any of his obligations under this contract and he will be wholly and solely responsible for the satisfactory operation and guaranteed performance of equipment/system/plant.

TO BE SUBMITTED BY THE BIDDER DURING DETAILED ENGG.

I) FOR APPROVAL:

Basic Engineering:

01. Level-1 Automation system configuration & I/) lists
02. Functional description, control philosophy for the plant indicating start-up, shutdown, control locations, interlocking and annunciation system, mimic pages, report/data formats.

03. Tentative dimensions of panels

**Detailed Engineering:**

01. Finalized System configuration diagram for the automation system of CHP, CSP and FFP along with its peripherals with list of hardware and write-up on the system.

02. Bill of Materials & Data Sheets of all the hardware i.e. Processors, Communication modules, Power supply cards, RLM, OLM, Operator stations, Eng Stations, Servers, Bus cables etc.

03. Overall General arrangement drawings & sectional views of various cabinets, panels, consoles, etc., showing internal disposition of all components/ units, with dimensional details and bill of materials.

04. Interconnecting diagram between existing MCCs & other panels of BSP and PLC / Remote I/O stations of the Bidder.

05. Single line power supply diagram with specification and bill of quantities of electrical accessories.

06. Quality assurance plan & Factory Acceptance Test procedures for Automation system.

07. Control room layout drawing showing disposition of panels, consoles, desks, etc with dimensional details.

08. System Control Philosophy.

09. Functional description, control philosophy for the plant indicating start up, shut down, control locations, interlocking and annunciation system, mimic pages, report/data formats (for reference).

10. Schematic drawings of different feeders, control alarms, indicators, interlocking, inputs/outputs.

11. Level-1 automation system software and graphic displays.

12. Input/ Output list in specified format to be finalized during
detailing.

13. Communication cable routing and procedure for laying of communication cable.

14. Quality Assurance Plan

15. Shut Down Details and Procedure.


II) FOR SCRUTINY AND REFERENCE

01. Detailed technical literature/ catalogue for Automation system with peripherals, highlighting the model number.

02. Input/ Output list.(CHP,CSP & Flux-Flux Crushing Plant area wise)

03. Terminal wiring diagram and cable termination plan with terminal block arrangement of all the RI/O & Marshalling panels. (Plant-wise).

04. Cable schedule and specification.

05. System earthing/grounding scheme.

06. Formats and work sheets for generation and display of overview, groups, loops, graphics, alarms, operator’s guide messages, real time & historical trends, log & shift formats.

07. Detailed listing of application software, system software, HMI software, etc and the number of licenses.

08. Application software formats and details in documentation and CDs.

09. Manufacturer’s test, calibration and guarantee certificates for all instruments and automation system.

10. Operation and maintenance manuals for Automation system.

11. Power Consumption Details and heat load of panels.

12. Cable Routing Diagram, cable layout and procedure for laying of communication cables.
13. Earthing and Lighting protection scheme and special electronics earthing scheme.

14. List of interfaces of Pkg-064 control system with existing plant.

15. List of drawings and spare parts.

16. Final test and calibration certificates and guarantee certificate/warrantee certificate

17. As built control description with operational instruction, use of various commands, instruction for control of plant and equipment from operator workstation.

18. Erection specification and BOM of erection materials, earthing materials, Junction Box.

19. Procedure for testing and commissioning of automation equipment.

20. Ladder logic Diagram/statement list and software details.

21. Instructions for storage, erection, testing and commissioning.

22. Graphic Display sheets, reports/data generation, fault listings and Data base.

23. Control description with operational instruction use of various commands, instruction for control of plant and equipment from operator workstation.

24. Procedure for shut down and energization

25. Preventive maintenance schedule

26. Spares List for two years operation & maintenance

27. Drawings/ Documents for inspection of equipment
   a) Type test certificate
   b) Sub-suppliers technical datasheets/ technical literature
   c) Internal test report
   d) Test certificateof components
   e) Technical specification & data sheets
   f) All approved drawings
   g) FAT
28. Automation system
   a) Software including media and documentation
   b) Description of all components of the user system with functional description, overview, flow diagram, interface listing, mathematical models and fault message lists, operator commands, simulation facilities etc.
   c) Source code of user system
   d) Object code of user system
   e) I/O listing
   f) Ladder Block diagrams/Factory Acceptance Tests and Procedures for PLC
   g) Technical Specification of equipment
   h) Instructions for storage/erection, testing and Commissioning.
   i) Commissioning Report.

III As-built drawings and documents.

1. Drawings and documents of complete automation systems

2. Soft copy of all the above drawings & documents in CDs/DVDs.

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Tech. Specifications- PLC Based Automation
System (Pkg-064) BSP-Bhilai
EPI New Delhi, NIT No.-DLI/C&E/WI-675/851
### ADDITIONAL POINTS TO BE CONSIDERED BY BIDDER FOR AUTOMATION SYSTEM WITH REFERENCE TO GTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>GS Clause</th>
<th>Additional Points for Automation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ch-1, 06.03.01</td>
<td>Drawings of all listed categories (except fabrication drawings) will be submitted to BSP/EPI in minimum 6 sets.</td>
</tr>
<tr>
<td>2.</td>
<td>Ch-1, 06.03.03</td>
<td>Original hardcopy documentation and manuals are to be supplied, for all relevant hardware, software, network, technology, etc.</td>
</tr>
<tr>
<td>3.</td>
<td>Ch-3(Elect), 1.02.15.01.A.2.0</td>
<td>For all equipment with redundant power supply, supply from two separate sources will be drawn.</td>
</tr>
<tr>
<td>4.</td>
<td>Ch-3 (Elect), 1.01.15.02.A</td>
<td>No mode selection at LCS.</td>
</tr>
<tr>
<td>5.</td>
<td>Ch-3 (Elect), 1.02.21.02(10)</td>
<td>Conduits carrying special cables will be painted, coded, marked as per plant norms.</td>
</tr>
<tr>
<td>6.</td>
<td>Ch-3(Elect), 1.02.15.01.B.16.0</td>
<td>Provisions to be made for off-line testing of Level-I systems prior to actual deployment.</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td>Max CAT-6 length of 30m for shop floor installations.</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td>Necessary facility/software will be supplied for remote management and monitoring of the entire network.</td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td>Network teams from multiple switches to be employed for all the important machines (computers).</td>
</tr>
</tbody>
</table>