



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

Std. / Doc. Number

PY 56311

Rev. No.

00

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Specification for FPS PLC System, Field Instrument Package and hookup material

1. SCOPE

This technical specification covers the Design, Engineering, Manufacturing, System integration, Assembly, testing at vendor works, inspection by purchaser, packing and transportation to site with necessary documentation like data sheets, statutory approvals, O&M manuals etc., as required and supervision of Erection, Commissioning till final handover of PLC system to End user.

2. Proven Track Record

The systems being offered as per specification should be operating satisfactorily for at least two (2) years prior to the date of techno- commercial bid opening in industrial installations.

Vendor shall submit necessary supporting documents / past users confirmation supporting to above PTR requirements along with technical offer.

If offered instruments / equipments are supplied to BHEL PE&SD within last 5 years, above PTR clause is not applicable.

3. INSTRUCTIONS TO BIDDERS

3.1 Bidders **are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry.** In the event of any conflict between these specifications, data sheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for clarifications before bid submission **and the decision of Purchaser shall be final & binding on Bidder, without any cost & delivery implications. In the event of conflict, most stringent requirements shall be followed in general.**

3.2 Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.

3.3 Any technical features [over & above BHEL enquiry specification requirements] proposed by Bidder will not be given preference for the purpose of evaluation.

3.4 Bidder shall submit the "Duly filled & Signed copy of Check list" compulsorily along with technical offer without which offer is liable for rejection without any further interaction with the Bidder

4. List of Annexures (To followed along with this specification)

Document No.	Document Name
Annexure – [A]	Bill of material [for Main Supply + Mandatory Spares+Services]
Annexure – [B]	Price Bid format [for Main Supply + Mandatory Spares+Services]
Annexure – [C]	PLC Configuration Diagram
Annexure – [D]	Technical Specification for PLC System
Annexure – [E]	Instrument data sheets.
Annexure – [F]	Master Document Schedule
Annexure – [G]	Quality Requirements
Annexure – [H]	Vendor list

Revisions:

Refer to record of revisions

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5. CHECK LIST (To be filled by BIDDER and submitted along with Technical offer is compulsorily)

Vendor shall submit the following documents mandatorily as part of COMPLTE technical offer.

Enquiry No. / Date : _____

Name of the Bidder : _____

Project Name : _____

Item Description : _____

S. No	Document	Bidder confirmation (Yes/No)	Remarks
1	Technical offer complies with the specifications and its associated annexures, pre-bid clarifications in Toto and there are no technical deviations. Signed and stamped copy of this specification along with annexures enclosed along with technical offer.		
2	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in BHEL format . In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, <u>no commercial implications can be claimed by the bidder</u>		
3	All items are manufactured conforming to latest version of material grade standard and manufacturing standard mentioned in this specifications		
4	Bidder to quote as per BHEL price format only. No other format is acceptable. Bidder to attach un-priced price bid format by indicating "QUOTED" against each item and submit with technical offer duly signed & stamped.		
5	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of + 10% and -30% of order Value.		
6	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 & its Annexures, scope matrix etc.		
7	All the equipments / items / etc., supplied by bidder are having valid statutory approval certificates 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's Signature and stamp with date)



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6. DEVIATION FORMATEnquiry No.:Item:Name of Bidder:Offer Ref. No.:

Sl. No.	Clause no. & Spec. no.	Description as per Specification	Deviation taken	Nature of Deviation	Remarks

NOTES:

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

SIGNATURE OF THE BIDDER_____

NAME_____

DESIGNATION_____

DATE_____

COMPANY SEAL

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7. Scope Matrix for Supply, Engg, Installation & commissioning

S.No.	Description	Engineering by	Supply by	Erection by	Supervision of Erection by	Commissioning by	Remarks
[A]	FPS PLC including Remote IO cabinets, operation station, Engg station, softwares, etc. based on IO count	Bidder (Note-3)	Bidder	BHEL	Bidder (Note-1,2,4)	Bidder + BHEL (Note-2)	Note-(5)

Notes:

- 1) Termination accessories and termination of all types of cables at bidder supplied items/panels shall be in Bidder scope.
- 2) BHEL will provide the necessary man power required for commissioning. However, system commissioning shall be done by bidder only.
- 3) Engineering of Panels, model selections, configuration of software, etc are part of Bidder scope.
- 4) Any special activities involved in erection like FO cable splicing, termination, etc. shall be by bidder including special tools & tackles.
- 5) PLC I/O List, Signal grouping, Logic diagrams & inputs for graphics shall be provided by BHEL after P.O. placement.

8. Technical SPECIFICATIONS

S. No.	System	:	Technical specifications			
[A]	PLC System for FPS package					
1	Bill of material	:	Refer Annexure-[A] of this specification for <u>Main Supply + Mandatory Spares</u>			
2	PLC configuration	:	Refer Annexure-[C] of this specification			
3	I/O Count	:	S. No.	System	No. of I/O's	
					FPS PLC	Remote IO-1 (Booster Pump House)
			1	Analog Input (Non- Redundant)	192	8
			2	Analog Input (Redundant)	0	0
			3	Digital Input (Non-redundant)	85	44
			4	Digital Input (Redundant)	0	0
			5	Digital Output (Non-Redundant)	25	9
			6	Digital Output (Redundant)	0	0
7	No. of Interposing Relays	For all DO's	For all DO's			
4	System Loading	:	Loading of controller shall not exceed 50% with installed spares; Also refer Annexure-[D] of this specification			
5	System Redundancy	:	Controller - 1:1; Communication / Network cards – 1:1; Power supply – 1:1; PLC shall be provided with 100% redundancy i.e. hot standby. Refer Annexure-[D] of this specification			
6	Installed Spares	:	Refer Annexure-[D] of this specification			
7	Work stations Control desk	:	Refer Annexure-[D] of this specification along with 1 set of keypad and Locker set			
8	Chairs	:	1 No Industry standard revolving chairs for each work station with wheels and with provision for adjustment of height (hydraulically/gas lift) shall be provided. These shall be designed for sitting for long duration such that these are comfortable for the back			
9	Other technical requirements	:	1) Refer Annexure-[D] of this specification; Software Licenses shall be valid for life time. 2) All softwares provided shall necessarily include the cost for perpetual license(s) for use on all the machines and shall include software upgrades as & when released by the software agency for a period of three (3) years after warranty/guarantee period. 3) PLC shall be provided with necessary interface hardware and software for dual fiber optic connectivity & interconnection with station wide LAN for two –way transfer of signals for information sharing. The information shall be made available through Ethernet link following TCP/IP standard. The system shall be OPC compliant. All required plant data shall be transferred ensuring complete security. 4) Time Synchronization: Station LAN shall also be used for time synchronization of PLCs connected on the LAN.			
10	Operation requirements	:	The PLC based panel at fire water pump house and Remote IO panel at Booster pump house shall indicate the status of each pump, system pressure, operation of hydrant and/ or spray system, failure of starting of pumps, healthiness & failure of batteries / chargers, main supply, low level of fuel oil of diesel engines, tripping of pumps, low level / very low level of water level in the water supply system, status of batteries & chargers of panels and diesel engines etc. Alarms from these panels shall also be available to operator at fire alarm addressable panels, central monitoring station and DDCMIS. Operation of Hydrant and Spray booster pumps shall be possible from booster pump house control room through GIU as well as from OWS at Main fire water pump house			



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[B]	Field Instruments Package and hookup materials	
1	Bill of material	: Refer Annexure-[A] of this specification for <u>Main Supply + Mandatory Spares</u>
2	Technical specifications	: Annexure-[E] of this specification.
3	Tag Numbers	: Shall be provided after P.O. placement

9. Panel Specification

9.1 PLC Panels and Remote IO Panels shall be designed & manufactured as per Annexure-[D] of this specification.

9.2 Other requirements shall be as given below:

a)	Installation location	: FPS PLC & Remote IO Panels : Indoor in air-conditioned room
b)	Panel colour	: To be intimated during detail engineering
c)	Panel Cable entry	: From Bottom
d)	Removable gland plate at bottom	: Required

10. POWER SUPPLY

10.1 Purchaser shall provide the power supplies as per scope markings indicated in Annexure-[C] of this specification. Further conditioning & distribution within bidder supplied Panels/system & HMIs shall be in bidder scope. Vendor shall do the distribution with necessary protections & metering. Power distribution scheme shall be approved by purchaser.

10.2 24 V DC power supply system for each PLC based control system shall comprise of two sets, each set shall consist of 1x100% microprocessor controlled, intelligent, modular rectifier banks, Controller – one for each rectifier bank, x100% Nickel - Cadmium batteries for one (1) hour duty, 1x100% DC distribution board and 1x100% Microprocessor controlled Battery Health Monitoring System (BHMS)– common for both the sets.

10.3 Vendor shall supply accessories (like cable glands, plugs, etc.) required for termination of purchaser's as well as vendor power & control cables at vendor supplied equipments.

10.4 Vendor shall furnish above feeder capacity during order execution with calculations.

10.5 All internal distributions shall be designed such that a single power fault in any instrument branch system shall not cause a trip of the entire system. Each consumer shall be provided with separate switch & isolation fuse.

10.6 For detailed specification of power supply system, please refer Annexure-[D] of this Specification

11. EARTHING

11.1 All panels, desks, cabinets shall be provided with a continuous bare copper ground bus. The ground bus shall be bolted to the panel structure on bottom on both sides. The bolts shall face inside of panels. The system ground shall be isolated from the panel ground with suitable isolators. All internal component grounds or common shall be connected to the system ground, which shall be fabricated of copper flat (size 25mm x 6mm min., length as applicable). Shield on instrumentation cables shall be grounded on panel side. When shielding termination is required in cabinets furnished under this specification, suitable terminals shall be furnished on copper flat forming system ground.

11.2 Scheme for recommended earthing system/earth pit shall be furnished by vendor during order execution for approval.

11.3 Earth points of all panels shall be looped together and shall be terminated at BHEL's earth raisers at single point.

11.4 All hardware with in package required for earthing & connectivity up to BHEL's earth points shall be in vendor scope.

12. Bidder's Scope of SERVICES

12.1 Supervision of erection & commissioning, performance guarantee testing & trial run and final handing over to end customer for the supplied systems.

12.2 Number of man days and number of visits as specified in the "Annexure-[A] of this specification" shall be considered. However, either or both of the number of man days or no of visits may increase / decrease based on the actual site requirement.

12.3 Bidder to mobilize concerned competent person for supervision of Erection & commissioning activities within a period of 7 days of receipt of intimation in this regard from BHEL.

12.4 Following shall be the scope of work for services:

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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.	a) Services charges shall include the travel to & fro travel from vendors work to site, lodging, boarding & local travel. Vendors shall arrange their own lodging, boarding & traveling. b) Vendors shall arrange their own Test equipment's, commissioning tools, manpower etc as required. 12.5 Above services shall be ordered by BHEL Site at the time of commissioning. However vendor shall submit the price offer for services as per "<u>Annexure-[A] of this specification</u>" and same shall be considered for L1 evaluation. 13. MANDATORY SPARES - Spares requirement shall be as per enquiry & "<u>Annexure-[A] of this specification</u>". 14. Erection & Commissioning SPARES 14.1 All commissioning spares as required during erection and commissioning of all the systems are included in bidder's scope & shall be supplied along with the main supply/package. 14.2 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. 15. TRAINING 15.1 Bidder shall arrange training for Owner's personnel. Different type of courses shall be offered for operation / process engineers and operators, instrument maintenance engineers and technician. 15.2 Travel and living expenses of the owner's personnel shall be borne by the Owner. Apart from the hardware and software maintenance training and site training, bidder shall also offer operation training basically meant for operating personnel. 15.3 The various facilities available in the system for operation, actions required during emergencies and identifying the various diagnostic messages shall be the main contents of the operation training. 15.4 The duration & location of the training shall be as per "<u>Annexure-[A] of this specification</u>". 16. DOCUMENTATION 16.1 Information to be included with offer Vendor shall make the offer in detail, with respect to every item of the Purchaser's specifications. Any offer not conforming to this shall be summarily rejected. a) Duly filled & Signed copy of Check list b) Deviation list, if any (as per "No deviation format" given in this specification). If there are no deviations, bidders shall submit "Deviation format" by mentioning deviations "Nil". c) Unpriced price schedule (To be submitted compulsorily without fail) d) Bill of materials 16.2 Documentation after P.O. Placement a) Submission of documents as per "Master documents schedule" (which will be finalized in Kick-off meeting after award of the contract) within 2 weeks of placement of LOI (for approval by BHEL and / or BHEL's customer in 4 sets) b) All vendor documents of PLC and its sub-items shall be submitted to End user for approval during order execution. Any comment furnished by End user / BHEL shall be taken care by vendor during ordering execution. c) Further BHEL will provide comments on vendor submitted document within 25 working days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals. d) Revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 25 days on receipt of these revised documents / drawings from vendor for approvals. e) All the approvals required for manufacturing shall be completed with 2months from P.O to meet the P.O delivery schedule. Accordingly vendor shall ensure the submission of approval category documents (which are required for manufacturing) and obtain their approvals. f) Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates.			

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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.	g) It is vendor’s responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordingly, vendor to plan and execute the supplies in time. 16.3 Documents to be submitted during final shop testing and before equipment dispatch. (Note: submission of these documents are commercially linked) - all in 16 sets (2 sets to be included with item dispatch and balance to BHEL purchase department). a) Complete O& M manual. b) Approved Engg documents, As-Shipped documents, As-Built documents c) Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL’s Customer 3 sets of CD-ROM – containing O&M manual and Engineering documents (1 set to be included with item dispatch and balance to BHEL purchase department). 17. MARKING, PACKING AND DESPATCH 17.1 All items shall be marked (stamped/etched) in accordance with the applicable code/standard/specification. In addition, the item code, if available, shall also be marked. 17.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard. 17.3 Part number/Dispatch link-up of all the equipment’s/items supplied and also their co-relation with system/drawing/approved BOQ. 17.4 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. 17.5 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. 17.6 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. 17.7 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. 17.8 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. 17.9 The following minimum packing procedures shall be followed:- a) All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds. b) All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling. c) 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. d) All electrical, instrumentation etc., shall be properly packed to prevent damage during transport, storage, handling at site. e) 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. f) 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. g) Mandatory Spare parts shall be packaged separately and clearly marked as ‘Mandatory Spares ’. h) Commissioning spares, Tools & tackles to be packed separately & suitably tagged. 17.10 If mandatory spare items are ordered, same shall be sent in pre-decided lots in containers /secure boxes distinctly marked in Red color with boldy written "S "mark on each face of the containers /secure boxes				

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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.	17.11 Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items. A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in black color painted box for easy identification at site. 17.12 In case of imported/exported items, seaworthy packing shall be done as per specification no: AA0490004 (latest revision) and the type of packing applicable for flow orifice is "CR". This specification shall be obtained by vendor on request. 18. TESTING, INSTALLATION, COMMISSIONING & ACCEPTANCE – As per Annexure-[D] of this specification. 18.1 Final Inspection including document verification as per approved QAP shall be carried out by CUSTOMER /CONSULTANT/ CUSTOMER's Third Inspection Agency & BHEL/BHEL's Third Party Inspection Agency at vendor works. 18.2 Inspection & Factory Acceptance Test at Vendor works – by BHEL + VENDOR + END USER as per approved FAT procedure 18.3 Site Acceptance Test at site - by BHEL + VENDOR + END USER as per approved SAT procedure 18.4 Representative of OEM shall also required to be present during Factory acceptance testing of PLC. 19. WARRANTY 19.1 Warranty shall be valid for 48 months commencing from date of commissioning or 60 months from the date of supply whichever is earlier. 19.2 Free upgrades to new versions and introductory training for the new version of the software and programming software shall be provided free of cost during the warranty period. 20. SUB VENDOR LIST 20.1 Project specific vendor list is shall be as per "Annexure-[H] of this specification". Bidder to follow the same. 20.2 If sub-vendor list not available for any specific item, bidder shall be follow NTPC approved vendors meeting proven track record as per cl.2 of this specification and by producing the previous executed references / NTPC approvals <i>during order execution for NTPC's approval</i>. Any comment furnished by End user shall be taken care by vendor during ordering execution without any time / cost implication		

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