

Bharat Heavy Electricals Limited

(A Government of India undertaking)

ELECTRONICS DIVISION

P. B. No 2606, Mysore Road,

Bengaluru - 560 026

**NOTICE INVITING EXPRESSION OF
INTEREST FOR BUSINESS SHARING
AGREEMENT(BSA) / TRANSFER OF
TECHNOLOGY(TOT) FOR
ASSEMBLY/MANUFACTURING OF SIL3
CERTIFIED SYSTEM FOR SAFETY
FUNCTIONS OF PROCESS INDUSTRIES
BY INTEGRATION WITH BHEL DCS AT
ELECTRONICS DIVISION, BENGALURU.**

EOI REFERENCE NUMBER:

CE/Engg./SIL3_PLC/EOI/01

This document contains 27 pages

DISCLAIMER

The information contained in this Expression of Interest document (the "EOI") or subsequently provided to Applicant(s), whether verbally or in documentary or any other form, by or on behalf of BHEL or any of its employees or advisors, is provided to Applicant(s) on the terms and conditions set out in this EOI and such other terms and conditions subject to which such information is provided.

The purpose of this EOI is to provide interested parties with information that may be useful in formulation of their application for qualification pursuant to this EOI.

BHEL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused or arising from reliance of any Applicant upon the statements contained in this EOI.

The issue of this EOI does not imply that BHEL is bound to select and shortlist Applicants for next stage of evaluation or to enter into any technology tie-up agreements with shortlisted Applicants.

The respondent shall bear all costs associated with the preparation, technical discussion/presentation and submission of EOI, the Purchaser shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EOI process.

With respect to tenders participated by BHEL for a project wherein BHEL make DCS and SIL-3 safety PLC or SIL-3 safety PLC alone is in the offering, the business partner shall not participate in any way via parent or subsidiaries or group companies in the same tender and in services like system upgrading, project expansion, AMC, spare supply and other services related to the project.

Further, BHEL reserves the right to utilise the SIL-3 PLC system H/W and S/W in areas other than those mentioned elsewhere in this EOI.

Canvassing in any form by the respondent or by any other agency on their behalf may lead to disqualification of their EOI.

BHARAT HEAVY ELECTRICALS LIMITED

ELECTRONICS DIVISION

INVITES EXPRESSION OF INTEREST FROM OEMs FOR BUSINESS SHARING AGREEMENT(BSA)/TRANSFER OF TECHNOLOGY (BSA) FOR ASSEMBLY/ MANUFACTURING OF SIL3 CERTIFIED SYSTEM FOR SAFETY FUNCTIONS OF PROCESS INDUSTRIES BY INTEGRATION WITH BHEL DCS AT ELECTRONICS DIVISION, BENGALURU.

CONTACT PERSON AND SCHEDULE OF EVENTS

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Schedule of Events	
Last date for receipt of Responses from prospective technology partners:	30.09.2015 14:00 Hrs IST
All corrigenda, addenda, amendments, clarifications, time extensions etc. related to this EOI will be hosted on	www.bhel.com and www.bheledn.com
Mode of Submission of Documents	The respondents shall submit their offers with following: Three part bid, Part I: Qualification Requirements with supporting Documents Part-II: Techno-commercial proposal with declaration of “no deviation” Part III: Priced proposal in sealed cover to the contact person so as to reach on or before the date mentioned above.
	The cover shall be super scribed with EOI Reference number and the words “Expression of Interest– Assembly/Manufacturing of TUV certified SIL3 PLC system with QMR/TMR architecture for safety functions of process industries like Emergency Shutdown System (ESD), Burner Management System (BMS), Fire and Gas System (F&G), High Integrity Pressure Protection System (HIPPS), Process Pipeline Management System, etc. with integration to BHEL DCS”.



EXPRESSION OF INTEREST FOR BUSINESS SHARING AGREEMENT(BSA)/ TRANSFER OF TECHNOLOGY (TOT)FOR ASSEMBLY/MANUFACTURING, TESTING AND TRAINING FOR SIL3 CERTIFIED SYSTEM FOR SAFETY FUNCTIONS OF PROCESS INDUSTRIES BY INTEGRATION WITH BHEL DCS.

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SECTION - 1

EXPRESSION OF INTEREST

1.1 ABOUT BHEL

Bharat Heavy Electricals Limited (BHEL) (www.bhel.com), a Government of India Undertaking and a Maharatna Company, is an integrated power plant equipment manufacturer for both Indian and export markets. It is one of the largest engineering and manufacturing enterprises in India with annual revenue of over INR 400 Billion (US\$ 6.6 Billion). About 63% of the equity in BHEL is owned by the Government of India.

Established in 1964, BHEL is India's largest engineering and manufacturing company of its kind engaged in the design, engineering, manufacture, construction, testing, commissioning and servicing of a wide range of products and services for the core sectors of the economy, viz. Power, Transmission, Industry, Transportation, Renewable Energy, Oil & Gas and Defence. With a widespread network of 17 manufacturing units, two repair units, four regional setups, eight service centres, eight overseas offices, 15 regional centres, seven joint ventures and infrastructure to execute more than 150 project sites across India & abroad, BHEL provides products, systems and services to customers efficiently and at competitive prices. The Power sector covers generation, transmission and distribution equipment for hydro, fossil, and gas fuels. BHEL has been in this business for nearly 50 years and has supplied equipment that accounts for 64 % of the total thermal generating capacity in India. The high level of quality & reliability of BHEL products is due to adherence to international standards by acquiring and adapting to some of the best technologies from leading companies in the world including General Electric Company, Alstom SA, Siemens AG and Mitsubishi Heavy Industries Ltd., together with technologies developed in BHEL own R&D centres.

The annual turnover of BHEL for the year 2013-14 was INR 400 Billion (US\$ 6.6 Billion) with a profit before tax of US \$ 822 Million. BHEL's highly skilled and committed manpower of about 47500 employees, the best of manufacturing facilities and practices together with the latest technologies, has helped BHEL to deliver a consistent track record of performance. With the current order book exceeding US \$ 16 Billion, BHEL is poised for excellent future growth. More details about the entire range of BHEL's products and operations can be obtained by visiting BHEL web site www.bhel.com.

1.2 ABOUT ELECTRONICS DIVISION & ELECTRONICS SYSTEMS DIVISION

Electronics Division (EDN) (www.bheledn.com) along with its Electronics Systems Division (ESD) situated in Bengaluru is a leading supplier of new generation power plant automation and control systems. EDN has also emerged as a leading player in the field of power transmission and distribution, industry, transportation and renewable energy sources. The state of the art equipment and systems manufactured meet the demanding requirement of both the national and international markets in terms of technical specifications and quality.

This Division has established references both in India and overseas by successful installation of power plant automation and photo voltaic systems. Besides providing unified solutions for various control systems application, EDN proudly holds the largest market share for power plant automation systems in India. Further, it has been accredited with Quality Management Systems (ISO 9001), Environmental Management Systems (ISO 14001), Occupational Health & Safety Management Systems (OHSAS 18001) and ISMS (ISO 27001) certifications.

Electronics System Division (ESD) is located at Electronic City, Bengaluru. Presently the unit manufactures Defence Electronics Products, Control Equipment for power plants, naval automation



systems, Space batteries and Solar Space panels.

1.3 BHEL's EXPERIENCE IN PLC :

BHEL has supplied the SIL 3 safety requirements of Emergency Shutdown system (ESD) and Burner Management System (BMS) packages for IOCL Paradeep and IOCL Vadodara projects by integrating safety PLC from Honeywell with BHEL DCS. Now, BHEL is looking for business partners for assembly/manufacturing of SIL3 certified safety system for safety functions of process industry by integration with BHEL DCS AT EDN and ESD, Bengaluru to meet in-house and other market requirements.

1.4 EXPRESSION OF INTEREST (EOI)

BHEL proposes to address the present and future requirements of SIL3 certified safety system in various safety functions of process industries like Emergency Shutdown System (ESD), Burner Management System, fire and gas system, HIPPS, etc. This EOI is published for seeking responses from Original Equipment Manufacturers (**OEMs**) who are willing to be associate with BHEL-EDN to enable it to meet the above objective on establishing complete setup of SIL3 certified system with integration to BHEL DCS and provide training to BHEL engineers for long term service support. The business association shall be for minimum of 10 years and further amendments can be issued after prescribed time. It covers the scope of Design, Engineering, Configuration, Supply & Manufacture, Programming, Inspection, testing, Factory Acceptance Testing (FAT) at BHEL –EDN premises, documentation, shipping, installation supervision & commissioning, Site Acceptance Testing (SAT) & Integrated SAT of QMR/TMR type TUV AK6 certified and SIL-3 certified safety system.

1.5 A COLLABORATIVE APPROACH

BHEL intends to have a long term association with the prospective technology partner to enable it to manufacture and market SIL3 certified system for safety functions of process industries by integration with BHEL DCS.

1.6 BUSINESS MODEL

BHEL proposes to have an association with the Respondent (i.e. prospective Business partner) who shall be responsible to the customer jointly with BHEL for the design, procurement of components and sub-systems, system integration with BHEL DCS, testing (Functional & Type Tests) and also shall be responsible for the successful Acceptance (including field trials), guarantee and warranty obligations & long term support. Scope of technology transfer is listed in Section-5.

1.7 TYPICAL REQUIREMENTS

Indicative Typical requirements of safety PLC are covered in Section – 2. However, the Respondent is requested to provide detailed specifications to achieve the objective of BSA /TOT.

1.8 METHODOLOGY OF BSA /TOT BETWEEN BHEL AND PROSPECTIVE BUSINESS PARTNER WHO IS AN OEM

Assembly/Manufacturing of SIL3 certified system for safety functions of process industries with integration to BHEL DCS comprise of 2 types of items:



- A. Items in the manufacturing range of the prospective business partner (OEM) and manufactured at their works or at their sub-contractors' works, either at a single location or at multiple locations has to be provided for the entire product life cycle to BHEL to enable BHEL to assemble/integrate safety PLC with BHEL DCS at its Electronics Division.

(OR)

Items in the manufacturing range of the prospective business partner (OEM) and manufactured at their works or at their sub-contractors' works, either at a single location or at multiple locations for which technology has to be provided for the entire product life cycle to BHEL to enable BHEL to assemble/integrate safety PLC with BHEL DCS at its Electronics Division.

- B. Items other than A above shall be procured by BHEL-EDN. The specifications for these items are to be given by the prospective technology partner.

Any improvement in the technology by the OEM during the agreement period shall be shared concurrently with BHEL for implementation along with the TUV certification for upgraded design.

1.8.1 Typical Arrangement

The prospective business partner shall be OEM and shall have proven track record as mentioned in the section 2.3 and shall indicate in their response to this EOI the proposed arrangement for information sharing to BHEL along with the milestones and time frame.

This shall however be mutually discussed at the time of entering into a final agreement.

1.8.2 Information Sharing

In response to the EOI, the prospective technology partner shall clearly state his willingness to share the following with BHEL.

- a. Complete Technical know-how information & documentation as mentioned in the subsequent sections shall be provided to BHEL.
- b. Engineering information and selection criteria of all bought-out components (Recommended third party bidders database).
- c. Details of special purpose equipment for design platform, engineering platform, Manufacturing, testing and servicing at both sub-assemblies and system level.
- d. Deputation of OEM's experts for training and assistance in design, assembly/manufacturing and testing & quality check of the equipment, know-how and know-why to enable BHEL to provide long term product support. The charges related to transportation, lodging & boarding are to be borne by OEM.
- e. Support for training of BHEL engineers for assembly, manufacturing, integrating, testing, operating, maintaining and troubleshooting of SIL-3 PLC system for 12 man months at OEM's works including cost of certified trainers (engineering and commissioning experience) and training material cost and other support.
- f. The partner shall send their technical experts to provide assistance in setting up the facilities and subsequently demonstrate successful production and testing of the integrated system at BHEL EDN, Bengaluru in the established facilities. . The charges related to transportation, lodging & boarding are to be borne by OEM.
- g. Technology upgrades including addressing of obsolescence issues covering all the above for a mutually agreed period.
- h. A commitment has to be given by the prospective BSA/TOT partner for long-term association with BHEL. The prospective partner shall forward details regarding methodology of support for a period of 10 years.



- i. Exclusive rights to be given to BHEL to modify hardware/ software and usage beyond partnership period, on no charge basis.
- j. If any equipment needs Type tests (Environmental, EMI/EMC and any end equipment specific tests), a copy of Type test certificates or type test procedures to be provided by the prospective business partner.
- k. The prospective technology partner shall provide details of all the standards followed for the hardware & software used in their products.
- l. Copies of SIL Certification carried out to SIS safety standards IEC 61508, IEC 61511 and all relevant safety standards of products offered by OEM to be given. These should include Functional Safety Management activities carried out like procedures, tests conducted, report, analysis and certificates.
- m. Data on Proof of test and periodicity of tests with respect to SIL certification of product shall be offered by OEM.
- n. Repair, trouble-shooting procedures, database of failures, MTBF, User/Operator manual, maintenance and engineering Manuals to be provided so as to enable BHEL to provide product support to Customer.

1.9 RESPONSE TO THE “EXPRESSION OF INTEREST” – (EOI)

BHEL will analyse the responses received towards this EOI to shortlist prospective Business partners.

1.9.1 Qualifying Requirements

Only OEMs meeting the **Qualifying Requirements** (QR) as described in **Section–3** may respond to this Expression of Interest and will be considered for further evaluation.

1.9.2 Checklist of Documents

The information required to be submitted along with the EOI by the interested OEMs are given in Section–7.

SECTION– 2

TECHNICAL REQUIREMENTS FOR SIL3 BASED SAFETY SYSTEM

- 1.0 BHEL intends to leverage the infrastructure; competence and capabilities of Electronics Division to augment its manufacturing capacity by engineering an integrated DCS with SIL3 based safety system for the safety functions of process industries. Towards this, BHEL intends to select suitable partner(s) having the requisite infrastructure and competence to form a memorandum of understanding to undertake the work of assembly/manufacturing at BHEL premises to meet in house requirement as well as to meet the regional demand or Export to meet the global demand also.
- 2.0 With this objective in view, EOI is invited from “interested, competent and Manufacturer” (OEM) with proven track record engaged in manufacturing of SIL3 based safety system for entering into understanding with BHEL to facilitate engineering, manufacturing and supply on time with highest quality product to the customer.

Salient features of EOI for manufacturing as given below:-

Manufacturing of SIL3 based safety system covering all the components which includes Safety PLC with controller in QMR/TMR architecture, Input / Output modules, relays etc.

Integration of safety system with BHEL DCS through safe communication protocol.

Software associated with the safety functions meeting the requirement of IEC 61508/IEC61511 standards.

BHEL will provide the space for manufacturing of components & assembly line in BHEL premises. However the certification of work place has to be provided by OEM during the contract period and support BHEL in obtaining TUV certificate during contract period.

2.1. Technical requirements:

2.1.1. General:

This safety PLC is required for safety functions of process industries like Emergency Shutdown System, Burner Management System, Fire and Gas System etc. The PLC shall have SIL3 (or better) certification along with TUV approvals.

2.1.1.1 Programmable logic controller (PLC) shall be configured in QMR/ TMR architecture as applicable.

2.1.1.2 The PLC system shall be programmable, modular microprocessor based safety system, which shall be used for implementation of safety functions

2.1.1.3 The PLC (Processor & I/O SYSTEM) shall have very high noise immunity in order to ensure safe and reliable operation when subjected to electrical radio frequency interference and electromagnetic disturbances expected in a plant. The design of system electronics shall be in compliance with the



electromagnetic compatibility requirements as per 'IEC-801-2, IEC-801-3, IEC-801-5: Electromagnetic compatibility for Industrial Process Measurement and Control Equipment'.

2.1.1.4 The safety PLC should be SIL3 (or better) in accordance with IEC 61508 / IEC 61511 and approved by TUV with 2004 (QMR)/2003 (TMR) architecture.

2.1.1.5 All the components of Safety PLC like Processor, I/O modules, Power Supply, communication modules, cables & software shall be TUV certified.

2.1.1.6 Safety PLC shall be TUV certified for specific applications like ESD, BMS, F&G and HIPPS etc.

2.1.1.7 PLC system should meet the following :

- Industrial Noise Test : NEMA1- 109
- Showering Arc test:IEC61000-4-4
- Surge withstand capability test: IEEE 472/ANSI C37.90A
- 2KV/5KV Isolation test: IEC 255-4

2.1.1.8 The PLC System (Processor & I/O) shall also comply to UL 508 / CSA C22.2 No 142 Standards for Industrial Control Equipment's / Process control equipment.

2.1.1.9 The system shall have extensive set of self-diagnostics hardware and software for easy and fast maintenance of PLC. Routine checks should run automatically at frequent intervals for identifying any fault in software or hardware. Diagnostics shall be required at local module as well as operator interface console level.

2.1.1.10 Operation of the PLC shall be completely unaffected by a momentary power loss of the order of 20 milliseconds.

2.1.1.11 The scan time of programmable controller shall be of the order of 100 milliseconds for logic & 250 milliseconds for closed loops.

2.1.1.12 Safety PLC shall have SOE functionality with 1 ms resolution.

2.1.1.13 The offered Safety PLC System with all its sub systems shall be successfully installed & operating satisfactorily in a captive power plant application of hydrocarbon industry like Refinery , petrochemical or gas processing plants running for more than 4000 hours continuously (as corroborated by user certificate).

2.1.1.14 The System shall be designed for a minimum availability of 99.99% or better.

2.1.2 System Hardware Configuration:

2.1.2.1 INPUT /OUTPUT SUBSYSTEM



2.1.2.1.1 The I/O modules shall be mounted in the I/O racks located in control room i.e. I/O modules shall be general purpose unless otherwise specified. I/O devices interface with PLC shall be at I/O racks only.

2.1.2.1.2 The maximum number of input/outputs per module shall be limited as follows :

S.NO	I/O TYPE	NO OF CHANNES	REMARKS
1	DIGITAL INPUT CARD	8/ 16/32 CHANNEL	
2	DIGITAL OUTPUT CARD	4/8/16 CHANNEL	
3	ANALOG INPUT	4/8/16 CHANNEL	2/3/4 wire HART
4	ANALOG OUTPUT	4/8 CHANNEL	2 wire HART

2.1.2.1.3 Each I/O shall be electrically isolated from external control circuit by suitable means. The minimum isolation level between I/O and logic circuit shall be 1000 V AC. I/O status indication shall be provided for each I/O module.

2.1.2.1.4 Each I/O shall be protected against reversal of polarity of the power supply voltage to I/O.

2.1.2.1.5 Each module shall have LED for each I/O channel to indicate the healthy status of each input/output.

2.1.2.1.6 Each input shall be provided with filters to filter out any noise in the input line or noise because of input contact bouncing.

2.1.2.1.7 PLC inputs shall be provided with potential free/dry contacts unless otherwise specified.

2.1.2.1.8 All the inputs shall preferably be double ended i.e. two wires per input and not common return for all inputs.

2.1.2.1.9 The interrogation voltage (24 V DC) to the input/output contact shall be powered from separate redundant power supply units and shall not be a part of the power supply to PLC.

2.1.2.1.10 Output contacts from the PLC shall be potential free/dry contacts. Wet contacts/ powered contacts/TTL outputs etc., shall not be acceptable. Suppression device for each output contact is to be provided.

2.1.2.1.11 Input type shall be intrinsically safe with barriers for analog input modules and explosion proof type for digital input modules. Only Active Barriers shall be employed for achieving galvanic isolation. All analog input channels shall be provided with barriers.

2.1.2.1.12 Each output shall be short-circuit proof and protected by fuse. Visual indication of fuse down/blown must be provided for each output.

- 2.1.2.1.13 Failure in the safety system should de-energise the output contact of IO module. Where ever normally open field contacts are used, the I/O cards shall have line monitoring to detect wire open condition.
- 2.1.2.1.14 All modules shall have conformal coating with respect to G3 environment (ISA71.01 and ISA71.04).
- 2.1.2.1.15 Power supply modules to the rack should be TUV certified.
- 2.1.2.1.16 All modules shall be hot swappable which should not disturb the process during swapping. It shall be possible to hot swap any faulty system module without degrading the system safety or operation or freezing the output status. Switch over to the healthy module shall be bump less. The swapped module shall take over the function of failed module without any manual programming.

2.1.2.2 PROCESSOR SYSTEM (32 BIT or 64 BIT):

- 2.1.2.2.1 The processor shall have a minimum reference capacity to handle 2000 real time I/O. Processors shall be configured in QMR/TMR architecture. Redundancy shall be provided for complete processor subsystem including CPU, memory, and power supply & host system communication interface i.e. Rack to rack redundancy. Processor shall have ECC (Error-Correcting Code) logic integrated in CPU to protect both memory and buses.
- 2.1.2.2.2 Memory shall be non-volatile and have ECC feature. However, in case volatile memory is provided, rechargeable battery backup shall be provided for a minimum of one year to keep the stored program intact. A battery drain /pass indication shall be provided .The size of the memory shall be sufficient for storage of the program instructions required by the logic schemes.
- 2.1.2.2.3 In case of failure of complete processor system, safety system outputs shall take fail safe automatically.
- 2.1.2.2.4 The processor shall have capability to implement all the control functions required to implement the logic scheme, as logic/ladder diagram.
- 2.1.2.2.5 Time stamping for all alarms / event shall be done.
- 2.1.2.2.6 VENDOR TO FURNISH DETAILED CONTROLLER SCHEMATIC SHOWING MODULE WISE INTER CONNECTIVITY, WITH THE PROCESSOR, I/O MODULE, COMMUNICATION MODULE ETC. ALSO CONNECTIVITY OF VARIOUS FIELD DEVICES / INTERFACING DEVICES TO THE CONTROLLER SHALL BE SHOWN. THE SAME SHALL BE ENCLOSED ALONGWITH THE TECHNICAL OFFER.

2.1.2.3 COMMUNICATION SUB SYSTEM:

- 2.1.2.3.1 The communication subsystem shall be a digital communication bus that provides reliable and high speed data transfer between the processor subsystem & I/O subsystem.



- 2.1.2.3.2 The PLC shall have open protocol and share data with read only permission through Ethernet. PLC shall be configured in fail safe manner considering processor I/O module / power supply failure.
- 2.1.2.3.3 Redundancy in communication subsystem shall be as follows unless otherwise specified.
- (a) Communication Interface between each I/O rack & the dual processor system shall be via separate dedicated dual redundant communication link in multi-drop mode; daisy chained redundant communication bus to establish interface between I/O racks & processor system shall not be acceptable.
 - (b) The communication interface between each processor subsystem and host system shall be dual redundant consisting of two separate communication interface modules located in / from each individual processor rack and two individual communication links, with each one configured in redundant mode. **Use of PLC processor CPU port for establishing host interface connectivity shall not be acceptable.**
- 2.1.2.3.4 In case of redundant communication subsystem on the failure of the active device, the redundant device shall take-over automatically without interrupting the system operation. Information about the failed device shall be displayed locally as on well as the console. It shall be possible to manually switch-over the communication from main bus/device to redundant bus/device without interrupting the PLC functions. The mechanism used by the system for error checks and control shall be transparent to the application information/program. Error checking shall be done on all data transfers by suitable codes. All communication interfaces shall be galvanic ally or optically isolated.

2.1.2.4 SELF DIAGNOSTICS:

- 2.1.2.4.1 The system shall have an extensive set of self-diagnostic routines which shall be able to identify the system failures at channel and module level including redundant components and power supplies through detailed CRT displays, report print outs and the same feature shall be available to logic programming.
- 2.1.2.4.2 At the local level, failure of a module in any subsystem shall be identified by an individual LED.
- 2.1.2.4.3 Self-diagnostics shall be provided to detect faults (which make the contacts in fail safe mode) in the input and output modules. Each module shall have separate arrangement for self-diagnostic facility. This may be achieved by automatically running the testing software at desired cyclic intervals for meeting SIL3. Testing software shall be capable of detecting faults in case of normally closed system as well as in normally open system.
- 2.1.2.4.4 Feedback shall be provided internally from the output voting logic system to detect any latent faults of the system.

2.1.3 SYSTEM SOFTWARE SPECIFICATIONS

2.1.3.1 System Software.



The operating system must be having real time capabilities.

The operating system shall be modular in design and shall provide effective utilization of resources and facilitate future expansion. It shall have the following features:

- Real time capabilities.
- Multiprogramming and Multitasking facilities including background and foreground operations in real time mode.
- Virtual Memory System.
- Event based priority scheduling/ priority driven pre-emptive kernel
- Dynamic memory allocation
- Memory lock/unlock feature
- Hardware based control interrupt handling
- System including Cyber Security Features
- RDBMS/SQL database management system
- Dual LAN support
- Bulk Storage Management
- OSI/TCP/IP network connectivity support
- Input/output drivers for all peripherals
- Graphic support package
- Online and detailed offline diagnostic package to troubleshoot CPU, memory and various system and peripheral cards.
- Alarm management, Operator interface, device maintenance features.
- The failure of single component shall not result in a failure of correctly executed safety function. The degradation mode for the selected configuration shall be 3-2-0 or 4-2-0 or 3-2-1-0 or 4-3-2-1-0 (SIL-3 is maintained for all the modes) etc. shall be documented in SIL certification report.

2.1.4 NETWORK REQUIREMENTS:

2.1.4.1 The automation system communication shall be on the high-speed modern local area network (LAN) conforming to IEEE 802.3 standards and utilize industry standard protocols with **minimum 100 Mbps bandwidth.**

2.1.4.2 To ensure maximum reliability, communications shall be dual redundant. The communications system shall be capable of sustaining loss of one media channel without loss of data or performance degradation.



2.1.4.3 Ethernet Switches with auto sensing for 10/100 MBPS port selection & Simple Network Management Protocol support are to be used for establishing LAN inter-connectivity in dual redundant configuration. All the STP/ UTP/Co-axial cabling within Ethernet network should have 100% redundancy or better.

2.1.4.4 Loss of communications shall not cause loss of control at the local subsystem.

2.1.4.5 The communication software should employ a peer to peer communications (master less) protocol between all sub-systems where-ever applicable.

2.1.4.6 Loss of a subsystem or module shall not disrupt communications to other subsystems or result in performance de-gradation. Loss of a subsystem or module shall cause automatic isolation by pass of the failed subsystem without disrupting communications & without performance degradation; **loss of a subsystem or module or module channel shall generate a diagnostic message to be displayed at the operator stations and logged; identifying location /type of fault.**

2.1.4.7 Dedicated Front End Communication Processors / LAN Server are to be offered with 100 % redundancy in hardware with 20 % spare ports capacity. PLC shall be connected in dual redundant configuration to Ethernet ports of the primary & secondary (redundant) Ethernet switch / Communication Processor. Maximum 16 port Ethernet Switch are acceptable. Interfacing of field serial communication links directly to adapters / interface cards residing within the EISA/ISA/PCI slots & using CPU clock cycles shall not be acceptable. **Interfacing of redundant serial links from field equipment to a single front-end terminal or communication server shall not be acceptable.**

2.1.5 ENGINEER cum OPERATOR INTERFACE: -

- Access to Operator/Engineering Station functions shall be provided by a multi-level password system.

2.1.6 ENGINEERING FEATURES: -

- The software shall provide extensive user-friendly tools for creation of dynamic displays and total system configuration. All the Engineering tools shall be initiated within the system.

2.1.7 SYSTEM ACCESS SECURITY:

- All operator commands shall be automatically checked for validity of authorization by the system.
- Validity checks shall be automatically performed by the system to ensure that control parameters entered by the operator are within the defined limits.
- Access to all system functions shall be protected by a multi-level password system.



2.1.8 SYSTEM DIAGNOSTICS :

- The system diagnostics shall support fault isolation to a specific module or channel or subsystem device, which can be subsequently removed and replaced.
- The system diagnostics shall include both hardware and software diagnostics routines which upon detecting an abnormal conditions, reports this information on standard diagnostics displays on the OIC and printers.
- Once a diagnostic test has detected a failure, a descriptive alarm shall be generated and bump less transfer to control to a redundant component shall be triggered wherever specified.
- Audit trail for the change management.

2.1.9 DIAGNOSTIC DISPLAY

- The system status level shall be accessible by a single dedicated key.
- A flashing diagnostic message prompt shall be displayed and allow the user to immediately view the specific error message in a single key stroke without going through a diagnostic display hierarchy.
- A system status display shall provide the current status of every subsystem. Subsystems with a diagnostic alarm shall be identified by flashing indicator. The system status display shall include information on the communications system including status of each of the communication modules for every subsystem.
- The subsystem level status display should provide detail information on the subsystem itself and the status of the individual modules contained therein.
- The I/O status display shall provide detailed information of each I/O Channel of the associated device.
- The message level diagnostic display shall provide English text message explaining the exact nature of the diagnostic error and the time and frequency of occurrence. The users shall be able to go to an archive file to obtain a history of diagnostic messages for the entire system and additionally shall be able to make a backup copy to a removable media

2.1.10 SYSTEM SOFTWARE (LATEST VERSION) & APPLICATION SOFTWARE (LATEST VERSION):

- O.S. environment may be Windows 2008 SERVER STD (for Sever) & Windows 7 PROF (for Client) & Application software may have RDBMS like SQL Server ; ORACLE. The operating system software should be modular in design & shall provide effective utilization of all system resources and facilitate future expansion to the windows advanced version.



- The application software should be GUI (i.e. Graphic User Interface) based & should have excellent features in regard to real time data acquisition, data & alarm processing, database downloading, Terminal security, access etc. The software should also meet desired operational criterion.

2.2 Technical documents requirement

Document for review/records to be provided by OEM, along with technical BID (without any price implication)

Sl. No	Description	For Owner's Consideration		Remarks
		Review	Records	
1.	Offered system write-up, technical catalogue/data sheets of PLC and its modules.	✓		
2	Bill of material. Unpriced list of each module / item of PLC & its subsystem.	✓		
3	Processor loading calculations.	✓		
4.	Sub-Vendor list	✓		
5	Power consumption and heat load calculation of each subsystem and total requirement. Power supply / feeder distribution drawings		✓	
6	Earthing scheme for total package/ panels.		✓	
7	Cable / Tubing schedule & Interconnection cable details		✓	
8.	Logic diagrams	✓		
9	Functional schematics including complex loops	✓		
10	PLC Input /Output Summary	✓		
11	Foreign device (DCS, PLC's) interface details (as proposed). Detailed BOQ for both OEM and sub bidder items.	✓		
12	A copy of TUV Certificate & Configuration along with Systems Wise details (Components / Modules &		✓	ESD, BMS, Fire and Gas systems, HIPPS, Pipeline management system, machinery control.

	Model / Type etc.) approved for SIS utility. List of restrictions specified for the system with TUV certificate.			
13	Bill of material. Un-priced list of each module / item of PLC & its subsystem.		✓	Line Monitoring/Non Line Monitoring, HART/Non HART compatibility
14	Catalogs including technical information and programming manuals, Installation, operation and maintenance manuals		✓	
15	Special test equipment/ tool requirement for maintenance		✓	
16	Sub vendor drawings & documents List	✓		
17	Hardware console layout	✓		
18	PTR (Proven Track Record) and reference list.	✓		
19	Graphic display drawings including overview graphics group views, assignments etc. for DCS & Interlock Graphics for PLC.	✓		
20	Log and MIS reports, Trend Groups	✓		
21	PLC and sub system architecture. Panel IA/PA/GA.		✓	

2.3 Proven Track Record

- The system (with all its sub-systems) as being offered/supplied should have been installed and operating satisfactorily in process industries for the applications like Emergency Shutdown System (ESD), Burner Management System, fire and gas system, HIPPS, etc. for at least 3 Years. This shall be corroborated with user certificate.
- The system should be supplied; energized, integrated, tested etc. from an established bidder's factory and meeting the criteria mentioned above.
- PLC system shall be designed with minimum availability requirement of 99.99% or better with a MTTR figure of 8 hours. Minimum level of redundancy has been specified in the package. Additional redundancy if required must be provided by Bidder to meet these specified availability requirements.

SECTION - 3

QUALIFYING REQUIREMENTS

3.1 The Prospective Technology partner for Business sharing agreement (BSA) or Transfer of Technology (TOT) must have valid TUV certificate IEC 61508, IEC 61511 for both H/W and S/W components and services of SIL-3 PLC as a system with QMR or TMR architecture for safety functions of process applications like ESD, Burner management System, Fire and GAS System etc. from TUV Rheinland.

3.2 The Prospective Technology partner must have supplied on an average three systems per year for last three years

3.3 Prospective business partner shall have manufactured and supplied to firms in process industry for past Two years.

3.4 All bidders quoting for this EOI shall be in the approved PLC bidder list of EIL, JACOBS, Toyo Engineering, MECON, Uhde to name a few consultants (at least any 4 consultants). If not, they shall initiate action for getting the approved bidder status parallelly and complete this activity within 30 Days of submission of technical/commercial bid. All the commercial expenditure for the above said activities is in the scope of bidder. If the bidder does not meet the above mentioned requirements, the bidder's offer is liable for rejection.

3.4 The Bidder shall own the IPRs for the (SIL3 PLC) encapsulation technology being proposed for transfer OR have unencumbered right from the owner of the IPRs to sub-license the technology.

PROFORMA FOR PROSPECTIVE TECHNOLOGY PARTNER'S QUALIFYING EXPERIENCE

SL.NO	CUSTOMER NAME, REFERENCE& DATE	ITEM DESCRIPTION	QTY	CUSTOMER'S CONTACT DETAILS (NAME, DESIGNATION, PHONE NO., FAX NO., EMAIL ID)	DATE OF SUPPLY/ COMMISSIONING	PERFORMANCE CERTIFICATE FROM CUSTOMER REGARDING SATISFACTORY PERFORMANCE
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3.5 The respondent shall have latest and proven technology record for at least three years.

3.6 The business partner shall possess license/patent for transfer of assembly/manufacturing/ technology of SIL-3 or AK6 DIN V 19250 certified safety system. Successful associate shall be agreeing to provide SIL calculation and classification as per IEC61508

3.7 In future, if the respondent is taken over by another firm either by merger or acquisitions, there shall be no hindrance to support for assembly/manufacturing/ technology of this product (H/W, S/W and services) as per the scope.

3.8 The business association shall be applicable for minimum of 10 years and further extension of time frame shall be decided later.



3.9 Interest in Non-competence and non-disclosure agreement.



SECTION – 4 COMPANY PROFILE

4.1	GENERAL INFORMATION:
4.1.1	NAME OF COMPANY (ownership details for the last 5 years):
4.1.2	DETAILS OF HEAD OFFICE: ADDRESS: TELEPHONE: FAX: E-MAIL: WEB SITE: NO. OF COUNTRIES OPERATING FROM:
4.1.3	DETAILS OF FACTORY / WORKS: ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.4	DETAILS OF MARKETING AGENT (OUTSIDE INDIA, IF ANY): ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.5	DETAILS OF INDIAN AGENT, IF ANY: ADDRESS: TELEPHONE: FAX: E-MAIL:
4.1.6	CHIEF EXECUTIVE:
4.1.7	CONTACT PERSON(S) FOR PRODUCT OFFERED: NAME(S): DESIGNATION: ADDRESS: TELEPHONE: FAX: E-MAIL:

4.1.8	YEAR OF ESTABLISHMENT:
4.1.9	PRODUCTION CAPACITY PER ANNUM FOR SIL3 BASED SAFETY SYSTEMS: (Manpower in design, R&D, manufacturing, testing, QC and after sales support)
4.1.10	PARTICULARS OF PRODUCT INCLUDING SPECIFICATION AND RANGE: (ATTACH BROCHURES AND CATALOGUES) Compliance to international standards such as ISO, IEEE, MIL
4.2	COUNTRY OF ORIGIN FOR OFFERED PRODUCTS AND TECHNOLOGY
4.3	FINANCIAL INFORMATION:
4.3.1	ANNUAL TURNOVER AND PROFIT-AFTER-TAX FOR LAST 3 YEARS: (attach copies of audited Balance Sheet and Profit& Loss Account) YEAR – 2012-13: YEAR – 2013-14: YEAR – 2014-15: (Break-up of overall revenue)
4.3.2	DUNN AND BRADSTREET REPORT FOR THE COMPANY (If applicable)
4.4	QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEM:
4.4.1	IS THE COMPANY ISO: 9001 OR EQUIVALENT CERTIFIED: YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.4.2	IS THE COMPANY ISO: 14001 OR EQUIVALENT CERTIFIED: YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.4.3	IS THE COMPANY OHSAS 18001 OR EQUIVALENT CERTIFIED: YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.4.4	IS THE COMPANY ISO 27001OR EQUIVALENT CERTIFIED: YES / NO. IF YES, ENCLOSE COPY OF CERTIFICATE
4.5	EXPERIENCE LIST FOR OFFERED/SIMILAR ITEMS
4.6	LIST OF COMPLIANCE STANDARDS FOR DEVELOPMENT, DESIGN, TESTING AND LIFE CYCLE MANAGEMENT
4.7	ANY OTHER INFORMATION

SECTION – 5

Format for filling-up compliance to scope of BSA/TOT: Respondents shall express their compliance to the individual clauses on right-side column.

S No	Description	BHEL	BIDDER	REMARKS
1	Extension of TUV licence to setup manufacturing facility for SIL3 certified system and its integration with DCS for safety functions of process industries at BHEL EDN.		✓	
2	System Cabinet, Bus bars, Field Termination Assemblies(FTA), Prefab modules	✓		Bidder shall furnish the BOM.
3	Rack with power supply and connectors		✓	Bidder shall furnish the BOM for the rack assembly with price separately
4	Controllers with communication interface modules and prefab cables.		✓	
5	All type of I/O Modules including Remote I/O		✓	
6	Engineering station with dongle in redundant configuration. Along with availability of Sequence of events (SOE) features, Safety related networking of system with redundant configuration (MODBUS TCP/OPC/PROFINET and PROFISAFE). Time synch with SNTP protocol.		✓	
7	Engineering of integrated system	✓	✓	Joint engineering for FIRST 2 Sets.
8	Manufacturing of SIL3 System (The supplied SIL 3 hardware by the bidder will be mounted in BHEL Cabinet and all the interfacing field elements and modules will be wired at BHEL EDN works. The detailed BOM required will be furnished by bidder. COC shall be furnished for all the components.	✓	✓	Bidder shall share all information related to design, manufacture, testing-performance-functional testing, test jigs and S/W-H/W tools, quality assurance methods, training, etc., for the complete SIL3 certified safety system including hardware and software with BHEL.
9	Testing of the integrated system (The integrated system will be tested at BHEL EDN and bidder shall provide required assistance including deputation of experts till the product stabilises. Bidder to specify the details of	✓	✓	Bidder shall share all information related to testing, simulation techniques and protocols.

	deputation in the offer)			
10	Erection & Commissioning (Bidder shall provide required assistance including deputation of experts till the product stabilises. Bidder to specify the details of deputation in the offer)	✓	✓	Bidder shall share all information related to erection, trouble shooting, servicing/maintenance
11	Warranty/Guaranty (Bidder shall exclusively provide the relevant document in the offer.)		✓	Bidder shall continue to support in providing back-up engineering, maintenance support and spare part to customer for a period of 15 years from the date of placement of order.
12	Spares (Bidder shall submit the list of mandatory spares per unit rate with the offer.)		✓	Each type of Module used in PLC i.e. I/O Cards, all type of processor cards, all type of power supply cards, communication cards, Interface cards, FTA cards, Operator Keyboard, hard disk controller cards, inclusive of console, etc. as required for the System, 10% of total installed quantity or Two of each type (whichever is maximum) shall be provided as mandatory spares.
13	Site acceptance test(SAT)	✓	✓	Joint SAT for first set
14	Integrated site acceptance test(ISAT)	✓	✓	Joint ISAT for first set
15	Annual Maintenance contract(AMC) (Bidder shall offer AMC for a period of 5 years with per year rate from the ISAT)		✓	For first set
16	Documentation of SIL certification carried out to SIS safety standards IEC 61508, IEC61511 and all relevant safety standards of product offered by OEM.		✓	Bidder shall share all information related to SIL Certification. These should include the Functional Safety Management activities like procedures, tests conducted, report, analysis and certificates. Data on Proof of test and its periodicity with respect to SIL certification of product offered by OEM.
17	A hazard and operability study (HAZOP) (Bidder shall include in the offer and train BHEL engineers for the implementation of findings.)		✓	For first set
18	TUV certificate for BHEL EDN (Bidder shall assist to Obtain the certificate to enable for engineering, design, manufacture, software testing,		✓	

	trouble shooting, servicing/maintenance, quality assurance methods and training at EDN)			
19	Offer shall include BSA for a period of 5 years and TOT as an option at the end of third year for a period of 10 years.		✓	Offers with incomplete information will not be considered for evaluation and are likely to be rejected outright without any further interaction with the Bidder. BHEL's decision to accept the proposal shall be final and binding
20	Defective material (Defect in the material during manufacturing process, transportation activities, E&C, etc)		✓	Bidder shall be responsible for the replacement with in a period of 3 weeks from the supply/identified
21	Drawings and documents for PLC.		✓	Within a time frame of 4 weeks after placement of order.
22	Non competence and Non disclosure agreement.	✓	✓	
23	All modules with conformal coating for G3 environment meeting the standard of ISA 71.01 and & 71.04		✓	Bidder shall share all information related to conformal coating and price to be quoted separately for all types of modules.
24	All modules with non conformal coating.		✓	Price to be quoted separately.
25	If non-conformal coated modules are only offered, the methodology of conformal coating for G3 environment to be provided.		✓	Bidder shall share all information related to conformal coating.

SECTION -6

LOGISTIC SUPPORT:

Logistic support certificate as per format below shall be provided on part of each purchase specification Certificate. The logistic support certificate shall be signed by a corporate level person of the bidder and submitted along with technical bid.

Certificate For Logistics Support (by Principal)

(To be signed by Principal's corporate level signatory on company's letterhead)

I, on behalf of M/s...confirm that the * quoted by M/s...for..... Project shall continue to be supported by us. The quoted item shall not be withdrawn from Indian market as a matter of BHEL corporate policy.

I further confirm that in case of placement of order by on M/s.... we shall continue to support M/s.....in providing back-up engineering, maintenance support and spare part to for a period of 15 years from the date of placement of order.

SIGNATURE WITH SEAL
AUTHORIZED, SENIOR MANAGEMENT LEVEL

* DCS/ PLC/ Machine monitoring system/ all types of analyzers and chromatograph, Steam Turbine Control System, GTG control system, BMS, antisurge controllers, and any other Control System provided by Bidder.



SECTION – 7

CHECKLIST OF DOCUMENTS TO BE SUBMITTED AS RESPONSE TO EOI

Information/documents to be provided along with response to Expression of Interest:

Sl. No.	Information / Document	Compliance
1	Covering Letter signed by an Authorized Signatory on Company letterhead, listing clearly the Enclosures.	Yes / No
2	Point wise reply to Technical requirements as per section 2.1.	Yes / No
3	Duly filled section 2, clause 2.2 for technical document requirements.	Yes / No
4	Pre-qualification requirements as per section 3	Yes / No
5	Company profile duly filled as per section 4 and organisation chart	Yes / No
6	Duly filled format as per section 5.	Yes / No
7	Details required in Section-6.	Yes / No
8	Typical MoU	Yes / No
9	Instruction to bidder (ITB)-Part-I	Yes / No
10	Terms and Conditions –Part-III	Yes / No
11	Annexure-A	Yes / No
12	Annexure-B	Yes / No



INSTRUCTION TO BIDDERS (ITB) – PART I

T&C/EOI/SIL3/7

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**TITLE: INSTRUCTION TO BIDDERS FOR
ASSEMBLY/MANUFACTURING OF SIL3 CERTIFIED SAFETY SYSTEM
FOR THE SAFETY FUNCTIONS OF PROCESS INDUSTRIES WITH
INTEGRATION TO BHEL DCS.**

REVISION –00

APPROVED

Prepared

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INSTRUCTION TO BIDDERS (ITB) – PART I

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1.00.00. PRELUDE:

- 1) Bharat Heavy Electricals Ltd – Electronics Division, Mysore Road, Bangalore-560026 having its head office at BHEL House, Siri Fort, New Delhi – 110049, is a regular supplier of Distributed Control systems (DCS). BHEL intends to leverage the infrastructure; competence and capabilities of Electronics Division to augment its manufacturing capacity by engineering an integrated DCS with SIL3 based safety system for the safety functions of process industries.
- 2) BHEL-EDN proposes to select suitable Business Associate / technology provider who is a regular manufacturer of SIL3 certified safety systems and who will agree to supply the required hardware and Software to BHEL-EDN and also assemble, manufacture and test SIL3 certified safety systems at BHEL-EDN. This Global Tender is floated to seek Bids from Bidders who were qualified and desirous of working with BHEL through the Business sharing / Technology transfer route. The techno-commercially best and price wise lowest bidder will then be selected and called for signing the BSA / ToT agreement (as applicable) with BHEL valid for next 10 years from date of signing. Subsequent to signing of this MoU, the Bidder will be called as BHEL’s associate and together BHEL and Associate will submit bids jointly against Tenders in this Business segment in the Domestic market as well as Global opportunities.

Bidder’s scope for this tender shall be

1) To provide Technology to design, engineer, manufacture, supply necessary SIL3 hardware and software to BHEL, provide necessary support and services to BHEL at BHEL’s works at EDN, Bangalore for assembly, manufacturing and testing of SIL3 certified systems integrated with BHEL’s DCS as per customer’s specification requirements for process plants.

Or

2) To enter into Business sharing agreement for design, engineer, manufacture, supply necessary SIL3 hardware and software to BHEL, provide necessary support and services to BHEL at BHEL’s works at EDN, Bangalore



INSTRUCTION TO BIDDERS (ITB) – PART I

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for assembly, manufacturing and testing of SIL3 certified systems integrated with BHEL's DCS as per customer's specification requirements for process plants.

2.00.00. Qualification Requirements:

2.00.01 Bidders desirous of bidding for this tender shall meet the Qualification Requirements as mentioned in the tender specifications .**CE/Engg./SIL3_PLC/EOI/01** section-3 and shall submit Documentary evidence in support of their Qualification in a separate sealed envelope..

2.00.02. Establishment and man power criteria:

The bidder shall be able to provide services to BHEL-EDN as detailed in the specifications within Three (3) days of BHEL-EDN asking for the same. It is preferred that the Bidder has a local Indian office for providing services to BHEL-EDN. However Bidders who do not have a local India office may also participate if they are willing to start a local Indian office for services within 30 days from the date of receipt of intent to sign MoU from BHEL, for which documentary evidence shall be furnished. Also all Prices for Services shall necessarily be quoted in INR.

3.00.00. Bid Submission:

Qualification Requirement documents in separate envelope, Techno-commercial (Un-priced) and Price Bids (Password protected) shall be submitted together latest by **18:00 hrs IST on 30th Sept 2015.**

Password for Price Bids shall be requested subsequently from technically qualified bidders. Password shall be sent through E-Mail after getting written E-Mail communication from BHEL.



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Soft signed copy of Qualification Requirements, Techno-Commercial Bids and Price Bids (Password protected) in soft copies in .pdf format shall reach the mailbox mentioned below:

- 1) nirmal@bheledn.co.in and
- 2) majakar@bheledn.co.in

NO REQUEST FOR EXTENSION SHALL BE ENTERTAINED.

Signed sealed ORIGINAL Hard copy of the Qualification Requirements, Techno-Commercial Bids and Price Bids shall be sent separately to so as to reach on or before 14:00 hrs IST on 30th September 2015 :

AGM (CE-Engg/BOP)
Bharat Heavy Electricals Ltd.
NEB 2nd Floor, Electronics Division
Mysore Road, Bangalore – 560026.
Ph. 080-26998245,

5.00.00. Bid Clarifications

Bidders seeking clarifications on the tender specification requirements shall email the same to the following on or before **18:00 hrs IST on 15th Sept 2015** to following:

- majakar@bheledn.co.in
nirmal@bheledn.co.in

Bid clarifications will be sent out to all bidders by 15:00 hrs IST on 17th Sept 2015.

7.00.00. Preparation of Bids

The Qualification requirements, Techno-Commercial (Un-priced) and Price Bids shall consist of following and the same shall be submitted together within the due date as stipulated in the tender specifications.

7.01.00 No Deviation Certificate



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Bidder shall furnish a signed soft copy of “No Deviation Certificate” on BHEL Technical specification requirements in a separate document. Non furnishing of the same shall risk in rejection of Bids.

7.01.01: Acceptance of Terms & Conditions

Bidder shall furnish a signed soft copy of BHEL’s “Terms & Conditions as in Part-III” of these specifications as an unconditional acceptance of the same.

7.01.02 Bids which do not comply with Clauses 7.01.00 and 7.01.01 shall not be considered for evaluation.

7.02.00 Techno Commercial Bid

Bidder shall furnish a responsive techno commercial bid containing the qualification requirement details along with supporting documents, data required to be filled in attachments for the techno-commercial proposal.

7.03.00 Price Bid

Bidder shall furnish the signed soft copy of the filled price schedules as per the format enclosed in the specification in .pdf format. The Price bid shall be password protected. The password shall be furnished upon request by BHEL (after technical bid evaluation) on date and time intimated by BHEL.

Bidder shall also be required to furnish signed ORIGINAL HARD COPY of No Deviation Certificate, Techno Commercial proposal (Un-priced) and Price Bid separately.

8.00.00. Bid evaluation:

8.01.00 Bidders who meet the qualification requirements as in Section-3 of EOI: - CE/Engg/SIL3_3/EOI/01 and have submitted documentary evidence in support of the same and who have submitted the signed copy of “No Deviation Certificate” as well as acceptance of Terms & Conditions shall be considered as eligible bidders and the Technical commercial bids of these Bidders shall be evaluated.

8.02.00 Clarifications if any shall be sought from Bidders on technical commercial Bid, and these clarifications shall be provided by Bidders within



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24 hours upon request from BHEL failing which Bids shall be treated as non-responsive and summarily rejected.

8.03.00 In case during the evaluation of Technical commercial Bid if any amendment is required to scope of supply and services, then the same shall be informed to eligible Bidders and Supplementary Price Bids shall be requested and the same shall be submitted by Bidders on date and time specified by BHEL-EDN.

8.04.00 Bidders whose techno-commercial bids are found to be responsive and suitable shall be requested by BHEL-EDN to submit the password for Price Bids via email.

8.05.00 Price Bids shall be opened by the committee. Bidder may depute representative for attending price Bid opening. Clarifications if any shall be sought and filed for records. The Bids shall be evaluated as per the following criteria:

8.06.00 All Prices shall be quoted in Indian Rupees (INR). Where Prices are quoted in Foreign Currency, the same will be converted to INR at SBI selling Ex Rate applicable two (2) days prior to Price Bid Opening.

8.07.00 The Total cost to BHEL-EDN shall be calculated to include basic prices, Taxes & Duties, Transit Freight & Insurance as Applicable to arrive at the “Lowest Cost to BHEL” Bid (L1). Bidder shall ascertain all applicable Taxes & Duties for inclusion in the Price Bid. Also Applicable taxes and duties as included in the Price shall be declared along with rates applicable. No other Taxes & Duties other than those declared by Bidder shall be allowed at a later date except where the Taxes & Duties undergo a change due to statutory reasons.

8.08.00 No other taxes & Duties other than declared by Bidder shall be admissible during evaluation. BHEL shall not be liable to pay any other Taxes & Duties other than those declared by the bidder in the quoted bid price.



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8.09.00 Though all item prices shall be used for evaluation, during project execution, BHEL reserves the right to order whole or part thereof and avail only certain services from Associate depending on requirement.



**TERMS AND CONDITIONS –
ASSEMBLY/MANUFACTURING OF SIL3
CERTIFIED SAFETY SYSTEM FOR THE
SAFETY FUNCTIONS OF PROCESS
INDUSTRIES WITH INTEGRATION TO BHEL**

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**TITLE: TERMS & CONDITIONS FOR ASSEMBLY/MANUFACTURING OF
SIL3 CERTIFIED SAFETY SYSTEM FOR THE SAFETY
FUNCTIONS OF PROCESS INDUSTRIES**

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TERMS AND CONDITIONS – PART III

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Terms and Conditions:

1. BHEL-EDN is not responsible for any delay in receipt of quotation sent by supplier through post/e-Mail/fax.
2. Qualification requirements shall be evaluated first and only Techno-Commercial Bids of Bidders who meet QR will be opened and further evaluated.
3. Bidder shall declare in the Techno-Commercial Bid whether the Bid is for (a) Business Sharing route or (b) Transfer of Technology route. Bids will be evaluated accordingly.
4. BHEL- EDN does not bind itself to accept the lowest rate quoted, but reserves right to accept whole or part of any quotation at its sole discretion. Quotation should remain valid for a minimum period of 180 days from the due date of Bid opening (30th Sept, 2015) and shall be further extendable depending upon requirement of BHEL - EDN, in any case not beyond 1 year from the date of Price (stage-II) Bid Opening.
Lowest quotation is determined on the basis of Total Cost to BHEL- EDN for supply & services including basic value, taxes and duties, freight, and insurance etc.
5. Successful Bidder selected to become BHEL's Associate is required to furnish an on demand bank guarantee for a value of 1% of vendor's evaluated price to BHEL-EDN, before signing MoU for BSA /TOT.
6. Non-Acceptance of conditions at Sl. No. 5 will result in rejection of the PQR and technical bid. Price bid will not be opened.
7. Successful bidder has to sign MOU with BHEL (after price evaluation). Typical format of MOU is attached as reference and the same shall be finalized after price evaluation.
8. Validity of MOU shall be at least for 180 days, BHEL and Associate will sign the MOU for Business Sharing Agreement (BSA) or Transfer of technology (ToT) as opted by the Associate. BSA shall be valid for a period of 10 years from the date of signing. If successful bidder shows interest in Technology



TERMS AND CONDITIONS – PART III

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Transfer (TOT) the same shall be discussed and finalized separately.

9. At the time of award of order, Inspection/Test Reports/Certificates, if any as per specification/enquiry requirement, shall be adhered to. If Pre-shipment inspection at supplier's works is required by BHEL, vendor shall provide any kind of necessary assistance for inspection.

10. Payment terms: As per BHEL-EDN standards. These will be mentioned in MOU with successful bidder.

11. Taxes and duties shall be as indicated in the Purchase Order of BHEL-EDN.

12. Bidder's Sales Tax/ECC/VAT Registration Number should be mentioned in the quotation.

13. Bidder shall duly submit a signed copy with company seal of these terms and conditions as an "in-to to" acceptance of the same along with the technical bid.

14. BHEL-EDN reserves the right to accept/reject bids of any Bidder and/or annul/re-float/call for snap bid the tender, in case outcome is not favorable to BHEL-EDN's techno commercial requirement.

Note: - The selected associate after price bid evaluation shall visit BHEL-EDN, Bengaluru office within a short notice of three days for price negotiation and signing of MOU along with supporting documents by authorized signatory.

DATE:

MEMORANDUM OF UNDERSTANDING (MoU)- TYPICAL
BETWEEN
BHARAT HEAVY ELECTRICALS LTD (BHEL) – ELECTRONICS DIVISION
AND
M/S. -----(Associate)

Sub: Memorandum of Understanding for BSA/TOT “For assembly/manufacturing of SIL-3 certified Safety system for the safety functions of process industries” at BHEL-EDN works.

Ref:-BHEL/EDN/MM/PR/001 dtd 09.09.2015 Sealed Tender for Expression of interest CE/Engg/SIL3_PLC/EOI/01 for mentioned subject.

- 1) Bharat Heavy Electricals Ltd – Electronics Division, Mysore Road, Bangalore-560026 having its head office at BHEL House, Siri Fort, New Delhi – 110049, is a regular supplier of Distributed Control systems (DCS). In order to augment business BHEL-EDN shall also be participating in tenders for SIL3 certified Safety systems for process industries.
- 2) BHEL-EDN proposed to select suitable Business Associate / technology provider who is a regular manufacturer of SIL3 certified safety systems and who will agree to supply the required hardware and Software to BHEL-EDN and also assemble, manufacture and test SIL3 certified safety systems at BHEL-EDN. A GLOBAL tender was floated to seek Bids from Bidders who were qualified and desirous of working with BHEL through the Business sharing / Technology transfer route. The techno-commercially best and price wise lowest bidder was identified and has been now called for signing the BSA / ToT agreement (as applicable) with BHEL valid for next 10 years from date of signing. Subsequent to signing of this MoU, the Bidder will be called as BHEL’s associate and together BHEL and Associate will submit bids jointly against Tenders in this Business segment
- 3) The following has been understood and agreed upon by both parties :
 - i. BHEL and M/s. ----- (Associate) hereby understood that M/s. ----- (Associate) shall associate with BHEL exclusively and shall not participate in tenders participated by BHEL for a project wherein BHEL make DCS and SIL-3

safety PLC or SIL-3 safety PLC alone is in the offering , the associate shall not participate in any way via parent or subsidiaries or group companies in the same tender and in services like system upgrading, project execution, AMC, spares supply and other services related to the project. As a guarantee to this agreement, M/s. ----- (Associate) shall submit to BHEL, a MoU guarantee amounting to 1% of the Associate's share either in the form of a BG.

- ii. Where the Tender condition stipulates, BHEL and M/s. ----- (Associate) shall jointly sign and submit a Deed of Joint Undertaking as per format enclosed at Annexure-1, which will be a part of the Stage-I (Techno-commercial) Bid.
- iii. In case BHEL is successful in bagging a contract, this MoU shall form the basis for working together and shall be a back to back agreement for placement of purchase order by BHEL for supply of SIL3 hardware and requisite software to BHEL for Assemble, manufacture and test SIL3 certified safety systems at BHEL-EDN works in Bengaluru and provide required associated services to BHEL as per BHEL's specification (Enclosed as Annexure--) on M/s. ----- (Associate) during project execution.
- iv. The tender conditions stipulates that the Techno-commercial Bids shall remain valid for 180 days from date of Stage-I (Techno-Commercial) Bid opening and the Price Bids shall remain Valid for 180 days from opening of Stage-II (Price) Bids. M/s. ----- (Associate) hereby agrees that the proposal submitted for qualification in BSA shall remain valid till 180 days from date of bid opening by customer and validity shall be further extended by M/s----- (Associate) as required by customer and BHEL till a confirmed Purchase order is issued by BHEL on M/s----- (Associate).
- v. Subsequent to submission of Stage-I (Techno-commercial) Bid by BHEL and M/s. ----- (Associate), customer shall evaluate the Bids and later call for submission of Stage-II (Price) Bids from qualified Bidders. At that stage the prices shall be negotiated with M/s. ----- (Associate), in order to submit most competitive Bid and bag the order.
- vi. The terms and conditions drawn during BSA/TOT which have been agreed and signed M/s. ----- (Associate) become part of this MoU and are enclosed as Annexure--.
- vii. The division of scope shall be as in BHEL's Specification enclosed at Annexure--.
- viii. The Liquidated Damages, if any, levied by customer shall be borne by BHEL and M/s. ----- (Associate) in accordance with the value of share and scope of work determined under the contract.

- ix. The General Conditions of Contract, the Special Conditions of contract and the Erection Conditions of Contract, as listed in the customer's tender documents, are enclosed as Annexure-- to this MoU and shall be adhered to by both Parties as and where applicable for respective scope of work of parties.
- x. The work schedule stipulated by customer is enclosed to this MoU as Annexure--, and BHEL and M/s. ----- (Associate) shall be jointly responsible for completion of all tasks as per the work schedule including performance guarantee.
- xi. Payment Terms of BHEL shall be as below:-

Supply portion

50% of P.O supply price component shall be paid within 60 days of date of acceptance of supplies by BHEL.

20% of P.O supply price component shall be paid within 60 days of completion of Assembly and Testing and its acceptance by BHEL

20% of P.O supply price component shall be paid within 60 days of completion of FAT at BHEL-EDN works.

10% of P.O supply price component shall be paid within 30 days of Project Completion at Site and handing over to end user.

Services portion

20% of P.O services price component shall be paid within 60 days of Completion of FAT at BHEL-EDN against BG of same value valid upto Project Completion at Site and handing over to customer.

50% of P.O services price component shall be paid within 60 days of Completion of SAT at site and acceptance of the same by end user customer, against BG of same value valid up to Project Completion at Site and handing over to customer.

Balance 30% of the P.O Services component shall be paid within 30 days of Project Completion at Site and handing over to customer.

- 4) The Warranty and Guarantee conditions of contract shall be applicable on back-to-back basis for M/s -----scope of supply.
- 5) Limitation of liability: "Subject to any other clause relating to the liability of the parties, in no event parties will be liable for any consequential damages and the aggregate liability of either of the parties under this contract / Joint bid shall in no event exceed 100% of contract value except in cases of criminal neglect or willful misconduct.
- 6) Confidentiality

Either party shall keep other party's information confidential. The information which needs to be kept confidential shall be marked as "confidential" by the

disclosing party while making disclosure. This confidentiality obligation of either party shall remain for a period of 5 years from expiry of the agreement.

7) Mutual Arbitration Clause:

Any dispute in respect of which amicable settlement has not been reached within thirty days period shall be finally and conclusively settled by arbitration in accordance with The Arbitration and Conciliation Act, 1996 and any other enactment or modification thereof for the time being in force. The following provisions shall apply to any arbitration proceedings:

- a) Each party shall appoint its own Arbitrator and bear the cost of its own Arbitrator, these two shall appoint a mutually acceptable Lead Arbitrator, whose cost shall be borne equally.
- b) The language to be used in the arbitration proceedings shall be English.
- c) The place of arbitration shall be Bengaluru.
- d) The arbitration shall be carried out in accordance with the laws of India.
- e) The award shall be final and binding.
- f) Each of the Parties shall bear their respective costs.
- g) Notwithstanding the foregoing, either Party may apply to any court of competent jurisdiction at Bengaluru for preliminary injunctive relief without breach of this arbitration provision.

In agreement to the above, this MoU has been signed as under by representatives of both BHEL and M/s ----- (Associate)

M/s----- (Associate)

BHEL

ANNEXURE-A

EOI-SIL3 PLC Price comparison table
 Conformal coating and G3 compliance

	Controller Sub-system for Process I/O:	IO COUNT	NO. OF MODULES/ITEMS	UNIT RATE	UNPRICED
1	Analog Inputs,4-20mA	128			
2	Analog Outputs,4-20mA	32			
3	Counter Inputs	16			
4	Digital Inputs with line monitoring	800			
5	Digital Inputs with out line monitoring	256			
6	Digital Outputs	416			
7	Software Points to DCS(Analog/Digital)	2500			
8	Alarm Contacts	160			
9	SER Signals(not required if 1 mili sec time stamping at module level)	160			
10	OPC/TCP/IP redundant (SIL-3 certified)	2			
11	Controller for QMR	as required			
12	controller forTMR	as required			
13	IO racks	as required			
14	Rack Power supply module	as required			
15	Interface cards (all types)	as required			
16	communication cards	as required			
17	Field termination assimbles	as required			
18	Interface cables	as required			
19	Documentation related to hardware and software like data sheets of the individual components, software library of functional blocks used in logic making etc. in soft copy and hard copy format	1 copy			
	PFC- Potential free contact				
	NIS- Non- intrinsic Safe				
	IS- Non- intrinsic Safe				

	SER- Sequence of event recorder				
	OPC-OLE for process control				
	For the above Racks,Rack Power supply,Controllers ,I/O modules and communication cards				
	Any other other required H/w like prefab cables and conectors				
	In redundant mode configuration offer to be made. Sapres shall already be considered for SI.NO 1 to 6				
20	All Mandatory Software licence covering Engg, operation,SER and Trends as a minimum	1 copy			
21	Second copy of all Mandatory Software licence covering Engg, operation,SER and Trends as a minimum	1 copy			
22	All Optional software licence (not covered in Mandatory Software)	1 copy			
23	All run time Software	1 copy			
24	Support Application Engg				
25	Support Erection supervision				
26	Support commissioning				
27	Support Factory acceptance Test				
28	Support Site acceptance				
29	Support Integrated site acceptance				
30	Support any other not covered above lumpsome basis				
31	Training at OEM works for 12 Man months (batches) during the contract period including all charges of Trainer and Training material.				
32	Training at BHEL EDN works in 4 batches each of 10 Man days lumpsome basis including all charges of Trainer and Training material.				
33	Support for SIL-3 certification of works at BHEL EDN&ESD lumsum				
34	cost of Training for safety professional and safety expert conducted by TUV per person.				

Note:-

Sl. 19 to 34 covers lumpsome including all charges with multiple visits

Prospective Bidder to Note:

The above mentioned table is for Prize comparison only. However the exact quantity per project shall be finalised during detailed engineering only. Prospective bidders to provide per module (Each types of module used in SIL PLC i.e IO cards, all types of Controllers cards,all types of Power Supply cards, communication cards, interface cards, all types of Racks, prefab cables, all types of Connectors etc), rate and associated accessories which includes mandatory and optional software license rate seperately with rate validity of 10 (TEN) years.

ANNEXURE-B

EOI-SIL3 PLC Price comparison table

G3 compliance without conformal coating

	Controller Sub-system for Process I/O:	IO COUNT	NO. OF MODULES/ITEMS	UNIT RATE	UNPRICED
1	Analog Inputs,4-20mA	128			
2	Analog Outputs,4-20mA	32			
3	Counter Inputs	16			
4	Digital Inputs with line monitoring	800			
5	Digital Inputs with out line monitoring	256			
6	Digital Outputs	416			
7	Software Points to DCS(Analog/Digital)	2500			
8	Alarm Contacts	160			
9	SER Signals(not required if 1 mili sec time stamping at module level)	160			
10	OPC/TCP/IP redundant (SIL-3 certified)	2			
11	Controller for QMR	as required			
12	controller forTMR	as required			
13	IO racks	as required			
14	Rack Power supply module	as required			
15	Interface cards (all types)	as required			
16	communication cards	as required			
17	Field termination assimbles	as required			
18	Interface cables	as required			
	PFC- Potential free contact				
	NIS- Non- intrinsic Safe				
	IS- Non- intrinsic Safe				
	SER- Sequence of event recorder				
	OPC-OLE for process control				
	For the above Racks,Rack Power supply,Controllers ,I/O modules and communication cards				
	Any other other required H/w like prefab cablesand conectors				

	In redundant mode configuration offer to be made. Sapres shall already be considered for SI.NO 1 to 6				
19	All Mandatory Software licence covering Engg, operation,SER and Trends as a minimum	1 copy			
20	Second copy of all Mandatory Software licence covering Engg, operation,SER and Trends as a minimum	1 copy			
21	All Optional software licence (not covered in Mandatory Software)	1 copy			
22	All run time Software	1 copy			
23	Support Application Engg				
24	Support Erection supervision				
25	Support commissioning				
26	Support Factory acceptance Test				
27	Support Site acceptance				
28	Support Integrated site acceptance				
29	Support any other not covered above lumpsome basis				
30	Training at OEM works for 12 Man months (batches) during the contract period including all charges of Trainer and Training material.				
31	Training at BHEL EDN works in 4 batches each of 10 Man days lumpsome basis including all charges of Trainer and Training material.				
32	Support for SIL-3 certification of works at BHEL EDN&ESD lumsum				
33	cost of Training for safety professional and safety expert conducted by TUV per person.				

Note:- SI. 19 to 33 covers lumpsome including all charges with multiple visits

Prospective Bidder to Note:

The above mentioned table is for Prize comparison only. However the exact quantity per project shall be finalised during detailed engineering only. Prospective bidders to provide per module (Each types of module used in SIL PLC i.e IO cards, all types of Controllers cards,all types of Power Supply cards, communication cards, interface cards, all types of Racks, prefab cables, all types of Connectors etc), rate and associated accessories which includes mandatory and optional software license rate seperately with rate validity of 10 (TEN) years.