



**TENDER ENQUIRY FOR OZONE GENERATION PLANT FOR 2X800 MW YERMARUS**

Date: 16.01.2015

**CORRIGENDA-1**

**Tender Enquiry no.: PE/PG/YTP/E-4700/14 Dated 29.12.2014**

<b>DUE DATE</b>
<b>22-JAN-2014</b>
<b>10.00 AM</b>

Please find attached Amendment-1 to Technical specification for subject tender enquiry.  
All other terms & conditions of NIT shall remain unchanged.

This is for your information.

With Regards,  
For & on behalf of BHEL

*Isha Rawat*  
16/01/15  
SR. ENGR/PG-II-1  
BHEL-PEM

Please reply to:

**Isha Rawat, Sr Engineer**  
**PG-II-1**

Power Project Engineering Institute Building  
HRD & ESI Complex Plot No. 25, Sector -16 A,  
BHEL-PEM, Noida-201301 (U.P.)  
Tel No. 0120-4213577, Fax: 0120-4329106



**AMENDMENT ON TECHNICAL SPECIFICATION  
FOR OZONE GENERATION PLANT**

**2X800 MW YERMARUS THERMAL POWER  
STATION**

SPECIFICATION NO.: PE-TS-362-174-14000A-A001

AMENDMENT NO # 1

REV. NO. 01

DATE: 15.01.15

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The following modifications with respect to Technical Specification for OZONE GENERATION PLANT, BHEL's Technical specification no. PE-TS-362-174-14000A-A001 REV 01 shall apply.

Bidder to note that existing clauses/page numbers as appearing in the specification stands deleted and clauses/page numbers as mentioned in "Modified to" column shall be applicable and complied by the bidder.

**MODIFIED CLAUSES/PAGE NUMBERS.**

Sl no.	Vol. No.	Section/Description	Clause no	Page no	Existing	Modified to
1.	IIB	SECTION – C3	--	79 OF 176	Page no. 79 OF 176	Refer attached Annexure – A.
2.	IIB	SECTION – D3	--	137 TO 144 OF 176	Page no. 137 TO 144 OF 176	Refer attached Annexure – B.
3.	IIB	SECTION – D3	--	146 TO 147 OF 176	Page no. 146 TO 147 OF 176	Refer attached Annexure – C.

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TITLE:

TECHNICAL SPECIFICATION FOR  
OZONE GENERATION PLANT

2X800 MW YERMARUS THERMAL POWER STATION

BHEL DOCUMENTS NO.: PE-TS-362-174-14000A-A001

VOLUME **II-B**

SECTION -C3

REV. NO. 01

DATE: 14/01/15

**SPECIFIC TECHNICAL REQUIREMENT C&I**

**ANNEXURE -A**

1. Bidder to include Field instrumentation and Field Junction Box (JB's) in his scope of supply. Field instrument specification and Data Sheet are given elsewhere in this spec.
2. In case of any discrepancy in the requirement noted by the bidder in the specification, the same will be brought to the notice of BHEL in the form of pre- bid clarification. In absence of any pre-bid clarification, the more stringent requirement as per interpretation of customer shall prevail without any commercial implication.
3. Instrument installation drawings are to be provided by bidder. All instrument fitting and erection hardware as per instrument installation diagram shall be in bidder's scope.
4. The controls for Ozone generation Plant/ Electrical breaker control shall be realized in PLC based system. PLC control system as defined in the enclosed specification and DATA Sheets shall be in bidder scope. The PLC system shall comprise of (i) PLC based local panel (ii) UPS Power supply (iii) Operator interface in the form of TFT, keyboard and OWS along with required furniture.
5. The redundant I/O's shall be provided for all Controls.
6. PLC shall have the facility to synchronize its time with BHEL supplied GPS. Necessary Hardware (IRIG-B port) for the same at PLC end to be provided by bidder.
7. Plant schematic for monitoring & operation shall be available on OWS, bidder to further submit list of important signal along with applicable schematic for monitoring in DCS.
8. All furniture (tables, chairs etc.) required for PLC operator HMI/ printer shall be in bidder's scope. Chairs shall be capable of being adjusted for height and position of backrest. The chairs shall be mounted on five castors, shall swivel and shall have arm rests. One table and chair shall be provided for each operator station and separate table for each printer. Vendor shall submit the furniture details to customer/owner for approval during detail engineering.
9. Specification for Instruments used in PID other than specified in this specification (i.e. O3 analyser, O2 purity analyser, dew point transmitter etc.) shall be evaluated during detail engineering. All Data sheets submitted by bidder are subject to customer approval.
10. Soft-link communication between PLC and DDCMIS shall be redundant Bi-directional OPC link. Bidder shall supply required hardware and software. Communication protocol between PLC end & DDCMIS shall be TCP/IP (Ethernet) and the maximum communication time for receipt of signal at DDCMIS end should not exceed 2 second. Necessary Patch Chord/ Converters, LIU at PLC end, shall be in bidder scope.
11. Bidder shall provide redundant UPS with 60 minutes Lead Acid battery backup & necessary redundant power packs for PLC panel and PC, OWS, printer etc.
12. VMS to be included in bidder's scope for HT drives, if applicable.
13. Connected data cable for PLC to remote I/O panels shall be through redundant cable/optic fibre with redundant I/O, if applicable.
14. Bidder shall include measurement and control instruments of transmitters only. No switches shall be considered. All the control measurement and analysers and interlocks shall have redundant sensors.
15. Offered Ozone PLC shall have the provision to accept metering signals (Current, Voltage, Power for all phases)/ Protection signals (Overcurrent, Earth fault, under-voltage and no voltage) from numerical relay (BHEL supply) using IEC 61850. Required hardware/software shall be in bidder's scope.
16. Two no. (02) of computer tables of 1500 mm(L)x750 mm(D)x740 mm(h), One no. (01) of printer table of 900 mm(L)x600 mm(D)x740 mm(h) along with Two no. (02) of chairs shall be in bidder's scope of supply.



**TITLE:**  
**TECHNICAL SPECIFICATION FOR  
OZONE GENERATION PLANT**  
**2X800 MW YERMARUS THERMAL POWER STATION**

BHEL DOCUMENTS NO.: PE-TS-362-174-14000A-A001

VOLUME **II-B**

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In addition to the system control, PLC shall have following provisions also:

- a) Control of Incomer and Bus-coupler breakers of ozonisation PMCC shall be provided in the PLC (2 Incomers and 1 bus-coupler): All logics shall be built in the PLC itself and necessary inputs will be provided to the PLC. Provision to be kept in the PLC for receiving such inputs for successful implementation of the logic.
- b) Metering signals (Current, Voltage, Power for all phases) : Numerical relay with metering facility is envisaged in the ozonisation PMCC. PLC shall be suitable for this information exchange between relay and PLC. Communication port of the relay shall be used for this purpose and protocol shall be IEC-61850.
- c) Protection signals (Overcurrent, Earth fault, under-voltage and no-voltage) : PLC shall be suitable for this information exchange between relay and PLC. Communication port of the relay shall be used for this purpose and protocol shall be IEC-61850.
- d) Suitable mimic shall be made in the OWS for control/metering of the PMCC as mentioned above.
- e) Metering/Protection signals will be further sent to DDCMIS via the fiber optic link envisaged between PLC & DDCMIS.
- f) Details regarding control, metering and preparation of mimic shall be finalized during detailed engineering. All control & metering shall be in line with the philosophy followed for the main plant.


Number of signals to be exchanged between PLC and switchgear shall be as listed below:

Binary inputs: around 70 nos.

Binary outputs: around 10 nos.

Analog inputs: around 25 nos.

In line with the main plant requirements wherein numerical relays with communication facility are envisaged/approved in LV & MV switchgear, LV switchgear of ozonization plant shall also have numerical relays with communication facility, which are required to be interfaced with PLC for above input/output signal exchange in soft.


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## 1. SCOPE

This specification covers the Design, Manufacture, Assembly, Inspection and Testing at manufacturer's works, proper packing and delivery to site, erection & commissioning, site acceptance test of the PLC Control & Monitoring System comprising PLC Control panel/Remote I/O panel (housing Processors, I/O cards, power supply packs etc.), Operator workstations(OWS), Printers, Annunciation system, UPS, cables and all other equipment and accessories required for completeness of the system as mentioned in different sections of this specification.

## 2. GENERAL

- 2.1. The offered PLC shall be of Industrial Grade and from Original Equipment manufacturer (OEM).
- 2.2. The PLC shall perform protection logic, interlock and sequential control functions such as binary logic operation, set/reset operation, timers, counters, logic blocks, math functions, input quality checking engineering unit conversion, Boolean functions & PID control (Analog logic function) etc.
- 2.3. The system shall be redundant in processor, power supply and communication interfaces unless otherwise specified. The control of all drives and equipment shall be effected through the keyboard/mouse / panel mounted push button / control switches as per Data sheets-A&B. The system shall include self-diagnostic features not limited to the following:-
  - Memory Faults, both PROM and EPROM
  - Processor Faults
  - Communication Faults
  - I/O interface or address faults
  - Voltage signal discrepancy on input and output
  - Power supply faults
  - Output loop check
  - Channel level diagnostics such as fault monitoring, contact bounce filtering etc.
  - Failure of main or I/O processor
- 2.4. The system shall have facility for connecting to Main Plant's Distributed control system (DCS) using hardware/software interface for two-way transfer of signals.
- 2.5. The mimic shall be displayed on the OWS screen and may also be provided on the control desk/panel (as per Datasheet).
- 2.6. In case OWS is provided, HMI functions like trends, curves, bar charts, historical storage of data, logs and reports etc. shall be provided in addition to Plant schematics. The necessary catalogue / literature elaborating the features of HMI shall be supplied along with the bid.
- 2.7. It shall be possible to use the same OWS as programming station.
- 2.8. The PLC system shall be sized to meet process/system requirements as per the approved P&IDs and Control write-up.
- 2.9. The PLC system shall be designed to ensure that no single device failure should result in failure of any other device.

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- 2.10. Signal multiplication where required shall be done in PLC. Use of relays for multiplication of contacts (for control, monitoring and alarm) is not acceptable. The control/ monitoring components on the control panel/ desk shall be driven through I/O modules.
- 2.11. Bidder shall provide all software on CDs along with required software licenses .The original CDs of installed operating & application software shall be maintained by bidder. Software modification and up gradation (as & when required) shall also be covered under the vendor scope without any cost implication.
- 2.12. PLC programming console shall be provided with industry proven antivirus software with perpetual license (free version not acceptable).

### 3. TECHNICAL REQUIREMENTS

Details of various PLC system components shall be inclusive of but not limited to the following:

#### 3.1. CODES AND STANDARDS

- 3.1.1. The equipment covered under this specification shall meet the requirements of latest edition of all applicable codes and standards like ANSI, NEMA, IEEE, IEC, NEC & IS.
- 3.1.2. PLC shall conform to IEC: 61131
- 3.1.3. The offered PLC shall comply with safety standards as per Data sheet-A&B.


#### 3.2. CONTROL PANEL

- 3.2.1. PLC control panel shall be freestanding type with provision for mimic display, push-button stations, control switches, indicating lamps, metering instruments like Indicators, ammeters etc. and facia windows for critical alarms.

- 3.2.2. The salient features of construction shall be:

Sheet material: Cold rolled sheet steel  
Frame thickness: Not less than 3.0mm  
Enclosure thickness: Not less than 2.5 mm for load bearing sections (mounted with instruments) and not less than 1.6 mm for others  
Gland plate thickness: 3.0mm  
Base channel: ISMC 100 with anti-vibration mounting & foundation bolts.

- 3.2.3. Each panel shall be identified by a name plate, which shall be of non-rusting metal or three ply lamicold, with engraved lettering.

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- 3.2.4. Vendor shall indicate earthing details along with bid.
- 3.2.5. 25 x 6 mm Copper ground bus to be provided for each panel.
- 3.2.6. 240V AC single phase, thermostatically controlled space heaters shall be provided. Each free standing panel shall have a door switch operated fluorescent lamp and a 240V AC plug point.
- 3.2.7. Painting treatment shall be as per IS: 6005. Two coats of lead oxide primer shall be followed by powder coating. Paint shade shall be as specified in the "Data sheet for PLC system"-Data Sheet-A&B. Project specific paint shade, if applicable, shall be followed.
- 3.2.8. Panel internal wiring shall be as per NEC and NEMA standard.
- 3.2.9. TB points in terminal block shall be cage clamp type/screw type.
- 3.2.10. The annunciation system shall be facia window type, driven by the PLC. Audible alarm, Acknowledge, Reset and lamp test facility shall be provided as per ISA sequence – S18.1, M.

### 3.3. PROCESSORS

- 3.3.1. The microprocessors shall be 32 bit, and Hot redundant.
- 3.3.2. Hot redundancy: PLC shall be provided with two processors (Main processing unit and memories) one for normal operation and one as hot standby. In case of failure of working processor, there shall be an appropriate alarm and simultaneously the hot standby processor shall take over the complete operation automatically. This transfer from main processor to standby processor shall be bump less and shall not cause any disturbance whatsoever. In the event of both processors failing, the system shall revert to fail safe mode. It shall be possible to keep any of the processor as master and other as standby.
- 3.3.3. An authorized forcing facility shall be provided for changing the status of inputs and outputs, timers and flags to facilitate fault finding and other testing requirements.
- 3.3.4. The standby processor shall be updated automatically in line with the changes made in the working processor.
- 3.3.5. In the event of any replacement of the processor, synchronization of the replaced processor shall be automatic upon live insertion.
- 3.3.6. The cycle time for input scanning, execution of logics, overheads and output scan shall not exceed 120 m sec.
- 3.3.7. The processor & memory shall be loaded up to 50% at normal conditions and maximum up to 60% under worst loading conditions.
- 3.3.8. The memories shall be field expandable. Memory capacity shall be sufficient for complete system operation and have a capability for at least 20% expansion in future.
- 3.3.9. Memory shall be non-volatile, preferably EEPROM type. However, in case volatile memory is provided, battery backup shall be provided for a minimum of three months to keep the stored program intact. Battery drain indication shall be provided at least 1 week before the battery gets drained and same shall be annunciated in OWS.



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### 3.4. INPUT / OUTPUT Modules

3.4.1. Input/output card assignments shall be modular i.e. no single card shall be assigned with more than one drive of a particular sub-system. The maximum number of channels per I/O module shall be as follows.

- Analog Input Module: 16
- Analog Output Module: 16
- Binary Input Module: 32
- Binary Output Module: 32
- Analog Input/output combined: 16
- Binary Input/output combined: 32

3.4.2. On line module replacement (hot swappable): All modules cards shall have quick disconnect terminations allowing for card replacement without disconnection of external wiring and without switching off the power supply.

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

3.4.4. 10% spare capacity shall be ensured in each card channel assignment. Overall minimum 20% spare channels shall be provided.


3.4.5. Output command to MCC/Switchgear shall be through coupling relays, whose mounting location shall be as per "Data sheet A & B for PLC System". In case coupling relays are located in PLC Panel, the same shall be in PLC vendor's scope of supply.

3.4.6. Status feedback from MCC shall be in the form of potential free contact.

### 3.5. DATA BUS/ I/O BUS

3.5.1. The Data bus connecting PLC and HMI work stations shall be TCP/IP on Ethernet.

3.5.2. The Data bus and I/O bus communication medium shall be twisted pair shield copper conductor for indoor locations and those areas not subjected to induced signals. Repeaters/signal amplifiers shall not be used. Copper conductor cable used shall be Category-5 or better. The communication medium shall be Fibre optic cable in the event any portion of communication cable run is in outdoor or where distances are beyond 500 meters.

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### 3.6. OPERATOR WORK STATION (OWS)

3.6.1. The OWS and Keyboard shall be desktop mounted and shall be used for controlling, monitoring and programming function.

3.6.2. Colour CRT(s) with keyboard and mouse shall be as per Data Sheet-A&B. CRT shall have graphic display facility.

3.6.3. The OWS shall be with Windows based operating system having necessary Engineering/Configuring software.

3.6.4 Specification of OWS

(a) CPU

- |                           |                                                        |
|---------------------------|--------------------------------------------------------|
| 1. Processor              | 32 Bit or better                                       |
| 2. Main Memory            | Min. 1 GB and expandable to at least 4 GB              |
| 3. Hard drive             | Min 40 GB                                              |
| 4. Floppy drive           | 3.5", 1.44 MB                                          |
| 5. Removable bulk storage | DVD (R/RW)                                             |
| 6. Graphic memory         | Min. 16 MB                                             |
| 7. Auto controller        | 16 bit or better                                       |
| 8. Operating system       | Window XP or better                                    |
| 9. Communication ports    | 2 serial, 1 parallel, 8 Nos. USB, Dual 100 MB Ethernet |
| 10. Expansion slot        | 3 Nos. or more                                         |

(b) Monitor

- |                         |                                                                 |
|-------------------------|-----------------------------------------------------------------|
| 1. Type                 | LCD colour monitor (TFT based)                                  |
| 2. Screen diagonal      | 22" (approx.) flat                                              |
| 3. Display              | XGA or better                                                   |
| 4. Degree of Protection | IP-30                                                           |
| 5. External controls    | Brightness, Contrast, Horizontal/vertical amplification & shift |
| 6. Power supply         | 240 VAC, 50 Hz, 1 phase                                         |
| 7. Version              | Industrial grade                                                |

(c) Keyboard & Mouse

- |                    |                                                       |
|--------------------|-------------------------------------------------------|
| 1. Type            | Flat spill membrane or positive depression type ASCII |
| 2. Life expectancy | 50 Million cycles per key                             |
| 3. Version         | Industrial                                            |
| 4. Mouse           | Optical                                               |

### 3.7. PRINTER

Printers shall be provided as per Data Sheet-A&B.



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**3.8. COMMUNICATION WITH PLANT DCS/ THIRD PARTY SYSTEM**

- 3.8.1. The PLC system shall be provided with hardwired/serial interface for communication with plant DCS. Hardwired outputs from PLC shall be isolated. Necessary isolators shall be part of PLC.
- 3.8.2. Serial communication to / from DCS where provided shall be engineered to ensure that signal communication time from / to DCS shall not exceed 1 seconds for control / feedback.
- 3.8.3. Serial communication to DCS shall be OPC (Data access 2.0), Ethernet based TCP/IP Protocol. Alternatively the serial communication shall be MODBUS protocol on RS 485 network.
- 3.8.4. Data transmitted from PLC to DCS shall include all information necessary for the DCS graphic displays to monitor and control the process equipment and PLC. Such data may include pertinent analog and digital status information, interlock, alarms and maintenance conditions. Data transmitted from DCS to the PLC shall include necessary signals to provide operator control interface from DCS for the process/equipment being controlled by PLC.
- 3.8.5. Bidder to include 'Light interface units, converters, Ethernet switch, accessories etc. at both ends viz PLC and DCS for connectivity to other system. The bidder's terminal point shall be Ethernet port in case of copper medium connection to DCS or LIU in case of Fiber optic medium for connectivity with plant DCS. In case distance between PLC & DCS is greater than 1.8 Km, single mode of optical fiber cable with compatible accessories shall be used. For distance less than 1.8 Km multimode optical fiber ports shall be used.


**3.9. POWER SUPPLY Scheme**

- 3.9.1. PLC Panel and I/O Cabinets: PLC system shall be provided with 2x100% UPS fed from Two Nos. redundant 415V, 3-ph feeders, as per the scheme PE-SD-999-145-001, sh-08 of 08. Each UPS shall have 30 minutes back up. Input feeder failure shall be monitored in the PLC system. Necessary redundant power pack and transformers shall be provided (in the PLC panel) to derive the power supply for control desk, PLC panel and input / output cabinets etc
- 3.9.2. Remote I/O panels: Similar power supply arrangement as for PLC panels shall be provided if it is not possible to extend the power cable form UPS of PLC panels.
- 3.9.3. Each OWS and associated HMI peripherals shall be provided with a feeder from Either one of the UPS

**4. DRAWING/DOCUMENT AND DATA TO BE FURNISHED AFTER AWARD OF THE CONTRACT:**

4.1. For Approval:

- PLC system configuration drawing along with functional write-up.
- Input/output signal list.
- BOM of PLC
- List of PLC controlled devices
- Control panel/control desk GA drawings.
- Control desk/panel component layout drawing.
- Control panel/control desk Foundation detail and cutout drawings

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- Power distribution scheme.
- Block logic diagrams/ Ladder diagram mimic.
- Annunciation list.
- PLC control room layout drawing.
- List of soft signal exchange with Plant DCS.
- List of mandatory spares.
- UPS load calculation details.
- Quality plan
- FAT
- Data Sheet-C
- CRT display
- Power supply scheme for PLC system, HMI & peripherals, Remote I/O etc.


#### 4.2. For Information:

- Cable schedule and cable interconnection drawing( in BHEL approved format)
  - Between Field and PLC
  - Between Field and MCC
  - Between MCC and PLC
- Electronic earthing requirements.
- Panel Heat dissipation data
- Product/component catalogues.
- Operation & Maintenance Manual on CDs.
- Softcopy of Final/As-built drawings on CDs.
- Calculation for Processor, Memory & Data bus loading

The above list is the minimum requirements. Additional documents/calculations required shall be finalized during contract stage.

#### 5. DRAWINGS AND DOCUMENTS TO BE SUBMITTED ALONG WITH THE BID

- Proposed PLC system configuration drawing with write-up
- Product catalogues and specifications for PLC as well as HMI application.
- Proposed power supply schemes for PLC system, peripherals, and Remote I/O panels.

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## 6. TESTING AND INSPECTION

- 6.1. The bidder shall adopt suitable quality assurance program to ensure that the equipments offered will meet the specification requirements in full.
- 6.2. BHEL's standard Quality Plan for PLC is enclosed with the specification. The bidder shall furnish his acceptance to BHEL's QP and submit the signed and stamped copy of QP along with the offer.
- 6.3. The complete PLC system, including all instrument and devices shall be subjected to standard factory tests (i.e. Type Tests and Routine Tests) as per relevant IS, NEMA, IEEE, IEC.
- 6.4. Factory Acceptance Test-FAT (Functional Tests) shall be performed prior to shipment and Owner/Purchaser shall be notified 15 days before the schedules dates of the test.
- 6.5. The certificates for following type tests, as per IEC Standard, shall be submitted: -
  - Surge protection test as per IEC-225-4
  - Dry heat test as per IEC-68-2-2
  - Damp Heat test as per IEC-68-2-3
  - Vibration Heat test as per IEC-68-2-6
  - Electrostatic discharge test as per IEC-801-2 or equivalent
  - Radio frequency Immunity test as per IEC-801-6 or equivalent
  - Electromagnetic Immunity test as per IEC-801-3 or equivalent

## 7. SPARES AND CONSUMABLES

### 7.1. Commissioning Spares and consumables

The bidder shall supply all commissioning spares and consumables 'as required' during Start-up, as part of the main equipment supply.

### 7.2. Mandatory Spares

The bidder shall offer along with main offer, the Mandatory Spares as specified elsewhere in the specification. The Mandatory Spares offered shall be of the same make and type as the main equipment.

### 7.3. Recommended Spares


The bidder shall furnish a list of Recommended Spares indicating the normal service expectancy period and frequency of replacement; quantities recommended for 3 years operation along with unit rate against each item to enable BHEL/BHEL's Customer to place a separate order later, if required.

### 7.4. Special Tools & Tackles

The bidder shall supply all Special Tools & Tackles 'as required' during Start-up and further maintenance of the system, as part of the main equipment supply.

### 7.5. Spares, Service support

Bidder shall provide availability of spares and service support for minimum 15 years after guarantee period.

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## 8. MARKING AND PACKING

### 8.1. Marking:

A stainless steel name-plate shall be permanently fixed on each equipment giving its Tag/serial Number and salient technical specification.

### 8.2. Packing:

All equipment/materials shall be suitably packed and protected for the entire period of dispatch, storage and erection against impact, abrasion, corrosion, incidental damage due to vermin, sunlight, high temperature, rain, moisture, humidity, dust, sea-water spray (where applicable) as well as rough handling and delays in transit and storage in open.

## 9. PERFORMANCE AND GUARANTEE


The PLC system shall be guaranteed to meet the performance requirement as specified and also for trouble-free continuous operation for 12 months from the date of commissioning or 18 months from the date of delivery at site whichever is later unless specified otherwise in Vol-IIB Section - B or Section - C.

## 10. APPLICABLE DATA SHEET FORMS

This document shall be read with the following data sheet forms :

- Data Sheet A & B for PLC system - PE-DC-999-145-I036-1
- Data Sheet C for PLC system - PE-DC-999-145-I036-2

FORM NO. PEM-6666-0

	<b>DATA SHEET FOR PLC SYSTEM</b>		SPECIFICATION NO.:
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	SHEET 1 OF 1		
<b>Data Sheet No.: PES-145-36-DS1-0</b>			
<b>Data Sheet A&amp;B</b>			
DATA SHEET – A (TO BE FILLED BY PURCHASER)			DATA SHEET-B (TO BE FILLED BY BIDDER)
<b>GENERAL</b>	PROJECT		
	SERVICE		
	QUANTITY	<input type="checkbox"/> UNITISED <input checked="" type="checkbox"/> COMMON	
	LOCATION	<input checked="" type="checkbox"/> INDOOR <input type="checkbox"/> OUTDOOR <input checked="" type="checkbox"/> AC <input type="checkbox"/> NON-AC*	
<b>PLC EQUIPMENT</b>	MAKE / MODEL NO.	BIDDER TO INDICATE	
	<b>PROCESSOR</b>	REDUNDANT WITH HOT STANDBY	
	DATA BUS (HMI)	<input type="checkbox"/> COPPER WIRE <input type="checkbox"/> FIBRE OPTIC	
	DATA BUS (I/O - CPU)	<input type="checkbox"/> COPPER WIRE <input type="checkbox"/> FIBRE OPTIC	
	DATA BUS (REMOTE I/O - CPU)	<input type="checkbox"/> COPPER WIRE <input type="checkbox"/> FIBRE OPTIC	
	FIELD CONTACTS INTERROGATION VOLTAGE	<input checked="" type="checkbox"/> 24 V DC <input type="checkbox"/> 48 V DC <input type="checkbox"/> 110 V AC	
	LOCATION OF COUPLING RELAYS	<input checked="" type="checkbox"/> MCC <input type="checkbox"/> PLC PANEL	
	DESKTOP OWS QUANTITY	<input type="checkbox"/> ONE <input checked="" type="checkbox"/> TWO <input type="checkbox"/> _____ <input checked="" type="checkbox"/> DESKTOP VERSION <input type="checkbox"/> SERVER VERSION <input type="checkbox"/> WORK STATION VERSION REQUIREMENT OF OWS IN CCR <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO QUANTITY _____	
	DESKTOP MONITOR TYPE	<input type="checkbox"/> 19" <input checked="" type="checkbox"/> 22"      TFT or Higher Size <input type="checkbox"/> GIU <input type="checkbox"/> OTHERS	
	PRINTER	INKJET <input type="checkbox"/> A3__NOS <input type="checkbox"/> A4__NOS LASER B/W <input type="checkbox"/> A3__NOS <input type="checkbox"/> A4__NOS COLOR INKJET <input type="checkbox"/> A3__NOS <input type="checkbox"/> A4__NOS COLOR LASER <input checked="" type="checkbox"/> A3 01 NOS <input type="checkbox"/> A4__NOS	
PROGRAMMING / CONFIGURATION FACILITY	A) <input type="checkbox"/> HAND HELD <input type="checkbox"/> LAPTOP B) ENGINEERING SOFTWARE <input checked="" type="checkbox"/> ONE OWS <input type="checkbox"/> ALL OWS <input type="checkbox"/> _____		
SAFETY STANDARD	<input type="checkbox"/> SIL-3 <input type="checkbox"/> SIL-2 <input type="checkbox"/> NIL		
	COMPUTER FURNITURE	BOQ <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO INDUSTRIAL GRADE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> START UP & COMMISSIONING	
<b>SPARE LIST</b>	SPARE LIST	<input type="checkbox"/> MANDATORY SPARE <input type="checkbox"/> RECOMMENDED	
	SPARE LIST ATTACHED	<input type="checkbox"/> YES <input type="checkbox"/> NO	
<b>REDUNDANCY</b>	CPU	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	POWER SUPPLY	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	COMMUNICATION	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	I/O CARD (For control application)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	OTHER ELECTRONICS	<input type="checkbox"/> YES <input type="checkbox"/> NO	

THIS IS A PART OF TECHNICAL SPECIFICATION FOR OZONE GENERATION PLANT  
(TECHNICAL SPECIFICATION NUMBER: PE-TS-362-174-14000A-A001 REV 01)  
Annexure -C

FORM NO. PEM-6666-0



**DATA SHEET FOR PLC SYSTEM**

SPECIFICATION NO.:	
VOLUME	II B
SECTION	D3
REV. NO. 03	DATE: 21.03.2014
SHEET 1	OF 1

Data Sheet No.: PES-145-36-DS1-0

**Data Sheet A&B**

DATA SHEET – A (TO BE FILLED BY PURCHASER)		DATA SHEET-B (TO BE FILLED BY BIDDER)
<b>No. of CHANNELS PER CARD</b>	ANALOG INPUT	<input type="checkbox"/> 8 NOs <input type="checkbox"/> 16 NOs
	ANALOG OUTPUT	<input type="checkbox"/> 8 NOs <input type="checkbox"/> 16 NOs
	BINARY INPUT	<input type="checkbox"/> 16 NOs <input type="checkbox"/> 32 NOs
	BINARY OUTPUT	<input type="checkbox"/> 16 NOs <input type="checkbox"/> 32 NOs
	RTD**	4 NOs
	THERMOCOUPLE**	8 NOs
ELECTRONIC CARD ISOLATION		<input checked="" type="checkbox"/> GALVANIC <input type="checkbox"/> OPTICAL <input type="checkbox"/> OTHER
<b>PANEL</b>	QUANTITY	BIDDER TO INDICATE
	CLASS OF PROTECTION(Refer Location of PLC)	<input type="checkbox"/> _____
	REMOTE I/O PANEL (AS REQUIRED)	<input type="checkbox"/> YES <input type="checkbox"/> NO AC REQUIREMENT <input type="checkbox"/> YES <input type="checkbox"/> NO
	COLOUR	AS PER PAINTING SCHEDULE
	BACK-UP DESK	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
	MIMIC	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, THEN <input type="checkbox"/> PANEL MOUNTED GUI <input type="checkbox"/> ACRYLIC <input checked="" type="checkbox"/> OWS
	CONTROL HARDWARE @@	<input checked="" type="checkbox"/> PB <input checked="" type="checkbox"/> INDICATORS <input checked="" type="checkbox"/> FACIAS _____ Nos. <input type="checkbox"/> OTHERS
	CONFORMAL COATING	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
<b>COMMUNICATION WITH OTHER SYSTEM</b>	HARDWIRED	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	PURPOSE	<input type="checkbox"/> CONTROL <input checked="" type="checkbox"/> MONITORING
	MEDIUM	<input type="checkbox"/> UTP <input checked="" type="checkbox"/> FIBRE OPTIC <input type="checkbox"/> OTHERS
	TIME SYNCHRONIZATION SIGNAL FORMAT	<input type="checkbox"/> PULSE <input type="checkbox"/> RS-485 <input checked="" type="checkbox"/> IRIG-B <input type="checkbox"/> NTP
	SOFTLINK §	<input type="checkbox"/> MODBUS <input checked="" type="checkbox"/> OPC for DCS connectivity & IEC-61850 for numerical relays IF MODBUS THEN <input type="checkbox"/> RS-485 <input type="checkbox"/> ETHERNET
	SERIAL LINK	<u>OPC on TCP/IP</u>
<b>POWER SUPPLY INPUT FEEDER</b>	PLC PANEL	BIDDER TO INDICATE LOAD DATA
	REMOTE I/O PANEL	BIDDER TO INDICATE LOAD DATA
<b>POWER SUPPLY</b>	SOURCE	<input checked="" type="checkbox"/> UPS(INDUSTRIAL GRADE) <input type="checkbox"/> 24V DC CHARGER
	BATTERY TYPE	<input type="checkbox"/> Ni-Cd <input checked="" type="checkbox"/> LEAD ACID <input type="checkbox"/> OTHERS
	BACK-UP TIME	<input type="checkbox"/> 30 MINS <input checked="" type="checkbox"/> 60 MINS <input type="checkbox"/> OTHERS
	BATTERY CONFIGURATION	<input type="checkbox"/> 1X100% <input checked="" type="checkbox"/> 2X100% <input type="checkbox"/> 2X50%
<b>CUSTOMER TRAINING</b>	TRAINING	<input checked="" type="checkbox"/> REQUIRED <input type="checkbox"/> NOT REQUIRED
	NO OF DAYS	03 DAYS
	LOCATION	<input type="checkbox"/> VENDOR'S WORK <input checked="" type="checkbox"/> PROJECT SITE <input type="checkbox"/> OTHERS

\*IF THE LOCATION IS INDOOR, KINDLY SPECIFY IF PLC PANEL IS PLACED IN AC OR NON-AC ENVIRONMENT.

\*\*SHALL NOT BE APPLICABLE IF TEMPERATURE TRANSMITTERS ARE ENVISAGED.

@@ AS REQUIRED DURING DETAIL ENGINEERING.

§ LIU, CONVERTER ETC. OF BOTH THE END SHALL BE IN BIDDER'S SCOPE.

THIS IS A PART OF TECHNICAL SPECIFICATION FOR OZONE GENERATION PLANT  
(TECHNICAL SPECIFICATION NUMBER: PE-TS-362-174-14000A-A001 REV 01)  
Annexure -C

FORM NO. PEM-6666-0



**DATA SHEET FOR PLC SYSTEM**


SPECIFICATION NO.:	
VOLUME	II B
SECTION	D3
REV. NO. 03	DATE: 21.03.2014
SHEET 1	OF 1

Data Sheet No.: PES-145-36-DS2-0

DATA SHEET - C  
(TO BE FILLED BY BIDDER AFTER AWARD OF CONTRACT)

<b>GENERAL</b>	PROJECT	
	SERVICE	
	QUANTITY	
	LOCATION	
<b>PLC EQUIPMENT</b>	MAKE / MODEL NO.	
	<b>PROCESSOR</b>	
	DATA BUS (HMI)	
	DATA BUS (I/O - CPU)	
	DATA BUS (REMOTE I/O - CPU)	
	FIELD CONTACTS INTERROGATION VOLTAGE	
	LOCATION OF COUPLING RELAYS	
	DESKTOP OWS QUANTITY	
	DESKTOP MONITOR TYPE	
	PRINTER	
	PROGRAMMING / CONFIGURATION FACILITY	
	SAFETY STANDARD	
	COMPUTER FURNITURE	
<b>SPARE LIST</b>	SPARE LIST	
	SPARE LIST ATTACHED	
<b>REDUNDANCY</b>	CPU	
	POWER SUPPLY	
	COMMUNICATION	
	I/O CARD	
	OTHER ELECTRONICS	
<b>No. of CHANNELS PER CARD</b>	ANALOG INPUT	
	ANALOG OUTPUT	
	BINARY INPUT	
	BINARY OUTPUT	
	RTD**	
	THERMOCOUPLE**	
	ELECTRONIC CARD ISOLATION	
<b>PANEL</b>	QUANTITY	
	CLASS OF PROTECTION(Refer Location of PLC)	
	REMOTE I/O PANEL	

FORM NO. PEM-6666-0

	<b><u>DATA SHEET FOR PLC SYSTEM</u></b>	SPECIFICATION NO.:			
		VOLUME	II B		
		SECTION	D3		
		REV. NO.	03	DATE:	21.03.2014
		SHEET	1	OF	1

Data Sheet No.: PES-145-36-DS2-0

DATA SHEET - C  
 (TO BE FILLED BY BIDDER AFTER AWARD OF CONTRACT)

	COLOUR	
	BACK-UP DESK	
	MIMIC	
	CONTROL HARDWARE	
	CONFORMAL COATING	
COMMUNICATION WITH OTHER SYSTEM	HARDWIRED	
	PURPOSE	
	MEDIUM	
	TIME SYNCRONIZATION SIGNAL FORMAT	
	SOFTLINK	
	SERIAL LINK	
POWER SUPPLY INPUT FEEDER	PLC PANEL	
	REMOTE I/O PANEL	
POWER SUPPLY	SOURCE	
	BATTERY TYPE	
	BACK-UP TIME	
	BATTERY CONFIGURATION	
CUSTOMER TRAINING	TRAINING	
	NO OF DAYS	
	LOCATION	

\*IF THE LOCATION IS INDOOR,KINDLY SPECIFY IF PLC PANEL IS PLACED IN AC OR NON-AC ENVIRONMENT.

\*\*SHALL NOT BE APPLICABLE IF TEMPERATURE TRANSMITTERS ARE ENVISAGED.