

**INSTITUTE FOR PLASMA RESEARCH
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CORRIGENDUM No.1 DATED 6-7-2020

**TENDER NO. IPR/TN/PUR/TPT/ET/20-21/1 DATED 1-6-2020
FOR DESIGN, SUPPLY, FABRICATION, INSTALLATION,
TESTING, AND COMMISSIONING OF COOLING WATER SYSTEM
FOR NEW LABORATORIES AT IPR CAMPUS, AHMEDABAD AS
PER THE SPECIFICATIONS MENTIONED IN THE TENDER
DOCUMENTS**

Based on the Pre-Bid meeting held on 2nd July, 2020 the following documents are uploaded in tender portal.

- 1) Pre_bid_meeting_Agenda_Guidelines_020720.pdf
- 2) CWS_project_brief_introduction_dkg.pdf
- 3) CWS_Electrical_system_v10_DP_020720.pdf
- 4) CWS_InC_and_DAC.pdf

The closing of Bid Clarification End Date of above tender is also hereby extended upto 17.00 hrs. on 9-7-2020.

All other details mentioned in the Tender documents will remain unchanged.





Design, Supply, Fabrication, Installation, Testing,
and Commissioning of Cooling Water System for
New Laboratories” at IPR campus, Ahmedabad

Pre Bid Meeting Prebid Meeting

for Tender No: IPR/TN/PUR/TPT/ET/20-21/1

02/07/2020



AGENDA of meeting

Date: 2nd July 2020

Time: 10:30 am to 01:00 pm

Venue: Board Room, IPR

Meeting Chairperson: Mr. Rajendra Kumar
Coordinator : Mr. Dinesh Gupta

Participants: In-person and through Video Conference

Time	Topic	Presenter
10:30 to 10:40	Welcome and Introduction	Mr. Rajendra Kumar
10:40 to 11:00	Overview of CWS and mechanical system	Mr. Dinesh Gupta
11:00 to 11:10	Electrical System	Mr. Deepak Parmar
11:10 to 11:20	I&C and DAC system	Mr. Deepak Mange
11:20 to 12:55	Questions & Clarifications	Contractors & IPR Representatives
12:55 to 13:00	Concluding Remarks	Mr. Rajendra Kumar



Guidelines for Video Conference Meeting (VCM)

(Pre-bid Meeting; Dated: 02/07/2020)

1. After introduction to the VCM, all participants (except the people involved in discussion) are requested to mute your microphone, to avoid any cross talk and noise during the discussions.
2. After introduction to the VCM, all participants are requested to turn off your video camera to save band width and to have good network connectivity throughout the meeting.
3. Initially, as per the agenda IPR representatives will complete all their presentations without any interruptions / questions from the participants. Separate time has been allotted for questions/clarifications and queries.



Guidelines for Video Conference Meeting (VCM)

4. **Each Vendor/Contractor will be given maximum 10 minutes for their queries and discussion.** Kindly avoid the questions that are already answered through some other discussion. The sequence will be followed based on the alphabetical order as per the instructions from the Chairperson, Tender Pre-bid meeting, IPR.
5. Each participating vendor is requested to nominate one representative from your participating team (if more than one person participating) to raise the queries to IPR during the VCM.
6. Due to shortage of time and technical limitations in conducting VCM, all queries may not be responded immediately, therefore, you are requested **to upload your remaining queries in the website online before 6th July 2020 before 5.00 PM.** IPR will upload the responses to the received queries on or before 14th July 2020, 5.00 PM.
7. All participants are requested to strictly follow the above guidelines



**Design, Supply, Fabrication, Installation, Testing,
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02/07/2020



CWS for New Laboratories project

- Introduction
- CWS scheme
- Design aspects
- Execution plan
- Procurement
- Bidding stages and path forward



Introduction

- ❖ Institute for Plasma Research (IPR) is an internationally renowned research institute under the Department of Atomic Energy, GOI
- ❖ Cooling Water System (CWS) for various experimental set ups in ITER India Lab building such as ICRH, ECRH, DNB and other systems of IPR for testing of various components.
- ❖ Some of the testing components are critical components on the basis of very stringent water quality i.e. low dissolved oxygen and very low ionic conductivity for which Water Polishing Unit (WPU) shall be installed. Please note that WPU is not in the scope of this contract.



Introduction

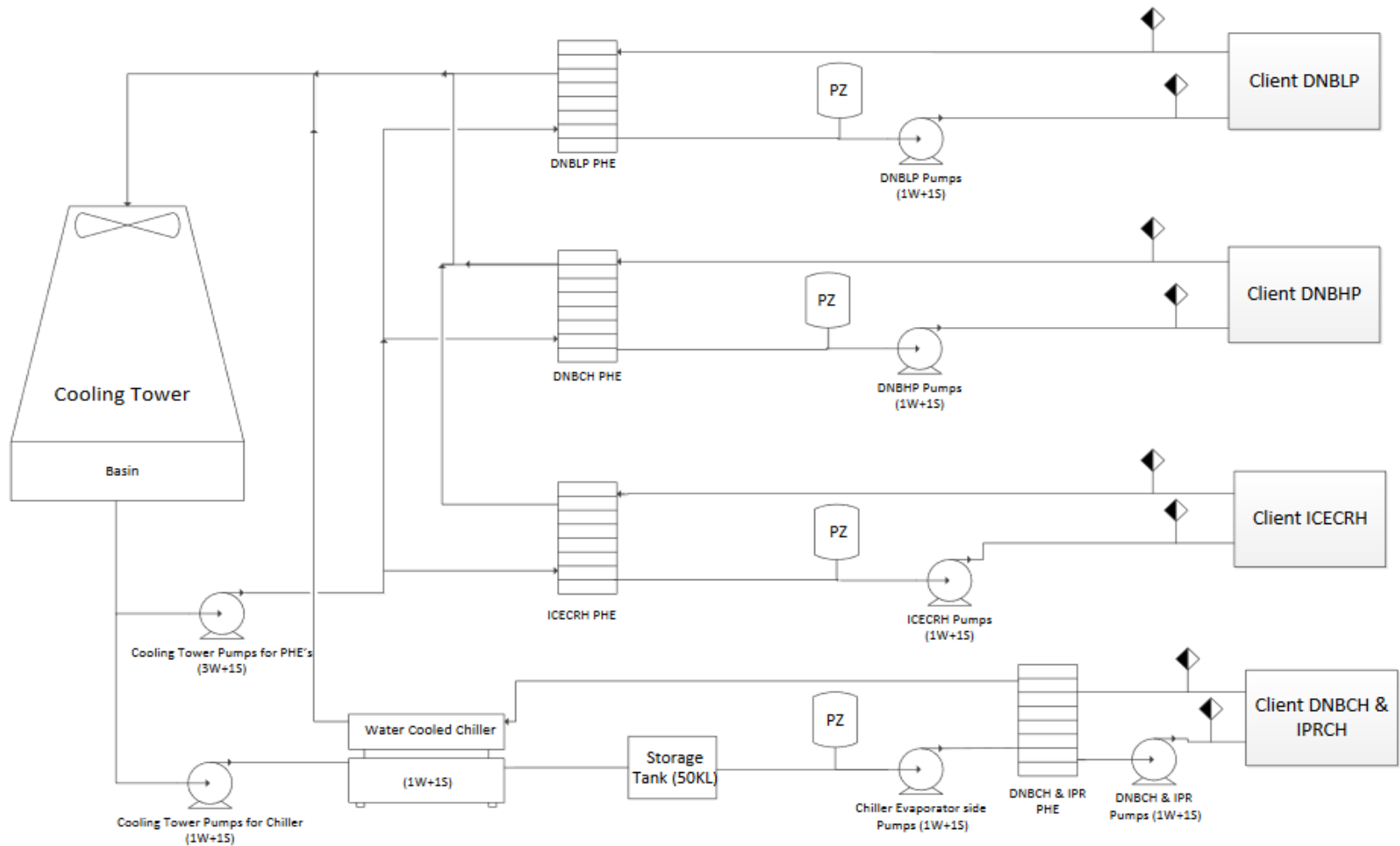
On this basis of requirement received from various users, Overall Cooling Water System(CWS) is composed of seven loops as under:

1. ICECRH Loop
2. DNBHP Loop
3. DNBLP Loop
4. DNBCH Loop
5. IPRCH Loop
6. CHILLER Loop
7. HRS Loop



CWS scheme

Cooling Water System at IPR New Laboratory building





Design Aspects

Following criteria to consider for design:

- ✓ CWS is designed to cater requirement of various users
- ✓ Operation campaign , average heat load based on ramp up heating
- ✓ System operating pressure and temperature
- ✓ Water chemistry requirement
- ✓ Space reservation and available inside Lab
- ✓ Space available for Plant room
- ✓ Quality and Engineering standards
- ✓ Stress analysis for the portion of piping passing on pipe racks (crossing road) including support qualification
- ✓ Operation and Maintenance requirement
- ✓ Installation and execution best engineering and industrial practices
- ✓ Equipment and system performance and acceptance at Factory
- ✓ Integrated testing and commissioning



Major documents List

1	Quality Plan
2	Detailed Schedule of Project Execution.
3	Revised PFDs, P&IDs, Design reports of process flow calculations and integrated stress analysis
4	2D CAD isometric/GA drawings of cooling water distribution network
5	SLD of electrical line distribution for all instrumentations.
6	Bill of materials, tools and Equipment required for fabrication of entire CWS work.
7	Technical Compliance report along with makes for the items under scope of supply as per relevant annexure
8	Manufacturing and Inspection Plan (MIP)
9	Test Certificates/ Calibration Certificates/ Manufacturer's Warranty of all supplied equipment/components/instruments and controls/materials etc.)
10	Weld plan, WPS, WPQR, and Welder Qualification Record.
11	As built isometric & GA Drawings after commissioning.
12	Operation and maintenance Manual



Major Equipment/items deliverables

- 1) Cooling Tower - **Multicell**, FRP body and basin, **305kg/sec (lit/sec) Flow, (44-32)deg C- in/out** . CT shall be supported on RCC beam/column structure (**all civil work related to CT is in the scope of tender**)
- 2) Screw Chiller (Water cooled)- **300 TR, 2 nos.** 134a refrigerant
- 3) PHEs-5 nos (9 MWx1no + 2MWx2nos. +1MWx2nos)
- 4) Centrifugal Pumps of various flow/ pressure-
 - a) All pumps of Primary cooling loops namely, ICECRH, DNBHP, DNBLP, DNBCH, IPRCH shall be equipped with Variable Frequency Drive (VFD) suitable to respective pump set- total 10 nos
 - b) Other 8 pumps in chiller and condenser and CT loop
 - c) Drain pumps
- 5) Pressurizers- **MoC-SS and CS** , 1CuM capacity each
- 6) Chilled water storage tank- **MoC-CS, 50 Cu.M capacity**



Major Equipment/items deliverables

- 7) **SS piping** (\emptyset 25 to \emptyset 400mm) and **CS piping** (\emptyset 25 to \emptyset 600mm) with fittings (**as per PMS**) strainers, supports, structure, insulation, painting etc.
- 8) Valves (\emptyset 40 to \emptyset 500mm), MoC- **SS and CS-** type:- Butterfly, Gate, Globe, check, pressure reducing, ball valves in **Class-150 and Class-300,**
- 9) Few control valves with actuators
- 10) Pressure relief valves
- 11) Non metallic bellows



Major Electrical, I&C and DACs Deliverables

Electrical:

- 1) Motors for Pump : 3 \emptyset induction , various range (min 22kW to min 200kW)
- 2) VFDs for Primary circuit Cooling Pumps (ICECRH, DNBHP, DNBLP, DNBCH, IPRCH)
- 3) Motor Control Center (MCC)- incomer feeder-3200 Amps/3 \emptyset /ACB, Outgoing Feeders- 38 nos(tentative), internally wired, earthing etc.
- 4) Local Push Button stations, Power Cabling, earthing

Instrumentation and Controls:

- 1) Gauges: Pressure, temp, Level
- 2) Transmitters: Pressure, temp, Flow, level
- 3) Analysers: pH, DO, Conductivity
- 4) I&C wiring and tubing



Major Electrical, I&C and DACs Deliverables

Data Acquisition and Control System (DACs):

Total work stations- **2 nos**

a) Hardware:

- A Standalone, expandable, programmable centralized plant controller which can handle all I/Os of all cooling loops
- PC units at both work stations as per technical specification

b) Software:

- Software features technical specific. mimic display with status of required process parameters, programming and logging of control parameters, history recording, annunciation, pass word protection for system, reset and reprogramming etc., including the open communication port (RS 232 / 485) for integration to main IICWS control room system with 8 nos licensed copies
- I/O List shall be worked out during final phase of design. Tentative list of instruments are as per SOQ



Some Clarifications

- The quantities indicated in the BOQ are tentative and final quantity for each items shall be arrived during final phase of design. The measurement and payment shall be based on actual installed quantity and approved by IPR.
- The quantity of equipment such as CT, Chiller, PHE, Pumps with motor, VFD, Pressurizer etc. are not likely to change.
- All civil work as per technical specification and SOQ shall be carried by the contractor under scope of this tender.
- The contractor has to provide the summarized schedule in excel or in any recommended software like primavera.
- If the make is not available for certain items/consultancy/software in the tender, the contractor shall propose names of Manufacturer/consultancy firms and we will finalize with mutual agreement.
- IPR shall provide free power and water for the testing and commissioning of CWS. Power and water for installation/construction/fabrication shall be chargeable.
- Detailed drawings and other inputs as applicable shall be provided during final phase of design.



Execution Plan

1. Submission of bids
2. Technical bid opening and clarifications seeking from the bidder
3. Price bid opening who qualified the EEC and submitted complete technical bid
4. Price bid comparison and Issue Lol/ PO to the successful bidder
5. Kick off meeting with successful bidder(now here refer as contractor)
6. Providing input drawings/technical inputs to the contractor
7. Carry out detailed engineering of CWS and submit engineering drawings/analysis/technical specs/data sheet, quality plan, Manufacturing drawings etc and getting approval on the system design documents from the IPR
8. Providing execution plan/detailed schedule of the project indicating the suppliers of each equipment/items



Contd..

10. Identification of long lead items, Placing order for equipment/ items from the list of makes
11. Delivery of piping materials at site, finalizing fabrication team and obtaining necessary approvals for manpower
12. Start fabrication work
13. Commencing RCC work for Cooling Tower and foundations of Equipment at site
14. Factory acceptance test of Equipment/items as per tender specs
15. Delivery of Equipment/ mechanical, electrical , I&C and DACs other items at site, unloading and safe storage at site
16. Complete installation of Equipment/ electrical/I&C/DACs including piping, cabling and earthing etc at site
17. Pre-commissioning, testing , integrated commissioning at site



Execution Plan

Quality aspects:

1. Quality Plan
2. Weld Plan (WP), Welding Procedure specification (WPS), Welding Procedure Qualification Record (WPQR), Manufacturing Inspection Plan (MIP), Piping and fabrication work as per code and standard, good industrial engineering practices
3. Civil work like RCC for CT, foundation for equipment and make/finish of openings for pipe/cable tray etc. shall be as per good industrial engineering practices
4. All Equipment/items from the list of make available in the tender
5. Test Certificates/ Calibration Certificates/ Manufacturer's Warranty of all supplied equipment/components/
6. Factory & Site Acceptance Test
7. Operation and maintenance manual of complete system
8. Training to our O&M staff



Procurement

➤ **Payment terms:**

As per Tender terms and conditions

➤ **Place of Delivery:** IPR, Bhat (Gandhinagar , Gujarat)

➤ Factory Loading, surface transportation, unloading at site, safe storage, internal shifting from one location to other inside IPR campus, insurance etc. shall be in the scope of contractor

➤ **Project Completion:** 24 months from the date of Lol

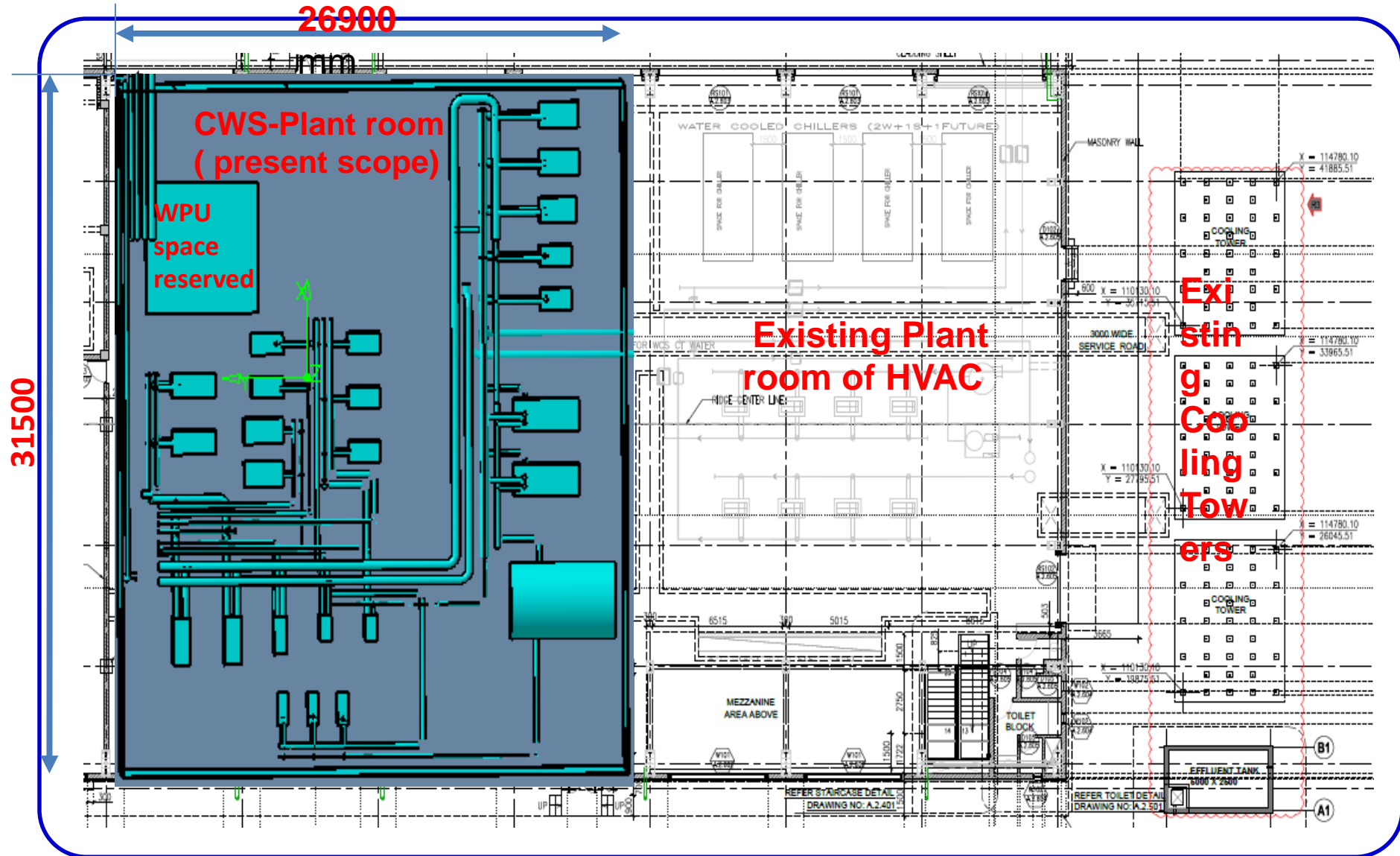


Path forward

- ✓ Site Visit – last date- 26thJune'2020
- ✓ Pre bid meeting- 02nd July'2020
- Last date for online submission of bid- 05/08/2020 at 13:00 hrs.
- Date of online opening – Technical bid (Part-1)- 05/08/2020 at 14:30 hrs.
- Review of received Technical bids and seeking clarifications from the bidders
- Opening of commercial bids

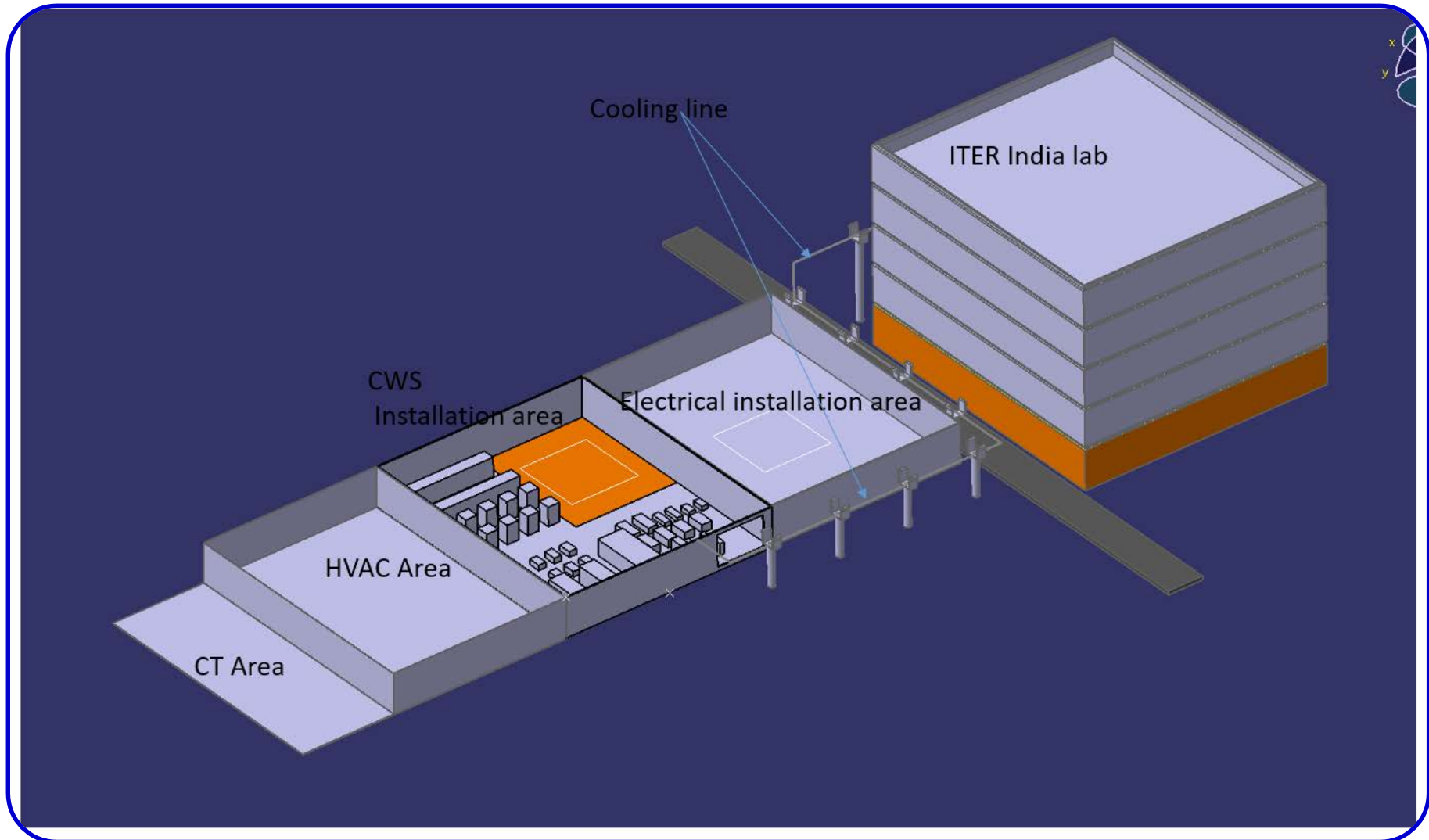


Plant Room space for CWS project



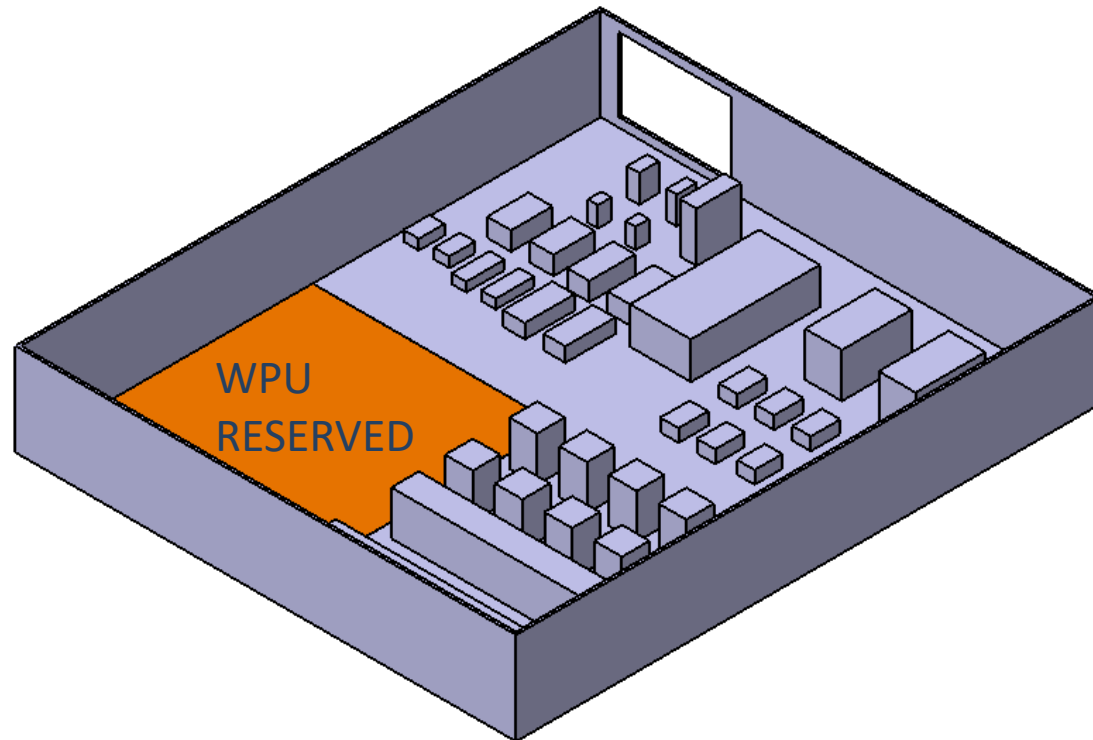


Pictorial view-CWS area





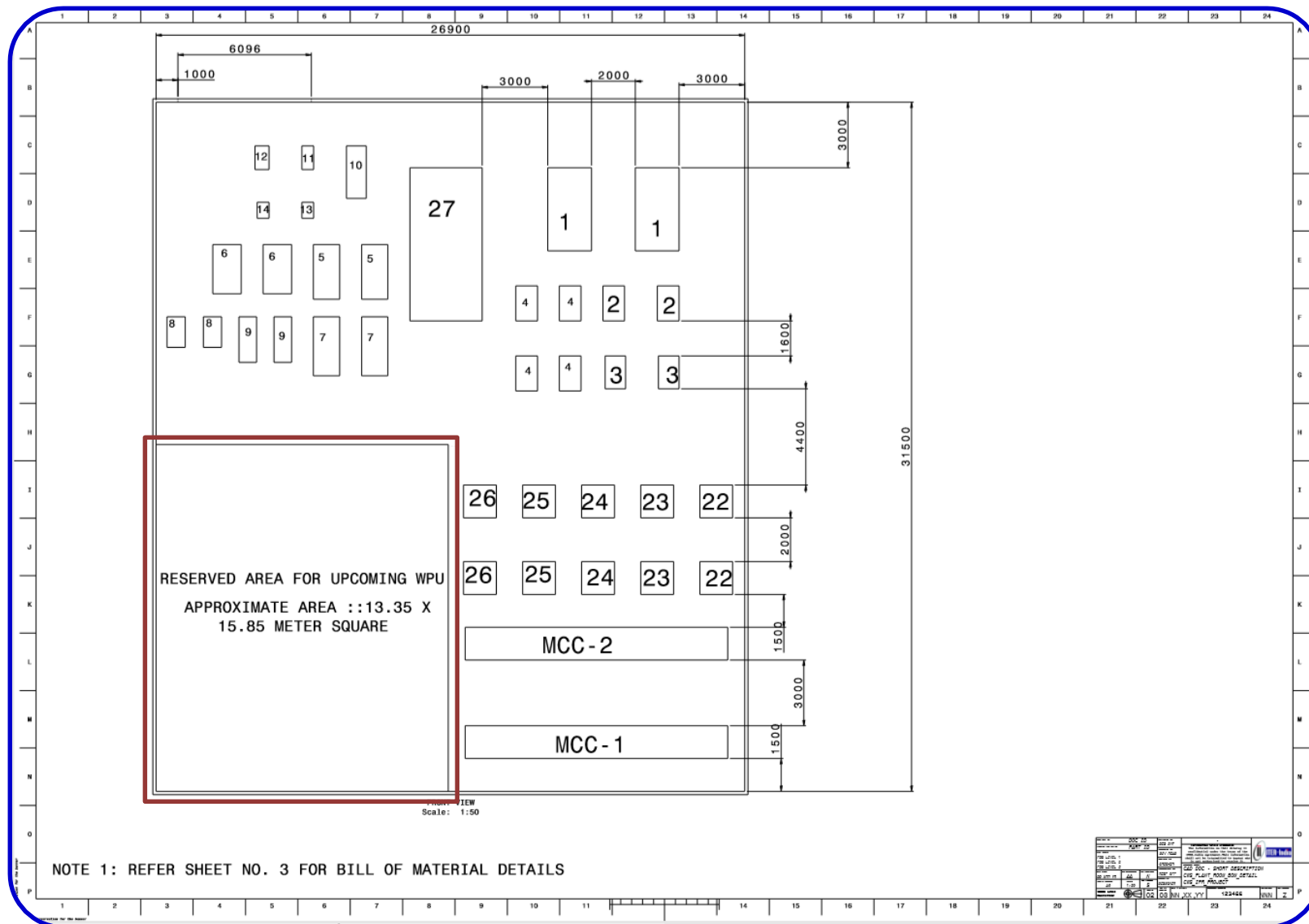
Plant room- tentative layout



Isometric view for Plant room Part 2 CWS Project



Plant room- tentative layout



Note: sheet no. 3 is on next slide



Cooling Tower area proposed





CWS- Prebid Meeting





CWS : Electrical System



Outline

- *Overview*
- *Electrical Motors*
- *Variable Frequency Drives*
- *Electrical Panels*
- *Single Line Diagram*
- *Cables and Cable Laying*



Electrical System: Overview

- *For Cooling water system implementation, IPR has specified various technical requirement and specification of the Electrical Items in Tender documents (Annexure : 6). The quantities are given in Sec. 7 (Schedule of Quantities)*
- *The scope of the supplier is the design, supply, erection, installation, testing and commissioning of Electrical Items conforming to IPR Specifications and as per system design requirements.*



Electrical Motors: Overview

- *Three phase squirrel cage induction motors*
- *Operating on variable voltage, variable frequency source*
- *The ac motors shall be selected suitably as per system requirement and compatible with pumps/fans.*
- *High energy efficient motor.*
- *All pumps of Primary cooling loops namely, ICECRH, DNBHP, DNBLP, DNBCH, IPRCH shall be equipped with Variable Frequency Drive (VFD) suitable to respective pump set.*



Electrical Motors: Overview

- *Selection of Motors as per system requirement*
- *Supply of Electrical Motors as per Section 3.3.1*
- *Loading/Unloading, Packaging and Shipping as per Section 3.3.1.8*
- *Erection and Installation at the Site*
- *Inspection, Testing and Commissioning as per the system requirements.*



Electrical Motors: Tests

Routine Tests

(on all motors)

- *IR test of winding before and after HV test*
- *HV test*
- *Winding resistance measurement*
- *IR, HV, IR on space heaters and winding RTDs*
- *Phase sequence and direction of rotation*
- *Locked rotor test*
- *Reduced voltage running test on no load*
- *No load test and bearing temperature*
- *Noise level on no load*
- *Vibration on no load*
- *Functional checks on all accessories and auxiliaries*
- *Terminal marking and rating plates details*
- *Overspeed test at 120% of rated speed for 2 minutes*

Type Tests

(One motor of same type and same rating)

- *Current balance test at no load*
- *Polarization index test*
- *Temperature rise test at full load at 90% rated voltage and rated frequency*
- *Load test and derivation of performance data corresponding to 25%, 50%, 75% and 100% load at rated voltage*
- *Test for degree of protection by enclosure of motor and terminal boxes*
- *Momentary overload test*
- *Operation of motor at full load at 80% of rated voltage for 10 minutes and at 70% of rated voltage for 10 secs*



VFDs : Overview

- *Design, Selection and Supply of VFDs as per system requirement and shall conform as per Section 3.3.2*
- *Loading/Unloading, Packaging and Shipping as per Section 3.3.2.10*
- *Erection and Installation at the Site as per Section 3.3.2.11*
- *Inspection, Testing and Commissioning as per Section 3.3.2.12*
- *VFDs shall be compatible with AC motor of pump set as per the system requirement of ICECRH, DNBHP, DNBLP, DNBCH and IPRCH cooling loops.*
- *Clean Power voltage source, advanced Pulse-Width Modulated, space vector technology motor controller which utilizes the latest IGBT technology and surface mount construction to afford efficient use of available space, prudent energy consumption and reliability.*
- *Power factor of 0.95 or better, at all speeds without external correction capacitors*



VFDs: QA and Testing

Quality Assurance & Factory Tests

- *Power transistors, SCR's and diodes shall be tested to ensure correct function and highest reliability.*
- *Every Variable Frequency Drive will be functionally tested with a motor to ensure that if the VFD is started up according to the Instruction & Operations Manual provided, the unit will function properly as intended.*
- *The VFD systems shall be fabricated by the same VFD manufacturer, to assure a properly coordinated system. VFD systems must not be fabricated in whole or in part by parties other than the VFD manufacturer. Third party distributor or package modifications to a standard product will not be allowed.*
- *VFD shall utilize a field proven design. The VFD manufacturer shall demonstrate at least 5 years of continuous field operating experience with equipment of similar size and design.*

- *General inspection*
- *Insulation Resistance Test (before and after HV test)*
- *Checking of the auxiliary devices and their functioning (as per internal test procedure of contractor)*
- *Checking of the setting of the protection devices and their functioning (as per internal test procedure of contractor)*
- *Speed variation test (within operating range)*
- *V/F Test*
- *Output Current and voltage waveform*
- *Checking of the control and wiring diagram*
- *High voltage test*
- *General operational test*
- *Checking interface of control circuits & signals*
- *Power factor measurement*
- *Audible noise*

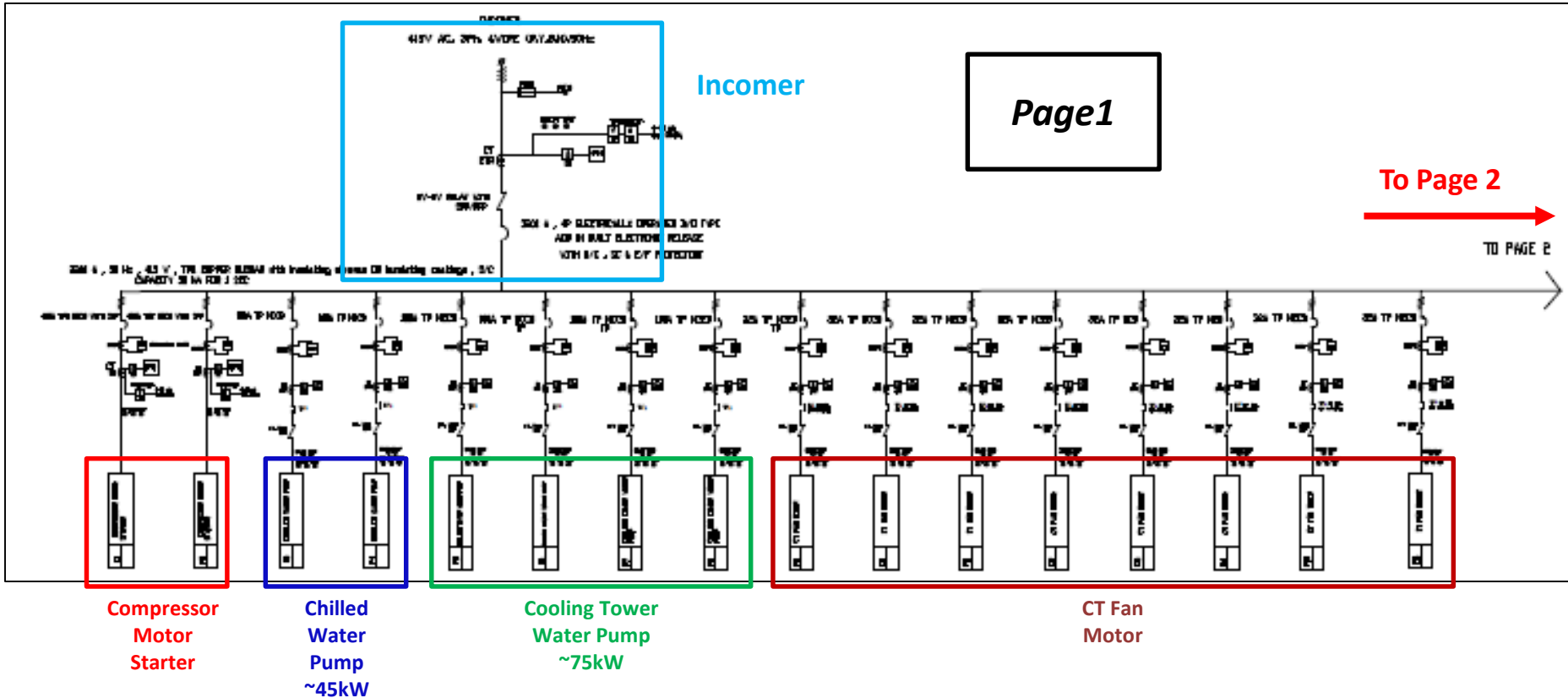


Electrical Panels : Overview

- *Fabrication and supply of electrical panels*
- *Erection, Testing and commissioning of electric panels, control panels, cabling, wiring.*
- *Earthing of all equipment, components and accessories that is in the scope of the tender of CWS.*
- *SLD provided by IPR shall be indicative and contractor shall develop and finalized SLD as per the requirement of system during final design phase.*
- *Current density for Busbar: Cu should not exceed 1.6 A/sq.mm.*



Electrical Panels : Tentative Proposed SLD

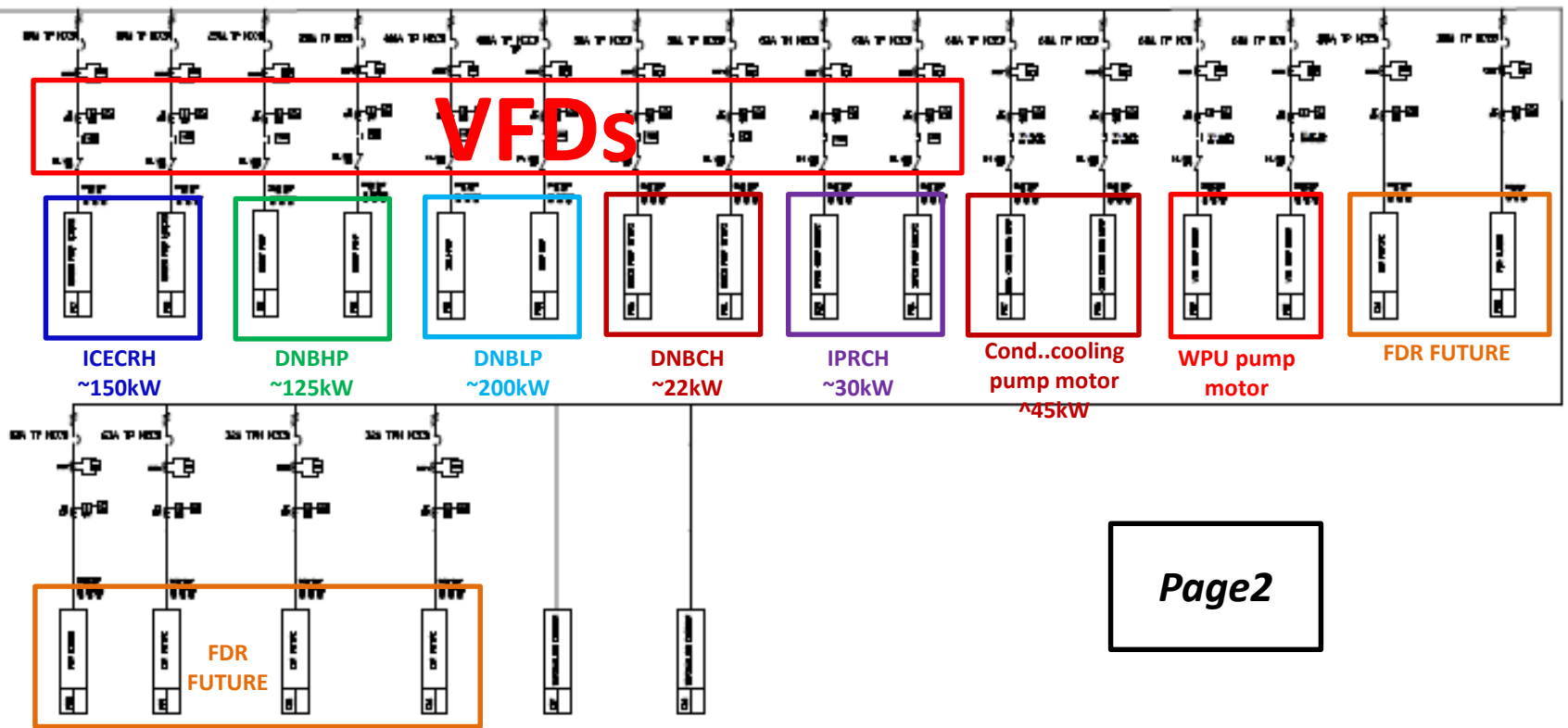
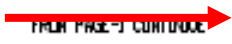


Refer SOQ for ratings.



Electrical Panels : Tentative Proposed SLD

From Page 1



Refer SOQ for ratings.



Electrical Panels : Testing

- *General inspection and dimensions check*
- *IR test before and after HV test*
- *HV test*
- *Overall functional test*



Cable and Cable Laying : Overview

- ***Supply of XLPE Power Cables as per 3.3.3.3.20 and 3.3.3.5.1***
- ***Supply of PVC Control wiring as per 3.3.3.3.20***
- ***Supply of GI and perforated Cable trays as per Schedule of Quantity (SOQ) in Section 7***
- ***Laying, termination, testing and commissioning of the XPLE 1100V grade FRLS cables as per SOQ.***
- ***Installation of cable trays as per SOQ.***



Tentative Cable Sizing as per 3.3.3.5.1

Sr. No.	Motors Rating	Power Wiring / Cables Sizes
1.	Up to 5 HP motors/ 5 kW heaters	3C x 4 sq.mm copper conductor wires / armoured cables
1.	From 6 HP to 7.5 HP motors / 6 kW to 7.5 kW heaters	3C x 6 sq.mm copper conductor wires / armoured cables
1.	10 HP to 15 HP motors	3C x 6 sq.mm copper conductor armoured cables
1.	20 HP to 25 HP motors	3C x 10 sq.mm copper conductor armoured cables
1.	30 HP to 35 HP motors	3C x 16 sq.mm copper conductor armoured cables
1.	40 HP motors	3.5C x 25 sq.mm aluminum conductor armoured cables
1.	50 HP motors	3.5C x 35 sq. mm. aluminium conductor armoured cables
1.	60 HP to 75 HP motors	3.5C x 70 sq.mm aluminum conductor armoured cables
1.	100 HP motors	3.5C x 150 sq.mm aluminum conductor armoured cables
1.	150 HP to 225 HP motor	3.5C x 240 sq.mm aluminum conductor armoured cables
1.	250 HP to 300 HP motor	3.5C x 400 sq.mm aluminum conductor armoured cables





CWS : I&C and Data Acquisition



Outline

- *Introduction*
- *Overview of Instruments*
- *Control & DAQ Functions*
- *Features of Control system*
- *Logic Development*
- *SCADA requirement*
- *Hardware and Field Interfaces*
- *Schedule of Quantities*
- *PFDs and PIDs*



Introduction

- For Cooling water system implementation at IPR, **Centrally operated Instrumentation Control and Data acquisition system** is envisaged for the operation of CWS.
- Various kinds of Instruments, in various quantities, are to be used to measure pressure, Temperature, Flowrate, Conductivity , Dissolved Oxygen, pH, water level etc. at various points of CWS.
- IPR has specified various technical requirement and specification of the Control and Data acquisition system in Tender documents (Annexure : 6). The quantities are given in Sec. 7 (Schedule of Quantities)
- The scope of the supplier is the supply, erection, installation, testing and commissioning of automatic controls and instruments conforming to ITER-India Specifications.



Overview of Instruments

- The **Pressure gauges** and **pressure transmitter** are to be used to measure pressure at various points in CWS.
- The **Temperature gauges** and **Temperature sensor cum transmitter** are to be used to measure temperature at various points in CWS.
- **Vortex type flow transmitter** are used to measure flowrate in various points in CWS.
- The **Conductivity meter**, **DO meter**, **pH analyzer** and **Level transmitter** are to be used to measure Conductivity , Dissolved Oxygen, pH, and water level respectively at various points of CWS.
- **Flow switches** shall be used to **allow/cut off** water flow at condensing water outlet and chiller water outlet.
- The **Variable frequency drives(VFDs)** shall be used to control all the **pumps and motors** under commands of central control system.



Data Acquisition and Control Functions

The main functions are :

- Control & Maintain specified Temperature, Flow, Pressure , Conductivity and dissolved oxygen of the water entering into various loops (Ref . Section 3.5.1.1) as different loops have different control requirement of Temperature, Conductivity and dissolved oxygen level.
- Monitor continuously Temperature, Flow, Pressure , Conductivity and dissolved oxygen, status of pumps and VFD, incoming AC Breakers etc.
- For this purpose, the **PLC based control and DAQ system** is planned.
- It shall have central **PLC Controller**, with **field modules** to connect to various field signals, **desktop computer** to program the PLC and **server computer to run SCADA tools to operate CWS.**



Logic Development

- The complete PLC Logic development for control and DAQ is in the scope of supplier in order to operate CWS safely and reliably
- The necessary logic functions are to be implemented in PLC system using PLC's application development software.
- The logic functions include ON/Off control, PID Control, interlock function, safety functions, etc.
- This logic development is one time activity and is less likely to be modified during the operation of CWS.
- The software development should follow standard software practices and should be of high reliability and repeatability.



Features of Control System

- State-of-the-art technology
- High level of reliability and availability
- Higher Modularity and Expandability
- Multi-platform support.
- Multi-user support.
- High speed data transfers.
- Multi-vendor Networking.
- On-line bi-directional Relational Database support.
- Scalable Application.
- Flexible system integration.
- Client/ Server architecture support.



SCADA

- A SCADA Configuration package shall be provided by the contractor for the development of **Operator Interface, Alarm configuration and data archiving configuration** etc.
- SCADA Runtime software should allow an operator to make set point changes on PLC controllers, usually **to control, monitor alarms, to analyses or report industrial automation applications using HMI.**
- With SCADA, user should be able to collect data from sensors and devices and transform them into dynamic text, alarm or graphic scheme.
- The SCADA should have functionality viz. **Data Acquisition, Data Processing, Alarms, Data Archiving, Visualization, Controlling, Trending, and Reporting.**



Hardware and Interfaces

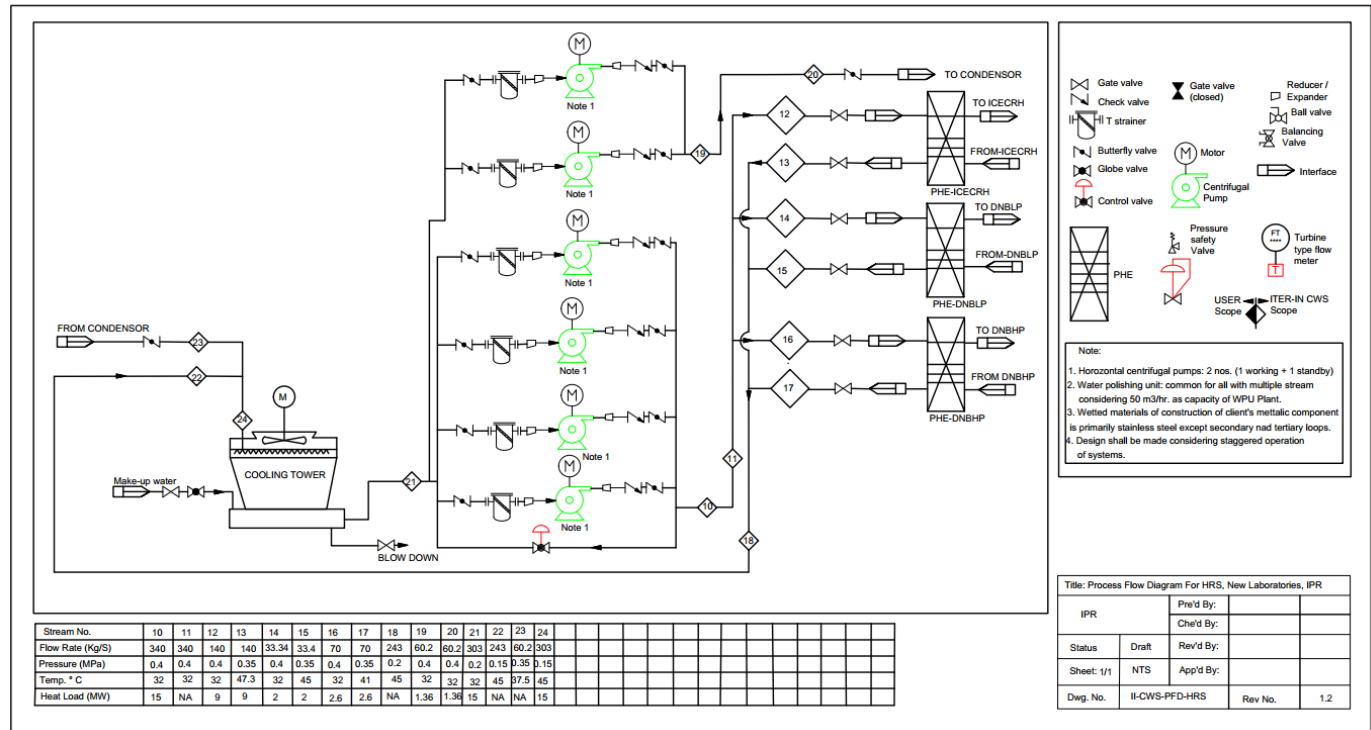
- All the instruments shall preferably have 4-20mA current interface with PLC system.
- The PLC controller, Desktop and server computers shall run on UPS with atleast 20 min of back up time.
- The central controller shall be installed in suitable cabinet along with use of junction boxes and marshalling box.
- The all control nodes shall be connected in the same network for data exchange and communications.
- Suitable cabling guidelines as specified in Table 32 must be followed to connect instruments with central control system.
- Other guidelines for cabling and wiring is specified in section 3.5.1.6.1.1



PFDs and PIDs

- The PFD and PID diagrams for each of the loop is given in annexure documents.

- Annexure 21_ICECRH Loop_PFD
- Annexure 22_DNBHP Loop_PFD
- Annexure 23_DNBLP Loop_PFD
- Annexure 24_DNBCH Loop_PFD
- Annexure 25_IPRCH Loop_PFD
- Annexure 26_HRS Loop_PFD
- Annexure 27_ICECRH Loop_PID
- Annexure 28_DNBHP Loop_PID
- Annexure 29_DNBLP Loop_PID
- Annexure 30_DNBCH Loop_PID
- Annexure 31_IPRCH Loop_PID
- Annexure 32_Chiller Loop_PID
- Annexure 33_HRS Loop_PID
- Annexure 34_CWS Loop_SLD



Example : PFD of Heat Rejection System



Schedule of Quantities

Instruments	Quantity
Flow Transmitter	9 (of different size)
Pressure Gauge	125
Temperature Gauge	70
Pressure Transmitter	20
Temperature sensor cum transmitter	30
Level Gauge	6
Level Transmitter	7
DO Meter and Analyser	5
pH meter and Analyser	6
Conductivity meter and Analyser	6
Data Acquisition and Control System	1 set

