

Bharat Heavy Electricals Ltd
Electronics Division
Mysore Road, Bangalore – 560026

Tender Document for Design, Engg., Manufacturing, Testing, Supply and E&C Support Services of Steam and Water Analysis System (SWAS)- Analysers + Sample Handling System for APPDCL/ Krishnapatnam (1X800 MW) STPP & NTPS/ Vijayawada (1X800 MW) STPP Projects
RFQ Ref.: MGR0000214 Dt: 10/01/2018

Part-I Bid Opening Date: 01/02/2018 (Thursday), 16:00 Hrs

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Important Information:

Last Date and Time of Tender Submission in **EPS Portal**: 01/02/2018 upto 16:00:00 Hrs.
Date and Time of Tender Opening in **EPS Portal**: 01/02/2018, 16:15:00 Hrs.

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			REF. : CE/416/KRISHNA/SWAS/PS REV. NO. : 00 PAGE : 01 OF 02			
		PROJECT :- KRISHNAPATNA - 1 X 800 MW TPS CUSTOMER :- APGENCO PURCHASE SPECIFICATION FOR STEAM & WATER ANALYSIS SYSTEM				
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	C O P Y			 (Punit P Singh)		
				PREPARED  PRK	ISSUED 416	DATE 01-12-2016

SECTION	DESCRIPTION
A	GENERAL INSTRUCTIONS
B	PRE-QUALIFICATION REQUIREMENTS
C	SCOPE OF SUPPLY
D	TECHNICAL REQUIREMENTS AND ANALYSER SPECIFICATIONS
E	SWAS SCHEMES
F	QUALITY CHECKLISTS
G	APPROVED VENDOR LIST

SECTION- A

GENERAL INSTRUCTIONS TO BIDDERS:

All required documents against this Tender/Specification shall be submitted in English only.

Introduction: Bidders are required to offer SWAS to be used in Power Plant applications.

In order to accept the Technical offers / proposals from Bidders for the project mentioned in this Specification (refer Sections C & D), certain Pre-qualification criteria are required to be met by Bidder.

Pre-qualification requirements are clearly mentioned in AA of Section-B of this Specification. Bidder to read the same carefully and submit the details/documents required for BHEL's acceptance.

In case Bidder does not include the details or meet the requirements of Pre-qualification requirements, their offer will be summarily rejected and Bidder's Technical offers will not be evaluated.

Evaluation methodology: BHEL shall initially open Bidder's PQR documents as per Section-B of this specification for review & acceptance. Only after acceptance of PQR documents, BHEL shall open Bidder's technical offers for evaluation. Technically acceptable vendors will be proposed to customer / End user for vendor approval. Commercial bids of only accepted/approved vendors by End users/Customers, shall be considered by BHEL for further processing.

Bidders are required to submit offers as detailed below:

- A. Documents pertaining to Pre-Qualification requirements for AA of Section-B along with point-wise compliance to be uploaded as Part-I Bid.
- B. Documents pertaining to Clause BB Section-B along with point-wise compliance to be uploaded in Part-I Bid, documents for this clause to be identifiable separately in the uploaded documents.
- C. Technical offers/proposals for the Project, whose requirements are mentioned in Sections C & D to be submitted along with point-wise compliance and uploaded as Part-II Bid.

Note 1:-Whenever required during evaluation of PQR and Technical offers/bids, vendor is required to be present at BHEL Electronic Division, Bangalore, for discussions. Further in the event of order, during approval of the Vendor documents by End users/Customers, Vendor shall accompany BHEL representative for discussions.

Note 2:- Deviations (if any) shall be discussed with only those vendors who quote for this tender.

SECTION- B

AA. Pre-Qualification Requirements (PQR) of Bidders for SWAS:

1. The bidder should have executed/ completed work of “Design, supply, erection & commissioning of SWAS (Including Sample Handling System and Analysers) in a Thermal Power Plant minimum of 200 MW rating for at least 1 unit on the bid opening date of this tender.
 2. Original Equipment Manufacturers based outside India, who are making offer for this tender shall have authorized representatives in India for support related to Documentation, Erection, Commissioning & post commissioning services. The Indian representative should have the team of experienced service engineers on payroll.
 3. Submit Reference List of Projects wherein offered system is supplied & commissioned and working satisfactorily, along with details of critical components like Coolers, High Pressure Reducer/regulator, Back Pressure regulator and Year of Commissioning.
 4. If Bidder is procuring Chiller from a subcontractor, he should declare subcontractor name & location. Bidder to certify that Chiller subcontractor meets required Quality standards for the product. Bidder should have supplied & commissioned Chiller from offered subcontractor for min. one system.
 5. For Vendors offering upgraded / latest models of various analysers, PQR of previous model is acceptable. In such cases OEM shall certify that offered model is upgraded version of previous model.
 6. OEM shall furnish an undertaking that in case of change in Indian representative / agent, OEM shall continue to support supplies made by previous representatives/agents w.r.t to field service and supply of spare parts.
 7. Bidder shall have optimum inventory of critical components like sensors/ electronic modules of Analysers and Coolers, pressure regulators etc. to meet site requirements/failures on urgency basis.
 8. BHEL shall issue call for service / commissioning with 07 days’ notice. Bidder shall agree to visit BHEL project sites within above notice period.
 9. BHEL shall submit credentials/details furnished by vendor with their offers to customer and await customer’s decision for a maximum of one month from the date of PQ bid opening. If approval is not received within above period, BHEL shall treat the offer as “NOT Meeting PQ” criteria and offer shall be rejected.
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10. In case Customer/End user does not accept the offered makes of analysers, bidders offers will be acceptable only if they agreed to supply Analysers of customer approved make of Analysers without any commercial implications to BHEL.

BB. Additional Documents to be submitted along with the documents related to PQR above for reference (OPTIONAL):

1. Technical literature / Manuals of offered Sensors/ System/ Accessories.
2. In the event of technical specification not indicated in Technical literature, confirmation from OEM is acceptable. Such confirmations shall be suitably supported by certificates like Type test/ Routine test certificates.
3. Submit Unpriced Purchase Order copies for executed projects in the past three years.
4. Submit List of Projects, for which Erection & Commissioning has been carried out in the past three years. Also, submit reports of successful erection & commissioning Protocols & Minutes of the meetings for handing over of SWAS for these projects.
5. Name & registered address of the Indian branch office or Indian representative for support of E&C and after sales service with Organization chart.
6. Bidder shall have facility in India for Engineering activities, preparation of Documents, trouble shooting and calibration of the system. Submit these details.
7. If Bidder is not Original Equipment Manufacturer (OEM), then Bidder to include Authorization letter from OEM for Design, Engineering, Manufacture, Testing, supply, Erection, Commissioning and Servicing of the offered System. This Authorization letter provided by OEM to Bidder shall indicate the Type and Duration of Validity of the agreement.

Important Note: In case Bidder does not submit details mentioned in above clauses (AA) or meet the requirements of Pre-qualification requirements (AA), Offers will be summarily rejected and Bidder's Technical offers/proposals will not be evaluated. Please read carefully the GENERAL INSTRUCTIONS in Section A of this specifications.

Note 4: A point-wise compliance to be submitted for SECTION-B along with all relevant documents.



A4 - 11

REF. : KRISHNA/416/SWAS/SOS

REV. NO. : 00

PAGE : 01 OF 03

PROJECT :- KRISHNAPATNAM - 1 X 800 MW TPS

CUSTOMER :- APGENCO

SCOPE OF SUPPLY

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REVISIONS :

APPROVED

(Punit P Singh)

PREPARED

ISSUED

DATE

PRK

416

01-12-2017



SCOPE OF SUPPLY FOR TSGENCO KRISHNAPATNAM 1X800 MW

SL NO	ITEM DESCRIPTION	UNITS	QTY PER SET
SWAS PACKAGE EACH SET CONSISTING OF ;			
1	SAMPLE HANDLING SYSTEM -		
a	PRIMARY RACKS (With IBR certified Isolation , Blowdown Valves & IBR certified Cooler Coils)	NO.	2
b	WET PANEL - ENCLOSED TYPE WALKTHROUGH PANEL	NO.	1
c	DRY PANEL	NO.	1
d	CHILLER UNIT - 100% REDUNDANT - Min. 5 TR rating (With 25% extra Capacity)	NO.	1
e	SAMPLING SKID FOR CONDENSER and STAND ALONE PANEL WITH ALL SAMPLING ACCESSORIES FOR MOUNTING ONE NUMBER OF CONDUCTIVITY(CATION) ANALYSER - CONDENSER APPLICATION - OPTION A	NO.	1
f	SAMPLING SKID FOR CONDENSER and STAND ALONE PANEL WITH ALL SAMPLING ACCESSORIES FOR MOUNTING TWO NUMBER OF CONDUCTIVITY(CATION) ANALYSERS - CONDENSER APPLICATION - OPTION B	NO.	1
2	ANALYSERS - MICROPROCESSOR BASED WITH DIGITAL COMMUNICATION FACILITY LIKE RS 485/Modbus/Profibus.	ST	1
a	CONDUCTIVITY(SPECIFIC, CATION) ANALYSER - SINGLE CHANNEL	NOS.	15
b	CONDUCTIVITY(SPECIFIC) ANALYSER FOR HOTWELL - SINGLE CHANNEL	NOS.	4
c	CONDUCTIVITY(CATION) ANALYSER FOR CONDENSER APPLICATION - SINGLE CHANNEL - OPTION A	NOS.	1
d	CONDUCTIVITY(CATION) ANALYSER FOR CONDENSER APPLICATION - SINGLE CHANNEL - OPTION B	NOS.	2
e	pH ANALYSER- SINGLE CHANNEL	NO	10
f	DISSOLVED OXYGEN ANALYSER- SINGLE CHANNEL	NOS.	4
g	SODIUM ANALYSER(MULTI CHANNEL- 5 CHANNEL INCLUDING SPARE CHANNEL)	NO	1
h	SILICA ANALYSER (MULTI CHANNEL- 6 CHANNEL INCLUDING SPARES CHANNEL)	NO	1
i	HYDRAZINE ANALYSER - SINGLE CHANNEL	NO	2
j	IRON ANALYSER-(MULTI CHANNEL - SIX CHANNEL INCLUDING SPARES CHANEL)		
k	TURBIDITY ANALYSER	NO	1
l	CHLORIDE ANALYSER (SINGLE CHANNEL)		
3	LOOSE SUPPLY ITEMS AS PER ANNEXURE-A	ST	1
4	Mandatory Spares as per Annexure- B	ST	1
5	COMMISSIONING SPARES- Reagents required for commissioning & Handing over of System to Owner (Dynamic Calibrator/Automatic Calibration kit shall be provided as applicable for Analysers for Eg. Sodium, Hydrazine Analysers at the time of commissioning)	ST	1
6	CONSUMABLES OTHER THAN CHEMICAL REAGENTS LIKE PH CELL , DO Sensors ,ETC	ST	1
7	CONSUMABLES I.E. CHEMICAL REAGENTS FOR 1 YEAR OPERATION	ST	1
8	ANNUNCIATOR - Microprocessor based 96 Points, Window size : 70 mm x 50 mm	ST	1
9	O & M MANUALS / DOCUMENTATION CHARGES	LOT	1
10	TEST, CALIBRATION & GUARANTEE CERTIFICATES AS PER APPROVED QUALITY CHECKLIST/ PLAN	LOT	1
11	SUPERVISION OF ERECTION, TOTAL COMMISSIONING AND HANDING OVER OF SWAS SYSTEM	ST	1
12	Price for one line of High Pressure & High Temp. - Primary & Secondary cooling to be considered along with other instruments as per P&ID applicable for the project.	ST	1
13	Price for one line of Low Pressure & Low Temp. - Secondary cooling to be considered along with other instruments as per P&ID applicable for the project.	ST	1
14	Sample/Metering Pump with MCB & Starting panel - Suitable for metering sample from DM Make up to SWAS Room	No.	1
15	SODIUM ANALYSER (SINGLE CHANNEL)	NO	1
16	Flow switch for Primary rack (FW, Separator O/L, Main Steam services) - Suitable for return Cooling water line of individual Primary cooler	No.	1
17	Following activities will be in Vendor's scope :- i. Supervision of erection, Total commissioning & Handing over of the system to the End user. ii. Erection of inter connecting cabling / tubing between wet & dry panel, chiller & wet panel etc. iii. Complete Erection of Chiller system including proper insulation of pipes between chiller & wet panel. iv. Vendor to also consider 1 no. of Gas filling at Site for Chiller during Commissioning/Handing over. This shall be in addition to Gas filling done at OEM works for inspection.		
17	Note:- 1.0 Vendors to quote unit rates for all above items individually. 2.0 Vendors who do not quote prices as per pt. 1, shall be disqualified. 3.0 BHEL shall use unit rates indicated above for quantity addition/deletion required during execution. 4.0 Bidders to quote item wise prices for all the items indicated above. Evaluation for L1 shall be done considering offered prices for all items indicated above however items in sl. No. 1.f, 2.d, 12,13,14, 15 , 16 shall be ordered only if required.		

ANNEXURE - "A"

LOOSE SUPPLY ITEMS FOR SWAS

SL. NO	DESCRIPTION	QTY / UNIT
1	Power Cable to SWAS panels	25 Meter
2	Power Cable to Chiller(3 phase 3 wire)	25 Meter
3	Special Cables between wet and dry panel . (for each cell / analyser Combination)	30 Meter/ run
4	All cabling and Tubing(along with connection fittings) between wet and dry panel	30 Meter / run
5	Cooling water header, A 106 Gr. B, 2 " NB Sch 40 (between nearest tapping point & chiller and chiller & Wet panel)+ Elbows (20 Nos) and Bends(10 Nos) .	60 Meter
6	Blow down header(Wet Panel) , A 106 Gr. B, 2" NB SCH 40 + Elbows (3 nos.)	20 Meter
7	Blow down header (Primary Racks) , SS 304 , 2" NB SCH 80 + Elbows (3 Nos)	20 Meter
8	Recoverable drain header , SS 316 , 2" NB SCH 40 + Elbows (3 Nos.)	20 Meter
9	Waste Drain header (analyser Panel) A 106 Gr. B , 2" NB SCH 40 + E bows (6 Nos.)	30 Meter
10	Waste drain header(Primary Racks)) , A 106 Gr. B , 2" NB SCH 40 + Elbows (3 Nos)	30 Meter
11	Waste drain header (wet panel) , A 106 Gr. B , 2" NB SCH 40 + Elbows (3 Nos)	20 Meter
12	Furniture:-	
i	STEEL ALMIRAH - Size - 900 (W) x 450(D) x1800(H) mm	2 Nos.
ii	OPERATOR CHAIRS	1 No.
i	WORKBENCH FOR CALIBRATION & TESTING - Size - 1500(W) x 1000(D) x 800(H) mm	1 No
Note		

1.0 Vendors to quote unit rates for all items individually.

2.0 Vendors who do not quote prices as per pt. 1, shall be disqualified.

3.0 BHEL shall use unit rates indicated above for quantity addition/deletion required during execution.

4.0 In addition to the set of flanges(mating & counter) which is mounted on the header in panel/rack , vendors to consider one additional set of mating & counter flanges for all headers,as indicated above.

ANNEXURE - "B"

MANDATORY SPARES FOR SWAS

SL. NO	DESCRIPTION	TOTAL QTY
a.	Field sensor	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
b.	Field transmitter/ complete electronic unit	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
c.	Power supply card	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
d.	Instrumentation hardware	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
e	Consumbles/Reagents for Analysers	For 12 months operation from the COD.
f	Calibrators required for commissioning and maintaining the analysers	1 no for each type of Analysers as applicable.

Telangana State Power Generation Corporation Ltd.
1x800 MW Kothagudem

REF:- KRISHNA/416/SWAS/TR

TECHNICAL REQUIREMENTS & ANALYSER SPECIFICATIONS

1.00.00 INTENT OF SPECIFICATION

This section intended to cover scope of design, engineering, supply, erection, testing and commissioning of the Steam and Water Analysis System (SWAS) for the Power Generating Unit.

2.00.00 GENERAL

2.01.00 The typical monitoring and analysis requirement for plant steam and water system is furnished below. Bidders shall however determine the analysis requirement based on the criticality of major equipment.

2.02.00 Steam and Water Analysis System shall be furnished for continuous monitoring of water and steam purity in the plant cycle and at other important points. The system shall enable the plant chemist and operators to make adjustments in the water and steam conditioning system or to modify the plant operating procedure to minimize equipment damage due to corrosion, scaling etc.

2.03.00 Bidder shall provide necessary main process line tapping along with isolation/root valves up to SWAS system.

2.04.00 The system shall conform to the following standards and requirement specified here in:

STANDARD	GUIDELINES
ASTM PTC 19.11	Standard Practice for Steam and water sampling, conditioning and analysis in power plant
ASTM D3370	Standard practice for sampling water from closed conduits
ASTM D1066	Standard practice for sampling steam
ASTM D5540	Standard Practice for flow control and temperature control for on-line water sampling and analysis
BS 6739	Code practice for instrumentation in process control system: Installation, Design and Practice

3.00.00 STEAM AND WATER ANALYZERS - AS PER P&ID

TYPE	LOCATION

- 3.01.00 The sampling system shall obtain samples from steam and water lines, which shall be adequately conditioned and led to Analyzers for continuous analysis and also to provide facility for grab (manual) sampling.
- 3.02.00 The system shall include complete Sample Conditioning system, Analyzers, Converters / Transmitters, Indicators, alarm initiating devices, Annunciators, interlocks for sample protection, hardware interface with DDCMIS, interface with dosing system for remote closed loop control, all necessary pipes, tubes, fittings and valves etc. and other conditioning and protective devices to integrate into a completely assembled system.
- 3.03.00 Bidder shall be responsible for proper engineering, selection of hardware, manufacture, testing, commissioning and satisfactory functioning of complete and fully operational steam and water analysis system, meeting the intent of the specification.
- 3.04.00 System components shall be assembled, piped, wired and tested at the factory as a complete unit and shall be ready for installation at the project site.
- 3.05.00 Parts subject to high pressure or temperature or severe duty shall be of materials suitable for the service.

Sample Piping System shall be as follows:

APPLICATION	PIPING MATERIAL
Sample tapping point to primary cooler (including root valves and fittings)	SS316
All the sample pipe after primary cooler	ASTM A213 TP316H
Blow down header and drain receiver holder	ASTM A312 Type 304
Closed Cooling Water piping except grab sample and water purge line, sample through drain piping and waste header piping	ASTM A53 Gr. A
Purge air piping/ tubing and fitting valves	Brass / copper

Size and schedule number of sample pipe shall be suitable for particular application. Pressure reducing valves, isolation valves before primary sample cooler and all the isolation valves for pressure and flow indicators shall be needle valves. Cooling water and chilled water supply and return valves shall be block valves. All fitting shall be socket welded type and of material ASTM A182 F316H confirming to ANSI B16.11. The valves to be used in sample piping shall be of globe type, forged construction and stainless steel confirming to ASTM A182 with pressure and temperature ratings as per ANSI B16.34.

- 3.06.00 The grab sample valves shall allow grab sample feed to be directed to grab sample nozzles to the sample trough.
- 3.07.00 SWAS System components and accessories shall be from the latest proven product range of qualified manufacturers. Components and accessories shall be proven for SWAS application in power plant of comparable size.
- 3.08.00 Analysers shall be microprocessor based, drift free and auto compensating type.
- 3.09.00 Sample coolers shall be designed for the maximum allowable water pressure drop, from inlet connection to outlet connection of 0.7 Kg/Sq. cm
- 3.10.00 Consumables up to guarantee period shall be in bidder's scope.
- 3.11.00 Self-regulating type devices shall be provided to maintain constant sample flow through analyzers at a preset sample pressure. Variations in sample flow to individual analyzer shall not exceed 5%.
- 3.12.00 Bidder shall provide necessary isolated 4-20 mA DC outputs from analyzers at separate terminal block for DDCMIS.
- 3.13.00
- 3.14.00 Analyzers shall be powered from the unit UPS system.
- 3.15.00 Furniture
- a) Bidder shall include a complete set of furniture for the SWAS Room of ergonomic design suitable for industrial application. Furniture shall include but shall not be limited to Operator's chairs, work benches for calibration and testing purpose, cabinets for storage of manuals / booklets, storage racks for special tools / chemicals / reagents etc.
 - b) Table top surfaces and other surfaces which are likely to come into contact of chemicals and reagents shall be suitably coated / treated.
-

4.00.00 SWAS PANEL AND ACCESSORIES

4.01.00 SWAS panels shall be of modular construction and comprising of :

- a) A wet section consisting of a sample conditioning panel housing components for processing samples and grab sample.
- b) A dry sections housing all the transmitters and corresponding annunciators and monitors. The dry section shall be physically separate from the sample conditioning panel, so that the electrical equipment are kept dry and away from process fluids. Dry panel shall be kept in air condition environment.

4.02.00 The wet section shall be a vertical panel housing various sample lines, primary coolers, instruments such as sight flow indicators, Pressure / Temperature Gauges, Pressure Control Valves, Rotameter, Pressure / Temperature Switch, Solenoid Valves, NRV s, Secondary heat ex changers, Strainers, Iso lation Va lves, Drain Headers, Grab Samp ling Pans et c. The panel s hall be pro vided with bulkhead connection to conn ect sample pipes drawn from tapping points.

4.03.00 The Chiller Unit shall b e kept near the Wet Panel to supply c hilling water t o the secondary heat ex changers in Wet Panel. Capacity of chiller unit shall not be less than 5 TR (Tonnage refrigeration capacity) & refrigerant shall be eco friendly type.

4.04.00 Sample con ditioning components shall be mounted on the front of the wet section with easily accessible ope rating hand les, levers and dia ls e tc. All components shall be suitably supp orted to the panel and s hall be clearl y labeled.

4.05.00 The physical arrangement of the tubing and wiring shall permit easy access for maintenance.

4.06.00 Bidder shall keep provision of 25% spare capacity in coolers for future addition of analyzers. Sample coolers shall have removable SS coil. Coolers shall be designed to achieve the required sample temperature at the specified maximum flow rate of the Analyzers with an assumed fouling factor of 0.2 and at maximum cooling water temperature.

4.07.00 Piping and tubing sha ll be neatly installed and s ecurely braced t o e nsure mechanical rigidity. Th e complete S WAS panel and accessories shall be suitable for continuous operation under ambient temperature condition of 8 Deg C to 50 Deg C and relative humidity of 100%.

5.00.00 ALARM ANNUNCIATION SYSTEM

5.01.00 Alarms shall be available in the local monitor in the dry room for each unit covering the entire SWAS system, with repeat facility in DDCMIS.

6.00.00 ANALYZERS

All Analyzers shall be of microprocessor based design. The general technical specification of the analyzers is provided in this section. Bidder in his offer shall indicate the sample flow requirement of each analyzer and the total quantity of cooling water required for the system.

6.01.00 CONDUCTIVITY ANALYZER - Range - 0-1/ 0-10 / 0-100 uM/cm

A. Sensor

1. Type of Cell : Flow thru'
2. Conductivity Range : As per process
3. Cell Constant : 0.01 / 0.1 / 1.0 depending upon range
4. Temp. Compensation : Manual and Automatic (Integral) 0-100°C
5. Process Connection : Screwed
6. Wetted Parts : Electrodes-SS 316L/ Insulators KYNAR/ Viton
7. Pressure Rating : 10 kg/cm²
8. Accessories : Vessel (SS 316) with ½" NPT connection
9. Cable : Upto transmitter in flexible conduct

B. Transmitter

1. Type : Microprocessor based, Single stream
 2. Mounting : 2" pipe
 3. Protection Class : IP-65 or better
 4. Output : 4-20 mA DC (isolated)
 5. Display : Digital Display in Engineering Unit , Alarm Status.
 6. Zero/Span Adjustment : Front Panel Membrane type Keyboard
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- | | | | |
|-----|--------------------|---|--|
| 7. | Temp. Compensation | : | Automatic |
| 8. | Diagnostic | : | Self diagnostic for e lectronics, electrode etc |
| 9. | Alarm | : | Dual set point, hysteresis and time delay adjustable |
| 10. | Enclosure | : | Die cast aluminum, epoxy coated |
| 11. | Cable Termination | : | Internal (cable entry through conduit) |
| 12. | Accuracy | : | ± 1.0 % of measured range |
| 13. | Response time | : | Less than 5 sec |
| 14. | Stability | : | ± 1.0 % of output range / month non-cumulative |
| 15. | Accessories | : | a.2" pipe mounting bracket, Sensor cable with flexible conduit (as required), ½" NPT Cable Gland, SS Tag plate, For cation conductivity- Du al Ion-E xchange column, resin, etc. (minimum 12 months' requirements).

b.Retractable type conductivity sensor along with flow chamber and other accessories shall be provided for vacuum application. Transmitter (local) along with 4-20 Ma o utput to S WAS room & DDCMIS shall also be provided. |

6.02.00 pH ANALYZER - Range 0-14 pH

A. Sensor

- | | | | |
|----|---------------------|---|---|
| 1. | Type of Cell | : | Flow thru' |
| 2. | Range | : | 0-14 pH |
| 3. | Type of measurement | : | Combination electrode |
| 4. | Temp. Compensation | : | Manual and Automatic (Integral) 0-100°C |
| 5. | Process Connection | : | Screwed |
-

- | | | | |
|-----|---------------------|---|---|
| 6. | Measuring Electrode | : | Glass, high independence, thin electrode in one housing |
| 7. | Pressure Rating | : | 10 kg/cm ² |
| 8. | Accessories | : | Vessel (SS 316) with ½” NPT connection |
| 9. | Cable | : | Upto transmitter in flexible conduct |
| 10. | Preamplifier | : | Integral or separate |
| 11. | Liquid Junction | : | Ceramic / Kyner or equivalent |

B. Transmitter

- | | | | |
|-----|--------------------|---|---|
| 1. | Type | : | Microprocessor based, Single stream |
| 2. | Mounting | : | 2” pipe |
| 3. | Protection Class | : | IP-65 or better |
| 4. | Output | : | 4-20 mA DC (isolated) |
| 5. | Display | : | Digital Display in Engineering Unit, Alarm Status. |
| 6. | Accuracy | : | ± 0.2% of FSD or better |
| 7. | Response time | : | Less than 5 sec |
| 8. | Stability | : | ± 0.001 pH /week |
| 9. | Repeatability | : | ± 1% or better |
| 10. | Temp. Compensation | : | Automatic (Pt-100 sensor) |
| 11. | Diagnostic | : | Self diagnostic for “Calibration required”/ “ Calibration O .K.”, electrode checking etc. |
| 12. | Alarm | : | Dual set point, hysteresis and time delay adjustable |
| 13. | Enclosure | : | Die cast aluminum, epoxy coated |
| 14. | Cable Termination | : | Internal (cable entry through conduit) |
| 15. | Accessories | : | 2” pipe mounting bracket, Sensor cable |
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with flexible conduit (as required), ½”
NPT Cable Gland, S S Tag plate, ,
Ultrasonic Electrode Cleaner, Buffer
solution tablets

6.03.00 SILICA ANALYZER - Range - 0 - 500 ppb / 0- 1000 ppb

- | | | | |
|-----|--------------------------|---|---|
| 1. | Type | : | Colorimetric monitor, gravity / pumped feed Microprocessor based |
| 2. | No. of Streams | : | Multi-stream with at least one stream as spare |
| 3. | Output | : | 4-20 mA DC (isolated) into 600 ohms |
| 4. | Readout | : | Digital Indicating meter for direct readout |
| 5. | Accuracy | : | ± 1% of F.S.D or better |
| 6. | Reproducibility | : | ± 2% of F.S.D. or better |
| 7. | Calibration | : | Manual & automatic |
| 8. | Cycle time | : | Less than 10 min or better |
| 9. | Operating temperature | : | 0-50 ° C |
| 10. | Temperature Compensation | : | (Pt-100 Sensor) |
| 11. | Mounting | : | 2” pipe |
| 12. | Life of light source | : | 10,000 hours (approx.) |
| 13. | Alarm Facility | : | 2 HI & 2 LO independently adjustable over span. |
| 14. | Enclosure Protection | : | IP-65 |
| 15. | Accessories | : | Reagent cabinet , Sample strainer, Reagent Reservoir etc., Phenolic name plate, Reagents & consumables, Special cables. |

6.04.00 SODIUM ANALYZER ASSEMBLY - Range 0- 200 ppb

- | | | | |
|----|--------------|---|--------------------------------------|
| 1. | Type of Cell | : | Flow Through ion-selection electrode |
| 2. | Flow Chamber | : | Plexi Glass Body or equivalent |
-

Telangana State Power Generation Corporation Ltd.
1x800 MW Kothagudem TPS

REF:-KRISHNA/416/SWAS/TR

- | | | | |
|-----|----------------------|---|--|
| 3. | Measuring Electrode | : | Sodium Selective Glass Electrode |
| 4. | Output | : | 4-20 mA DC (isolated) into 600 ohms |
| 5. | Temp. Compensation | : | Automatic upto 45 deg.C |
| 6. | Read Out | : | Digital Indicating meter |
| 7. | Accuracy | : | < 5% of reading |
| 8. | Response Time | : | 2 minutes or better |
| 9. | Mounting | : | Flush Panel |
| 10. | Calibration | : | Automatic |
| 11. | Alarm Facility | : | 2 HI and 2 LO independently adjustable over span. |
| 12. | Enclosure Protection | : | IP-65 or better |
| 13. | Accessories | : | Phenolic tag plate, Sample filter, Pressure regulator & flow meter, Automatic calibration kit, Reagents and consumables, Special cables, ½" NPT cable gland. |

6.05.00 HYDRAZINE ANALYZER - Range - 0 - 200 ppb

- | | | | |
|-----|--------------------|---|--|
| 1. | Type | : | Electrochemical |
| 2. | Output | : | 4-20 mA DC linear |
| 3. | Readout | : | Digital Indicating Meter, linear read-out |
| 4. | Accuracy | : | ± 2% of FSD or better |
| 5. | Reproducibility | : | 2% of FSD or better |
| 6. | Drift | : | 2 ppb/month or better |
| 7. | Temp. Compensation | : | Automatic up to 45 °C |
| 8. | Response Time | : | 1 minutes or better |
| 9. | Mounting | : | Flush Panel |
| 10. | Alarm Facility | : | 2 HI and 2 LO independently adjustable over span |
-

11. Preferred Feature : 2 Hi and LO alarm LED visible from front , Power supply on/failure LED
12. Enclosure Protection : IP-65/ NEMA 4 or better
13. Accessories : Sample Conditioning kit, Phenolic nameplate, Special cable upto transmitter with flexible conduit Chemical reagents for 12 months, . ½” NPT Cable Glands

6.06.00 DISSOLVED OXYGEN ANALYZER - Range - 0- 200 ppb

1. Type : Electro-chemical, Microprocessor based.
2. Range : As per process.
3. Type of Cell : Flow through sampling type (continuous)
4. Enclosure : IP-65 or better
5. Output : 4-20 mA DC isolated to a load of 600 Ohms (minimum)
6. Temp.Compensation : Automatic up to 45°C
7. Readout : Digital Indicating meter
8. Accuracy : Better than ± 2 % of full scale for Transmitter
9. Sensor Response Time : 90% in 30 seconds or better
10. Mounting : Flush panel
11. Alarm Facility : 2 HI & 2 LO independently adjustable over span.
12. Preferred Feature : HI & LO Alarm LED visible from front, Power supply on/failure LED, In-built calibration facility.
13. Accessories : Phenolic nameplate, Special cable upto transmitter with flexible conduit, ½” NPT Cable Glands

6.07.00 CHLORIDE ANALYZER - Range 0- 1000 ppb

1. Type : Electro-chemical, Microprocessor based.
-

Telangana State Power Generation Corporation Ltd.
1x800 MW Kothagudem TPS

REF:- KRISHNA/416/SWAS/TR

- | | | | |
|-----|---------------------|---|--|
| 2. | Type of cell | : | Chloride ion selective electrode |
| 3. | Enclosure | : | IP-65 or better |
| 4. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum) |
| 5. | Temp.Compensation | : | Automatic with Pt 100 |
| 6. | Ambient temperature | : | 45°C |
| 7. | Readout | : | Digital Indicating meter |
| 8. | Accuracy | : | Better than $\pm 2\%$ |
| 9. | Reproducibility | : | <3% |
| 10. | Detection limit | : | 0.5 mg/ L or better |
| 11. | Analysis time | : | 5 minutes (max). |
| 12. | Cycle time | : | Adjustable |
| 13. | Calibration | : | Manual or automatic |
| 14. | Mounting | : | Flush panel |
| 15. | Alarm | : | 1 HI, 1 LO & 1 system alarm |
| 16. | Control accessories | : | Sample level detector, Reagent level detector, Calibration solution level detector, Automatic sample, rinse and drain valve, Pump for calibration solution, Pump for reagent solution. |
| 17. | Accessories | : | Reagent solution tank, Calibration solution tank |

6.08.00 TURBIDITY ANALYZER -

- | | | | |
|----|-----------|---|---|
| 1. | Type | : | Nephelometric (Light reflection principle) |
| 2. | Range | : | 0.001-100 NTU |
| 3. | Body | : | Corrosion resistant polystyrene |
| 4. | Enclosure | : | IP-65 or better |
-

- | | | | |
|----|---------------|---|--|
| 5. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum) |
| 6. | Readout | : | LCD Display |
| 7. | Accuracy | : | Better than $\pm 2\%$ of full scale |
| 8. | Repeatability | : | $\pm 1\%$ of reading or ± 0.002 NTU (whichever is greater) |
| 9. | Accessories | : | Phenolic nameplate, Special cable upto transmitter with flexible conduit, $\frac{1}{2}$ " NPT Cable Glands, 2" pipe mounting bracket, Calibration kit & standard solution etc. |

6.09.00 IRON ANALYZER - Range - 0 - 500 ppb

- | | | | |
|----|-----------------------|---|--|
| 1. | Type | : | Colorimetric |
| 2. | Range | : | 0-100 ppb, 0-2 ppm |
| 3. | Material | : | Kynar (Probe), Hastelloy C (Reflector) |
| 4. | Enclosure | : | IP-65 or better |
| 5. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum), 2NO+NC Contacts |
| 6. | Readout | : | LCD Display |
| 7. | Operating Temperature | : | 45 Deg. C |
| 8. | Accessories | : | As required. |

6.10.00 SAMPLE CONDITIONING SYSTEM

Sample conditioning system shall be designed and constructed to receive and condition all samples as required by the respective analyzers. This shall include all conditioning equipment mentioned herein:

- a) Sample filtering
 - b) Primary and final sample cooling and temperature control
 - c) Pressure reduction and control, as required
 - d) Flow rate control
 - e) Pressure and Temperature Protection
-

- f) Other treatment as required by individual analyzers or mentioned herein.

Sample line to analyzers shall incorporate an anti-siphon design to prevent possibility of running dry because of a broken or plugged sample line.

6.11.00 SAMPLE FILTER / STRAINER

Sample particulate removal shall be accomplished by passing samples through cartridge type filters with 316 stainless steel body or Y-Strainer. The filter elements shall be capable of retaining particulates of 40 microns and larger. The filter elements shall be installed immediately after the sample shut off valve.

6.12.00 PRIMARY SAMPLE COOLER

- a) Primary cooling of samples having temperature in excess of 45 °C shall be accomplished by passing each sample through one or more individual sample coolers of shell and tube heat exchanger type.
- b) The primary coolers shall use plant closed cycle cooling water.
- c) The overall capacity (flow rate and heat transfer capacity) of cooler / coolers in cascade shall be adequate to cool all samples to within ± 5 °C of the cooling water inlet temperature for the combined flows of each required analyzer sample plus a manual grab sample flow rate of 500 cc/min.
- d) Sample coolers shall be of submerged helical coil type of shell and tube design with removable coil meeting the intent of ASTM D1192-64 (Equipment for Sampling Industrial Water and Steam). Sample tubing shall be seamless type with no welded or other joints inside the cooling jacket. Unions shall be provided to facilitate removal of coils.
- e) All sample tubing, fittings and other components wetted by the samples shall be constructed of type 316 stainless steel.
- f) Primary cooler shall be protected on the cooling water side by relief valve on the water header. The cooling water header is provided with pressure gauge and isolating valves.
- g) Provision shall be made for draining the heat exchanger shell. The drain line shall be valved and piped to waste drain header.

6.13.00 SECONDARY HEAT EXCHANGERS

- a) Each sample stream shall be finally cooled to $25 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$, in an isothermal bath by counter current or in secondary shell and tube heat
-

exchanger similar to the primary coolers with chilled water at about 20°C.

- b) Chilled water shall be produced in a packaged refrigeration unit (chiller).
- c) Sufficient heat exchange capacity (flow rate and heat transfer capacity) shall be provided to obtain 25 Deg C $\pm$ 1 °C sample outlet temperature at the maximum flow rate required by all analyzers and grab sample requirements of all sample streams. Additionally, 25% spare coils / capacity shall be provided for samples/analyzers added in future.
- d) Provision shall be made for adjusting each sample temperature individually.
- e) The heat exchanger coils shall be of stainless steel (SS 316). Heat exchanger coils shall be provided with unions to facilitate easy removal. A removable cover shall be provided for the isothermal bath.
- f) Adequate space shall be provided for maintenance.

6.14.00

TEMPERATURE CONTROL SYSTEM OF CHILLER

- a) A local Temperature Controller modulating a three way-mixing valve shall maintain the chiller temperature at 20 °C $\pm$ 1 °C by mixing the chilled water from the chiller with the re-circulated water from the chiller tank.
- b) The chiller shall include the following:-
 - Automatic water make-up.
 - Bath temperature indicator.
 - Level gauge to indicate bath water level.
 - Drain and over-flow connection for bath.
 - Chilled Water Re-circulation System.
- c) Temperature Switch shall be provided to annunciate high chilled water temperature.

6.15.00

CHILLER

- a) A pair of 100% capacity redundant water-cooled chillers each with sufficient refrigeration capacity to ensure desired isothermal bath temperature under all operating conditions shall be provided.
-

- b) The compressor shall be readily accessible for service and shall include low noise, hermetically sealed motors. Compressors assembly shall also include crank case heater, suction and discharge valves, oil sight glasses, forced feed lubrication system and an integrated motor protection system.
- c) The condenser shall be water cooled and of the cleanable shell and tube design and constructed in accordance with the ASME code for Unfired Pressure Vessels. A condenser water-regulating valve shall be included.
- d) Chiller shall be of the direct expansion type with refrigerant tubes inside a shell. The chiller is to be completely insulated and to be constructed in accordance with the ASME code for Unfired Pressure Vessels.
- e) Refrigerant circuit shall be complete with thermostatic expansion valve, liquid line solenoid valve, sight glass, filter-dryer, refrigerant shut-off and charging valves.
- f) Chilled water pumps with suction and discharge gauges and the thermometers shall be provided, mounted with the packaged chiller on the channel base. Chiller water tank shall have level indication and auto level control.
- g) The chiller water pump shall be of the centrifugal type, close coupled, bronze fitted construction, complete with motor. Pump & motor shall be designed for continuous operation.
- h) Vibration dampeners, mounted between the chiller and the base channel shall be provided.
- i) Cooling water and chilled water piping shall be provided with block valves.

6.16.00

SAMPLE PRESSURE CONDITIONING

- a) Pressure reduction of samples shall be accomplished by using high pressure reducing element.
 - b) All samples below 40 kg/cm² pressure shall be provided with back-pressure (upstream pressure) regulating valves (PCV).
 - c) Each sample line shall have Pressure Indicator and Temperature Indicator upstream of pressure reducer. The gauge shall be 100 mm dial with suitable stainless steel wetted parts. Casing shall be stainless steel construction.
-

- d) Each sample line shall include a safety relief valve set at about 3 kg/cm²g, upstream of the rate set valve, having stainless steel wetted parts.

6.17.00 HIGH PRESSURE REDUCING ELEMENTS (HPRE)

- a) Pressure reduction shall be accomplished by means of a "variable rod-in-tube capillary" valve.
- b) The device shall be designed for inlet pressure of 350 kg/cm²g, temperatures of 65°C and flow rate of not less than 2000 milliliters per minute. The device shall be sized for maximum required sample flow rate.
- c) The pressure-reducing elements shall be conveniently located for removal and periodic cleaning.

6.18.00 FLOW RESTRICTING ELEMENT (FRE)

Flow Restricting Element for grab sample line shall be provided for all samples to maintain constant sample flow at a preset sample inlet pressure.

6.19.00 TEMPERATURE SWITCH AND SOLENOID VALVE

Thermostat and Solenoid Valves shall be provided in the sample line. The thermostat shall be a bimetallic sensor to operate a micro-switch to close the Solenoid Valve when sample temperature is above preset value or cooling flow to primary cooler is low.

6.20.00 TEMPERATURE GAUGES

Temperature gauges shall be of 100 mm size gas filled type with stainless steel armored capillary tubing. Gauges shall be provided after primary coolers and outlet sample lines. Each gauge shall have a dial engraving or separate phenolic nameplate to identify the service. All wetted parts, internal and casing shall be stainless steel.

6.21.00 PRESSURE GAUGES

Pressure gauges shall be 100 mm size, stainless steel movements and bourdon tubes and nylon bearings. Gauges shall be provided after primary cooler and outlet sample lines. Each gauge shall have a dial engraving or separate phenolic nameplate to identify the service. All wetted parts, internal and casing shall be stainless steel.

6.22.00 FLOW INDICATORS

Rotameters shall be provided for sample flow rate indication (to be located in individual branch line to Analyzer Cell) with 75 mm scale length, panel mounting bezel, and stainless steel float and body.

6.23.00 FLOW SWITCHES

Flow switch shall be provided on the primary cooler cooling water outlet. The switch shall be equipped with alarm contacts for annunciation and interlocking. Wetted parts shall be stainless steel.

6.24.00 GRAB SAMPLES

Grab sample valves on the panel front shall be furnished to allow grab sample flow to be directed grab sample nozzles to the sample trough. Approximately 300 mm of flexible tubing shall be furnished for each sample to allow grab sample collection and prevent splashing. Valve body and trim shall be of SS-316.

6.25.00 SAMPLE SINK

A continuous sink for Grab Sample Analysis shall be provided. The sink shall be made of stainless steel. Sink shall have drain to a header.

Cleaning water connection shall be provided for cleaning of sample containers.

7.00.00 SAMPLING SKID FOR CONDENSER

7.01.00 Sampling Skid for condenser is required for drawing the sample for the measurement of cation conductivity. Sampling skid shall be provided with all required accessories not limiting to PLC, heavy duty seal less pumps (continuous operation), non return valves, solenoid valves, fittings, piping/tubing. It is sole responsibility of the Bidders to supply Sampling Skid system designed to draw sample from the condenser preventing leakages in the system so that vacuum/draft pressure level in condenser

is not affected. All piping, tubing, fittings and other sample wetted parts in the sampling and analyzing system shall be of type 316 Stainless Steel.

Bidder must provide 1 working + 1 Standby pumps. These pumps must be designed to operate continuously to pump sample out from condenser vacuum. Pumps must be protected for Dry running, Excess Vibration and Bearing wear and tear.

Offered system shall be provided with provision of priming of pumps. Pump skid shall be located in condenser Pit below LP Condenser Hotwell at least 5 meter below tapping points.

Pump must be selected to work under designed NPSH. Design, manufacturing and pump selection is bidders responsibility.

Typical scheme of sampling skid is indicated for reference

**Skid must be designed with its own standalone IP65 Control panel.
Control panel must provide Pump Running/ Stop Feedback to DCS.**

During the commissioning of the system if it is found that any component which is required for the drawing of the sample without affecting draft/vacuum levels has not been offered, then Bidder has to supply all required components at their own cost.

8.00.00 DRAWINGS AND DOCUMENTS

Bidder shall furnish following drawings and documents after award of contract:

- a) Final version of all the drawing and document furnished along with bid**
- b) Drawing and document submission schedule**
- c) Power supply scheme**
- d) Interconnection and wiring diagram.**
- e) Spare part list**
- f) Consumable list**
- g) QAP**
- h) Inspection and Test report**
- i) Training details**
- j) O&M Manual**
- k) Any other scheme, data, drawing, document, etc required to establish product quality and completeness of supply**

SWAS SCHEME

CUSTOMER:		 ANDHRA PRADESH POWER DEVELOPMENT CO. LTD. (APPDCL) ANDHRA PRADESH, INDIA 1X800 MW APPDCL KRISHNAPATTANAM STAGE-II											
OWNER'S CONSULTANT:		 DEVELOPMENT CONSULTANTS PVT. LTD. KOLKATA											
 Maharatna Company		BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA				DEPT CODE I		NAME AC DESN CHD APPD		SIGN -SD- -SD- -SD- -SD-		DATE 07.09.16 07.09.16 07.09.16 07.09.16	
TITLE :-													
SWAS SCHEME													
							DEPT.	SCALE	DRAWING/DOC. NO.				
							SIGN		PE-DC-420-145-II10				
							DATE		SHEET	1	OF	21	REV. 06

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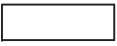
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LEGEND :

	ISOLATING VALVE (NORMALLY OPEN)
	ISOLATING VALVE (NORMALLY CLOSED)
	PRESS REDUCING VALVE
	BACK PRESS REGULATOR
	SOLENOID OPERATED VALVE
	SAFETY RELIEF VALVE
	3 WAY NEEDLE VALVE
	SAMPLE COOLER
	SAMPLE FILTER
	EXPANDER
	FLOW INDICATOR WITH REGULATING VLV

QDV QUICK DISCONNECTION VALVE

CT	CONDUCTIVITY TRANSMITTER
CCT	CAT. CONDUCTIVITY TRANSMITTER
pHT	pH TRANSMITTER
SiT	SILICA ANALYSER TRANSMITTER
NaT	SODIUM ANALYSER TRANSMITTER
NH3T	AMMONIA TRANSMITTER
DOT	DISSOLVED O2 TRANSMITTER
CIT	CHLORIDE TRANSMITTER

	ANALYSER IN DRY PANEL
	PRESSURE GAUGE
	TEMPERATURE GAUGE
	TEMPERATURE SWITCH
	FLOW SWITCH
	FLOW INDICATOR
	LEVEL INDICATOR
	IMPULSE LINE
	CABLE
CR	CONTROL ROOM
DDCMIS	DISTRIBUTED DIGITAL CONTROL MONITORING & INFORMATION SYSTEM
OWS ALARM	ALARM ON OWS IN CONTROL ROOM
	INDICATES RESPECTIVE SCOPE
EDN	BHEL-EDN
B(T)	BHEL-TRICHY

	IRON ELEMENT
	HYDRAZINE ELEMENT
	TURBIDITY ELEMENT
FeT	IRON TRANSMITTER
HzT	HYDRAZINE TRANSMITTER
TurbT	TURBIDITY TRANSMITTER



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE

SWAS SCHEME
LEGEND

DRG. NO.

PE-DG-420-145-1110

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NOTES :

1. ONE SET OF ALARM CONTACTS OF 2SPDT TYPE SHALL BE PROVIDED WITH EACH ANALYSER/MONITOR. 4-20 mA SIGNAL ALL ANALYSERS SHALL BE HOOKED-UP TO DDCMIS FOR MONITORING PURPOSE AS WELL AS ALARMS.
2. ALL FIELD SAMPLING LINE SHALL BE OF ANNEALED SEAMLESS 15NB SS316.
SAMPLING LINE SHALL BE OF 1/4" OD TUBING INSIDE PRIMARY RACKS, DRY AND WET PANEL.
3. ALL SAMPLING LINES SHALL BE ADEQUATELY SLOPED TOWARDS THE SAMPLING PANEL.
4. ALL PRIMARY COOLERS SHALL BE LOCATED IN FIELD.
5. SAMPLE TEMP SHALL BE AROUND 45 DEG C AT PRIMARY COOLER OUTLET AND SAMPLE TEMP AT SECONDARY COOLER OUTLET SHALL BE 25°C.
6. SAMPLE ENTRY IN PANEL SHALL BE FROM "TOP" AND CABLE ENTRY FROM "BOTTOM". IN ADDITION, PROVISION OF CABLE ENTRY FROM SIDE SHALL ALSO BE MADE AVAILABLE.
7. SAMPLE TEMP HIGH (COMMON) GROUP ALARM SHALL BE PROVIDED IN DDCMIS.
8. CHILLER SHALL HAVE 25% SPARE CAPACITY FOR FUTURE ADDITION. CHILLED WATER LINES ARE PROPERLY INSULATED.
9. SAMPLE COOLER SHALL BE OF SUBMERGED HELICAL COIL TYPE OF SHELL AND TUBE DESIGN SHALL BE OF REMOVABLE TYPE.
10. NECESSARY EXPANDERS/ REDUCERS, ETC. AS REQUIRED, WILL BE IN THE SCOPE OF SWAS BIDDER.
11. DEDICATED PC FOR SWAS WITH 24" TFT MONITOR AND PRINTER SHALL BE PROVIDED.
12. IN LINE WITH "1X800MW APPDCL SPEC- V-VI/S-VI/SS-M:6 , CL # 3.10.00, CONSUMABLES UPTO GUARANTEE PERIOD" SHALL BE SUPPLIED ALONG WITH SWAS EQUIPMENT.
13. IN LINE WITH "1X800MW APPDCL TPS SPEC- V-VI/S-VI/SS-M:6 , CL # 3.15.00, COMPLETE SET OF FURNITURE FOR THE SWAS ROOM SHALL BE PROVIDED.

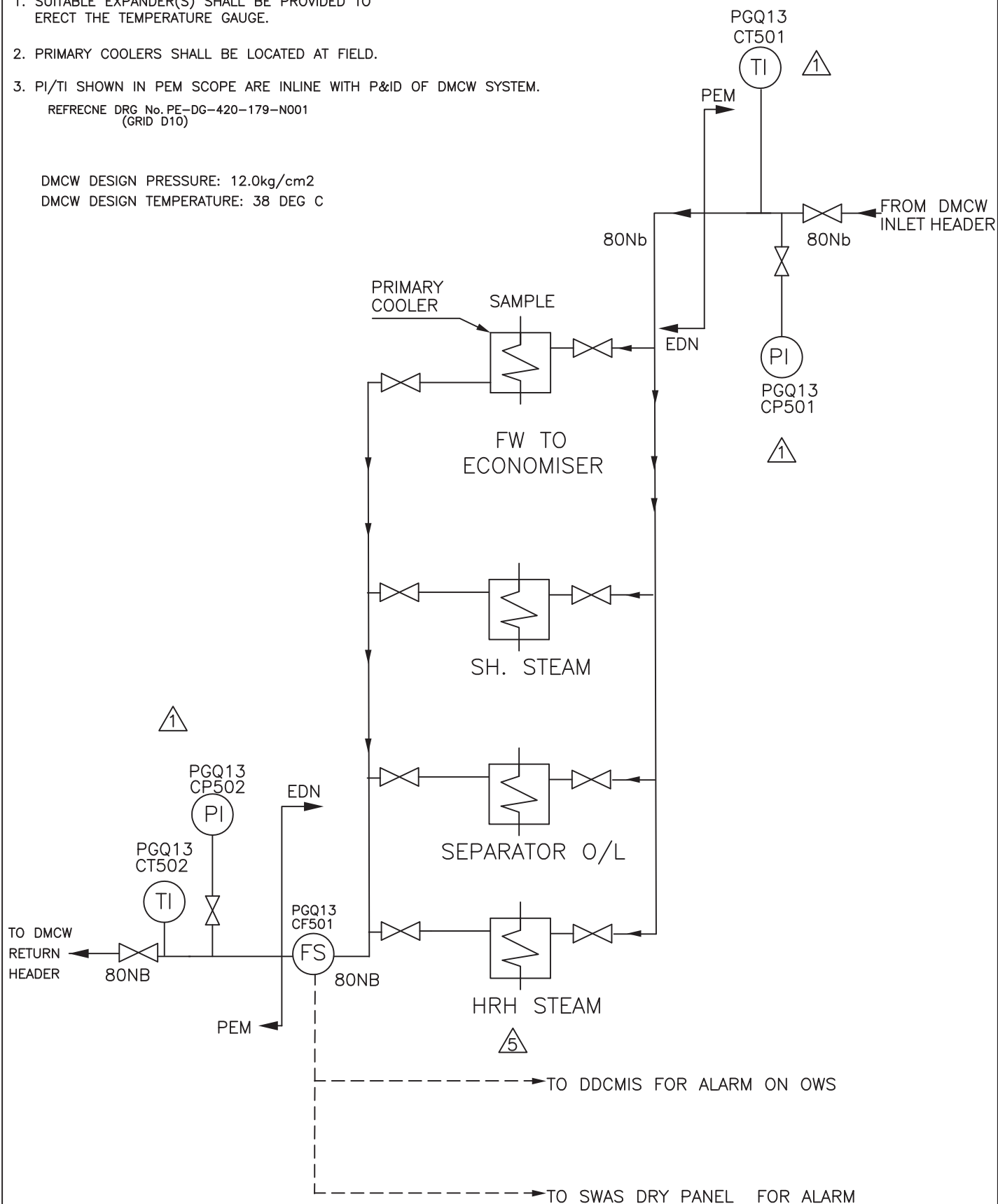
	1X800 MW APPDCL KRISHNAPATTANAM	TITLE SWAS SCHEME NOTES	DRG. NO. PE-DG-420-145-1110	
	STAGE-II		SHEET 4 OF 21	REV 06

NOTES:

1. SUITABLE EXPANDER(S) SHALL BE PROVIDED TO ERECT THE TEMPERATURE GAUGE.
2. PRIMARY COOLERS SHALL BE LOCATED AT FIELD.
3. PI/TI SHOWN IN PEM SCOPE ARE INLINE WITH P&ID OF DMCW SYSTEM.

REFRECNE DRG No. PE-DG-420-179-N001
(GRID D10)

DMCW DESIGN PRESSURE: 12.0kg/cm²
DMCW DESIGN TEMPERATURE: 38 DEG C



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE
SWAS SCHEME
DMCW SCHEME FOR PRIMARY COOLERS

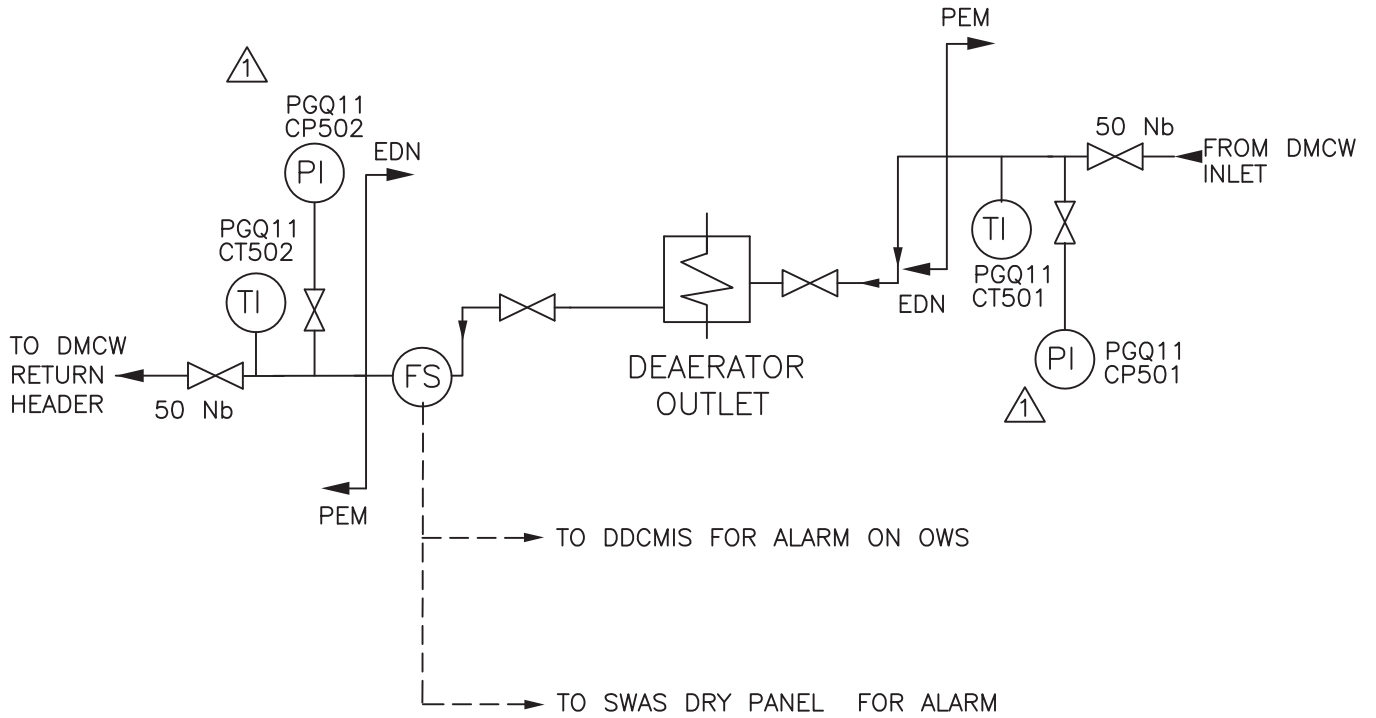
DRG. NO.
PE-DG-420-145-I110
SHEET 5 OF 21 REV 06

NOTES:

1. SUITABLE EXPANDER(S) SHALL BE PROVIDED TO ERECT THE TEMPERATURE GAUGE.
2. PRIMARY COOLERS SHALL BE LOCATED AT FIELD.
3. PI/TI SHOWN IN PEM SCOPE ARE INLINE WITH P&ID OF DMCW SYSTEM.

REFERENCE DRG : PE-DG-420-179-N001
(GRID D11)

DMCW DESIGN PRESSURE: 12.0kg/cm²
DMCW DESIGN TEMPERATURE: 38 DEG C



1X800 MW APPDCL KRISHNAPATTANAM

STAGE-II

TITLE

SWAS SCHEME

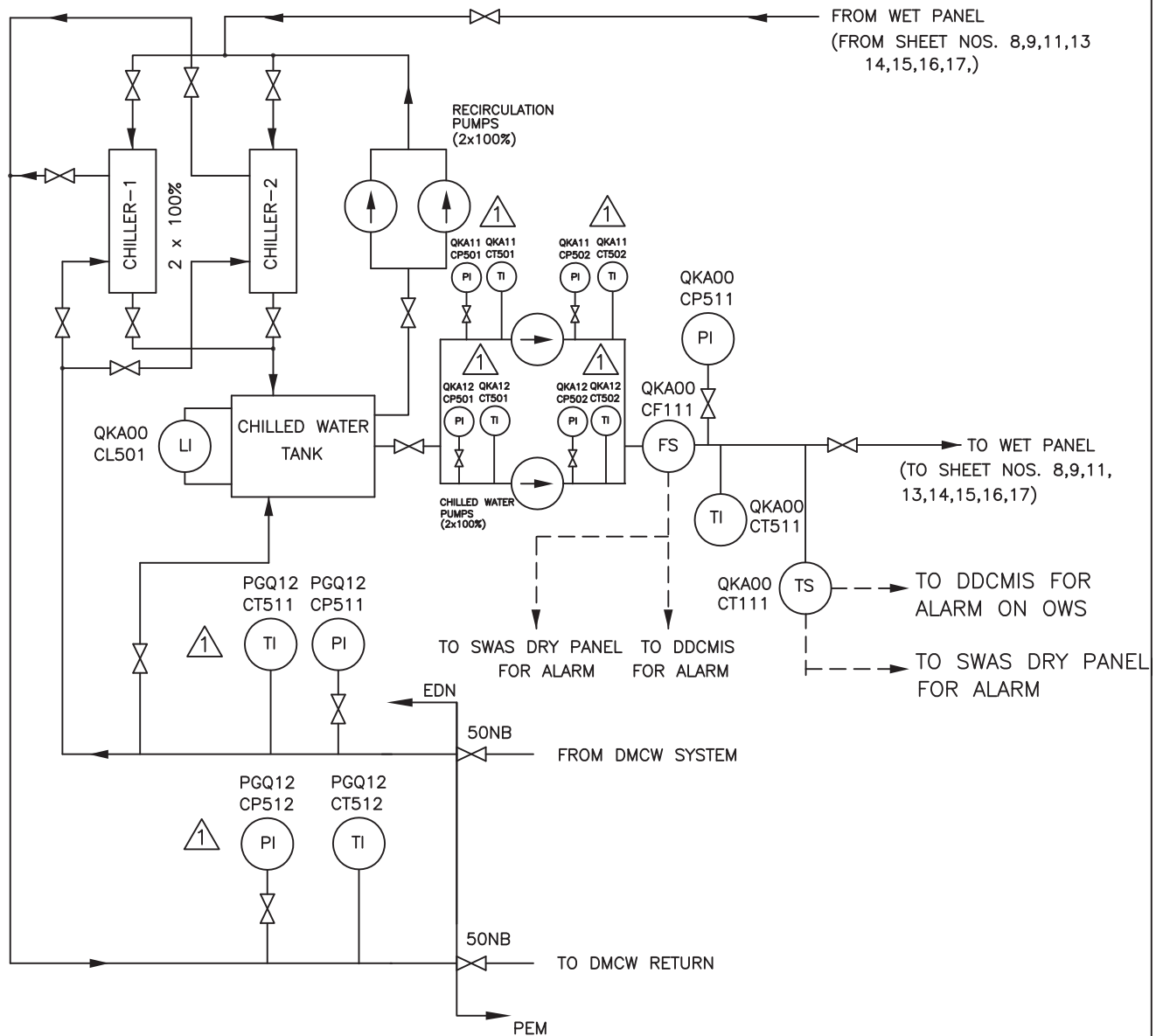
DMCW SCHEME FOR PRIMARY COOLERS

DRG. NO.

PE-DG-420-145-I110

SHEET 6 OF 21

REV 06



NOTES

1. ALL SECONDARY COOLERS ARE LOCATED IN SWAS WET PANELS.



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

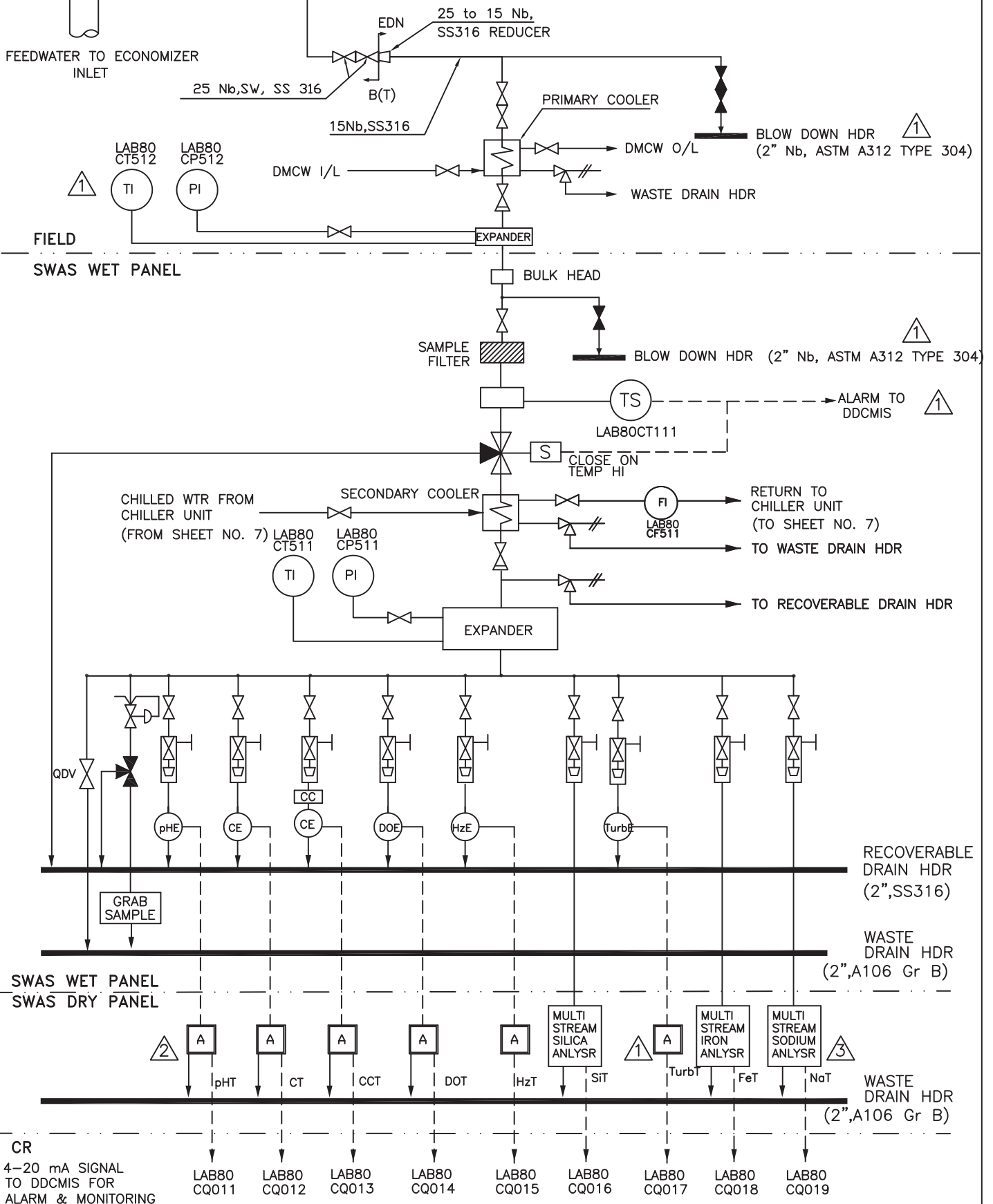
TITLE
SWAS SCHEME
CHILLED WATER SCHEME
FOR SECONDARY COOLERS

DRG. NO.
PE-DG-420-145-1110
SHEET 7 OF 21 REV 06

REFERENCE P&ID NAME :- FEED WATER SYSTEM
P&ID NO. :- PE-DG-420-100-N105

#PROCESS :

PARAMETER	OP/DESIGN	ENGG UNIT
PRESS	293/350	Kg/cm2(g)
TEMP	299/310	Deg C



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

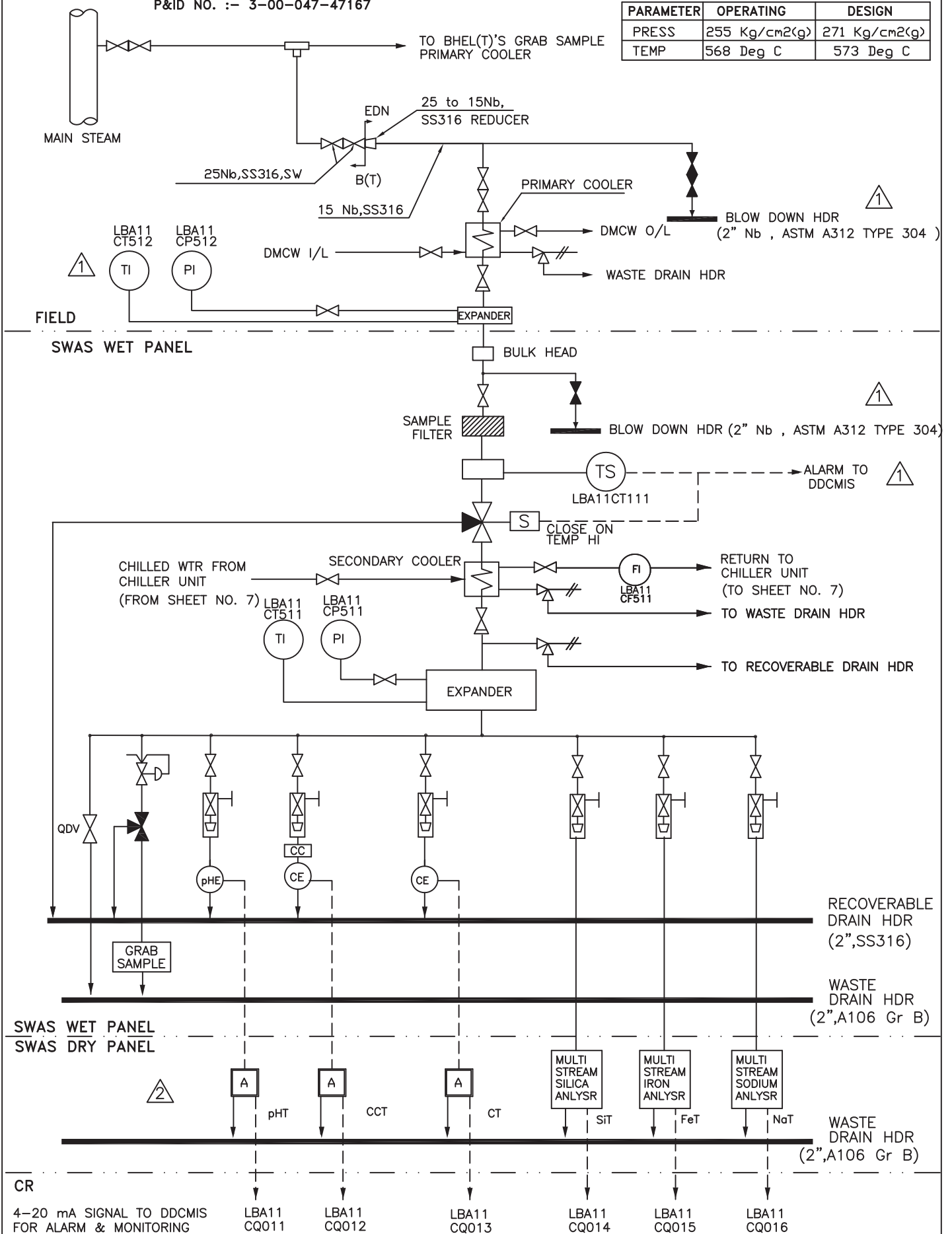
TITLE
SWAS SCHEME
FEED WATER TO ECONOMISER

DRG. NO.
PE-DG-420-145-I110
SHEET 8 OF 21
REV 06

REFERENCE P&ID NAME :- SAMPLING SYSTEM
P&ID NO. :- 3-00-047-47167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	255 Kg/cm2(g)	271 Kg/cm2(g)
TEMP	568 Deg C	573 Deg C



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE

SWAS SCHEME
SH/MAIN STEAM

DRG. NO.

PE-DG-420-145-I110

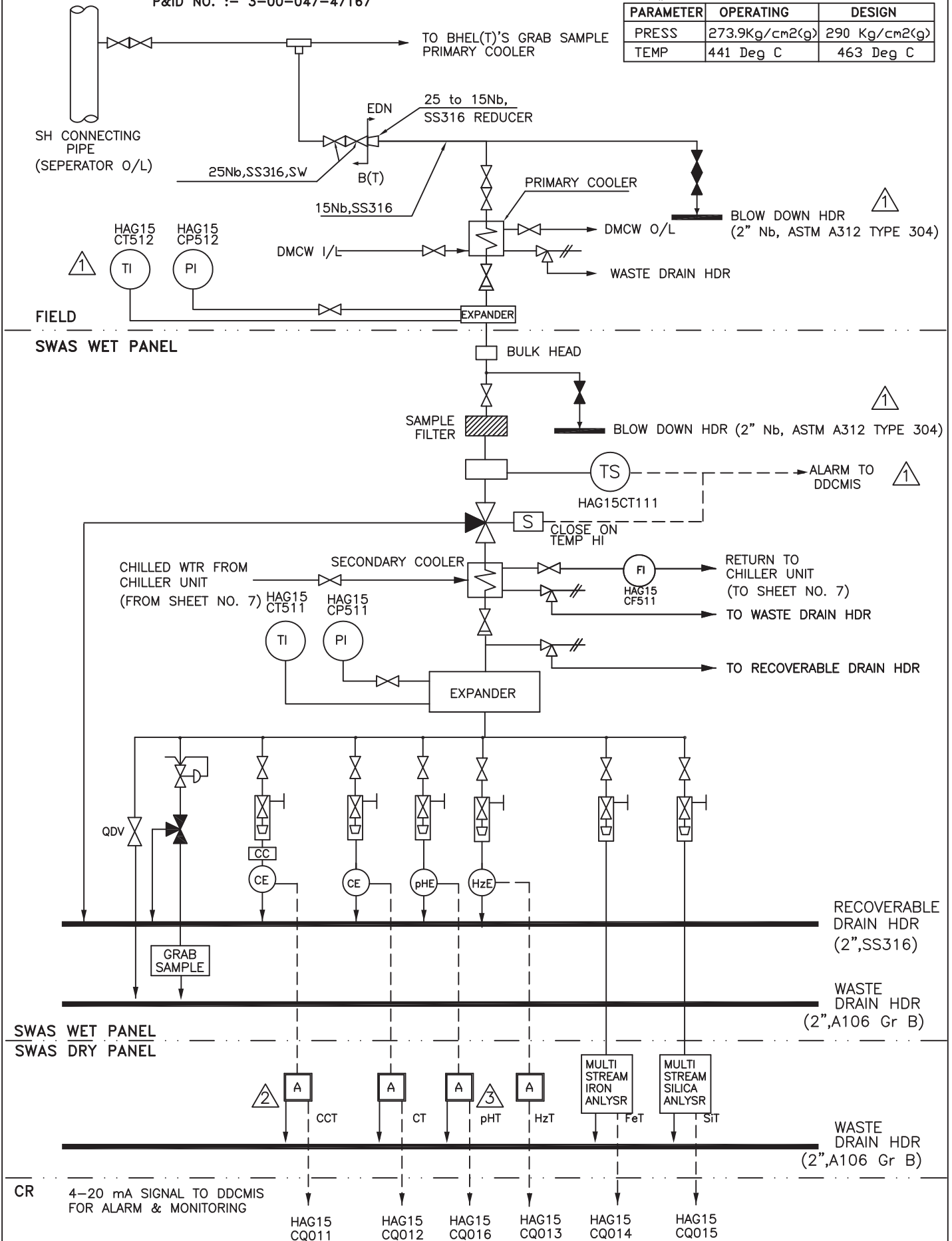
SHEET 9 OF 21

REV 06

REFERENCE P&ID NAME :- SAMPLING SYSTEM
P&ID NO. :- 3-00-047-47167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	273.9Kg/cm ² (g)	290 Kg/cm ² (g)
TEMP	441 Deg C	463 Deg C



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

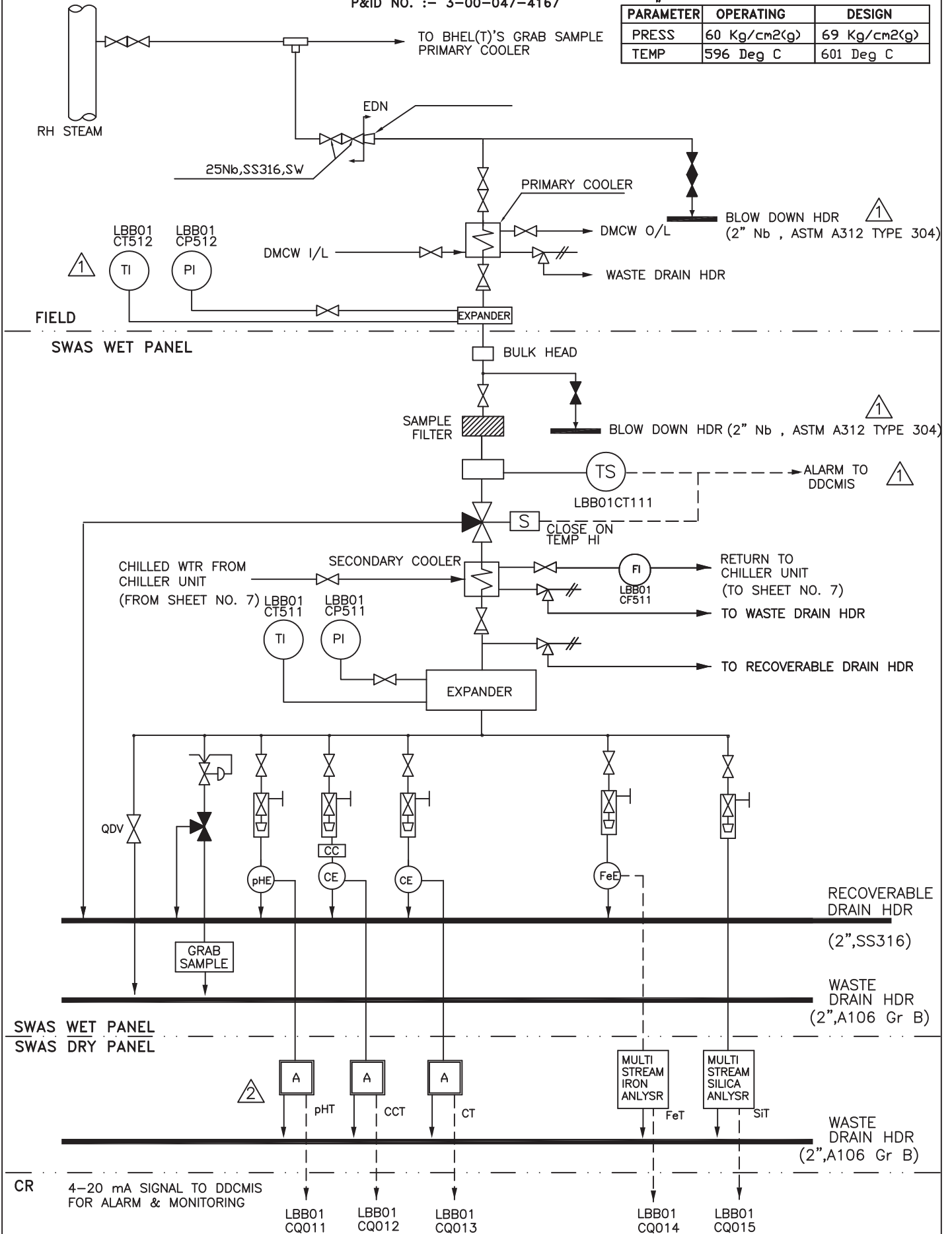
TITLE
SWAS SCHEME
SEPARATOR OUTLET STEAM

DRG. NO.
PE-DG-420-145-I110
SHEET 10 OF 21
REV 06

REFERENCE P&ID NAME :SAMPLING SYS
P&ID NO. :- 3-00-047-4167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	60 Kg/cm2(g)	69 Kg/cm2(g)
TEMP	596 Deg C	601 Deg C

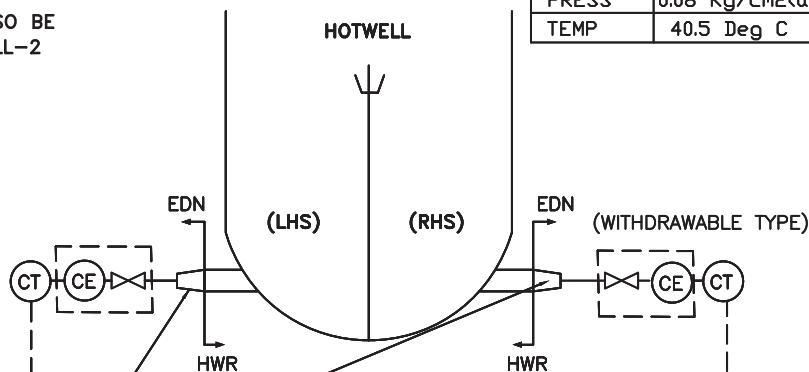


REFERENCE P&ID NAME :- CONDENSATE SYSTEM
P&ID NO. :- PE-DG-420-100-N106

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm ² (a)	1.1 Kg/cm ² (g)/VAC
TEMP	40.5 Deg C	60 Deg C

NOTE:- THIS SCHEME SHALL ALSO BE
APPLICABLE FOR HOTWELL-2



CR
4-20 mA SIGNAL
FOR ALARM &
MONITORING TO DDCMIS

MAG10
CQ011

MAG10
CQ012



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE

SWAS SCHEME
HOTWELL-1

DRG. NO.

PE-DG-420-145-I110

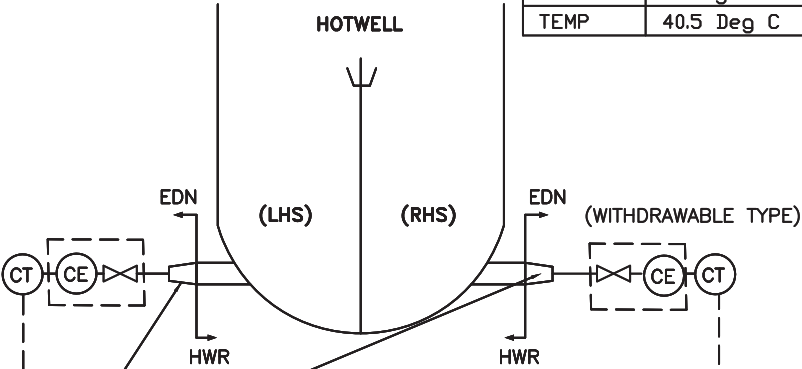
SHEET 12 OF 21

REV 06

REFERENCE P&ID NAME :- CONDENSATE SYSTEM
P&ID NO. :- PE-DG-420-100-N106

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm2(a)	1.1 Kg/cm2(g)/VAC
TEMP	40.5 Deg C	60 Deg C



SUITABLE ADOPTER SHALL BE PROVIDED ALONG WITH
PROBE FOR TAPPING POINT SIZE= 60.3X5.54MM
LENTGH OF PROBE SHALL BE DECIDED CONSIDERING
HOTWELL WALL THK + STUB HEIGHT + LENTGH OF ADOPTER.

CR
4-20 mA SIGNAL
FOR ALARM &
MONITORING TO DDCMIS

MAG20
CQ011

MAG20
CQ012



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE
SWAS SCHEME
HOTWELL-2

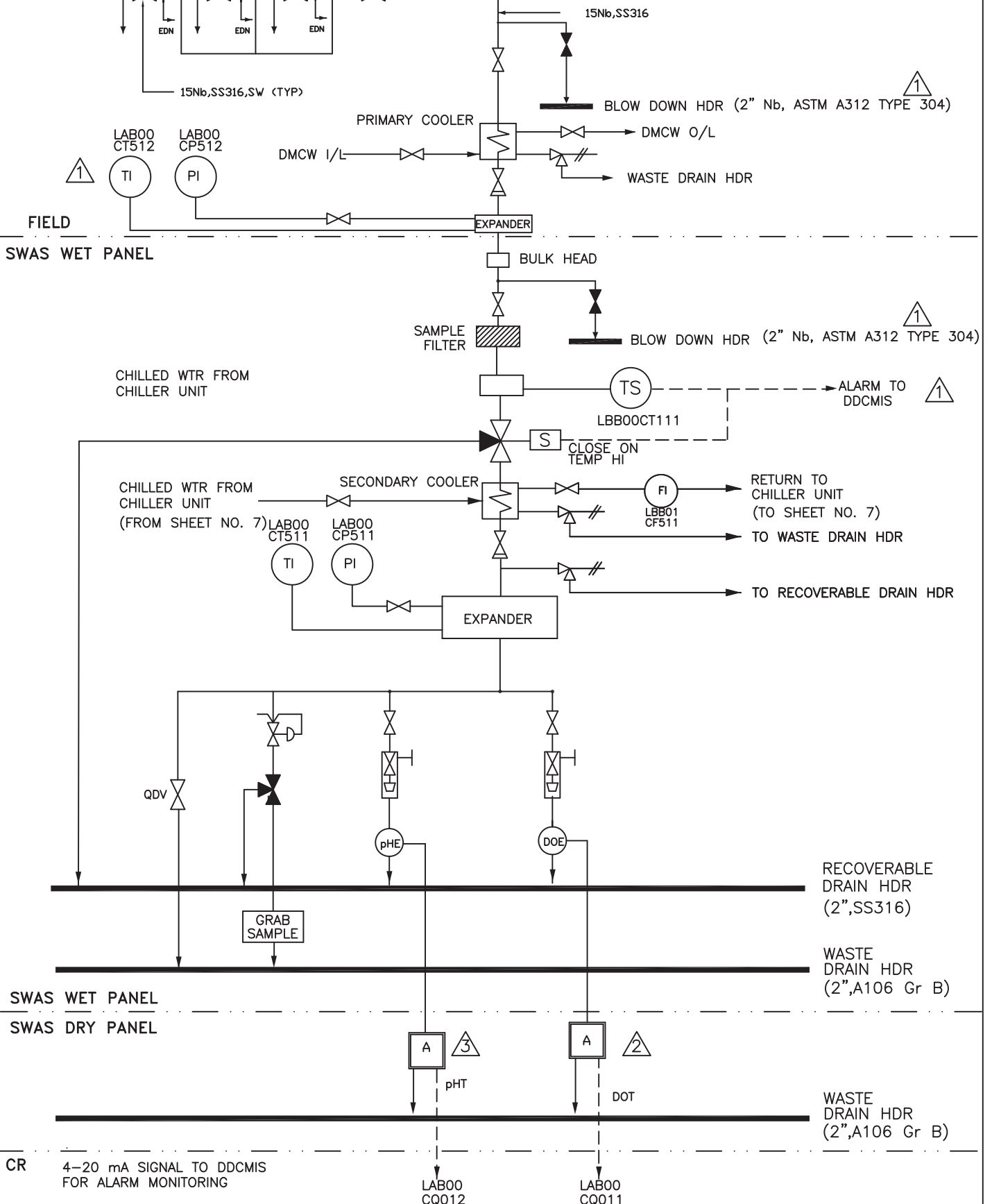
DRG. NO.
PE-DG-420-145-I110
SHEET 13 OF 21 REV 06



REFERENCE P&ID NAME :- FEEDWATER SYS
P&ID NO. :-PE-DG-420-100-N105

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	12.39Kg/cm2(a)	20 Kg/cm2(g)
TEMP	188.5 Deg C	200 Deg C



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE

SWAS SCHEME
DEAERATOR O/L

DRG. NO.

PE-DG-420-145-I110

SHEET 14 OF 21

REV 06

DM MAKE-UP WATER TO CONDENSER

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	7.0 Kg/cm2(a)	10 Kg/cm2(g)
TEMP	40 Deg C	50 Deg C

15Nb,SS316,SW

EDN

PEM

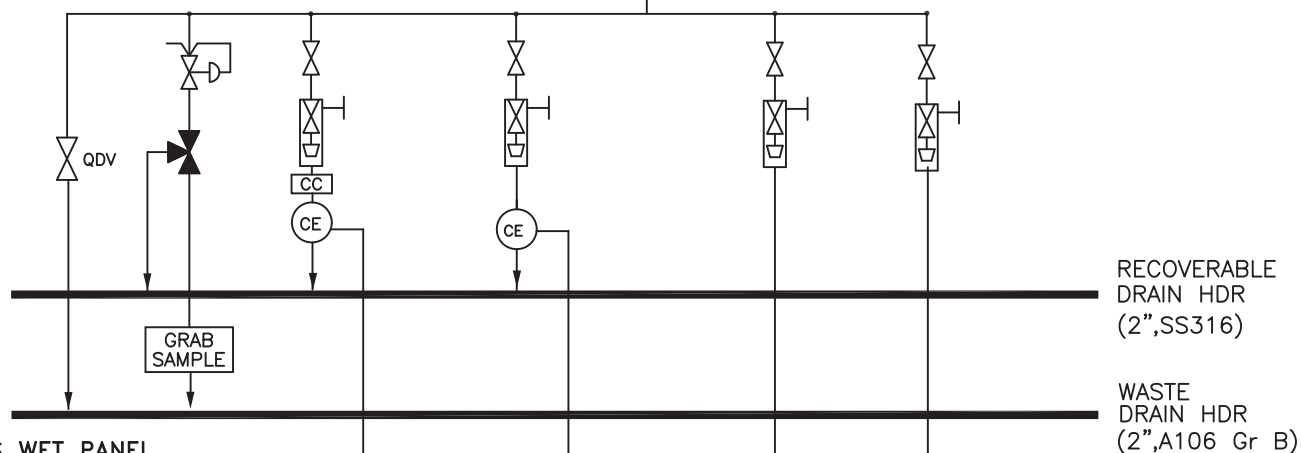
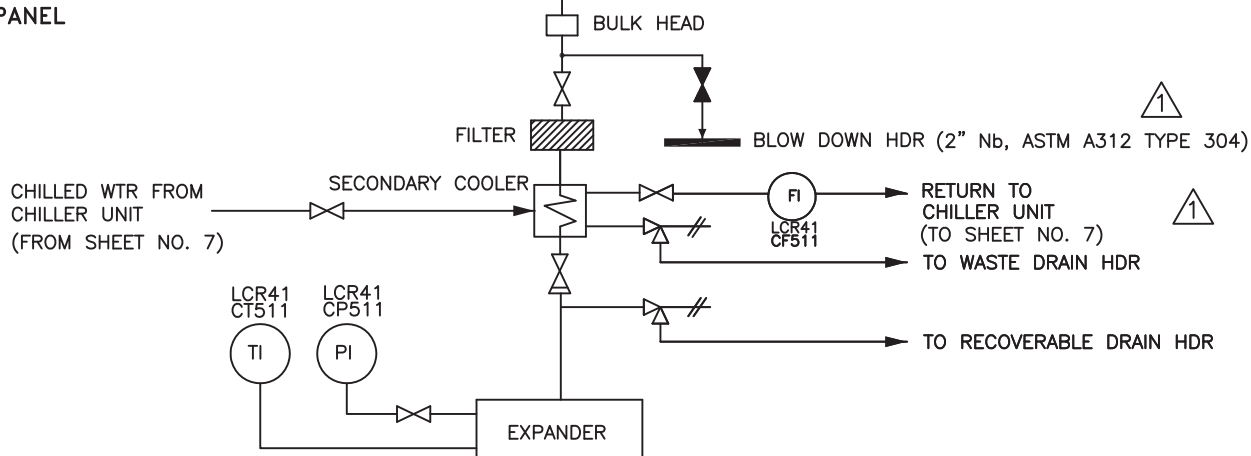
REFERENCE P&ID NAME :- DM M/U SYSTEM

P&ID NO. :- PE-DG-420-100-N110

15Nb,SS316

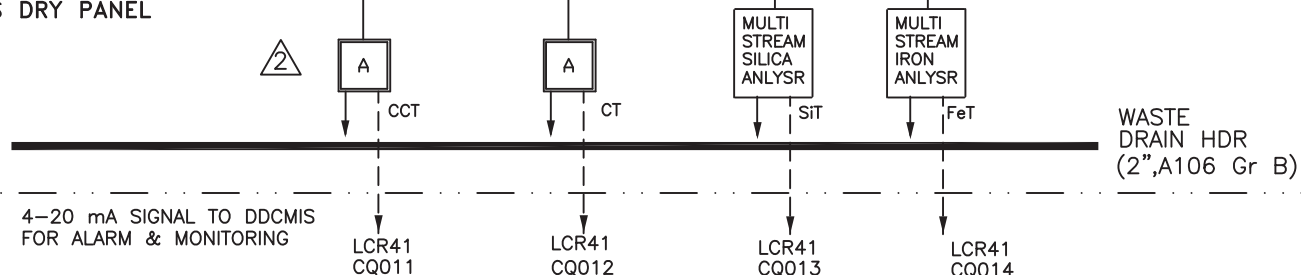
FIELD

SWAS WET PANEL



SWAS WET PANEL

SWAS DRY PANEL



CR 4-20 mA SIGNAL TO DDCMIS FOR ALARM & MONITORING



1X800 MW APPDCL KRISHNAPATTANAM

STAGE-II

TITLE

SWAS SCHEME

DM MAKE-UP WTR TO CONDENSER

DRG. NO.

PE-DG-420-145-I110

SHEET 15 OF 21

REV 06

CONDENSATE AT CEP DISCHARGE

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	30.6 Kg/cm2(a)	45 Kg/cm2(g)
TEMP	43 Deg C	60 Deg C

REFERENCE P&ID NAME :- CONDENSATE SYSTEM

P&ID NO. :- PE-DG-420-100-N106

15Nb,SS316,SW

EDN

PEM

15Nb,SS316

FIELD

SWAS WET PANEL

CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY COOLER

BULK HEAD

FILTER

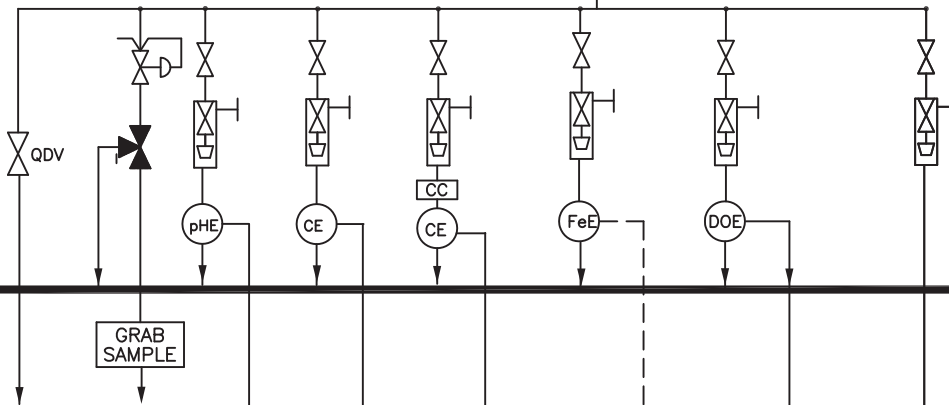
BLOW DOWN HDR (2" Nb, ASTM A312 TYPE 304)

RETURN TO
CHILLER UNIT
(FROM SHEET NO. 7)

TO RECOVERABLE DRAIN HDR

LCA20
CT511
TILCA20
CP511
PI

EXPANDER



SWAS WET PANEL

SWAS DRY PANEL

2

A

pHT

A

CT

A

CCT

5

MULTI
STREAM
IRON
ANLYSR
FeT

A

DOT

5

MULTI
STREAM
SODIUM
ANLYSR
NaTWASTE
DRAIN HDRCR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM & MONITORINGLCA20
CQ011LCA20
CQ012LCA20
CQ013LCA20
CQ014LCA20
CQ015LCA20
CQ016

1X800 MW APPDCL KRISHNAPATTANAM

STAGE-II

TITLE

SWAS SCHEME

CONDENSATE AT CEP DISCHARGE

DRG. NO.

PE-DG-420-145-I110

SHEET 16 OF 21

REV 06

CONDENSATE AT CPU O/L

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	30.6 Kg/cm ² (a)	45 Kg/cm ² (g)
TEMP	43.4 Deg C	60 Deg C

REFERENCE P&ID NAME :- CONDENSATE SYSTEM

P&ID NO. :- PE-DG-420-100-N106

15Nb,SS316,SW

EDN

PEM

5

15Nb,SS316

FIELD

SWAS WET PANEL

BULK HEAD

FILTER

BLOW DOWN HDR (2" Nb, ASTM A312 TYPE 304)

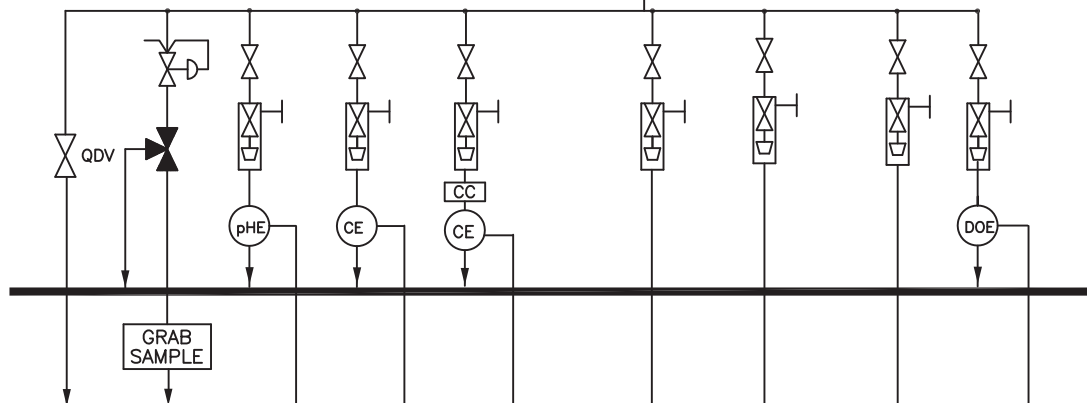
CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY COOLER

FI
LCA50
CF511RETURN TO
CHILLER UNIT
(TO SHEET NO. 7)
TO WASTE DRAIN HDRLCA50
CT511
TILCA50
CP511
PI

EXPANDER

TO RECOVERABLE DRAIN HDR

RECOVERABLE
DRAIN HDR
(2"Nb,SS316)WASTE
DRAIN HDR
(2"Nb,A106 Gr B)

SWAS WET PANEL

SWAS DRY PANEL

2

A

A

A

5

MULTI
STREAM
SODIUM
ANLYSRMULTI
STREAM
SILICA
ANLYSRMULTI
STREAM
CHLORIDE
ANLYSR

A

pHT

CT

CCT

NaT

SiT

CIT

DOT

WASTE
DRAIN HDR
(2"Nb,A106 Gr B)CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM & MONITORINGLCA50
CQ011LCA50
CQ012LCA50
CQ013LCA50
CQ014LCA50
CQ015LCA50
CQ016LCA50
CQ017

1X800 MW APPDCL KRISHNAPATTANAM

STAGE-II

TITLE

SWAS SCHEME
CONDENSATE POLISHER O/L

DRG. NO.

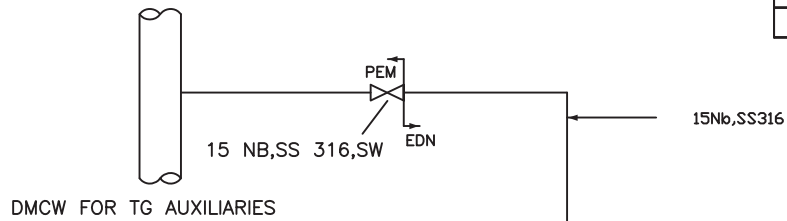
PE-DG-420-145-I110

SHEET 17 OF 21

REV 06

#PROCESS :

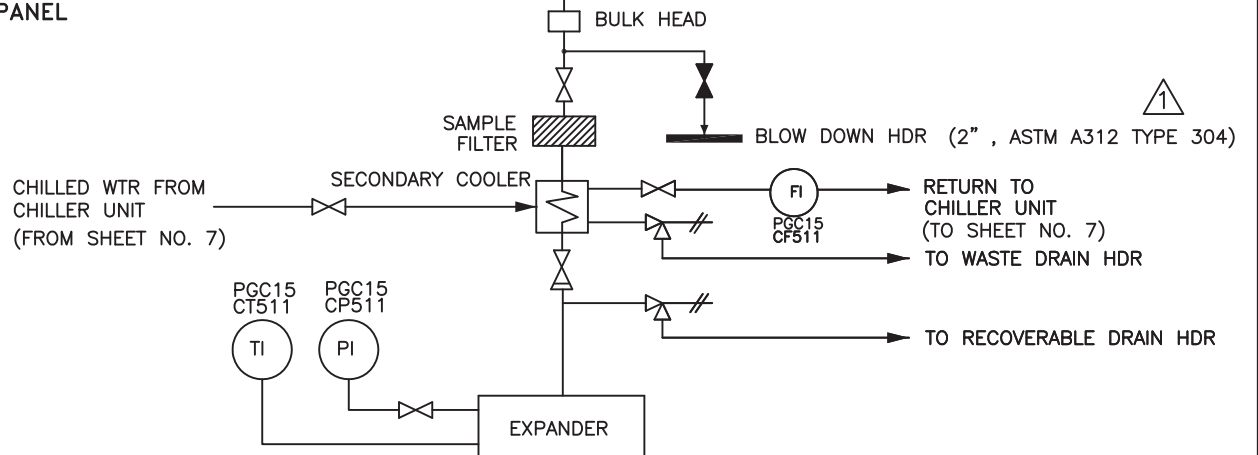
PARAMETER	OPERATING	DESIGN
PRESS	5.9 Kg/cm ² (g)	10 Kg/cm ² (g)
TEMP	38 Deg C	60 Deg C



\$REFERENCE P&ID NAME :- DMCW P&ID
\$ P&ID NO. :- PE-DG-420-179-N001

FIELD

SWAS WET PANEL



SWAS WET PANEL

SWAS DRY PANEL

CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM MONITORING

PGC15
CQ011



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

TITLE

SWAS SCHEME
DMCW FOR TG AUX

DRG. NO.

PE-DG-420-145-I110

SHEET 18 OF 21

REV 06

CW TO CONDENSER INLET

15Nb,SS316,SW

EDN

*CUSTOMER'S SCOPE

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm2(a)	1.1 Kg/cm2(g)/VAC
TEMP	40.5 Deg C	60 Deg C

* TERMINAL POINT SHALL BE IN TG BUILDING.

15Nb,SS316

FIELD

SWAS WET PANEL

BULK HEAD

FILTER

BLOW DOWN HDR (2" Nb,SS304)

CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY
COOLER

PAB11
CT511

PAB11
CP511

TI

PI

FI

PAB11
CF511

RETURN TO
CHILLER UNIT
(TO SHEET NO. 7)

TO WASTE DRAIN HDR

TO RECOVERABLE DRAIN HDR

EXPANDER

TS

PAB11CT111

ALARM TO
DDCMIS

CLOSE ON
TEMP HI

QDV

GRAB
SAMPLE

pHE

CE

RECOVERABLE
DRAIN HDR
(2"Nb,SS316)

WASTE
DRAIN HDR
(2"Nb,A106 Gr B)

SWAS WET PANEL

SWAS DRY PANEL

3

A

pHT

PAB11
CQ011

3

A

CT

PAB11
CQ012

WASTE
DRAIN HDR
(2"Nb,A106 Gr B)

CR 4-20 mA SIGNAL TO DCS
FOR ALARM & MONITORING



1X800 MW APPDCL KRISHNAPATTANAM
STAGE-II

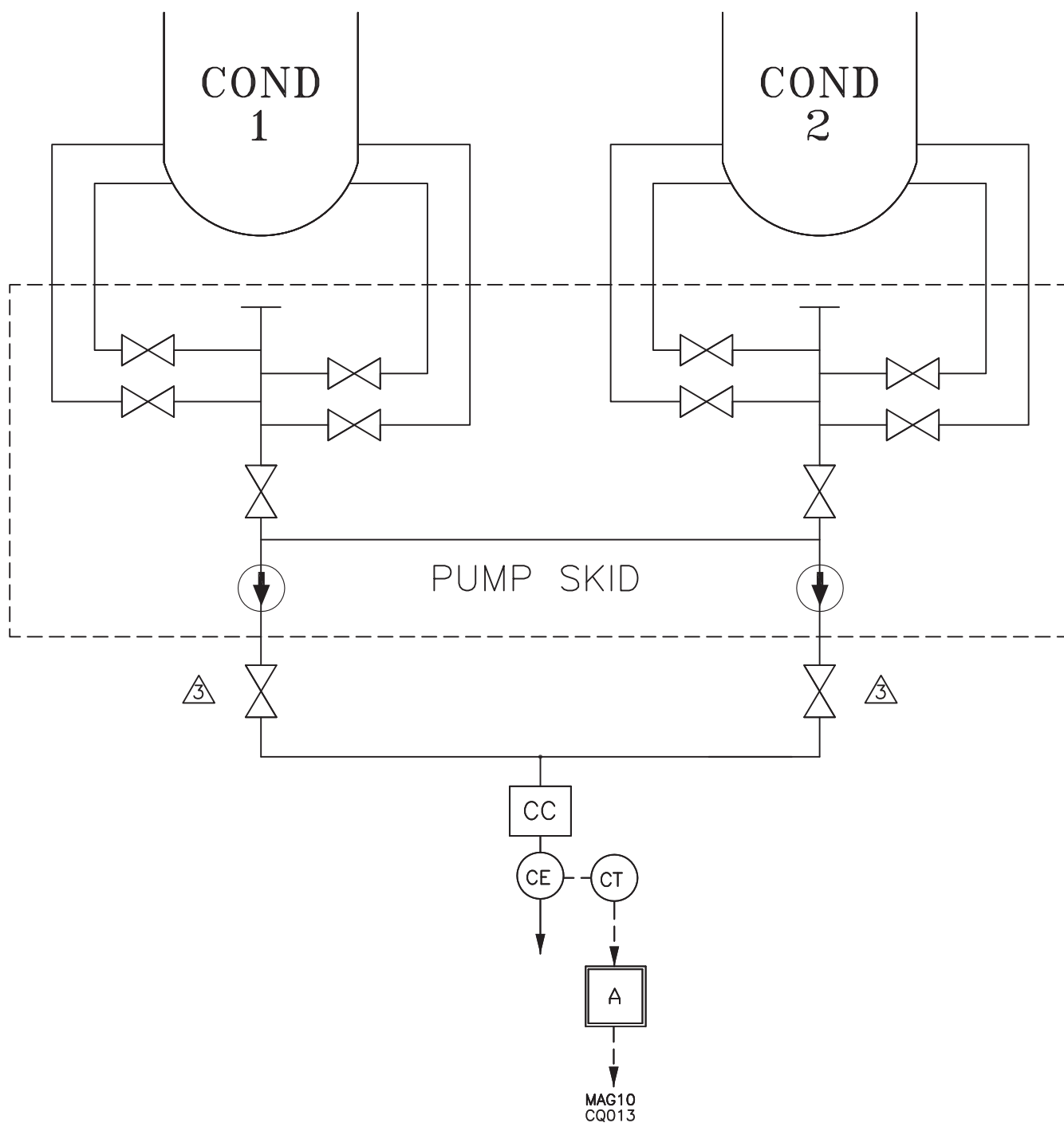
TITLE SWAS SCHEME
CONDENSER COOLING WATER

DRG. NO. PE-DG-420-145-1110
SHEET 21 OF 21 REV 06

REFERENCE P&ID NAME :- CONDENSATE SYSTEM
P&ID NO. :- PE-DG-419-100-N106

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm ² (a)	1.1 Kg/cm ² (g)/VAC
TEMP	40.5 Deg C	60 Deg C



NOTES:-

1. THIS IS ONLY A SCHEMATIC DRAWING DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
2. VENDOR TO PROVIDE SOLENOID VALVE, SEQUENCER ETC. TO COMPLETE THE PROCESS REQUIREMENT AND AS PER OEM's PRACTICE.
3. NECESSARY PUMP PROTECTION SHALL BE CONSIDERED BY VENDOR AS PER OEM's PRACTICE AND ALL THE RELATED DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
4. CATION CONDUCTIVITY ANALYZER SHALL BE MOUNTED IN RACK PLACED LOCALLY.
5. HARD WIRE ALARM SIGNAL SHALL BE PROVIDED TO SWAS PANEL AND DCS.



1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE
SWAS SCHEME
CATION CONDUCTIVITY AT
CONDENSER-1&2

DRG. NO.
PE-DG-419-145-I110
SHEET 20 OF 21 REV 04

SAMPLING PANEL P&ID



NOTE FOR CONDUCTIVITY ANALYZER SAMPLING PANEL:

1. SAMPLE TUBING: 3/8" OD 20 SWG, ASTM A213, TP316, SEAMLESS TUBE
2. SAMPLE INLET CONNECTION: BHU 3/8" OD x 3/8" OD SS316

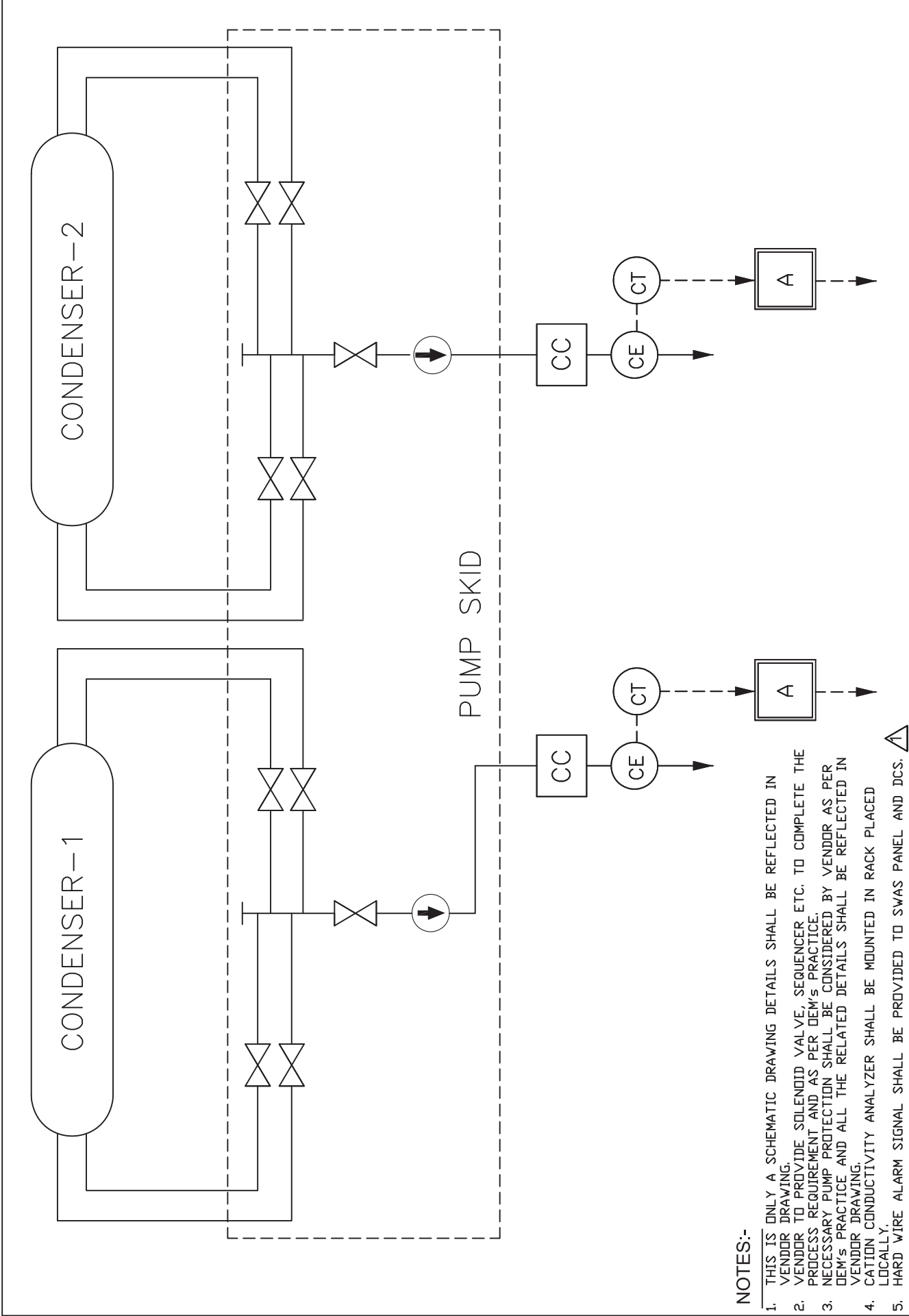
LEGEND FOR CONDUCTIVITY ANALYZER PANEL

ITEM NO	DESCRIPTION
16	ROTAMETER
17	TUNDISH
19	CATION COLUMN(DUAL TYPE)
27	SAMPLE INLET & OUTLET BHU (3/8"OD X 3/8"OD) SS316
CE	CATION CONDUCTIVITY CELL+FLOW THROUGH CHAMBER
CT	CONDUCTIVITY TRANSMITTER

THE

SAMPLING SKID FOR CONDENSER

DEPT:CE-ENG	REV.NO: 00	NO.OF SHEETS	SHEET NO.
CODE: 416			



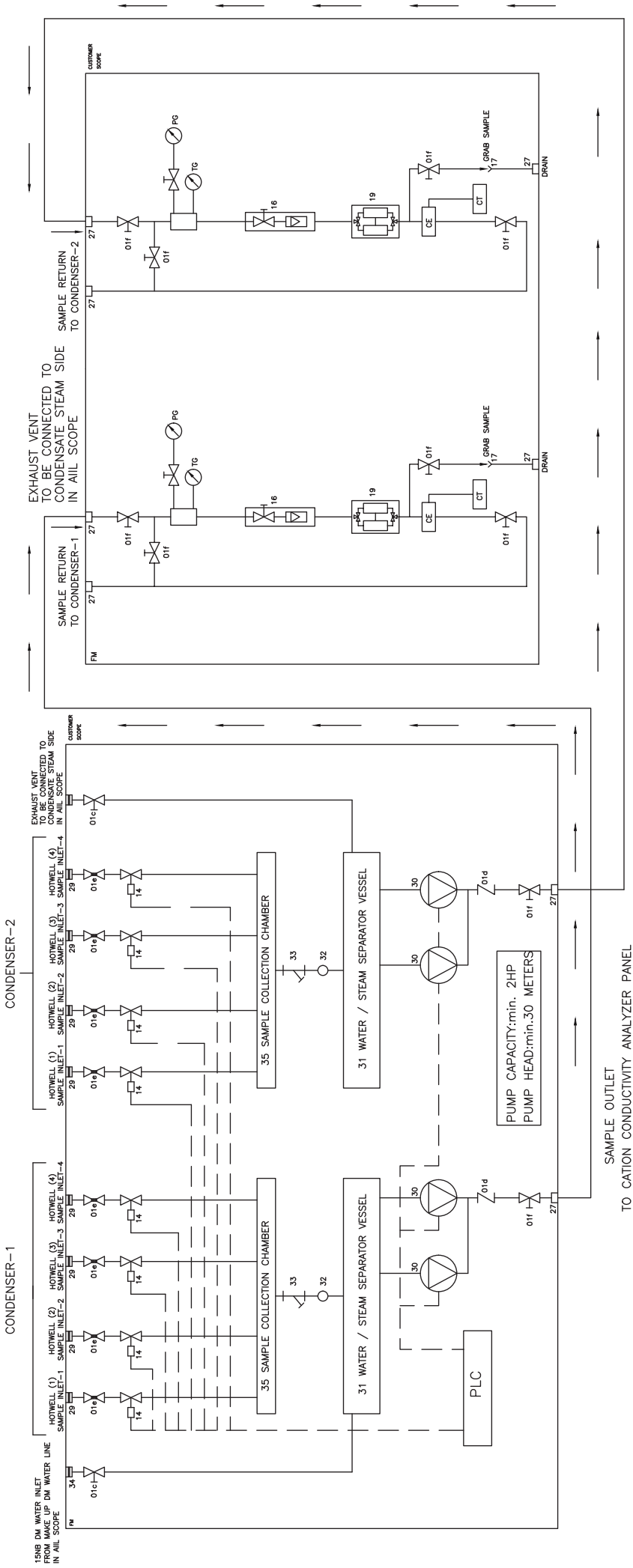
NOTES:-

1. THIS IS ONLY A SCHEMATIC DRAWING DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
2. VENDOR TO PROVIDE SOLENOID VALVE, SEQUENCER ETC. TO COMPLETE THE PROCESS REQUIREMENT AND AS PER DEM'S PRACTICE.
3. NECESSARY PUMP PROTECTION SHALL BE CONSIDERED BY VENDOR AS PER DEM'S PRACTICE AND ALL THE RELATED DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
4. CATION CONDUCTIVITY ANALYZER SHALL BE MOUNTED IN RACK PLACED LOCALLY.
5. HARD WIRE ALARM SIGNAL SHALL BE PROVIDED TO SWAS PANEL AND DCS. ⚠

	Telangana State Power Generation Co Ltd.	TITLE	CATION CONDUCTIVITY AT CONDENSER-1&2	DRG. NO.		
	KOTHAGUDEM (1X800 MW)			PE-DG-410-145-I110		
				SHEET 19	DF 19	REV 00

SAMPLING SKID P&ID

SAMPLING PANEL P&ID



NOTE FOR SAMPLING SKID:

- 1) SAMPLE PIPING INSIDE SAMPLING SKID : 25NB, ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE
- 2) SAMPLE INLET CONNECTION TO SYSTEM RACK : 25NB, SS304, ANSI B16.5, CLASS 150#, R/F FLANGE
- 3) SAMPLE OUTLET TO CONDUCTIVITY MEASUREMENT RACK FROM CLTDS RACK : UNION 3/8" OD SS316
- 4) MAKE UP DM WATER CONNECTION: 15NB SS304, ANSI B16.5, 150# S/W R/F, FLANGE
- 5) PIPING UP TO WATER/GAS SEPARATOR VESSEL INLET: 25NB,ASTM A312,TP-304,SCH-40S,SEAMLESS PIPE
- 6) PIPING AFTER WATER/GAS SEPARATION TO PUMP INLET: 50NB, ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE
- 7) TUBING AFTER PUMP OUTLET NRV TO CONDUCTIVITY ANALYZER PANEL: 3/8"OD, ASTM A213, 20SWG, TP-316, SEAMLESS TUBE
- 8) AIR VENT CONNECTION TO CONDENSER : 25NB,ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE WITH 25NB SS304 S/W RF 150# FLANGE
- 9) AIR VENT NOZZLE TO BE WELDED TO CONDENSER BY: SOCKET 25NB SS304 CLASS 3000#

NOTE FOR CONDUCTIVITY ANALYZER SAMPLING PANEL:

- 1. SAMPLE TUBING: 3/8" OD 20 SWG, ASTM A213, TP316, SEAMLESS TUBE
- 2. SAMPLE INLET CONNECTION: BHU 3/8" OD x 3/8" OD SS-316

LEGEND FOR PUMP SKID:

ITEM NO	DESCRIPTION
01c	MAKE UP WATER VALVE(1/2" NEEDLE VALVE)
01e	SAMPLE ISOLATION VALVE(1: BALL VALVE)
01d	NON RETURN VALVE
01f	SAMPLE ISOLATION VALVE (3/8"OD NEEDLE TYPE)
14	2-WAY SOLENOID VALVE
27	UNION (3/8"OD X3/8"OD)SS316
29	SAMPLE INLET FLANGE: 25NB, 150#, S/W RF
30	SAMPLE EXTRACTION PUMP
31	6" SIZE WATER/GAS SEPARATOR VESSEL
32	1" SIZE FLOW INDICATOR
33	1" SIZE Y TYPE STRAINER
34	MAKE UP WATER INLET FLANGE: 15NB, SS304, 150#, S/W R/F
33	SAMPLE COLLECTION CHAMBER

LEGEND FOR CONDUCTIVITY ANALYZER PANEL

ITEM NO	DESCRIPTION
16	ROTAMETER
17	TUNDISH
19	CATION COLUMN(DUAL TYPE)
27	SAMPLE INLET & OUTLET BHU (3/8"OD X 3/8"OD) SS316
28	3/4" NPT(M) CONNECTION FOR COOLING WATER
CE	CATION CONDUCTIVITY CELL+FLOW THROUGH CHAMBER
CT	CONDUCTIVITY TRANSMITTER



TITLE:

SAMPLING SKID FOR CONDENSER

DEPT:CE-ENG	REV.NO: 00	NO.OF SHEETS	SHEET NO.
CODE: 416			

CHECK LIST FOR STAINLESS STEEL COMPRESSION FITTINGS

NUMBER :CE/416/SSF/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	DIMENSIONS	REFER NOTE : 1	↑	P	V	V		
2	MATERIAL	SAMPLE/ HEAT / LOT	APPROVED SPECS./ DATA SHEETS ↓	P	V	V		
2.1	CHEMICAL			P	V	V	✓	
2.2	PHYSICAL, HARDWARE		↑	P	V	V	✓	
3	PROOF PRESSURE TEST	5 RDM. SAMPLE	↑	P	V	V	✓	
4	DISMANTLING RE-ASSEMBLY TEST	3 RDM. SAMPLE	↑	P	V	V		
5	HYDRAULIC IMPULES & VIBRATION TEST	5 RDM. SAMPLE	↓	P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100% - BY MANUFACTURER
NIL -BY M/s BHEL
NIL CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

PREPARED BY
M/S BHEL



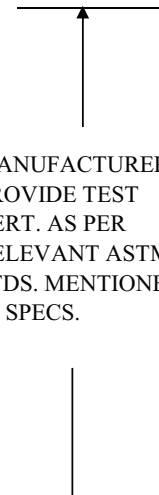
CHECK LIST FOR IMPULSE PIPES AND TUBES

NUMBER : CE/416/SP/CL

REVISION : 00

DATE : 21-07-15

CONTRACTOR : M/S BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	CHEEH FOR DIMENSION, GRADE, SURFACE-DEFECTS	SEE NOTE: BELOW	APPROVED DATA SHEET AND CORES SPONDING ASTM STDSFOR GRADE OF MATERIAL	P	V	V	✓	 MANUFACTURER TO PROVIDE TEST CERT. AS PER RELEVANT ASTM STDS. MENTIONED IN SPECS.
2	CHEMICAL PROPERTIES AND PHY. PROPERTIES AS PER RELEVANT ASTM. (GRADE SHALL BE AS PER APPROVED DATA SHEET)	FOR LOT		P	V	V	✓	
3	FLATTENING TEST.		DO	P	V	V	✓	
4	FLARING TEST	##		P	V	V	✓	
5	BENDING TEST.	**		P	V	V	✓	
6	HYDRAULIC TEST OR EDDY CURRENT TEST			P	V	V	✓	
7	HARDNESS CHECK	##		P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' \ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100% - BY MANUFACTURER.

NIL -BY M/S BHEL

NIL - BY CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) ## APPLICABLE FOR TUBES ONLY

4) ** APPLICABLE FOR CS PIPES ONLY.

5) WHEN MATERIAL CORRELATION IS NOT POSSIBLE , MATERIAL SAMPLES ARE TO BE TESTED AT THIRD PARTY LAB & TEST CERTIFICATES ARE TO BE SUBMITTED FOR NTPC REVIEW - CHP

PREPARED BY
M/S BHEL



CHECK LIST FOR FLOW SWITCH

NUMBER : CE/416/FS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	TYPE , MODEL , SL . NO . TAG NO. , RANGE.	↑	↑	P	V	V	✓	IN CASE OF IMPORTED ITEMS, CONTR. SHALL REVIEW TC's & NOT INSPECT.
2.0	SIZE , DIMENSIONS	REFER	AS PER APPROVED DATA SHEETS	P	V	V	✓	
3.0	REPEATABILITY	NOTE : 1 BELOW		P	V	V	✓	
4.0	HV / IR	↓		P	V	V	✓	
5.0	CONTACT RATNG / NO. OF CONTACTS	100%		P	V	V	✓	
6.0	MATL. T.C. FOR BODY, WET PARTS.	RANDOM		P	V	V	✓	
7.0	ACCESSORIES AS APPLICABLE	ONE/LOT		P	V	V	✓	
		100%	↓	P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ✓ SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

- 100 % - BY MANUFACTURER.
NIL - BY CONTRACTOR.
NIL -BY M/S CUSTOMER.

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST.

PREPARED
M/S BHEL



CHECK LIST FOR TEMPERTURE SWITCH

NUMBER : CE/416/TS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	TYPE, MODEL, SL. NO., TAG NO., RANGE.	↑	↑	P	W	V	✓	IN CASE OF IMPORTED ITEMS, CONTR. SHALL REVIEW TC's & NOT INSPECT.
2.0	DIMENSIONS CHECK	REFER NOTE : 1 BELOW	APPROVED SPECS./ DATA SHEETS	P	W	V	✓	
3.0	REPEATABILITY	↓		P	W	V	✓	
4.0	SWITCHING DIFERENTIAL							
5.0	CONTACT RATING / NO. OF CONTACTS	RANDOM		P	W	V	✓	
6.0	MATL. T.C. FOR BULB, CAPILLARY, ARMOUR	ONE/LOT		P	V	V	✓	
7.0	HV / IR	RANDOM		P	W	V	✓	
8.0	DEGREE OF PROTECTION	TYPE TEST		P	V	V	✓	
9.0	THERMOWELLS							
9.1	DIMENSIONS	100%		P	V	V	✓	
9.2	MATL. T.C. FOR THERMOWELL	ONE/LOT		P	V	V	✓	
9.3	HYD. TEST	100%		P	W	V	✓	
9.4	IBR CERT. IF APPLICABLE.		↓	P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP. AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION**NOTE :** 1) QUANTUM OF CHECK SHALL BE AS BELOW :

- 100 % - BY MANUFACTURER.
NIL - BY CONTRACTOR.
NIL - BY M/s CUSTOMER.

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.



PREPARED BY :
M/S BHEL



CHECK LIST FOR TEMPERATURE GAUGE / PAGE 1 OF 2

NUMBER : CE/416/TG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY**				REMARKS
				M	C	N	D*	
1.0	CHECK FOR		APPROVED SPECS. / APPROVED DATA SHEETS	P	V	V	✓	BY GO / NOGO GAUGE
1.1	DIAL SIZE			P	V	V	✓	
1.2	MODEL NO/TAG NO			P	V	V	✓	
1.3	RANGE/SCALE			P	V	V	✓	
1.4	END CONNECTION		DO	P	V	V	✓	MFR TO CARRY OUT ROUTINE TEST ON 100 %
2.0	CALIBRATION			P	V	V	✓	
2.1	ACCURACY			P	V	V	✓	
2.2	REPETABILITY			P	V	V	✓	
2.3	HYSTERESIS		DO	P	V	V	✓	WHEN MAT'L CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED
3.0	OVER TEMPERATURE TEST			P	V	V	✓	
4.0	AMBIENT TEMP. COMPENSATION CHECK			P	V	V	✓	
5.0	REVIEW OF T.C FOR MATERIALS OF-							
5.1	SENSOR	TYPE TEST	AS PER APPROVED DRAWING	V	V	V	✓	IBR CERT. TO BE PROVIDED IF CALLED IN SPECS.
5.2	MOVEMENT			V	V	V	✓	
5.3	PROCESS CONNEC.			V	V	V	✓	
5.4	HOUSING			V	V	V	✓	
6.0	REVIEW OF TC FOR DEGREE OF PROTEC.		AS PER APPROVED DRAWING	P	V	V	✓	IBR CERT. TO BE PROVIDED IF CALLED IN SPECS.
7.0	THERMOWELL			V	V	V	✓	
7.1	HYD TEST ON THERMOWELL			V	V	V	✓	
7.2	MATERIAL T.C FOR THERMOWELL			V	V	V	✓	
7.3	DIMENSIONAL CHECK							

LEGEND:

* RECORDS, IDENTIFIED WITH '✓' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY.
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

CHECK LIST FOR TEMPERATURE GAUGE / PAGE 2 OF 2

NUMBER : CE/416/TG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100 % - BY MANUFACTURER.

NIL - BY M/s BHEL.

NIL - BY CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING
BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING
ENGINEER SHALL CHECK THE SAME.

PREPARED BY :
M/S BHEL



CHECK LIST FOR PRESSURE & DIFFERENTIAL PRESSURE SWITCH

NUMBER : CE/416/PS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	CHECK FOR	↑	APPROVED SPECS. / DATA SHEETS	P	V	V	✓	BY GO/ NO GO GAUGE
1.1	MODEL NO. TAG NO.			P	V	V	✓	
1.2	RANGE			P	V	V	✓	
1.3	END CONNECTION	↓	DO	P	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
2.0	REPEATABILITY			P	V	V	✓	
2.1	HYSTERESIS			P	V	V	✓	
3.0	DIFFERENTIAL	↓	DO	P	V	V	✓	
4.0	OVER PRESSURE AND LEAK TEST			P	V	V	✓	
5.0	ELECTRICAL INSULATION / H.V TEST			P	V	V	✓	
5.1	REVIEW OF T.C FOR MATERIALS OF- SENSOR	FOR LOT	DO	V	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
5.2	MOVEMENT			V	V	V	✓	
5.3	HOUSING			V	V	V	✓	
6.0	TC OF MICRO SWITCH	TYPE TEST	DO	V	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
7.0	REVIEW OF T.C FOR DEGREE OF PROTECTION.			V	V	V	✓	
				V	V	V	✓	

LEGEND:

* RECORDS, IDENTIFIED WITH ' ✓ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY.
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW : 100 % - BY MANUFACTURER
NIL - BY CONTRACTOR.
NIL - BY M/s CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) IN CASE OF IMPORTED PRESSURE SWITCHES DP SWITCHES BHEL SHALL REVIEW TC AND SHALL NOT INSPECT.

PREPARED BY :

M/S BHEL



CHECK LIST FOR PRESSURE GAUGE & DIFFERENTIAL PRESSURE GAUGE

NUMBER : CE/416/PG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/S B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	CHECK FOR	SEE NOTE-1 BELOW	APPROVED SPECS. / DATA SHEETS	P	V	V	✓	MFR TO CARRY OUT ROUTINE TEST ON 100 % . WHEN MAT'L CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED
1.1	DIAL SIZE			P	V	V	✓	
1.2	MODEL NO/TAG NO			P	V	V	✓	
1.3	RANGE/SCALE			P	V	V	✓	
1.4	END CONNECTION			P	V	V	✓	
2.0	CALIBRATION							
2.1	ACCURACY			P	V	V	✓	
2.2	REPETABILITY			P	V	V	✓	
2.3	HYSTERESIS			P	V	V	✓	
3.0	OVER PRESSURE AND LEAK TEST			P	V	V	✓	
4.0	OPERATION OF PR. RELIEF DEVICE.	# ONE		P	V	V	✓	
5.0	REVIEW OF T.C FOR MATERIALS OF-	FOR LOT		V	V	V	✓	
5.1	SENSOR	TYPE TEST SEE NOTE-1		V	V	V	✓	
5.2	MOVEMENT			V	V	V	✓	
5.3	PROCESS CONNEC.			V	V	V	✓	
5.4	HOUSING			V	V	V	✓	
6.0	REVIEW OF TC FOR DEGREE OF PROTEC.			V	V	V	✓	
7.0	ACCESSORIES, AS APPLICABLE			V	V	V	✓	

LEGEND:

* RECORDS, IDENTIFIED WITH ' ✓ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY. N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100 % - BY MANUFACTURER.

NIL - BY M/s BHEL.

NIL - BY M/s CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) # ONE FOR PR. GAUGE AND ONE FOR DP GAUGE.

PREPARED BY :
M/S BHEL





A4 - 10

REF. : KRISHNA/416/SWAS/VL

REV. NO. : 00

PAGE : 01 OF 02

PROJECT :- KRISHNAPATNAM - 1 X 800 MW TPS

CUSTOMER :- APGENCO

APPROVED VENDOR LIST

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REVISIONS :

APPROVED

(Punit P Singh)

PREPARED

ISSUED

DATE

PRK

416

01-12-2017



VENDOR LIST FOR SWAS

KRISHNA/416/SWAS/VL
REV.NO.: 00

SS TUBES AND PIPES: TPS Technitube Germany, MAXIM TUBES COMPANY PVT LTD, AHMEDABAD Ratnamani Ahmedabad, Sumitomo Japan, Heavy Metals Ahmedabad, SURAJ STAINLESS LIMITED, AHMEDABAD, MBM TUBES PVT LTD, GUJARAT, Subhalaxmi Metals & Tubes, TUBACEX PRAKASH PVT LTD Gujarat.

PRESSURE GAUGES:

A.N.INSTRUMENTS PVT LTD, CHENNAI
H.GURU INSTRUMENTS (SOUTH INDIA) PVT LTD, BANGALORE
PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR, GUJARAT.
WIKA INSTRUMENTS INDIA PVT. LTD, PUNE
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI
GOA THERMOSTATIC INSTRUMENTS, GOA
MANOMETER (INDIA) PVT. LTD, MUMBAI (Subject to Approval)
FORBES MARSHALL (HYD) LTD, HYDERABAD
WALCHANDNAGAR INDUSTRIES LTD, DHARWAD, KARNATAKA. (Subject to Approval)
THERMAL INSTRUMENT INDIA PVT. LTD, MUMBAI. (Subject to Approval)

TEMPERATURE GAUGES:

A.N.INSTRUMENTS PVT LTD, CHENNAI
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
GOA THERMOSTATIC INSTRUMENTS, GOA
H.GURU INSTRUMENTS (SOUTH INDIA) PVT, BANGALORE
PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI
FORBES MARSHALL (HYD) LTD, HYDERABAD
WIKA INSTRUMENTS INDIA PVT. LTD, PUNE
GOA INSTRUMENTS INDUSTRIES PRIVATE LTD, GOA.
THERMAL INSTRUMENT INDIA PVT. LTD, MUMBAI.

PRESSURE SWITCH:

PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR, GUJARAT.
INDFOS INDUSTRIES PRIVATE LTD, CHENNAI
SWITZER PROCESS INSTRUMENTS PVT. LTD, CHENNAI.
TRAFAG CONTROLS INDIA PVT. LTD, GURGOAN, HARYANA.
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI

TEMPERATURE SWITCH:

INDFOS INDUSTRIES PRIVATE LTD, CHENNAI
SWITZER PROCESS INSTRUMENTS PVT. LTD, CHENNAI.
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI

TERMINAL:

Wago Noida, Phoenix Noida,

INSTRUMENT VALVES:

BHARAT HEAVY ELECTRICALS LIMITED VALVES DIVISION, TIRUCHIRAPALLI, TAMILANADU.
BALDOTA VALVE AND FITTINGS PVT LTD, MUMBAI
FLUID CONTROLS PVT LTD, PUNE
INSTRUMENTATION LIMITED, PALGHAT
PRECISION ENGG INDUSTRIES, MUMBAI (Subject to Approval)
EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI
METPRESS ENGINEERING WORKS, KOLKATA
AURA INC, NEW DELHI
PMT ENGINEERS, AHMEDABAD
HP VALVES & FITTINGS (INDIA) PVT. LTD, CHENNAI
FLOWTECH, KOLKATA. (Subject to Approval)



**VENDOR LIST
FOR
SWAS**

KRISHNA/416/SWAS/VL
REV.NO.: 00

COMPRESSION FITTINGS:

PRECISION ENGG INDUSTRIES, MUMBAI
EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI
METPRESS ENGINEERING WORKS, KOLKATA
ASTEC VALVE & FITTINGS PVT. LTD., MUMBAI
FLUID CONTROLS PVT. LTD, PUNE
PANAM ENGINEERS LTD, MUMBAI
AURA INC, NEW DELHI
HP VALVES & FITTINGS (INDIA) PVT. LTD, CHENNAI
PMT ENGINEERS, AHMEDABAD
PRIME ENGINEERS, MUMBAI
ARCELLOR CONTROLS, AHMEDABAD
ARYA CRAFTS & ENGINEERING PVT. LTD, MUMBAI
SWAGELOCK, USA
FLOWTECH. KOLKATA.
PARKER HANNIFIN INDIA PVT. LTD., CHENGAL PATTU, TAMILANADU

FURNITURE:

Godrej, Feather lite, **COSMOS MEDIA PRODUCTS PVT LTD, NOIDA, PYROTECH LTD, UDAIPUR, OTS Bangalore.**

Annunciator:- PROCON CHENNAI

ANALYSERS:

ROSEMOUNT ANALYTICAL INC, USA.
ENDRESS + HAUSER INDIA PVT. LTD, MUMBAI.
HACH.
ABB INDUSTRIES, SWITZERLAND.
THERMO ORION INC, CHELMSFORD, USA.
SWAN SWITZERLAND.
METTLER-TOLEDO INDIA PVT. LTD, MUMBAI

Note:-

1. Vendors to note that for major components of Sample Handling System, above indicated vendors only will be acceptable

SECTION - "H"

- Analysers & Spares shall be packed project wise in lockable Metal Container suitable for outside storage at project sites. Typical requirements are as below:-
 - Type: Standard Outdoor type MS container, fully closed.
 - Dimension: Vendor to decide based on Qty of Analysers & Spares.

General condition:

- 1) The container shall be suitable to store imported and sophisticated components in open environment at thermal power plants. It shall be leak proof.
 - 2) Container shall be provided with proper glass wool thermal insulation at inside.
 - 3) Wall thickness (all sides), reinforcement, supporting lugs, lifting lugs, etc., shall be suitable to store and transport the container with the permissible load as required.
 - 4) Doors shall have suitable latches to lock the container with pad locks for safety purpose.
 - 5) Interior and external surface shall be completely painted as per the standard practice and it shall be Suitable for sea-shore atmosphere.
 - 6) Containers shall be provided with Tag Plates with Project Name.
-

			REF. : CE/416/VIJAY/SWAS/PS REV. NO. : 00 PAGE : 01 OF 02			
		PROJECT :- VIJAYAWADA - 1 X 800 MW TPS CUSTOMER :- APGENCO PURCHASE SPECIFICATION FOR STEAM & WATER ANALYSIS SYSTEM				
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	C O P Y			 (Punit P Singh)		
				PREPARED  PRK	ISSUED 416	DATE 01-12-2016

CONTENTS

SECTION	DESCRIPTION
A	GENERAL INSTRUCTIONS
B	PRE-QUALIFICATION REQUIREMENTS
C	SCOPE OF SUPPLY
D	TECHNICAL REQUIREMENTS AND ANALYSER SPECIFICATIONS
E	SWAS SCHEMES
F	QUALITY CHECKLISTS
G	APPROVED VENDOR LIST

SECTION- A

GENERAL INSTRUCTIONS TO BIDDERS:

All required documents against this Tender/Specification shall be submitted in English only.

Introduction: Bidders are required to offer SWAS to be used in Power Plant applications.

In order to accept the Technical offers / proposals from Bidders for the project mentioned in this Specification (refer Sections C & D), certain Pre-qualification criteria are required to be met by Bidder.

Pre-qualification requirements are clearly mentioned in AA of Section-B of this Specification. Bidder to read the same carefully and submit the details/documents required for BHEL's acceptance.

In case Bidder does not include the details or meet the requirements of Pre-qualification requirements, their offer will be summarily rejected and Bidder's Technical offers will not be evaluated.

Evaluation methodology: BHEL shall initially open Bidder's PQR documents as per Section-B of this specification for review & acceptance. Only after acceptance of PQR documents, BHEL shall open Bidder's technical offers for evaluation. Technically acceptable vendors will be proposed to customer / End user for vendor approval. Commercial bids of only accepted/approved vendors by End users/Customers, shall be considered by BHEL for further processing.

Bidders are required to submit offers as detailed below:

- A. Documents pertaining to Pre-Qualification requirements for AA of Section-B along with point-wise compliance to be uploaded as Part-I Bid.
- B. Documents pertaining to Clause BB Section-B along with point-wise compliance to be uploaded in Part-I Bid, documents for this clause to be identifiable separately in the uploaded documents.
- C. Technical offers/proposals for the Project, whose requirements are mentioned in Sections C & D to be submitted along with point-wise compliance and uploaded as Part-II Bid.

Note 1:-Whenever required during evaluation of PQR and Technical offers/bids, vendor is required to be present at BHEL Electronic Division, Bangalore, for discussions. Further in the event of order, during approval of the Vendor documents by End users/Customers, Vendor shall accompany BHEL representative for discussions.

Note 2:- Deviations (if any) shall be discussed with only those vendors who quote for this tender.

SECTION- B

AA. Pre-Qualification Requirements (PQR) of Bidders for SWAS:

1. The bidder should have executed/ completed work of “Design, supply, erection & commissioning of SWAS (Including Sample Handling System and Analysers) in a Thermal Power Plant minimum of 200 MW rating for at least 1 unit on the bid opening date of this tender.
 2. Original Equipment Manufacturers based outside India, who are making offer for this tender shall have authorized representatives in India for support related to Documentation, Erection, Commissioning & post commissioning services. The Indian representative should have the team of experienced service engineers on payroll.
 3. Submit Reference List of Projects wherein offered system is supplied & commissioned and working satisfactorily, along with details of critical components like Coolers, High Pressure Reducer/regulator, Back Pressure regulator and Year of Commissioning.
 4. If Bidder is procuring Chiller from a subcontractor, he should declare subcontractor name & location. Bidder to certify that Chiller subcontractor meets required Quality standards for the product. Bidder should have supplied & commissioned Chiller from offered subcontractor for min. one system.
 5. For Vendors offering upgraded / latest models of various analysers, PQR of previous model is acceptable. In such cases OEM shall certify that offered model is upgraded version of previous model.
 6. OEM shall furnish an undertaking that in case of change in Indian representative / agent, OEM shall continue to support supplies made by previous representatives/agents w.r.t to field service and supply of spare parts.
 7. Bidder shall have optimum inventory of critical components like sensors/ electronic modules of Analysers and Coolers, pressure regulators etc. to meet site requirements/failures on urgency basis.
 8. BHEL shall issue call for service / commissioning with 07 days’ notice. Bidder shall agree to visit BHEL project sites within above notice period.
 9. BHEL shall submit credentials/details furnished by vendor with their offers to customer and await customer’s decision for a maximum of one month from the date of PQ bid opening. If approval is not received within above period, BHEL shall treat the offer as “NOT Meeting PQ” criteria and offer shall be rejected.
-

-
10. In case Customer/End user does not accept the offered makes of analysers, bidders offers will be acceptable only if they agreed to supply Analysers of customer approved make of Analysers without any commercial implications to BHEL.

BB. Additional Documents to be submitted along with the documents related to PQR above for reference (OPTIONAL):

1. Technical literature / Manuals of offered Sensors/ System/ Accessories.
2. In the event of technical specification not indicated in Technical literature, confirmation from OEM is acceptable. Such confirmations shall be suitably supported by certificates like Type test/ Routine test certificates.
3. Submit Unpriced Purchase Order copies for executed projects in the past three years.
4. Submit List of Projects, for which Erection & Commissioning has been carried out in the past three years. Also, submit reports of successful erection & commissioning Protocols & Minutes of the meetings for handing over of SWAS for these projects.
5. Name & registered address of the Indian branch office or Indian representative for support of E&C and after sales service with Organization chart.
6. Bidder shall have facility in India for Engineering activities, preparation of Documents, trouble shooting and calibration of the system. Submit these details.
7. If Bidder is not Original Equipment Manufacturer (OEM), then Bidder to include Authorization letter from OEM for Design, Engineering, Manufacture, Testing, supply, Erection, Commissioning and Servicing of the offered System. This Authorization letter provided by OEM to Bidder shall indicate the Type and Duration of Validity of the agreement.

Important Note: In case Bidder does not submit details mentioned in above clauses (AA) or meet the requirements of Pre-qualification requirements (AA), Offers will be summarily rejected and Bidder's Technical offers/proposals will not be evaluated. Please read carefully the GENERAL INSTRUCTIONS in Section A of this specifications.

Note 4: A point-wise compliance to be submitted for SECTION-B along with all relevant documents.



A4 - 11

REF. : VIAJAY/416/SWAS/SOS

REV. NO. : 00

PAGE : 01 OF 03

PROJECT :- VIJAYAWADA - 1 X 800 MW TPS

CUSTOMER :- APGENCO

SCOPE OF SUPPLY

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REVISIONS :

APPROVED


(Punit P Singh)

PREPARED

ISSUED

DATE

PRK

416

01-12-2017



SCOPE OF SUPPLY FOR TSGENCO VIJAYWADA 1X800 MW

SL NO	ITEM DESCRIPTION	UNITS	QTY PER SET
SWAS PACKAGE EACH SET CONSISTING OF ;			
1	SAMPLE HANDLING SYSTEM -		
a	PRIMARY RACKS (With IBR certified Isolation , Blowdown Valves & IBR certified Cooler Coils)	NO.	2
b	WET PANEL - ENCLOSED TYPE WALKTHROUGH PANEL	NO.	1
c	DRY PANEL	NO.	1
d	CHILLER UNIT - 100% REDUNDANT - Min. 5 TR rating (With 25% extra Capacity)	NO.	1
e	SAMPLING SKID FOR CONDENSER and STAND ALONE PANEL WITH ALL SAMPLING ACCESSORIES FOR MOUNTING ONE NUMBER OF CONDUCTIVITY(CATION) ANALYSER - CONDENSER APPLICATION - OPTION A	NO.	1
f	SAMPLING SKID FOR CONDENSER and STAND ALONE PANEL WITH ALL SAMPLING ACCESSORIES FOR MOUNTING TWO NUMBER OF CONDUCTIVITY(CATION) ANALYSERS - CONDENSER APPLICATION - OPTION B	NO.	1
2	ANALYSERS - MICROPROCESSOR BASED WITH DIGITAL COMMUNICATION FACILITY LIKE RS 485/Modbus/Profibus.	ST	1
a	CONDUCTIVITY(SPECIFIC, CATION) ANALYSER - SINGLE CHANNEL	NOS.	15
b	CONDUCTIVITY(SPECIFIC) ANALYSER FOR HOTWELL - SINGLE CHANNEL	NOS.	4
c	CONDUCTIVITY(CATION) ANALYSER FOR CONDENSER APPLICATION - SINGLE CHANNEL - OPTION A	NOS.	1
d	CONDUCTIVITY(CATION) ANALYSER FOR CONDENSER APPLICATION - SINGLE CHANNEL - OPTION B	NOS.	2
e	pH ANALYSER- SINGLE CHANNEL	NO	10
f	DISSOLVED OXYGEN ANALYSER- SINGLE CHANNEL	NOS.	4
g	SODIUM ANALYSER(MULTI CHANNEL- 5 CHANNEL INCLUDING SPARE CHANNEL)	NO	1
h	SILICA ANALYSER (MULTI CHANNEL- 6 CHANNEL INCLUDING SPARE CHANNEL)	NO	1
i	HYDRAZINE ANALYSER - SINGLE CHANNEL	NO	2
j	IRON ANALYSER-(MULTI CHANNEL - SIX CHANNEL INCLUDING SPARE CHANNEL)	NO	1
k	TURBIDITY ANALYSER	NO	1
l	CHLORIDE ANALYSER (MULTI CHANNEL- 3 CHANNEL INCLUDING SPARE CHANNEL)	NOS.	1
3	LOOSE SUPPLY ITEMS AS PER ANNEXURE-A	ST	1
4	Mandatory Spares as per Annexure- B	ST	1
5	COMMISSIONING SPARES- Reagents required for commissioning & Handing over of System to Owner (Dynamic Calibrator/Automatic Calibration kit shall be provided as applicable for Analysers for Eg. Sodium, Hydrazine Analysers at the time of commissioning)	ST	1
6	CONSUMABLES OTHER THAN CHEMICAL REAGENTS LIKE PH CELL , DO Sensors ,ETC	ST	1
7	CONSUMABLES I.E. CHEMICAL REAGENTS FOR 1 YEAR OPERATION	ST	1
8	ANNUNCIATOR - Microprocessor based 96 Points, Window size : 70 mm x 50 mm	ST	1
9	O & M MANUALS / DOCUMENTATION CHARGES	LOT	1
10	TEST, CALIBRATION & GUARANTEE CERTIFICATES AS PER APPROVED QUALITY CHECKLIST/ PLAN	LOT	1
11	SUPERVISION OF ERECTION, TOTAL COMMISSIONING AND HANDING OVER OF SWAS SYSTEM	ST	1
12	Price for one line of High Pressure & High Temp. - Primary & Secondary cooling to be considered along with other instruments as per P&ID applicable for the project.	ST	1
13	Price for one line of Low Pressure & Low Temp. - Secondary cooling to be considered along with other instruments as per P&ID applicable for the project.	ST	1
14	Sample/Metering Pump with MCB & Starting panel - Suitable for metering sample from DM Make up to SWAS Room	No.	1
15	SODIUM ANALYSER (SINGLE CHANNEL)	NO	1
16	Flow switch for Primary rack (FW, Separator O/L, Main Steam services) - Suitable for return Cooling water line of individual Primary cooler	No.	1
17	Following activities will be in Vendor's scope :- i. Supervision of erection, Total commissioning & Handing over of the system to the End user. ii. Erection of inter connecting cabling / tubing between wet & dry panel, chiller & wet panel etc. iii. Complete Erection of Chiller system including proper insulation of pipes between chiller & wet panel. iv. Vendor to also consider 1 no. of Gas filling at Site for Chiller during Commissioning/Handing over. This shall be in addition to Gas filling done at OEM works for inspection.		
17	Note:- 1.0 Vendors to quote unit rates for all above items individually. 2.0 Vendors who do not quote prices as per pt. 1, shall be disqualified. 3.0 BHEL shall use unit rates indicated above for quantity addition/deletion required during execution. 4.0 Bidders to quote item wise prices for all the items indicated above. Evaluation for L1 shall be done considering offered prices for all items indicated above however items in sl. No. 1.f, 2.d, 12,13,14, 15 , 16 shall be ordered only if required.		

ANNEXURE - "A"

LOOSE SUPPLY ITEMS FOR SWAS

SL. NO	DESCRIPTION	QTY / UNIT
1	Power Cable to SWAS panels	25 Meter
2	Power Cable to Chiller(3 phase 3 wire)	25 Meter
3	Special Cables between wet and dry panel . (for each cell / analyser Combination)	30 Meter/ run
4	All cabling and Tubing(along with connection fittings) between wet and dry panel	30 Meter / run
5	Cooling water header, A 106 Gr. B, 2 " NB Sch 40 (between nearest tapping point & chiller and chiller & Wet panel)+ Elbows (20 Nos) and Bends(10 Nos) .	60 Meter
6	Blow down header(Wet Panel) , A 106 Gr. B, 2" NB SCH 40 + Elbows (3 nos.)	20 Meter
7	Blow down header (Primary Racks) , SS 304 , 2" NB SCH 80 + Elbows (3 Nos)	20 Meter
8	Recoverable drain header , SS 316 , 2" NB SCH 40 + Elbows (3 Nos.)	20 Meter
9	Waste Drain header (analyser Panel) A 106 Gr. B , 2" NB SCH 40 + E bows (6 Nos.)	30 Meter
10	Waste drain header(Primary Racks)) , A 106 Gr. B , 2" NB SCH 40 + Elbows (3 Nos)	30 Meter
11	Waste drain header (wet panel) , A 106 Gr. B , 2" NB SCH 40 + Elbows (3 Nos)	20 Meter
12	Furniture:-	
i	STEEL ALMIRAH - Size - 900 (W) x 450(D) x1800(H) mm	2 Nos.
ii	OPERATOR CHAIRS	1 No
iii	WORKBENCH FOR CALIBRATION & TESTING - Size - 1500(W) x 1000(D) x 800(H) mm	1 No.
Note :-		

1.0 Vendors to quote unit rates for all items individually.

2.0 Vendors who do not quote prices as per pt. 1, shall be disqualified.

3.0 BHEL shall use unit rates indicated above for quantity addition/deletion required during execution.

4.0 In addition to the set of flanges(mating & counter) which is mounted on the header in panel/rack , vendors to consider one additional set of mating & counter flanges for all headers,as indicated above.

ANNEXURE - "B"

MANDATORY SPARES FOR SWAS

SL. NO	DESCRIPTION	TOTAL QTY
a.	Field sensor	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
b.	Field transmitter/ complete electronic unit	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
c.	Power supply card	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
d.	Instrumentation hardware	10 % of PH/DO/Conductivity Analysers or minimum of 2 nos each
e	Consumbles/Reagents for Analysers	For 12 months operation from the COD.
f	Calibrators required for commissioning and maintaining the analysers	1 no for each type of Analysers as applicable.

TECHNICAL REQUIREMENTS & ANALYSER SPECIFICATIONS

1.00.00 INTENT OF SPECIFICATION

This section intended to cover scope of design, engineering, supply, erection, testing and commissioning of the Steam and Water Analysis System (SWAS) for the Power Generating Unit.

2.00.00 GENERAL

2.01.00 The typical monitoring and analysis requirement for plant steam and water system is furnished below. Bidders shall however determine the analysis requirement based on the criticality of major equipment.

2.02.00 Steam and Water Analysis System shall be furnished for continuous monitoring of water and steam purity in the plant cycle and at other important points. The system shall enable the plant chemist and operators to make adjustments in the water and steam conditioning system or to modify the plant operating procedure to minimize equipment damage due to corrosion, scaling etc.

2.03.00 Bidder shall provide necessary main process line tapping along with isolation/root valves up to SWAS system.

2.04.00 The system shall conform to the following standards and requirement specified here in:

STANDARD	GUIDELINES
ASTM PTC 19.11	Standard Practice for Steam and water sampling, conditioning and analysis in power plant
ASTM D3370	Standard practice for sampling water from closed conduits
ASTM D1066	Standard practice for sampling steam
ASTM D5540	Standard Practice for flow control and temperature control for on-line water sampling and analysis
BS 6739	Code practice for instrumentation in process control system: Installation, Design and Practice

3.00.00 STEAM AND WATER ANALYZERS - AS PER P&ID

TYPE	LOCATION

- 3.01.00 The sampling system shall obtain samples from steam and water lines, which shall be adequately conditioned and led to Analyzers for continuous analysis and also to provide facility for grab (manual) sampling.
- 3.02.00 The system shall include complete Sample Conditioning system, Analyzers, Converters / Transmitters, Indicators, alarm initiating devices, Annunciators, interlocks for sample protection, hardware interface with DDCMIS, interface with dosing system for remote closed loop control, all necessary pipes, tubes, fittings and valves etc. and other conditioning and protective devices to integrate into a completely assembled system.
- 3.03.00 Bidder shall be responsible for proper engineering, selection of hardware, manufacture, testing, commissioning and satisfactory functioning of complete and fully operational steam and water analysis system, meeting the intent of the specification.
- 3.04.00 System components shall be assembled, piped, wired and tested at the factory as a complete unit and shall be ready for installation at the project site.
- 3.05.00 Parts subject to high pressure or temperature or severe duty shall be of materials suitable for the service.

Sample Piping System shall be as follows:

APPLICATION	PIPING MATERIAL
Sample tapping point to primary cooler (including root valves and fittings)	SS316
All the sample pipe after primary cooler	ASTM A213 TP316H
Blow down header and drain receiver holder	ASTM A312 Type 304
Closed Cooling Water piping except grab sample and water purge line, sample through drain piping and waste header piping	ASTM A53 Gr. A
Purge air piping/ tubing and fitting valves	Brass / copper

Size and schedule number of sample pipe shall be suitable for for particular application. Pressure reducing valves, isolation valves before primary sample cooler and all the isolation valves for pressure and flow indicators shall be needle valves. Cooling water and chilled water supply and return valves shall be block valves. All fitting shall be socket welded type and of material ASTM A182 F316H confirming to ANSI B16.11. The valves to be used in sample piping shall be of globe type, forged construction and stainless steel confirming to ASTM A182 with pressure and temperature ratings as per ANSI B16.34.

- 3.06.00 The grab sample valves shall allow grab sample feed to be directed to grab sample nozzles to the sample trough.
- 3.07.00 SWAS System components and accessories shall be from the latest proven product range of qualified manufacturers. Components and accessories shall be proven for SWAS application in power plant of comparable size.
- 3.08.00 Analysers shall be microprocessor based, drift free and auto compensating type.
- 3.09.00 Sample coolers shall be designed for the maximum allowable water pressure drop, from inlet connection to outlet connection of 0.7 Kg/Sq. cm
- 3.10.00 Consumables up to guarantee period shall be in bidder's scope.
- 3.11.00 Self-regulating type devices shall be provided to maintain constant sample flow through analyzers at a preset sample pressure. Variations in sample flow to individual analyzer shall not exceed 5%.
- 3.12.00 Bidder shall provide necessary isolated 4-20 mA DC outputs from analyzers at separate terminal block for DDCMIS.
- 3.13.00
- 3.14.00 Analyzers shall be powered from the unit UPS system.
- 3.15.00 Furniture
- a) Bidder shall include a complete set of furniture for the SWAS Room of ergonomic design suitable for industrial application. Furniture shall include but shall not be limited to Operator's chairs, work benches for calibration and testing purpose, cabinets for storage of manuals / booklets, storage racks for special tools / chemicals / reagents etc.
 - b) Table top surfaces and other surfaces which are likely to come into contact of chemicals and reagents shall be suitably coated / treated.
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4.00.00 SWAS PANEL AND ACCESSORIES

4.01.00 SWAS panels shall be of modular construction and comprising of :

- a) A wet section consisting of a sample conditioning panel housing components for processing samples and grab sample.
- b) A dry sections housing all the transmitters and corresponding annunciators and monitors. The dry section shall be physically separate from the sample conditioning panel, so that the electrical equipment are kept dry and away from process fluids. Dry panel shall be kept in air condition environment.

4.02.00 The wet section shall be a vertical panel housing various sample lines, primary coolers, instruments such as sight flow indicators, Pressure / Temperature Gauges, Pressure Control Valves, Rotameter, Pressure / Temperature Switch, Solenoid Valves, NRV s, Secondary heat ex changers, Strainers, Iso lation Va lves, Drain Headers, Grab Samp ling Pans et c. The panel s hall be pro vided with bulkhead connection to conn ect sample pipes drawn from tapping points.

4.03.00 The Chiller Unit shall b e kept near the Wet Panel to supply c hilling water t o the secondary heat exchangers in Wet Panel. Capacity of chiller unit shall not be less than 5 TR (Tonnage refrigeration capacity) & refrigerant shall be eco friendly type.

4.04.00 Sample con ditioning components shall be mounted on the front of the wet section with easily accessible ope rating hand les, levers and dia ls e tc. All components shall be suitably supp orted to the panel and s hall be clearl y labeled.

4.05.00 The physical arrangement of the tubing and wiring shall permit easy access for maintenance.

4.06.00 Bidder shall keep provision of 25% spare capacity in coolers for future addition of analyzers. Sample coolers shall have removable SS coil. Coolers shall be designed to achieve the required sample temperature at the specified maximum flow rate of the Analyzers with an assumed fouling factor of 0.2 and at maximum cooling water temperature.

4.07.00 Piping and tubing sha ll be neatly installed and s ecurely braced t o e nsure mechanical rigidity. Th e complete S WAS panel and accessories shall be suitable for continuous operation under ambient temperature condition of 8 Deg C to 50 Deg C and relative humidity of 100%.

5.00.00 ALARM ANNUNCIATION SYSTEM

5.01.00 Alarms shall be available in the local monitor in the dry room for each unit covering the entire SWAS system, with repeat facility in DDCMIS.

6.00.00 ANALYZERS

All Analyzers shall be of microprocessor based design. The general technical specification of the analyzers is provided in this section. Bidder in his offer shall indicate the sample flow requirement of each analyzer and the total quantity of cooling water required for the system.

6.01.00 CONDUCTIVITY ANALYZER - Range - 0-1/ 0-10 / 0-100 uM/cm

A. Sensor

1. Type of Cell : Flow thru'
2. Conductivity Range : As per process
3. Cell Constant : 0.01 / 0.1 / 1.0 depending upon range
4. Temp. Compensation : Manual and Automatic (Integral) 0-100°C
5. Process Connection : Screwed
6. Wetted Parts : Electrodes-SS 316L/ Insulators KYNAR/ Viton
7. Pressure Rating : 10 kg/cm²
8. Accessories : Vessel (SS 316) with ½" NPT connection
9. Cable : Upto transmitter in flexible conduct

B. Transmitter

1. Type : Microprocessor based, Single stream
 2. Mounting : 2" pipe
 3. Protection Class : IP-65 or better
 4. Output : 4-20 mA DC (isolated)
 5. Display : Digital Display in Engineering Unit , Alarm Status.
 6. Zero/Span Adjustment : Front Panel Membrane type Keyboard
-

- | | | | |
|-----|--------------------|---|--|
| 7. | Temp. Compensation | : | Automatic |
| 8. | Diagnostic | : | Self diagnostic for e lectronics, electrode etc |
| 9. | Alarm | : | Dual set point, hysteresis and time delay adjustable |
| 10. | Enclosure | : | Die cast aluminum, epoxy coated |
| 11. | Cable Termination | : | Internal (cable entry through conduit) |
| 12. | Accuracy | : | ± 1.0 % of measured range |
| 13. | Response time | : | Less than 5 sec |
| 14. | Stability | : | ± 1.0 % of output range / month non-cumulative |
| 15. | Accessories | : | a.2" pipe mounting bracket, Sensor cable with flexible conduit (as required), ½" NPT Cable Gland, SS Tag plate, For cation conductivity- Du al Ion-E xchange column, resin, etc. (minimum 12 months' requirements).

b.Retractable type conductivity sensor along with flow chamber and other accessories shall be provided for vacuum application. Transmitter (local) along with 4-20 Ma o utput to S WAS room & DDCMIS shall also be provided. |

6.02.00 pH ANALYZER - Range 0-14 pH

A. Sensor

- | | | | |
|----|---------------------|---|---|
| 1. | Type of Cell | : | Flow thru' |
| 2. | Range | : | 0-14 pH |
| 3. | Type of measurement | : | Combination electrode |
| 4. | Temp. Compensation | : | Manual and Automatic (Integral) 0-100°C |
| 5. | Process Connection | : | Screwed |
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- | | | | |
|-----|---------------------|---|---|
| 6. | Measuring Electrode | : | Glass, high independence, thin electrode in one housing |
| 7. | Pressure Rating | : | 10 kg/cm ² |
| 8. | Accessories | : | Vessel (SS 316) with ½” NPT connection |
| 9. | Cable | : | Upto transmitter in flexible conduct |
| 10. | Preamplifier | : | Integral or separate |
| 11. | Liquid Junction | : | Ceramic / Kyner or equivalent |

B. Transmitter

- | | | | |
|-----|--------------------|---|---|
| 1. | Type | : | Microprocessor based, Single stream |
| 2. | Mounting | : | 2” pipe |
| 3. | Protection Class | : | IP-65 or better |
| 4. | Output | : | 4-20 mA DC (isolated) |
| 5. | Display | : | Digital Display in Engineering Unit, Alarm Status. |
| 6. | Accuracy | : | ± 0.2% of FSD or better |
| 7. | Response time | : | Less than 5 sec |
| 8. | Stability | : | ± 0.001 pH /week |
| 9. | Repeatability | : | ± 1% or better |
| 10. | Temp. Compensation | : | Automatic (Pt-100 sensor) |
| 11. | Diagnostic | : | Self diagnostic for “Calibration required”/ “ Calibration O .K.”, electrode checking etc. |
| 12. | Alarm | : | Dual set point, hysteresis and time delay adjustable |
| 13. | Enclosure | : | Die cast aluminum, epoxy coated |
| 14. | Cable Termination | : | Internal (cable entry through conduit) |
| 15. | Accessories | : | 2” pipe mounting bracket, Sensor cable |
-

with flexible conduit (as required), ½”
NPT Cable Gland, S S Tag plate, ,
Ultrasonic Electrode Cleaner, Buffer
solution tablets

6.03.00 SILICA ANALYZER - Range - 0 - 500 ppb / 0- 1000 ppb

1. Type : Colorimetric monitor, gravity / pumped feed Microprocessor based
2. No. of Streams : Multi-stream with at least one stream as spare
3. Output : 4-20 mA DC (isolated) into 600 ohms
4. Readout : Digital Indicating meter for direct readout
5. Accuracy : ± 1% of F.S.D or better
6. Reproducibility : ± 2% of F.S.D. or better
7. Calibration : Manual & automatic
8. Cycle time : Less than 10 min or better
9. Operating temperature : 0-50 ° C
10. Temperature Compensation : (Pt-100 Sensor)
11. Mounting : 2” pipe
12. Life of light source : 10,000 hours (approx.)
13. Alarm Facility : 2 HI & 2 LO independently adjustable over span.
14. Enclosure Protection : IP-65
15. Accessories : Reagent cabinet , Sample strainer, Reagent Reservoir etc., Phenolic name plate, Reagents & consumables, Special cables.

6.04.00 SODIUM ANALYZER ASSEMBLY - Range 0- 200 ppb

1. Type of Cell : Flow Through ion-selection electrode
 2. Flow Chamber : Plexi Glass Body or equivalent
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REF:- VIJAY/416/SWAS/TR

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|-----|----------------------|---|--|
| 3. | Measuring Electrode | : | Sodium Selective Glass Electrode |
| 4. | Output | : | 4-20 mA DC (isolated) into 600 ohms |
| 5. | Temp. Compensation | : | Automatic upto 45 deg.C |
| 6. | Read Out | : | Digital Indicating meter |
| 7. | Accuracy | : | < 5% of reading |
| 8. | Response Time | : | 2 minutes or better |
| 9. | Mounting | : | Flush Panel |
| 10. | Calibration | : | Automatic |
| 11. | Alarm Facility | : | 2 HI and 2 LO independently adjustable over span. |
| 12. | Enclosure Protection | : | IP-65 or better |
| 13. | Accessories | : | Phenolic tag plate, Sample filter, Pressure regulator & flow meter, Automatic calibration kit, Reagents and consumables, Special cables, ½" NPT cable gland. |

6.05.00 HYDRAZINE ANALYZER - Range - 0 - 200 ppb

- | | | | |
|-----|--------------------|---|--|
| 1. | Type | : | Electrochemical |
| 2. | Output | : | 4-20 mA DC linear |
| 3. | Readout | : | Digital Indicating Meter, linear read-out |
| 4. | Accuracy | : | ± 2% of FSD or better |
| 5. | Reproducibility | : | 2% of FSD or better |
| 6. | Drift | : | 2 ppb/month or better |
| 7. | Temp. Compensation | : | Automatic up to 45 °C |
| 8. | Response Time | : | 1 minutes or better |
| 9. | Mounting | : | Flush Panel |
| 10. | Alarm Facility | : | 2 HI and 2 LO independently adjustable over span |
-

11. Preferred Feature : 2 Hi and LO alarm LED visible from front , Power supply on/failure LED
12. Enclosure Protection : IP-65/ NEMA 4 or better
13. Accessories : Sample Conditioning kit, Phenolic nameplate, Special cable upto transmitter with flexible conduit Chemical reagents for 12 months, . ½” NPT Cable Glands

6.06.00 DISSOLVED OXYGEN ANALYZER - Range - 0- 200 ppb

1. Type : Electro-chemical, Microprocessor based.
2. Range : As per process.
3. Type of Cell : Flow through sampling type (continuous)
4. Enclosure : IP-65 or better
5. Output : 4-20 mA DC isolated to a load of 600 Ohms (minimum)
6. Temp.Compensation : Automatic up to 45°C
7. Readout : Digital Indicating meter
8. Accuracy : Better than ± 2 % of full scale for Transmitter
9. Sensor Response Time : 90% in 30 seconds or better
10. Mounting : Flush panel
11. Alarm Facility : 2 HI & 2 LO independently adjustable over span.
12. Preferred Feature : HI & LO Alarm LED visible from front, Power supply on/failure LED, In-built calibration facility.
13. Accessories : Phenolic nameplate, Special cable upto transmitter with flexible conduit, ½” NPT Cable Glands

6.07.00 CHLORIDE ANALYZER - Range 0- 1000 ppb

1. Type : Electro-chemical, Microprocessor based.
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Telangana State Power Generation Corporation Ltd.
1x800 MW Kothagudem TPS

REF:- VIJAY/416/SWAS/TR

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|-----|---------------------|---|--|
| 2. | Type of cell | : | Chloride ion selective electrode |
| 3. | Enclosure | : | IP-65 or better |
| 4. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum) |
| 5. | Temp.Compensation | : | Automatic with Pt 100 |
| 6. | Ambient temperature | : | 45°C |
| 7. | Readout | : | Digital Indicating meter |
| 8. | Accuracy | : | Better than $\pm 2\%$ |
| 9. | Reproducibility | : | <3% |
| 10. | Detection limit | : | 0.5 mg/ L or better |
| 11. | Analysis time | : | 5 minutes (max). |
| 12. | Cycle time | : | Adjustable |
| 13. | Calibration | : | Manual or automatic |
| 14. | Mounting | : | Flush panel |
| 15. | Alarm | : | 1 HI, 1 LO & 1 system alarm |
| 16. | Control accessories | : | Sample level detector, Reagent level detector, Calibration solution level detector, Automatic sample, rinse and drain valve, Pump for calibration solution, Pump for reagent solution. |
| 17. | Accessories | : | Reagent solution tank, Calibration solution tank |

6.08.00 TURBIDITY ANALYZER -

- | | | | |
|----|-----------|---|---|
| 1. | Type | : | Nephelometric (Light reflection principle) |
| 2. | Range | : | 0.001-100 NTU |
| 3. | Body | : | Corrosion resistant polystyrene |
| 4. | Enclosure | : | IP-65 or better |
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- | | | | |
|----|---------------|---|--|
| 5. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum) |
| 6. | Readout | : | LCD Display |
| 7. | Accuracy | : | Better than $\pm 2\%$ of full scale |
| 8. | Repeatability | : | $\pm 1\%$ of reading or ± 0.002 NTU (whichever is greater) |
| 9. | Accessories | : | Phenolic nameplate, Special cable upto transmitter with flexible conduit, $\frac{1}{2}$ " NPT Cable Glands, 2" pipe mounting bracket, Calibration kit & standard solution etc. |

6.09.00 IRON ANALYZER - Range - 0 - 500 ppb

- | | | | |
|----|-----------------------|---|--|
| 1. | Type | : | Colorimetric |
| 2. | Range | : | 0-100 ppb, 0-2 ppm |
| 3. | Material | : | Kynar (Probe), Hastelloy C (Reflector) |
| 4. | Enclosure | : | IP-65 or better |
| 5. | Output | : | 4-20 mA DC isolated to a load of 600 Ohms (minimum), 2NO+NC Contacts |
| 6. | Readout | : | LCD Display |
| 7. | Operating Temperature | : | 45 Deg. C |
| 8. | Accessories | : | As required. |

6.10.00 SAMPLE CONDITIONING SYSTEM

Sample conditioning system shall be designed and constructed to receive and condition all samples as required by the respective analyzers. This shall include all conditioning equipment mentioned herein:

- a) Sample filtering
 - b) Primary and final sample cooling and temperature control
 - c) Pressure reduction and control, as required
 - d) Flow rate control
 - e) Pressure and Temperature Protection
-

- f) Other treatment as required by individual analyzers or mentioned herein.

Sample line to analyzers shall incorporate an anti-siphon design to prevent possibility of running dry because of a broken or plugged sample line.

6.11.00 SAMPLE FILTER / STRAINER

Sample particulate removal shall be accomplished by passing samples through cartridge type filters with 316 stainless steel body or Y-Strainer. The filter elements shall be capable of retaining particulates of 40 microns and larger. The filter elements shall be installed immediately after the sample shut off valve.

6.12.00 PRIMARY SAMPLE COOLER

- a) Primary cooling of samples having temperature in excess of 45 °C shall be accomplished by passing each sample through one or more individual sample coolers of shell and tube heat exchanger type.
- b) The primary coolers shall use plant closed cycle cooling water.
- c) The overall capacity (flow rate and heat transfer capacity) of cooler / coolers in cascade shall be adequate to cool all samples to within ± 5 °C of the cooling water inlet temperature for the combined flows of each required analyzer sample plus a manual grab sample flow rate of 500 cc/min.
- d) Sample coolers shall be of submerged helical coil type of shell and tube design with removable coil meeting the intent of ASTM D1192-64 (Equipment for Sampling Industrial Water and Steam). Sample tubing shall be seamless type with no welded or other joints inside the cooling jacket. Unions shall be provided to facilitate removal of coils.
- e) All sample tubing, fittings and other components wetted by the samples shall be constructed of type 316 stainless steel.
- f) Primary cooler shall be protected on the cooling water side by relief valve on the water header. The cooling water header is provided with pressure gauge and isolating valves.
- g) Provision shall be made for draining the heat exchanger shell. The drain line shall be valved and piped to waste drain header.

6.13.00 SECONDARY HEAT EXCHANGERS

- a) Each sample stream shall be finally cooled to $25 \text{ }^{\circ}\text{C} \pm 1 \text{ }^{\circ}\text{C}$, in an isothermal bath by counter current or in secondary shell and tube heat
-

exchanger similar to the primary coolers with chilled water at about 20°C.

- b) Chilled water shall be produced in a packaged refrigeration unit (chiller).
- c) Sufficient heat exchange capacity (flow rate and heat transfer capacity) shall be provided to obtain 25 Deg C $\pm$ 1 °C sample outlet temperature at the maximum flow rate required by all analyzers and grab sample requirements of all sample streams. Additionally, 25% spare coils / capacity shall be provided for samples/analyzers added in future.
- d) Provision shall be made for adjusting each sample temperature individually.
- e) The heat exchanger coils shall be of stainless steel (SS 316). Heat exchanger coils shall be provided with unions to facilitate easy removal. A removable cover shall be provided for the isothermal bath.
- f) Adequate space shall be provided for maintenance.

6.14.00

TEMPERATURE CONTROL SYSTEM OF CHILLER

- a) A Local Temperature Controller modulating a three way-mixing valve shall maintain the chiller temperature at 20 °C $\pm$ 1 °C by mixing the chilled water from the chiller with the re-circulated water from the chiller tank.
- b) The chiller shall include the following:-
 - Automatic water make-up.
 - Bath temperature indicator.
 - Level gauge to indicate bath water level.
 - Drain and over-flow connection for bath.
 - Chilled Water Re-circulation System.
- c) Temperature Switch shall be provided to annunciate high chilled water temperature.

6.15.00

CHILLER

- a) A pair of 100% capacity redundant water-cooled chillers each with sufficient refrigeration capacity to ensure desired isothermal bath temperature under all operating conditions shall be provided.
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- b) The compressor shall be readily accessible for service and shall include low noise, hermetically sealed motors. Compressors assembly shall also include crank case heater, suction and discharge valves, oil sight glasses, forced feed lubrication system and an integrated motor protection system.
- c) The condenser shall be water cooled and of the cleanable shell and tube design and constructed in accordance with the ASME code for Unfired Pressure Vessels. A condenser water-regulating valve shall be included.
- d) Chiller shall be of the direct expansion type with refrigerant tubes inside a shell. The chiller is to be completely insulated and to be constructed in accordance with the ASME code for Unfired Pressure Vessels.
- e) Refrigerant circuit shall be complete with thermostatic expansion valve, liquid line solenoid valve, sight glass, filter-dryer, refrigerant shut-off and charging valves.
- f) Chilled water pumps with suction and discharge gauges and the thermometers shall be provided, mounted with the packaged chiller on the channel base. Chiller water tank shall have level indication and auto level control.
- g) The chiller water pump shall be of the centrifugal type, close coupled, bronze fitted construction, complete with motor. Pump & motor shall be designed for continuous operation.
- h) Vibration dampeners, mounted between the chiller and the base channel shall be provided.
- i) Cooling water and chilled water piping shall be provided with block valves.

6.16.00

SAMPLE PRESSURE CONDITIONING

- a) Pressure reduction of samples shall be accomplished by using high pressure reducing element.
 - b) All samples below 40 kg/cm² pressure shall be provided with back-pressure (upstream pressure) regulating valves (PCV).
 - c) Each sample line shall have Pressure Indicator and Temperature Indicator upstream of pressure reducer. The gauge shall be 100 mm dial with suitable stainless steel wetted parts. Casing shall be stainless steel construction.
-

- d) Each sample line shall include a safety relief valve set at about 3 kg/cm²g, upstream of the rate set valve, having stainless steel wetted parts.

6.17.00 HIGH PRESSURE REDUCING ELEMENTS (HPRE)

- a) Pressure reduction shall be accomplished by means of a "variable rod-in-tube capillary" valve.
- b) The device shall be designed for inlet pressure of 350 kg/cm²g, temperatures of 65°C and flow rate of not less than 2000 milliliters per minute. The device shall be sized for maximum required sample flow rate.
- c) The pressure-reducing elements shall be conveniently located for removal and periodic cleaning.

6.18.00 FLOW RESTRICTING ELEMENT (FRE)

Flow Restricting Element for grab sample line shall be provided for all samples to maintain constant sample flow at a preset sample inlet pressure.

6.19.00 TEMPERATURE SWITCH AND SOLENOID VALVE

Thermostat and Solenoid Valves shall be provided in the sample line. The thermostat shall be a bimetallic sensor to operate a micro-switch to close the Solenoid Valve when sample temperature is above preset value or cooling flow to primary cooler is low.

6.20.00 TEMPERATURE GAUGES

Temperature gauges shall be of 100 mm size gas filled type with stainless steel armored capillary tubing. Gauges shall be provided after primary coolers and outlet sample lines. Each gauge shall have a dial engraving or separate phenolic nameplate to identify the service. All wetted parts, internal and casing shall be stainless steel.

6.21.00 PRESSURE GAUGES

Pressure gauges shall be 100 mm size, stainless steel movements and bourdon tubes and nylon bearings. Gauges shall be provided after primary cooler and outlet sample lines. Each gauge shall have a dial engraving or separate phenolic nameplate to identify the service. All wetted parts, internal and casing shall be stainless steel.

6.22.00 FLOW INDICATORS

Rotameters shall be provided for sample flow rate indication (to be located in individual branch line to Analyzer Cell) with 75 mm scale length, panel mounting bezel, and stainless steel float and body.

6.23.00 FLOW SWITCHES

Flow switch shall be provided on the primary cooler cooling water outlet. The switch shall be equipped with alarm contacts for annunciation and interlocking. Wetted parts shall be stainless steel.

6.24.00 GRAB SAMPLES

Grab sample valves on the panel front shall be furnished to allow grab sample flow to be directed grab sample nozzles to the sample trough. Approximately 300 mm of flexible tubing shall be furnished for each sample to allow grab sample collection and prevent splashing. Valve body and trim shall be of SS-316.

6.25.00 SAMPLE SINK

A continuous sink for Grab Sample Analysis shall be provided. The sink shall be made of stainless steel. Sink shall have drain to a header.

Cleaning water connection shall be provided for cleaning of sample containers.

7.00.00 SAMPLING SKID FOR CONDENSER

- 7.01.00** Sampling Skid for condenser is required for drawing the sample for the measurement of cation conductivity. Sampling skid shall be provided with all required accessories not limiting to PLC, heavy duty seal less pumps (continuous operation), non return valves, solenoid valves, fittings, piping/tubing. It is sole responsibility of the Bidders to supply Sampling Skid system designed to draw sample from the condenser preventing leakages in the system so that vacuum/draft pressure level in condenser is not affected. All piping, tubing, fittings and other sample wetted parts in the sampling and analyzing system shall be of type 316 Stainless Steel.
- Bidder must provide 1 working + 1 Standby pumps. These pumps must be designed to operate continuously to pump sample out from condenser vacuum. Pumps must be protected for Dry running, Excess Vibration and Bearing wear and tear.
- Offered system shall be provided with provision of priming of pumps. Pump skid shall be located in condenser Pit below LP Condenser Hotwell at least 5 meter below tapping points.
- Pump must be selected to work under designed NPSH. Design, manufacturing and pump selection is bidders responsibility.
- Typical scheme of sampling skid is indicated for reference
-

**Skid must be designed with its own standalone IP65 Control panel.
Control panel must provide Pump Running/ Stop Feedback to DCS.**

During the commissioning of the system if it is found that any component which is required for the drawing of the sample without affecting draft/vacuum levels has not been offered, then Bidder has to supply all required components at their own cost.

8.00.00 DRAWINGS AND DOCUMENTS

Bidder shall furnish following drawings and documents after award of contract:

- a) Final version of all the drawing and document furnished along with bid**
- b) Drawing and document submission schedule**
- c) Power supply scheme**
- d) Interconnection and wiring diagram.**
- e) Spare part list**
- f) Consumable list**
- g) QAP**
- h) Inspection and Test report**
- i) Training details**
- j) O&M Manual**
- k) Any other scheme, data, drawing, document, etc required to establish product quality and completeness of supply**

1X800 MW DR.NTTPS, STAGE V, UNIT#8, VIJAYWADA

SWAS SCHEME

REV	DATE	ALTD	CHKD	APPD
04	30.11.17	CM	SCS	SCS
1.	SHEET NO. 17 REVISED W.R.T. PRIMARY COOLER REQUIREMENT.			
REV	DATE	ALTD	CHKD	APPD
03	31.10.17	CM-SD	SCS-SD	SCS -SD-
1.	REVISED AS PER CUSTOMER'S COMMENTS VIA REF NO 1450 DTD 19.09.17 & MEETING WITH APGENCO & DCPL AT VIDYUT SOUDHA, VIJAYAWADA ON 26.10.17 & 27.10.17.			
REV	DATE	ALTD	CHKD	APPD
02	23.08.17	AC-SD+	CM-SD-	SCS -SD-
	REVISED AS PER CUSTOMER'S COMMENTS VIA REF NO 0314 DTD 27.01.17.			

JOB NO. 419				
PRINT SCALE 				
REV	DATE	ALTD	CHKD	APPD
01	05.12.16	AC-SD-	CM-SD-	SCS-SD-
	REVISED AS PER CUSTOMER'S COMMENTS VIA REF NO Lr.No.CPP/SE-III/EME4I Dr.NTTPS/BHEL-PEMMI /O.No. 67 16.0t: 7.10.16			

CUSTOMER:	ANDHRA PRADESH POWER GENERATION CORPORATION LTD (APGENCO) ANDHRA PRADESH, INDIA									
	PROJECT 1X800 MW DR.NTTPS, STAGE V, UNIT#8, VIJAYWADA									
OWNER'S CONSULTANT:	DEVELOPMENT CONSULTANTS PVT. LTD. KOLKATA									
										
 Maharashtra Company	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA					DEPT	NAME	SIGN	DATE	
						CODE I	DRN	AC	-SD-	07.09.16
							DESN	AC	-SD-	07.09.16
							CHD	CM	-SD-	07.09.16
							APPD	SCS	-SD-	07.09.16
TITLE :- SWAS SCHEME										
							DEPT.	SCALE	DRAWING/DOC. NO.	
							SIGN		PE-DG-419-145-II10	
						DATE			SHEET	1 OF 21

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4.	NOTES	04	△2
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7.	CHILLED WATER SCHEME FOR SECONDARY COOLERS	07	△3
8.	FEED WATER TO ECONOMISER	08	△3
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10.	SEPARATOR OUTLET	10	△2
11.	HRH STEAM	11	
12.	HOTWELL-1	12	
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18.	DMCW FOR TG AUX	18	△1
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1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
INDEX

DRG. NO.

PE-DG-419-145-I110

SHEET 02 OF 21

REV 04

LEGEND :

	ISOLATING VALVE (NORMALLY OPEN)
	ISOLATING VALVE (NORMALLY CLOSED)
	PRESS REDUCING VALVE
	BACK PRESS REGULATOR
	SOLENOID OPERATED VALVE
	SAFETY RELIEF VALVE
	3 WAY NEEDLE VALVE
	SAMPLE COOLER
	SAMPLE FILTER
	EXPANDER
	FLOW INDICATOR WITH REGULATING VLV

QDV QUICK DISCONNECTION VALVE

CT	CONDUCTIVITY TRANSMITTER
CCT	CAT. CONDUCTIVITY TRANSMITTER
pHT	pH TRANSMITTER
SiT	SILICA ANALYSER TRANSMITTER
NaT	SODIUM ANALYSER TRANSMITTER
NH3T	AMMONIA TRANSMITTER
DOT	DISSOLVED O2 TRANSMITTER
CIT	CHLORIDE TRANSMITTER

LS LEVEL SWITCH

PT PRESSURE TRANSMITTER

03

	ANALYSER IN DRY PANEL
	PRESSURE GAUGE
	TEMPERATURE GAUGE
	TEMPERATURE SWITCH
	FLOW SWITCH
	FLOW INDICATOR
	LEVEL INDICATOR
	IMPULSE LINE
	CABLE
CR	CONTROL ROOM
DDCMIS	DISTRIBUTED DIGITAL CONTROL MONITORING & INFORMATION SYSTEM
OWS ALARM	ALARM ON OWS IN CONTROL ROOM
	INDICATES RESPECTIVE SCOPE
EDN	BHEL-EDN
B(T)	BHEL-TRICHY

	IRON ELEMENT
	HYDRAZINE ELEMENT
	TURBIDITY ELEMENT

FeT	IRON TRANSMITTER
HzT	HYDRAZINE TRANSMITTER
TurbT	TURBIDITY TRANSMITTER



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
LEGEND

DRG. NO.

PE-DG-419-145-I110

SHEET 3 OF 21

REV 04

NOTES :

1. ONE SET OF ALARM CONTACTS OF 2SPDT TYPE SHALL BE PROVIDED WITH EACH ANALYSER/MONITOR. 4-20 mA SIGNAL ALL ANALYSERS SHALL BE HOOKED-UP TO DDCMIS FOR MONITORING PURPOSE AS WELL AS ALARMS.
2. ALL FIELD SAMPLING LINE SHALL BE OF ANNEALED SEAMLESS 15NB SS316.
SAMPLING LINE SHALL BE OF 1/4" OD TUBING INSIDE PRIMARY RACKS, DRY AND WET PANEL.
3. ALL SAMPLING LINES SHALL BE ADEQUATELY SLOPED TOWARDS THE SAMPLING PANEL.
4. ALL PRIMARY COOLERS SHALL BE LOCATED IN FIELD.
5. SAMPLE TEMP SHALL BE AROUND 45 DEG C AT PRIMARY COOLER OUTLET AND SAMPLE TEMP AT SECONDARY COOLER OUTLET SHALL BE 25°C.
6. SAMPLE ENTRY IN PANEL SHALL BE FROM "TOP" AND CABLE ENTRY FROM "BOTTOM". IN ADDITION, PROVISION OF CABLE ENTRY FROM SIDE SHALL ALSO BE MADE AVAILABLE.
7. SAMPLE TEMP HIGH (COMMON) GROUP ALARM SHALL BE PROVIDED IN DDCMIS.
8. CHILLER SHALL HAVE 25% SPARE CAPACITY FOR FUTURE ADDITION. CHILLED WATER LINES ARE PROPERLY INSULATED.
9. SAMPLE COOLER SHALL BE OF SUBMERGED HELICAL COIL TYPE OF SHELL AND TUBE DESIGN SHALL BE OF REMOVABLE TYPE.
10. NECESSARY EXPANDERS/ REDUCERS, ETC. AS REQUIRED, WILL BE IN THE SCOPE OF SWAS BIDDER.
11. DEDICATED PC FOR SWAS WITH 24" TFT MONITOR AND PRINTER SHALL BE PROVIDED.
12. IN LINE WITH "1X800MW APPDCL SPEC- V-VI/S-VI/SS-M:6 , CL # 3.10.00, CONSUMABLES UPTO GUARANTEE PERIOD" SHALL BE SUPPLIED ALONG WITH SWAS EQUIPMENT.
13. DUAL CHANNEL ANALYZERS SHALL BE USED FOR PH, CONDUCTIVITY AND DISSOLVED OXYGEN MEASUREMENT. EXACT GROUPING OF THE ANALYZERS SHALL BE INDICATED IN SWAS'S VENDOR DOCUMENTS. QUANTITY OF THESE ANALYSERS SHALL BE AS PER DUAL CHANNEL.
14. IN LINE WITH "1X800MW APPDCL TPS SPEC- V-VI/S-VI/SS-M:6 , CL # 3.15.00, COMPLETE SET OF FURNITURE FOR THE SWAS ROOM SHALL BE PROVIDED.

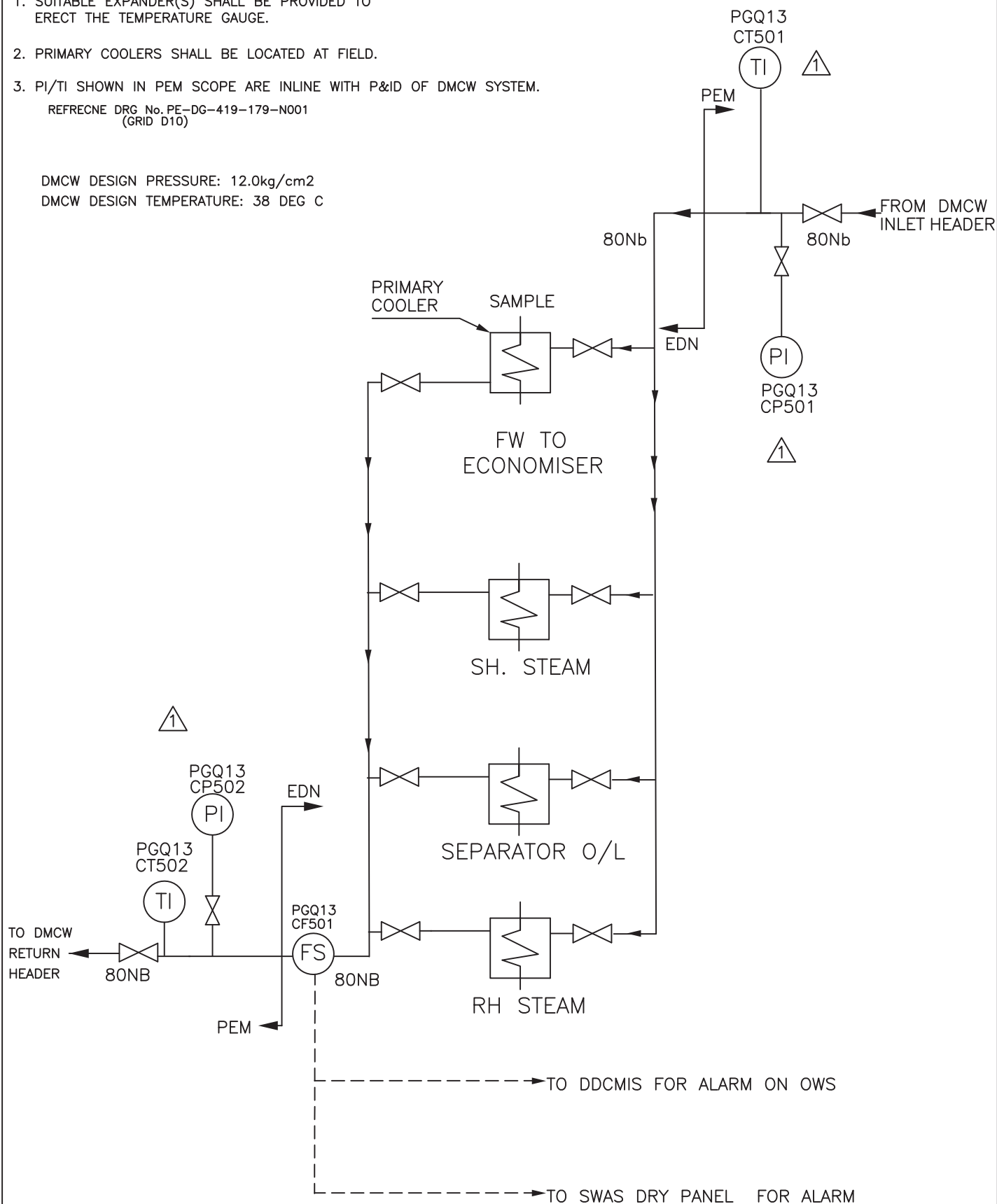
	1X800 MW DR.NTTPS, STAGE V,	TITLE SWAS SCHEME NOTES	DRG. NO. PE-DG-419-145-I110	
	UNIT#8, VIJAYWADA		SHEET 4 OF 21	REV 04

NOTES:

1. SUITABLE EXPANDER(S) SHALL BE PROVIDED TO ERECT THE TEMPERATURE GAUGE.
2. PRIMARY COOLERS SHALL BE LOCATED AT FIELD.
3. PI/TI SHOWN IN PEM SCOPE ARE INLINE WITH P&ID OF DMCW SYSTEM.

REFRECNE DRG No. PE-DG-419-179-N001
(GRID D10)

DMCW DESIGN PRESSURE: 12.0kg/cm²
DMCW DESIGN TEMPERATURE: 38 DEG C

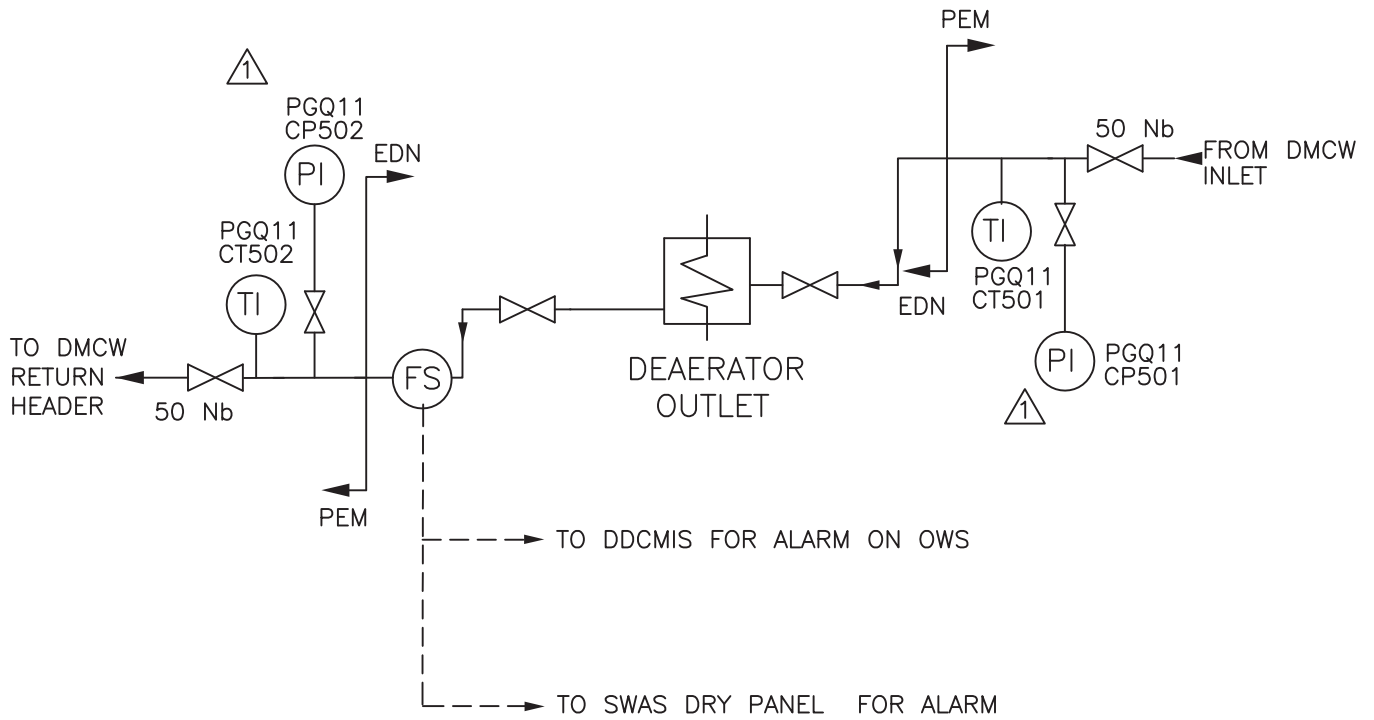


NOTES:

1. SUITABLE EXPANDER(S) SHALL BE PROVIDED TO ERECT THE TEMPERATURE GAUGE.
2. PRIMARY COOLERS SHALL BE LOCATED AT FIELD.
3. PI/TI SHOWN IN PEM SCOPE ARE INLINE WITH P&ID OF DMCW SYSTEM.

REFERENCE DRG : PE-DG-419-179-N001
(GRID D11)

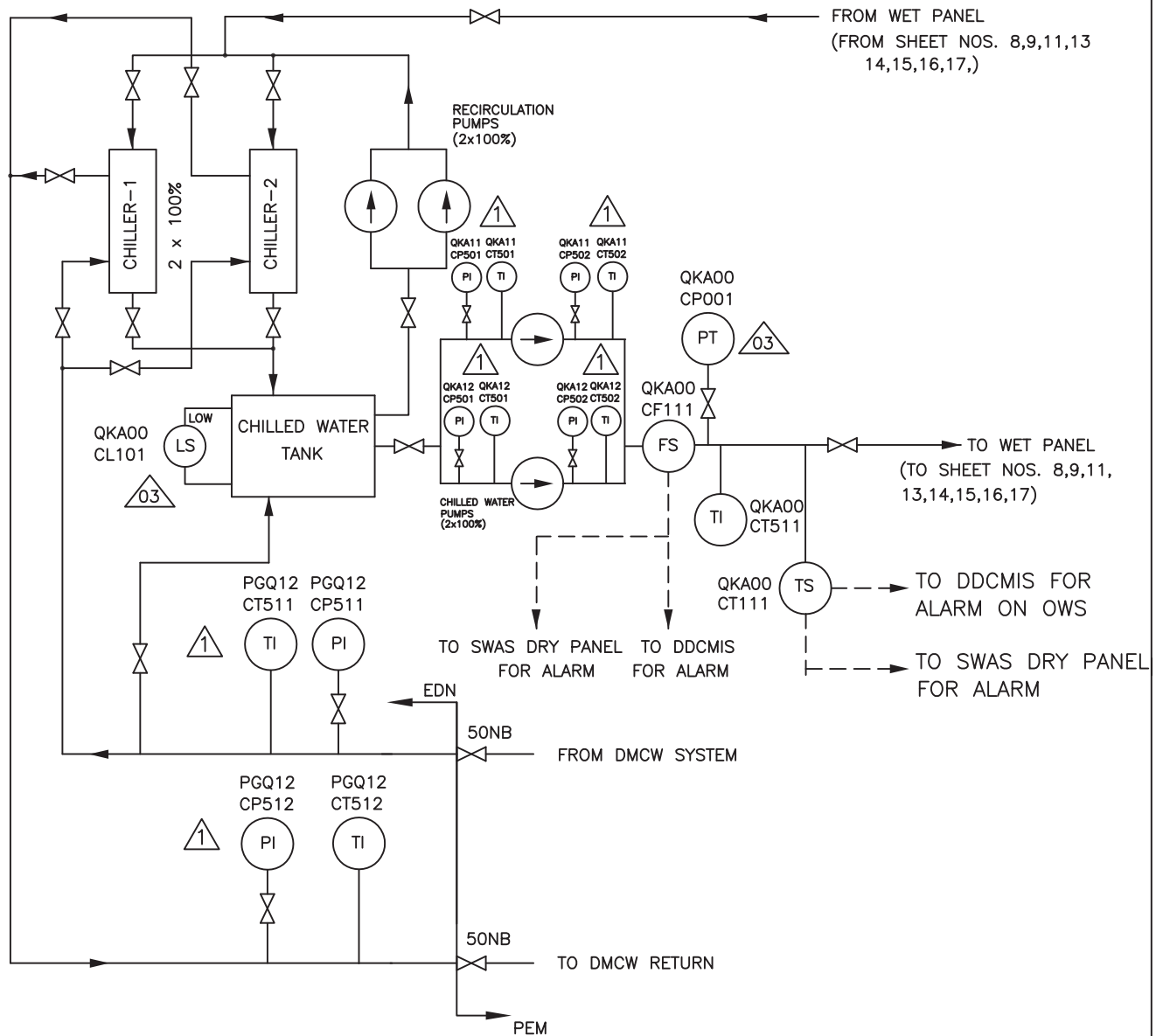
DMCW DESIGN PRESSURE: 12.0kg/cm²
DMCW DESIGN TEMPERATURE: 38 DEG C



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE
SWAS SCHEME
DMCW SCHEME FOR PRIMARY COOLERS

DRG. NO.
PE-DG-419-145-I110
SHEET 6 OF 21 REV 04



NOTES

1. ALL SECONDARY COOLERS ARE LOCATED IN SWAS WET PANELS.



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

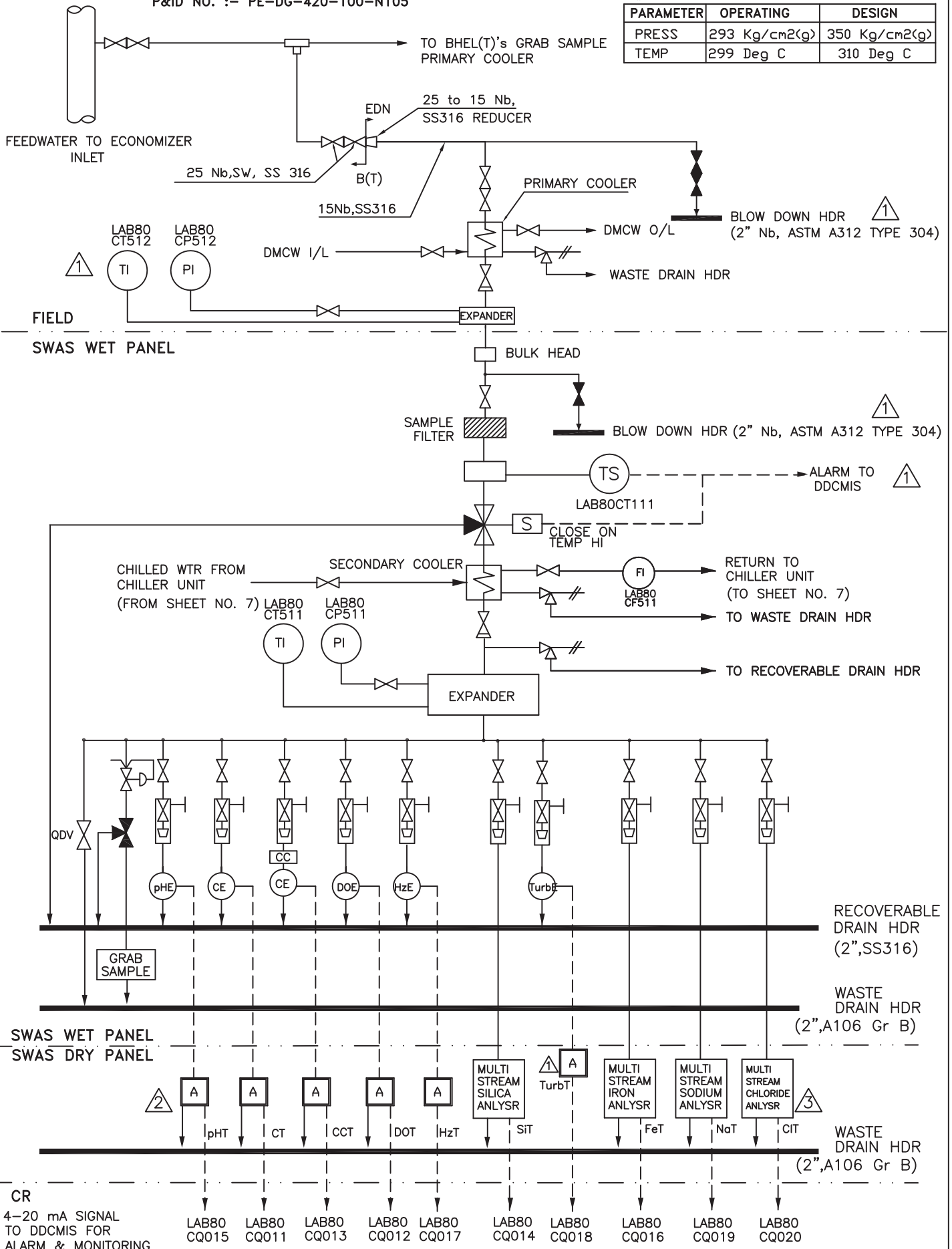
TITLE
SWAS SCHEME
CHILLED WATER SCHEME
FOR SECONDARY COOLERS

DRG. NO.
PE-DG-419-145-I110
SHEET 7 OF 21
REV 04

REFERENCE P&ID NAME :- FEED WATER SYSTEM
P&ID NO. :- PE-DG-420-100-N105

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	293 Kg/cm ² (g)	350 Kg/cm ² (g)
TEMP	299 Deg C	310 Deg C



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

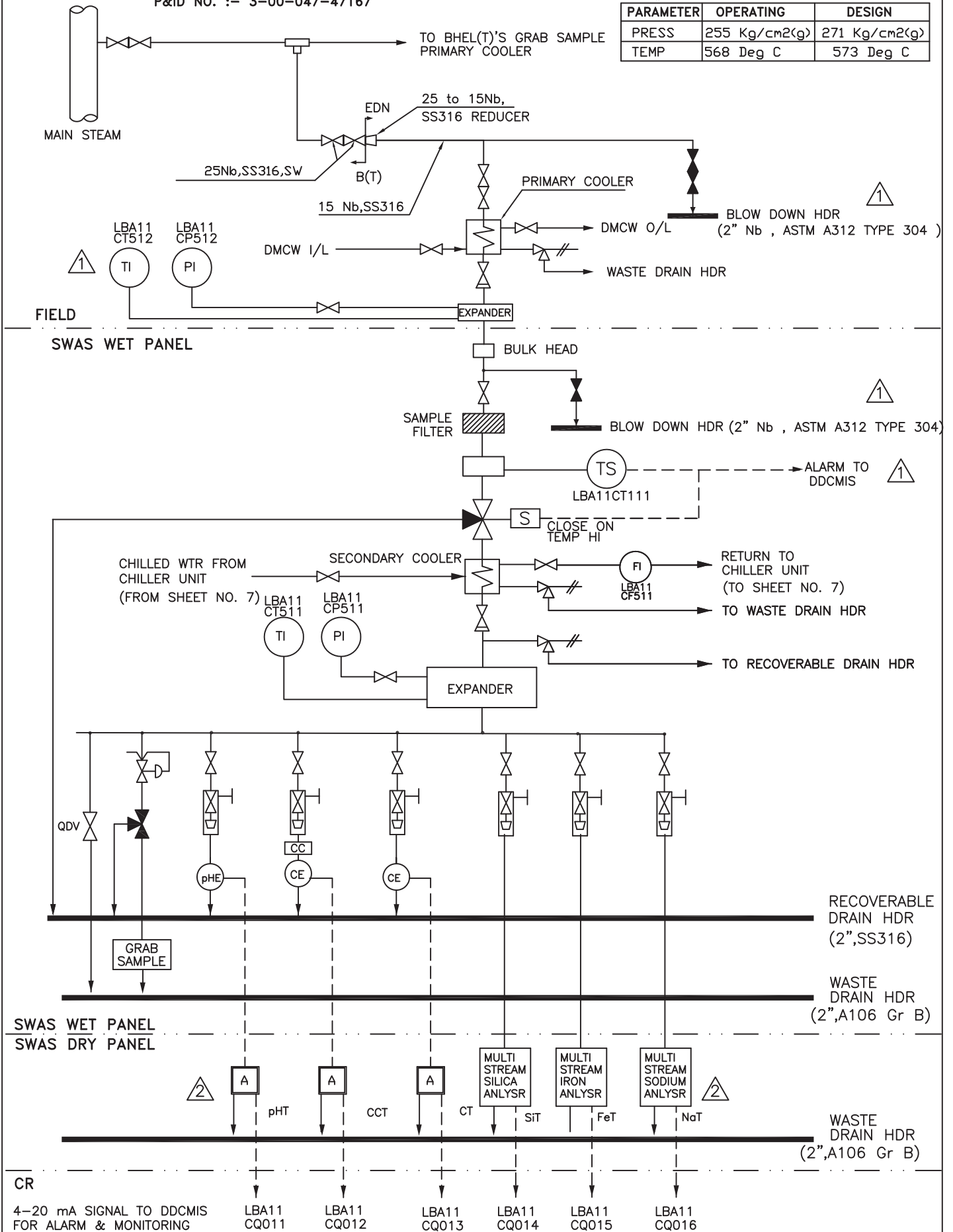
TITLE
SWAS SCHEME
FEED WATER TO ECONOMISER

DRG. NO.
PE-DG-419-145-I110
SHEET 8 OF 21
REV 04

REFERENCE P&ID NAME :- SAMPLING SYSTEM
P&ID NO. :- 3-00-047-47167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	255 Kg/cm ² (g)	271 Kg/cm ² (g)
TEMP	568 Deg C	573 Deg C

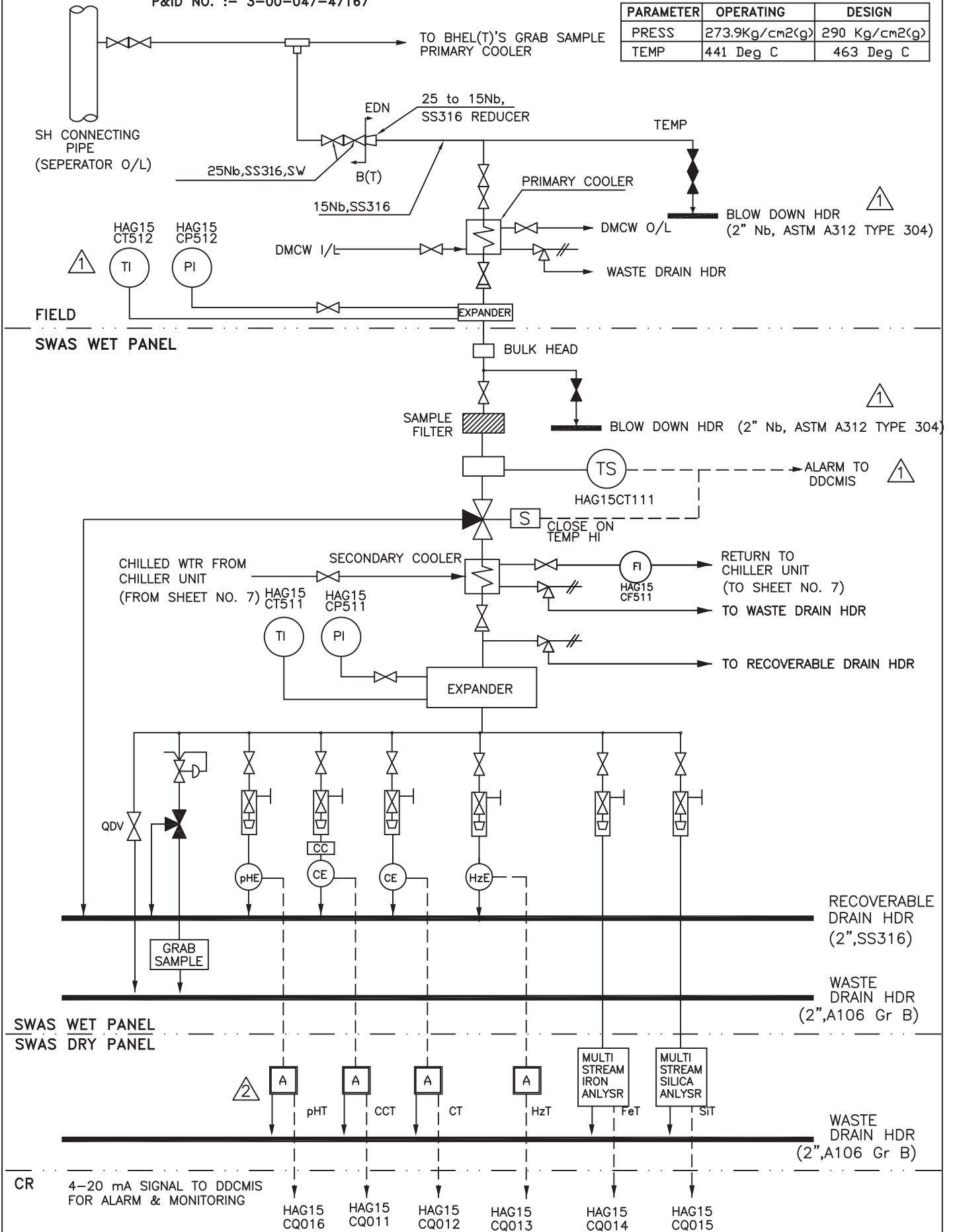


	1X800 MW DR.NTPS, STAGE V, UNIT#8, VIJAYWADA	TITLE SWAS SCHEME SH/MAIN STEAM	DRG. NO. PE-DG-419-145-I110
			SHEET 9 OF 21 REV 04

REFERENCE P&ID NAME :- SAMPLING SYSTEM
P&ID NO. :- 3-00-047-47167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	273.9Kg/cm2(g)	290 Kg/cm2(g)
TEMP	441 Deg C	463 Deg C



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

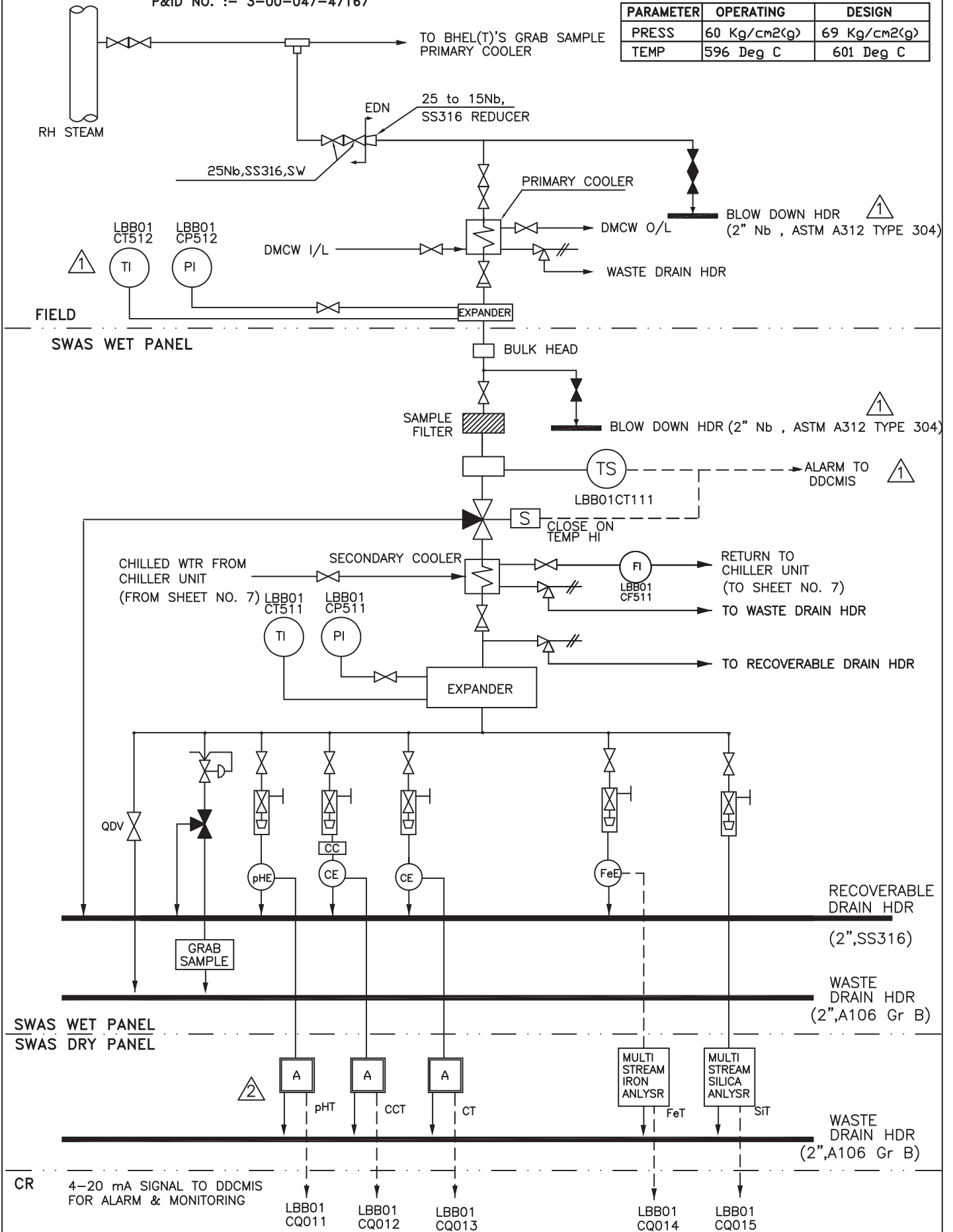
TITLE
SWAS SCHEME
SEPARATOR OUTLET STEAM

DRG. NO.
PE-DG-419-145-I110
SHEET 10 OF 21
REV 04

REFERENCE P&ID NAME :- SAMPLING SYSTEM
P&ID NO. :- 3-00-047-47167

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	60 Kg/cm2(g)	69 Kg/cm2(g)
TEMP	596 Deg C	601 Deg C



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
HRH STEAM

DRG. NO.

PE-DG-419-145-I110

SHEET 11 OF 21

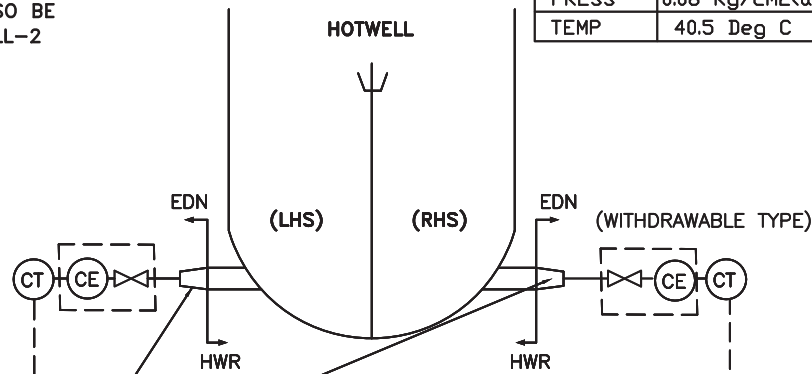
REV 04

REFERENCE P&ID NAME :- CONDENSATE SYSTEM
P&ID NO. :- PE-DG-419-100-N106

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm ² (a)	1.1 Kg/cm ² (g)/VAC
TEMP	40.5 Deg C	60 Deg C

NOTE:- THIS SCHEME SHALL ALSO BE
APPLICABLE FOR HOTWELL-2



SUITABLE ADOPTER SHALL BE PROVIDED ALONG WITH
PROBE FOR TAPPING POINT SIZE= 60.3X5.54MM
LENTGH OF PROBE SHALL BE DECIDED CONSIDERING
HOTWELL WALL THK + STUB HEIGHT + LENTGH OF ADOPTER.

CR
4-20 mA SIGNAL
FOR ALARM &
MONITORING TO DDCMIS

MAG10
CQ011

MAG10
CQ012



1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
HOTWELL-1

DRG. NO.

PE-DG-419-145-I110

SHEET 12 OF 21

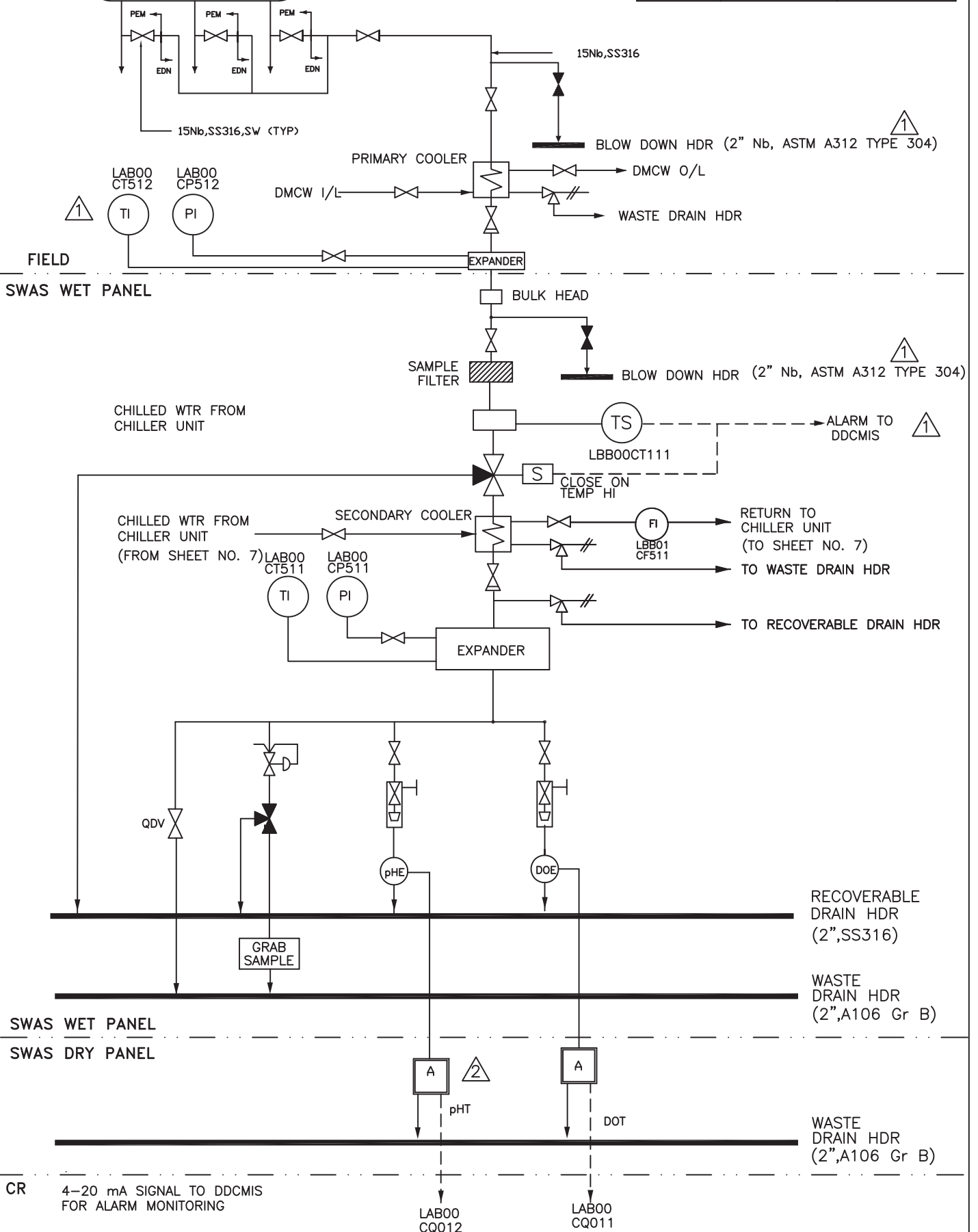
REV 04



REFERENCE P&ID NAME :- FEEDWATER SYS
P&ID NO. :-PE-DG-419-100-N105

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	12.39Kg/cm2(a)	20 Kg/cm2(g)
TEMP	188.5 Deg C	200 Deg C



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
DEAERATOR O/L

DRG. NO.

PE-DG-419-145-I110

SHEET 14 OF 21

REV 04

DM MAKE-UP WATER TO CONDENSER

15Nb,SS316,SW

EDN

PEM

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	7.0 Kg/cm2(a)	10 Kg/cm2(g)
TEMP	40 Deg C	50 Deg C

REFERENCE P&ID NAME :- DM M/U SYSTEM

P&ID NO. :- PE-DG-419-100-N110

15Nb,SS316

FIELD

SWAS WET PANEL

CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY COOLER

FILTER

BULK HEAD

BLOW DOWN HDR (2" Nb, ASTM A312 TYPE 304)

RETURN TO
CHILLER UNIT
(TO SHEET NO. 7)

TO WASTE DRAIN HDR

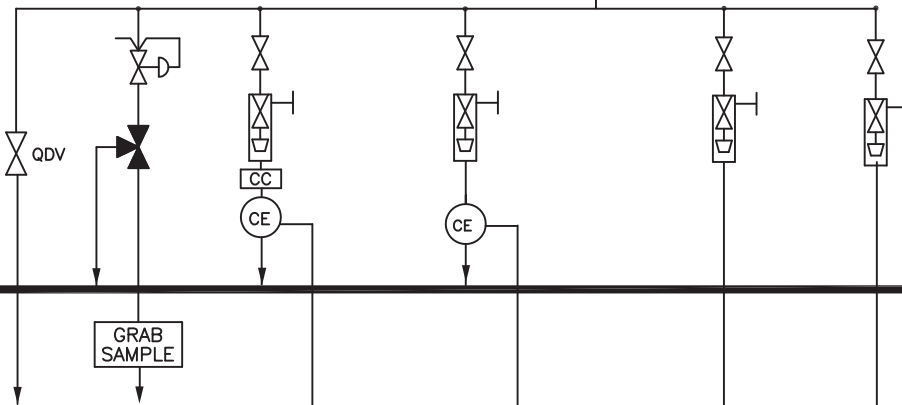
TO RECOVERABLE DRAIN HDR

LCR41
CT511

LCR41
CP511

FI
LCR41
CF511

EXPANDER



RECOVERABLE
DRAIN HDR
(2",SS316)

WASTE
DRAIN HDR
(2",A106 Gr B)

SWAS WET PANEL

SWAS DRY PANEL

2

A

CCT

A

CT

MULTI
STREAM
SILICA
ANLYSR

SiT

MULTI
STREAM
IRON
ANLYSR

FeT

WASTE
DRAIN HDR
(2",A106 Gr B)

CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM & MONITORING

LCR41
CQ011

LCR41
CQ012

LCR41
CQ013

LCR41
CQ014



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME

DM MAKE-UP WTR TO CONDENSER

DRG. NO.

PE-DG-419-145-I110

SHEET 15 OF 21

REV 04



PARAMETER	OPERATING	DESIGN
PRESS	30.6 Kg/cm ² (a)	45 Kg/cm ² (g)
TEMP	43 Deg C	60 Deg C

P&ID NO. :- PE-DG-419-100-N106

15Nb,SS316

SWAS WET PANEL

 BULK HEAD

FILTER

BLOW DOWN HDR (2" Nb, ASTM A312 TYPE 304)

SECONDARY COOLE

- RETURN TO
CHILLER UNIT
(FROM SHEET NO. 7)

LCA20
CT511

TI

LCA20
CP511

PI

EXPANDER

- TO RECOVERABLE DRAIN HDR

RECOVERABLE
DRAIN HDR
(2"Nb,SS316)

WASTE
DRAIN HDR

SWAS DRY PANEL

WASTE
DRAIN HDR

CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM & MONITORING

LCA20
CQ011

LCA20
CQ012

LCA20
CQ013

LCA20
CQ014

LCA20
CQ015

LCA20
CQ016



1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

TITLE	SWAS SCHEME
	CONDENSATE AT CEP DISCHARGE

DRG. NO.	DESCRIPTION	DATE	TIME	LOCATION	REMARKS
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89	...	...	...	...	...
90	...	...	...		

PE-DG-419-145-I110

SHEET 16 OF 21

REV 04

CONDENSATE AT CPU O/L

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	30.6 Kg/cm ² (a)	45 Kg/cm ² (g)
TEMP	43.4 Deg C	60 Deg C

REFERENCE P&ID NAME :- CONDENSATE SYSTEM

P&ID NO. :- PE-DG-419-100-N106

15Nb,SS316,SW

EDN

PEM

15 NB, SS 316

4

FIELD

SWAS WET PANEL

BULK HEAD

FILTER

BLOW DOWN HDR (2" Nb, ASTM A312 TYPE 304)

CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY COOLER

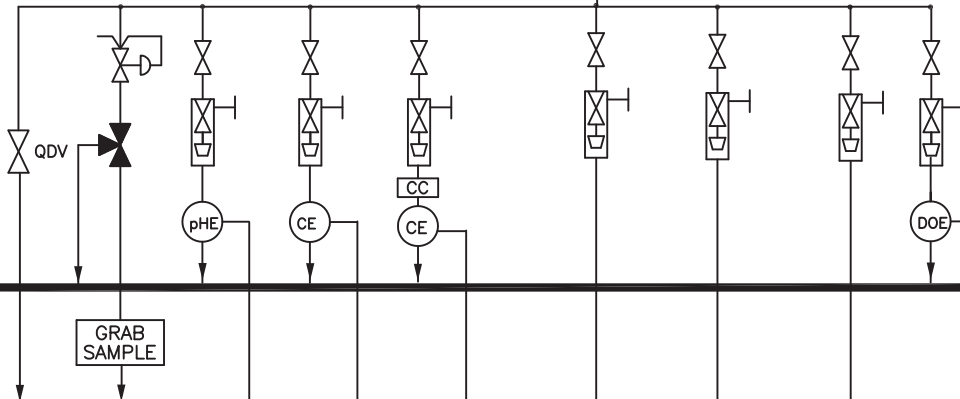
RETURN TO
CHILLER UNIT
(TO SHEET NO. 7)

TO WASTE DRAIN HDR

TO RECOVERABLE DRAIN HDR

LCA50
CT511
TILCA50
CP511
PI

EXPANDER



SWAS WET PANEL

SWAS DRY PANEL

RECOVERABLE
DRAIN HDR
(2"Nb,SS316)WASTE
DRAIN HDR
(2"Nb,A106 Gr B)WASTE
DRAIN HDR
(2"Nb,A106 Gr B)CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM & MONITORINGLCA50
CQ011LCA50
CQ012LCA50
CQ013LCA50
CQ014LCA50
CQ015LCA50
CQ016LCA50
CQ0171X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
CONDENSATE POLISHER O/L

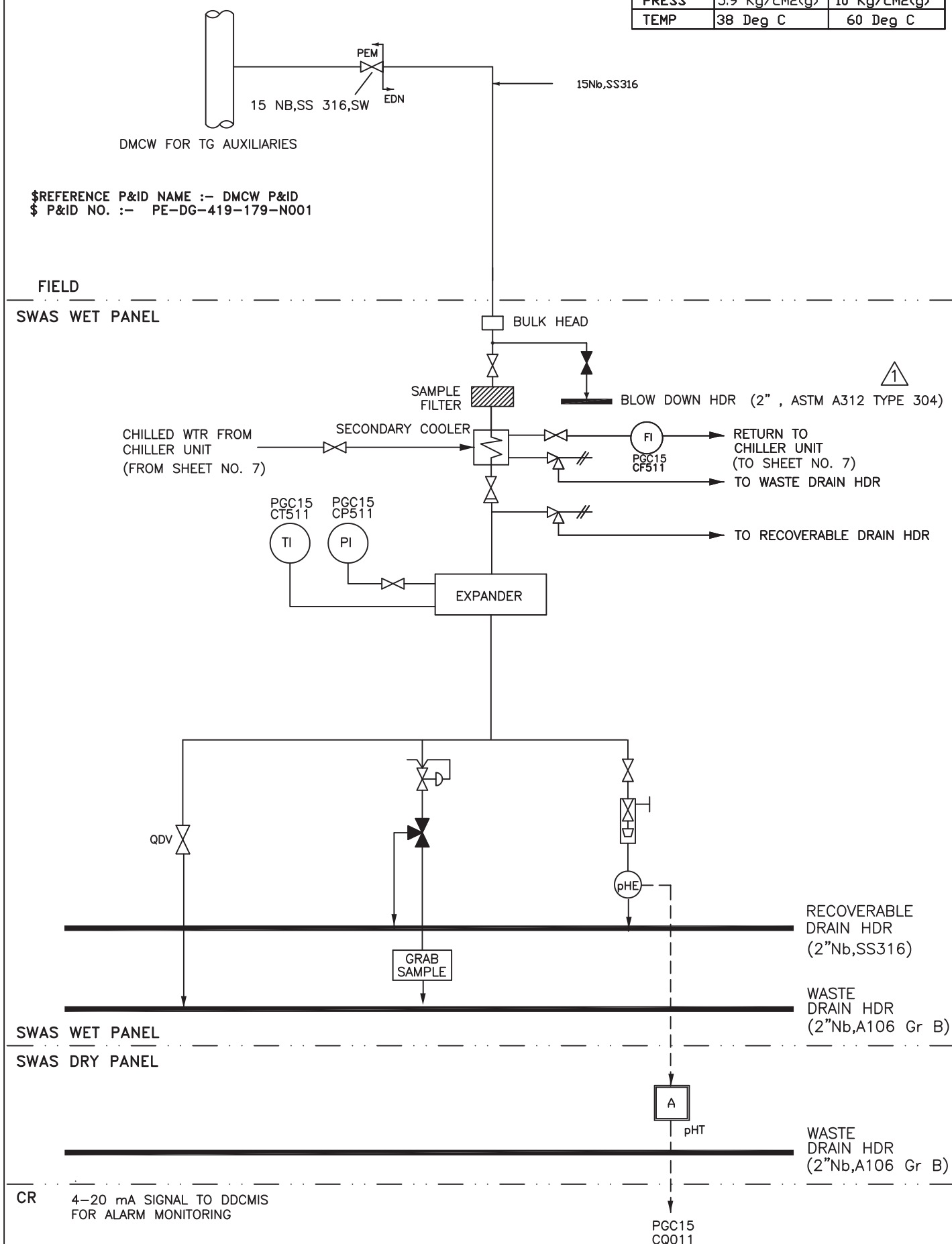
DRG. NO.

PE-DG-419-145-I110

SHEET 17 OF 21

REV 04

#PROCESS :		
PARAMETER	OPERATING	DESIGN
PRESS	5.9 Kg/cm2(g)	10 Kg/cm2(g)
TEMP	38 Deg C	60 Deg C



#PROCESS :

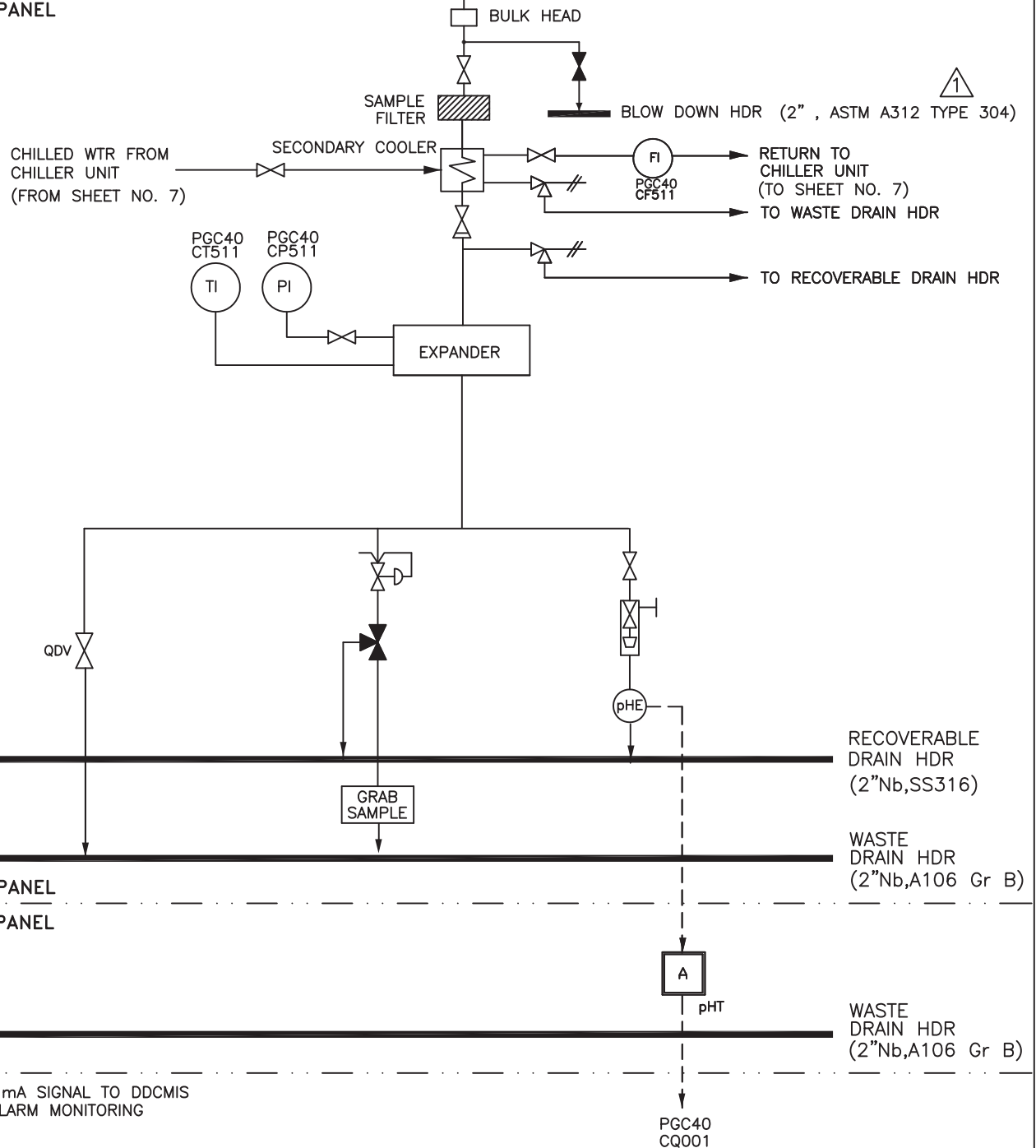
PARAMETER	OPERATING	DESIGN
PRESS	7.4 Kg/cm ² (g)	12 Kg/cm ² (g)
TEMP	38 Deg C	60 Deg C

DMCW FOR SG AUXILIARIES

\$REFERENCE P&ID NAME :- DMCW P&ID
\$ P&ID NO. :- PE-DG-419-179-N001

FIELD

SWAS WET PANEL



SWAS WET PANEL

SWAS DRY PANEL

CR 4-20 mA SIGNAL TO DDCMIS
FOR ALARM MONITORING



1X800 MW DR.NTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE

SWAS SCHEME
DMCW FOR SG AUX

DRG. NO.

PE-DG-419-145-I110

SHEET 19 OF 21

REV 04

CW TO CONDENSER INLET

15Nb,SS316,SW

EDN

*CUSTOMER'S SCOPE

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	2.0 Kg/cm2(g)	5.5 Kg/cm2(g)
TEMP	33 Deg C	60 Deg C

* TERMINAL POINT SHALL BE IN TG BUILDING

15Nb,SS316

FIELD

SWAS WET PANEL

BULK HEAD

FILTER

BLOW DOWN HDR (2" Nb,SS304)

CHILLED WTR FROM
CHILLER UNIT
(FROM SHEET NO. 7)

SECONDARY
COOLER

PAB11
CT511

PAB11
CP511

FI

PAB11
CF511

RETURN TO
CHILLER UNIT
(TO SHEET NO. 7)

TO WASTE DRAIN HDR

TO RECOVERABLE DRAIN HDR

EXPANDER

TS

PAB11CT111

ALARM TO
DDCMIS

CLOSE ON
TEMP HI

QDV

GRAB
SAMPLE

pHE

CE

RECOVERABLE
DRAIN HDR
(2"Nb,SS316)

WASTE
DRAIN HDR
(2"Nb,A106 Gr B)

SWAS WET PANEL

SWAS DRY PANEL

2

A

pHT

PAB11
CQ011

2

A

CT

PAB11
CQ012

WASTE
DRAIN HDR
(2"Nb,A106 Gr B)

CR 4-20 mA SIGNAL TO DCS
FOR ALARM & MONITORING



1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

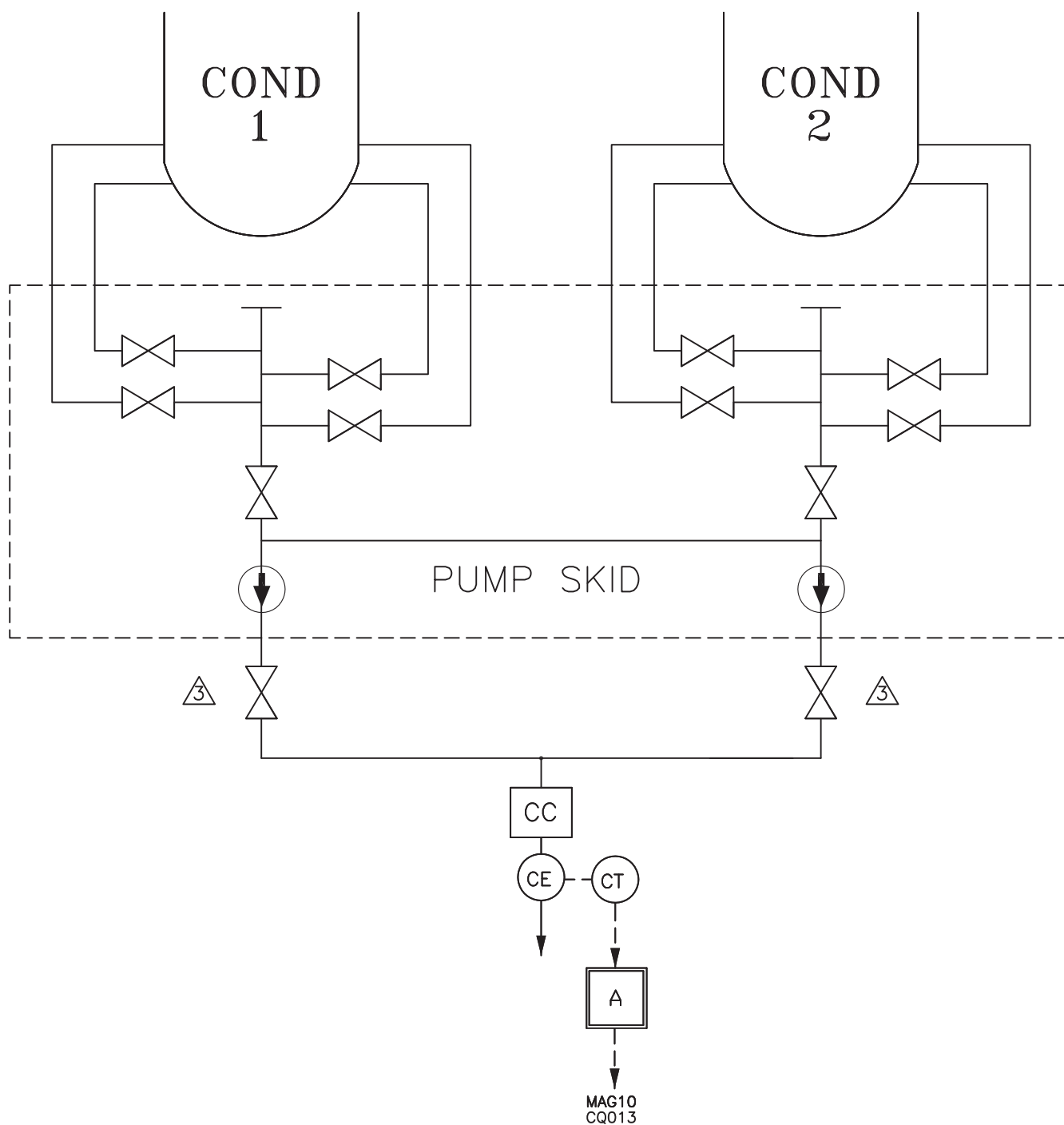
TITLE
SWAS SCHEME
CONDENSER COOLING WATER

DRG. NO.
PE-DG-419-145-I110
SHEET 21 OF 21 REV 04

REFERENCE P&ID NAME :- CONDENSATE SYSTEM
P&ID NO. :- PE-DG-419-100-N106

#PROCESS :

PARAMETER	OPERATING	DESIGN
PRESS	0.08 Kg/cm ² (a)	1.1 Kg/cm ² (g)/VAC
TEMP	40.5 Deg C	60 Deg C



NOTES:-

1. THIS IS ONLY A SCHEMATIC DRAWING DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
2. VENDOR TO PROVIDE SOLENOID VALVE, SEQUENCER ETC. TO COMPLETE THE PROCESS REQUIREMENT AND AS PER OEM's PRACTICE.
3. NECESSARY PUMP PROTECTION SHALL BE CONSIDERED BY VENDOR AS PER OEM's PRACTICE AND ALL THE RELATED DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
4. CATION CONDUCTIVITY ANALYZER SHALL BE MOUNTED IN RACK PLACED LOCALLY.
5. HARD WIRE ALARM SIGNAL SHALL BE PROVIDED TO SWAS PANEL AND DCS.



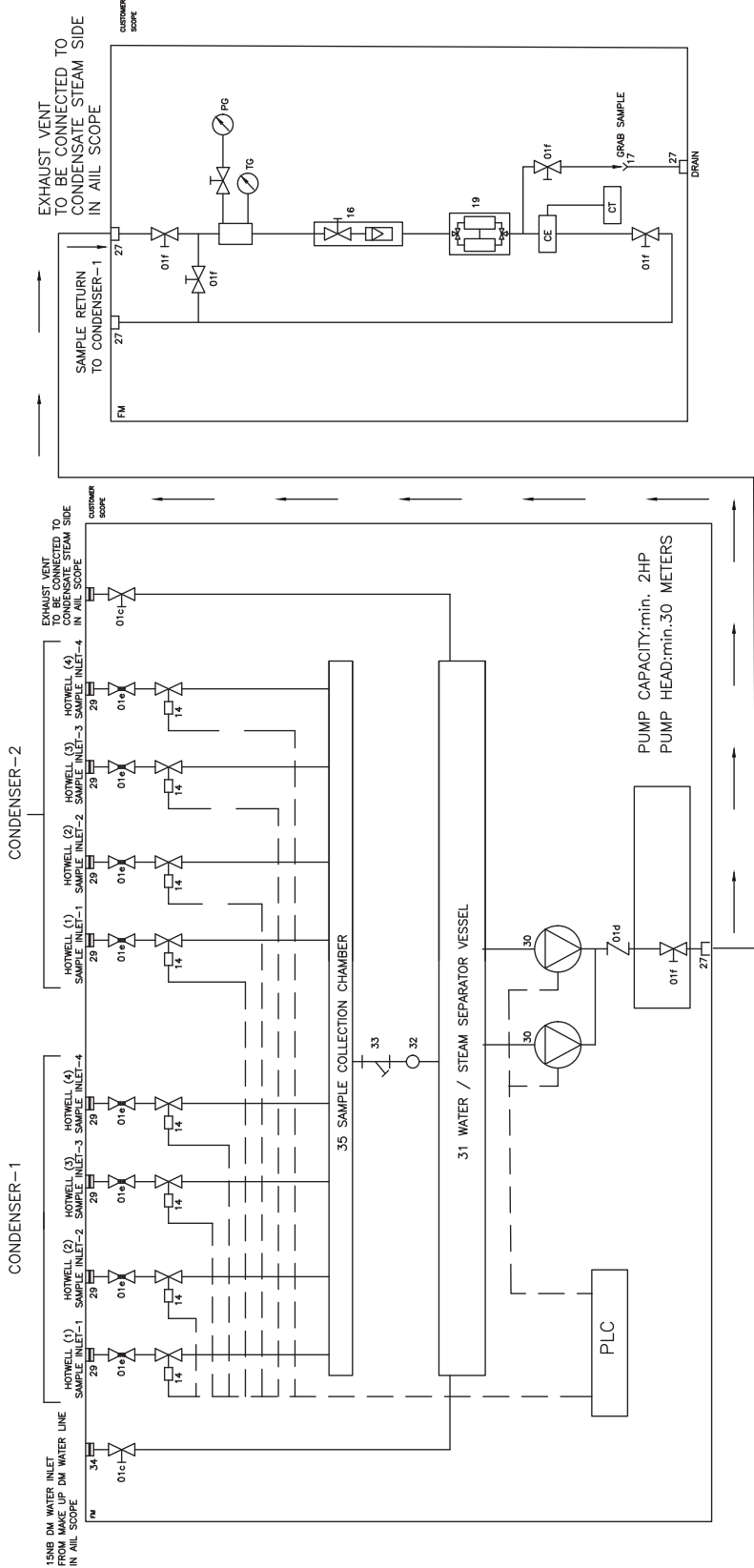
1X800 MW DR.NTTPS, STAGE V,
UNIT#8, VIJAYWADA

TITLE
SWAS SCHEME
CATION CONDUCTIVITY AT
CONDENSER-1&2

DRG. NO.
PE-DG-419-145-I110
SHEET 20 OF 21 REV 04

SAMPLING SKID P&ID

SAMPLING PANEL P&ID



NOTE FOR SAMPLING SKID:

- 1) SAMPLE PIPING INSIDE SAMPLING SKID : 25NB, ASTM A312, TP-316, SCH-40S, SEAMLESS PIPE
- 2) SAMPLE INLET CONNECTION TO SYSTEM RACK : 25NB, SS316, ANSI B16.5, CLASS 150#, R/F FLANGE
- 3) SAMPLE OUTLET TO CONDUCTIVITY MEASUREMENT RACK FROM CLTDS RACK : UNION 3/8" OD SS316
- 4) MAKE UP DM WATER CONNECTION: 15NB SS316, ANSI B16.5, 150# S/W R/F, FLANGE
- 5) PIPING UP TO WATER/GAS SEPARATION VESSEL INLET: 25NB/ASTM A312,TP-316,SCH-40S,SEAMLESS PIPE
- 6) PIPING AFTER WATER/GAS SEPARATION TO PUMP INLET: 50NB, ASTM A312, TP-316, SCH-40S, SEAMLESS PIPE
- 7) TUBING AFTER PUMP OUTLET NRV TO CONDUCTIVITY ANALYZER PANEL: 3/8"OD, 20 SWG ASTM A213 TP-316, SEAMLESS TUBE
- 8) AIR VENT CONNECTION TO CONDENSER : 25NB/ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE WITH 25NB SS304 S/W RF 150# FLANGE
- 9) AIR VENT NOZZLE TO BE WELDED TO CONDENSER BY: SOCKET 25NB SS304 CLASS 3000#

NOTE FOR CONDUCTIVITY ANALYZER SAMPLING PANEL:

1. SAMPLE TUBING: 3/8" OD 20 SWG, ASTM A213, TP316, SEAMLESS TUBE
2. SAMPLE INLET CONNECTION: BHU 3/8" OD x 3/8" OD SS-316

LEGEND FOR PUMP SKID:

ITEM NO	DESCRIPTION
01c	MAKE UP WATER VALVE(1/2" NEEDLE VALVE)
01e	SAMPLE ISOLATION VALVE(1: BALL VALVE)
01d	NON RETURN VALVE
01f	SAMPLE ISOLATION VALVE (3/8"OD NEEDLE TYPE)
14	2-WAY SOLENOID VALVE
27	UNION (3/8"OD X3/8"OD)SS316
29	SAMPLE INLET FLANGE: 25NB, 150#, S/W RF
30	SAMPLE EXTRACTION PUMP
31	6" SIZE WATER/GAS SEPARATOR VESSEL
32	1" SIZE FLOW INDICATOR
33	1" SIZE Y TYPE STRAINER
34	MAKE UP WATER INLET FLANGE: 15NB, SS316, 150#, S/W R/F
33	SAMPLE COLLECTION CHAMBER

LEGEND FOR CONDUCTIVITY ANALYZER PANEL

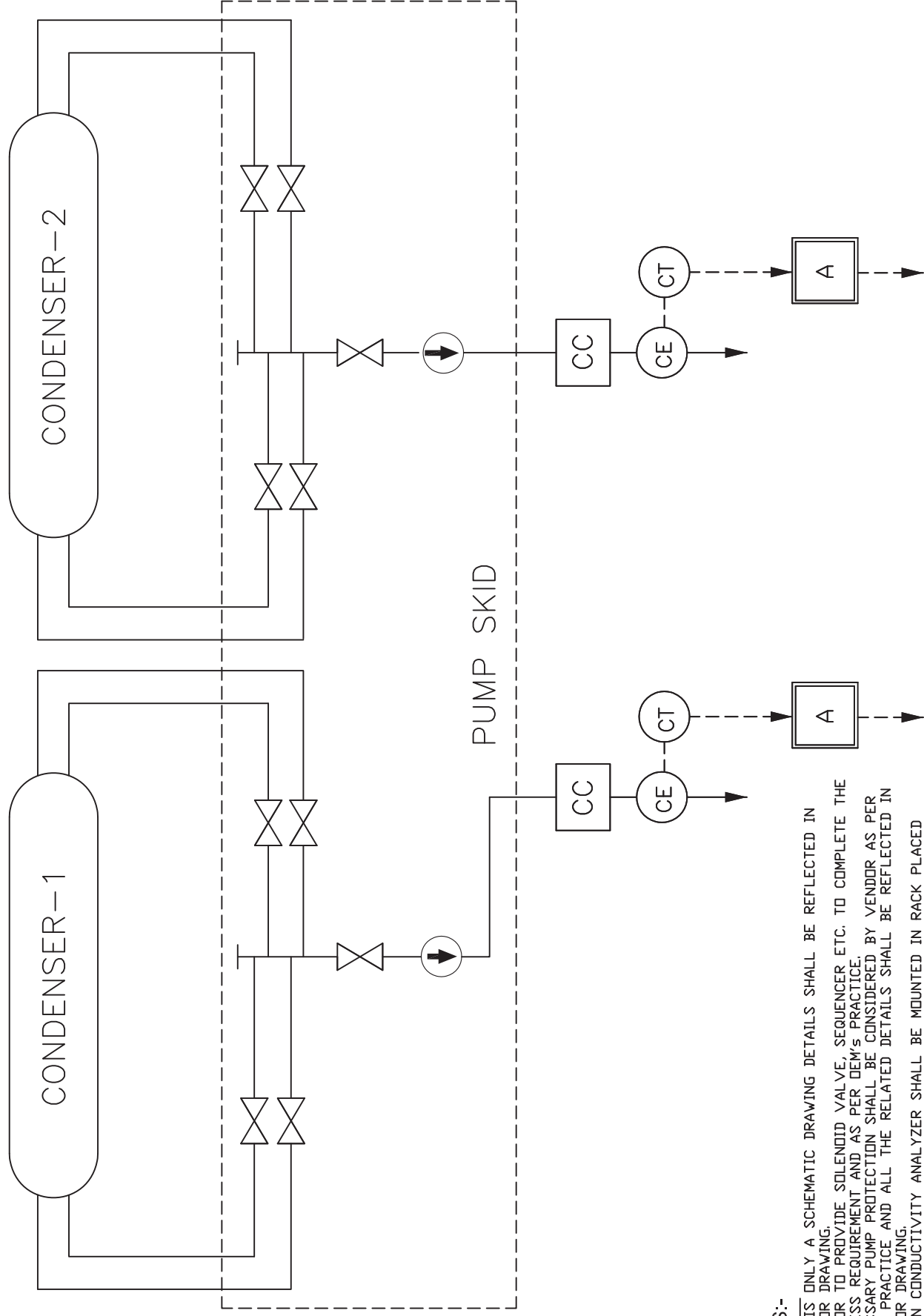
ITEM NO	DESCRIPTION
16	ROTAMETER
17	TUNDISH
19	CATION COLUMN(DUAL TYPE)
27	SAMPLE INLET & OUTLET BHU (3/8"OD X 3/8"OD) SS316
CE	CATION CONDUCTIVITY CELL+FLOW THROUGH CHAMBER
CT	CONDUCTIVITY TRANSMITTER



TITLE:

SAMPLING SKID FOR CONDENSER

DEPT:CE-ENG	REV.NO: 00	NO.OF SHEETS	SHEET NO.
CODE: 416			



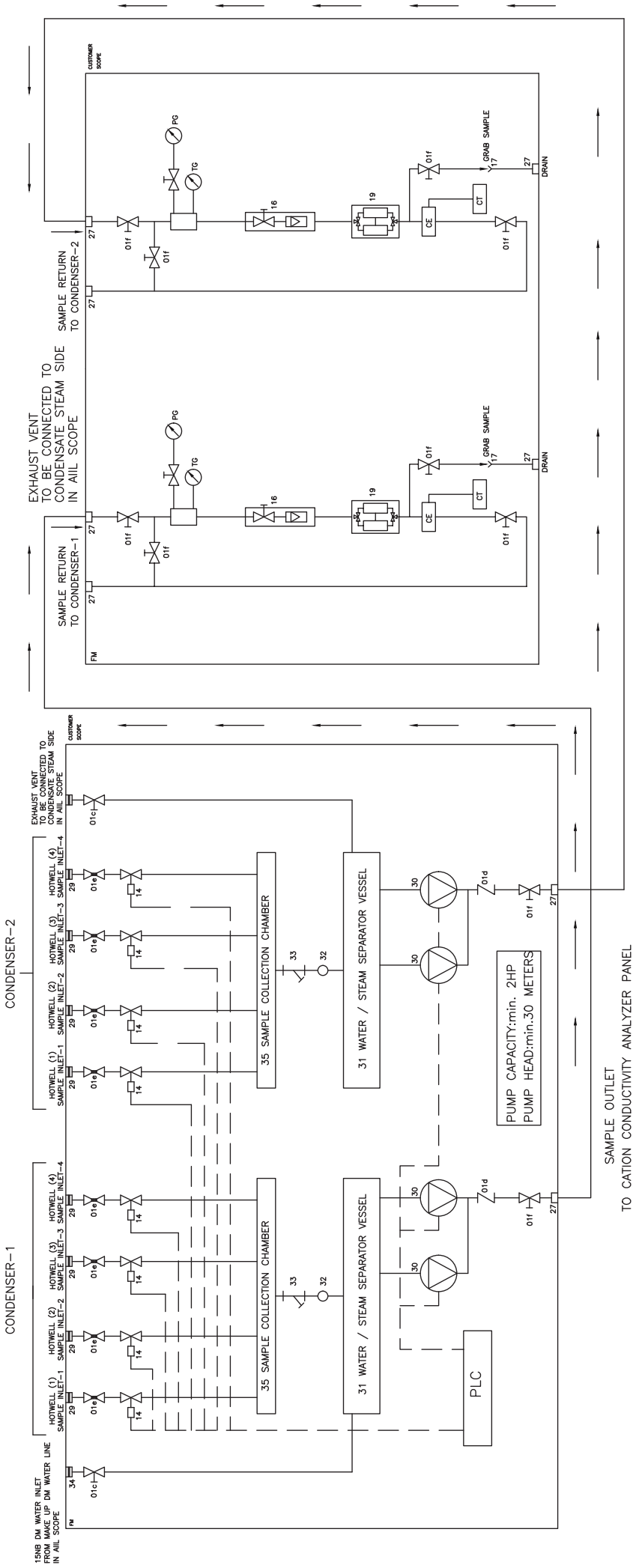
NOTES:-

1. THIS IS ONLY A SCHEMATIC DRAWING DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
2. VENDOR TO PROVIDE SOLENOID VALVE, SEQUENCER ETC. TO COMPLETE THE PROCESS REQUIREMENT AND AS PER DEM'S PRACTICE.
3. NECESSARY PUMP PROTECTION SHALL BE CONSIDERED BY VENDOR AS PER DEM'S PRACTICE AND ALL THE RELATED DETAILS SHALL BE REFLECTED IN VENDOR DRAWING.
4. CATION CONDUCTIVITY ANALYZER SHALL BE MOUNTED IN RACK PLACED LOCALLY.
5. HARD WIRE ALARM SIGNAL SHALL BE PROVIDED TO SWAS PANEL AND DCS. 

	Telangana State Power Generation Co Ltd.	TITLE	DRG. NO.				
	KOTHAGUDEM (1X800 MW)		CATION CONDUCTIVITY AT CONDENSER-1&2				
			PE-DG-410-145-I110				
			SHEET 19	DF 19	REV 00		

SAMPLING SKID P&ID

SAMPLING PANEL P&ID



NOTE FOR SAMPLING SKID:

- 1) SAMPLE PIPING INSIDE SAMPLING SKID : 25NB, ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE
- 2) SAMPLE INLET CONNECTION TO SYSTEM RACK : 25NB, SS304, ANSI B16.5, CLASS 150#, R/F FLANGE
- 3) SAMPLE OUTLET TO CONDUCTIVITY MEASUREMENT RACK FROM CLTDS RACK : UNION 3/8" OD SS316
- 4) MAKE UP DM WATER CONNECTION: 15NB SS304, ANSI B16.5, 150# S/W R/F, FLANGE
- 5) PIPING UP TO WATER/GAS SEPARATOR VESSEL INLET: 25NB,ASTM A312,TP-304,SCH-40S,SEAMLESS PIPE
- 6) PIPING AFTER WATER/GAS SEPARATION TO PUMP INLET: 50NB, ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE
- 7) TUBING AFTER PUMP OUTLET NRV TO CONDUCTIVITY ANALYZER PANEL: 3/8"OD, ASTM A213, 20SWG, TP-316, SEAMLESS TUBE
- 8) AIR VENT CONNECTION TO CONDENSER : 25NB,ASTM A312, TP-304, SCH-40S, SEAMLESS PIPE WITH 25NB SS304 S/W RF 150# FLANGE
- 9) AIR VENT NOZZLE TO BE WELDED TO CONDENSER BY: SOCKET 25NB SS304 CLASS 3000#

NOTE FOR CONDUCTIVITY ANALYZER SAMPLING PANEL:

1. SAMPLE TUBING: 3/8" OD 20 SWG, ASTM A213, TP316, SEAMLESS TUBE
2. SAMPLE INLET CONNECTION: BHU 3/8" OD x 3/8" OD SS-316

LEGEND FOR PUMP SKID:

ITEM NO	DESCRIPTION
01c	MAKE UP WATER VALVE(1/2" NEEDLE VALVE)
01e	SAMPLE ISOLATION VALVE(1: BALL VALVE)
01f	NON RETURN VALVE
14	SAMPLE ISOLATION VALVE (3/8"OD NEEDLE TYPE)
27	UNION (3/8"OD X3/8"OD)SS316
29	SAMPLE INLET FLANGE: 25NB, 150#, S/W RF
30	SAMPLE EXTRACTION PUMP
31	6" SIZE WATER/GAS SEPARATOR VESSEL
32	1" SIZE FLOW INDICATOR
33	1" SIZE Y TYPE STRAINER
34	MAKE UP WATER INLET FLANGE: 15NB, SS304, 150#, S/W R/F
33	SAMPLE COLLECTION CHAMBER

LEGEND FOR CONDUCTIVITY ANALYZER PANEL

ITEM NO	DESCRIPTION
16	ROTAMETER
17	TUNDISH
19	CATION COLUMN(DUAL TYPE)
27	SAMPLE INLET & OUTLET BHU (3/8"OD X 3/8"OD) SS316
28	3/4" NPT(M) CONNECTION FOR COOLING WATER
CE	CATION CONDUCTIVITY CELL+FLOW THROUGH CHAMBER
CT	CONDUCTIVITY TRANSMITTER



TITLE:

SAMPLING SKID FOR CONDENSER

DEPT:CE-ENG	REV.NO: 00	NO.OF SHEETS	SHEET NO.
CODE: 416			

CHECK LIST FOR STAINLESS STEEL COMPRESSION FITTINGS

NUMBER :CE/416/SSF/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	DIMENSIONS	REFER NOTE : 1	↑	P	V	V		
2	MATERIAL	SAMPLE/ HEAT / LOT	APPROVED SPECS./ DATA SHEETS ↓	P	V	V		
2.1	CHEMICAL			P	V	V	✓	
2.2	PHYSICAL, HARDWARE		↑	P	V	V	✓	
3	PROOF PRESSURE TEST	5 RDM. SAMPLE	↑	P	V	V	✓	
4	DISMANTLING RE-ASSEMBLY TEST	3 RDM. SAMPLE	↑	P	V	V		
5	HYDRAULIC IMPULES & VIBRATION TEST	5 RDM. SAMPLE	↓	P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100% - BY MANUFACTURER
NIL -BY M/s BHEL
NIL CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

PREPARED BY
M/S BHEL



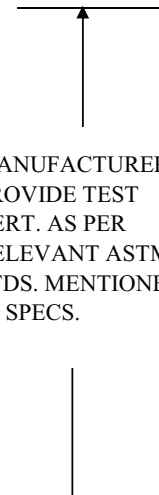
CHECK LIST FOR IMPULSE PIPES AND TUBES

NUMBER : CE/416/SP/CL

REVISION : 00

DATE : 21-07-15

CONTRACTOR : M/S BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1	CHEEH FOR DIMENSION, GRADE, SURFACE-DEFECTS	SEE NOTE: BELOW	APPROVED DATA SHEET AND CORES SPONDING ASTM STDSFOR GRADE OF MATERIAL	P	V	V	✓	 MANUFACTURER TO PROVIDE TEST CERT. AS PER RELEVANT ASTM STDS. MENTIONED IN SPECS.
2	CHEMICAL PROPERTIES AND PHY. PROPERTIES AS PER RELEVANT ASTM. (GRADE SHALL BE AS PER APPROVED DATA SHEET)	FOR LOT		P	V	V	✓	
3	FLATTENING TEST.		DO	P	V	V	✓	
4	FLARING TEST	##		P	V	V	✓	
5	BENDING TEST.	**		P	V	V	✓	
6	HYDRAULIC TEST OR EDDY CURRENT TEST			P	V	V	✓	
7	HARDNESS CHECK	##		P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' \~\$ SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100% - BY MANUFACTURER.

NIL -BY M/S BHEL

NIL - BY CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) ## APPLICABLE FOR TUBES ONLY

4) ** APPLICABLE FOR CS PIPES ONLY.

5) WHEN MATERIAL CORRELATION IS NOT POSSIBLE , MATERIAL SAMPLES ARE TO BE TESTED AT THIRD PARTY LAB & TEST CERTIFICATES ARE TO BE SUBMITTED FOR NTPC REVIEW - CHP

PREPARED BY
M/S BHEL



CHECK LIST FOR FLOW SWITCH

NUMBER : CE/416/FS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	TYPE , MODEL , SL . NO . TAG NO. , RANGE.	↑	↑	P	V	V	✓	IN CASE OF IMPORTED ITEMS, CONTR. SHALL REVIEW TC's & NOT INSPECT.
2.0	SIZE , DIMENSIONS	REFER	AS PER APPROVED DATA SHEETS	P	V	V	✓	
3.0	REPEATABILITY	NOTE : 1 BELOW		P	V	V	✓	
4.0	HV / IR	↓		P	V	V	✓	
5.0	CONTACT RATNG / NO. OF CONTACTS	100% RANDOM		P	V	V	✓	
6.0	MATL. T.C. FOR BODY, WET PARTS.	ONE/LOT		P	V	V	✓	
7.0	ACCESSORIES AS APPLICABLE	100%		P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ✓ SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP.AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

- 100 % - BY MANUFACTURER.
NIL - BY CONTRACTOR.
NIL -BY M/S CUSTOMER.

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST.

PREPARED
M/S BHEL



CHECK LIST FOR TEMPERTURE SWITCH

NUMBER : CE/416/TS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s BHEL-EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	TYPE, MODEL, SL. NO., TAG NO., RANGE.	↑	↑	P	W	V	✓	IN CASE OF IMPORTED ITEMS, CONTR. SHALL REVIEW TC's & NOT INSPECT.
2.0	DIMENSIONS CHECK	REFER NOTE : 1 BELOW	APPROVED SPECS./ DATA SHEETS	P	W	V	✓	
3.0	REPEATABILITY	↓		P	W	V	✓	
4.0	SWITCHING DIFERENTIAL							
5.0	CONTACT RATING / NO. OF CONTACTS	RANDOM		P	W	V	✓	
6.0	MATL. T.C. FOR BULB, CAPILLARY, ARMOUR	ONE/LOT		P	V	V	✓	
7.0	HV / IR	RANDOM		P	W	V	✓	
8.0	DEGREE OF PROTECTION	TYPE TEST		P	V	V	✓	
9.0	THERMOWELLS							
9.1	DIMENSIONS	100%		P	V	V	✓	
9.2	MATL. T.C. FOR THERMOWELL	ONE/LOT		P	V	V	✓	
9.3	HYD. TEST	100%		P	W	V	✓	
9.4	IBR CERT. IF APPLICABLE.		↓	P	V	V	✓	

LEGEND :

* RECORDS, IDENTIFIED WITH ' ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION.

** M: MANUFACTURER/SUB CONTRACTOR, C:CONTRACTOR/NOMINATED INSP. AGENCY
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION**NOTE :** 1) QUANTUM OF CHECK SHALL BE AS BELOW :

- 100 % - BY MANUFACTURER.
NIL - BY CONTRACTOR.
NIL - BY M/s CUSTOMER.

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.



PREPARED BY :
M/S BHEL



CHECK LIST FOR TEMPERATURE GAUGE / PAGE 1 OF 2

NUMBER : CE/416/TG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS	AGENCY**				REMARKS
				M	C	N	D*	
1.0	CHECK FOR		APPROVED SPECS. / APPROVED DATA SHEETS	P	V	V	✓	BY GO / NOGO GAUGE
1.1	DIAL SIZE			P	V	V	✓	
1.2	MODEL NO/TAG NO			P	V	V	✓	
1.3	RANGE/SCALE			P	V	V	✓	
1.4	END CONNECTION		DO	P	V	V	✓	MFR TO CARRY OUT ROUTINE TEST ON 100 %
2.0	CALIBRATION			P	V	V	✓	
2.1	ACCURACY			P	V	V	✓	
2.2	REPETABILITY			P	V	V	✓	
2.3	HYSTERESIS		DO	P	V	V	✓	WHEN MAT'L CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED
3.0	OVER TEMPERATURE TEST			P	V	V	✓	
4.0	AMBIENT TEMP. COMPENSATION CHECK			P	V	V	✓	
5.0	REVIEW OF T.C FOR MATERIALS OF-							
5.1	SENSOR	TYPE TEST	AS PER APPROVED DRAWING	V	V	V	✓	IBR CERT. TO BE PROVIDED IF CALLED IN SPECS.
5.2	MOVEMENT			V	V	V	✓	
5.3	PROCESS CONNEC.			V	V	V	✓	
5.4	HOUSING			V	V	V	✓	
6.0	REVIEW OF TC FOR DEGREE OF PROTEC.		AS PER APPROVED DRAWING	P	V	V	✓	IBR CERT. TO BE PROVIDED IF CALLED IN SPECS.
7.0	THERMOWELL			V	V	V	✓	
7.1	HYD TEST ON THERMOWELL			V	V	V	✓	
7.2	MATERIAL T.C FOR THERMOWELL			V	V	V	✓	
7.3	DIMENSIONAL CHECK							

LEGEND:

* RECORDS, IDENTIFIED WITH '✓' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY.
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

CHECK LIST FOR TEMPERATURE GAUGE / PAGE 2 OF 2

NUMBER : CE/416/TG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100 % - BY MANUFACTURER.

NIL - BY M/s BHEL.

NIL - BY CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING
BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING
ENGINEER SHALL CHECK THE SAME.

PREPARED BY :
M/S BHEL



CHECK LIST FOR PRESSURE & DIFFERENTIAL PRESSURE SWITCH

NUMBER : CE/416/PS/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/s B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS
				M	C	N	D*	
1.0	CHECK FOR	↑	APPROVED SPECS. / DATA SHEETS	P	V	V	✓	BY GO/ NO GO GAUGE
1.1	MODEL NO. TAG NO.			P	V	V	✓	
1.2	RANGE			P	V	V	✓	
1.3	END CONNECTION	↓	DO	P	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
2.0	REPEATABILITY			P	V	V	✓	
2.1	HYSTERESIS			P	V	V	✓	
3.0	DIFFERENTIAL	↓	DO	P	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
4.0	OVER PRESSURE AND LEAK TEST			P	V	V	✓	
5.0	ELECTRICAL INSULATION / H.V TEST			P	V	V	✓	
5.0	REVIEW OF T.C FOR MATERIALS OF-	FOR LOT	DO	V	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
5.1	SENSOR			V	V	V	✓	
5.2	MOVEMENT			V	V	V	✓	
5.3	HOUSING	TYPE TEST	DO	V	V	V	✓	MFR. TO CARRY OUT ROUTINE TEST ON WHEN MAT'L CORRELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED.
6.0	TC OF MICRO SWITCH			V	V	V	✓	
7.0	REVIEW OF T.C FOR DEGREE OF PROTECTION.			V	V	V	✓	

LEGEND:

* RECORDS, IDENTIFIED WITH ' ✓ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY.
N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW : 100 % - BY MANUFACTURER
NIL - BY CONTRACTOR.
NIL - BY M/s CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) IN CASE OF IMPORTED PRESSURE SWITCHES DP SWITCHES BHEL SHALL REVIEW TC AND SHALL NOT INSPECT.

PREPARED BY :

M/S BHEL



CHECK LIST FOR PRESSURE GAUGE & DIFFERENTIAL PRESSURE GAUGE

NUMBER : CE/416/PG/CL REVISION : 00 DATE : 21-07-15

CONTRACTOR : M/S B H E L - EDN

SL NO.	TESTS/CHECKS	QUANTUM OF CHECK	REFERENCE DOC. ACCEPTANCE NORMS.	AGENCY**				REMARKS	
				M	C	N	D*		
1.0	CHECK FOR	SEE NOTE-1 BELOW	APPROVED SPECS. / DATA SHEETS	P	V	V	✓	MFR TO CARRY OUT ROUTINE TEST ON 100 % . WHEN MAT'L CORELATION ARE NOT AVAILABLE MFR'S COMPLIANCE TO BE PROVIDED	
1.1	DIAL SIZE			P	V	V	✓		
1.2	MODEL NO/TAG NO			P	V	V	✓		
1.3	RANGE/SCALE			P	V	V	✓		
1.4	END CONNECTION			P	V	V	✓		
2.0	CALIBRATION								
2.1	ACCURACY			P	V	V	✓		
2.2	REPETABILITY			P	V	V	✓		
2.3	HYSTERESIS			P	V	V	✓		
3.0	OVER PRESSURE AND LEAK TEST			P	V	V	✓		
4.0	OPERATION OF PR. RELIEF DEVICE.	# ONE		DO	P	V	V		✓
5.0	REVIEW OF T.C FOR MATERIALS OF-	FOR LOT			V	V	V		✓
5.1	SENSOR				V	V	V		✓
5.2	MOVEMENT				V	V	V		✓
5.3	PROCESS CONNEC.				V	V	V		✓
5.4	HOUSING				V	V	V		✓
6.0	REVIEW OF TC FOR DEGREE OF PROTEC.	TYPE TEST			V	V	V		✓
7.0	ACCESSORIES, AS APPLICABLE	SEE NOTE-1			V	V	V		✓

LEGEND:

* RECORDS, IDENTIFIED WITH ' ✓ ' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION

** M: MANUFACTURER/SUB CONTRACTOR, C: CONTRACTOR/NOMINATED INSP. AGENCY. N: CUSTOMER "P" PERFORM "W" WITNESS "V" VERIFICATION

NOTE : 1) QUANTUM OF CHECK SHALL BE AS BELOW :

100 % - BY MANUFACTURER.

NIL - BY M/s BHEL.

NIL - BY M/s CUSTOMER

2) MANUFACTURER TO MAINTAIN CALIBRATED INSTRUMENT HAVING BETTER ACCURACY THAN THE ITEM UNDER TEST. INSPECTING ENGINEER SHALL CHECK THE SAME.

3) # ONE FOR PR. GAUGE AND ONE FOR DP GAUGE.

PREPARED BY :
M/S BHEL





A4 - 10

REF. : VIJAY/416/SWAS/VL

REV. NO. : 00

PAGE : 01 OF 02

PROJECT :- VIJAYWADA - 1 X 800 MW TPS

CUSTOMER :- APGENCO

APPROVED VENDOR LIST

COPY RIGHT AND CONFIDENTIAL
THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICAL LIMITED.
IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

REVISIONS :

APPROVED

(Punit P Singh)

PREPARED

ISSUED

DATE

PRK

416

01-12-2017



VENDOR LIST FOR SWAS

VIJAY/416/SWAS/VL
REV.NO.: 00

SS TUBES AND PIPES: TPS Technitube Germany, MAXIM TUBES COMPANY PVT LTD, AHMEDABAD Ratnamani Ahmedabad, Sumitomo Japan, Heavy Metals Ahmedabad, SURAJ STAINLESS LIMITED, AHMEDABAD, MBM TUBES PVT LTD, GUJARAT, Subhalaxmi Metals & Tubes, TUBACEX PRAKASH PVT LTD Gujarat.

PRESSURE GAUGES:

A.N.INSTRUMENTS PVT LTD, CHENNAI
H.GURU INSTRUMENTS (SOUTH INDIA) PVT LTD, BANGALORE
PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR, GUJARAT.
WIKA INSTRUMENTS INDIA PVT. LTD, PUNE
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI
GOA THERMOSTATIC INSTRUMENTS, GOA (Subject to Approval)
MANOMETER (INDIA) PVT. LTD, MUMBAI (Subject to Approval)
FORBES MARSHALL (HYD) LTD, HYDERABAD (Subject to Approval)
WALCHANDNAGAR INDUSTRIES LTD, DHARWAD, KARNATAKA. (Subject to Approval)
THERMAL INSTRUMENT INDIA PVT. LTD, MUMBAI.

TEMPERATURE GAUGES:

A.N.INSTRUMENTS PVT LTD, CHENNAI
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
GOA THERMOSTATIC INSTRUMENTS, GOA
H.GURU INSTRUMENTS (SOUTH INDIA) PVT, BANGALORE
PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI
FORBES MARSHALL (HYD) LTD, HYDERABAD (Subject to Approval)
WIKA INSTRUMENTS INDIA PVT. LTD, PUNE (Subject to Approval)
GOA INSTRUMENTS INDUSTRIES PRIVATE LTD, GOA.
THERMAL INSTRUMENT INDIA PVT. LTD, MUMBAI. (Subject to Approval)

PRESSURE SWITCH:

PRECISION MASS PRODUCTS PVT. LTD, GANDHI NAGAR, GUJARAT.
INDFOS INDUSTRIES PRIVATE LTD, CHENNAI
SWITZER PROCESS INSTRUMENTS PVT. LTD, CHENNAI.
TRAFAG CONTROLS INDIA PVT. LTD, GURGOAN, HARYANA.
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI.
BAUMER TECHNOLOGIES INDIA LTD, MUMBAI/VAPI

TEMPERATURE SWITCH:

INDFOS INDUSTRIES PRIVATE LTD, CHENNAI
SWITZER PROCESS INSTRUMENTS PVT. LTD, CHENNAI.
GAUGES BOURDON (INDIA) PVT. LTD, MUMBAI

TERMINAL:

Wago Noida, Phoenix Noida,

INSTRUMENT VALVES:

BHARAT HEAVY ELECTRICALS LIMITED VALVES DIVISION, TIRUCHIRAPALLI, TAMILNADU.
BALDOTA VALVE AND FITTINGS PVT LTD, MUMBAI
FLUID CONTROLS PVT LTD, PUNE
INSTRUMENTATION LIMITED, PALGHAT
PRECISION ENGG INDUSTRIES, MUMBAI (Subject to Approval)
EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI (Subject to Approval)
METPRESS ENGINEERING WORKS, KOLKATA (Subject to Approval)
AURA INC, NEW DELHI (Subject to Approval)
PMT ENGINEERS, AHMEDABAD
HP VALVES & FITTINGS (INDIA) PVT. LTD, CHENNAI



**VENDOR LIST
FOR
SWAS**

VIJAY/416/SWAS/VL
REV.NO.: 00

FLOWTECH, KOLKATA.

COMPRESSION FITTINGS:

PRECISION ENGG INDUSTRIES, MUMBAI
EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI
METPRESS ENGINEERING WORKS, KOLKATA
ASTEC VALVE & FITTINGS PVT. LTD., MUMBAI
FLUID CONTROLS PVT. LTD, PUNE
PANAM ENGINEERS LTD, MUMBAI
AURA INC, NEW DELHI
HP VALVES & FITTINGS (INDIA) PVT. LTD, CHENNAI
PMT ENGINEERS, AHMEDABAD
PRIME ENGINEERS, MUMBAI
ARCELLOR CONTROLS, AHMEDABAD
ARYA CRAFTS & ENGINEERING PVT. LTD, MUMBAI
SWAGELOCK, USA
FLOWTECH. KOLKATA.
PARKER HANNIFIN INDIA PVT. LTD., CHENGAL PATTU, TAMILANADU

FURNITURE:

Godrej, Feather lite, **COSMOS MEDIA PRODUCTS PVT LTD, NOIDA, PYROTECH LTD, UDAIPUR, OTS Bangalore.**

Annunciator:- PROCON CHENNAI

ANALYSERS:

ROSEMOUNT ANALYTICAL INC, USA.
ENDRESS + HAUSER INDIA PVT. LTD, MUMBAI.
HACH USA.
ABB INDUSTRIES, SWITZERLAND.
THERMO ORION INC, CHELMSFORD, USA.
SWAN SWITZERLAND. (Subject to Approval)
METTLER-TOLEDO INDIA PVT. LTD, MUMBAI. (Subject to Approval)

Note:-

1. Vendors to note that for major components of Sample Handling System, above indicated vendors only will be acceptable

SECTION - "H"

- Analysers & Spares shall be packed project wise in lockable Metal Container suitable for outside storage at project sites. Typical requirements are as below:-
 - Type: Standard Outdoor type MS container, fully closed.
 - Dimension: Vendor to decide based on Qty of Analysers & Spares.

General condition:

- 1) The container shall be suitable to store imported and sophisticated components in open environment at thermal power plants. It shall be leak proof.
 - 2) Container shall be provided with proper glass wool thermal insulation at inside.
 - 3) Wall thickness (all sides), reinforcement, supporting lugs, lifting lugs, etc., shall be suitable to store and transport the container with the permissible load as required.
 - 4) Doors shall have suitable latches to lock the container with pad locks for safety purpose.
 - 5) Interior and external surface shall be completely painted as per the standard practice and it shall be Suitable for sea-shore atmosphere.
 - 6) Containers shall be provided with Tag Plates with Project Name.
-



Bharat Heavy Electricals Ltd.,
(A Government of India undertaking)
Electronics Division
PB 2606 , Mysore Road Bangalore , 560026 INDIA

CE: PR: 003- Rev 00

SPECIAL COMMERCIAL CONDITIONS OF CONTRACT

Reference is brought to BHEL's Instructions to Bidders (Document Ref: CE: PR: 001- Rev 00) and General Commercial Conditions for Contract (Document Ref: CE: PR: 002- Rev 00) which are also sent along with RFQ. These two documents along with Special Conditions of Contract annexed to this RFQ will form an integral part of the contract as and when the RFQ culminates into a Purchase Order / Contract.

RFQ No: _____MGR0000214_____ RFQ Date: _____10/01/2018_____

Due Date: _____01/02/2018_____

Customer/Project: APPDCL/Krishnapatnam (1X800 MW) STPP & NTPPS/Vijayawada (1X800 MW) STPP

Item Description: Steam & Water Analysis System (SWAS) - Analysers + Sample Handling System along with Mandatory Spares

TYPE OF BID: ~~SINGLE PART BID~~ / TWO PART BID / THREE PART BID

Purchase Executives: Clarifications with regard to the tender shall be addressed to purchase officers whose e-mail IDs are given below:
kanimozhid@bhel.in (or) mounishg@bhel.in

Splitting of tendered quantity to MSE vendors: The tendered quantity ~~will~~ /will not be split to MSE vendors ~~subject to submission of relevant documents by vendors. Refer clause H of Instructions to Bidders for conditions applicable and for information on documents to be submitted.~~

Destination: a) For Indigenous scope of supply, items are to be directly despatched to BHEL's Site Office or Stores located at Krishnapatnam site in Nellore dist. of Andhra Pradesh state & NTPPS site in Vijayawada dist. of Andhra Pradesh state respectively. Consignee details and Road Permit, if applicable, will be issued by BHEL along with Despatch Clearance.

b) For Imported scope of supply, destination is Bangalore port. In case of shipment by sea, port of discharge will be Chennai seaport and port of delivery shall be ICD, Bangalore.

Project Benefits:**Imported scope of supply:**

- a) ~~DEEC/ EPCG/ DFIA contract: Eligible for "NIL" Basic Customs Duty.~~
- b) ~~Physical Export project: Eligible for exemption of Customs Duty.~~
- c) ~~Project Imports: Eligible for Basic Concessional Customs Duty.~~
- d) ~~Basic Custom duty and Cession Basic Custom duty are reimbursable by customer.~~

Supplies (Main Analysers & Spares) for both projects are eligible for "NIL" Basic Customs Duty.

Terms of Delivery:

- **Indigenous scope of supply:**
Ex-works < indicate station of dispatch > (including Packing & Forwarding charges but excluding Taxes).
- **Imported scope of supply:**
F.C.A. (for air consignments) < indicate international port of dispatch > / C.I.F. (for sea consignments) < ICD, Bangalore > (including Packing, Forwarding, Handling, Ancillary charges like processing of Sight Draft/ Letter of Credit, negotiation of bank documents, Export declaration, Country of Origin etc.).

Kindly indicate the approximate weight of the total imported consignment, which is required for calculating air-freight charges:

Under-mentioned details shall be provided against indigenous supplies:

a. GSTIN (no.) of place of supply: _____

b. HSN (Harmonized System of Nomenclature) code: _____

Applicable tax and Rate: _____ & _____

c. SAC (Service Accounting Code) no.: _____
 Applicable tax and Rate: _____ & _____

d. GSTIN (no.) of place of supply of service: _____

Note: Please ensure the required packing standard to take care of transit damages.

Bidders to mandatorily provide confirmation/compliance for the under-mentioned terms:

SL NO.	TERMS	BHEL ACCEPTABLE TERM	BIDDER'S CONFIRMATION	REMARKS, if any
01	Reverse Auction	BHEL's decision for opting Reverse Auction or price-bid opening, will be intimated separately to qualified bidders after finalization of techno-commercial evaluation. In case BHEL does not resort to Reverse Auction, the price bids and price impacts (if any) shall be opened as per BHEL's standard practice. <u>Note:</u> Non-acceptance to participate in RA may result in non-consideration of the bid, in case BHEL decides to go for RA.	AGREE	
02	Parting of license for imported raw materials	In case of projects where Basic Custom Duty is NIL and vendor is importing any raw materials / components for the enquired item, same are eligible for Zero Customs duty. As per EXIM policy, BHEL will part the import licence with the vendors to obtain import licence by themselves and custom clear the raw materials / components by availing zero customs duty. Hence, please furnish list of raw materials / components to be imported by you with Quantity and CIF value (for which BHEL has to share import licence). The benefit due to the above shall be passed on to BHEL and confirmed in the quotation. If there are no imported raw materials / components, same shall be confirmed in the offer.	AGREE CIF value Yes, benefit passed on to BHEL in the priced quotation. (or) We confirm that there are no imported components	
03	Delivery Period	Within 08 weeks from the date of issue of approved documents or manufacturing clearance by BHEL, whichever is later. Delay in contractual delivery will attract Penalty as per GCC Clause no.:04.b.	AGREE weeks	
04	Terms of Payment at the time of material supply	Refer Clause "F" of Instructions to Bidder for BHEL standard Payment terms and loading factors applicable for non-compliance against payment terms: Indigenous Scope: a) Supply with Erection & Commissioning b) Supply with Erection Supervision & Commissioning c) Supply only Imported Scope: d) Supply with Erection & Commissioning e) Supply with Erection Supervision & Commissioning f) Supply only High-Sea sales: g) Supply with Erection & Commissioning h) Supply with Erection Supervision & Commissioning i) Supply only	AGREE	

Bidder to note that Deviations shall not be permitted for the below mentioned terms and are deemed to be complied:

- (1) **Validity:** The offer will be valid for a period of _120_ days from the date of technical bid opening.
- (2) **Guarantee/ Warranty:** 30 months from the date of dispatch of goods or 24 months from the date of commissioning of goods, whichever is earlier.
- (3) **Performance Bank Guarantee (PBG):** PBG will be applicable for a period of _30_ months from the date of dispatch of goods + claim period of 06 months, for a value equal to 10% of the basic value of the purchase order (Refer Clause "G" of Instructions to

Bidders).

- (4) **Despatch Documents:** Complete set of despatch documents (original + 1 photocopy set) as per Purchase Order shall be forwarded to Purchase Executive, BHEL directly. Depending upon the project/customer demands, despatch documents may include one or more documents from the following: Invoice, Lorry Receipt (L/R), Packing List, Air Way Bill (AWB)/ Bill Of Lading (BOL), Country of origin certificate, Copy of High-Sea Sales Agreement, Warranty Certificate, Insurance Intimation Letter, NIL Short Shipment Certificate, Original Performance Bank Guarantee (directly from issuing bank to BHEL), POD (Proof of Delivery) on original L/R. **The precise list of despatch documents needed for the project will be specified in the Purchase Order.**

One set of Invoice, Packing List and L/R or AWB/BOL shall be e-mailed/faxed immediately to BHEL-EDN after despatch.

- (5) **Freight Charges (for indigenous scope of supply):** Freight charges shall be to vendor's account. Against each project, bidder to quote the Lump sum reasonable freight charges along with applicable tax, in priced offer.

- (6) **Evaluation criteria for tendered item/s:**

(a) ~~Item wise evaluation of tendered item.~~

~~(or)~~

- (b) **Evaluation of the lowest bidder will be done project-wise and separate purchase orders for Main supply and Spares supply will be released against each project.**

- (7) ~~**Integrity Pact:** Execution of Integrity Pact is applicable for this tender (Refer clause "J" of Instructions to Bidders). Details of IEM for this tender are mentioned below:~~

Name : _____ Address : _____ Email : _____

- (8) ~~**Comprehensive Annual Maintenance Contract :**~~

~~CAMC will be applicable for a period of 04 years from the date of expiry of warranty period (or) from the date of completion of commissioning of equipment, whichever is later.~~

~~In case the quoted total AMC value is less than 20% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price and apportioning towards AMC charges.~~

~~Refer Sl. no. 'j' under Clause 'F' of Instructions to Bidder for Payment term.~~

With this, we hereby confirm that all the terms & conditions as indicated in Instructions to Bidders (Document Ref: CE: PR: 001- Rev 01) & General Commercial Conditions for Contract (Document Ref: CE: PR: 002- Rev 01) are accepted without any deviation.

VENDOR'S SIGNATURE WITH SEAL

Note: For EPS tenders, bidder should necessarily fill the corresponding columns of "SPECIAL COMMERCIAL CONDITIONS OF CONTRACT" in EPS portal and the confirmation provided by bidder against these commercial terms in EPS portal will only be considered by BHEL.



Bharat Heavy Electricals Ltd.,
(A Government of India undertaking)
Electronics Division
 PB 2606 , Mysore Road Bangalore , 560026 INDIA

CE:PR:001- Rev 01

INSTRUCTIONS TO BIDDERS (Common for all RFQs)

Bidder is requested to read the instructions carefully and submit their quotation taking into consideration of all the points:

A. GENERAL INSTRUCTIONS:

1. Any Purchase Order resulting from this enquiry shall be governed by the Instructions to Bidders (document reference: CE: PR: 001 – Rev 01), General Conditions of Contract (document reference: CE: PR: 002 - Rev 01) and Special Conditions of Contract, if any, of the enquiry.
2. Any deviations from or additions to the “General Conditions of Contract” or “Special Conditions of Contract” require BHEL’s express written consent. The general terms of business or sale of the bidder shall not apply to this tender.
3. Bidders (also includes the terms suppliers / contractors wherever used in this document) are instructed to quote their most competitive price and best delivery, etc. in the offer. Prices should be indicated in both figures & words **(Please also refer clause 12 under section B)**
4. Regret letter (either through post or by mail or by EPS) indicating reasons for not quoting must be submitted without fail, in case of non-participation in this tender. If a bidder fails to respond against 3 consecutive tenders for the same item, he shall be liable for removal as a registered vendor of BHEL.
5. Procurement directly from the manufacturers shall be preferred. However, if the OEM/ Principal insist on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from the manufacturer/ supplier and his agent, bid received from the agent shall be ignored.
6. Consultant / firm (and any of its affiliates) shall not be eligible to participate in the tender/s for the related goods for the same project if they were engaged for consultancy services for the same project.
7. If an Indian representative/associate/liaison office quotes on behalf of a foreign based bidder, such representative shall furnish compulsorily the following documents:
 - a. Authorization letter to quote and negotiate on behalf of such foreign-based bidder.
 - b. Undertaking from such foreign based bidder that such contract will be honored and executed according to agreed scope of supply and commercial terms and conditions.
 - c. Undertaking shall be furnished by the Indian representative stating that the co-ordination and smooth execution of the contract and settlement of shortages/damages/replacement/repair of imported scope till system is commissioned and handed over to customer will be the sole responsibility of the Indian representative/associates/agent/liaison office.
 - d. Refer **Annexure I** on “Guidelines for Indian Agents”.
8. In case of imported scope of supply, customs clearance & customs duty payment will be to BHEL account after the consignment is received at Indian Airport /Seaport. Bidders must provide all original documents required

for completing the customs clearance along with the shipment. Warehousing charges due to incomplete or missing documentation will be recovered from the supplier's bill. All offers for imported scope of supply by air, must be made from any of the gateway ports (within the country) indicated (**Refer Annexure II**).

9. The offers of the bidders who are on the banned list and also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of the banned firms is available on BHEL website: www.bhel.com
10. Business dealings with bidders will be suspended if they are found to have indulged in any malpractices/misconduct which are contrary to business ethics like bribery, corruption, fraud, pilferage, cartel formation, submission of fake/false/forged documents, certificates, information to BHEL or if they tamper with tendering procedure affecting the ordering process or fail to execute a contract, or rejection of 3 consecutive supplies or if their firms / works are under strike/lockout for a long period. Bidder may refer "Guidelines for Suspension of Business Dealings with Suppliers/ Contractors" available on www.bhel.com for more details.

B. GUIDELINES FOR PREPARATION OF OFFER:

1. Quotation shall be submitted in Single Part Bid, Two Part Bid or Three Part Bid, as called for in the tender:
 - **SINGLE PART BID:** Technical and Commercial Bid with prices along with price summary & filled in BHEL Standard Commercial terms and conditions in a single sealed envelope.
 - **TWO PART BID:** Unpriced offer i.e. "Techno-commercial Bid" with filled in BHEL Standard Commercial terms and conditions in a sealed envelope **along with the copy of the "Price Bid" without the prices** should be enclosed in one cover and the cover must be superscribed "**Techno-commercial offer**" and Priced offer i.e. "Price Bid" containing price summary in a separate sealed envelope and must be superscribed "**Price Bid**". Both these envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.
 - **THREE PART BID:** Pre-qualification Bid (Part-I), Techno Commercial Bid with filled in BHEL Standard Commercial terms and conditions (Part-II), and Price Bid (Part-III). All three envelopes shall be enclosed in a single sealed envelope superscribed with enquiry number, due date of tender and any other details as called for in the tender document.

If any of the offers (Part I, Part II or Part III) are not submitted before the due date and time of submission (or) if any part of the offer is incomplete, the entire offer of the bidder is liable for rejection.

2. Supplier shall ensure to superscribe each envelope with RFQ number, RFQ Date, RFQ Due date and time, Item Description and Project clearly & boldly. Also mention on the envelope whether it is "Techno Commercial Bid" or "Price Bid" or "Pre-Qualification Bid". Please ensure complete address, department name and purchase executive name is mentioned on the envelope (before dropping in the tender box or handing over) so that the tender is available in time for bid opening.
3. BHEL standard Commercial Terms and Conditions (duly filled, signed & stamped) must accompany Technical-Commercial offer without fail and should be submitted in original only. Xerox copy will not be accepted.
The above indicated submission of Offers in "sealed envelope/hard copy" as mentioned in points B.1-B.3 is applicable for tenders that are not floated through EPS.
4. Validity: Unless otherwise specified in SCC (special commercial conditions of contract), the original offer will be valid for a period of 120 days from the date of technical bid opening.
5. Any of the terms and conditions not acceptable to supplier, shall be explicitly mentioned in the Techno-Commercial Bid. If no deviations are brought out in the offer it will be treated as if all terms and conditions of this enquiry are accepted by the supplier without deviation.
6. Deviation to this specification/item description, if any, shall be brought out clearly indicating "DEVIATION TO BHEL SPECIFICATION" without fail, as a part of Techno-Commercial Bid. If no deviations are brought out in the offer it will be treated as if the entire specification of this enquiry is accepted without deviation.

7. Suppliers shall submit one set of original catalogue, datasheets, bill of materials, dimensional drawings, mounting details and/or any other relevant documents called in purchase specification as part of Technical Bid.
8. "Price Bid" shall be complete in all respects containing price break-up of all components along with all applicable taxes and duties, freight charges (if applicable) etc. Once submitted no modification / addition / deletion will be allowed in the "Price Bid." Bidders are advised to thoroughly check the unit price, total price to avoid any discrepancy.
9. In addition, bidder shall also quote for erection & commissioning charges/erection supervision & commissioning charges (E&C/service charges) if & as applicable, documentation charges, testing Charges (type & routine), training charges etc. as applicable along with corresponding tax. The price summary must indicate all the elements clearly.
10. Vendors should indicate "lumpsum" charges (including To & Fro Fare, Boarding, Lodging, Local Conveyance etc.) for carrying out Erection and Commissioning (or) Erection Supervision and Commissioning, as applicable and further handing over to customer. The quotation shall clearly indicate scope of work, likely duration of commissioning, pre-commissioning checklist and service tax (if any).
11. Wherever bidders require PAC (Project Authority Certificate)/applicable certificates for import of raw materials, components required for DECC, EPCG Power Projects, Export Projects or other similar projects wherein supplies are eligible for customs duty benefits, lists and quantities of such items and their values (CIF) has to be mentioned in the offer. Prices must be quoted taking into account of such benefits.
12. All quotations shall be free from corrections/overwriting. Corrections if any should be authenticated with signature and seal. Any typographical error, totaling mistakes, currency mistake, multiplication mistake, summing mistakes etc. observed in the price bids will be evaluated as per **Annexure III** "Guidelines for dealing with Discrepancy in Words & Figures – quoted in price bid" and BHEL decision will be final.
13. Documents submitted with the offer shall be signed and stamped in each page by authorized representative of the bidder. This clause is not mandatory for offers uploaded through E-Procurement System (EPS).

C. GUIDELINES FOR OFFER SUBMISSION:

1. Offers / Quotations must be dropped in tender box before 13.00 Hrs. on or before due date mentioned in RFQ. The offers are to be dropped in the proper slot of the Tender Box kept in our reception area with caption "CE, SC&PV, DEFENCE." Tenders are opened on 3 days in a week (Monday/Wednesday/Friday). Tender must be deposited in the slot corresponding to the day (Monday - Box no.4/Wednesday - Box no. 6 /Friday - Box no.8) while depositing the offer (Dropping of offers in tender box is not applicable for EPS tenders).
2. E-Mail/ Internet/EDI offers received in time shall be considered only when such offers are complete in all respects. In case of offers received through E-mail, please send the offer to the email ID specified in the SCC document of the tender (This clause will not be applicable for EPS tenders).
3. In cases where tender documents are bulky, or due to some reasons tender documents are required to be submitted by hand or through posts/couriers, the offers are to be handed over either of the two officers whose names are mentioned in the SCC document of tender RFQ. (This clause will not be applicable for EPS tenders).
4. Tenders will be opened on due date, time and venue as indicated in the RFQ in the presence of bidders at the venue indicated in the RFQ. For EPS tenders, e-mail notifications will be automatically generated and forwarded to registered e-mail ID/s of bidders during opening of tenders.
5. Vendor will be solely responsible:
 - a. For submission of offers before due date and time. Offers submitted after due date and time will be treated as "Late offers" and will be rejected.
 - b. For submission of offers in the correct compartment of the tender box based on the day of due date (Monday/Wednesday/Friday). Please check before dropping your offer in the correct tender box.

- c. For depositing offers in proper sealed condition in the tender box. If the bidder drops the tender in the wrong tender box (or) if the tender document is handed over to the wrong person, BHEL will not be responsible for any such delays.
- d. For offers received through email etc., suppliers are fully responsible for lack of secrecy on information and ensuring timely receipt of such offers in the tender box before due date & time (This clause will not be applicable for EPS tenders).

The above indicated submission of Offers as mentioned in points 5.a-5.d is applicable for tenders that are not floated through EPS.

- e. In case of e-tender, all required documents should be uploaded before due date and time. Availability of power, internet connections, system/software requirements etc. will be the sole responsibility of the vendor. Wherever assistance is needed for submission of e-tenders, help-line numbers as available in the web-site of service provider of BHEL may be contacted.

Purchase Executive/ BHEL shall not be responsible for any of the activities relating to submission of offer.

D. PROCESSING OF OFFERS RECEIVED:

1. Any discount/ revised offer submitted by the supplier on its own shall be accepted provided it is received on or before the due date and time of offer submission (i.e. Part-I bid). The discount shall be applied on pro-rata basis to all items unless specified otherwise by the bidder.
2. Changes in offers or Revised offers given after Part-I bid opening shall not be considered as a part of the original offer unless such changes/revisions are requested by BHEL.
3. In case there is no change in the technical scope and/ or specifications and/ or commercial terms & conditions, the supplier will not be allowed to change any of their bids after Technical bids are opened (after the due date and time of tender opening).
4. In case of changes in scope and/ or technical specifications and/ or commercial terms & conditions by BHEL and it accounts for price implications from vendors, all techno-commercially acceptable bidders shall be asked by BHEL (after freezing the scope, technical specifications and commercial terms & conditions) to submit the impact of such changes on their price bid. Impact price will be applicable only for changes in technical specification/ commercial conditions by BHEL. The impact price must be submitted on or before the cut-off date specified by BHEL and the original price bid and the price impact bid will be opened together at the time of price bid opening.
5. BHEL EDN reserves the right to adopt Reverse Auction or standard Price Bid Opening procedure for price evaluation, at its discretion. This shall be decided after completion of techno-commercial evaluation of tender. **(Refer BHEL website www.bhel.com for Guidelines of Reverse Auction).** In case BHEL does not resort to Reverse Auction, the price bids and price impacts (if any) already submitted and available with BHEL shall be opened as per BHEL's standard practice.
6. Un-opened bids (including price bids) will be returned to the respective bidders after release of Purchase order. Regarding Offers for EPS tenders that get rejected on PQC/ techno-commercial grounds, the bids for the subsequent parts will not be opened i.e., both technical bid and price bid (Parts-II & III) will not be opened in case of rejection on PQC ground and price bid (Part-II/Part-III, as applicable) will not be opened in case of rejection on techno-commercial ground.
7. After receipt of Purchase Order, supplier should submit required documents viz., specified drawings, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/ Customer.

8. Any deviation to the terms and conditions not mentioned in the quotation by supplier in response to this enquiry will not be considered, if put forth subsequently or after issue of Purchase Order, unless clarification is sought for by BHEL EDN and agreed upon in the Purchase Order.
9. Evaluation shall be on the basis of delivered cost (i.e. "Total Cost to BHEL").
 "Total Cost to BHEL" shall include total basic cost, packing & forwarding charges, taxes and duties (if & as applicable), freight charges, taxes on Services, customs clearance charges for imported items, any other cost indicated by bidder for execution of the contract and loading factors (for non-compliance to BHEL Standard Commercial Terms & Conditions). Benefits arising out of Nil Import Duty on DEEC, EPCG, DFIA Projects, Physical Exports or such 100% exemptions (statutory benefits), project imports, customer reimbursements of statutory duties (like Basic Customs Duty and cess on customs duty), Input tax credits as applicable will also be taken into account for arriving at the Total cost to BHEL (wherever applicable and as indicated in SCC document of tender).
10. No deviation will be permitted from the duration of Guarantee/Warranty and/or Comprehensive Annual Maintenance Contract period specified in SCC.
11. For evaluation of offers in foreign currency, the exchange rate (TT selling rate of SBI) shall be taken as under:

Single part bids:	Date of tender opening
Two/three part bids:	Date of Part-I bid opening
Reverse Auction:	Date of Part-I bid opening

 In case of Performance Bank Guarantee (PBG) also, exchange rate will be considered as mentioned above for converting foreign currency to Indian currency and vice versa.
 If the relevant day happens to be a bank holiday, then the exchange rate as on the previous working day of the bank (SBI) shall be taken.
12. Ranking (L-1, L-2 etc.) shall be done only for the techno-commercially acceptable offers.

E. INFORMATION ON PAYMENT TERMS:

1. All payments will be through Electronic Fund transfer (EFT). Vendor has to furnish necessary details as per BHEL standard format (**Refer Annexure IV**) for receiving all payments through NEFT. (Applicable for Indian vendors only)
2. In case of High Sea Sales transaction, customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors. All warehousing charges due to delay in submission of complete and or correct HSS documents to BHEL will be to supplier's account only. Such recovery will be made out of any of the available bills (**Refer Annexure V**).
3. Statutory deductions, if any, will be made and the deduction certificate shall be issued. In case vendor does not provide PAN details, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act (Applicable for Indian vendors only).
 Foreign vendors shall submit relevant details of their bankers like Swift Code, Banker's Name & Address etc.
4. Incomplete documentation will not be accepted. Delayed submission of invoice / documents may result in corresponding delay in payment. In this connection, request to also refer clause: K about invoicing & payment formalities under GST regime. Applicable documents shall be submitted to the purchaser at the time of execution of supplies/services for availing GST input credits.

F. STANDARD PAYMENT TERMS OF BHEL-EDN

Against Purchase Orders for indigenous procurement-(a), (b) & (c):

(a) SUPPLY WITH ERECTION & COMMISSIONING:

85% of basic value + 100% of taxes and freight charges will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later.

Retention money equivalent to balance 15% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with E & C charges (if any) against proof of completion of E&C.

(b) SUPPLY WITH ERECTION SUPERVISION & COMMISSIONING:

90% of the basic value + 100% of taxes and freight charges will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later.

Retention money equivalent to balance 10% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with erection supervision & commissioning charges (if any) against proof of completion of commissioning.

(c) SUPPLY ONLY:

100% of PO value with taxes and freight will be paid in 45 days from the date of dispatch or 15 days from the date of submission of complete set of documentation, whichever is later.

Against Purchase orders for import procurement-(d), (e) & (f):

(d) SUPPLY WITH ERECTION & COMMISSIONING:

85% of the basic value will be paid on the 45th day, against usance draft of 45 days, from the date of AWB/BOL on submission of complete set of documents.

Retention money equivalent to balance 15% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with E&C charges (if any) against proof of completion of E&C.

(e) SUPPLY WITH ERECTION SUPERVISION & COMMISSIONING:

90% of the basic value will be paid on the 45th day, against usance draft of 45 days, from the date of AWB/BOL on submission of complete set of documents.

Retention money equivalent to balance 10% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with erection supervision & commissioning charges (if any) against proof of completion of commissioning.

(f) SUPPLY ONLY:

100% of PO value will be paid against usance draft of 45 days from the date of AWB/BOL on submission of complete set of documents.

Against Purchase orders for High-sea sales procurement-(g), (h) & (i):

g) SUPPLY WITH ERECTION & COMMISSIONING:

85% of basic value will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later.

Retention money equivalent to balance 15% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with E & C charges (if any) against proof of completion of E&C.

h) SUPPLY WITH ERECTION SUPERVISION & COMMISSIONING:

90% of the basic value + 100% of taxes, duties and freight charges will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later.

Retention money equivalent to balance 10% of basic value will be paid in 15 days from the date of submission of supplementary invoice/documents along with erection supervision & commissioning charges (if any) against proof of completion of commissioning.

i) SUPPLY ONLY:

100% of PO value with taxes, duties and freight will be paid in 45 days from the date of signing of High Sea Sale agreement or 15 days from the date of submission of complete set of documentation, whichever is later.

j) Comprehensive Annual Maintenance Contract:

Evaluation methodology: Unless and otherwise specified in SCC, CAMC will be applicable for a period of 04 years from the date of expiry of warranty period (or) from the date of completion of commissioning of equipment, whichever is later and the total AMC value should not be less than 20% of the main supply value. In case the quoted total AMC value is less than 20% of the main supply value, BHEL shall evaluate Bidders Price deducting differential amount from main supply price and apportioning towards AMC charges.

Payment terms: 100% AMC charges along with tax as applicable, will be paid in 15 days from the date of submission of supplementary invoice/documents against proof of completion of AMC on yearly basis.

k) Terms of Payment for Training: 100% payment will be made in 45 days from the date of completion of Training or 15 days from the date of submission of complete set of invoice along with documentary evidence, whichever is later.

LOADING FACTORS FOR PAYMENT TERMS:

- 1) For offers received with requests for negotiation of documents through bank loading will be 15% of basic value (all bank charges to be borne by the seller).
(This loading factor is applicable only for purchase orders for indigenous supply).
- 2) In all cases where credit period is <45 days and ≥30 days with the above offered standard payment terms, loading applicable will be 5% of basic value.
(This loading factor is applicable only for purchase orders against indigenous supply or High-sea sales procurement).
- 3) For offers received with usance draft of less than 45 days, loading of 5% will be applicable.
(This loading factor is applicable only for purchase orders for imported supply).
- 4) For offers received with Letter of Credit payment term in place of usance draft payment term, loading applicable will be 5% of basic value.
Additional loading of 5% will be applicable for payment terms as Letter of Credit with usance of less than 45 days.
(This loading factor is applicable only for purchase orders for imported supply).
- 5) All payment terms with credit period of less than 30 days for indigenous supply/HSS and any other variation of payment terms are liable for rejection.
- 6) Standard payment terms indicated in Clauses: F (a), (b), (c), (d), (e), (f), (g), (h), (i), (j) & (k) will not attract any loading.

Note 1: Basic value of Purchase Order mentioned above will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable).

Wherever the Purchase Order is split into import portion and indigenous portion of supply, the retention money will be 15% (where scope includes E&C) or 10% (where scope includes Erection supervision & Commissioning) of both purchase order values put together.

Note 2: *If the E&C could not be completed till the end of the Warranty period due to reasons not attributable to the supplier, BHEL will release the retention money to the supplier against Bank Guarantee for equivalent value valid for an initial period of one year.*

Note 3: In case of multiple packages/units in a power plant, payment of retention money/E&C charges will be processed on pro-rata basis.

G. Performance bank guarantee (PBG):

Performance bank guarantee (PBG) will be applicable as called in the tender documents.

Unless otherwise specified in the SCC, the PBG against performance of the contract shall be valid for a period of 24 months from the date of dispatch of goods + claim period of 06 months, for a value equal to 10 % of the basic value of the purchase order which will include all components of the purchase order and will exclude only taxes, duties, freight, training charges, E&C and AMC charges (wherever applicable).

1. The BG issued in Indian Rupees by Banks in India is to be executed on Non-Judicial Stamp paper/e-stamp paper of appropriate value as per Stamp Act prevailing in the State(s) where the BG is submitted or is to be acted upon or the rate prevailing in the State where the BG was executed, whichever is higher. The Stamp Paper/e-stamp paper shall be purchased in the name of Vendor/Contractor/Supplier /Bank issuing the guarantee.
2. No deviation for the duration and value of PBG will be permitted.
3. PBG shall be from any of the BHEL consortium of bankers (**refer Annexure VI**).
4. PBGs from nationalized banks are also acceptable.
5. PBG should be sent directly by the bank to the dealing executive mentioned in the purchase order located at the address mentioned in the purchase order.
6. PBG should be in the format indicated (**refer annexure VII**). No deviation to this format will be allowed. However in case BHEL changes the PBG format, bidder shall honor the same.
7. In Case of Bank Guarantees submitted by Foreign Vendors-
 - a. From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India) can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the BHEL Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.
 - b. From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)
 - b.1 Please note that Bank Guarantee issued by any of the Consortium Banks only will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter-Guarantee by Foreign Bank in favour of the Indian Bank's (BHEL's Consortium Bank) branch in India. It shall be noted that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor.

b.2 In case, Foreign Vendors intend to provide BG from Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at sl.no. b.1 is required to be followed.

b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time).

8. Expired BGs / PBGs will be returned only after expiry of the claim period or on completion of the contractual obligation with respect to Purchase Order.

H. PROVISIONS APPLICABLE FOR MSE VENDORS (MICRO AND SMALL ENTERPRISES)

Benefits/facilities as applicable for Micro and Small Enterprises (MSEs) shall be available to MSEs registered with Government designated authorities as per the Purchase & Price Preference Policy of the Government subject to them becoming eligible otherwise.

Vendors who qualify as MSE vendors are requested to submit applicable certificates (as specified by the Ministry of Micro, Small and Medium Enterprises) at the time of vendor registration. Vendors have to submit any of the following documents along with the tender documents in the Part I / Technical bid to avail the applicable benefits:

- a. Attested copy of valid NSIC certificate or
- b. Attested copy of Entrepreneur's Memorandum part II (EM II) certificate having deemed validity (two years from the date of issue of acknowledgement in EM II) or
- c. EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure VIII where deemed validity of EM II certificate for two years has expired) applicable for the relevant financial year (latest audited) or
- d. Udyog Aadhaar Memorandum and Acknowledgement along with attested copy of a CA certificate.

Documents have to be notarized/attested by a Gazetted officer and must be valid as on the date of part I / technical bid opening for the vendors to be eligible for the benefits applicable for MSE vendors. Please note that no benefit shall be applicable if any deficiency in the above required documents are not submitted before price bid opening of the tender.

Bidders to however note the documents that shall be furnished in order to establish credentials as MSE vendor should be as per the extant statutory requirements specified by the Ministry of Micro, Small and Medium Enterprises.

Note: If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded in the EPS portal.

PURCHASE PREFERENCE FOR MSE VENDORS:

- e. MSE vendors quoting within a price band of L1 + 15% shall be allowed to supply up to 20% of the requirement against this tender provided
 1. The MSE vendor matches the L1 price.
 2. L1 price is from a non MSE vendor.
 3. L1 price will be offered to the vendor nearest to L1 in terms of price ranking (L2 - nearest to L1). In case of non-acceptance by the MSE vendor (L2), next ranking MSE vendor will be offered who is within the L1 + 15% band (if L3 is also within 15% band).
 4. 20% of the 20% (i.e. 4% of the total enquired quantity) will be earmarked for SC/ST owned MSE firms provided conditions as mentioned in (1) and (2) are fulfilled.

5. In case no vendor under SC / ST category firms are meeting the conditions mentioned in (1) and (2) or have not participated in the tender, in such cases the 4% quantity will be distributed among the other eligible MSE vendors who have participated in the tender.
6. Serial no. 1 to 5 will not be applicable wherever it is not possible to split the tendered quantity/items on account of customer contract requirement, or the items tendered are systems. Such information that tendered quantity will not be split will be indicated in the SCC.

I. INTEGRITY COMMITMENT IN THE TENDER PROCESS, AND EXECUTION OF CONTRACTS:

1. Commitment by BHEL:

BHEL commits to take all measures necessary to prevent corruption in connection with the Tender process and execution of the Contract. BHEL will, during the tender process, treat all bidder / suppliers in a transparent and fair manner, and with equity.

2. Commitment by Bidder(s)/ Contractor(s):

- a. The Bidder(s)/ Contractor(s) commit(s) to take all measures to prevent corruption and will not directly or indirectly try to influence any decision or benefit which he is not legally entitled to.
- b. The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding or any actions to restrict competition.
- c. The Bidder(s)/ Contractor(s) will not commit any offence under the relevant Acts. The Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain or pass on to others, any information or document provided by BHEL as part of business relationship.
- d. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to the relevant guidelines issued from time to time by Government of India/ BHEL.

If the Bidder(s) / Contractor(s), before award or during execution of the Contract commit(s) a transgression of the above or in any other manner such as to put his reliability or credibility in question, BHEL is entitled to disqualify the Bidder(s) / Contractor (s) from the tender process or terminate the contract and/ or take suitable action as deemed fit.

J. Integrity Pact (IP):

- a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner.
A panel of independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those Bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

- b) Please refer Section-8 of the IP for Role and Responsibilities of IEMs (Annexure-IX). In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department.”

K. Terms & Conditions to be complied under GST regime :

1. All invoices to contain BHEL-EDN (buyer) GSTIN number: 29AAACB4146P1ZB and/or consignee (as applicable) GSTIN number, which will be intimated at the time of issuance of dispatch clearance. Note that 02 sets of original Invoices should be submitted.
2. The Bidder shall mention Bidder's GSTIN number in all Invoices submitted.
3. The Bidder shall also mention HSN (Harmonized System of Nomenclature) / SAC (Services Accounting Code) mandatorily in all invoices submitted.
4. Invoice submitted should be in the format as specified under GST Laws viz., all details as mentioned in Invoice Rules like GST registration number (GSTIN), invoice number with date of issue, quantity, rate, value, taxes with nomenclature – CGST, SGST, UGST, IGST mentioned separately, HSN Code / SAC Code etc. Invoice should be submitted in original for buyer plus duplicate for credit availment.
5. Payment of GST to Vendor will be made only if it is matching with data uploaded by the Vendor in GST portal.
6. Vendors to give undertaking that GST as mentioned in the Invoice has been paid either through cash or admissible input credit and also filed the returns at the time of submission of invoice.
7. For invoices paid on Reverse charge basis – “Tax payable on reverse charge basis” to be mentioned on the invoice.
8. In case GST credit is delayed/denied to BHEL due to non/delayed receipt of goods and/or tax invoice or expiry of timeline prescribed in GST law for availing such ITC, or any other reasons not attributable to BHEL, GST amount will be recoverable from vendor along with interest levied/leviable on BHEL.
9. In case vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law will be recoverable from vendor/contractor along with interest levied/leviable on BHEL.

Annexure I

- **Definition of Indian Agent:** An Indian Agent of foreign principal is an individual, a partnership, an association of persons, a private or public company, that carries out specific obligation(s) towards processing of BHEL tender or finalization or execution of BHEL's contract on behalf of the foreign supplier.

In case of yes, vendor to note the following and reply accordingly:

- BHEL shall deal directly with foreign vendors, wherever required, for procurement of goods. However, if the foreign principal desires to avail of the services of an Indian agent, then the foreign principal should ensure compliance to regulatory guidelines - which require mandatory submission of an Agency Agreement.
- It shall be incumbent on the Indian agent and the foreign principal to adhere to the relevant guidelines of Government of India, issued from time to time.
- The Agency Agreement should specify the precise relationship between the foreign OEM / foreign principal and their Indian agent and their mutual interest in the business. All services to be rendered by agent/ associate, whether of general nature or in relation to the particular contract, must be clearly stated by the foreign supplier/ Indian agent. Any payment, which the agent or associate receives in India or abroad from the OEM, whether as commission or as a general retainer fee should be brought on record in the Agreement and be made explicit in order to ensure compliance to laws of the country.
- Any agency commission to be paid by BHEL to the Indian agent shall be in Indian currency only.
- Tax deduction at source is applicable to the agency commission paid to the Indian agent as per the prevailing rules.
- In the absence of any agency agreement, BHEL shall not deal with any Indian agent (authorized representatives / associate / consultant, or by whatever name called) and shall deal directly with the foreign principal only for all correspondence and business purposes.
- The "Guidelines for Indian Agents of Foreign Suppliers" enclosed at annexure -'A' shall apply in all such cases.

VENDOR SIGNATURE WITH SEAL

- viii. The supply and execution of the Purchase Order (including indigenous supplies/ service) shall be in the scope of the OEM/ foreign principal. The OEM/ foreign principal should submit their offer inclusive of all indigenous supplies/ services and evaluation will be based on 'total cost to BHEL'. In case OEM/ foreign principal recommends placement of order(s) towards indigenous portion of supplies/ services on Indian supplier(s)/ agent on their behalf, the credentials/ capacity/ capability of the Indian supplier(s)/ agent to make the supplies/ services shall be checked by BHEL as per the extant guidelines of Supplier Evaluation, Approval & Review Procedure (SEARP), before opening of price bids. In this regard, details may be checked as per Annexure-B (copy enclosed). It will be the responsibility of the OEM/ foreign principal to get acquainted with the evaluation requirements of Indian supplier/ agent as per SEARP available on www.bhel.com.

The responsibility for successful execution of the contract (including indigenous supplies/ services) lies with the OEM/ foreign principal. All bank guarantees to this effect shall be in the scope of the OEM/ foreign principal.

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VENDOR SIGNATURE WITH SEAL

Guidelines for Indian Agents of Foreign Suppliers

- 1.0 There shall be compulsory registration of agents for all Global (Open) Tender and Limited Tender. An agent who is not registered with BHEL shall apply for registration in the registration form in line with SEARP.
- 1.1 Registered agents will file an authenticated Photostat copy duly attested by a Notary Public/Original certificate of the Principal confirming the agency agreement and giving the status being enjoyed by the agent and the commission/ remuneration/ salary/ retainership being paid by the principal to the agent before the placement of order by BHEL.
- 1.2 Wherever the Indian representatives have communicated on behalf of their principals and the foreign parties have stated that they are not paying any commission to the Indian agents, and the Indian representative is working on the basis of salary or as retainer, a written declaration to this effect should be submitted by the party (i.e. Principal) before finalizing the order.
- 2.0 **Disclosure of particulars of agents/ representatives in India, if any.**
- 2.1 Tenderers of Foreign nationality shall furnish the following details in their offers:
 - 2.1.1 The Bidder(s)/ Contractor(s) of foreign origin shall disclose the name and address of the agents/ representatives in India if any and the extent of authorization and authority given to commit the Principals. In case the agent/ representative be a foreign Company, it shall be confirmed whether it is existing Company and details of the same shall be furnished.
 - 2.1.2 The amount of commission/ remuneration included in the quoted price(s) for such agents/ representatives in India.
 - 2.1.3 Confirmation of the Tenderer that the commission/ remuneration, if any, payable to his agents/ representatives in India, may be paid by BHEL in Indian Rupees only.
- 2.2 Tenderers of Indian Nationality shall furnish the following details in their offers:
 - 2.2.1 The Bidder(s)/ Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any, indicating their nationality as well as their status, i.e. whether manufacturer or agents of manufacturer holding the Letter of Authority of the Principal specifically authorizing the agent to make an offer in India in response to tender either directly or through the agents/ representatives.
 - 2.2.2 The amount of commission/ remuneration included in the price (s) quoted by the Tenderer for himself.
 - 2.2.3 Confirmation of the foreign principals of the Tenderer that the commission/ remuneration, if any, reserved for the Tenderer in the quoted price(s), may be paid by BHEL in India in equivalent Indian Rupees on satisfactory completion of the Project or supplies of Stores and Spares in case of operation items.
- 2.3 In either case, in the event of contract materializing, the terms of payment will provide for payment of the commission/ remuneration, if any payable to the agents/ representatives in India in Indian Rupees on expiry of 90 days after the discharge of the obligations under the contract.
- 2.4 Failure to furnish correct and detailed information as called for in paragraph 2.0 above will render the concerned tender liable to rejection or in the event of a contract materializing, the same liable to termination by BHEL. Besides this there would be a penalty of banning business dealings with BHEL or damage or payment of a named sum.

ANNEXURE - II
LIST OF INTERNATIONAL GATEWAY AIRPORTS

For air based consignment, terms of delivery will be on FCA basis from following listed airports only. Vendors are requested to verify this list for use before submission of offer.

SCHEDULE NO	COUNTRY	CURRENCY CODE	AIRPORT
D01	UK	GBP	LONDON (HEATHROW)
D02	UK	GBP	NEW CASTLE
D03	UK	GBP	OXFORD. CHETLAM
D04	UK	GBP	BRISTOL. WELLINGBOROUGH
D05	UK	GBP	BIRMINGHAM
D06	UK	GBP	EAST MIDLANDS
D07	UK	GBP	MANCHESTER
D08	UK	GBP	LEEDS
D09	UK	GBP	GLASGOW
D10	FRANCE	EURO	PARIS (ROISSY) & LYON
D11	SWEDEN	EURO	STOCKHOLM
D12	SWEDEN	EURO	GOTHENBERG & MALMO
D13	ITALY	EURO	ROMA, MILAN
D14	ITALY	EURO	TURIN, BOLOGNA, FLORENCE
D15	NETHERLANDS	EURO	AMSTERDAM, ROTTERDAM
D16	AUSTRIA	EURO	VIENNA, LINZ, GRAZ
D17	BELGIUM	EURO	ANTWERP, BRUSSELS
D18	DENMARK	DKK	COPENHAGEN
D19	JAPAN	JPY	TOKYO, OSAKA
D20	SINGAPORE	SGD	SINGAPORE
D21	CANADA	CAD	TORONTO
D22	CANADA	CAD	MONTREAL
D23	USA	USD	NEW YORK, BOSTON
D24	USA	USD	CHICAGO
D25	USA	USD	SAN FRANCISCO, LOS ANGELES
D26	USA	USD	ALANTA, HOUSTON
D27	GERMANY	EURO	MUNICH, KOLN, DUSSELDORF, HANNOVER, HAMBURG, STUTTGART, DAMSTADT, MANIHIEM, NURUMBERG
D28	GERMANY	EURO	FRANKFURT
D29	GERMANY	EURO	BERLIN
D30	SWITZERLAND	SFR	BASLE, ZURICH, GENEVA
D31	SPAIN	EURO	BARCELONA
D32	AUSTRALIA	AUD	SYDNEY
D33	AUSTRALIA	AUD	MELBOURNE
D34	AUSTRALIA	AUD	PERTH
D35	CZECH	EURO	PRAGUE
D36	HONG KONG	HKD	HONG KONG
D37	NEW ZELAND	NZD	AUCKLAND
D38	RUSSIA	USD	MOSCOW
D39	SOUTH KOREA	USD	KIMPO INTERNATIONAL, INCHEON
D40	FINLAND	EURO	HELSINKI
D41	ROMANIA	EURO	BUCHAREST
D42	NORWAY	EURO	OSLO
D43	IRELAND	EURO	DUBLIN
D44	ISRAEL	USD	TEL AVIV
D45	UAE	USD	DUBAI
D46	OMAN	USD	MUSCAT
D47	EGYPT	USD	CAIRO
D48	TAIWAN	USD	TAIPEI
D49	UKRAINE	USD	KIEV
D50	CHINA	USD	SHANGHAI, SHENZHEN
D51	PHILIPINES	USD	MANILA
D52	MALAYSIA	USD	KUALALUMPUR, PE NANG
D53	CYPRUS	USD	LARNACA
D54	SOUTH AFRICA	USD	JOHANNESBERG, DURBAN
D55	SLOVAKIA	EURO	BARTISLOVA
D56	SAUDI ARABIA	SAR	RIYADH
D57	TURKEY	EURO	ISTANBUL
D58	THAILAND	USD	BANGKOK
D59	BRAZIL	USD	SAO PAULO, RIO DE JANEIRO

ANNEXURE – III
DISCREPANCY IN WORDS & FIGURES – QUOTED IN PRICE BID

Following guidelines will be followed in case of discrepancy in words & figures-quoted in price bid:

(a) If, in the price structure quoted for the required goods/services/works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.

(b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

(d) If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.

ANNEXURE - IV
Electronic Funds Transfer (EFT) OR
Paylink Direct Credit Form

Please Fill up the form in **CAPITAL LETTERS** only.

TYPE OF REQUEST(Tick one): _____ CREATE _____ CHANGE

BHEL Vendor / Supplier Code:

Company Name :

Permanent Account Number(PAN):

Address

City:

PINCODE

STATE

Contact Person(s)

Telephone No:

Fax No:

e-mail id:

1 Bank Name:

2 Bank Address:

3 Bank Telephone No:

4 Bank Account No:

5 Account Type: Savings/Cash Credit

6 9 Digit Code Number of Bank and branch
appearing on MICR cheque issued by Bank

7 Bank IFSC Code(applicable for NEFT)

8 Bank IFSC code(applicable for RTGS)

(Indian Financial System Code)

- A I hereby certify that the particulars given above are true, correct and complete and that I, as a representative for the above named Company, hereby authorise BHEL, EDN, Bangalore to electronically deposit payments to the designated bank account.
- B If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL / transferring Bank responsible.
- C This authority remains in full force until BHEL, EDN, Bangalore receives written notification requesting a change or cancellation.
- D I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under ECS / EFT.

Date:

Authorised Signatory:

Designation:

Telephone No. with STD Code

Company Seal

Bank Certificate

We certify that _____ has an Account No _____ with us and we confirm that the bank details given above are correct as per our records.

Date:

(.....)

Place:

Signature

Please return completed form **along with a blank cancelled cheque or photocopy** thereof to:

Bharath Heavy Electricals Ltd,

Attn:

Electronics Division, Mysore Road,

BANGALORE - 560 026

In case of any Query, please call concerned purchase executive.

ANNEXURE - V
PRESENT PROCEDURE FOR SALE IN TRANSIT (HIGH SEA SALES)

In case of High Sea Sales, vendor should submit following documents:

1. ORIGINAL HIGH SEA SALES AGREEMENT

- Sale agreement (on Rs. 200/- non-judicial stamp paper & notarised with 2 witnesses with identity) has to be signed between BHEL and the Party importing material. The date of the sale documents should be in between the date of House Air Way Bill / Bill of Lading and before landing of the goods in Indian origin.
- The date of the stamp paper should be prior to the Air Way Bill / Bill of Lading date.
- Following shall be included in the High Sea Sales Agreement:
“THE BUYER ALSO UNDERTAKE DISCHARGES, THE OBLIGATION AND FULFILLMENT OF CONDITIONS, IF ANY, ATTACHED TO THE IMPORTATION, ASSESSMENT AND CLEARANCE OF THE GOODS IN TERMS CUSTOMS TARIFF ACT 1975, THE CUSTOMS ACT 1962 & RULES & REGULATIONS MADE THERE UNDER AND OTHER RELEVANT ACTS, ORDERS, NOTIFICATIONS”.

2. ORIGINAL INVOICES: INDIGENOUS RUPEE INVOICE & FOREIGN CURRENCY INVOICE

- Prices should be C.I.F., designated airport/seaport basis.
- I.E.C., C.S.T., K.S.T. Nos. to be mentioned.
- Description of item (Nomenclature), Unit & Quantity in both the Foreign Currency & the Indigenous Invoice in Rupee shall be exactly as per Purchase Order Description of item, Quantity and Unit. The Indigenous Invoice value shall be exactly as per Purchase Order value.
- Seller should give Foreign Currency Invoice from the original consignor. The Foreign Currency Invoice value should be at least 2% (two per cent) less than the Indigenous Rupee Invoice value in equivalent foreign currency.

4. ORIGINAL HOUSE AIR WAY BILL/ BILL OF LADING

- The sale agents should duly endorse House Air Way Bill (HAWB) for air shipments or original Bill of Lading (O.B.L.) for sea shipments and Foreign Currency Invoice in favour of BHEL-EDN.

5. ORIGINAL CARGO ARRIVAL NOTICE FROM FORWARDER.

6. ORIGINAL DELIVERY ORDER ISSUED IN NAME OF BHEL-EDN.

7. ORIGINAL PACKING LIST.

8. A LETTER TO THE COMMISSIONER OF CUSTOMS FOR EFFECTING ABOVE SALE.

9. A LETTER TO THE DEPUTY ASSESSOR (OCTROI) FOR EFFECTING ABOVE SALE IN FAVOUR OF BHEL.

REMARKS: In case vendor needs any clarifications on the above, the same may be sought in writing.

Annexure-VI
BHEL MEMBER BANKS (LIST OF CONSORTIUM BANKS)

BANK GUARANTEE (BG) SHALL BE ISSUED FROM THE FOLLOWING BANKS ONLY:

	Nationalised Banks		Nationalised Banks
1	Allahabad Bank	19	Vijaya Bank
2	Andhra Bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign Banks
5	Corporation Bank	21	CITI Bank N.A
6	Central Bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hongkong and Shanghai Banking Corporation Ltd. (HSBC)
8	Indian Overseas Bank	24	Standard Chartered Bank
9	Oriental Bank of Commerce	25	J P Morgan
10	Punjab National Bank		
11	Punjab & Sindh Bank		Private Banks
12	State Bank of India	26	Axis Bank
13	State Bank of Hyderabad	27	The Federal Bank Limited
14	Syndicate Bank	28	HDFC Bank
15	State Bank of Travancore	29	Kotak Mahindra Bank Ltd
16	UCO Bank	30	ICICI Bank
17	Union Bank of India	31	IndusInd Bank
18	United Bank of India	32	Yes Bank

Note:

- All BGs must be issued from BHEL consortium banks listed above.
- This list is subject to changes. Hence vendors are requested to check this list every time before issuing BGs.
- Bank Guarantees issued by Co-Operative Banks/Financial Institutions cannot to be accepted under any circumstance.

Annexure-VII

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of Bharat Heavy Electricals Limited (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at _____¹ through its Unit at.....(name of the Unit) having awarded to (Name of the Vendor / Contractor / Supplier) with its registered office at _____² hereinafter referred to as the 'Vendor / Contractor / Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No.....dated³ valued at Rs.....⁴ (Rupees -----)/FC.....(in words.....) for⁵ (hereinafter called the 'Contract') and the Vendor / Contractor / Supplier having agreed to provide a Contract Performance Bank Guarantee, equivalent to% (.... Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we,, (hereinafter referred to as the Bank), having registered/Head office at and inter alia a branch at being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer any sum or sums upto a maximum amount of Rs -- -----⁶ (Rupees -----) without any demur, immediately on first demand from the Employer and without any reservation, protest, and recourse and without the Employer needing to prove or demonstrate reasons for its such demand.

Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Vendor / Contractor / Supplier in any suit or proceeding pending before any Court or Tribunal, Arbitrator or any other authority, our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Vendor / Contractor / Supplier shall have no claim against us for making such payment.

We thebank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract/satisfactory completion of the performance guarantee period as per the terms of the Contract and that it shall continue to be enforceable till

all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

WeBANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Vendor / Contractor / Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Vendor / Contractor / Supplier and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Vendor / Contractor / Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Vendor / Contractor / Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Vendor / Contractor / Supplier and notwithstanding any security or other guarantee that the Employer may have in relation to the Vendor / Contractor / Supplier 's liabilities.

This Guarantee shall remain in force upto and including.....⁷ and shall be extended from time to time for such period as may be desired by Employer.

This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Vendor / Contractor / Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the⁸we shall be discharged from all liabilities under this guarantee thereafter.

We, BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.

Notwithstanding anything to the contrary contained hereinabove:

- a) The liability of the Bank under this Guarantee shall not exceed.....⁶
- b) This Guarantee shall be valid up to⁷
- c) Unless the Bank is served a written claim or demand on or before⁸ all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated.....

Place of Issue.....

¹ NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited

² NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.

³ DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE

⁴ CONTRACT VALUE

⁵ PROJECT/SUPPLY DETAILS

⁶ BG AMOUNT IN FIGURES AND WORDS

⁷ VALIDITY DATE

⁸ DATE OF EXPIRY OF CLAIM PERIOD

Annexure – VIII
(Applicable only for MSE suppliers)
Certificate by Chartered Accountant on Letter Head

This is to certify that M/s
.....(hereinafter referred to as 'Company')
having its registered office at is registered under MSMED Act 2006,
(Entrepreneur Memorandum No (Part-11 dtd
Category: (Micro/Small) (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as
per the latest audited financial year..... as per MSMED Act 2006 is as follows:

- 1. For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722 (E) dated October 5, 2006:
Rs.....Lacs.
- 2. For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:
Rs.Lacs.

The above investment of Rs.Lacs in within permissible limit of
Rs.....Lacs for.....Micro / Small (Strike off which is not
applicable) Category under MSMED Act 2006.

Or

The company has been graduated from its original category (Micro/ Small) (**Strike off which is not applicable**) and the date of graduation of such enterprise from its original category is (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name:

Membership Number:

Seal of Chartered Accountant

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi – 110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved

in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors". framed by the Principal.

Section 4 – Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

- 6.1 The Bidder(s)/ Contractor(s) undertake(s) to obtain from all subcontractors a commitment consistent with this Integrity Pact and report Compliance to the Principal. This commitment shall be taken only from those sub-contractors whose contract value is more than 20 % of Bidder's/ Contractor's contract value with the Principal. The Bidder(s)/ Contractor(s) shall continue to remain responsible for any default by his Sub-contractor(s).
- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- 8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the

Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.

8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.

9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.

10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal

(Office Seal)

For & On behalf of the Bidder/ Contractor

(Office Seal)

Place-----

Date-----

Witness: _____

(Name & Address) _____

Witness: _____

(Name & Address) _____



**Bharat Heavy Electricals Ltd.,
(A Government of India undertaking)
Electronics Division
PB 2606 , Mysore Road Bangalore , 560026 INDIA**

CE: PR: 002- Rev 01

GENERAL COMMERCIAL CONDITIONS FOR CONTRACT

These 'General Commercial Conditions for Contract for Purchase' herein after referred to as GCC apply to all enquiries, tenders, requests for quotations, orders, contracts and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliveries") to Bharat Heavy Electricals Limited and any of its units, regions or divisions (hereinafter referred to as "BHEL" or the Purchaser) or its projects/ customers.

Any deviations from or additions to these GCC require BHEL's express written consent. The general terms of business or sale of the vendor shall not apply to BHEL. Acceptance, receipt of shipments or services or effecting payment shall not mean that the general terms of business or sale of the vendor have been accepted.

Orders, agreements and amendments thereto shall be binding if made or confirmed by BHEL in writing. Only the Purchasing department of BHEL is authorized to issue the Purchase Order or any amendment thereof.

Definitions: Throughout these conditions and in the specifications, the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.

- a) 'The Purchaser' means Bharat Heavy Electricals Limited, Electronics division, Mysore road, Bangalore 560 026, a Unit of Bharat Heavy Electricals Limited (A Govt. of India Undertaking) incorporated under the Companies Act having its registered office at BHEL House, Siri Fort, New Delhi-110049, India and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
- b) 'The vendor' means the person, firm, company or organization on whom the Purchase Order is placed and shall be deemed to include the vendor's successors, representative heirs, executors and administrator as the case may be. It may also be referred to as Seller, Contractor or Supplier.
- c) 'Contract' shall mean and include the Purchase Order incorporating various agreements, viz. tender/ RFQ, offer, letter of intent/acceptance/ award, the General Conditions of Contract and Special Conditions of Contract for Purchase, Specifications, Inspection/ Quality Plan, Schedule of Prices and Quantities, Drawings, if any enclosed or to be provided by BHEL or his authorized nominee and the samples or patterns if any to be provided under the provisions of the contract.
- d) 'Parties to the Contract' shall mean the 'The Vendor' and the Purchaser as named in the main body of the Purchase Order.

Interpretation:

In the contract, except where the context requires otherwise:

- a) words indicating one gender include all genders;
- b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
- d) "Written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

Applicable Conditions:

1. **Price Basis:** All prices shall be firm until the purchase order is executed / completed in all respects. No price variations / escalation shall be permitted unless otherwise such variations / escalations are provided for and agreed by BHEL in writing in the purchase order.

2. **Ordering and confirmation of Order:** Vendor shall send the order acceptance on their company letter head within 02 weeks from the date of receipt of Purchase Order or such other period as specified/ agreed by BHEL. BHEL reserves the right to revoke the order placed if the order confirmation differs from the original order placed. The acceptance of goods/services/supplies by BHEL as well as payments made in this regard shall not imply acceptance of any deviations.
The purchase order will be deemed to have been accepted if no communication to the contrary is received within one week (or the time limit as specified/agreed by BHEL) from the date of receipt of the purchase order.

3. **Documentation:** After receipt of Purchase Order, vendor should submit necessary documents (if & as applicable) like drawings specified, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and/or any other relevant documents as per Specification/Purchase Order, as and when required by BHEL/ Customer.
At any stage within the contract period, the vendor shall notify of any error, fault or other defect found in BHEL's documents / specifications or any other items for reference. If and to the extent that (taking account of cost and time) any vendor exercising due care would have discovered the error, fault or other defect when examining the documents/specifications before submitting the tender, the time for completion shall not be extended. However if errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the vendor's documents, they shall be corrected at his cost, notwithstanding any consent or approval.

4. **Penalty:**
 - a. **For delay in documentation:** In the event of delay in submission of complete set of specified documents ((like drawings, bill of materials, datasheets, catalogues, quality plan etc. as called in tender specifications including soft copies wherever applicable) in required sets beyond three(03) weeks (or as agreed/indicated in the SCC/Purchase Order) from the date of receipt of Purchase Order (by email), penalty at 0.5% (half percent) per week or part thereof, limited to a maximum of 5% (five percent) of the basic material value of the Purchase Order will be applicable.
Penalty for delayed documentation if applicable, shall be deducted at the time of first supply payment. If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted.

 - b. **For delay in delivery:** In the event of delay in agreed contractual delivery as per Purchase Order, penalty @ 0.5 % (half percent) per week or part thereof but limited to a max of 10% (ten percent) value of undelivered portion (basic material cost) will be applicable. Delivery will commence from the date of issue of manufacturing clearance or approved document by BHEL, whichever is later. The date for which Inspection call is issued by vendor along with test certificates / test reports / Certificate of Conformance / calibration reports, as proof of completion of manufacturing will be treated as date of deemed delivery for penalty calculation. In the absence of furnishing such document indicated above as proof of completion of manufacturing along with inspection call, actual date of inspection will be considered as date of deemed delivery and BHEL will not be responsible for delay in actual date of inspection.

Penalty for delayed delivery if applicable, shall be deducted at the time of first supply payment. If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted.

5. **Contract variations (Increase or decrease in the scope of supply):** BHEL may vary the contracted scope as per requirements at site. If vendor is of the opinion that the variation has an effect on the agreed price or delivery period, BHEL shall be informed of this immediately in writing along with technical details. Where unit rates are available in the Contract, the same shall be applied to such additional work. Vendor shall not

perform additional work before BHEL has issued written instructions/ amendment to the Purchase Order to that effect. The work which the vendor should have or could have anticipated in terms of delivering the service(s) and functionality (i.e.) as described in this agreement, or which is considered to be the result of an attributable error on the vendor's part, shall not be considered additional work.

6. Inspection: Prior written notice of at least 10 days shall be given along with internal test certificates/COC and applicable test certificates. Materials will be inspected by BHEL-EDN-QS/CQS or BHEL nominated Third Party Inspection Agency (TPIA) or BHEL authorized Inspection Agency or Customer / Consultant or jointly by BHEL & Customer / consultant. All tests have to be conducted as applicable in line with approved Quality plan or QA Checklist or Purchase specification and original reports shall be furnished to BHEL -EDN, Bangalore for verification/acceptance for issue of dispatch clearance.
All costs related to inspections & re-inspections shall be borne by vendor. Whether the Contract provides for tests on the premises of the vendor or any of his Sub-contractor/s, vendor shall be responsible to provide such assistance, labour, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by BHEL only if specifically agreed to in the purchase order.
7. Transit Insurance: Transit insurance coverage between vendor's works and project site shall be to the account of BHEL, unless specifically agreed otherwise. However, vendor shall send intimation directly to insurance agency (as mentioned in dispatch instructions issued by BHEL) through fax/courier/e-mail, immediately on dispatch of goods for covering insurance. A copy of such intimation sent by vendor to insurance agency shall be given to BHEL along with dispatch documents. Dispatch documents will be treated as incomplete without such intimation copy. BHEL shall not be responsible for sending intimations to insurance agency on behalf of the vendor.
8. Mode of dispatch:
Indigenous Scope: By road on Door Delivery Consignee Copy attached basis through your approved transporter (unless otherwise indicated in Dispatch Instructions), only on receipt of Despatch Clearance from BHEL.
Imported Scope: By Air/Sea through BHEL approved Freight Forwarder/supplier approved Consolidator respectively as per agreed contractual terms, only on receipt of Dispatch Clearance from BHEL.
9. High Sea Sales (HSS): Customs clearance of the consignment landed on Indian Sea/Air ports will be done by BHEL based on the original HSS documents provided by vendors.
Any delay in submission of complete/correct HSS documents to BHEL may incur demurrage charges. All demurrage charges on account of incomplete /incorrect HSS documents submission by vendor will be to vendor's account and all such charges will be recovered from any of the available vendor bills with BHEL.
10. Packaging and dispatch: The Seller shall package the goods safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by Sea/ Air / Rail/ Road to its destination suitably protected against loss, damage, corrosion in transit and the effect of tropical salt laden atmosphere. The packages shall be provided with fixtures/ hooks and sling marks as may be required for easy and safe handling. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols / instructions. Hazardous material should be notified as such and their packing, transportation and other protection must conform to relevant regulations.
The packing, shipping, storage and processing of the goods must comply with the prevailing legislation and regulations concerning safety, the environment and working conditions. Any Imported/Physical Exports items packed with raw/ solid wood packing material should be treated as per ISPM – 15 (fumigation) and accompanied by Phytosanitary/ Fumigation certificate. If safety information sheets (MSDS – Material Safety Data Sheet) exist for an item or the packaging, vendor must provide this information without fail along with the consignment.
Each package must be marked with Consignee name, Purchase order number, Package number, Gross weight and net weight, dimensions (LxBxH) and Seller's name. Packing list of goods inside each package with PO item number and quantity must also be fixed securely outside the box to indicate the contents of each box. Total number of packages in the consignment must also be indicated in the packing list.
Separate packing & identification of items should be as follows.
1. Main Scope - All items must be tagged with part no. & item description.

2. Commissioning spares - All items must be tagged with part no. & item description.
3. Mandatory spares - All items must be tagged with part no. & item description. All boxes/containers of spare items are to be distinctly marked in Red colour with boldly written "S" mark on each face of the containers / secure boxes as indication of items to be handed over directly to customer.
11. Assignment of Rights & Obligations; Subcontracting: Vendor is not permitted to subcontract the delivery or any part thereof to third party or to assign the rights and obligations resulting from this agreement in whole or in part to third parties without prior written permission from BHEL. Any permission or approval given by the BHEL shall, however, not absolve the vendor of the responsibility of his obligations under the Contract.
12. Progress report: Vendor shall render such report as to the progress of work and in such form as may be called for by the concerned purchase officer from time to time. The submission and acceptance of such reports shall not prejudice the rights of BHEL in any manner.
13. Non-disclosure and Information Obligations: Vendor shall provide with all necessary information pertaining to the goods as it could be of importance to BHEL. Vendor shall not reveal any specified confidential information that may be divulged by BHEL to Vendor's employees not involved with the tender/ contract & its execution and delivery or to third parties, unless BHEL has agreed to this in writing beforehand. Vendor shall not be entitled to use the BHEL name in advertisements and other commercial publications without prior written permission from BHEL.
14. Cancellation / Termination of contract: BHEL shall have the right to completely or partially terminate the agreement by means of written notice to that effect. Termination of the Contract, for whatever reason, shall be without prejudice to the rights of the parties accrued under the Contract up to the time of termination.
BHEL shall have the right to cancel/foreclose the Order/ Contract, wholly or in part, in case it is constrained to do so on account of any decline, diminution, curtailment or stoppage of the business.
15. Risk Purchase Clause: In case of failure of supplier, BHEL at its discretion may make purchase of the materials / services not supplied / rendered in time at the RISK & COST of the supplier. Under such situation, the supplier who fails to supply the goods in time shall be wholly liable to make good to BHEL any loss due to risk purchase.
In case of items demanding services at site like erection and commissioning, vendor should send his servicemen/representatives within 7 days from the service call. In case a vendor fails to attend to the service call, BHEL at its discretion may also make arrangements to attend such service by other parties at the **RISK & COST** of the supplier. Under such situation the supplier who fails to attend the service shall be wholly liable to make good to BHEL any loss due to risk purchase/service including additional handling charges due to the change. Pl. ref. *Note: A mentioned in pg. nos: 07 & 08 for details.
16. Shortages: In the event of shortage on receipt of goods and/or on opening of packages at site, all such shortages, caused by supplier's act or omission, shall be made good within a reasonable time that BHEL may allow from such intimation and at free of cost.
Transit Damages: In the event of receipt of goods in damaged condition or having found them so upon opening of packages at site, supplier shall make good of all such damages within a reasonable time from such intimation by BHEL. In case BHEL raises an insurance claim, the cost of material limited to insurance settled amount less handling charges will be reimbursed to supplier.
17. Remedial work: Notwithstanding any previous test or certification, BHEL may instruct the vendor to remove and replace materials/goods or remove and re-execute works/services which are not in accordance with the purchase order. Similarly BHEL may ask the vendor to supply materials or to execute any services which are urgently required for any safety reasons, whether arising out of or because of an accident, unforeseeable event or otherwise. In such an event, Vendor shall provide such services within a reasonable time as specified by BHEL.
18. Indemnity Clause: Vendor shall comply with all applicable safety regulations and take care for the safety of all persons involved. Vendor is fully responsible for the safety of its personnel or that of his subcontractor's

men / property, during execution of the Purchase Order and related services. All statutory payments including PF, ESI or other related charges have to be borne by the vendor. Vendor is fully responsible for ensuring that all legal compliances are followed in course of such employment.

19. Product Information, Drawings and Documents: All specified drawings, technical documents or other technical information received by Vendor from BHEL or vice versa shall not, without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the Disclosing party, otherwise be used or copied, reproduced, transmitted or communicated to third parties. All information and data contained in general product documentation, whether in electronic or any other form, are binding only to the extent that they are by reference expressly included in the contract.

Vendor, as per agreed date/s but not later than the date of delivery, provide free of charge information and drawings which are necessary to permit and enable BHEL to erect, commission, operate and maintain the product. Such information and drawings shall be supplied in as many numbers of copies as may be agreed upon.

All intellectual properties, including designs, drawings and product information etc. exchanged during the formation and execution of the Contract shall continue to be the property of the disclosing party.

20. Intellectual Property Rights, Licenses: If any Patent, design, Trade mark or any other intellectual property rights apply to the delivery (goods/related service) or accompanying documentation shall be the exclusive property of the Vendor and BHEL shall be entitled to the legal use thereof free of charge by means of a non-exclusive, worldwide, perpetual license. All intellectual property rights that arise during the execution of the Purchase Order/ contract for delivery by vendor and/or by its employees or third parties involved by the vendor for performance of the agreement shall belong to BHEL. Vendor shall perform everything necessary to obtain or establish the above mentioned rights. The Vendor guarantees that the delivery does not infringe on any of the intellectual property rights of third parties. The Vendor shall do everything necessary to obtain or establish the alternate acceptable arrangement pending resolution of any (alleged) claims by third parties. The Vendor shall indemnify BHEL against any (alleged) claims by third parties in this regard and shall reimburse BHEL for any damages suffered as a result thereof.

21. Force Majeure: Notwithstanding anything contained in the purchase order or any other document relevant thereto, neither party shall be liable for any failure or delay in performance to the extent said failures or delays are caused by the "Act of God" and occurring without its fault or negligence, provided that, force majeure will apply only if the failure to perform could not be avoided by the exercise of due care and vendor doing everything reasonably possible to resume its performance.

A party affected by an event of force majeure which may include fire, tempest, floods, earthquake, riot, war, damage by aircraft etc., shall give the other party written notice, with full details as soon as possible and in any event not later than seven (7) calendar days of the occurrence of the cause relied upon. If force majeure applies, dates by which performance obligations are scheduled to be met will be extended for a period of time equal to the time lost due to any delay so caused.

Notwithstanding above provisions, in an event of Force Majeure, BHEL reserves for itself the right to cancel the order/ contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of deliveries and other schedules.

22. Guarantee / Warranty:

Wherever required, and so provided in the specifications/ Purchaser Order, the Seller shall guarantee that the stores supplied shall comply with the specifications laid down, for materials, workmanship and performance.

Unless otherwise specified in SCC, guarantee / warranty period for main supply items shall be applicable for a period of 24 months from the date of delivery of goods or 18 months from the date of commissioning of goods, whichever is earlier.

The guarantee / warranty period as described above shall apply afresh to replaced, repaired or re-executed parts of a delivery. Unless otherwise specifically provided in the Purchase Order, Vendor's liability shall be co terminus with the expiration of the applicable guarantee / warranty period.

23. Limitation of Liability: Vendor's liability towards this contract is limited to a maximum of 100% of the contract value and consequential damages are excluded. However the limits of liability will have no effect in cases of criminal negligence or wilful misconduct.
The total liability of Vendor for all claims arising out of or relating to the performance or breach of the Contract or use of any Products or Services or any order shall not exceed the total Contract price.
24. Liability during guarantee / warranty: Vendor shall arrange replacement / repair of all the defective materials / services under its obligation under the guarantee / warranty period. The rejected goods shall be taken away by vendor and replaced / repaired. In the event of the vendor's failure to comply, BHEL may take appropriate action including disposal of rejections and replenishment by any other sources at the cost and risk of the vendor.
25. Liability after guarantee / warranty period: At the end of the guarantee / warranty, the Vendor's liability ceases except for latent defects. For the purpose of this clause, latent defects shall be the defects inherently lying within the material or arising out of design deficiency which do not manifest themselves during the guarantee / warranty Period, but later. The Contractor's liability for latent defects warranty for the equipment including spares shall be limited to a period of six months from the end of the guarantee / warranty period of the respective equipment including spares or first time commissioning whichever is later but not later than three (03) years from the date of shipment.
26. Compliance with Laws: Vendor shall, in performing the contract, comply with all applicable laws. The vendor shall make all remittances, give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals, as required by the laws in relation to the execution and completion of the contract and for remedying of any defects; and the Contractor shall indemnify and hold BHEL harmless against and from the consequences of any failure to do so.
27. Settlement of Disputes: Except as otherwise specifically provided in the Purchase Order, decision of BHEL shall be binding on the vendor with respect to all questions relating to the interpretation or meaning of the terms and conditions and instructions herein before mentioned and as to the completion of supplies/work/services, other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the contract, instructions, orders or these conditions or otherwise concerning the supply or the execution or failure to execute the order, whether arising during the schedule of supply/work or after the completion or abandonment thereof. Any disputes or differences among the parties shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration. Vendor shall continue to perform the contract, pending settlement of dispute(s).
28. Arbitration Clause: In case amicable settlement is not reached in the event of any dispute or difference arising out of the execution of the Contract or the respective rights and liabilities of the parties or in relation to interpretation of any provision in any manner touching upon the Contract, such dispute or difference shall (except as to any matters, the decision of which is specifically provided for therein) be referred by either party to the sole arbitration of an Arbitrator appointed by the Executive Director/ General Manager of the purchasing unit/ region/ division of BHEL. Vendor shall have no objection even if the Arbitrator so appointed is an employee of BHEL or has ever dealt/ had to deal with any matter relating to this Contract.
Subject as aforesaid the provisions of the Arbitration and Conciliation Act, 1996 of India or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. It is a term of contract that the party initiating arbitration shall specify the dispute or disputes to be referred to arbitration under this clause together with the amount or amounts claimed in respect of each such dispute. The venue for the arbitration shall be Bangalore, India. The award of the arbitrator shall be a speaking award and shall be final, conclusive and binding on all parties to this contract.
The cost of arbitration shall be borne equally by the parties. Notwithstanding the existence of any dispute or difference or any reference for the arbitration, the vendor shall proceed with and continue without hindrance the performance of the work under the contract with due diligence and expedition in a professional manner.

29. Applicable Laws and Jurisdiction of Courts:Prevailing Indian laws both substantive and procedural, including modifications thereto, shall govern the Contract.Subject to the conditions as aforesaid, the competent courts in Bangalore alone shall have jurisdiction to consider over any matters touching upon this contract.

30. General Terms: That any non-exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents.

That the headings used in this agreement are for convenience of reference only.

That all notices etc., to be given under the Purchase order shall be in writing, type script or printed and if sent by registered post or by courier service to the address given in this document shall be deemed to have been served on the date when in the ordinary course, they would have been delivered to the addressee.

Registration of Suppliers

unregistered Supplier: Supplier visits EPS at <https://bheleps.buyjunction.in>

- a. Supplier visits EPS at <https://bheleps.buyjunction.in>
- b. Clicks "REGISTER" for registration
- c. Fills up the Registration Page form
- d. MJ will ensure Authentication of Registration ¹
- e. Supplier logs in with the ID and password
- f. Supplier Maps the signing Certificate
- g. MJ will ensure the authentication the signing certificate ¹.
- h. Supplier Logs in to the system again and views the RFQ
- i. Supplier Attaches himself to the RFQ by clicking the Interested button
- j. Supplier fills the bid template and makes necessary attachments
- k. Supplier submits his bid by clicking CONFIRM.

NB:-

¹ -- BHEL Administrator or user will have no role for approving Registration and Open Tenders and DSC for Any supplier who has registered himself from the front END which is in case of OT.

- **For registered Supplier:**

- Supplier visits EPS home page
 - Supplier signs in with his/her user id and password
 - Selects the RFQ Code and views it.
 - Attaches himself to the RFQ by clicking the Interested button
 - Supplier fills the bid template and makes necessary attachments
 - Supplier submits his bid by clicking CONFIRM.
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