

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD				PY 56144
						REV. 00

40	PY9756144408	Conductivity analyzer (online Retractable type)	4-20mA	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80
41	PY9756144416	Conductivity analyzer (online Retractable type)	4-20mA + HART	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80
42	PY9756144424	Conductivity analyzer (online Retractable type)	Foundation Field bus	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80
43	PY9756144432	pH analyzer (online Retractable type)	4-20mA	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80
44	PY9756144440	pH analyzer (online Retractable type)	4-20mA + HART	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80
45	PY9756144459	pH analyzer (online Retractable type)	Foundation Field bus	Pressure: -1 to 3 Kg/cm ² (g) Temperature : 30 to 80

Note-1 : Wherever Two (2) no's of cat-ion exchange columns are provided, necessary switching valves for switching to the standby column shall also be provided. The switch over shall be possible from the front of the panel. Also one (1) conductivity cell for each stream shall be provided after the cat-ion exchange column

VARIANT TABLE – 2 (for Sample Handling System)

Cooling Water process data:
Pressure – 3 to 10 kg/cm²(g); Temperature – 27 to 36 Deg C;
Chloride content: 130 – 285 mg/ltr

Var No.	Material Code	Sample Stream	Sample Handling System shall be designed for			Standard ranges
			Medium	Pressure (Kg/cm ² (g))	Temperature (Deg C)	
60	PY9756144602	Main STEAM (Superheated)	Steam	47.3 to 63.8	495 to 528	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm Silica : 0.001 – 1 ppm Sodium : 0 – 100 ppb pH : 0 -14
61	PY9756144610	Main STEAM (Saturated)	Steam	49 to 67.3	263 to 283	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm
62	PY9756144629	HP Drum Water	Water	49 to 67.3	263 to 283	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm Silica : 0.001 – 10 ppm
63	PY9756144637	LP STEAM (Superheated)	Steam	2.2 to 6.1	285 to 300	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm Silica : 0.001 – 1 ppm Sodium : 0 – 100 ppb pH : 0 -14
64	PY9756144645	LP STEAM (Saturated)	Steam	2.8 to 7.6	142 to 173	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm
65	PY9756144653	LP Drum Water	Water	2.8 to 7.6	142 to 173	CCT : 0 – 1 µS/cm CT : 0 – 100 µS /cm Silica : 0.001 – 10 ppm
66	PY9756144661	HP Feed water (Economizer inlet)	Water	54 to 76	110 to 140	CCT : 0 – 1 µS/cm CT : 0 – 1 µS/cm Silica : 0.001 – 1 ppm
67	PY9756144670	LP Feed water (Economizer inlet)	Water	5.2 to 11.5	110 to 140	pH : 0 -14 Do2 : 0.001 – 1 ppm
68	PY9756144688	Feed water (HP BFP outlet)	Water	71 to 115	110 to 140	CCT : 0 – 1 µS/cm CT : 0 – 1 µS/cm Silica : 0.001 – 1 ppm
69	PY9756144696	Feed water (LP BFP outlet)	Water	14.5 to 25	110 to 140	pH : 0 -14 Do2 : 0.001 – 1 ppm
70	PY9756144700	Feed water (Deaerator outlet)	Water	1 to 7.5	100 to 170	CCT : 0 – 1 µS/cm CT : 0 – 1 µS/cm Silica : 0.001 – 1 ppm pH : 0 -14 Do2 : 0.001 – 1 ppm
71	PY9756144718	Condensate (CEP outlet/ CST inlet/ Cooling water)	Condensate	3 to 16	30 to 80	CCT : 0 – 200 µS/cm Silica : 0.001 – 10 ppm Sodium : 10 – 1000 ppm pH : 0 -14 Do2 : 0 – 200 ppb
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CCT : Cat-ion conductivity; CT : Specific conductivity

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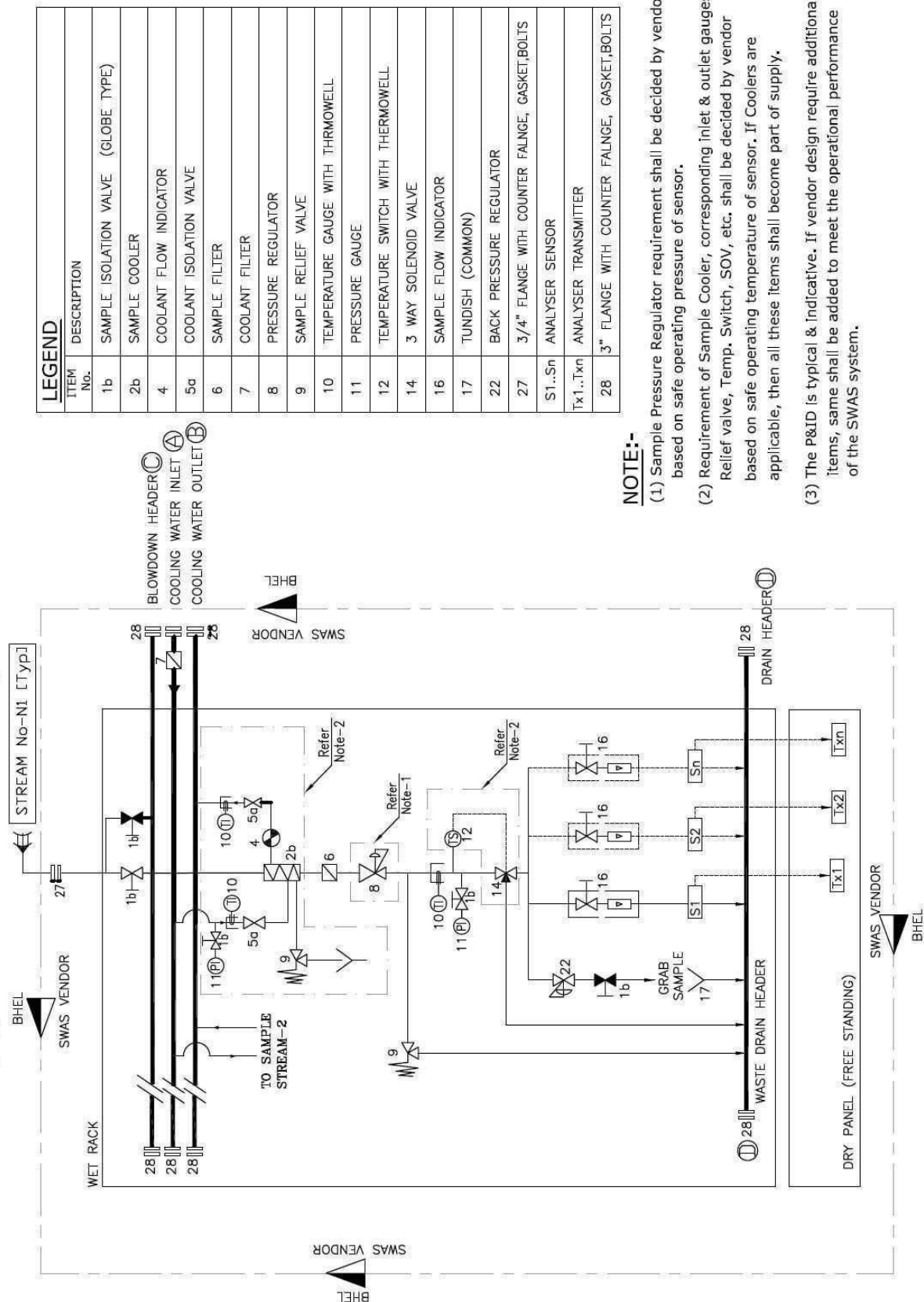
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18. SAMPLE HANDLING SYSTEM (Typical Drawing)

[Applicable for Variant No. 20 to 40]



NOTE:-

- (1) Sample Pressure Regulator requirement shall be decided by vendor based on safe operating pressure of sensor.
- (2) Requirement of Sample Cooler, corresponding inlet & outlet gauges, Relief valve, Temp. Switch, SOV, etc. shall be decided by vendor based on safe operating temperature of sensor. If Coolers are applicable, then all these items shall become part of supply.
- (3) The P&ID is typical & Indicative. If vendor design require additional items, same shall be added to meet the operational performance of the SWAS system.

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19. DATA SHEET for SAMPLE HANDLING SYSTEM for PANEL MOUNTED ANALYSERS Sample conditioning system shall be as per DWG-1 and technical requirements for items involved in sample handling system shall be as per below. All the items shall be suitable for sample pressure and temperature mentioned in variant tables.																																																					
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20. RACK/PANEL SPECIFICATION

S.No.	Requirement	:	For Panel/ Rack
(1)	Dry & Wet section	:	Separate free standing WET PANEL/RACK and separate free standing DRY PANEL as per variant table
(2)	Dry Panel ingress protection	:	IP-54 to weather proof
(3)	Panel Design	:	Shall be designed for ready access of components for ease of maintenance
(4)	Panel Supports	:	panels shall be furnished with 100 mm base angle for bolting to 100 mm high concrete curb
(5)	Removable gland plate at bottom	:	Required
(6)	Cable entry	:	From Bottom/Top – will be finalized during order execution
(7)	Sample line & Cooling water lines	:	Entry from left side of wet panel
(8)	Earthing Bus bar	:	Copper, flat strip
(9)	Terminal blocks	:	2.5 sq.mm. screw type
(10)	Cooling fan	:	Required for Dry panel at top
(11)	Lifting lugs	:	SS (without paint) at panel top
(12)	Cable routing	:	Through PVC channels. Analog and digital signals shall be routed separately.
(13)	Sample line routing	:	Through Aluminum trays
(14)	Local junction box mounted inside Dry panel	:	Required. All analog and digital signals from all analyzers shall be terminated in separate junction box.
(15)	Cables	:	1) All Cables between SWAS panels & purchaser DCS - By BHEL 2) All other internal cables inside SWAS panels – By vendor
(16)	Cable glands [Nickel plated brass] & SS 304 dummy plugs [supply by vendor for purchaser's use]	:	1) Suitable for cable OD 23mm – 8 No's glands + 8 No's plugs 2) Suitable for cable OD 18mm – 12 No's glands + 12 No's plugs 3) Suitable for cable OD 13mm – 15 No's glands + 15 No's plugs
(17)	Panel/rack dimensions	:	<u>For Dry Panel:</u> 1) Up to 3 analyzers : 400 x 800 x 2100 mm 2) For every addition of 3 analyzers: 200 mm width to be added <u>For Wet Panel:</u> 1) Up to 3 analyzers : 400 x 800 x 2100 mm 2) For every additional analyzer: 300 mm width to be added
(18)	Wet rack/panel & Dry panel charges	:	Shall be included in Sample handling system unit rates

21. DATA SHEET for pH Sensor & Transmitter

S.No.	Requirement for	:	PH analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Make	:	Rosemount/ABB/Yokogawa/E&H/HACH/EMERSON
(3)	Range	:	0 to 14 pH
(4)	Sensor Type	:	Differential Electrode with automatic flushing arrangement
(5)	Flow through chamber material	:	SS 316
(6)	Sensor & Electrode material	:	Glass
(7)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000
(8)	Sensor calibration	:	Single/dual point calibration with buffer solution
(9)	Sensor response time	:	90% in 60 seconds or better at 25 Deg C
(10)	Power supply to sensor	:	Loop powered from transmitter
(11)	Sensor process connection	:	Vendor to select
(12)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(13)	Type	:	Microprocessor based Electronics
(14)	Measuring range	:	Suitable for sensor full range
(15)	Transmitter mounting	:	Panel flush mounting & 2" pipe mounting(for online retractable analyser)
(16)	Power supply	:	Suitable for available power supply rating mentioned in this specification
(17)	Transmitter no of channels	:	Vendor to select
(18)	Transmitter output	:	As per variant table; transmitter OUTPUT shall be independent for each analyzer
(19)	Alarm relay outputs	:	Min 2 No's, 24 V DC, 5A resistive for each parameter
(20)	Transmitter accuracy	:	± 0.5% of span or better
(21)	Linearity	:	± 1% of span or better

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(22)	Local Display on panel	:	Required for each analyzer for indicating measured value, engg unit & alarms.
(23)	Configuration facility	:	Required for calibration, alarm & instrument configuration
(24)	Transmitter Enclosure material	:	Epoxy painted metallic or Polycarbonate
(25)	Housing Ingress protection	:	Minimum IP54 for indoor installation & Minimum IP65 for outdoor installation
(26)	Diagnostic features	:	Required
(27)	Process data	:	As per SHS material code
(28)	Sample handling system	:	Required as per DWG-1 & SHS material code
(29)	Interface & scope of supply	:	Refer DWG-1 & DWG-2.

22. DATA SHEET for Conductivity Sensor & Transmitter (Specific/ Cat-ion/ Degassed Cat-ion)

S.No.	Requirement for	:	Conductivity analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Make	:	Rosemount/ABB/Yokogawa/E&H/HACH/EMERSON
(3)	Range	:	As per variant table
(4)	Sensor Type	:	Flow through type automatic flushing arrangement
(5)	Flow through chamber material	:	SS 316
(6)	Sensor & Electrode material	:	SS 316 or better
(7)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000
(8)	Sensor calibration	:	Single/dual point calibration with buffer solution
(9)	Sensor response time	:	90% in 60 seconds or better at 25 Deg C
(10)	Power supply to sensor	:	Loop powered from transmitter
(11)	Sensor process connection	:	Vendor to select
(12)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(13)	Type	:	Microprocessor based Electronics
(14)	Measuring range	:	Suitable for sensor full range
(15)	Transmitter mounting	:	Panel flush mounting & 2" pipe mounting(for online retractable analyser)
(16)	Power supply	:	Suitable for available power supply rating mentioned in this specification
(17)	Transmitter no of channels	:	Vendor to select
(18)	Transmitter output	:	As per variant table; transmitter OUTPUT shall be independent for each analyzer
(19)	Alarm relay outputs	:	Min 2 No's, 24 V DC, 5A resistive for each parameter
(20)	Transmitter accuracy	:	$\pm 0.5\%$ of span or better
(21)	Linearity	:	$\pm 1\%$ of span or better
(22)	Local Display on panel	:	Required for each analyser for indicating measured value, engg unit & alarms.
(23)	Configuration facility	:	Required for calibration, alarm & instrument configuration
(24)	Transmitter Enclosure material	:	Epoxy painted metallic or Polycarbonate
(25)	Housing Ingress protection	:	Minimum IP54 for indoor installation & Minimum IP65 for outdoor installation
(26)	Diagnostic features	:	Required
(27)	Process data	:	As per SHS material code
(28)	Sample handling system	:	Required as per DWG-1 & SHS material code
(29)	Interface & scope of supply	:	Refer DWG-1 & DWG-2.

23. DATA SHEET for DO2 Sensor & Transmitter

S.No.	Requirement for	:	Dissolved Oxygen analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Make	:	Rosemount/ABB/Yokogawa/Chemtrol
(3)	Range	:	As per variant table;
(4)	Sensor Type	:	Flow through type automatic flushing arrangement
(5)	Flow through chamber material	:	SS 316
(6)	Sensor & Electrode material	:	Noryl/PTFE & Gold or silver cathode
(7)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000

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Form No.

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HYDERABAD

PRODUCT STANDARD

PROJECT ENGINEERING & SYSTEMS DIVISION

HYDERABAD

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(8)	Sensor calibration	:	Single/dual point calibration with buffer solution
(9)	Sensor response time	:	90% in 60 seconds or better at 25 Deg C
(10)	Power supply to sensor	:	Loop powered from transmitter
(11)	Sensor process connection	:	Vendor to select
(12)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(13)	Type	:	Microprocessor based Electronics
(14)	Measuring range	:	Suitable for sensor full range
(15)	Transmitter mounting	:	Panel flush mounting
(16)	Power supply	:	Suitable for available power supply rating mentioned in this specification
(17)	Transmitter no of channels	:	Vendor to select
(18)	Transmitter output	:	As per variant table; transmitter OUTPUT shall be independent for each analyzer
(19)	Alarm relay outputs	:	Min 2 No's, 24 V DC, 5A resistive for each parameter
(20)	Transmitter accuracy	:	± 0.5% of span or better
(21)	Linearity	:	± 1% of span or better
(22)	Local Display on panel	:	Required for each analyser for indicating measured value, engg unit & alarms.
(23)	Configuration facility	:	Required for calibration, alarm & instrument configuration
(24)	Transmitter Enclosure material	:	Epoxy painted metallic or Polycarbonate
(25)	Housing Ingress protection	:	Minimum IP54 for indoor installation & Minimum IP65 for outdoor installation
(26)	Diagnostic features	:	Required
(27)	Process data	:	As per SHS material code
(28)	Sample handling system	:	Required as per DWG-1 & SHS material code
(29)	Interface & scope of supply	:	Refer DWG-1 & DWG-2.

24. DATA SHEET for SILICA ANALYSER

S.No.	Requirement for	:	Silica Analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Make	:	HACH/Emerson/E&H GmBH/Yokogwa
(3)	Range	:	As per variant table;
(4)	Sensor Type	:	As per vendor standard
(5)	Flow through chamber material	:	As per vendor standard
(6)	Sensor & Electrode material	:	As per vendor standard
(7)	Automatic temp. compensation	:	As per vendor standard
(8)	Sensor calibration	:	Single/dual point calibration with std. solution
(9)	Sensor response time	:	As per vendor standard
(10)	Power supply to sensor	:	Loop powered from transmitter
(11)	Sensor process connection	:	Vendor to select
(12)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(13)	Type	:	Microprocessor based Electronics
(14)	Measuring range	:	Suitable for sensor full range
(15)	Transmitter mounting	:	Panel flush mounting
(16)	Power supply	:	Suitable for available power supply rating mentioned in this specification
(17)	Transmitter no of channels	:	Dual channel
(18)	Transmitter output	:	As per variant table; transmitter OUTPUT shall be independent for each analyzer
(19)	Alarm relay outputs	:	Min 2 No's, 24 V DC, 5A resistive for each parameter
(20)	Transmitter accuracy	:	As per vendor standard
(21)	Linearity	:	As per vendor standard
(22)	Local Display on panel	:	Required for each analyser for indicating measured value, engg unit & alarms.
(23)	Configuration facility	:	Required for calibration, alarm & instrument configuration
(24)	Transmitter Enclosure material	:	Epoxy painted metallic or Polycarbonate
(25)	Housing Ingress protection	:	Minimum IP54 for indoor installation & Minimum IP65 for outdoor installation

(26)	Diagnostic features	:	Required
(27)	Process data	:	As per SHS material code
(28)	Sample handling system	:	Required as per DWG-1 & SHS material code
(29)	Interface & scope of supply	:	Refer DWG-1 & DWG-2.

25. DATA SHEET for SODUM ANALSYER

S.No.	Requirement for	:	analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Make	:	ABB/ Yokogawa/ Emerson/ Forbes Marshall
(3)	Range	:	As per variant table;
(4)	Sensor Type	:	As per vendor standard
(5)	Flow through chamber material	:	As per vendor standard
(6)	Sensor & Electrode material	:	As per vendor standard
(7)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000
(8)	Sensor calibration	:	Single/dual point calibration with buffer solution
(9)	Sensor response time	:	As per vendor standard
(10)	Power supply to sensor	:	Loop powered from transmitter
(11)	Sensor process connection	:	Vendor to select
(12)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(13)	Type	:	Microprocessor based Electronics
(14)	Measuring range	:	Suitable for sensor full range
(15)	Transmitter mounting	:	Panel flush mounting
(16)	Power supply	:	Suitable for available power supply rating mentioned in this specification
(17)	Transmitter no of channels	:	3 (Three)
(18)	Transmitter output	:	As per variant table; transmitter OUTPUT shall be independent for each analyzer
(19)	Alarm relay outputs	:	Min 2 No's, 24 V DC, 5A resistive for each parameter
(20)	Transmitter accuracy	:	As per vendor standard
(21)	Linearity	:	As per vendor standard
(22)	Local Display on panel	:	Required for each analyser for indicating measured value, engg unit & alarms.
(23)	Configuration facility	:	Required for calibration, alarm & instrument configuration
(24)	Transmitter Enclosure material	:	Epoxy painted metallic or Polycarbonate
(25)	Housing Ingress protection	:	Minimum IP54 for indoor installation & Minimum IP65 for outdoor installation
(26)	Diagnostic features	:	Required
(27)	Process data	:	As per SHS material code
(28)	Sample handling system	:	Required as per DWG-1 & SHS material code
(29)	Interface & scope of supply	:	Refer DWG-1 & DWG-2.

26. DATA SHEET for HC ANALYSYER

S.No.	Requirement for	:	analyzer
(1)	Service	:	Liquid (as per SHS material code)
(2)	Range	:	As per variant table;
(3)	Sensor Type	:	As per vendor standard
(4)	Flow through chamber material	:	As per vendor standard
(5)	Sensor & Electrode material	:	As per vendor standard
(6)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000
(7)	Sensor calibration	:	Single/dual point calibration with buffer solution
(8)	Sensor response time	:	As per vendor standard
(9)	Power supply to sensor	:	Loop powered from transmitter
(10)	Sensor process connection	:	Vendor to select
(11)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]

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(1)	Service	:	Liquid (as per SHS material code)
(2)	Range	:	As per variant table;
(3)	Sensor Type	:	As per vendor standard
(4)	Flow through chamber material	:	As per vendor standard
(5)	Sensor & Electrode material	:	As per vendor standard
(6)	Automatic temp. compensation	:	Required, in built RTD, PT-100/PT1000
(7)	Sensor calibration	:	Single/dual point calibration with buffer solution
(8)	Sensor response time	:	As per vendor standard
(9)	Power supply to sensor	:	Loop powered from transmitter
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(11)	Sensor cable length	:	As per DWG-2 [suitable hardware/software to be provided to meet the requirement]
(12)	Type	:	Microprocessor based Electronics
(13)	Measuring range	:	Suitable for sensor full range
(14)	Transmitter mounting	:	Panel flush mounting
(15)	Power supply	:	Suitable for available power supply rating mentioned in this specification
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DEVIATION FORMAT

Enquiry No.: _____

Item: _____

Name of Bidder: _____

Offer Ref. No.: _____

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

NOTES:

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

COMPANY SEAL

SIGNATURE OF THE BIDDER_____

NAME_____

DESIGNATION_____

DATE_____

Ref. Doc

TD-106-3 Rev.No. 5 Form No.		बी एच ई एल  HYDERABAD PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 56144 Rev No. 00 Page 18 of 18		
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		Rev. No.	Date	Revision Details	Revised By	Approved By
		00	14.07.2015	Original issue	-----	Kamal 
		Ref. Doc.				



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEM S DIVISION
HYDERABAD

ANNEXURE-1 OF PY56144

REV 00

Page 1 of 3

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BHEL ENQUIRY NO :

Vendor Offer ref no:

Project ::

Date of vendor offer:

PRICE SCHEDULE FOR SW AS SYSTEM :: Common Notes

SN	NOTES ::
1	This document details the price schedule format for the enquiry. No other format will be entertained.
2	Duly signed & stamped un-priced price schedule format shall be submitted by vendor as a token of his concurrence that his price schedule would be submitted in this format.
3	Vendor shall fill up prices of various items and submit to BHEL in separate sealed cover. All prices shall be submitted as ex works. Applicable taxes and duties shall be indicated separately in commercial offer.
4	The format contains following sections apart from this page ::
4.a	Main Equipment Price format
4.b	Mandatory spares for Main Equipment
5	Main equipment details are as per BHEL enquiry specs forwarded to vendors by BHEL.
6	For addition/reduction/deletion of quantity, unit rate quoted in the present offer shall be considered and shall be valid up to execution of the contract to the extent of $\pm 10\%$ of order Value.
7	The total Erection & Commissioning charges should be minimum 10% of the total quoted price of the supply package excluding taxes and duties, failing which break up of prices shall be adjusted accordingly for evaluation & ordering
8	Supervision of Erection & Commissioning services shall be ordered by BHEL Site at the time of commissioning. Hence prices quoted for services shall be valid for minimum 3 years or 18 months from date supply, whichever is earlier.
9	For the purpose of tender evaluation, quantities as applicable on the date of issue of this price schedule format for main equipment & spares shall be considered.
10	Components/Items/spares shall be identical to the main eqpt.
11	Tender evaluation priority shall be the total aggregate price of main equipment (including accessories & services) & spares. Quantities would be as applicable on the date of issue of this price schedule format.

Signature of bidder
Date:

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD				ANNEXURE-1 OF PY 56144									
						REV. 00									
						Page 2 of 3									
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.								BHEL ENQUIRY NO :		Vendor Offer ref no:					
								Project ::		Date of vendor offer:					
								PRICE SCHEDULE FOR SWAS SYSTEM							
								S. No	MATERIAL CODE	ITEM	QTY	UNIT RATE (Rs)	TOTAL PRICE (Rs)	Remarks	
								(A)	SWAS SYSTEM – SUPPLY, DESIGN, ENGINEERING, TESTING						
								(1)	As per enquiry	As per enquiry	As per enquiry				
									MAIN EQUIPEMENT TOTAL PRICE [in Rs.] (SUB-TOTAL-[A])=						
(B)	Operational and maintenance TRAINING for SWAS system for 3 man-days at Manufacturer's works [Optional offer]		1 set			Total shall be minimum 1% of SUB-TOTAL-[A]									
(C)	Supervision of Erection & Commissioning [Refer cl. 13 of PY 56022] [Unit rate for 1 Set = 1 visit of 2 days]		8 sets			Note-(9) & (10)									
(D)	SWAS SYSTEM – Mandatory Spares														
(1)	As per enquiry	Specific Conductivity Sensor	1 No's												
(2)		Specific Conductivity Transmitter (4-20mA + HART)	1 No's												
(3)		Cat – ion conductivity sensor with 2 cat-ion exchange columns	1 No's												
(4)		Cat – ion conductivity transmitter (4-20mA + HART)	1 No's												
(5)		pH Sensor	1 No's												
(6)		pH transmitter (4-20mA + HART)	1 No's												
(7)		Do2 sensor	1 No's												
(8)		Do2 Transmitter (4-20mA + HART)	1 No's												
(9)		Silica analyser + transmitter (4-20mA) (2 streams per analyser)	1 No's												
(10)		Sodium analyser + transmitter (4-20mA) (3 streams per analyser)	1 No's												
(11)		Conductivity analyzer (online Retractable type) (4-20mA + HART)	1 No's												
(12)		pH analyzer (online Retractable type) (4-20mA + HART)	1 No's												
(13)		SHS items (1 set)	1 Set												
	Mandatory Spares TOTAL PRICE [in Rs.] (SUB-TOTAL-[D])=														
	Total Price (sub-total-[A] + [C] + sub-total-[D]) =														

Note: S.No. (A), (C) & (D) will be considered for L1 evaluation

Signature of bidder
Date:

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Ref. Doc

TD-106-3 Rev No. 5 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE-1 OF PY 56144		
				Rev No. 00		
				Page 3 of 3		
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		Rev. No.	Date	Revision Details	Revised By	Approved By
		00	15.07.15	Original issue	-----	Kamal
		Ref. Doc.				

Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 56142																																																																																																										
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				Page 23 of 25																																																																																																										
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SL.NO	Drg./ Doc. Name	Drg./Doc.		Cat	DATE OF SUBMISSION	Remarks
		Number	No. of SHEETS	A/I		
A.	MECHANICAL					
I. GENERAL						
1	DESIGN BASIS REPORT				ONE WEEK FROM PO	
2	PIPING AND INSTRUMENTATION DRAWING FOR DM PLANT				ONE WEEK FROM PO	
	P & I DIAGRAM FOR SIDE STREAM FILTER				ONE WEEK FROM PO	
	PIPING LAYOUT OF DM PLANT				TWO WEEKS FROM PO	
	PIPING LAYOUT FOR SIDE STREAM FILTER				TWO WEEKS FROM PO	
	EQUIPMENT LAYOUT OF MB UNIT				TWO WEEKS FROM PO	
	EQUIPMENT LAYOUT OF SSF				ONE WEEK FROM PO	
3	INSPECTION CATEGORIZATION PLAN				ONE WEEK FROM PO	
4	BILL OF MATERIALS & SUB VENDOR LIST				TWO WEEKS FROM PO	
5	CALCULATION FOR CHEMICAL REQUIREMENT				TWO WEEKS FROM PO	
6	VALVE LIST				TWO WEEKS FROM PO	
7	EQUIPMENT FOUNDATION INPUT DRAWINGS (INCLUDING SSF)				THREE WEEKS FROM PO	
8	2Yrs of Recommended SPARE LIST				THREE WEEKS FROM PO	
9	OPERATION & CONTROL PHILOSOPHY				THREE WEEKS FROM PO	
10	OPERATION & MAINTAINENCE MANUAL				FOUR WEEKS FROM PO	
11	LIST OF CONSUMABLES(Chemicals, Lubricants, Oils for Instruments, etc)				THREE WEEKS FROM PO	
12	PROCEDURE FOR PERFORMANCE AND GUARANTEE TEST RUN				THREE WEEKS FROM PO	
II. GENERAL ARRANGEMENT DRAWINGS						
1	GA DRAWING FOR MB VESSEL				ONE WEEK FROM PO	
2	GA DRAWING FOR CAUSTIC MEASURING TANK(MB)				ONE WEEK FROM PO	
3	GA DRAWING FOR ACID MEASURING TANK(MB)				ONE WEEK FROM PO	
4	GA DRAWING FOR SIDE STREAM FILTER				ONE WEEK FROM PO	
5	GA DRAWING FOR AIR SCORING BLOWERS				TWO WEEKS FROM PO	
6	GA DRAWING FOR BACKWASH PUMPS				TWO WEEKS FROM PO	

	GA DRG OF SERVICE AND POTABLE WATER TANK				TWO WEEKS FROM PO	
7	AS BUILT DRAWINGS					
III. DATA SHEETS						
1	DATA SHEET OF SSF				ONE WEEK FROM PO	
2	DATA SHEETS FOR TANKS & VESSELS				ONE WEEK FROM PO	
3	DATA SHEETS & GA FOR REGENERATION PUMPS				TWO WEEKS FROM PO	
4	DATA SHEETS & GA FOR MB BLOWER				TWO WEEKS FROM PO	
5	DATA SHEETS & GA FOR EJECTORS				TWO WEEKS FROM PO	
6	DATA SHEET & GAD FOR VALVES				TWO WEEKS FROM PO	
7	TECHNICAL DATASHEET FOR SIDE STREAM FILTER				ONE WEEK FROM PO	
8	TECHNICAL DATASHEET FOR AIR SCOURING BLOWERS				ONE WEEK FROM PO	
	DATA SHEET AND GA DRG. OF SAFETY SHOWER & EYE WASH				TWO WEEKS FROM PO	
B. INSTRUMENTATION						
1	DATA SHEET FOR LEVEL SWITCH				THREE WEEKS FROM PO	
2	DATA SHEET FOR LEVEL INDICATOR				THREE WEEKS FROM PO	
3	DATA SHEET FOR DIFFERENTIAL PRESSURE SWITCH				THREE WEEKS FROM PO	
4	DATA SHEET FOR PRESSURE GAUGES				THREE WEEKS FROM PO	
5	DATA SHEET FOR PRESSURE SWITCH				THREE WEEKS FROM PO	
6	DATA SHEET FOR FLOW INDICATORS				THREE WEEKS FROM PO	
7	DATA SHEET FOR PH ANALYZER				THREE WEEKS FROM PO	
8	DATA SHEET FOR CONDUCTIVITY ANALYZER				THREE WEEKS FROM PO	
9	DATA SHEET FOR SILICA ANALYZER				THREE WEEKS FROM PO	
C. ELECTRICAL						
1	ELECTRICAL LOAD LIST				ONE WEEK FROM PO	
2	SINGLE LINE DIAGRAM FOR MCC PANEL				ONE WEEK FROM PO	
3	GA DRAWING FOR MCC PANEL				THREE WEEKS FROM PO	
4	DATA SHEET FOR LOCAL PUSH BUTTON				TWO WEEKS FROM PO	
D. MISC.						
1	Billing Break-Up				TWO WEEKS FROM PO	

CHECK LIST FOR CHEMICAL DOSING SKID OFFER

Note: Bidder to note that Check List shall be completely filled and the data required in-line with Check List shall be submitted along with their Offer to enable Purchaser to evaluate the offer submitted.

<u>S.No.</u>	<u>Description</u>	Enclosed or [Yes/No]	Remarks/Comments By Bidder
	Bidder to confirm compliance with PEMC-06165 and its annexure (Including P&IDs for Mixed bed and associated system & CW system for SSF unit) without any deviations.		
	Bidder has already raised pre-bid queries (if any) on Purchase specification.		
	Bidder to Confirm Compliance with scope, terminal points and exclusions for Mechanical/Electrical/C&I Sub-Sections of Purchase Specification.		
	Bidder Shall submit completely filled following Annexures enclosed with Technical Purchase Specification PY 51199, Rev00 along with their offer Annexure-I: Key Information Annexure-II: List of Recommended Spare Parts Annexure-III: Special Tools and Tackles Annexure-IV: Commissioning spares Annexure-V: Deviation from specification		
	Bidder to comply compliance with list of sub-vendor indicated in Job Specification for Chemical Dosing System, Doc. No. PEMC-06165.		
	Tentative Electrical Load List is enclosed with offer.		
	Bidder shall furnish the list of Erection and commissioning spares along with their offer.		
	Bidder to fill Deviation list (Refer Annexure-IV of PY 51199). Only those deviation indicated in this list will be considered during technical evaluation of offer. Bidder to indicate the deviations which are impractical.		
	All other requirements except for the deviation brought out under deviation list, have been taken into consideration.		
	Bidder to Confirm Compliance with Typical QAP enclosed with purchase specification PEMC-06165		

Typical Quality Plan for Mixed Bed and SSF Units

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
									D	P	W	V	
1 STORAGE VESSELS & PIPINGS													
A	RAW MATERIALS & BROUGHT OUT ITEMS.												
1.1	Plate	Material	Major	1 per heat	100%	Approved Drawing& Mtc	Approved Drawing& Mtc	Material identification report	v	3	2	1	
1.2	Piping Materials,identification, Material certification review &material traceability	Physcial,chemical & visual	MAJOR	Visual / MTC review	100%	Approved Drawing, ASME Code & PO Spec	Approved Drawing, ASME Code & PO Spec	Material identification report	v	3	2	1	
1.3	Rubber sheet	Material	Major	Random	100%	Approved Drawing& Mtc	Approved Drawing& Mtc / Is 4682	Material identification report	v	3	2	1	if applicable
B	IN PROCESS INSPECTION												
1.4	Welding procedure tanks & vessels	Welding properties	Major	Visual/ Measurement	100%	Approved WPS	As per Sec - IX	WPS,WPQ & PQR	v	3	2	1	
1.5	Dimensional & welding	Fit up check & weld	Major	Visual/ Measurement	100%	Approved Drawing	Approved Drawing	Fit up report	v	3	2	1	
1.6	Fabrications of Piping as per the Drawing	Fitt-Upps,Visual& Alignments	MAJOR	Visual /Dimensional	100%	Approved Drawing, ASME Code & PO Spec	Approved Drawing, ASME Code & PO Spec	Inspection report	v	3	2	1	

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
									D	P	W	V	
C	FINAL INSPECTION & TESTING												
1.8	Hydro test & Nozzle pad leak test	Check the joint leakage & pressure drops. (Hydro test before & after lining)	Major	Visual	100%	APPROVED DRAWINGS	APPROVED DRAWINGS / ASME SEC- VIII	HYDRO TEST REPORT	v	3	1	1	
1.9	Rubber lining	Thickness bonding & Shore Hard ness	Major	Spark test ,Hardness test & Visual	100%	APPROVED DRAWINGS	IS - 4682	TEST REPORT	v	3	2	1	
1.10	PAINTING	DRY FLIM THICKNESS	Major	Visual / Measurement	100%	APPROVED DRAWINGS	BS - 4232	TEST REPORT	v	3	2	1	
D	PRESERVATIONS & PACKING												
1.11	PACKING	LEGIBILITY & COMPLETENESS	MAJOR	VISUAL	100%	AS PER THE VENDOR PROCEDURE	AS PER THE VENDOR PROCEDURE	-	v	3	2		
2 MOTORS & PUMPS													
A	RAW MATERIALS & BROUGHT OUT ITEMS.												
2.1	CASING, IMPELLER & WEAR RING	MATERIAL	MAJOR	MECHANICAL TEST, CHEMICAL ANALYSIS	1 PER HEAT	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	COMPLIANCE REPORT		3	2	1	
2.2	SHAFT & SLEEVES	MATERIAL	MAJOR	MECHANICAL TEST, CHEMICAL ANALYSIS	1 PER HEAT	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	COMPLIANCE REPORT		3	2	1	
B	IN PROCESS INSPECTION												
2.3	DYNAMIC BALANCING OF IMPELLER	DYNAMIC BALANCING	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	v	3	2	1	
2.4	HYDRO TEST	CASING & STUFFING BOX	MAJOR	HYDRO TEST	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	v	3	2	1	
2.5	MOTOR	TYPE TEST, ROUTINE TEST	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	v	3	2	1	

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS	
									D	P	W	V		
C	FINAL INSPECTION & TESTING													
2.6	PUMP NOZZLE, FLANGE CENTRE DISTANCE	VISUAL & DIMENSION	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	✓	3	2	1		
2.7	FINAL ASSEMBLY ALONG WITH ALL ACCESSORIES	PERFORMANCE TEST ALONG WITH JOB MOTOR, NOISE LEVEL ,VIBRATION CHECK & IP CERTIFICATE	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION REPORT	✓	3	2	1		
D	PAINTING													
2.8	PAINTING	SURFACE FINISH & UNIFORMITY	MAJOR	VISUAL	100%	APPROVED DRAWINGS	AS PER THE DATE SHEET	INSPECTION REPORT		3	2	1		
E	PRESERVATIONS & PACKING													
2.9	PACKING	LEGIBILITY & COMPLETENESS	MAJOR	VISUAL	100%	AS PER THE VENDOR PROCEDURE	AS PER THE VENDOR PROCEDURE	-		3	2			
3 BLOWERS														
A	RAW MATERIALS & BROUGHT OUT ITEMS.													
3	CASING, COVER / ST. BOX / BOTTOM BRG. HSG. IMPELLER	MATERIAL	MAJOR	MECHANICAL TEST, CHEMICAL ANALYSIS	1 PER HEAT	APPROVED DRAWING / DATA SHEET	APPROVED DRAWING / DATA SHEET	TEST REPORT	✓	3	2	1		
3.1	SHAFT & SLEEVES	MATERIAL	MAJOR	MECHANICAL TEST, CHEMICAL ANALYSIS	1 PER HEAT	APPROVED DRAWING / DATA SHEET	APPROVED DRAWING / DATA SHEET	TEST REPORT	✓	3	2	1		
3.2	IMPELLER	MATERIAL	MAJOR	MECHANICAL TEST, CHEMICAL ANALYSIS	RANDOM	APPROVED DRAWING / DATA SHEET	APPROVED DRAWING / DATA SHEET	TEST REPORT	✓	3	2	1		
B	IN PROCESS INSPECTION													
3.3	IMPELLER	DYNAMIC BALANCING	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	✓	3	2	1		
3.4	MOTOR	TYPE TEST, ROUTINE TEST	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	✓	3	2	1		

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
									D	P	W	V	
3.5	BLOWERS	STATIC BALANCING	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET AND SPEC.	APPROVED DATA SHEET & SPECIFICATION	VENDOR TEST REPORT	V	3	2	1	
C FINAL INSPECTION & TESTING													
3.7	FINAL ASSEMBLY ALONG WITH ALL ACCESSORIES	OVERALL DIMENSIONS ALONG WITH JOB MOTOR	MAJOR	MEASUREMENT - VISUAL INSPECTION, VERIFICATION OF ACCESSORIES & PERFORMANCE TEST	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION REPORT	V	3	2	1	
4 VALVES													
A RAW MATERIALS & BROUGHT OUT ITEMS.													
4.1	C.S & S.S BODY COVER, body disc, shaft, rubber seal, stem & ball	CHEMICAL & PHYSICAL PROPERTIES	MAJOR	PHYSICAL	100%	AS PER DWG	AS PER DWG / STANDARDS	TEST REPORT & INSPECTION REPORT	V	3	2	1	FOR ALL APPLICABLE VALVES
B IN PROCESS INSPECTION													
4.2	MACHINING OF BODY, BONNET, COMPRESSOR & STEM	DIMENSIONS & SURFACE QUALITY AFTER FINAL ASSEMBLY	MAJOR	VISUAL / MEASUREMENT	100%	AS PER DWG	AS PER DWG / STANDARDS		V	3	2	1	FOR ALL APPLICABLE VALVES
C FINAL INSPECTION & TESTING													
4.3	FINAL ASSEMBLY	DIMENSIONS, SURFACE DEFECTS, HYDRO SHELL TEST, HYDRO SEAT TEST, PNEU. SEAT TEST, HARDNESS, SPARK TEST & PERFORMANCE TEST	MAJOR	DIMENSIONAL, PRESSURE TESTING & PHYSICAL	10%	AS PER DWG / VALVE SCHEDULE	AS PER DWG / STANDARDS	HYDRO TEST REPORT	V	3	2	1	FOR ALL APPLICABLE VALVES

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
									D	P	W	V	
5 INSTRUMENTS													
A	RAW MATERIAL INSPECTION & FINAL ASSEMBLY												
5.1	MATERIALS	CHEMICAL & PHYSICAL PROPERTIES	MAJOR	CHEMICAL & MECHANICAL ANALYSIS	SAMPLE	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	VENDOR REPORT	√	3	2	1	
B	IN PROCESS INSPECTION												
5.2	DIMENSIONS	CHECK FOR DIMENSIONS	MAJOR	VISUAL	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION / CALIBRATION REPORT	√	3	2	1	
5.3	CHECK RANGE	LOWER & HIGHER RANGE	MAJOR	VISUAL	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION / CALIBRATION REPORT	√	3	2	1	
5.4	IP CHECK	CHECK FOR INSULATION PROTECTION CLASS	MAJOR	VISUAL	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION / CALIBRATION REPORT	√	3	2	1	
B	FINAL INSPECTION & TESTING												
5.2	FINAL ASSEMBLY & FUNCTIONAL TEST	CALIBRATION , OPERATION & PERFORMANCE TEST, HYDROTEST	MAJOR	VISUAL & MEASUREMENT	100%	APPROVED DATA SHEET/DRAWING AND SPEC.	APPROVED DATA SHEET/DRAWING AND SPEC.	INSPECTION / CALIBRATION REPORT	√	3	2	1	
6 ELECTRICALS													
A	RAW MATERIAL INSPECTION & FINAL ASSEMBLY												
6.1	CABLES, CABLE TRAY, CABLE GLAND & LUGS	CHEMICAL & PHYSICAL PROPERTIES	MAJOR	CHEMICAL & MECHANICAL ANALYSIS	SAMPLE	AS PER VENDOR SPECIFICATION	AS PER VENDOR SPECIFICATION	VENDOR REPORT	√	3	2	1	
6.2	INSTRUMENTS & ELECTRICAL HARDWARE	CHEMICAL & PHYSICAL PROPERTIES	MAJOR	CHEMICAL & MECHANICAL ANALYSIS	SAMPLE	AS PER GA DWG	AS PER GA DWG	VENDOR REPORT	√	3	2	1	
B	IN PROCESS INSPECTION												
6.3	DIMENSIONS	CHECK THE DIMENSIONS FOR PANEL, JUNCTION BOX	MAJOR	VISUAL & MEASUREMENT	100%	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	√	3	2	1	
6.4	ELECTRICAL CHARACTERISTICS	WIRING CONTINUITY, INSULATION CLASS, H. V	MAJOR	VISUAL	100%	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	√	3	2	1	
6.5	INSULATION CLASS	WEATHER PROOF & INSULATION PROTECTION CLASS	MAJOR	VISUAL	100%	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	√	3	2	1	

SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS	
									D	P	W	V		
B	FINAL INSPECTION & TESTING													
6.3	CONDUCTOR RESISTANT TEST & H.V TEST	FUNCTIONAL REQUIRMENT	MAJOR	FUNCTIONAL TEST	10%	AS PER VENDOR SPECIFICATION	AS PER VENDOR SPECIFICATION	VENDOR REPORT	v	3	2	1	ONLY FOR CABELS	
6.4	FINAL ASSEMBLY	TERMINATION OF ALL CONNECCCTIONS , ALIGNMENT	MAJOR	VISUAL & MEASUREMENT	SAMPLE	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	v	3	2	1		
C	PRESERVATIONS & PACKING													
6.5	PACKING	PROPER PACKING	MAJOR	VISUAL	RANDOM	PACKING LIST	AS PER THE VENDOR PROCEDURE	-	v	3	2	2		
7	MISC ITEMS (MEDIAS, RESINS, SAND & PEBBLES)													
7.1	INDIVIDUAL PRODUCT	CHEMICAL & PHYSICAL PROPERTIES	MAJOR	COMPLETENESS	100%	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	v	3	2	1		
8	FINAL ASSEMBLY OF SKID MOUNTED DM PLANT													
8.1	FINAL INSPECTION OF SKID	VISUAL INSPECTION AS PER P & ID & BOM , Painting Check, Dimensional	MAJOR	COMPLETENESS	100%	AS PER APPROVED DRAWING	AS PER APPROVED DRAWING	GET INSPECTION REPORT	v	3	1	1		
9	PACKING													
891	PACKING	PROPER PACKING	MAJOR	VISUAL	RANDOM	PACKING LIST	AS PER THE VENDOR PROCEDURE	PACKING LIST	v	3	2	2		
1.1	Safety Shower	Physical & Dimensional verification	Major	Visual	100%	Approved Data Sheet	Approved Data Sheet	MTC / Compliance certificate	v	3	2	1		

1.9	Mandatory Spares	Physical & Chemical Properties	Major	Visual	100%	Approved Drawing& Mtc	Approved Drawing& Mtc	Compliance certificate	v	3	2	1	
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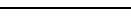
PRODUCT : AGITATORS													
SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
									D	P	W	V	
1	RAW MATERIALS & BROUGHT OUT ITEMS.												
1.1	Materials	Physical & Chemical Properties	Major	Visual	100%	Approved Drawing& Mtc	Approved Drawing& Mtc	MTC	v	3	2	1	
2	IN PROCESS INSPECTION												
2.1	Impeller & Shaft Machining	Visual & Dimensions	MAJOR	VISUAL & MEASUREMENT	100%	Approved Data sheet & Specification	Approved Data sheet & Specification	Inspection Report	v	3	2	1	
2.2	Motor	Routine test, type test	MAJOR	VISUAL & MEASUREMENT	100%	Approved Data sheet & Specification	Approved Data sheet & Specification	Inspection Report	v	3	2	1	
2.3	Impeller	Dynamic balancing and static balancing	MAJOR	VISUAL & MEASUREMENT	100%	Approved Data sheet & Specification	Approved Data sheet & Specification	Inspection Report	v	3	2	1	
3	FINAL INSPECTION & TESTING												
3.1	Assembled Agitators	Overall Performance	MAJOR	Performance Test with Job Motor	100%	Approved Data sheet & Specification	Approved Data sheet & Specification	Inspection Report	v	3	2,1	1	
3.2	Final Inspection	Overall dimensions,	Major	Visual	100%	Approved Data sheet & Specification	Approved Data sheet & Specification	Inspection Report	v	3	2,1	1	
4	PRESERVATION & PACKING												
4.2	Packing	Visual	Major	Visual	100%					3	2		

PRODUCT : EJECTORS														
SL.NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY				REMARKS
									D	P	W	V		
1	RAW MATERIALS & BROUGHT OUT ITEMS.													
1.1	Materials	Material	Major	Visual	100%	Approved Drawing & Mtc	Approved Drawing & Mtc	MTC	√	3	2	1	Compliance certificate for PP materials	
2	IN PROCESS INSPECTION													
2.1	Machining	Finished Machining dimensions	Major	Visual/ Measurement	100%	Approved Drawing	Approved Drawing	Inspection Report	√	3	2	1		
3	FINAL INSPECTION & TESTING													
3.1	Final Inspection & testing	Overall dimensions, functional test	Major	Visual	100%	Approved Drawing	Approved Drawing	Inspection Report	√	3	2,1	1	functional test will be done at site	
4	PRESERVATION & PACKING													
4.1	Packing	Visual	Major	Visual	100%					3	2			

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL / BHEL NOMINATED INSPECTION AGENCY) & 2 & 3 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. FOR ITEMS MARKED (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

Note :

1. Typical /Indicative /Standard QAP(s) for equipment /package attached is reference document and to use by successful bidder in future for preparation and submission of QAP for BHEL /CUSTOMER approval.
2. No deviation to reference document is acceptable.
3. Please note that this is not a scope document & Only the items applicable as per Engg. Specification shall be considered by bidder.
4. This MQP should be read along with specification (latest revision), approved drawings & approved data sheet.
5. Drawing/data sheet shall prevail over quality plan for contradiction if any between quality plan and drawing/specification.
6. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.

	Subject	Doc. No.	Rev.	Vol. / Sec.
	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	IV / 7
				Sheet No.
				899

1.6.0 PLANT WATER SYSTEM & CHEMICAL TREATMENT SYSTEMS

[illegible]

	Subject	Doc. No.	Rev.	Vol. / Sec.
	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	IV / 7
				Sheet No. 900

1.4.12	Quantity		
1.4.13	Material of construction		
1.6.0	Acid measuring tank		
1.6.1	Design standard		
1.6.2	Material of construction		
1.6.3	No. of tanks		
1.6.4	Fluid handled		
1.6.5	Capacity		
1.6.6	Accessories / instruments		
1.7.0	Caustic dilution tank		
1.7.1	Design standard		
1.7.2	Material of construction		
1.7.3	Nos.		
1.7.4	Fluid handled		
1.7.5	Capacity		
1.7.6	Accessories / instruments		
1.8.0	Agitators for caustic dilution tanks		
1.8.1	Quantity		
1.8.2	Type		
1.8.3	Material of construction		
1.8.4	Impeller / shaft		
1.8.5	Mounting		
1.8.6	Impeller type		
1.8.7	Transmission		
1.9.0	Ejectors		
1.9.1	Nature of fluid		
1.9.2	No. of ejectors		
1.9.3	Location		
1.9.4	Injection fluid		
1.9.5	Material of construction		

FORMT9-P REV-A (MUM)

	Subject	Doc. No.	Rev.	Vol. / Sec.
	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	IV / 7
				Sheet No. 901

1.4.0	SSF backwash water transfer pump		
1.4.1	No. of pumps	no.	
1.4.2	Design capacity of pumps	m ³ /hr.	
1.4.3	Head of the pumps	bar (g)	
1.4.4	Material of construction		
	i. Casing / impeller / shaft		
	ii. Base plate		
1.4.5	Shaft sealing arrangement		
1.4.6	Design temperature	Deg. C	

FORM T9-P REV-A (MUM)

Subject	Doc. No.	Rev.	Vol. / Sec.
BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	IV / 7
			Sheet No.
			902

1.6.2 CW Treatment

[illegible]

		TYPICAL PRESSURE RELIEF VALVE				Document No. : PEMC-0XXXX		Rev. 00	
General Data	1	Tag No.							
	2	Service							
	3	Line/Vessel No							
	4	Type of nozzle (Full/Semi)							
	5	Purpose of Valve (Safety/Relief)							
	6	Conventional/Bellow/Pilot operated							
	7	Bonnet Type (Open/Close)							
	8	Installation (On pipe/Vessel)							
	9	Service Type							
Fluid Data	10	Fluid	State						
	11	Required Discharge Capacity							
	12	Design Pressure	Design Temp.						
	13	Oper. Pressure	Set Pressure						
	14	Oper. Temp.	Relief Temp.						
	15	Constant Back Pressure							
	16	Max. Flow							
	17	Max. Pressure							
	18	Max. Temp.							
	19	Variable Back Pr	From	To					
	20	% Over Pressure (Allowable)							
	21	Compressibility Factor							
	22	Operating Viscosity							
	23	Blow Down Capacity							
End Conn.	24	Type (Flanged/Screwed/Welded)							
	25	Size & Rating	Inlet	Outlet					
	26	Flange Facing	Inlet	Outlet					
	27	Body & Bonnet							
Material	28	Seat & Disc							
	29	* Resilient Seat Seal							
	30	Nozzle							
	31	Guide & Spindle Rings							
	32	Spring							
	33	Bellows							
Options	34	Cap (Screwed / Bolted)							
	35	Lifting Lever (Plain / Packed)							
	36	Test Gag							
	37	Sizing Code							
	38	* Calc. Orifice Area	* Selected Area						
	39	*Model No.							
Test & Certificates	40	IBR Certificate Form IIIC							
	41	Material Certification							
	42	Radiography Test for Castings (Note-2)							
	43	Hydrostatic Test							
	44	Seat leakage, Set & Reset Pressure Test							
	45	Calibration							
	46	Visual & Dimensional Check							
	47	Type Test Certificate for IBR.							
	48	Molecular Weight							
	49	Hardness Test							

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

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

JCS

FIRST ANGLE PROJECTION

66*0-101-38101-06496

2 SH. OF

Bidder to note that the MOC of existing acid/alkali pipelines are CSRL.
Bidder to provide suitable end connecting flanges and counter flanges.

(ALL DIMENSIONS ARE IN mm)

TAG NOS. ALLOCATION SUMMARY

DESCRIPTION	USED TAG NO.	RANGE	NOT USED
VALVE TAG.	5101-5199	5101-5199	5156,5146,5146
INTERLOCKS	5101-5110	5101-5199	-
INSTRUMENTATION TAG.	5101-5140	5101-5199	5130,5131,5138,5139
LINE NUMBERS	5101-5104	5101-5199	-
EQUIPMENT TAG.	5101-5118	5101-5199	5109,5113,5115

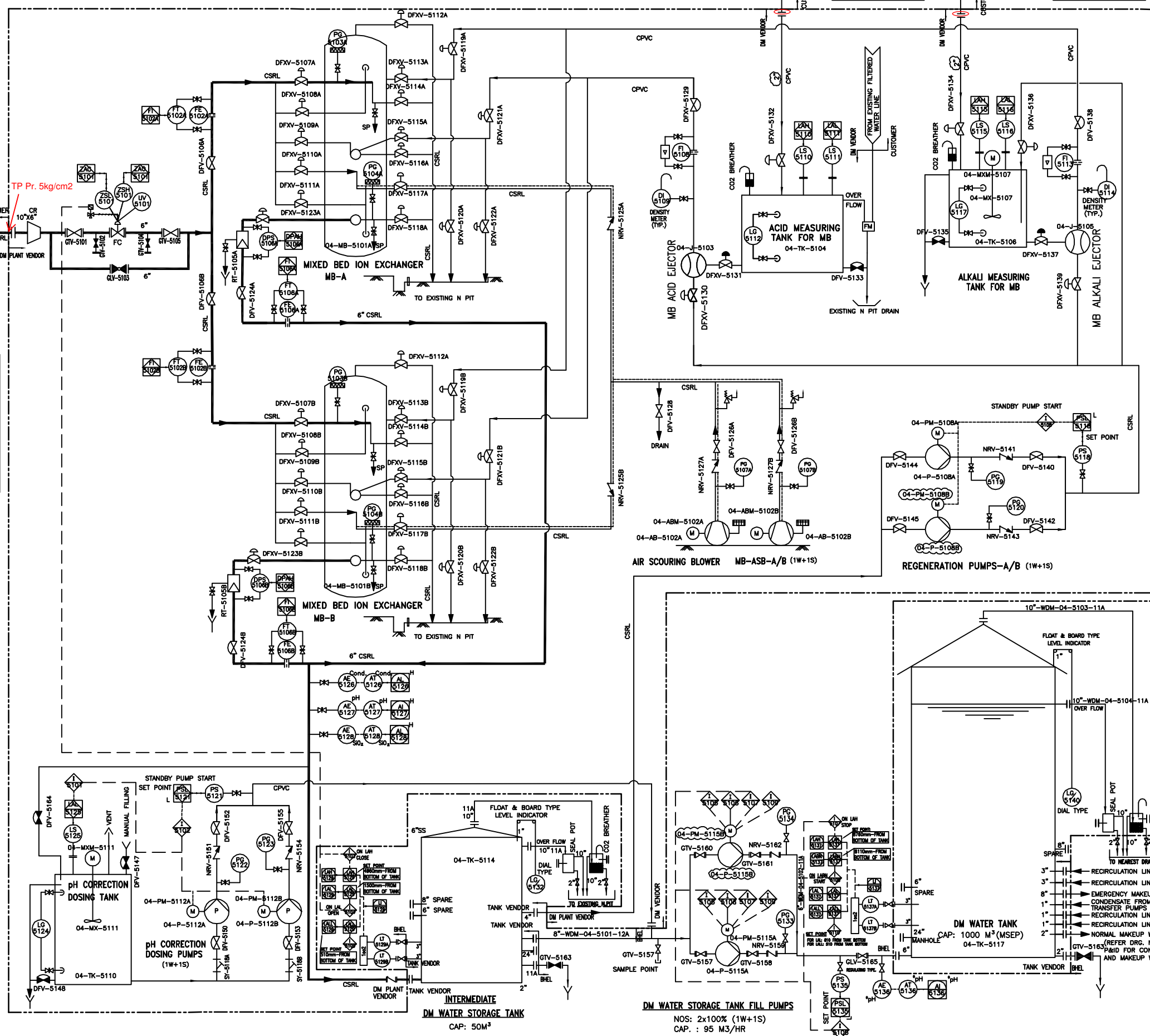
INTERLOCK SUMMARY:-

TITLE OF LOGIC	LOGIC NO.	TAGS INVOLVED	CONDITIONS FOR LOGIC EXECUTION	REMARKS
DM WATER INLET TO MB UNIT	5103	LAH -5130	INTERMEDIATE DM WATER STORAGE TANK FULL	TO CLOSE UV-5101
	5104	LAL-5131	INTERMEDIATE DM WATER STORAGE TANK LEVEL LOW	TO OPEN UV-5101
DM WATER STORAGE FILL PUMP	5107	LAH -5139	DM WATER STORAGE TANK FULL	TRIP THE DM WATER STORAGE FILL PUMP.
	5106	LAL-5138	DM WATER STORAGE TANK LEVEL LOW	START THE DM WATER STORAGE FILL PUMP.
	5105	PSL-5135	DISCHARGE HEADER PRESSURE LOW	START STANDBY DM WATER STORAGE FILL PUMP.
	5109	LALL-5129	INTERMEDIATE DM WATER STORAGE TANK LEVEL LOW LOW	TRIP THE DM WATER STORAGE FILL PUMP.
REGENERATION PUMP	5108	PSL-5118	DISCHARGE HEADER PRESSURE LOW	START STANDBY REGENERATION PUMP.
PH CORRECTION PUMP	5101	LAH -5125	PH CORRECTION TANK LEVEL LOW.	TRIP THE PH CORRECTION DOSING PUMP.
	5102	PSL-5121	DISCHARGE HEADER PRESSURE LOW	START STANDBY PH CORRECTION DOSING PUMP.
NORMAL & EMERGENCY DM MAKE UP WATER PUMPS (REF P&ID-13810106218)	5110	LALL-5137	DM WATER STORAGE TANK LEVEL LOW LOW	TRIP THE NORMAL & EMERGENCY DM MAKE UP WATER PUMPS.

NOTES:-

- ADDITIONAL VENTS AT HIGH POINTS AND DRAINS AT LOW POINT SHALL BE PROVIDED AS PER FINAL LAYOUT.
 - DM PLANT WILL BE OPERATED ON SEMI-AUTOMATIC MODE WITH ADEQUATE INSTRUMENTS FOR MONITORING AND ANNOUNCEMENTS IN DCS
 - THE ACTUAL SIZE OF VALVES & PIPES SHALL BE INDICATED AFTER FINALIZATION OF DM PLANT VENDOR.
- * TO BE SUPPLIED BY DM PLANT VENDOR.

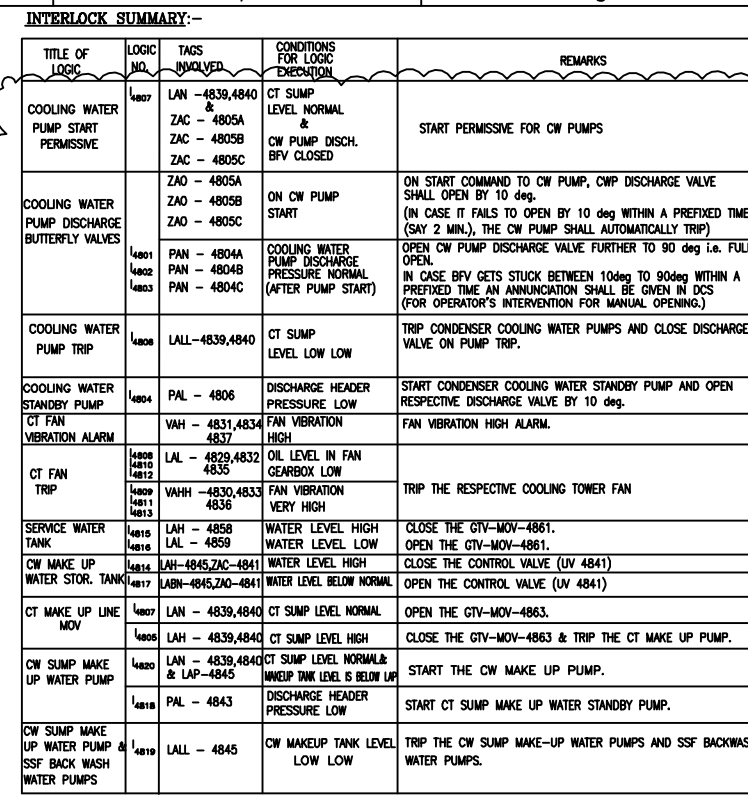
1-38101-06323	STANDARD LEGEND FOR P&ID	
PEMC-05061	NUMBERING PHILOSOPHY	
DRAWING NO.	TITLE	REMARKS
REFERENCE DRAWINGS		
CUSTOMER: OIL AND NATURAL GAS CORPORATION LIMITED		
CONSULTANT: FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.		
PROJECT: 1x51MW COMBINED CYCLE CAPTIVE POWER PLANT, AT HAZIRA PLANT, GUJARAT.		
BHARAT HEAVY ELECTRICALS LTD HYDERABAD		
NAME	SIGN.	DATE
DRN. AJIT SINGH	SD/-	18.05.15
CHD. PRADEEPA	SD/-	18.05.15
APPD. AMIT SINHA	SD/-	18.05.15
DEPT. FE&SD	REF. TO ASSY. DRG.	ITEM NO.
CODE 450	-N.A.-	-N.A.-
TITLE: P&ID OF MIXED BED UNIT & ASSOCIATED SYSTEM		
CARD CODE	BHEL DRG NO. 1-38101-06496	REV.
N.A.	CUST. DRG NO. 6496-04-1151	04p
	SHT. No 01	NO. OF SHT. 01



REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

INVENTORY NO



TAG NOS. ALLOCATION SUMMARY			
	USED IN THIS DRG. NO.	RANGE	NOT USED
VALVE TAG.	4801-4893	4801-4899	4815, 4816, 4860
INTERLOCKS	4801-4820	4801-4899	—
INSTRUMENTATION TAG.	4801-4868	4801-4899	4844
LINE NUMBERS	4801-4834	4801-4899	—
EQUIPMENT TAG.	4801-4834	4801-4899	—

-FOR NOTES REFER SHEET 02:

2-38101-04696	P&ID CW TREATMENT SYSTEM	
2-38101-04547	P&ID ACW SYSTEM	
1-38101-06547	P&ID EFFLUENT COLLECT. & DISPOSAL SYS.	
1-38101-06495	STANDARD LEGEND	
PEMC-05061-R01	NUMBERING PHILOSOPHY	
DRAWING NO.	TITLE	REMARKS

REFERENCE DRAWINGS

CUSTOMER:
OIL AND NATURAL GAS CORPORATION LIMITED

CONSULTANTAT:
FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.

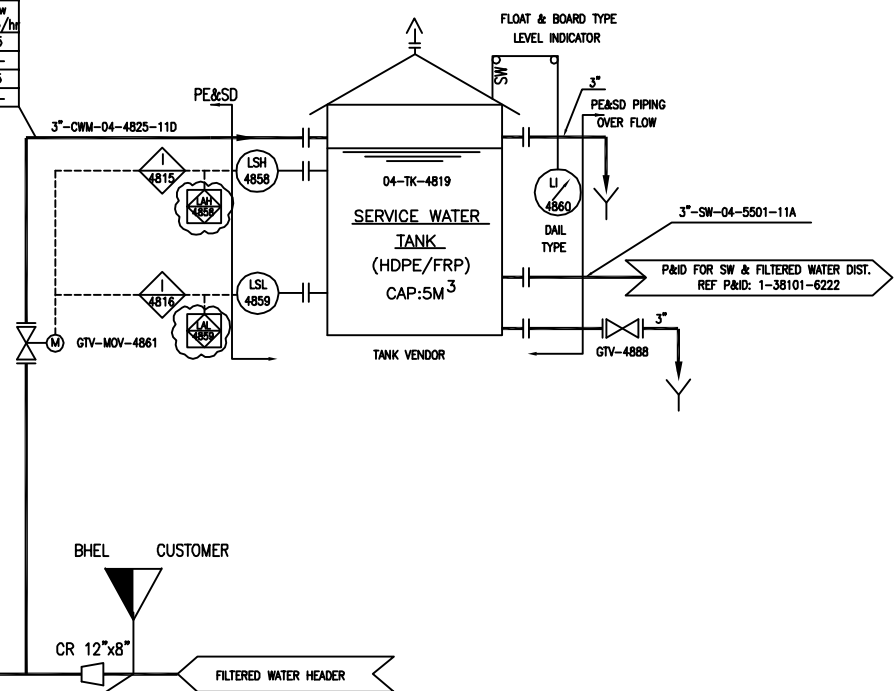
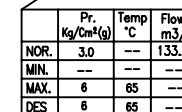
PROJECT:	1x51MW COMBINED CYCLE CAPTIVE POWER PLANT.AT HAZIRA PLANT, GUJARAT.
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	BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME	SIGN.	DATE	NO. OF VAR.
		DRN.	AJIT SINGH	SD/-	16.06.15	
		CHD.	PRADEEPA	SD/-	16.06.15	
		APPD.	AMIT SINHA	SD/-	16.06.15	-N.A.

TITLE:	P&ID FOR COOLING WATER SYSTEM	CARD CODE	BHEL DRG NO. 2-38101-04548	REV.
			CUST. DRG NO. 4548-04-1248	04

REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	AJIT SINGH
04	22.02.16	CHD/APPD	PRADEEPA/AKS	03	19.10.15	CHD/APPD	PRADEEPA/AKS	02	25.08.15	CHD/APPD	PRADEEPA/AKS	01	13.07.15	CHD/APPD	PRADEEPA/AKS
ZONE	REFER SHEET 02 FOR DETAILS.			ZONE	A GRAVITY LINE ADDED FROM CT MAKE UP TANK TO CT SUMP ALONG WITH REQUIRED VALVES AND MODIFIED RELATED INTERLOCKS. =TAH 4823. TAH 4814 ADDED.			ZONE	REVISED AS PER EQUIPMENT LATEST REQUIREMENTS AND CONSULTANT(FCE) COMMENTS. (REV. MARKED AS CLOUDED)			ZONE	REVISED IN LINE WITH CONSULTANT (FCE) COMMENTS DATED 12.05.15. AS CLOUDED		

	T	SIGN. AND DATE	T	REF. DRG. NO.
<u>INVENTORY NO</u>				



CUSTOMER:	OIL AND NATURAL GAS CORPORATION LIMITED
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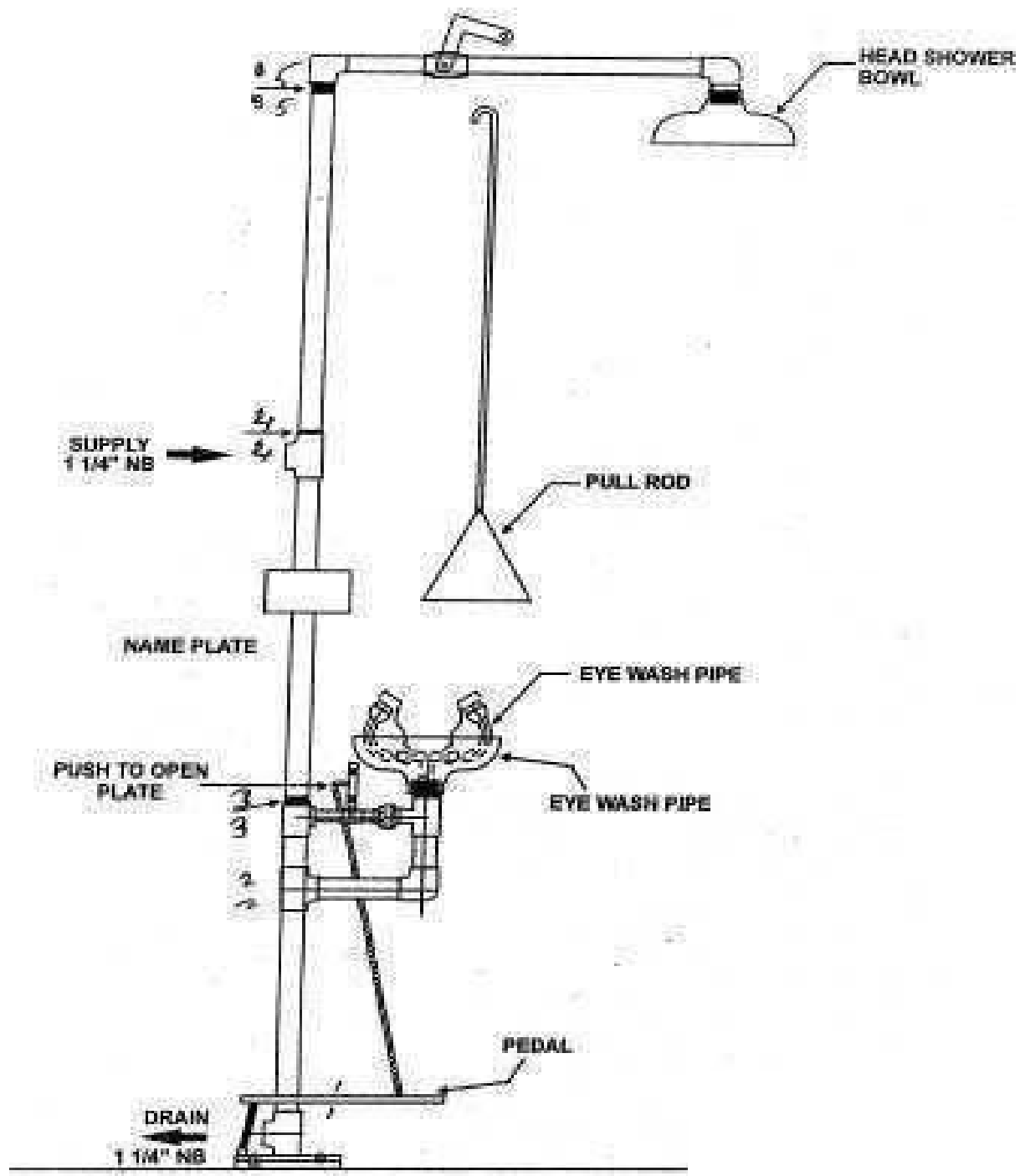
CONSULTANAT:
FICHTNER CONSULTING ENGINEERS (INDIA) PVT. LTD.

PROJECT:	1x51MW COMBINED CYCLE CAPTIVE POWER PLANT.AT HAZIRA PLANT, GUJARAT.
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	BHARAT HEAVY ELECTRICALS LTD.		NAME	SIGN.	DATE	NO. OF VAR. -N.A.-	
	HYDERABAD		DRN.	AJIT SINGH	SD/-		16.06.15
			CHD.	PRADEEPA	SD/-		16.06.15
			APPD.	AMIT SINHA	SD/-		16.06.15

REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	SANTOSH	REV.	DATE	ALTERED	AJIT SINGH
04	22.02.16	CHD/APPD	PRADDEEPA/AKS	03	19.10.15	CHD/APPD	PRADDEEPA/AKS	02	25.08.15	CHD/APPD	PRADDEEPA/AKS	01	13.07.15	CHD/APPD	
ZONE	LEVEL HIGH LAH4858 AND LEVEL LOW ALARM LAL4859 INDICATIONS ADDED.			ZONE	A GRAVITY LINE ADDED FROM CT MAKE UP TANK TO CT SUMP ALONG WITH REQUIRED VALVES AND MODIFIED RELATED INTERLOCKS. (REV. MARKED AS CLOUED)			ZONE	REVISED AS PER EQUIPMENT LATEST REQUIREMENTS AND CONSULTANT(FCE) COMMENTS.			ZONE	REVISED IN LINE WITH CONSULTANT (FCE) COMMENTS DATED 12.05.15. AS CLOUED		

TITLE:	P&ID FOR COOLING WATER SYSTEM	CARD CODE	BHEL DRG NO. 2-38101-04548	REV.
			CUST. DRG NO. 4548-04-1248	04P
N.A.	SHT. No 02	NO. OF SHT.	02	



EYE WASH AND SAFETY SHOWER



INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
			13810106222-S00-R01.DWG

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

	Subject	Doc. No.	Rev.	Vol. / Sec.
	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	III / 2.14
				Sheet No.
				312

VOLUME - III
SECTION - 2
DETAILED TECHNICAL SPECIFICATION - MECHANICAL

SUB-SECTION - 2.14
WATER SYSTEM

	Subject	Doc. No.	Rev.	Vol. / Sec.
	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	III / 2.14
				Sheet No.
				313

VOLUME - III

SUB-SECTION - 2.14

WATER SYSTEM

CLAUSE NO.	DESCRIPTION	SHEET NO.
1.0.0	GENERAL	314
2.0.0	PLANT DESCRIPTION	314
3.0.0	SPECIFIC REQUIREMENTS	316
4.0.0	PERFORMANCE TEST REQUIREMENTS & GUARANTEES	317
5.0.0	SUBMISSION OF TEST PROCEDURES	318
6.0.0	DESIGN AND CONSTRUCTION FEATURES	318
7.0.0	TECHNICAL SPECIFICATION FOR VALVES	320
8.0.0	BOLTS AND NUTS	321
9.0.0	WELDING	322
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SUB-SECTION – 2.14**WATER TREATMENT PLANT****1.0.0 GENERAL**

1.1.0 This section is intended to provide within the scope which includes design, constructional and functional requirements for water system for Gas Based Combined Cycle Captive power plant (CCCPP).

1.2.0 The bidders are requested to note that only the major equipments are mentioned below. Any other equipment / system not specifically mentioned below but mentioned elsewhere in the specifications and any other equipment / system essential for smooth and efficient functioning of the system shall be considered in the scope of the bidder at no extra cost. Also bidder shall ensure the adequacy of extension from existing filtered water, DM water, service water and potable water lines from locations as marked in the plot plan.

1.3.0 This section covers the technical aspects of design, manufacture, testing at works and transportation to site, supervision of erection, testing and commissioning of Water system. Capacity shall be decided by EPC bidder as per the design basis given elsewhere.

1.4.0 Supply and services shall be rendered in conformity with proven design principles, taking into account the current technology. The requirements of the contract must be fulfilled in its entirety.

1.5.0 The supply and services shall be rendered inclusive of all appliances and interconnecting arrangements with other supplies needed for proper and reliable continuous operation and for satisfactory maintenance and repair.

2.0.0 PLANT DESCRIPTION**2.1.0 Description of existing Facilities****2.1.1 Pre-treatment Plant**

Raw water from river is pumped to the raw water reservoir. From raw water reservoir, water is treated through clarifier and gravity sand filter. This filtered water is pumped into the complex with help of filtered water transfer pump located near raw water reservoir, through 14" & 30" filtered water line. Bidder shall identify the tapping point either in 14" or 30" line based on the availability of adequate flow and pressure

Bidder shall start their scope from counter flange and extend the piping up to cooling tower as well as overhead service water storage tank of proposed power plant with fittings, pipe rack, supports etc. However, bidder to ensure the adequacy of the flow and head at the tap off point.

2.1.2 DM Plant

There are 3 x 100 % (2w+1s) each of 100 m³/hr is available in the existing HRSG area. Bidder to check the adequacy of the existing plant in terms of capacity requirement of DM water for proposed CCCPP.

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2.1.3 Potable water

There is existing potable water running near to the proposed power plant as marked in the attached plot plan.

Bidder shall start there scope by taking tapping from existing potable water piping and extend the same up to overhead potable water storage tank located at the highest elevation in the proposed power plant (Over Control room building). However bidder to ensure the adequacy of the flow and head at the tap off point.

2.2.0 Description of Proposed water system

2.2.1 Scope of proposed DM plant for HRSG make up purpose is as below,

- Checking adequacy of existing DM plant for make - up water requirement for steam generation of proposed power plant.
- Tapping from the existing DM water line shall be taken by bidder
- 2 x 100 % (1w+1s) Mixed Bed
- 1 x 100% Acid dosing tank
- 1 x 100 % of caustic dosing tank
- ~~1 no. Intermediate DM water tank of 30 minutes Retention.~~
- ~~2 x 100 % DM water storage tank fill pumps of suitable capacity.~~
- ~~1 no. DM water storage tank of (1000 m³)~~
- ~~2 x 100 % DM water transfer pumps for HRSG make up.~~
- ~~1 x 100% HRSG Initial fill pump.~~
- 1 x 100 % pH correction dosing system with 1 no. of pH Correction dosing tank and 2 nos. of pH correction dosing pumps.
- ~~DM water piping after Mixed Bed to DMWST in CCCPP area along with pipe fittings, pipe rack.~~

2.2.2 ~~Scope of proposed Filtered water distribution for cooling tower make - up and service water purpose is as below:~~

- ~~Checking adequacy of existing Pre-treatment plant for make - up water requirement for cooling tower.~~
- ~~Tapping from existing filtered water line shall be taken by bidder.~~
- ~~1 no. CW makeup water storage tank.~~
- ~~Extension of piping along with pipe fittings and pipe rack.~~

2.2.3 Scope of proposed Potable water system:

- ~~Tapping from the existing potable water network shall be taken by bidder.~~
- 1 no. potable water overhead tank.
- ~~Extension of piping along with pipe fittings and pipe rack. Distribution of potable water in the proposed CCCPP.~~
- "UV sterilizers" shall be used to disinfect the potable water near the potable water outlets.

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2.2.4 Scope of proposed Service water system:

- ~~• Tapping from filtered water line shall be taken for service water purpose~~
- 1 no. Service water overhead tank
- ~~• Extension of piping along with pipe fittings and pipe rack.~~
- ~~• Distribution of service water in the proposed CCPP.~~

2.2.5 Scope of proposed Effluent disposal system:

~~Effluent generated from HRSG blow down along with oily waste shall be collected in the HRSG blow down tank, and pumped with HRSG blow down transfer pump to the existing PWS drain pit. SSF backwash water shall be collected in the SSF backwash storage tank and with the help of SSF backwash water transfer pump; it shall be transferred to the OWS drain pit. Cooling tower blow down, shall be routed to the existing OWS drain pit. MB regeneration waste shall be neutralised in the existing N-Pit. Bidder to check the adequacy of existing N-Pit in terms of capacity so as to accommodate the additional regeneration effluent generated by Mixed Bed unit for proposed CCCPP.~~

~~Contractor to check the adequacy of the existing effluent treatment system such as OWS & PWS, so as to handle the additional flows from the proposed CCCPP.~~

3.0.0 **SPECIFIC REQUIREMENTS**

- a) Gross capacity of the plant shall be sized corresponding to net requirement indicated including regeneration.
- b) Piping of Mixed Bed Unit shall be done in such a way that there shall be interchangeability of the streams shall be done.
- c) Contractor to check the adequacy of extending the existing acid/alkali lines, for MB regeneration.
- d) ~~1 X 100% CW make-up water storage tank of 1000 m³ capacity shall be provided near CW forebay.~~
- e) Minimum thickness of pressure vessels shall be 6 mm.
- f) For unlined pressure vessels a minimum of 2 mm corrosion allowance shall be provided.
- g) Chemical dosing pumps shall be provided with SS 316 strainer.
- h) Contractor to furnish all necessary instruments including level indicators for all tanks.
- i) Mixed Bed shall be designed to provide minimum chemical consumption for the specified outlet water quality.
- j) The maximum allowable noise level shall be 85 dBA at 1 m from the outline of respective equipment.
- k) Approved quality assurance plan of Owner/Owner's representative shall be followed by Contractor.
- l) Erection and Commissioning.
- m) All Electrical Equipment.
- n) Complete Instrumentation & control.

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- o) Contractor to consider adequacy of flow, pressure & also recheck the location of hook up points at site before ordering / commercial negotiation, any change in the hook up points shall be done by Bidder without any cost implications, Also if isolation of the system is not possible at hook up points, then Bidder shall take the hot tapping at the interface points

4.0.0 **PERFORMANCE TEST REQUIREMENTS & GUARANTEES**

4.1.0 **Guarantee Requirements**

All chemicals & consumables shall be given by Supplier for 72 hours availability period from commissioning.

In addition to compliance with the requirements of the Specification, Supplier shall meet the specific guarantees of performance as required and as stated in the Schedule of Guaranteed Data. All tests shall be carried out in accordance with the relevant international standards, unless otherwise specified or approved by Owner/Owner's representative.

- a) The Complete Water treatment plant & its auxiliaries shall operate safely, reliably, and without undue maintenance or operator attention/intervention. Guarantees shall be such as can be met in everyday operation under all specified operating conditions. All guarantee figures shall be realisable in everyday operation under all anticipated operating conditions.
- b) Supplier shall note the provisions of the clauses on tests as outlined in the specification for "Inspection and Testing".
- c) Performance test will be carried out within the appropriate time period as specified. The performance test result of the water treatment plant & its auxiliaries shall be corrected to the design conditions to establish an "as new and clean" performance.
- d) **Guarantee Test Procedure**

In conducting the plant performance tests, the plant shall be operated by Owner/Owner's representative's staff under the direction and responsibility of Supplier's representative and to the mutual satisfaction of the parties concerned, but under the general supervision of Supplier.

e) **Water treatment plant**

- i. Supplier shall submit the design calculations for arriving at the required quantity of resin for each exchanger, supported by resin characteristic data used in the calculations, inline with manufacturer's / best engineering practices. Supplier shall take into account derating factor of 10% while deciding the useful quantity of resin. A derating factor of 30% shall be considered for resin used for MB unit. After including the above margins and other additions such as minimum resin quantity, the chemical consumption shall be calculated. The quantity of resin and regeneration chemical consumption shall be as per the "Guaranteed Data".
- ii. Before commencement of tests, Supplier may if so desired by him, bring the MB resins to the fully regenerated condition by carrying out double regeneration, that is, two consecutive regenerations. No other double regeneration will be permitted during the capacity test period.

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- iii. Minimum six (6) runs shall be carried out for establishing the guaranteed values of treated water with regard to quality (stage wise) and capacity as well as for establishing the guaranteed values for chemical consumption, continuous power consumption etc. Of these six test runs, a minimum of three (3) consecutive test results shall meet the guaranteed values. For Mixed Bed, a minimum of (3) three test runs shall be conducted and all the results shall meet the guaranteed values.

5.0.0 SUBMISSION OF TEST PROCEDURES

The Supplier shall submit for approval **one month** prior to testing, detailed test procedures for equipment, sub-systems and complete systems covered under this Order. These procedures shall include details of all performance tests either conducted in the manufacturer's works or at site. Detailed lists shall be provided which shall specify applicable codes, functional and other tests to be carried out on each item of equipment, each sub-system and each complete system. The lists shall be supplemented with logic diagram to show the correct plant functioning requirements together with system flow diagrams showing all points of measurement for both functional and performance tests.

The procedures, lists, logic diagrams and flow diagrams together with test results shall be correlated and presented as a single bound document to form a comprehensive set of test procedures and records of the tests conducted on the plant.

6.0.0 DESIGN AND CONSTRUCTION FEATURES

6.1.1 Mixed Bed

The Mixed bed Ion exchange units are provided for removal of TDS and to achieve desired DM water quality to produce Dematerialized water of required quality and quantity for steam cycle.

The Mixed Bed Exchanger contains both Strong Acid Cation and Strong Base Anion resins. Hydrochloric Acid and Sodium Hydroxide are used for regenerating cation and Anion Resins respectively. The Dematerialized water thus generated will be led and stored in DM water storage tanks. MB is designed for regeneration every 7 days. The MB will be constructed of vulcanized rubber lined Carbon steel. Resin Traps are provided in rinse outlet and process outlet of the Mixed Bed unit.

Design

Mixed bed shall have Shells and Dished ends both constructed of IS:2062 and shall be designed as per IS 2825. Vessels shall be designed to contain resins, filter media, distribution system and under drain system. All the vessels shall be supplied with frontal pipe work with valves and fittings.

Mixed bed shall be provided with a group of individual pneumatic operated valves designed for manual operation. The Material of construction of all valves and piping shall be as per specification. All internal material shall be of Stainless steel (SS - 316) for pipe size less than 50 NB and more than 50 NB shall be MSRL unless otherwise specified elsewhere.

All the vessels shall be provided with Cat Ladder and Platform.

The interior of all vessels and all parts, which come into contact with corrosive liquid, shall be lined with natural rubber.

Wherever rubber lining is required, the same shall confirm to IS 4682 Part I.

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All vessels shall be furnished with a manhole, hand hole, view glass, vent and drain valves, resin traps, flanged connections for the piping system and structural steel leg support.

MB units shall be equipped with three (3) nos. of sight glass, one (1) at upper resin level, one (1) in upper section of exchanger vessel & one (1) at resin interface level.

Construction

The Mixed Bed shall be of vertical, cylindrical type. It shall have shells and dished shall be designed as per IS 2825. The filters shall be designed to contain filter media, distribution system and under drain system. All internal material such as nuts bolts & washers shall be of Stainless steel (SS 316) unless otherwise specified elsewhere.

The Ion exchangers shall be supplied with frontal pipe work with valves and fittings. Instrument and accessories shall be supplied as per specified in relevant clause.

6.1.2 ~~DM Water Storage Tank~~

~~One number of DM water storage tank shall be located in the proposed HRSG area. The tank will be vertical, cylindrical, field erected tanks of Carbon steel construction with protective interior coating. The tank roof will be of the self-supported type. The tank will be provided with a vent, stub type overflow, etc.~~

6.1.3 **General**

All piping shall be designed, fabricated and tested in accordance with the Approved Standards, Piping Materials Specification as per the specification.

All pipes subject to corrosion which are unwrapped, unlagged and external to the building, in addition to the normal designed wall thickness, shall have an additional corrosion allowance sufficient to ensure a minimum service life of 20 years.

The velocity of flow in pipes shall not generally exceed the following values unless otherwise specifically mentioned.

Water lines	m/s
Water Discharge lines	1.0 to 2.2
Water suction lines	0.6 to 0.9

6.1.4 **Pipe Materials**

Instrument tubing shall be of stainless steel 316 for all pressures. Pipe connections after the isolating valves can be compression type couplings to the approval of the Owner/Owner's representative. Steels made by Acid Bessemer process are not acceptable. Fittings made from block forgings and machined to required dimensions are not acceptable.

Chemical Lines	:	GRP/CPVC.
DM water	:	SS 316
Filtered water piping	:	MSEP

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6.1.5 Bends and Fittings

Wherever possible, pipe fittings such as bends and tees, shall be to standard dimensions.

All flanged joints shall meet the requirements of **ANSI B 16.5**. All fasteners shall be in mm size only.

All flanges shall be machined on the edge and spot faced at the back to receive bolts, washers and nuts.

For high-pressure services, flange faces must be of serrated finish. Blank flanges are to be solid steel and machined all over.

Flanges having pressure ratings less than 10 bar (g) shall not be used. All flange jointing material unless specified shall be approved quality.

7.0.0 TECHNICAL SPECIFICATION FOR VALVES

7.1.0 Intent of Specification

7.1.1 This section of the specification covers the requirements of valves for various system of the plant.

7.2.0 Codes & Standards

7.2.1 The supply manufacture, inspection, testing and performance of valves shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform the latest applicable standards. Nothing in this specification shall be construed to relieve the Supplier of this responsibility.

7.2.2 Latest edition of design codes and standards shall be considered as minimum requirements.

7.3.0 Design and Construction Features

7.3.1 Supplier shall select valves and accessories, which are suitable for the operating conditions of the systems.

7.3.2 Valves and accessories which are of a similar make, size and type shall be interchangeable with one another.

7.3.3 All valve bodies shall be of the same nominal size as the adjacent piping, unless otherwise required.

7.3.4 Hand wheels shall be of painted normal standard type and of spoked construction with smooth finished spokes and rims.

7.3.5 Spindles for all valves located outdoors shall have weather-proof protection on spindle bearings and guards. Valve stem shall be forged or from a forged rolled bar. Casting for stem is not acceptable.

7.3.6 All valves shall be designed to withstand a hydrostatic pressure test for tightness and mechanical strength as per applicable standards.

7.3.7 For handling heavy valves (or part of valves), eye bolts, lugs etc. shall be provided.

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7.3.8 All valves shall be designed so that the hand wheel moves in a clockwise direction to close the valve. The face of each hand wheel shall be clearly marked with the words 'OPEN' and 'CLOSE' and shall be provided with an arrow to indicate the direction for opening.

7.3.9 Valves of sizes 50 NB and above shall be provided with position indicators.

7.3.10 All flanged valves shall have flanges integral with the valve body.

7.3.11 All the valves shall be of CI diaphragm type. All the valves for corrosive service shall be rubber lined / ebonite lined to a thickness of minimum 3mm.

The material of construction of diaphragm shall be as follows:

- Reinforced natural rubber for water service.
- Reinforced neoprene rubber for handling weak chemicals
- Teflon with backing for severe chemicals and solvents.

Needle valves shall be used in sampling lines and for instrument isolation.

7.4.0 **Tests and Inspection**

7.4.1 All valves shall be subjected to tests. Tests shall be conducted at Supplier/ Sub Supplier's works witnessed by the Owner/Owner's representative and conforming to the relevant standards and all test certificates shall be submitted for approval of Owner/Owner's representative before despatch of material. All valves shall be tested hydrostatically for strength, tightness of seats and tightness of backseating at pressure specified in the standards.

7.4.2 Procedure for testing the tightness of seats of valves shall be as follows. The valves shall be subjected to city water pressure to or a minimum of 2.812 Kg/cm² (40 psig). The pressure shall then be increased to the specified seat test pressure. Valves shall then be cracked open at this pressure to determine the tightness of the seat ring in the body. Gate valves shall be tested on both sides of the disc and globe valves shall be tested under the disc.

8.0.0 **BOLTS AND NUTS**

All bolts and nuts shall conform dimensionally and be threaded in accordance with the Approved Standards and shall be in mm size only.

Where there is a risk of corrosion, studs and bolts are to be finished flush with the surface of the nuts otherwise a maximum of 1.5 complete threads shall protrude.

The use of slotted screws shall be avoided, hexagon socket screws of recess type heads being preferred.

When connecting pipe work to fittings studs shall not be used. Where fitted bolts are used they shall be adequately marked to ensure correct assembly and the fitted portion shall be not less than 4 mm in diameter larger than the threaded diameter. They shall be driving fit in the reamed holes they occupy.

All washers shall be included in the scope, including locking devices and anti vibration arrangements, which shall be subject to the approval of the Owner/Owner's representative. Taper washers shall be fitted where necessary.

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If bolts are to be tightened under heat or by mechanical extension, one set of the necessary equipment shall be provided under this Order and retained at site for each unit.

9.0.0 **WELDING**

9.1.0 **General**

All welding performed in pursuance of this Order shall conform to the Approved Standards.

The Supplier shall show that the proposed welding specifications and standards conform to the requirements of the design codes adopted for the relevant portion of the work.

Wherever there is conflict between Codes and Standards the Owner/Owner's representative shall decide which shall prevail.

9.2.0 **Welding Techniques**

Single sided butt weld joints (in low alloy steel and high yield steel) shall be designed to have the root run made by the Gas Tungsten Arc Welding process.

For butt welded joints the following techniques are acceptable.

- Shielded Metal arc welding with argon root-run.
- Shielded Metal arc welding with consumable insert in root fused by argon arc.
- Semi-automatic or automatic welding with argon root-run.

Weld joint preparations shall be in accordance with ASME Sec. VIII Div.1 as applicable or an equivalent or superior approved standard and to the Owner/Owner's representative's approval. Welding symbols shall be to any Approved Standard.

10.0.0 **INSTRUMENT LIST FOR WTP**

A)	DM PLANT	
1	Mixed Bed	Conductivity transmitter at the outlet (common for each MB)
		Pressure gauge at the I/L& O/L
		pH transmitter (Ultra Pure Water) at the outlet (common for MB)
		Dual Channel Silica analyzer at the common outlet of MB
		FT at the I/L & O/L
2	DM Water Tank	Float and Board type level indicator
		Level switch low low and Level switch high
		Differential pressure/Ultrasonic type level Transmitter
3	DM water transfer pump/HRSG Initial fill pump	Pressure Gauge on the discharge of each Pump.
		Pressure switch on the common discharge header
		pH transmitter at the discharge of pumps.
4	CW makeup storage tank	Level gauge
		Level low switch
5	Acid dosing system	Level gauge

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		Level low switch
6	Caustic dosing system	Level gauge
		Level low switch
7	HRSG Blow down Pit	Level switch low low and Level switch high
8	HRSG Blow down transfer pumps	Pressure Gauge on the discharge of each Pump.
		Pressure switch on the common discharge header
		Temperature gauge
9	SSF backwash water storage tank	Level switch low low and Level switch high
10	SSF backwash water transfer pump	Pressure Gauge on the discharge of each Pump.
		Pressure switch on the common discharge header
11	Overhead Service water storage tank	Float and board level gauge
12	Overhead potable water storage tank	Float and board level gauge

11.0.0 DESIGN CRITERIA - TREATMENT SCHEME

11.1.0 Filtered Water

- i. Raw water source / storage : Filtered water
- ii. Design Filtered water analysis : Refer 12.1.0 below.

11.2.0 DM Plant

- i. Feed water source : DM water from existing DM plant.
- ii. Design DM water analysis : Refer 12.2.0 below.
- iii. Net output capacity of DM plant : 2 x 100 %
- iv. Operation / location : Manual / Outdoor
- v. Stream configuration : Refer flow scheme and scope of supply

Note : There shall be interconnection between two MB streams in such a way that, during regeneration of one mixed bed, second mixed bed can be possible. Also in case of emergency 2 mixed bed shall run together

11.3.0 ~~Effluent Treatment Plant~~

- i. ~~Effluent water source : Effluent from Cooling tower blow down, HRSG blow down, SSF backwash, MB. Regeneration waste, Oily waste water.~~

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12.0.0 WATER ANALYSIS (TYPICAL)**12.1.0 Filtered Water Analysis (Typical)**

Sr. No.	Characters	Unit	Filtered water Analysis
1	pH		8.3
2	Total Hardness	Mg/l as CaCO ₃	115
3	Ca Hardness	Mg/l as CaCO ₃	60
4	Sodium	Mg/l as CaCO ₃	78
5	Iron	As Fe	Traces
6	Total Cation	Mg/l as CaCO ₃	193
7	Turbidity	NTU	<2
8	Total Alkalinity	Mg/l as CaCO ₃	130
9	Sulphate	Mg/l as CaCO ₃	6
10	Chloride	Mg/l as CaCO ₃	57
11	EMA	Mg/l as CaCO ₃	63
12	Total Anion	Mg/l as CaCO ₃	193
13	Silica	Mg/l as SiO ₂	20
14	KMnO ₄ Value	Mg/l as CaCO ₃	15

Note : Bidder shall consider 20% deterioration in the above values while considering the same for Cooling tower make up purpose as well as service water purpose.

12.2.0 DM water analysis at the outlet of existing DM plant (Typical)

Sr. No.	Characters	Unit	Filtered water Analysis
1	pH		6.5 - 7
2	Conductivity		

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13.0.0 SPECIFIED DATASHEETS

A	DM PLANT		
1.1.0	Mixed bed exchanger-		
1.1.1	Design standard		IS:2825
1.1.2	Type		Vertical, dished ended, Rubber lined, Steel, welded vessel.
1.1.3	No. of units		2 x 100% – MB
1.1.4	Design pressure		Shut-off head of upstream pump
1.1.5	Hydrostatic test pressure		1.5 times design pressure
1.1.6	Maximum flow rate		45 m ³ /hr/m ²
1.1.7	Rubber lining		4.5 mm thick (min.) to IS:4682 Part-I
1.1.8	Free board		100 % of bed depth
1.1.9	Gross output of each exchanger per cycle		As per requirement indicated in Section-1 of this specification.
1.1.10	Minimum resin bed depth		1000 mm
1.1.11	Material of construction		IS:2062
1.1.12	Minimum shell / dishend thickness		6 / 8 mm thick
1.1.13	Tolerance		0.2 mm mill tolerance for dished end, 2 mm thinning allowance.
1.1.14	Resin type		High capacity strongly acidic, polystyrene based cation exchanger resin and Strongly basic anion exchange resins.
1.1.15	Method of regeneration		Co current (Simultaneous air blower)
1.1.16	Under drain system		Strainer on plate.
1.1.17	Accessories / Instrumentation		Refer control and instrumentation for details.
1.2.0	Air scouring blowers (For MB units)		
1.2.1	Type		Rotary, twin lobe
1.2.2	No. of units		2 x 100% (1w+1s)
1.2.3	Capacity & Head		As per requirement of MB units.
1.2.4	Material of construction		CI Gr. 25-with EN8 shaft with SS sleeving, damper and filters in CS, Base plate in M.S.
1.2.5	Medium handled		Air
1.2.6	Design temperature		Refer project information.
1.2.7	Painting		As per painting specification
1.3.0	DM Water Storage Tank		
1.3.1	Design standard		IS:803
1.3.2	No. of tanks		1 No – DM water
1.3.3	Material of construction		MSEP- DM water
1.3.4	Working capacity of each tank		1000 m ³ – DM Water

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1.3.5	Type		Conical roof type, Vertical atmospheric steel tank. Tank shall have 3 layers of PP balls of 50 mm dia. Also it shall be provided with CO2 absorbers.
1.3.6	Accessories / instruments		As per control & instrumentation requirements.
1.4.0	pH Correction Dosing Station		
1.4.1	PH Correction Solution tank		
1.4.2	No. of tank	No.	One (1W)
1.4.3	Capacity of tank	Litres	To suit process requirement.
1.4.4	Material of construction		MSRL / FRP
1.4.5	pH Correction Dosing Pump		
1.4.6	No. of pumps	Nos.	2(1w + 1s)
1.4.7	Capacity of pump		To suit process requirement.
1.4.8	head of pump		To suit process requirement.
1.4.9	Type		Positive displacement
1.4.10	Material of construction		PP
1.4.11	Motorised Agitator for above tank		
1.4.12	Quantity		One
1.4.13	Material of construction		SS316
1.5.0	DM water transfer Pump for Hotwell make up / HRSG Initial fill pump		
1.5.1	Type		Centrifugal, horizontal.
1.5.2	Design standard		IS :1520 / IS: 5120
1.5.3	No. of pumps	Nos.	2(1w + 1s)
1.5.4	Medium handled		DM water
1.5.5	Design temperature		Ambient
1.5.6	Capacity of each pump		2 x 100% (for Hot well makeup) / 1 x 100 % (for HRSG Initial fill)
1.5.7	Head required		Suitable.
1.5.8	Material of construction		
	i. Casing / impeller / shaft		SS 316
	ii. Base plate		MS
1.5.9	Shaft sealing arrangement		Mechanical sealing
1.6.0	Acid measuring tank		
1.6.1	Design standard		BS 4994
1.6.2	Material of construction		FRP
1.6.3	No. of tanks		i) 1 no. 100% capacity for MB.
1.6.4	Fluid handled		32 % HCl diluted to required concentration

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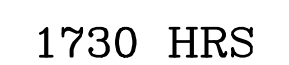
1.6.5	Capacity		One regeneration requirement with 20% margin
1.6.6	Accessories / instruments		Refer control and instrumentation
1.7.0	Caustic dilution tank		
1.7.1	Design standard		IS 803
1.7.2	Material of construction		MSEP / FRP
1.7.3	Nos.		i) 1 no. 100% capacity for MB.
1.7.4	Fluid handled		48 % NaOH diluted to 10% solution
1.7.5	Capacity		One regeneration requirement with 20% margin
1.7.6	Accessories / instruments		Refer control and instrumentation
1.8.0	Agitators for caustic dilution tanks		
1.8.1	Quantity		1 no. per tank
1.8.2	Type		Turbine type
1.8.3	Material of construction		
1.8.4	Impeller / shaft		SS - 316
1.8.5	Mounting		Clamped / flanged
1.8.6	Impeller type		Propeller
1.8.7	Transmission		Direct coupled
1.9.0	Ejectors		
1.9.1	Nature of fluid		Acid/ Caustic
1.9.2	No. of ejectors		2 Nos.
1.9.3	Location		i) 1 no. at the outlet of AMT ii) 1 no. at the outlet of CDT
1.9.4	Injection fluid		HCl / NaOH
1.9.5	Material of construction		Ebonite lined CI
2.0.0	CW Makeup Water Storage Tank		
	Design standard		IS:803
	Quantity	No	1 – Filtered water
	Material of construction		MSEP
	Working capacity	m ³	1000
	Free board	Mm	300
	Type		Conical roof type, Vertical atmospheric steel tank.
B	POTABLE WATER SYSTEM		
1.1.0	Potable water overhead tank		
1.1.1	No. of tank	No.	One (1)
1.1.2	Capacity of each tank	Litres	To suit drinking water requirement.
1.1.3	Material of construction		HDPE / FRP

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	BID PACKAGE FOR COMBINED CYCLE CAPTIVE POWER PLANT AT HAZIRA PLANT, GUJARAT	5111168-ME-SPC-100-001	R1	III / 2.14
				Sheet No.
				328

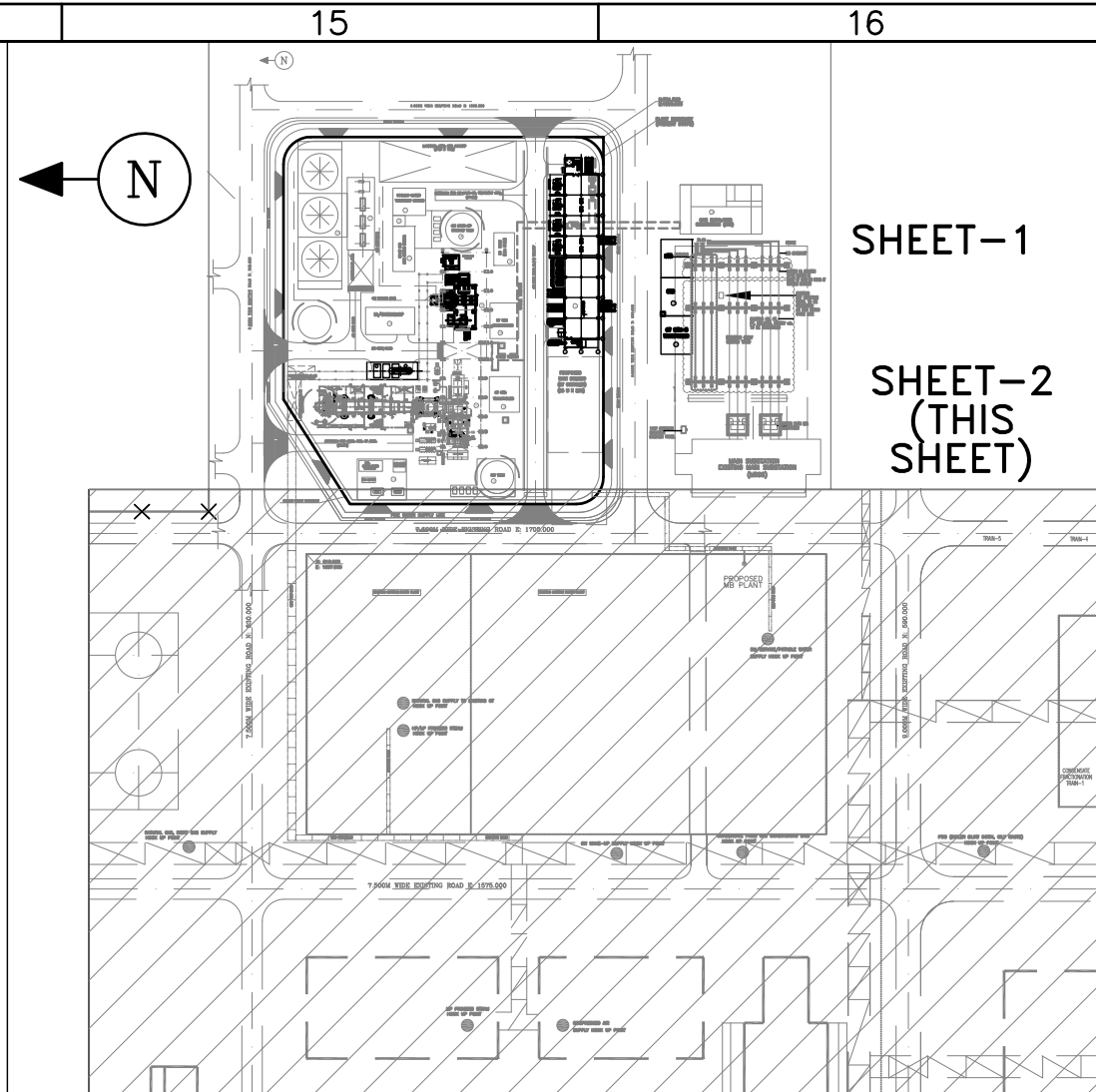
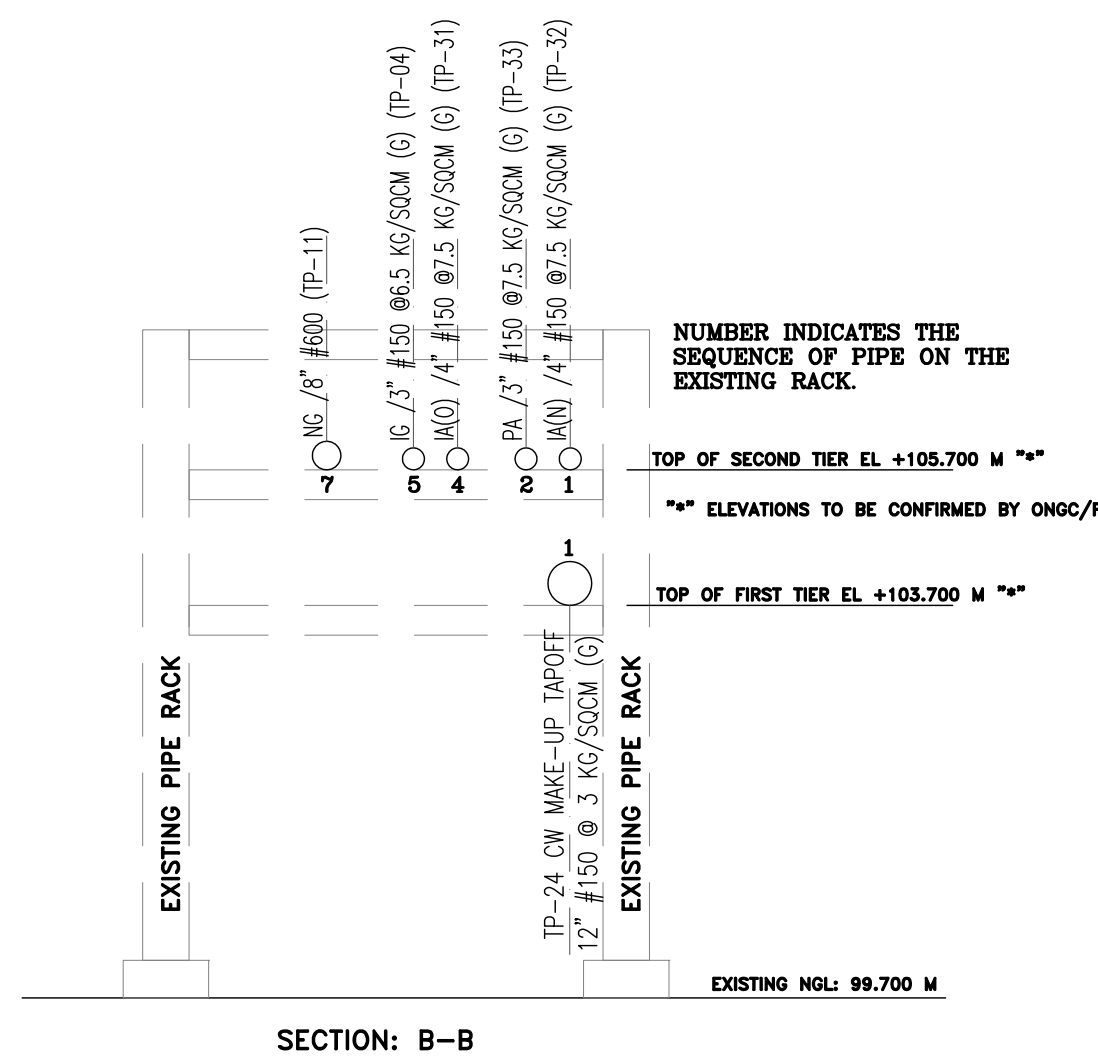
C	SERVICE WATER SYSTEM		
1.1.0	Service water overhead tank		
1.1.1	No. of tank	No.	One (1)
1.1.2	Capacity of each tank	Litres	To suit process requirement.
1.1.3	Material of construction		HDPE / FRP
D	EFFLUENT DISPOSAL SYSTEM		
1.1.0	HRSG Blow down pit		
1.1.1	No. of tank	No.	One (1)
1.1.2	Capacity	m ³	Suitable to store the HRSG Blow down for 2 hrs
1.1.3	Location		Underground (u/g)
1.1.4	Material of construction		RCC
1.2.0	HRSG Blow down transfer Pump		
1.2.1	No. of pumps	Nos.	2(1w + 1s)
1.2.2	Design capacity of pumps	m ³ /hr	As per System requirement
1.2.3	Head of the pumps	bar (g)	As per System requirement
1.2.4	Material of construction		
	i. Casing / impeller / shaft		SS : 316
	ii. Base plate		MSEP
1.2.5	Shaft sealing arrangement		Gland packing
1.2.6	Design temperature	Deg. C	80 to 90
1.3.0	SSF backwash water storage tank		
1.3.1	No. of tank	Nos.	One
1.3.2	Capacity	m ³	Suitable to store the SSF backwash for 20 minutes.
1.3.3	Location		Underground
1.3.4	Material of construction		RCC
1.4.0	SSF backwash water transfer pump		
1.4.1	No. of pumps	Nos.	2(1w + 1s)
1.4.2	Design capacity of pumps	m ³ /hr	As per System requirement
1.4.3	Head of the pumps	bar (g)	As per System requirement
1.4.4	Material of construction		
	i. Casing / impeller / shaft		SS : 316
	ii. Base plate		MSEP
1.4.5	Shaft sealing arrangement		Gland packing
1.4.6	Design temperature	Deg. C	Atmospheric



2

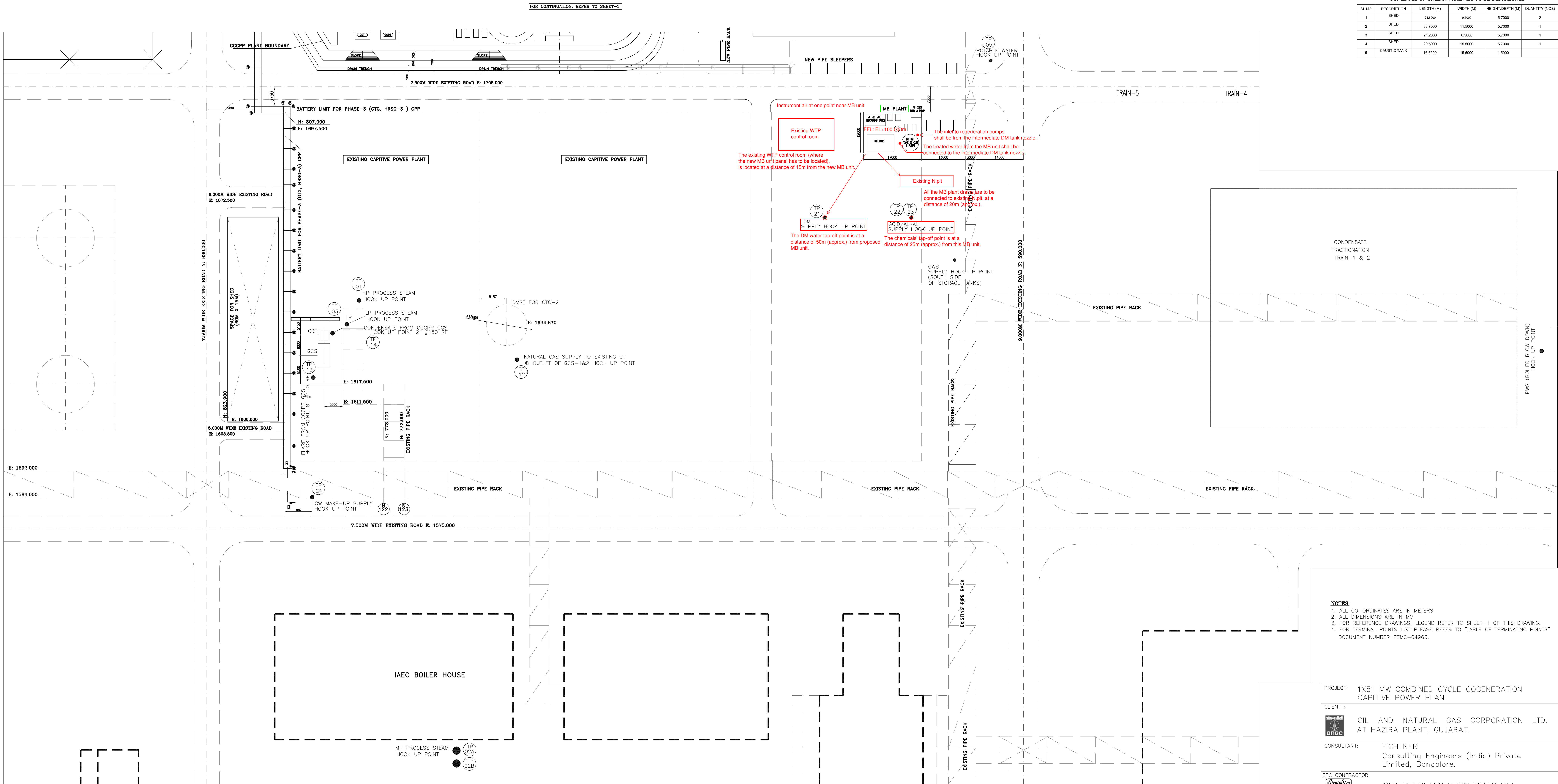


INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	COMPUTER FILE NAME
			03810101570-S02-R04.DWG

[illegible]

KEY PLAN

SCHEDULE OF SHEDS/FACILITIES TO BE DEMOLISHED					
SL NO	DESCRIPTION	LENGTH (M)	WIDTH (M)	HEIGHT/DEPTH (M)	QUANTITY (NOS)
1	SHED	24.8000	9.5000	5.7000	2
2	SHED	33.7000	11.5000	5.7000	1
3	SHED	21.2000	8.5000	5.7000	1
4	SHED	29.5000	15.5000	5.7000	1
5	GAUSTIC TANK	16.8000	15.8000	1.5000	



- NOTES:**
1. ALL CO-ORDINATES ARE IN METERS
 2. ALL DIMENSIONS ARE IN MM
 3. FOR REFERENCE DRAWINGS, LEGEND REFER TO SHEET-1 OF THIS DRAWING.
 4. FOR TERMINAL POINTS LIST PLEASE REFER TO "TABLE OF TERMINATING POINTS"
- DOCUMENT NUMBER PEMC-04963.

PROJECT:	1X51 MW COMBINED CYCLE COGENERATION CAPTIVE POWER PLANT
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CLIENT

 OIL AND NATURAL GAS CORPORATION LTD.
AT HAZIRA PLANT, GUJARAT.

CONSULTANT:	FICHTNER Consulting Limited, Inc.
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EPC CONTRACTOR

BHARAT HEAVY ELECTRICALS LTD
HYDERABAD



BHEL BHARAT HEAVY ELECTRICALS LTD
HYDERABAD

DEPT.	PED
CODE	

UNTOL. DIM
GR.
(CIME)

A diagram showing a converging lens with a horizontal optical axis. An object, represented by an upward-pointing arrow, is placed to the left of the lens. A real image, represented by a downward-pointing arrow, is formed to the right of the lens. The image is inverted and smaller than the object.

	SCALE 1:25
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WEIGHT	WEIGHT
0	N

Weight (KG)	Reference
10	10

NA

RG.

ITEM NO.	
NA	

NO.OF TEMS NA	M
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TITLE	PLOT PLAN (DM PLANT AREA)
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PIPING HOOK-UP LOCATIONS)	15
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CARD CODE	DRAWING NO. 0-381-01-01570	R
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N.A.	SHT. No 02	NO. OF SHT. 02
	16	

