1X800 MW TSGENCO KOTHAGUDEM TPS
STAGE –VII, PALONCHA

VOLUME: II B & III

TECHNICAL SPECIFICATIONS
FOR
CONDENSATE POLISHING UNIT

SPECIFICATION NO.: PE-TS-410-155A-A001

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

CONTENTS
VOLUME-IIB & III

VOLUME-IIB

SECTION – A
SCOPE OF ENQUIRY

1. SCOPE OF INQUIRY/ INTENT OF SPECIFICATION

1.1 The specification is intended to cover design, engineering, manufacture, fabrication, assembly, inspection / testing at vendor's & sub-vendor's works, painting, mandatory spares along with spares for erection, startup and commissioning as required, forwarding, proper packing, shipment and delivery at site, unloading, handling, transportation & storage at site , in site transportation, assembly, erection & commissioning, trial run on FOR site basis preparation and submission of drawing /documents including "As Built" drawings and carrying out performance guarantee tests at site and handover in flawless condition of Condensate Polishing Unit and external regeneration system to the end customer, complete with all accessories for the total scope defined in different sections / volumes of this specification for **1X800 MW TSGENCO KOTHAGUDEM TPS,STAGE-VII, PALONCHA.**

1.2 The contractor shall be responsible for providing all material, equipment & services, which are required to fulfil the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification, irrespective of whether it has been specifically listed herein or not. Omission of specific reference to any component / accessory necessary for proper performance of the equipment shall not relieve them of the responsibility of providing such facilities to complete the supply, erection and commissioning of Condensate Polishing Units and external regeneration system.

1.3 It is not the intent to specify herein all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to purchaser who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material which in his judgment is not in full accordance herewith.

1.4 The extent of supply under the contract includes all items shown in the drawings, notwithstanding the fact that such items may have been omitted from the specification or schedules. Similarly, the extent of supply also includes all items mentioned in the specification and /or schedules, notwithstanding the fact that such items may have been omitted in the drawing.

1.5 The general terms and conditions, instructions to tenderer and other attachment referred to elsewhere are made part of the tender specification. The equipment materials and works covered by this specification are subject to compliance to all attachments referred to in the specification. The bidder shall be responsible for and governed by all requirements stipulated herein.

1.6 While all efforts have been made to make the specification requirement complete & unambiguous, it shall be bidders' responsibility to ask for missing information, ensure completeness of specification, to bring out any contradictory / conflicting requirement in different sections of the specification and within a section itself to the notice of BHEL and to seek any clarification on specification requirement in the format enclosed under Vol-III of the specification. In absence of any such clarifications, in case of any contradictory requirement, the more stringent requirement as per interpretation of BHEL/Customer shall prevail and shall be complied by the bidder without any commercial implication on account of the same. Further in case of any missing information in the specification not brought out by the prospective bidders as part of pre-bid clarification, the same shall be furnished by BHEL/ Customer as and when brought to their notice either by the bidder or by BHEL/ customer themselves. However, such requirements shall be binding on the successful bidder without any commercial & delivery implication.

1.7 Deviations, if any, should be very clearly brought out clause by clause in the enclosed schedule; otherwise, it will be presumed that the vendor's offer is strictly in line with NIT specification.

1.8 In case all above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

1.9 Unless specified otherwise, all through the specification, the word contractor shall have same meaning as successful bidder/vendor and Customer/Purchaser/Employer will mean BHEL and/or Customer (TSGENCO: Telangana State Power Generation Corporation Ltd.) including their consultant (Development Consultants Pvt. Ltd.) as interpreted by BHEL in the relevant context. Bidder to refer GCC/SCC for more clarity.

1.10 The equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and dispatch release issued by BHEL/Customer.

1.11 BHEL's/Customer's representative shall be given full access to the shop in which the equipments are being manufactured or tested and all test records shall be made available to him.

1.12 Pre-bid meeting shall be held before bid submission, if felt necessary.

SECTION – B
PROJECT INFORMATION

PROJECT SYNOPSIS AND GENERAL INFORMATION

1.00.00 INTRODUCTION

The proposed 1x800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 would be set up by Telangana State Power Corporation Ltd. (TSGENCO) at Kothagudem, Telangana. The proposed Power Plant will be installed adjacent to the existing D colony of Kothagudem Thermal Power Station, at Kothagudem.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on the Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

2.00.00 APPROACH TO SITE

Site is located in the existing D Colony of Kothagudem Thermal Power Station, which is at a distance 30 km from temple town of Bhadrachalam and 300 km from Hyderabad by road. The Nearest railway station is Bhadrachalam Road (Known as Kothagudem) at a distance of 12 km. Kothagudem- Bhadrachalam National Highway branches off to the power station site near village Paloncha.

3.00.00 LAND

Land is primarily required for the main plant & auxiliaries (BTG) and balance of plant (BOP) like ash handling, coal storage, cooling tower, switchyard etc., which is available within the existing plant boundary.

The existing colony is to be dismantled, and the land of about 137 acres will be used for the main plant building, water facilities, switchyard, coal handling etc. The raw water reservoir will be located adjacent to the existing raw water reservoirs.

230 acres of land required for Ash Dyke will be procured. Land is available for staff colony, which is to be constructed by the EPC contractor.

4.00.00 SOURCE OF COAL

100% Imported and Blended coal (50% imported + 50% indigenous) will be used. Indigenous coal shall be sourced from Suliyari coal mines, Madhya Pradesh.

5.00.00 SOURCE OF WATER

Source of water (total quantity of water is 2192 m^3/hr) is Godavari River near Burgampahad & water will be pumped through existing GRP pipe line (of length approx. 26 km).

6.00.00 ASH DISPOSAL AREA

Ash shall be dumped in the ash dump area which will be about 9 km from plant. The ash dyke area of 230 acres is adequate for 1x800 MW unit as per MOEF norms.

7.00.00 SALIENT DESIGN DATA

7.01.00 Meteorological data of site is given below:-

Elevation above MSL	:	89 m
Monthly highest temperature	:	44.9 °C
Monthly lowest temperature.	:	12.9 °C
Rainfall		
Average.	:	1031 mm
Max.	:	100 mm/ hr
Mean Wind speed	:	5.8 kmph
Relative Humidity		
Max	:	82%
Min	:	35%
Seismic Zone	:	Zone-III as per IS- 1893 (Part-IV)

[Climatological data of Khammam is attached for reference].

TREATED WATER QUALITY

(DESIGN ANALYSIS OF CLARIFIED WATER)

[After addition of 50 ppm Alum, 20 ppm Lime ,1 ppm Polyelectrolyte and 5 ppm Chlorine on 100% purity basis)]

DESIGN ANALYSIS OF CLARIFIED WATER:

CONSTITUENTS	As	CONTENT
Calcium	$CaCO_3$	128.9 ppm
Magnesium	$CaCO_3$	53.52 ppm
Sodium	$CaCO_3$	73.44 ppm
Potassium	$CaCO_3$	1.02 ppm
Iron in Soln.	Fe	0.1 ppm
Hydrogen (FMA)	$CaCO_3$	- ppm
TOTAL CATIONS (except iron)	$CaCO_3$	256.88 ppm
Bicarbonate	$CaCO_3$	143.4 ppm
Carbonate	$CaCO_3$	0.53 ppm
Hydroxide	$CaCO_3$	0.02 ppm
Sulphate	$CaCO_3$	59.85 ppm
Chloride	$CaCO_3$	50.82 ppm
Nitrate	$CaCO_3$	1.21 ppm
Phosphate	$CaCO_3$	- ppm
Fluoride	$CaCO_3$	1.05 ppm
TOTAL ANIONS	$CaCO_3$	256.88 ppm
Reactive Silica	SiO_2	10 ppm
Total Suspended Solid	CaCO3	15 ppm (overload condition)
Conductivity at 25 deg C		450 Microsiemens/cm (max)
pH value at 25^0 C	-	7.62
Turbidity		Not to exceed 15 NTU (max)

Note:- The COC of CW system has been considered as 5.0.

SECTION – C1
SPECIFIC TECHNICAL REQUIREMENT- MECHANICAL

1.0 GENERAL

1.1 The Condensate Polishing Units with a common external regeneration system and associated accessories shall conform to the technical specification for **1X800 MW TSGENCO KOTHAGUDEM TPS,STAGE-VII, PALONCHA.**

2.0 DESIGN CONDITIONS FOR CONDENSATE POLISHING PLANT

The Condensate Polishing Plant is designed for the condensate flow corresponding to VWO (valve wide open) condition at 1%make up.

3.0 BRIEF DESCRIPTION OF THE SYSTEM

The proposed condensate plant shall treat the entire condensate of the turbine generator of unit of power station. The proposed schematic arrangement of the condensate polishing plant and its regeneration facility shall be as per the enclosed P&I Diagram. Arrangement of piping, valves and instruments shown in the P&ID are bare minimum. The bidder shall include the complete system including regeneration facility as elaborated in this specification meeting the contractual & system requirements.

The condensate polisher service vessels shall be located in the TG hall of corresponding unit. The resins shall be transferred to and from the common regeneration facility by sluicing through a pipeline hydraulically.

The regeneration process offered by the bidder shall be of proven design and shall essentially be the same process by virtue of which the bidder is qualified and shall give resin-separation compatible with the desired effluent quality.

4.0 SCOPE OF SUPPLY (MECHANICAL)

Following are in bidder's scope of supply:

Broad scope of supply (mechanical) for this package is detailed below and as indicated in relevant portion of this specification.

A. SERVICE VESSEL AREA FACILITY

1) Three (3X50%) service vessels for 800 MW unit.

2) Each Condensate polisher vessels shall be complete with condensate inlet and outlet connections, connections for resin transfer to and from the vessels, bed support-cum-under drain system, inlet water distributors, air distribution arrangement for resin mixing, all fittings and appurtenances etc. as specified and as required.

3) One no External resin traps at the outlet of each of the polisher vessel, designed for in-place manual back washing.

4) Condensate inlet and outlet headers with pipe connections to the condensate polisher vessels.

5) Resin transfer lines of stainless steel construction between the external regeneration facilities to the condensate polisher vessels along with all necessary supports, anchors etc for 800 MW unit.

6) Rinse water outlet header of each condensate-polishing unit shall be provided with a pressure reducing valve and orifice plate, suitably designed to enable the water entry to the condenser hot well under all operating condition of condenser. The pressure reducing station shall consist of either a pressure reducing valve (reducing the pressure from design pressure of service vessel to condenser vacuum) or a combination of orifice plates to reduce pressure from design pressure of service vessel to 2 kg/cm2 and a pressure reducing valve from 2 kg/cm2 to condenser vacuum.

7) All necessary valves and fittings for the installations with actuators necessary for their remote operation. These shall include suitable fool proof arrangement to prevent accidental over pressurization of the resin transfer pipeline and regeneration facilities connected to it which are designed for pressure much lower than that of the polisher service vessels.

8) A common drain header for the condensate polisher service vessels of unit up to the condenser hot well.

9) All necessary drains, vents and sampling points, with valves as specified and as required.

10) Gland sealing water piping for the valves in the rinse water line.

11) Two nos. (1W + 1S) oil free type air blowers with electric motor drives for each unit for supplying air required for mixing the resins in the service vessels. Each blower shall be complete with motor, V-belt drive with belt guard, inlet filter, silencer, flexible couplings and discharge snubber, acoustic hood, relief valve etc. all mounted on a single base.

12) Two (2) nos.(2x100%), Rinse Recirculation pumps, each complete with electrical drive motor and all other accessories as required.

13) Complete Instrumentation and Control for automatic operation.

14) Instruments racks for mounting pressure & flow transmitters, pressure switches, conductivity analyzers etc. for each of condensate polisher mixed beds.

15) Emergency bypass between the condensate influent and effluent headers with a modulating butterfly type control valve, along with wafer type butterfly isolation valves (resilient material seated, to ensure bubble tight shut off) on the upstream and downstream side of the control valve. The control valve shall be of 1x100% configuration to achieve proper control under all operating conditions. Isolation valve shall be provided with geared operators for manual operation. In addition to control valve one no. manual valve of similar capacity in the bypass of control valve shall be provided as per P&ID For Condensate Polishing Unit.

16) Five (5) complete charges of resins (cation + anion + inert (if applicable)) along with 1 charge for resin make up hopper shall be provided.

In addition, the above charges will include make-up resin for first three years of operation also.(Quantity of make-up resins shall be calculated on the basis of 3% and 5% attrition loss per annum for cation and anion resin respectively).

17) One no specific Conductivity Analyzer at condensate inlet header, one at condensate outlet header, and one each at outlet of each condensate polishing vessel for the unit.

18) One no cation Conductivity Analyzer at condensate outlet header, and one each at outlet of each condensate polishing vessel for the unit.

19) One no pH Analyzer at condensate inlet header, one at condensate outlet header and one each at outlet of each condensate polishing vessel for the unit..

20) One no multichannel silica analyzer at outlet of the three service vessels & common outlet header. Total no of multichannel silica analyzers for the unit shall be one.

21) One no multichannel sodium analyzer at outlet of the three service vessels & common outlet header. Total no of multichannel sodium analyzers for the unit shall be one.

22) Complete instrumentation and controls for this system, including the differential pressure transmitters, panel mounted indicating type controller with provision for remote manual operation, actuator for the control valve with positioner etc. All tubing, wiring, air sets, and other fittings, required to complete the system.

23) All valves, which are subjected to the pressure of service vessel, shall be considered as high pressure valves. Rest shall be considered as low pressure valves.

24) All the piping, valves, fitting, accessories etc. used in service vessel area shall be 300# class minimum.

25) All the minimum instrumentation required as per P&ID For Condensate Polishing Unit.

B. REGENERATION SYSTEM

I. One common facility for regeneration of the resins from the condensate polishers of all the TG units shall be provided by the bidder and consisting of following:

1) One no Resin Separation & Cation Regeneration Vessel complete with all accessories.

2) One no Anion resin regeneration vessel with all accessories

3) One no Mixed resin storage vessel complete with all accessories.

4) All vessels must be complete with vents, drains, piping & valves for air scrubbing, back-washing & regeneration process.

5) All internals, fittings and appurtenances for these vessels.

6) Common waste effluent header with one resin trap designed for in place manual backwashing.

7) The type of vessels indicated above (at S.No 1, 2, and 3) shall be as per supplier process requirement. However design requirement shall be as per tender specification.

8) Resin make-up hopper complete with water ejector system for resin make up. The resin make-up hopper tank shall be sized to handle up to 150 liters of as received new resin per single injection or maximum attrition loss whichever is higher.

9) Two (2) nos. (1W+1S) oil free type air blowers with electric motor drives, for supplying all the process air required for cleaning of the resins and their regeneration processes. Each blower shall be complete with motor, V-belt drive with belt guard, inlet filter, silencer, flexible couplings and discharge snubber, acoustic hood, relief valve etc all mounted on a single base.

10) Two (2X100%) nos. DM water pumps (Located near DM water storage Tank) for resin transfer, regeneration, chemical preparation & dilution with electric motor drives for water supply for regeneration, chemical preparation, dilution, etc. and resin transfer from the service vessel to the regeneration area & vice-versa.

11) One no. resin trap at common discharge line of CPU regeneration vessel.

12) All integral pipe works, valves, internals, fittings, hangers, supports and appurtenances etc for these vessels.

13) Two (2) sets of safety equipment comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided. Two number personnel water drench shower/safety shower and eye bath in regeneration area shall be provided by the bidder.

14) Bidder to included one no toilet block having facilities for Ladies & Gents as per attached Space available for CPU Regeneration area(Vide ref. Dwg. No. PE-DG-410-155A-A003).

II. ALKALI PREPARATION FACILITY

In order to facilitate erection at site alkali preparation equipment shall be mounted on structural steel skids and assembled (including piping) at the manufacturer's shop, to the maximum extent possible, prior to shipping. The number of mechanical connections shall be minimized by the use of pipe headers wherever possible. The bidder may also supply and install these equipment's independently instead of assembling the skids. Complete facility for preparing alkali solution from alkali lye & flakes shall be included in Bidder's scope. This will consist of the following:

1) One number alkali storage tank complete with carbon dioxide absorber, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

2) One number alkali solution preparation tank. The tank shall consist of slow speed agitator driven by motor, carbon dioxide absorber, overflow seal, dissolving basket, integral pipe works, valves and all other required accessories.

3) One no. hot water tank with 2x50% electrical heating coil for heating of alkali diluent water, in a tank of mild steel rubber lined construction complete with integral pipe works, valves, instrumentation and all other accessories required shall be provided.

4) Two (2) nos. (1W+1S) alkali transfer cum recirculation pumps. These pumps shall take suction from the alkali preparation tank and alkali storage tank. These pumps shall be provided with a pulsation dampener at the outlet header of each pump along with necessary valves & instrumentation & accessories as required.

5) One (1) no. Activated carbon filter for alkali complete with internals, integral pipe works, valves and all other accessories as required.

6) One carbon trap at the outlet of ACF

7) One no. hose station for transfer of alkali. The hose station shall have two (2) nos. each 80 mm NB rubber hose connection.

8) Two (2) nos. (1W+1S) alkali unloading pumps along with necessary valves & instrumentation & accessories as required. These pumps shall take suction from the unloading tankers.

9) All interconnecting piping, valves and fittings & instrumentation as required to complete the system.

III. Acid and Alkali Dosing System

All the equipments for dosing of acid, alkali solutions are rated to provide a maximum dosing rate of 20% in excess of that required from process calculations. Similarly all the tanks shall be sized to store one regeneration requirement with 20% excess requirements.

The Acid and Alkali dosing systems shall be skid mounted and shall consist of at least following equipment's:

1) Two (2) nos. (1W+1S) acid unloading/transfer pumps along with necessary valves & instrumentation & accessories as required. These pumps shall take suction from the unloading tankers.

2) One (01) number acid storage tanks complete with fume absorbers, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

3) One (01) number acid measuring tanks complete with fume absorbers, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

4) Two (02) numbers (1W+1S) Positive displacement type metering pumps for acid dosing with electric motor drive, pulsation dampener & safety relief valve at the outlet header of each pump along with all other required accessories.

5) One (1) no Alkali measuring (day) tank including slow speed agitator driven by motor complete with carbon dioxide absorber, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

6) Two (02) numbers (1W+1S) Positive displacement type metering pumps for alkali dosing with electric motor drive, pulsation dampener & safety relief valve at the outlet header of each pump along with all other required accessories.

7) One no. hose station for transfer of acid. The hose station shall have two (2) nos. each 80 mm NB rubber hose connection.

8) DM water supply separately, for acid and alkali, each provided with an automatic on-off valve, a throttling valve for setting of flow, a local flow indicator, and a mixing tee where the chemicals get injected into the water stream.

9) All necessary suction and discharge piping for these pumps including all strainers, valves and fittings as required, upto the mixing tee with the diluent water.

10) All the equipment, piping etc. shall be assembled on two structural steel skids one for acid and one for alkali dosing equipment. The bidder shall supply all anchor bolts, foundation plates, sleeves, nuts, inserts etc. to be embedded in concrete for these equipment skids. The length of the foundation bolts shall be liberally sized to reach below the reinforcement level. Each equipment skid shall be provided with suitable lighting lugs, eye bolts etc. to facilitate erection and maintenance.

C. NPIT AND NPIT DISPOSAL SYSTEM

1) The waste water from the external regeneration facility is led to the N.Pit.

2) Two (2) nos (1W+1S) N.Pit disposal pumps along with necessary valves & instrumentation & accessories as required.

3) One (1) no Alkali tank for N-Pit including slow speed agitator driven by motor complete with carbon dioxide absorber, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

4) One (01) no acid tank for N-Pit complete with fume absorbers, overflow seal, integral pipe works, valves, instrumentation and all other accessories required.

5) Two (2) nos pH Analyser at effluent discharge header, shall be in the scope of bidder.

D. PIPING

All the piping as listed below & indicated in P&ID for Condensate Polishing Unit shall be in bidder's scope. The below indicated pipes shall be designed, supplied, erected, laid and tested by the bidder. Elbows, tees, flanges Hangers and supports, embedment plates with lugs etc required for the below given piping shall also be provided by the bidder.

1) Minimum OD 457.0 X 12.7 mm thick service vessel inlet header confirming to CS ASTM A 106 Gr-C.

2) Minimum OD 457.0 X 12.7 mm thick service vessel outlet header confirming to CS to ASTM A 106 Gr-C.

3) 150 m of minimum OD 168.3 x 7.11 mm thick rinse water outlet piping from service vessel to condenser hotwell confirming to CS to ASTM A 106 Gr-B.

4) Rinse recirculation piping confirming to CS to ASTM A 106 Gr-C

5) 360 m of minimum 80 NB resin transfer piping confirming to SS 304 Sch 10S (minimum).

6) 360 m of minimum 100 NB DM water piping for the CPU Service Vessel Area to regeneration area confirming SS 304 Sch 10S (minimum). In addition to it, all the distribution of the same inside the CPU Service Vessel Area for unit shall be in bidder's scope.

7) 200 m of minimum 100 NB DM water piping from CPU DM water pumps (Located near DM water storage Tank) to CPU regeneration building confirming to SS 304 Sch 10S (minimum). In addition to it, all the distribution of the same inside the CPU regeneration area shall be in bidder's scope.

8) 700m of minimum 150 NB effluent transfer piping for the N-pit confirming to CSRL.

9) Minimum 50 NB of piping handling alkali and alkali solution confirming to CPVC Sch 80 .The distribution of the same inside the CPU regeneration area shall be in bidder's scope.

10) Minimum 50 NB of piping handling acid service confirming to CPVC Sch 80.The distribution of the same inside the CPU regeneration area shall be in bidder's scope.

11) Piping for the instrument & service air confirming to SS 304 Sch 40S for size equal to & less than 50 NB and SS 304 Sch 10S for size equal to & more than 65 NB. The distribution of the same inside the CPU regeneration area and CPU service vessel area shall be in bidder's scope.

12) Minimum 65 NB of DM pump recirculation piping confirming to SS 304 Sch 10S (minimum).shall be in bidder's scope.

13) All piping within each of the above skids/equipment shall be in bidder's scope.

14) DM water piping from each of DM water storage tanks to CPU DM water pumps for resin transfer, regeneration, chemical preparation & dilution (including re circulation lines connected to DM water storage tanks).

15) DM water piping from each CPU DM water pumps for resin transfer, regeneration, chemical preparation & dilution to service vessel area and to required facilities in regeneration area shall be in bidder's scope.

16) Service water piping, instrument air piping, service air piping, potable water piping, etc. as applicable as per the Terminal Points shall be in bidder's scope.

17) All piping between the CPU regeneration area and the skids for alkali preparation facility and acid & alkali dosing system shall be designed, supplied, erected & tested by the bidder and shall be in bidder's scope. The demineralized water piping to the required CPU regeneration area facilities, acid & alkali piping from storage tanks to respective acid & alkali skids in the CPU regeneration area, alkali piping from alkali solution preparation facility to the alkali dosing skid, and dilute acid & alkali solution piping from the acid & alkali dosing skids to the required CPU regeneration vessels & other facilities in the CPU regeneration area shall be in bidder' scope.

E. ADDITIONAL REQUIREMENT

1) Operating platforms, ladders, supports and other structural works for each vessel and tanks to facilitate accessibility for operation and maintenance for all the condensate polisher mixed beds, regeneration vessels, storage tanks, alkali and acid measuring tanks & preparation tanks and other equipment's etc. is also in bidder's scope.

2) Initial charge of all lubricants & grease.

3) All special tools necessary for proper maintenance or adjustment of the equipment packaged in permanent box. Finish paints for touch-up painting of equipment after erection at site in sealed container.

Start-up and commissioning spares are in bidder's scope of supply.

Start-up and Commissioning spares are those which would be required during equipment or system testing, start-up and commissioning. All spares used until the plant is finally handed over by the bidder to the customer come under this category. All start-up and commissioning spares as required shall be provided by the bidder without any additional cost to the BHEL and customer. Bidder to provide spares as per their system requirement without any commercial and delivery implication to BHEL/Customer during detailed engineering. List of spares shall be furnished by BIDDER along with the offer.

Bidder shall be responsible for the ready and timely availability for all the startup and commissioning spares as required during various stages of testing, cleaning and commissioning up to handing over of each unit of the total plant.
An adequate stock of start-up spares shall be available at the site such that the start-up and commissioning of the equipment/systems, Performance guarantee test and handing over the equipment/ systems to the customer will be carried out without hindrance and delay. All start-up spares which remain unused after the taking over of the plant shall remain the property of the customer.

4) Mandatory spares. .(Refer attached, Annexure-V/Section-C1).

5) Wherever pipe racks are not available, pipes shall run on pedestals or below ground. All fixing items such as U clamps, nuts, bolts etc. required to lay the pipes on pedestals shall be in bidder's scope of work. Coating, wrapping and protection required for buries pipes shall be in bidder's scope of work.

6) Bidder shall consider 12 m static head + 10% margin in addition to the losses in straight and bend in pipes and valves etc. while selection of pump head during detailed engineering.

7) All the first fill and one Year's topping requirements of consumable such as greases, oil, lubricants, servo fluids/control fluids, gases and etc. which will be required to put the equipment covered under the scope of specifications, into successful commissioning / initial operation and to establish completion of facilities shall be furnished by the bidder. Suitable standard lubricants as available in India are desired. Efforts should be made to limit the variety of lubricants to minimum.

8) MCC shall be located in CPU regeneration area. All regeneration vessels and chemical dosing facilities shall be located in Building. Bulk chemical storage tanks, unloading and transfer pumps shall be located open to sky. However control panels and MCC shall be located in building in regeneration area.

9) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.

10) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.

11) Engineering for this project is being carried out in 3D environment at BHEL end. Name of engineering platform on which BHEL is doing the project IS Smart Plant Suite. This is being done to have automated interface checking and thereby minimising rework at site. Hence bidder, in their own interest, is requested to prepare all layout drawings using 3D Modelling software. These drawings will also be made available to BHEL in soft for checking interface with other agencies in consolidated layout drawings. Bidder's inability to prepare drawing using 3D Modelling software will not be criterion for evaluation of their bid.

12) Bidders shall make Site visit in order to familiarize themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t. existing facility at site. Customer approval on any drawing having details of existing facility shall not be cited by the successful bidder a valid reason for any shortcoming in the work by them. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail engineering.

13) Successful bidder shall furnish detailed erection manual for each of the equipment as well as complete system supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.

14) Final Electrical Load list will be submitted by the successful bidder as per agreed drawing/ doc submission schedule. Thereafter any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendor cost of any changes necessitated in the switch gear /MCC on account of changed loads.

15) Wherever CIVIL works is excluded from the bidder's scope, successful bidder shall furnish civil assignment / scope drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence. In case any modification is required in the civil work already carried out based on final civil inputs given by vendor, BHEL reserves the right to debit cost of such rework to vendor".

16) Necessary approach (platform) shall be provided for all the Pneumatic Valves & Flow Orifice Plates. Necessary drawing/documents, indicating the same, shall be provided by successful bidder during contract stage.

17) AII the transmitters (Pressure,Temperature,Flow, Level ,Differential Pressure etc.), which are used in system for interlock & protection shall be redundant. The same shall be indicated in P&ID by successful bidder after award of contract.

18) Instruments, analyzers etc. used in system should sustain operating & design parameters of system. In case operating & design parameters of instruments, analysers are less than system's parameters, then necessary arrangement/accessories shall be provided by bidder for safe operation.

19) Space available for CPU service Vessels area & CPU Regeneration area(Vide ref. Dwg. No. PE-DG-410-155A-A002 & PE-DG-410-155A-A003) are attached in Section-C1 of this specification. Bidder to accommodate their equipment within the space provided.

20) Bidder to submit BBU during detailed engineering after approval of Basic documents. BBU shall be equal to BOQ for the package and there shall be no price and delivery implication is applicable to BHEL / customer for the same. None of the items supplied for the project as non-billable. Incomplete BBU shall not be review by BHEL. The Break-up (%) of Supply prices of DM plant package in the BBU shall be in line with the provided below details:

1.0	Break-up (%) of supply prices given at Sl No-2.1 in price schedule (To be used during contract execution for payment).	
1.1	Lumpsum firm price for supply of Service vessels inclusive of all taxes, duties and other levies as applicable.	15% of sl no 2.1 above.
1.2	Lumpsum firm price for supply of Pressure vessels other than Service vessels inclusive of all taxes, duties and other levies as applicable.	10% of sl no 2.1 above.
1.3	Lumpsum firm price for supply of Resin inclusive of all taxes, duties and other levies as applicable.	12% of sl no 2.1 above.
1.4	Lumpsum firm price for supply of Atmospheric tank inclusive of all taxes, duties and other levies as applicable.	6% of sl no 2.1 above.
1.5	Lumpsum firm price for supply of Low Pressure Valves inclusive of all taxes, duties and other levies as applicable.	7% of sl no 2.1 above.
1.6	Lumpsum firm price for supply of High Pressure Valves inclusive of all taxes, duties and other levies as applicable.	10% of sl no 2.1 above.
1.7	Lumpsum firm price for supply of Instruments & Analyser inclusive of all taxes, duties and other levies as applicable.	8% of sl no 2.1 above.

1.8	Lumpsum firm price for supply of Rotary Equipments (Pumps,Blowers,Agitators etc.) inclusive of all taxes, duties and other levies as applicable.	5% of sl no 2.1 above.
1.9	Lumpsum firm price for supply of Piping & Fittings inclusive of all taxes, duties and other levies as applicable.	10% of sl no 2.1 above.
1.10	Lumpsum firm price for supply of Balance items inclusive of all taxes, duties and other levies as applicable.	7% of sl no 2.1 above.
1.11	Submission & approval of all documents including DCS engineering inputs comprising of following documents as minimum requirement (i.e. O&M Manual, PG test procedure, Recommended control scheme & write-up, Input/output list, Drive List, List of alarm & SOE with set points, Grouping of Instruments, JB details, Graphics/Mimic, Power supply requirement for instruments) & Deputation of vendors Engineer during FAT (at Bangalore) to certify correctness & complete implementation of Control Logic.	10% of sl no 2.1 above.

21) Bidder to take care for cooling/ lubrication of the pumps being supplied by the bidder under this technical specification. If service water pressure requirement is more than available pressure, bidder to consider two (2) nos. cooling pump for package.

22) Any statutory requirement / clearance required for the packages from government / local body shall be in bidder's scope.

23) KKS codes for all drives and instruments for the project have to be followed.

24) KKS numbering shall be followed for all instruments/equipments/tanks/valves/pipe etc for maintaining plant quality standard.

25) The suction & discharge valves of pumps shall be provided with open & close limit switches for auto operation.

5.0 SCOPE OF SUPPLY (ELECTRICAL)

Complete electrical as per specification and details indicated in Section C2 (Specific Technical Requirement Electrical) and D2 (General Technical Requirement Electrical).

6.0 SCOPE OF SUPPLY (C&I)

Complete C&I as per specification and details indicated in Section C3 (Specific Technical Requirement C&I) and D3 (General Technical Requirement C&I).

7.0 SCOPE OF SUPPLY (CIVIL)

Total Civil is in BHEL's Scope of work, however detailed Civil Input drawing shall be provided by bidder. Successful bidder shall furnish civil assignment drawings. The corresponding CIVIL drawing prepared by BHEL / CIVIL agency, based on civil assignment drawing of bidder will be furnished to the successful bidder for concurrence. In case any modification is required in the civil work already carried out based on final civil inputs given by vendor, BHEL reserves the right to debit cost of such rework to vendor".

8.0 SCOPE OF SERVICES

The bidder's scope also includes following services for scope under this specification:

(i) Erection and Commissioning.

(ii) Arrangement of all instruments, reagents, monitoring gadgets for monitoring, pre-commissioning, carrying out trial run & commissioning and Performance guarantee test.

(iii) Monitoring gadgets, instruments and equipments required for maintenance.

(iv) All personnel required during maintenance and Performance guarantee test.

(v) Trial run for requisite period.

(vi) Performance Guarantee Test.

(vii) Painting shall be as specified in ANNEXURE- IV of this technical specification. However any variation in the painting schedule as finally approved by BHEL & Customer shall be taken care by the bidder without any commercial & delivery implication to BHEL & Customer.

(viii) Final touch up paint at site.

(ix) Presence of Bidder at BHEL-EDN-Banglore during FAT of DDCMIS as per Cl.No.-6/Section-C3 (C&I)

9.0 TERMINAL POINTS

9.1 CONDENSATE POLISHING PLANT - SERVICE VESSEL AREA

(i) Service vessel inlet – (OD 457.0 X 12.7 mm thick, CS to ASTM A 106 Gr-C) - Single piping connection at 5 m in TG Hall near service vessel area, As per attached Composite Piping Layout Plan Below Mezzanine Floor Dwg.No. PE-DG-410-100-M032.Rev-00

(ii) Service vessel outlet – (OD 457.0 X 12.7 mm thick, CS to ASTM A 106 Gr-C) - Single piping connection at 5 m in TG Hall near service vessel area, As per attached Composite Piping Layout Plan Below Mezzanine Floor Dwg.No. PE-DG-410-100-M032.Rev-00

(iii) Rinse water outlet- Rinse water outlet piping (minimum OD 168.3 x 7.11 mm, CS to ASTM A 106 Gr.B) till condenser hot well for unit is in the scope of bidder.

(iv) 25 NB connection of Instrument air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from service vessel area. However distribution and piping inside service vessel area shall be in bidder's scope.

(v) 50 NB connection of Service air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from service vessel area. However distribution and piping inside service vessel area shall be in bidder's scope.
If service air required is more than provided by BHEL, bidder to provide necessary compressors or blowers and associated valves, piping, fittings, flanges, instruments etc. to meet the system requirement.

9.2 EXTERNAL REGENERATION AREA

(i) DM Water Supply – From the outlet nozzle of the DM water storage tanks to the pump suctions (DM water pumps for resin transfer, regeneration, chemical preparation & dilution) shall be in the scope of bidder.

(ii) DM Pump Recirculation Lines – From DM water pumps for resin transfer, regeneration, chemical preparation & dilution header to DM Water storage tanks recirculation nozzle/inlet nozzle shall also be in the scope of bidder.

(iii) 25 NB Instrument air supply at 5 to 7 kg/cm2 (g) – At 5 meter distance from the regeneration area. However distribution and piping inside CPU regeneration area shall be in bidder's scope.

(iv) 25 NB Service air supply at 5 to 7 kg/cm2 (g) - At 5 meter distance from regeneration area. However distribution and piping inside CPU regeneration area shall be in bidder's scope. If service air required is more than provided by BHEL, bidder to provide necessary compressors/blowers and associated valves, piping, fittings, flanges, instruments etc. to meet the system requirement.

(vi) Service water connection (25 NB connections) at 5 meter distance from regeneration building. Piping inside regeneration area for mentioned services will be in bidder's scope.

10.0 EXCLUSIONS

10.1 All civil works including foundation of equipment. However complete grouting for equipment, fixing and any concreting inside vessels and lining shall be in the scope of the bidder. Also civil works including operating / maintenance platforms and interconnection platforms (if any) with ladders / stairs & handrails, structural supports and hangers for pipes / cables / ducts, crane rails, all embedment and inserts with lugs including anchor fasteners, bolts etc., dressing of foundations, grouting of pockets and underpinning of base plates for equipment / structures and fixing supports, filling and finishing of openings in walls, floors, cladding, roof and trenches shall be in bidder's scope.

Main pipe trestles interconnecting CPU regeneration building and Service vessel Pipe trestle. However, auxiliary structure, hanger/support components for all the piping (CPU regeneration area, in acid/alkali handling area, interconnecting acid/alkali storage area ,CPU service vessels, DM water piping, resin transfer piping, instrument air piping, service air piping and effluent disposal piping etc.) are in bidder's scope. Maximum height of the pipe trestle between CPU regeneration area and service vessel area may be considered as 13.0M.

10.2 Instrument air & service air up to terminal points.

10.3 All chemicals.

10.4 Air conditioning, ventilation & fire fighting facilities.

10.5 Other exclusions are mentioned in the electrical & C&I parts of this specification.

11.0 QP AND SUB VENDOR APPROVAL

11.1 QP requirements are specified as **ANNEXURE -I.** BHEL & customer reserves the right for inspection of imported items by BHEL/customer officials (if felt necessary).The same shall be decided during detail engineering during approval of QP's.

11.2 However any additional comments as given by BHEL/Customer shall be adhered by the bidder without any commercial & delivery implication to BHEL.

11.3 Indicative sub vendor list is enclosed as ANNEXURE-II. However any additional sub vendor shall be subjected to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL. The Final sub vendor list shall subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

12.0 PERFORMANCE GUARANTEE TEST

The Performance guarantee test shall be as per Annexure-VI/Section-C1.

13.0 DESIGN/ CONSTRUCTION

In addition to the requirements of Section C & D the following shall also be complied under scope of this specification.

The P&I diagram is enclosed herein in this section for bidders compliance.

The material of construction specified in data sheet-A are minimum requirements and material of construction for other components not specified shall be similarly selected by the bidder for intended duty which shall be subject to BHEL / Customer approval during detail engineering without any commercial & delivery implication to BHEL.

14.0 DRAWING/DOCUMENTS REQUIREMENT

After award of LOI, following minimum drawing/documents shall be submitted by the bidder for BHEL and Customer approval. However any additional drawing/document if found necessary for completion of the engineering, the same shall be submitted by bidder without any commercial & delivery implication to BHEL.
For the Drawings/Documents Submission Procedure, please refer **Annexure-III**. The submission of soft copy or hard copy of the drawing/document whichever is later will be considered as final date of submission of the drawing/document. The bidder has to submit the revised drawing/document along with the compliance sheet

indicating enumerate reply to all BHEL and customer comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER without price & delivery implication.
Bidder to note that the drawings to be submitted by bidder in the event of award of contract shall be as per the below given drawing/document list. Bidder to note that any additional drawings/documents requirement during detailed engineering shall be provided by bidder without any technical, commercial and delivery implications to BHEL. Bidder confirmed drawings submission schedule as follows:

a. Drawing/documents submission schedule: First submission of basic drawings/ documents – (Please refer MDL for list of basic drawing/documents & submission schedule).
b. The rest of the drawings/documents shall be submitted within three months from the date of approval of P&ID and Process Design & Sizing Calculation in CAT-II.
c. Every revised submission incorporating comments – within 10 days.

Bidder further confirmed that drawings submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

(a) List and schedule of drawings/documents to be submitted after award of contract:-

MASTER DRAWING LIST(MDL)

S.No.	Drawing/Document No.	Drawing/Document Title	No. of weeks for drawing/document submission after placing LOI/PO	Paper Size of Dwg/Docs.
1.0	PE-V2-410-155A-A001*****	P& I DIAGRAM OF CONDENSATE POLISHING UNIT	4	A1
2.0	PE-V2-410-155A-A002*****	EQUIPMENT LAYOUT OF CONDENSATE POLISHING UNIT (SERVICE VESSEL AREA)	4	A1
3.0	PE-V2-410-155A-A003*****	EQUIPMENT LAYOUT OF CONDENSATE POLISHING UNIT (REGENERATION AREA)	4	A1
4.0	PE-V2-410-155A-A004*****	PROCESS DESIGN AND SIZING CALCULATIONS , DATA SHEET OF RESIN VESSEL THICKNESS AND PRESSURE DROP CALCULATIONS FOR CPU	4	A4
5.0	PE-V2-410-155A-A005*****	SUB-VENDOR LIST AND INSPECTION CRITERIA	4	A4
6.0	PE-V2-410-155A-A006*****	OPERATION & CONTROL PHILOSOPHY FOR CPU ALONG WITH CONTROL SYSTEM CONFIGURATION DIAGRAM	6	A4
7.0	PE-V2-410-155A-A007	CIVIL ASSIGNMENT DRAWING OF CONDENSATE POLISHING UNIT (SERVICE VESSEL AREA)	8	A1
8.0	PE-V2-410-155A-A008	CIVIL ASSIGNMENT DRAWING OF CONDENSATE POLISHING UNIT REGENERATION AREA)	8	A1
9.0	PE-V2-410-155A-A009	PIPING LAYOUT (REGENERATION AREA)	10	A1
10.0	PE-V2-410-155A-A010	PIPING LAYOUT (SERVICE VESSEL AREA)	10	A1
11.0	PE-V2-410-155A-A011	ELECTRICAL LOAD DATA	10	A4

12.0	PE-V2-410-155A-A012	GA DRAWING OF SERVICE VESSELS FOR CPU	10	A1
13.0	PE-V2-410-155A-A013	QAP FOR SERVICE VESSEL	10	A4
14.0	PE-V2-410-155A-A014	GA DRAWING OF PRESSURE VESSELS FOR CPU	10	A1
15.0	PE-V2-410-155A-A015	QAP FOR PRESSURE VESSELS	10	A4
16.0	PE-V2-410-155A-A016	GA DRAWING OF ATMOSPHERIC TANKS FOR CPU	10	A1
17.0	PE-V2-410-155A-A017	QAP FOR ATMOSPHERIC TANKS	10	A4
18.0	PE-V2-410-155A-A018	TECHNICAL DATA SHEET OF HORIZONTAL / VERTICAL CENTRIFUGAL PUMPS	10	A4
19.0	PE-V2-410-155A-A019	TECHNICAL DATA SHEET FOR METERING PUMPS	10	A4
20.0	PE-V2-410-155A-A020	TECHNICAL DATA SHEET OF BLOWERS	10	A4
21.0	PE-V2-410-155A-A021	TECHNICAL DATA SHEET FOR MOTOR	10	A4
22.0	PE-V2-410-155A-A022	QAP FOR HORIZONTAL / VERTICAL CENTRIFUGAL PUMPS WITH MOTOR	10	A4
23.0	PE-V2-410-155A-A023	QAP FOR METERING PUMPS WITH MOTORS	10	A4
24.0	PE-V2-410-155A-A024	QAP FOR BLOWERS WITH MOTORS	10	A4
25.0	PE-V2-410-155A-A025	TECHNICAL DATA SHEET FOR HIGH PRESSURE VALVES	10	A4
26.0	PE-V2-410-155A-A026	TECHNICAL DATA SHEET FOR LOW PRESSURE VALVES	10	A4
27.0	PE-V2-410-155A-A027	QAP FOR VALVES	10	A4
28.0	PE-V2-410-155A-A028	TECHNICAL DATA SHEET FOR INSTRUMENTS	10	A4
29.0	PE-V2-410-155A-A029	TECHNICAL DATA SHEET FOR ANALYZERS	10	A4
30.0	PE-V2-410-155A-A030	TECHNICAL DATA SHEET FOR HEATER AND RESIN	10	A4
31.0	PE-V2-410-155A-A031	VALVE SEQUENCE CHART	10	A3
32.0	PE-V2-410-155A-A032	INSTRUMENT SCHEDULE	12	A3

33.0	PE-V2-410-155A-A033	VALVE SCHEDULE	12	A3
36.0	PE-V2-410-155A-A036*****	CABLE TRAY/TRENCH & CONDUIT ROUTING AND EARTHING LAYOUT DIAGRAM FOR CONDENSATE POLISHING UNIT (REGENERATION AREA)	12	A1
37.0	PE-V2-410-155A-A037*****	CABLE TRAY/TRENCH & CONDUIT ROUTING AND EARTHING LAYOUT DIAGRAM FOR CONDENSATE POLISHING UNIT (SERVICE VESSEL AREA)	12	A1
38.0	PE-V2-410-155A-A038	DATASHEET OF RESIN TRAP, CARBON TRAP, ACF, AGITATOR	12	A4
39.0	PE-V2-410-155A-A039	GA OF BATTERY BANK AND CHARGER	12	A4
40.0	PE-V2-410-155A-A040	QAP / ICL FOR CPU (FOR BALANCE OF ITEMS)	12	A4
41.0	PE-V2-410-155A-A041	ERECTION PROCEDURE	16	A4
42.0	PE-V2-410-155A-A042	YARD PIPING LAYOUT	16	A1
43.0	PE-V2-410-155A-A043	CABLE SCHEDULE FOR CONDENSATE POLISHING UNIT	16	A3
44.0	PE-V2-410-155A-A044	PERFORMANCE GUARANTEE TEST PROCEDURE FOR CONDENSATE POLISHING UNIT	20	A4
45.0	PE-V2-410-155A-A045	ENGINEERING BOQ	20	A4
46.0	PE-V2-410-155A-A046	O&M MANUAL FOR CONDENSATE POLISHING UNIT	24	A4

Note- The drawing/document marked as (*****) shall be considered as basic drawings/documents.In addition to above bidder to refer Section-C2 & C3 for documents related to Electrical & Control & instrumentation respectively.

(b) Bidder to note that drawings/documents submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drawings/documents approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7
- Internet speed – 2 mbps (Minimum preferred)
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked
- Vendor's internal proxy setting should not block DMS application's link
  - (http://124.124.36.198/wrenchwebaccess/login.aspx)
- DMS user manuals to be used by BHEL PEM vendors for uploading, viewing, revising, commenting and tracking documents on PEM's DMS have been uploaded on PEM internet website (www.bhelpem.com) under the Vendor session.
- For quick access bidder may refer the link http://bhelpem.com/DMSManuals/DMSManuals.html

15.0 SPARES

i) All the spares for the equipment under the contract provided by the vendor will strictly conform to the specifications and documents and will be identical to the corresponding main equipment/components supplied under the contract.

ii) The quality plan and the inspection requirement finalized for the main equipment will also be applicable to the corresponding spares.

VENDOR WARANTS-

1. That all spares supplied will be new and in accordance with the contract document and will be free from defects in design, material and workmanship and shall further guarantee as under.

2. In case of any failure in the original component/equipments due to faulty designs, materials and workmanship, the corresponding spare parts if any, supplied will be replaced without any extra cost to the BHEL and customer unless a joint examination and analysis by BHEL and/or customer of such spare parts prove that the defect found in the original part that failed can safely be assured not to be present in spare parts.

3. The long term availability of spares to the BHEL and the customer for the full life of the equipment covered under the contract and that before going out of production of spare parts of the equipment covered under the contract, vendor and his sub-vendors shall give the BHEL and the customer at least 24 (Twenty Four) months advance notice so that the latter may order his bulk requirements of spares, if he so desires. The same provision will also be applicable to the sub-vendors. Further, in case of discontinuance of manufacture of any spares by the vendors or his sub-vendors the vendors and his sub-vendors, will provide the BHEL and the customer, 2 (two) years in advance, with full manufacturing drawings, material specifications and technical information required by the BHEL and the customer for the purpose of manufacture of such items and also the right to manufacture such spares for their own requirements.

4. Further in case of discontinuance of supply of spares by the vendors or his sub-vendors, the vendor will provide the BHEL and the customer with full information for replacement of such spares with other equivalent makes, if so required by the BHEL and the customer.

5. Notwithstanding the above, the vendor shall be responsible for supply of spares for the lifetime of the package at reasonable prices. The prices of all future requirements of spares shall be derived from the corresponding ex-works price at which the orders for such spares have been placed by the BHEL and the customer as a part of the mandatory or long term or any other kind of spares. The base indices for calculating ex-works price shall be commissioning of last equipment under main contract.

iii) The vendor will indicate the delivery period of the spares, which the BHEL and the customer may procure in accordance with this clause.

iv) In case of emergency requirements of spares, the vendor would make every effort to expedite the manufacture and delivery of such spares on the basis of mutually agreed time schedule.

v) In case the vendor fails to supply the mandatory or long term or any other kind of spares on the terms stipulated above, the BHEL and the customer shall be entitled to purchase the same from the alternate sources at the risk and the cost of the vendor and recover from the vendor, the excess amount paid by the BHEL and the customer over the rates as per the contract. In the event of such risk purchase by the BHEL or the customer, the purchases will be as per the works and procurement policy of the BHEL and the customer prevalent at the time of such purchases and BHEL & the customer at his option may include a representative from the vendor in finalizing the purchases.

vi) It is expressly understood that the final settlement between the parties in terms of relevant clauses of the tender document shall not relieve the vendor of any of his obligations under the provision of long term availability of spares and such provisions shall continue to be enforced till the expiry of 30 (thirty) years period reckoned from the scheduled date of completion of trial operation of the last equipment unless otherwise discharged expressly in writing by the BHEL or the customer.

16.0 MINIMUM IMPORTED ITEMS

1. Resins.

17.0 Bidder to furnish 4 sets of techno-commercial bid including following documents/information (For Electrical and C&I please refer the respective section of the specification).

- Detailed process write up of the system offered for information (meeting the specification requirement for information purpose only).
- Deviation if any in the enclosed Schedule of deviation with cost of withdrawal only with mention of specification clause for which deviation is being asked. (Stamped & Signed)
- Compliance certificate.(Stamped & Signed)
- Schedule of Declaration. (Stamped & Signed)
- Electrical Load data in BHEL format (Stamped & Signed)
- Price Schedule duly filled in. (Stamped & Signed)
- List of Startup & commissioning spares, if any. (Stamped & Signed)
- Following guaranteed chemical consumption required per regeneration per vessel (in kg) to be furnished in sealed envelope. (Stamped & Signed)

  1. Acid (30% HCL) consumption per vessel per regeneration
  2. Alkali (48 % NaOH) consumption per vessel per regeneration.

18.0 SITE VISIT BEFORE SUBMISSION OF OFFER.

Bidders shall make Site visit in order to familiarize themselves with existing condition of site before submitting the bid in order to make their offer complete. During detail engineering also, the successful bidder shall be responsible for the correctness of details w.r.t existing facility at site. Customer approval on any drawing having details of existing facility shall not be cited by the successful bidder a valid reason for any shortcoming in the work by them. BHEL shall also not entertain any cost implication for any lack of input data with regard to site during detail ENGINEERING.

ANNEXURE-I

QUALITY PLAN

CONENSATE POLISHING PLANT

Items / Components \ Tests/Check	Material Test	WPS/PQR/Welder Qualification	DPT/MPI	Assembly Fit up	Dimension	RT	Hydraulic / Water Fill	Pneumatic Test	Functional/operational Test	Bleeding resistance tests	Adhesion/ Spark Test	Performance Test	Other Test	All Test as per relevant Std/ Appd Data Sheets	Dynamic Balancing	Remarks
CPU Service Vessel	Y[a]	Y	Y	Y	Y	Y	Y[3]						Y[1]			
Acid Alkali/Chemical Storage Tanks/ Vessels (LP)	Y[a]	Y	Y	Y	Y	Y[4]	Y									
Resins/Activated Carbon & Internals of CPU	Y[a]				Y									Y		
Rubber Lining of Vessels/ Tanks/ Pipes etc	Y[a]				Y					Y[2]	Y			Y		
Dosing Pumps/Metering Pumps	Y[a]						Y					Y[5]		Y		
Diaphragm Valves	Y[a]				Y		Y[6]	Y[6]						Y[7]		
Butterfly Valves (...ssure)					Y		Y[6]		Y				Y[8]			
1. Body (Cast)	Y[a]		Y[b]													
2. Disc (Cast)	Y[a]		Y[b]													
3. Shaft	Y[a]		Y										Y[c]			
High Pressure Ball Valves & Butterfly Valves	Y[a]						Y							Y		
Horizontal Centrifugal Pumps				Y	Y							Y[5]		Y		
1. Casing	Y[a]		Y[b]				Y									
2. Impeller	Y[a]		Y[b]												Y	
3. Shaft	Y[a]		Y										Y[c]		Y	
Rotary Blowers				Y	Y							Y		Y		
1. Casing	Y[a]		Y[b]				Y									
2. Rotor	Y[a]		Y										Y		Y	

Notes:

1. Heat Treatment shall be done as per ASME code.
2. Bleeding Resistance tests shall be done by keeping the sample in 33% HCl, 48% NaOH and DM Water for 72 Hrs.
3. Hydro Test shall be conducted, before Rubber lining.
4. As per code requirements.
5. As per HIS, USA.
6. Hydro test of body before Rubber lining. Seat Leakage test for Actuator operated valves shall be done by closing the Valves with Job Actuator.
7. Tests on Rubber parts such as Diaphragms shall be done per batch of Rubber mix, such as Tensile, Hardness, Adhesion, Spark Test, Bleed Resistance test and Flex test. Life Cycle test for Diaphragms for 50000 cycles etc shall also be done.
8. Hydro Test of Body, Seat & Disc Strength shall be carried out in accordance with latest edition of AWWA C-504 Standard. Proof of Design Test in accordance with latest edition of AWWA C-504 Standard shall also be carried out, if not carried out earlier. Seat Leakage test for Actuator operated valves shall be done by closing the Valves with Job Actuator. Seat leakage test shall be carried out in both directions.
   a) One per Heat/Heat Treatment batch/Lot
   b) On machined surfaces only.
   c) UT shall be done for shafts with Dia 50 mm or above.
9. For all other Misc. items, refer Table on LP piping.

10. Bidder will perform hydro test at 1.5 times of design pressure of entire Condensate Polishing Plant at site after commissioning of all the equipments in pressence of Customer/BHEL. Format of record will be through protocol, subject to BHEL/Customer acceptance.
11. Hydro test will be conducted before rubber lining.
12. Proof of Design (P.O.D.)

12.1 P.O.D. test certificates shall be furnished by the bidder for all applicable size-ranges and classes of Butterfly valves supplied by him in the presence of Customer's representative.

12.2 All valves that are designed and manufactured as per AWWA-C-504 shall be governed byt he relevant clauses of P.O.D test in AWWA-C-504. For Butterfly valves designed and manufactured to EN-593 or equivalent, the P.O.D. test methods and procedures shall generally follow the guidelines of AWWA-C-504 in all respect except that Body & seat hydro test and disc-strength test shall be conducted at the pressures specified in EN-593 or the applicable code. Actuators shall also meet requirements of P.O.D. test of AWWA-C-504.

ANNEXURE-II

SUB-VENDOR LIST
(INDICATIVE)

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
1.	PRESSURE VESSELS	GLOBAL STRUCTURES & COMPOSITE LTD	-	
		JASMINO POLYMERTECH	TALOJA	
		SYSCON ENGINEERS	AMBERNATH	
		S.V. FABRICATORS	NAVI MUMBAI	
		SPARK FABRICATORS / STEELCON	-	
		ANUP ENGINEERING	AHMEDABAD	
		MURTHAL TANKS & VESSELS	SONEPAT	
		TITAN ENGG.	DURGAPUR	
		RISHI INDUSTRIES	BAHALGARH	
		UNIVERSAL HEAT EXCHANGERS	-	
		ATS CHEM	SALEM/HOSUR	
		CHEM PROCESS SYSTEM	SANAND	
		PROGEN	CHENNAI	
		CRYSTAL ENGINEERING	HOSUR	
		ISHAN EQUIPMENTS	VADODARA	
2.	ATMOSPHERIC/ STORAGE TANKS	GLOBAL STRUCTURES & COMPOSITE LTD	-	
		JASMINO POLYMERTECH	TALOJA	
		SYSCON ENGINEERS	AMBERNATH	
		S.V. FABRICATORS	NAVI MUMBAI	
		SPARK FABRICATORS / STEELCON	-	
		ANUP ENGINEERING	AHMEDABAD	
		MURTHAL TANKS & VESSELS	SONEPAT	
		TITAN ENGG.	DURGAPUR	
		RISHI INDUSTRIES	BAHALGARH	
		UNIVERSAL HEAT EXCHANGERS	-	
		ATS CHEM	SALEM/HOSUR	
		CHEM PROCESS SYSTEM	SANAND	
		PROGEN	CHENNAI	
		CRYSTAL ENGINEERING	HOSUR	
		ISHAN EQUIPMENTS	VADODARA	
3.	RUBBER LINING (AT SHOP)	TEMSEC	KOLKATA	
		RISHI INDUSTRIES	SONEPAT	
		CORI ENGINEERS	CHENNAI	
		POLY RUBBER	MUMBAI	
		INDUSTRIAL LINING	VADODARA	
		ARUL RUBBERS	CHENNAI	
		JASMINO POLYMERTECH	TALOJA	
		WESTERN RUBBER	NAVI MUMBAI	
		ELASTOMER LINNING	AMBERNATH	
		EMKAY RUBBER	MUMBAI	
4.	AIR BLOWERS (TWIN LOBE TYPE)	SWAN PNEUMATIC	NOIDA	
		EVEREST TRANSMISSION	NEW DELHI	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		KAY INTERNATIONAL	NEW DELHI / SONEPAT	
		EVEREST BLOWER	BAHADURGARH	
		KULKARNI POWER TOOLS	KOLHAPUR/ PUNE	
5.	METERING PUMPS	VK PUMPS	NASIK	
		MILTON ROY INDIA	CHENNAI	
		SWELLORE	AHMEDABAD	
		POSITIVE METERING PUMPS	NASIK	
		METACHEM	MUMBAI	
6.	AGITATOR	REMI PEOCESS PLANT & M/C	MUMBAI	
		FIBRE & FIBRE	MUMBAI / SILVASA	
		CEECONS	CHENNAI	
		STANDARD ENGINEERS	MUMBAI	
7.	HORIZONTAL CENTRIFUGAL PUMPS	BEST AND CROMPTON ENGG LTD.	CHENNAI	
		BHARAT PUMPS & COMPRESSORS LTD	ALLAHABAD	
		FLOWMORE LTD.	GURGAON	
		FLOWSERVE INDIA CONTROLS PVT. LTD.	COIMBATORE	
		JYOTI LTD.	VADODARA	
		KIRLOSKAR BROTHERS LTD	PUNE	
		WILO MATHER & PLATT PUMPS PVT. LTD.	PUNE	
		V-FLO PUMPS & SYSTEMS CO. LTD.,	BEIJING-CHINA	
		WPIL LIMITED	KOLKATA	
8.	VERTICAL CENTRIFUGAL PUMPS	BHARAT PUMPS & COMPRESSORS LTD	ALLAHABAD	
		FLOWMORE LTD.	GURGAON	
		FLOWSERVE INDIA CONTROLS PVT. LTD.	COIMBATORE	
		JYOTI LTD.	VADODARA	
		WILO MATHER & PLATT PUMPS PVT. LTD.	PUNE	
		SULZER PUMPS INDIA LTD.	THANE	
		WPIL LIMITED	KOLKATA	
9.	HORIZONTAL CENTRIFUGAL PUMPS (RUBBER LINED)	KISHORE PUMPS	PUNE	
		SU MOTORS	MUMBAI	
10.	NON METALLIC (PP/FRP) HORIZONTAL CENTRIFUGAL PUMPS	ENGINEERS COMBINE	THANE	
		ANTICORROSIVE	VALSAD	
		LEAK PROOF PUMPS PVT. LTD. (RAJEDIA)	-	
11.	MISC. PUMP VERTICAL TURBINE TYPE	KBL	PUNE	
		M&P	PUNE	
		WPIL	GHAZIABAD	
		KISHORE PUMPS	PUNE	
		FLOWMORE	SAHIBABAD	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
12.	BATTERY CHARGER FOR PLC	AMARA RAJA POWER SYSTEMS LIMITED	TRIPUTI	
		CHHABI ELECTRICALS PVT.LTD.	JALGAON	
		CHLORIDE POWER SYSTEMS & SOLUTIONS LIMITED	KOLKATA	
		DUBAS ENGG PVT LTD	BANGALORE	
		HBL POWER SYSTEMS LTD	HYDERABAD	
		JEMA ENERGY	SPAIN	FOR STATIC SCR TYPE FULL WAVE FULLY CONTROL TYPE
		MASS-TECH CONTROLS PVT.LTD.	MUMBAI	
		STATCON POWER CONTROLS LTD	NOIDA	
13.	UNDER BED NOZZLE	JONSONS SCREEN	AUSTRALIA/ IRELAND	
14.	COATING & WRAPPING MATERIAL TAPE	IWL LTD.	CHENNAI	
		MP TAR PRODUCT	BHILAI	
		PORWAL INDUSTRIES	RAIPUR	
		RUSTECH	KOLKATA	
		STP	JAMSHEDPUR	
15.	HEATER	ESCORTS	FARIDABAD	
		RACOLDS	FARIDABAD	
16.	RESIN	ROHM & HASS	FRANCE / USA	
		LANXESS	GERMANY	
		PUROLITE	ROMANIA/CHINA	
17.	HIGH PRESSURE BUTTERFLY VALVE	DeZURICK (Upto 400 NB)	USA	
		TYCO VALVES (UPTO 450 NB)	USA	
		BRAY	CHINA	
18.	BALL VALVE (HIGH PRESSURE) SIZE 100 NB	VELAN	CANADA	
		BRAY	USA	
19.	CAST IRON GATE/GLV/NRV/SRV	A.V. VALVES LTD	AGRA	
		ATAM VALVES PVT. LTD.	JALANDHAR	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		G.M. DALUI AND SONS PVT.LTD.	HOWRAH	
		H.SARKER AND COMPANY	HOWRAH	
		LEADER VALVES LTD.	JALANDHAR	
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	
20.	BALL VALVE (MANUAL /PNEUMATIC/ ELECTRIC) CLASS 150	A.V. VALVES LTD	AGRA	
		AKAY INDUSTRIES PVT.LTD.	DHARWAD	
		BELGAUM AQUA VALVES PVT. LTD.	BELGAUN	
		ASIAN INDUSTRIAL VALVES & INSTRUMENTS.	CHENNAI	
		ATAM VALVES PVT. LTD.	JALANDHAR	
		DEMBLA VALVES LTD.	THANE	
		M/S GM ENGINEERING	RAJKOT	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		HAWA VALVES (INDIA) PVT. LTD.	NAVI MUMBAI	
		INTERVALVE (INDIA) LTD.	PUNE	
		LEADER VALVES LTD.	JALANDHAR	
		MICROFINISH VALVES PVT LTD.	HUBLI	
		NILON VALVES PRIVATE LIMITED	AHMEDABAD	
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	
		UNIFLOW	CHENNAI	
		VALTECH INDUSTRIES	MUMBAI	
		VAAS AUTOMATION PVT. LTD.	NEW DELHI	
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	
21.	**ELECTRIC MOTOR**	CROMPTON GREAVES	AHMEDNAGAR	
		LAXMI HYDRAULICS PVT. LTD	BANGALORE / HUBLI*	
		RAJINDRA ELECT INDUSTRIES	FARIDABAD* / BANGALORE	
		GE-POWER		
		BHARAT BIJLEE	MUMBAI	
		SIEMENS	MUMBAI	
		NGEF	BANGALORE	
		KIRLOSKAR ELECTRIC CO LTD.		
		ASEA BROWN BOVERI		
		MARATHON	KOLKATA	
22.	**BUTTER-FLY VALVE**	ADVANCE VALVES PVT. LTD.	NOIDA	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	
		INSTRUMENTATION LTD.	PALAKKAD	
		INTERVALVE (INDIA) LTD.	PUNE	
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	
		PENTAIR VALVES AND CONTROLS INDIA PRIVATE LIMITED	NAVI MUMBAI	
		UPADHAYA VALVES MANUFACTURERS PRIVATE LIMITED,	KOLKATA	
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	
23.	**DIAPHRAGM VALVE (MANUAL / PNEUMATIC) CLASS 150**	WEIR BDK	HUBLI	
		CRANE FLOW PROCESS	SATARA	
		PROCON	MUMBAI	
		MAJESTIC VALVES (LABLINE)	-	
		HAWA ENGINEERS	AHMEDABAD	
24.	**DUAL PLATE CHECK VALVES**	ADVANCE VALVES PVT. LTD.	NOIDA	
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	1. DUAL PLATE CHECK VALVE CI -

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
				CLASS 150 & UP TO 600NB, 2. DUAL PLATE CHECK VALVE CCS - CLASS 150 & UP TO 500NB
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	CI ,CCS & STAINLESS STEEL SPRING ASSISTED DUAL PLATE CHECK VALVES UPTO 700 NB AND 150 CLASS RATING.
25.	**Y-TYPE STRAINER / STRAINER (WATER SERVICE)**	OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	
		GRAND PRIX	NEW DELHI	
		JAYPEE	NEW DELHI	
		GREAVES COTTON	MUMBAI	
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI / NOIDA	
		FILTERATION ENGINEERS (I) PVT. LTD	MUMBAI	
		FLUIDNYE	-	
		SUNGOV ENGINEERING PVT. LTD.	DELHI	
		GRAND PRIX	FARIDABAD	
		JAYPEE INDUSTRIES PVT. LTD.	DELHI	
		BHATIA ENGINEERING CO.	DELHI	
26.	**RUBBER FLAP TYPE CHECK VALVES**	ASHVIK VALVES	-	
		FLOW WAY VALVES	-	
		BDK	-	
		MAJESTIC VALVES (LABLINE INST)	-	
		ADVANCE VALVES	-	
27.	**MEMBRANES**	DOW		
		TORAY		
		KOCH		
		HYDRONOTICS		
		NORIT		
28.	**SOLENOID VALVES**	ROTEX	-	
		AVCON	-	
29.	**PRESSURE GAUGE/ DIFFERENTIAL PRESSURE GAUGE**	A.N. INSTRUMENTS PVT. LTD.	KOLKATA	
		ASHCROFT INDIA PVT LTD.	GUJARAT	
		BOSE PANDA INSTRUMENTS PVT.LTD.	KOLKATA	
		FORBES MARSHALL (HYD) LTD.	HYDERABAD	
		GAUGE BOURDON INDIA PVT. LTD.	MUMBAI	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		H.GURU INDUSTRIES	KOLKATA	
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	BANGALORE	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI	
30.	CHAIN PULLEY BLOCK	ARMSEL MHE PVT. LTD	BANGALORE	
		CENTURY CRANE ENGINEERS PVT. LTD.	FARIDABAD	
		HERCULES HOISTS LTD.	RAIGAD	
		LIFTING EQUIPMENTS AND ACCESSORIES	DELHI	
		TUOBRO FURGUSON (INDIA) PVT LTD	KOLKATA	UPTO 10 TONNE.
		TRACTEL TIRFOR INDIA PVT. LTD.	FARIDABAD	
		TECHNO INDUSTRIES	AHMEDABAD	
		ARMSEL MHE PVT. LTD	BANGALORE	
		ALPHA SERVICES	BHIWADI	
		CONSOLIDATED HOISTS PVT LTD	PUNE	UPTO 20 TONNES
		CENTURY CRANE ENGINEERS PVT. LTD.	FARIDABAD	
		EDDY CRANES PVT. LTD.	MUMBAI	CAPACITY UPTO 10 TONS. BOIS BHEL APP.SUB-VENDORS.
		GRIP ENGINEERS PVT. LTD.,	FARIDABAD,	
		GLOBAL TECHNOLOGIES	HYDERABAD	
		HERCULES HOISTS LTD.	RAIGAD	
		LIFTING EQUIPMENTS AND ACCESSORIES	DELHI	
		MANGLA HOISTS PVT LTD	NEW DELHI	
		MEEKA MACHINERY PVT. LTD.	AHMEDABAD	
		REVA INDUSTRIES LTD.	FARIDABAD	UPTO 25.0 T CAPACITY.
		ROCKWELL HOISTO CRANES PVT. LTD.	BAHADURGARH	
		SAFEX ENERGY PVT. LTD.	AHMEDABAD	
		TUOBRO FURGUSON (INDIA) PVT LTD	KOLKATA	UPTO 15 TONNES.
		TECHNO INDUSTRIES	AHMEDABAD	
31.	ELECTRIC HOIST	ARMSEL MHE PVT. LTD	BANGALORE	
		ALPHA SERVICES	BHIWADI	
		CONSOLIDATED HOISTS PVT LTD	PUNE	UPTO 20 TONNES
		CENTURY CRANE ENGINEERS PVT. LTD.	FARIDABAD	
		EDDY CRANES PVT. LTD.	MUMBAI	CAPACITY UPTO 10 TONS. BOIS BHEL APP.SUB-VENDORS.
		GRIP ENGINEERS PVT. LTD.,	FARIDABAD,	
		GLOBAL TECHNOLOGIES	HYDERABAD	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		HERCULES HOISTS LTD.	RAIGAD	
		LIFTING EQUIPMENTS AND ACCESSORIES	DELHI	
		MANGLA HOISTS PVT LTD	NEW DELHI	
		MEEKA MACHINERY PVT. LTD.	AHMEDABAD	
		REVA INDUSTRIES LTD.	FARIDABAD	UPTO 25.0 T CAPACITY.
		ROCKWELL HOISTO CRANES PVT. LTD.	BAHADURGARH	
		SAFEX ENERGY PVT. LTD.	AHMEDABAD	
		TUOBRO FURGUSON (INDIA) PVT LTD	KOLKATA	UPTO 15 TONNES.
		TECHNO INDUSTRIES	AHMEDABAD	
32.	CONTROL VALVE	SPX CORPORATION, USA	AHMEDABAD	
		CONTROL COMPONENT INC.	CALIFORNIA	
		DRESSER VALVE INDIA PVT. LTD	COIMBATORE	
		DAUME REGELARMATUREN GMBH,	GERMANY	
		EMERSON PROCESS MANAGEMENT CHENNAI LIMITED	CHENNAI	
		WEIR VALVES & CONTROLS UK LTD.	U.K	
		HOLTER REGELARMATUREN GMBH & CO.KG	GERMANY	
		INSTRUMENTATION LTD.	KERALA	
		KOSO INDIA PRIVATE LIMITED,	NASHIK	
		LESLIE CONTROLS, INC	USA	
		MIL CONTROLS LTD.	KERALA	
		METSO SINGAPORE PTE. LTD.,	SINGAPORE	
		PARCOL S.P.A	ITALY	
		R.K.CONTROL INSTRUMENTS PVT. LTD.	THANE	
		RINGO VALVULAS S.L,	SPAIN	
		SHENJIANG VALVE CO. LTD.	CHINA	
		VALVITALIA S.P.A. ,	ITALY	
		WALDEMAR PRUSS ARMATURENFABRIK GMBH	GERMANY	
33.	PRESSURE/DP/VACUUM SWITCH	INDFOSS	GHAZIABAD	
		SOR	USA	
		DRESSOR	USA	
		DELTA CONTROL	UK	
		TRAFAG	RANIPET	
		GIC(GAUGES BOURDON)	PANVEL	
		ASHCROFT INDIA PVT LTD.	USA/GERMANY	
		SWITZER	CHENNAI	
34.	TEMPERATURE GAUGE	A.N. INSTRUMENTS PVT. LTD.	KOLKATA	
		ASHCROFT INDIA PVT LTD.	GUJARAT	
		BUDENBERG GUAGE CO.LTD.	UK	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		FORBES MARSHALL (HYD) LTD.	HYDERABAD	
		GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	GOA	
		GOA THERMOSTATIC INSTRUMENTS PVT.LTD.		
		GAUGE BOURDON INDIA PVT. LTD.	MUMBAI	
		H.GURU INDUSTRIES	KOLKATA	
		H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	BANGALORE	
		BAUMER TECHNOLOGIES INDIA PVT. LTD.	MUMBAI	
35.	LEVEL GAUGE (F&B, TUBULAR, REFLEX)	SBEM		
		CHEMTROL		
		PUNE TECHTROL		
		SIGMA		
		V AUTOMAT		
		GENERAL INSTRUMENTS		
36.	ROTAMETER	EUREKA INDUSTRIAL EQUIPMENTS PVT.LTD.	PUNE	
		FLOW STAR ENGINEERING PVT. LTD.,	FARIDABAD	
		FLOWTECH INSTRUMENTS SERVICRS	VADODARA	
		INSTRUMENTATION ENGINEERS PVT LTD	TELANGANA	
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	NAVI MUMBAI	
37.	LEVEL SWITCH-CONDUCTIVITY TYPE	BLISS ANAND PVT. LTD.	GURGAON	
		FLOWTECH INSTRUMENTS SERVICRS	VADODARA	
		HI-TECH SYSTEMS & SERVICES LTD.	KOLKATA-	VENDOR SHALL SOURCE IMPORT CONTENTS OF LEVEL SWITCH (CONDUCTIVITY TYPE) FROM LEVELSTATE SYSTEMS LTD., UNITED KINGDOM.
		LEVCON INSTRUMENTS PVT. LTD.	KOLKATA	
		RAMAN INSTRUMENTS PVT.LTD.	MUMBAI	VENDOR SHALL SOURCE IMPORT CONTENTS OF LEVEL SWITCH (CONDUCTIVITY TYPE) FROM MOBREY MEASUREMENT, AN OPERATING UNIT

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
				OF MORBEY LTD., SLOUGH, BERKSHIRE, UNITED KINGDOM.
		SIGMA INSTRUMENTS CO.	MUMBAI	
		SOR INC.	USA	
		SAPCON INSTRUMENT PVT LTD.	INDORE	
		V. AUTOMAT & INTRUMENTS (P) LTD.	NEW DELHI	
38.	**LEVEL SWITCH (ALL TYPES)**	LEVCON		
		CHEMTROLS SAMIL (INDIA) PVT LTD.		
		SWITZER		
		WAAREE (BAUMER INSTRUMENTS)		
		V AUTOMAT		
		PUNE TECHTROL		
39.	**MAGNETIC FLOW METER**	ABB	-	
		WAAREE (BAUMER INSTRUMENTS)	-	
		EUREKA	-	
		EMERSON	-	
		YOKOGAWA	-	
		HACH (POTENSE)	-	
		KROHNE MARSHALL	-	
40.	**FLOW ELEMENT - NOZZLE**	HYDROPNEUMATICS PVT. LTD.	GOA	
		INSTRUMENTATION LTD.	PALAKKAD	
		MICRO PRECISION PRODUCTS PVT. LTD.	FARIDABAD	
		MINCO (INDIA) FLOW ELEMENTS PVT. LTD.	GOA	
		STAR-MECH CONTROLS (I) PVT.LTD.	PUNE	
		SEIKO FLOW CONTROL GMBH	AUSTRIA	
41.	**FLOW ELEMENT - ORIFICE**	FLOW STAR ENGINEERING PVT. LTD.,	FARIDABAD	
		HYDROPNEUMATICS PVT. LTD.	GOA	
		INSTRUMENTATION LTD.	PALAKKAD	
		INSTRUMENTATION ENGINEERS PVT LTD	HYDERABAD	
		MICRO PRECISION PRODUCTS PVT. LTD.	FARIDABAD	
		MINCO (INDIA) PRIVATE LIMITED	GOA	
		STAR-MECH CONTROLS (I) PVT.LTD.	PUNE	
42.	**FLOW TRANSMITTERS (ALL TYPES)**	E & H	-	
		KHRONE MARSHALL	-	
		EMERSON	-	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		ABB	-	
		HONEYWELL	-	
		YOKOGAWA	-	
43.	LEVEL TRANSMITTERS (ALL TYPES)	EMERSON	-	
		E & H	-	
		ABB	-	
		HONEYWELL	-	
		V AUTOMAT	-	
		YOKOGAWA	-	
		SIEMENS	-	
		KROHNE MARSHALL	-	
44.	PRESSURE TRANSMITTERS (ALL TYPES)	EMERSON	USA/PAWANE	
		LAXONS AUTOMATION	DAMAN	
		YIL	BANGALORE	
		SIEMENS	THANE	
		FUJI	CHINA	
		YOKOGAWA	JAPAN	
		HONEYWELL	USA/PUNE	
45.	TEMPERATURE TRANSMITTERS	EMERSON	-	
		E & H	-	
		ABB	-	
		HONEYWELL	-	
		V AUTOMAT	-	
		YOKOGAWA	-	
		SIEMENS	-	
		FORBES MARSHALL	-	
46.	PH TRANSMITTERS	EMERSON	-	
		YOKOGAWA	-	
		HONEYWELL	-	
		ABB	-	
		HACH	-	
		FORBES MARSHALL	-	
47.	ANALYSERS (ALL TYPES)	ABB	-	
		EMERSON	-	
		YOKOGAWA	-	
		HONEYWELL	-	
		HACH POLYMETRON	-	
		SIEMENS	-	
		FORBES MARSHALL	-	
48.	PROGRAMMABLE LOGIC CONTROLLER	GE INTELLIGENT PLATFORMS PRIVATE LIMITED	BANGALORE	
		HONEYWELL AUTOMATION INDIA LIMITED ,	PUNE	
		ROCKWELL AUTOMATION INDIA LTD	SAHIBABAD	
		SIEMENS LIMITED	MUMBAI	
		SCHNEIDER ELECTRIC INDIA	NEW DELHI	

SR. NO.	ITEM	SUPPLIERS	PLACE	REMARKS
		PVT.LTD.		
49.	UPS	HITACHI-HIREL	GANDHINAGAR	
		APC	BANGALORE	
		DELTA	GURGAON	
		EMERSON	MUMBAI	
		DB POWER	PUNE	
		APLAB	MUMBAI	
50.	INSTRUMENT FITTINGS	AURA INCORPORATED	NEW DELHI	
		ASTEC VALVES & FITTINGS PVT. LTD.,	MUMBAI	
		ARYA CRAFTS & ENGINEERING PVT. LTD.	MUMBAI	
		COMFIT & VALVE PVT. LTD.	GUJARAT	
		FLUIDFIT ENGINEERS PVT. LTD.	MUMBAI	
		FLUID CONTROLS PVT. LTD.	MUMBAI	
		HP VALVES & FITTINGS INDIA PVT. LTD.	CHENNAI	
		PRECISION ENGINEERING INDUSTRIES	MUMBAI	
		PANAM ENGINEERS,	MUMBAI	
		PERFECT INSTRUMENTATION CONTROL (INDIA) PVT. LTD.	MUMBAI	
		VIKAS INDUSTRIAL PRODUCTS	NOIDA	
51.	JUNCTION BOX	AJMERA INDUSTRIAL & ENGINEERING WORKS	MUMBAI	
		FLEXPRO ELECTRICALS PVT. LTD.	GUJARAT	METAL TYPE JUNCTION BOX ONLY
		K.S.INSTRUMENTS PVT.LTD.	BANGALORE	
		SUCHITRA INDUSTRIES	BANGALORE	
		SHRENIK & COMPANY,	AHMEDABAD	
52.	CABLE GLAND	COMET	-	
		DOWELL	-	
		CHETNA	-	
53.	CABLE LUGS	ELECTRO BILLETS	-	
		COMET	-	
		DOWELL	-	
		CHETNA	-	
54.	MS PLATES	SAIL		
		ESSAR STEEL		
		TISCO		
		RINL		
		JINDAL		
		LLOYD		
		ISPAT		