



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

An ISO 9001
Company

ENQUIRY NOTICE INVITING TENDER	Phone: +91 431 257 7653
	Fax : +91 431 252 0719
	Email : skaruna@bheltry.co.in
	Web : www.bhel.com

TWO PART BID	Enquiry Number:	Enquiry Date:	Due date for submission of quotation :
Tender to be submitted in Two Parts	2711200005	20.03.2012	20.04.2012

You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order.

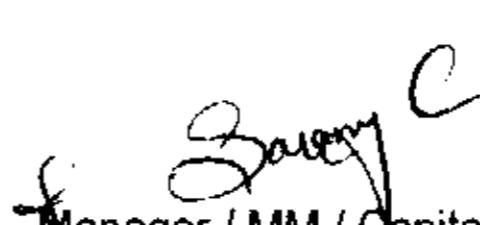
Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 Hrs on the date of tender opening

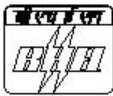
Item No.	Item Description	Quantity
10	Supply of Water Softening Plant and Online Self Cleaning Filter at SSTP BHEL, Trichy as per the technical Specification, & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 Set

Important Points to be taken care during the submission of offer:-

- 1. Delivery Period: 4 months from the date of Purchase Order is the project requirement. Delivery period of earlier than 4 months is also acceptable.**
- 2. The Technical Specification to be duly filled (as Point wise reply) and enclosed with offer.**
- 3. Check list to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**

BHEL's General guidelines /instructions including bank guarantee formats and list of consortium banks, commercial terms checklist can be downloaded from BHEL web site <http://www.bhel.com> or from the government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) Tender Enquiry reference “ 2711200005”

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED  Manager / MM / Capital Equipment
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Specification for Water Softener & Online Self Cleaning Filters – SSTP

Document No.: SSTP/PLS/001

Dt. 14/03//2012

1. **GENERAL:**

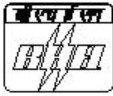
- 1.1 This document deals with requirements for submitting offers and executing the order on placement of Purchase order / Contract for the subject item. The equipment under this specification is required for the Closed Circuit Cooling Water System in Seamless Steel Plant in BHEL, Tiruchirappalli, for filtering and softening the cooling water recycled in the in the closed circuit system.
- 1.2 Bidders have to submit the offers as below by filling in the "Vendor's response" column with relevant information against each point in the respective sections below by providing information on model no, parameters etc. The technical requirements shall also be confirmed for each clause.
- 1.3 Note: A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the "Vendor's response" column is not acceptable and may lead to disqualification of the Technical Offer.
- 1.4 Brand and model No. of the items offered must be indicated in the offer
- 1.5 The offer shall Consist of Sections:
- 1.5.1 Part A:
- a. General Requirements
 - b. Technical offer
 - c. Commercial terms and conditions
 - d. Un-priced Price bid as per Part B (i.e. Price bid as per list shown in Part B of this Specification with the price value blanked)

1.5.2 Part B: Price bid for all items with split of major components:

Sl. No	Particulars	Qty	Rate
01	Water Softening Plant of 150 m ³ /hr (3 Nos. x 50 m ³ /hr) capacity with accessories along with an Online Self Cleaning Pre-Filter of 150 m ³ /hr. (1 No. x 150 m ³ /hr) with four layer SS316L screen of 60 micron along with control panel & Inter connecting piping & isolation valves, suitable for outdoor installation to improve the Water Quality as per the technical specification & commercial conditions given.	1 Set	
02	Online Self Cleaning filter of 600 m ³ /hr. (2 Nos. x 300 m ³ /hr) with four layer SS316L screen of 60 micron for Full Stream Filtration in circulating flow for closed circuit with control panel & Inter connecting piping & isolation valves, suitable for outdoor installation, to improve the water Quality as per the technical specification & commercial conditions given.	1 Set	

Note: All the above items shall be awarded as a single package.

- 1.6 Necessary Documents, records, drawings, catalogues as required shall also be referenced in the response column and attached with the offer.
- 1.7 The supplier may visit SSTP and understand the requirements before bidding.
- 1.8 The requirements to be met for submitting the offer and the execution of the order are laid out below.



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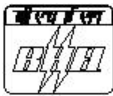
2. QUALIFYING CRITERIA FOR THE SUPPLY

- 2.1. The VENDOR has to necessarily provide the following details, for making an assessment of the firm's capability and competency: [The VENDOR is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details]

Sl. No.	PARTICULARS	Vendor's response with ref. cl. No. of detailed offer.
1.0	Number of Years of Experience of the VENDOR in the field of design, manufacture and supply of similar equipment to similar industries	
2.0	Number of systems supplied, installed and commissioned till date, in the QUOTED MODEL / Technology. Attach a reference list of customers with equipment type, model, year of supply and contact address.	
3.0	Details of Design Set-Up and Technology Back-Up if any for the PRINCIPAL Equipment Maker	
4.0	Details on International Standards followed in Design of the Equipment.	
5.0	Confirmation to performance testing requirement of the equipment prior to dispatch from supplier's end	
6.0	Details of Quality System followed (Kindly furnish the salient aspects of the QA system followed)	
7.0	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centers in India and Asia	
8.0	Any Additional Data to supplement the manufacturing capability of the VENDOR	

- 2.2. The VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for this tender. Confirmation against each clause is to be indicated in the space provided.

Sl. No.	REQUIREMENTS	Vendor's confirmation and ref. to detail enclosed
9.0	The VENDOR shall have a minimum of <u>2 Years</u> of Continuous Experience in the Design, Manufacture & Supply of Water Softener Plant and On-line self cleaning filters for similar purpose and industries'. Indicate the actual experience.	



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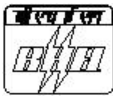
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10.0	The VENDOR shall have supplied at least 2 number of similar capacity Water Softener Plant and On-line self cleaning filters within the last five years. The equipment shall be working satisfactorily at least for the past 2 years. Indicate the number of equipment (of quoted model / Technology) sold in India & Other Countries.	
11.0	Performance Certificate in original from CUSTOMERS (minimum 2 Customers) for satisfactory working of the installations as above for the past 1 years with full contact details of CONTACT PERSON for cross reference by BHEL shall be submitted with the offer. Please confirm. <u>Offers received without this certificate will be summarily rejected.</u>	

2.3. The VENDOR has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser. Confirmation against each clause is to be indicated in the space provided.

Sl. No.	REQUIREMENTS	Vendor's confirmation and ref. to detail enclosed
12.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details. A schematic diagram shall be provided in the offer indicating all the items to be supplied.	
13.0	The Commercial Offer (given with the Technical Offer – Part I) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation of Scope of Supply.	
14.0	The points confirmed by the supplier based on the clarifications sought for the original offer shall be incorporated in the revised final offer wherever applicable. Pl. confirm	
15.0	The Vendor shall provide a complete list of out sourced / Bought-Out-Items: electrical, electronic and mechanical components with Source name, Model no., Specification, catalog and drawings. This shall be included in the offer. Pl. confirm.	
16.0	Break up cost for electrical, electronic and mechanical components shall be furnished. Optional Systems / items shall be indicated separately. Pl. confirm	
17.0	Portion of Supplies from Foreign countries and from Indian source shall be separately grouped both in the Technical offer (Part I) and in the price bid (Part II).	
18.0	The Technical requirement below shall be commented clause wise as compared to the offered system in the space provided against each point.	
3.0	Job Details	
	In Seamless Steel Tube Plant, BHEL, Trichy Seamless Steel Tubes are manufactured by hot rolling process. For this hot process and for the equipments water is used as a cooling media. The water is circulated two ways viz.. in a closed circuit and open circuit. Water requirement for the initial filling and for the make up for the closed & open circuit cooling system is drawn from the bore well. In case of shortage of water from the bore well, water drawn from the head works situated on the	

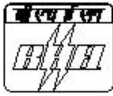


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	banks of river Cauvery, stored in an over head tank will be used. In the closed circuit system the water is recycled continuously in a round a clock shifts. The water thus circulated in the closed circuit should meet the quality requirement as given in Annexure-1.	
3.1	Details of water quality parameters & Raw water Parameters.	
	<ol style="list-style-type: none">1. Water quality requirement - Annexure-12. Raw water (initial filling & make up) parameters – Annexure-23. Closed circuit cooling water system single line layout – Annexure-3	
3.2	Design	
	<p><u>A) WATER SOFTENER:</u></p> <p>The softener shall be designed so as to get the quality of water with the required parameter as given in Annexure-1. The total flow rate of the softener shall be 150 m³/hr consisting of 3 Nos. each of 50 m³/hr. and all the three shall be in operation during softening time. In the regeneration period the plant shall be capable of supplying treated water of minimum 100 m³/hr. Regeneration shall be done once in 8 hrs. or as per the system requirement.</p> <p>The present level of the Total Hardness of the Raw water (make up water) is 310 ppm and it may vary upto 350 ppm. In the closed circuit system (Annexure-3) the water is recycled continuously for 24 hours with the flow rate of 600 m³/hr. From this 150 m³/hr (25%) of water shall be taken from the common sump of the closed circuit and processed through the pre-filter and water softener plant for water treatment. The treated water shall again be let-in to the same common sump. The resultant quality of water of the closed circuit shall have the Total Hardness of less than 320 ppm. and shall also meet the other quality parameters as given in Annexure-1. To meet this requirement of Total Hardness of less than 320 ppm, the Softener shall be designed to supply treated water at the outlet of softener with the Total Hardness as per the system requirement. Tenderer to specify the Total Hardness of the treated water at the outlet of the softener.</p> <p>The plant startup and operation for one month shall be under tenderer scope. Chemicals like salt, resin, etc., required shall be specified by the tenderer and same shall be under the scope of tenderer for start up and one month operation. Flat concrete cement flooring, making pockets for foundation, cementing the pockets shall be under BHEL scope. All other facilities like, base frames, fastners, etc.. required for erection & commissioning shall be under tenderer scope.</p> <p><u>B) ONLINE SELF CLEANING FILTER</u></p> <p>The filter shall be designed for following parameters:</p> <ul style="list-style-type: none">• Normal and maximum flow rate• Minimum Inlet Pressure• Filtration Degree absolute• Inlet TSS in mg/l or ppm	

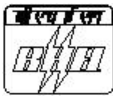


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- Minimum water used for draining / flushing
 - Cleaning Mechanism
 - Mechanical Life of screens and housing
- a) **Normal and Maximum Flow rate:**
The filter should be able to handle the flow rate of minimum 120% of the normal flow rate.
- b) **Minimum Inlet Pressure:**
The minimum inlet pressure provided for the filter shall be in the range of 2.0 to 2.5 bars. No back wash pumps shall be used for cleaning purpose.
- c) **Filtration Degree absolute :**
The filter design shall be based on weave wire screen – 4 layer wherein the filtration degree to be achieved shall be by 2nd layer screen. The minimum useable area of the screen shall be 6:1 or 32% of the proposed screen area.
- d) **Inlet TSS in mg / or ppm :**
Based on the inlet TSS load the filter selection shall be done accordingly with minimum flushing cycles.
- e) **Minimum water for flushing:**
The water used for flushing shall not exceed 1 to 2 % of the rated flow and the filter shall always deliver at the outlet of 98% of the rated flow. No standby filters are envisaged for this application.
- f) **Cleaning mechanism :**
The cleaning mechanism shall be of spring loaded suction nozzles to ensure uniform cleaning of the screen. The cleaning mechanism shall be suitable for number of flushing cycles online basis with no downtime and should be activated either by pressure differential or timer whichever is earlier.
- g) **Mechanical life of screens / filter housing:**
As no standby filters are envisaged for this application the functionality of the system and mechanical parameters shall be of high quality. The screens shall be in SS316L material & Housings shall be in high grade carbon steel with suitable sandblasting and epoxy coating with polyester coating.
- h) **Control System:**
The control panel shall be provided with the following control and monitoring.

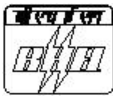


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	<ul style="list-style-type: none">➤ Common Selector switch to operate the system in following mode.➤ PDS mode. (Pressure Differential Switch)➤ PDS & Timer Mode➤ Continuous Flushing Mode <p>The filters shall be having arrangement to do manual flushing with the help of test button on the front of the control panel as well by simulation locally on the filter by closing the small ball valve for 5 sec and re opening it, thus creating an artificial back flush cycle.</p> <p><u>PAINTING</u></p> <p><u>Internal Coating:</u></p> <p>Coated with two layers of epoxy powder and oven-cured.</p> <p><u>External Coating:</u></p> <p>Coated with a polyester powder and oven-cured.</p>	
3.3	TECHNICAL DATA: Annexure-4	
4	Scope of supply	
4.1	The scope of work of the tenderer shall cover design, engineering, manufacture, assembly, testing, painting, packing, delivery, erection, commissioning, training & running of the water softener and on line self cleaning filters for one month in BHEL, Tiruchi. All interconnecting piping for the above items with accessories like valves, Flow meters, gauges, instruments, pumps, etc., shall be in tenderer scope. Each units should be equipped with a local control panel and all should be connected to a central control system. All electrical wirings shall be done by the tenderer with copper wiring. Input Power supply upto the control panel shall be under BHEL scope. Flat cement flooring shall be provided by BHEL for erecting / mounting the equipments & accessories. Tenderer should furnish a list of commissioning spares and recommended spares for 2 year normal operation for both water softener and online self cleaning prefilters and full stream filters and also for auxiliaries. The tenderer shall submit GA drawing for approval of purchaser. On completion of engineering the tenderer shall supply O&M manual as part of the contract. The offer should be strictly inline with the enclosed specification and any deviation in process or equipment selection from this specification shall be clearly indicated and also the objective of deviating from the specification.	
4.2	The layout and footprint area shall be described using drawings to identify space requirement and feasibility of incorporating in the existing set up. This shall be provided with the offer.	
4.3	Operating instruction / maintenance manual to be supplied along with relevant drawings at the time of equipment delivery.	
4.4	Recommended spares for the smooth running of the system for minimum 2 year period shall be listed down in the offer.	

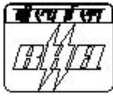


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5. General requirements:		
5.1	The schematic drawing and operational features, catalogues etc. shall be provided in the offer	
5.2	Supplier shall prepare quality plan covering major items indicating critical quality characteristics, method of measurement, reference standard, acceptance norms and to BHEL before starting the manufacturing activities.	
5.5	List of spares with part identification no. (Tools, Mechanical, Electrical & Electronics) to be maintained for ensuring continuous operation with least delay time shall be provided in the offer with price.	
5.6	Supply of required commissioning spares for proving the performance of the m/c at SSTP is supplier's scope	
6	<u>DOCUMENTATION</u>	
6.1	<u>With the offer:</u> Preliminary design, Quality plan covering major items indicating critical quality characteristics, method of measurement, reference standard, acceptance norms. List, source and model of bought out items of Pneumatic, Mechanical, Electrical and electronics. Internationally reputed brands shall be used.	
6.2	<u>After order:</u> Activity schedule, Detailed drawings, Specification, Foundation drawings, Detailed Quality plan, Periodic status report.	
6.3	<u>Along with the supply:</u> The documentation shall be, one-fold on paper and one-fold on CD-Rom in English language consisting of the following: installation manual, assembly drawing and part lists general description of function and function cycle maintenance instructions operating instructions circuit diagram, component list, etc. Installation drawings and final layout	
6.4	The documentation sent through e-mail or CD-ROM shall be in the following format: Documents and lists in PDF format Drawings in DWG format Layout and foundation plan in DWG format	
7	<u>INSTALLATION, PERFORMANCE & ACCEPTANCE OF THE SYSTEM</u>	
7.1	The system shall be shipped after inspection and testing at Suppliers works by BHEL. 20 days prior notice shall be given for this inspection.	
7.2	The system shall be installed and commissioned by the manufacturer of the system.	



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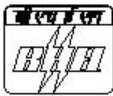
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7.3	The system performance shall be checked at BHEL after Installation and commissioning. Functioning of the system to be demonstrated for a period of at least 3 shifts continuously. The installations should be operated by the supplier for a period of one month with all the required chemicals like salt, resin, etc.. Testing methods and acceptance norms for each items for tests at Suppliers works and after installation shall be detailed out in the offer.	
7.4	Service shall be provided by the supplier during guarantee period and also later through AMC. The system supplied must be supported by way of spares, availability and service for a minimum period of 10 years.	
7.5	Guarantee for the trouble free performance of the system shall be provided for min. 1 year for 3 shift operation. This shall be by way of performance Bank guaranty as applicable. The guarantees of the seller refer to Acceptance Test quality of operation life time performance and any other aspect agreed upon	
8	Training:	
8.1	Supplier shall provide operational and first level system maintenance training for 4 persons at BHEL.	

Prepared

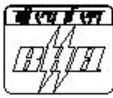
Reviewed and approved



Annexure 1

Water Quality Requirement:

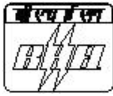
	Properties / Parameters	Unit	Requirement
1	Settling materials	mg/l	20 to 30
2	Max. grain size	micron	60
3	Total hardness (1°dH = 17.8 mg/l or ppm)	°dH mg/l	18 320.4
4	Carbonate hardness (1°dH = 17.8 mg/l or ppm)	°dH mg/l	5 89.0
5	Undissolved matter	mg/l	10
6	Sulphate (H ₂ SO ₄)	mg/l	< 150
7	Chloride (Cl)	mg/l	< 150
8	Contamination with oil	mg/l	max. 5
7	Salt content	mg/l	< 1000
8	PH Value		7.5 to 8.5
9	Conductivity	µS/cm	< 700



Annexure-2

Bore Water & Drinking Water Quality – Test Sample readings:

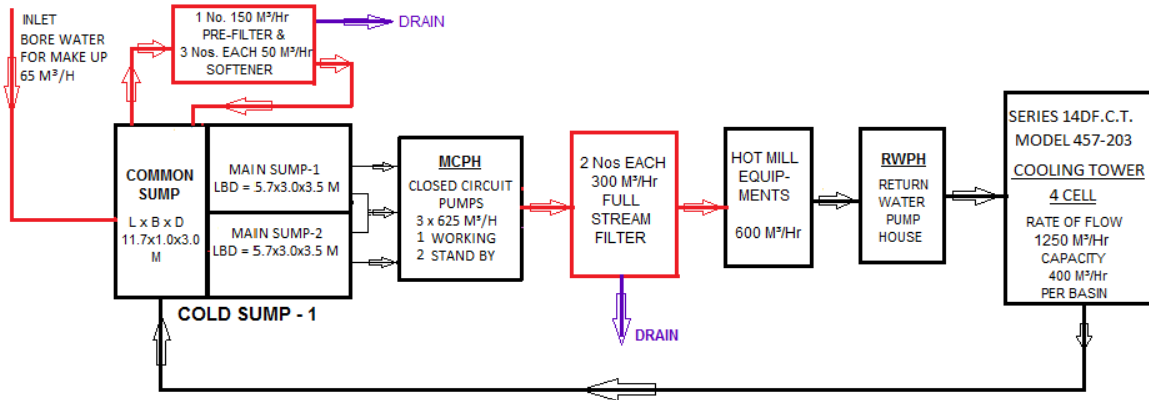
	Proprties / Parameters	Requirement	Actual		
			Bore Water (HPBP Lab Report)	Drinking Water (HPBP Lab Report)	Drinking Water (NITT Report)
1	Settling materials (mg/l)	20 to 30	----	---	1.6
2	Max. grain size (µm)	60	----	----	---
3	Total hardness (°dH) (1°dH = 17.8 mg/l) (mg/l or ppm)	18 320.4	17.4 309.7	7.3 129.94	11.5 211.82
4	Carbonate hardness (°dH) (1°dH = 17.8 mg/l) (mg/l or ppm)	5 89.0	11.8 210.04	---	11.5 211.82
5	Undissolved matter (mg/l)	10	20	----	---
6	Sulphate (H2 SO4) (mg/l)	< 150	42	23	BDL
7	Chloride (Cl) (mg/l)	< 150	42	44	55
8	Contamination with oil (mg/l)	max. 5	NIL	NIL	NIL
7	Salt content (mg/l)	< 1000	530	290	---
8	PH Value	7.5 to 8.5	8.5	7.6	8.32
9	Conductivity (µS/cm)	< 700	820	450	---



Annexure-3

CLOSED CIRCUIT COOLING WATER SYSTEM

PLANT SERVICES / SSTP
BHEL, TRICHY-14



— PROPOSED

MCPH

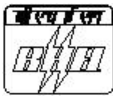
WORKING - 1 x 150 HP, H = 50 M, 625 M³/Hr, Pr: 5 Kg/cm.sq.

STAND BY - 2 x 150 HP, H = 50 M, 1250 M³/Hr,

RWP

WORKING - 2 x 65 HP, H = 20 M, 1200 M³/Hr, Pr. 2 Kg/cm.sq.

STAND BY - 1 x 65 HP, H = 20 M, 600 M³/Hr,



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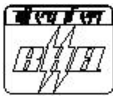
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ANNEXURE-4

TECHNICAL DATA:

01. WATER SOFTENING PLANT WITH ONLINE SELF CLEANING PRE-FILTER & ACCESSORIES

(A)	Water Softening Plant:	
1	Raw water Total Hardness. (Present level of make up water)	17.4 to 20 °dH (310 to 350 mg/l or ppm) (1°dH = 17.8 mg/l)
2	Treated Water quality requirement.	<u>Resultant Quality of the closed circuit water</u> – Total Hardness shall be less than 320 ppm. and to meet the other quality parameters given in Annexure-2. <u>At the outlet of the softener</u> - Total Hardness as per the system requirement so as to meet 320 ppm as above – Tenderer to specify.
3	Capacity & Flow rate	3 Nos. each of 50 m ³ /hr. During regeneration time 1 unit will be under regeneration and 2 Units under softening delivering 100 m ³ /hr. Regeneration shall be done sequentially one by one.
7	Size	Dia 1400mm x 2500mm Height Of Softener per unit or as per the system requirement – Tenderer to specify.
8	Material Of Construction - Vessel	MSEP (Mild Steel Epoxy Painted)
9	Operation Hours Before Regeneration	Tenderer to specify
10	Resin quantity	Tenderer to specify
11	Salt Required for Regeneration	Tenderer to specify
12	Agitator	1.0 H.P
13	Brine Mixing Tank (BMT)	2000 Ltrs, HDPE Tank
14	Type of valves	Butterfly valves.
15	Other Accessories	Control board, Inter connecting piping & isolation valves suitable for Outdoor installation . All interconnecting piping's of MS with necessary CI Butterfly valves.
16	Electrics & Instruments	Panel with cabling, Pressure gauge, Level switch and all other sensors, switches required.
17	Feed Pump Assembly for Softener (including pump, motor, non-return valve, isolation valve)	Flow Rate : 150 m ³ /hr Quantity : 2 Nos. (1 working + 1 stand by) Head : 30 M Type : Horizontal, Centrifugal, Make - pump : Kirloskar / KSB / Beacon - Motor : Kirloskar / Crompton / Siemens



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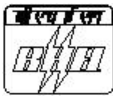
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Annexure-4 : Page-2

(B)	Online Self Cleaning Pre-Filter	
18	Type	Online self cleaning
19	Flow rate	150 m ³ /hr
20	Quantity	
20	Filtration Degree	60 micron absolute. Filtration degree shall be achieved by 2 nd layer screen. Minimum useable area is 6:1
21	Min working pressure	2.5 Kg/cm ²
22	Design pressure	10 Kg/cm ²
23	Inlet TSS (Undissolved matter) (Present level of make up water)	20 to 30 ppm
24	Filtration Area / Unit	Minimum 10000 cm ²
25	End connections	ANSI B 16.5 / BS
26	Inlet / Outlet Diameter	8"
27	Location	Outdoor Installation
28	Design Temperature	50 Degrees C
29	Average wasted water	Up to 1% of total flow
30	Exhaust Valve	3" hydraulically operated
31	Duration of Flushing cycle	60 seconds
	<u>CONSTRUCTION MATERIALS:</u>	
32	Filter Housing and Lid	Carbon Steel epoxy coated
33	Filtration Element	4 Layer Weave Wire screen of SS 316 L Internals and cleaning mechanism SS 316 L
34	Exhaust Valve	Cast Iron, Natural Rubber
35	Seals	Synthetic Rubber
	<u>CONTROL AND ELECTRICITY</u>	
36	Control voltage	24 V AC
37	Electric Motor	1/2 HP,
38	Operation Voltage	415 V AC, 3 Phase, 50 Hz.

Battery limit for softener & pre-filter : **From suction of feed pump to out let flange end of softener.**



Specification for Water Softener & Online Self Cleaning Filters – SSTP

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Annexure-4 : Page-3

02. ON LINE SELF CLEANING FULL STREAM WATER FILTER

1	Type	Online self cleaning
2	Flow rate	2 Nos. x 300 m ³ /hr (Total 600 m ³ /hr) All working. No stand by.
3	Filtration Degree	60 micron absolute
4	Min working pressure	2.0 to 2.5 Kg/cm ²
5	Design pressure	10 Kg/cm ²
6	Inlet TSS (Undissolved matter) (Present level of make up water)	20 to 30 ppm
7	Filtration Area / Unit	10000 cm ²
8	End connections	ANSI B 16.5 / BS
9	Inlet / Outlet Diameter	10"
10	Location	Outdoor Installation
11	Design Temperature	60 Degrees C
12	Average wasted water	Up to 1% of total flow
13	Exhaust Valve	3" hydraulically operated
14	Duration of Flushing cycle	60 seconds
	<u>CONSTRUCTION MATERIALS:</u>	
15	Filter Housing and Lid	Carbon Steel epoxy coated
16	Filtration Element	4 Layer Weave Wire screen of SS 316 L Internals and cleaning mechanism SS 316 L
17	Exhaust Valve	Cast Iron, Natural Rubber
18	Seals	Synthetic Rubber
	<u>CONTROL AND ELECTRICITY</u>	
19	Control voltage	24 V AC
20	Electric Motor	1/2 HP,
21	Operation Voltage	415 V AC, 3 Phase, 50 Hz.
22	Control & Monitoring	The control panel shall be provided with Common Selector switch to operate the system in – ➤ PDS mode. (Pressure Differential Switch) ➤ PDS & Timer Mode ➤ Continuous Flushing Mode

Battery limit for full stream filter: Flange end of inlet manifold to flange end of outlet manifold including inlet, outlet isolation valves, non-return valves, interconnecting piping and manifolds.

Scope:

Design, manufacture, supply, erection and commissioning of below mentioned as per general technical delivery condition Ref. no: SSTP/PLS/001, DT.14.03.12

Item No.	Description	Qty
01	Water Softening Plant of 150 m ³ /hr (3 Nos. x 50 m ³ /hr) capacity with accessories along with an Online Self Cleaning Pre-Filter of 150 m ³ /hr. (1 No. x 150 m ³ /hr) with four layer SS316L screen of 60 micron along with control panel & Inter connecting piping & isolation valves, suitable for outdoor installation to improve the Water Quality as per the technical specification & commercial conditions given.	1 Set
02	Online Self Cleaning filter of 600 m ³ /hr. (2 Nos. x 300 m ³ /hr) with four layer SS316L screen of 60 micron for Full Stream Filtration in circulating flow for closed circuit with control panel & Inter connecting piping & isolation valves, suitable for outdoor installation, to improve the water Quality as per the technical specification & commercial conditions given.	1 Set

Note: All the above items shall be awarded as a single package.

Operation:

The softener shall be designed, so as to get quality of water with the required parameter as given in Annexure-1. The total flow rate of the softener shall be 150 m³/hr consisting of 3 Nos. each of 50 m³/hr. and all the three shall be in operation during softening time. In the regeneration period the plant shall be capable of supplying treated water of minimum 100 m³/hr. The pre-filter and the full stream filter shall give the rated output with 60 micron filtration.

Technical Data: As per Annexure-4 (Technical Specification)