

Name of Item/ Equipment

ITEM No 6 ; SUPPLY OF EFFLUENT TREATMENT PLANT
Supply, Installation, Commissioning and operation of Bleaching and dyeing effluent treatment plant with it accessories including civil, mechanical and electrical works in all respect on turnkey basis. Tenderer should give the treated effluent quality confirming with norms stipulated by the Central Pollution Board and State Pollution Board, Tamilnadu

1. The design of the proposed Effluent treatment plant shall be based on the following data

Expected characteristic of raw effluent

Capacity of package unit	25 m3/day
Plant Operation Period:	20 hrs operation per day
Ph	6-8
COD	245 mg/lt
BOD	100 mg/lt
Total Dissolved Solid (TDS)	4112 mg/lt
Hardness	218 mg/lt
Silica	55 mg/lt

DESIRED CHARACTERISTIC OF RAW EFFLUENT

Capacity of package unit	25 m3/day
Plant Operation Period:	20 hrs operation per day
Ph	7 - 7.5 mg/lt)
COD	< 30 mg/lt)
BOD	< 5 mg/lt)
Total Dissolved Solid (TDS)	4000 mg/lt)
Hardness	< 200 ppm
Silica	< 25 ppm

2 Detail Of Effluent Treatment Plant

1.	Screen chamber	1	0.75 x 0.5 x 0.5
2.	Collection Tank	1	2.5 x 2.5 x 2.5
3.	Flash mixer	1	0.75 x 0.5 x 0.5
4.	Primary setting tank	1	1.5 x 1.5 x 1.5
5.	Clarified effluent sump	1	1.5 x 1.5 x 1.5
6.	Pressure sand filter	1	1.5 m3 / hr
7.	Azud filter	1	1.5 m3 / hr
8.	Filtrate collection sump	1	1.5 x 1.5 x 1.5
9.	Sludge drying beds	6	2.0 x1.0 x 1.0
10.	RO Ist stage	1	
11.	Ro Permeate collection tank	1	1.5 x 1.5 x 1.5

NIT for supply of Machineries/Equipments
for Trichy Handloom Cluster

12..	RO I Reject collection tank	1	1.5 x 1.5 x 1.5
13.	RO II Stage	1	
14.	RO II Reject collection tank	1	1.5 x 1.5 x 1.5
15.	Nano filtration plant	1	--
16.	Nano permeate collection tank	1	1.5 x 1.5 x 1.5
17.	Solar Evaporation Pan	1	200 m ²

3 Scope Of Work

1. The tenderer should Visit to the unit, study the details, collect the data and design the plant suitable to handle 25 cum/day
2. The tenderer should give the treated effluent quality confirming with the Tmilnadu State Pollution Control Board Standards (consent condition), as well as the parameters specified
3. Preparation of detailed report for submission to Tamilnadu Pollution Control Board, preparation of drawings, layout and construction drawing etc for civil/mechanical requirements, bill of quantities for civil mechanical and electrical work, erection, testing and commissioning of the plant.
4. Since the work is on turnkey basis all construction materials including steel and cement required for the completion of the plant are included in the contractors scope of supply
5. Supply , laying, testing and commissioning of interconnecting pipes and valves
6. Training of personal with regard to operation and maintenance of Effluent Treatment Plant
7. Commission to plant to get the treated effluent characteristics/standards laid down by Tamilnadu State Pollution Control Board
8. Supplier has to arrange NOC from the Pollution Control Board prior to installation of ETP and consent to operate.
9. For efficient running of the plant, the Mechanical and Electrical equipment such as pumps, motors, pressure gauges, pipe lines, valves, starters, agitators etc., should be as per IS specifications.

4 Description Of The System

Raw Effluent Characteristics

Sl. No.	Parameters	Value
1.	Flow	25 m ³ /day
2.	Ph	6-8
3.	Total Dissolved Solids	4112 mg/l
4.	COD	245 mg/l
5.	BOD	100 mg/l
6.	Hardness	218 mg/l
7.	Silica	55 mg/l

The raw effluent from the Dyeing unit will be passed through the screen chamber, to remove the coarse particles which are present in the wastewater and it will be collected in a collection tank.

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From the collection tank, the effluent will be pumped in to the flash mixer where the coagulants such as Alum, Lime and Poly Electrolyte will be dosed. Then the chemical dosed effluent from the flash mixer will be sent to the settling tank.

The overflow from the settling tank will be collected in the clarified effluent sump from where it is pumped into the Pressure Sand Filter and Azud Filter for further polishing. The outlet of Azud Filter will be the treated effluent from the ETP and the treated effluent will be collected in the filtrate water sump. The treated effluent will be further treated in the two stage Reverse Osmosis system to recover permeate and permeate will have the Total Dissolved Solids of less than 300 mg/l. Permeate recovered from the RO system will be reused in the process.

Two stage RO systems will be provided. The reject from I stage RO will be treated in the II stage RO. For this suitable membranes will be provided. The reject from II stage RO will be further treated in the Nano Filtration plant. The salt solution recovered from the NF plant will be reused in the Dyeing process. The reject from NF will be treated through Solar Evaporation pond.

The sludge settled at the bottom of the settling tank will be sent to the sludge drying beds for further dewatering. The filtrate generated from the sludge drying bed and the back wash water generated from the Pressure Sand Filter and Azud Filter will be sent back to the collection tank for further treatment.

The process flow chart for the treatment of wastewater generated from the dyeing process is shown in figure 3.1.

5.0 Units Of Proposed Effluent Treatment Plant

5.1 The proposed treatment plant shall have the following units:-

5.2 Topography Of The Site:

The general topography of the area where ETP's is to be constructed is shown in the drawing

The sump size, pump capacity and head, size of pumping main shall be fixed based on above future inflows.

The entire dyeing effluent from the industry treatment facilities is collected through a buried effluent network.

Spiral staircase (RCC) is inside the effluent well to access the screen which will be installed on a platform with hand railing around.

RCC beam with a monorail to be provided over the effluent tank for lifting of pums and the screens.

Submersible effluent pumps (with open / semi open impeller) shall have flexible delivery pipes.

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The effluent tank shall have GI wire mesh cover with necessary hinges.

Arrangement shall be provided for removal and disposal of screenings from the screens.

5.3 Effluent Pump Sets

The tender shall provide 2 nos. submersible effluent pumps with 1 no. pump working and the other standby. The capacity of each pump shall be fixed based on average inflow of effluent into sump. As a guideline, the capacity of each pump may be considered to be 2 m³/h. Necessary space provision shall be kept for addition of one more pump in future.

The pumps shall be of non-clog type, handling domestic sewage.

The pumps shall have rpm of not more than 1500.

The pump shall have CI casing, SS impeller, EN-8 shaft and stainless steel shaft sleeves etc,

The maximum size of particle the pump can handle shall be 50 mm.

The pump shall operate automatically with liquid level controller.

The pumps shall have manual control in addition to automatic control.

The selected motor KW rating shall be 20% more than the BKW arrived as per calculation.

5.4 Material Handling Equipment

0.5 ton chain pulley block shall be provided for handling the raw effluent pump.

5.5 Raw Effluent Pipeline

Raw effluent collected in sump shall be pumped to clarified sump. The delivery side of pumps shall have non-return valve, isolation valve, pressure gauge, etc.

5.6 Facilities At Effluent Treatment Plant

Effluent sump cum equalization tank

- The effluent sump shall have a capacity of 2 hrs storage of average flow.
- The effluent sump shall have suitable access and CI step irons as per relevant standards.
- Suitable hand railing shall be provided for the effluent pump.
- Effluent transfer pump – 2 Nos. (1w + 1SB) shall be provided for pumping effluent from equalization tank to Settling tank

5.7 Return Sludge Pumps

2 nos (1 working - 1 standby) self-priming, horizontal centrifugal, non-clogging sludge handling pumps conforming to IS: 5600 – 1970 with all accessories shall be provided.

The capacity of each pump shall be determined by the tender.

Positive suction shall be provided.

Access steps to pump floor shall be provided.

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The rpm of the pump shall not be more than 1500.

The pump shall have SS impeller.

The minimum velocity of 0.6 m/s shall be maintained in the suction and delivery pipelines.

5.8 Water Supply Facilities

Fresh water is required in ETP for washing and laboratory needs. The tender shall consider a separate pipeline from design limit to consumer points.

5.9 Fencing

Barbed wire fencing shall be considered around ETP with 4m wide gate. Barbed wire fencing shall be with 1.4 m high, 8 barbed wire lines as per IS 4996 – 1984 with gate.

5.10 Inter Connecting Pipelines, Valves, Fittings & Flanges

Inter connecting piping shall consist of pipes from the sewage sump and between various units inside sewage treatment plant.

All pipes shall be of DI cement mortar lined (High Alumina Cement) conforming to IS : 8329-2000, class K9 and DI fittings conforming to IS : 9523 – 2000. The DI pipe and fittings shall be flanged or push on type.

5.11 Flow Measurement

Based in TNPC board requirement, Electromagnetic flow meter will have to be provided. (The contractor can quote for only one flow meter).

6.0 Civil Works

The following Civil components will be required for the ETP process.

6.1 Screen Chamber

One No. of Screen of Size 0.75 x 0.5 m x 0.5 m shall be constructed in brick work in CM 1:5. All internal surfaces shall be finished with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All outside surfaces above ground level shall be finished with 15mm thick sand faced plaster (CM 1:3) and painted with snowcem of approved shade. The screen chamber has been designed based on the following design calculations.

6.2 Collection Tank

One No. of Collection Tank of size 2.5 x 2.5 x 2.5m (LD) shall be constructed in brick work in CM 1:3 concrete. All internal surfaces shall be finished with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All outside surfaces above ground level shall be finished with 15mm thick sand faced plaster (CM 1:3) and painted with snowcem of approved shade

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6.3 Flash Mixer

The Flash Mixer shall be of size **0.75 x 0.75 x 0.5 m LD** shall be provided to mix the incoming effluent with the chemical solutions. The unit shall be in RCC M20 construction. All internal surfaces shall be finished with smooth cement plaster with water proofing compound. All outside surface above ground level shall be finished with 15mm thick sand faced plaster (CM 1:3) and painted with snowcem of approved shade.

6.4 Primary Settling Tank

One Number of Settling Tank of size **2.0 x 1.5 x 1.5 m** will be provided.

6.5 Clarified Water Sump

The size of the Clear Water Sump shall be **1.5 x 1.5 x 1.5 m LD**. The clarified Water Sump shall be constructed in RCCM20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade. The clarified water sump is designed based on the following design calculations.

6.6 Filtrate Collection Sump

The size of the filtrate collection sump shall be **1.5 x 1.5 x 1.5 m**. The Filtrate Collection Sump shall be constructed in RCC.M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

6.7 Sludge Drying Beds

Six numbers of Sludge Drying Bed with the size of 2.0 x 1.0 x 1.0 m will be provided for dewatering the sludge generated from the Primary Settling Tank.

Mode of Construction : Brick work in CM 1:5, or RR in CM 1:6

Channel : RCC 1:1½:3

Perforated Slab : 30x200 mm openings at 60 mm c/c slab 50 mm thick

Sand Filling : 150 mm

Bottom Slope : 1 in 10

Fillings : 0.1 - 2 mm fine sand - 150 mm thick

2 - 3 mm coarse sand - 150 mm thick

10 mm coarse aggregate - 100 mm

20 mm coarse aggregate - 100 mm

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40 mm coarse aggregate - 100 mm

Central Drain : 200 mm wide channel of brick wall in CM 1:5

6.8 Table 4.1 Lists of Civil Structures

S.No	Description	Quantity	Dimensions	MOC
1.	Screen Chamber	1 no.	0.75 x 0.5 x 0.5 m	B.W
2.	Collection tank	1 no.	2.5 x 2.5x 2.5 m	B.W
3.	Flash mixer	1 no.	0.75 x 0.75 x 0.5 m	RCC M20
4.	Dosing Tanks	2 nos.		RCC M20
5.	Primary Settling Tank	1 no.	1.5 x 1.5 x 1.5 m	RCC M20
6.	Clarified Effluent sump	1 no.	1.5 x 1.5 x 1.5 m	RCC M20
7.	Foundations for PSF/ACF FILTER	1 lot	-	RCC M20
8.	Filtrate collection Sump	1 no.	1.5 x 1.5 x 1.5 m	RCC M20
9.	Sludge Drying beds	6 nos.	2.0 x 1.0 x 1.0 m	B.W/RCC M20
10.	Panel / Blower Room	1 No.	5.0 x 4.0 x 3.0 m	

7.0 Mechanical Equipments

Technical data sheets and details of the equipment for the following shall be submitted for approval:

7.1 Screen chamber

One No. of Bar Screen fabricated in M.S. Flats with opening 50 mm size shall be provided in the Screen Chamber. The Screen shall be coated with two coats of epoxy paint over a coat of epoxy primer. Bar screen in MS shall be fixed to suit the tank size of **0.75 x 0.5 x 0.5 m**.

7.2 Raw Effluent Transfer Pump

(1 +1)Nos. of Non Clog, self priming centrifuged pump of capacity 1.5 m³ / hr shall be provided in the collection tank.

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7.3 Flash Mixer

1 No. of Flash Mixer shall be provided in the Flash Mixing tank for mixing chemical solutions with the effluent. The unit shall be complete with necessary reduction gear box with suitable torque rating, motor, coupling, shaft and impeller. The Shaft impeller shall be in SS 304 material and shall rotate at 100 rpm. Necessary M.S .Mechanical base frame across the tank shall be fabricated from ISMC. The base frame shall be minimum of 1m wide and chequered plate of minimum 5mm thick. Necessary handrails on the 3 sides of bridge shall be provided in 32 NB M.S.Pipe. All the fasteners used shall be in G.I. The bridge shall be given one coat of primer and two coats of epoxy paint. Suitable cover shall be provided. 1 No. Flash Mixer mechanism is being provided to suit tank size of **0.75 x 0.75 x 0.75 m LD**.

7.4 Filter Feed Pump

(1 +1)Nos. of Non-Clog, horizontal, centrifugal pumps of capacity, 1.25m³/hr. at 30 m head shall be provided to transfer the effluent from Clarified Water Sump to the special Filter press. The pumps shall be complete with necessary Control Panel with low/high level limits switches and shall be suitable for handling particle size of upto 50 mm. The pump's impeller, Shaft and Sleeve shall be in S.S. and the casing shall be in C.I.

7.5 Pressure Sand Filter

The Pressure Sand Filter of capacity 1.5 m³/hr shall be provided to filter the treated water from the tertiary clarifier

Provide 0.55 m dia x 1.2 m ht

Fabricated in M.S. plates for shell thickness 5 mm, dish thickness 5 mm, working pressure 3.5 kg/cm², Filtered sand and Pebbles as media. Specific gravity of sand will be 2.65, effective size will be 0.40 – 0.60 and the uniformity co-efficient will be 1.2 – 1.60.

7.6 ACF Filter

The Azud Filter of capacity 1.5 m³/hr shall be provided to filter the treated water from the sand filter.

Provide 0.55 m dia x 1.2 m ht Fabricated in M.S. plates for shell thickness 5 mm, dish thickness 5 mm, carbon and pebbles as media. Iodine value for the granular activated carbon will be 1000.

8.0 Structural

8.1 General Description Of The Work

Steel structures envisaged for the STP are as follows:-

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Steel structural works are as necessary for, monorail beams, staircase with landing platforms, hand railing, chequered plate floor cover etc., complete, for the satisfactory working and completeness of the plant.

8.2 Electricals

The incomer of MCC shall be brought up to the control panel at ETP and the plant shall be run from local controls. The cables, control panel, lighting of the buildings in ETP and the necessary electrics required for ETP shall be in the scope of tenderer.

8.3 Instrumentation

The operation control of ETP shall be locally monitored and the required high-low switches for the automatic operation of the pumps, switches, gauges and necessary instruments required for the operation of the plant shall be in the scope of tenderer.

8.4 Inspection And Testing

Inspection of equipment by the Purchaser/Consultant shall be only with a view to ensuring that the equipment is fabricated/manufactured, assembled, tested, supplied, installed and commissioned as per approved drawings and prescribed specifications.

8.5 Erection And Commissioning

Performance tests of pumps and the complete system at site shall be conducted by the tenderer after erection of all the equipment to check the soundness of the system.

Before start of preparation for commissioning, all the equipment and pipelines shall be certified by the Purchaser for commissioning.

8.6 Performance Guarantee

Tenderer shall provide and install all measuring instruments required for checking and the guarantee performance which are not included among the permanent measuring instruments of the equipment / system. Such instruments shall be furnished by the tenderer on a temporary basis for the duration of the performance tests at no extra cost to the Purchaser/Consultant. The specification for the testing instruments to be used for performance guarantee tests shall be as approved by purchaser/consultant.

8.7 Minimum Equipment Parameters For Acceptance Of Equipment

The performance test of mechanical equipment shall be carried out for a period of 72 hours in the presence of the Purchaser / Consultant satisfactorily. The tenderer shall be solely responsible for foolproof performance of the entire effluent treatment plant offered by him. The performance guarantee shall cover the following:

- a) Satisfactory running of Mechanical, Electrical and Instrumentation equipment.

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b) Final quality of treated effluent during the warranty period as per the following / Central / State PCB norms whichever are most stringent.

BOD (5 day) : less than 5 mg/l

Suspended Solids : less than 5 mg/l

The quality of the effluent shall be guaranteed after the lamella settler and before chlorination.

8.7.2 The equipment shall conform to the design criteria indicated for various equipment in the Technical specification.

8.7.3 The samples will be collected over a period of 7 days during acceptance test and should conform to the parameters given above. The necessary tests shall be carried out by the tenderer at his own cost in the approved lab indicated by Purchaser / consultant.

8.7.4 The tenderer should study the specification and satisfy himself regarding the workability of the proposed system and shall take responsibility for the design of the total system, quality of the material and workmanship, guaranteed operation and smooth performance etc. of the equipment. This technical specification is only for the guidance of the tenderer and hence all the item necessary for safe and satisfactory operation and guaranteed performance of the proposed system shall be considered by the tenderer even if they are not specifically mentioned in the specification.

8.7.5 Penalty for poor quality of the treated effluent

If the BOD content of the treated effluent exceeds 5 mg/l it will be the sole responsibility of the tenderer to modify/reconstruct the plant at his own cost in 3 weeks to meet performance specifications. In the event of non-performance, the Purchasere reserves his right to get the plant modified / repaired, to meet the guarantee parameters, from third party at the risk and cost of tenderer.

The penalty clause shall remain valid during the 1 year warranty period.

9.0 Reverse Osmosis System

9.1 The treatment plant is having the capacity of **25m³/day**. The proposed Pre-treatment plant and R.O System is also having the capacity of **25 m³ / day, 20 hrs operations**, suitable to the R.O's feed flow.

9.2 The **Reverse Osmosis System** has designed for a **Two Stage Recovery**. The Permeate from the Stage - I shall be about 70%, i.e., 17.5 **KLD** of product water will be obtained from the feed flow of **25 KLD**. The remaining 30% i.e., 7.5**KLD** shall be the rejects from Stage – I.

9.3 It is proposed to install a Stage - II **Reverse Osmosis System** to treat the 7.5 KLD of the rejects from Stage – I. The Permeate from Stage – II shall be also about 50% i.e., 3.75 KLD of product water will be obtained from the feed flow of 7.5 KLD.

9.4 The reject from RO-II will be pumped to Nano Filtration system to recover the salts present in the effluent. About 85 % of the salt will be recovered from the NF plant i.e. 3.2 KLD and remaining .55 KLD will be sent to the Solar Evaporation Plant.

10.1 Operating Data For R.O. Plant:

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Sl no	Description	Stage – I	Stage – II
1.	No. of Streams	One	One
2.	Mode of plant operation	Semi automatic	Semi automatic
3.	Feed Flow rate	1.25 m ³ /hr	0.375 m ³ /hr
4.	Average recovery (at 25°C)	70%	50%
5.	Product flow rate	0.875 m ³ /hr	0.1875 m ³ /hr
6.	Operating pressure (at 25°C)	15-20 kg/cm ²	40 kg/cm ²
7.	Operating Hours	20 hrs.	20 hrs.
8.	No. of membranes	2 Nos. 8” dia membranes, (Fouling Resistant) (KOCH/Hydronautics/ Filmtec/Osmonics)	1 No. 8” dia membranes, (KOCH/Hydronautics/ Filmtec/Osmonics)

10.2 Details Of High Pressure Pump:

Sl No	Description	Details – Stage - I	Details - Stage – II
1.	Pump Type	CR	HNTN
2.	Make	GRUNDFOS /EQUIVALENT	HIRONISHA/EQUIVALENT
3.	Flow rate	1.5 m ³ / hour @ 20 kg/cm ²	0.5 m ³ /hr @ 40 kg/cm ²
4.	HP	3 HP	3 HP
5.	MOC	SS	SS 316

10.3 Details Of Pressure Vessel:

Sl No	Description	Details – Stage – I	Details – Stage – II
1.	Capacity	To house 2 Nos of 8” membrane	To house 1 No of 8” membrane
2.	Make	MAXIMA/CODE LINE/EQUIVALENT	MAXIMA/CODE LINE/EQUIVALENT
3.	Maximum pressure	400 psi	1000 psi
4.	MOC	FRP	FRP
5.	Quantity	1 no.	1 no.

11.0 Nanofiltration

11.1 The NF plant was designed for **5 m³ / day, 10 hrs operations** to treat the rejects generated from the Reverse Osmosis system. The N. F. system is designed at a recovery rate of more than 85%. The rejects from the RO system will be sent to the NF plant. The Permeate 4.25 KLD (85%

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recovery), which will be reuse in the process. The rejects of Nano Filtration Plant will be about 0.75 KLD (15% of Nano Feed) which will be further treated in the Solar Evaporation pond.

OPERATING DATA FOR N.F. PLANT:

No. of streams	...	One
Mode of plant operation	...	Semi automatic
Feed Flow rate	...	0.5 m ³ /hr
Average recovery (at 25°C)	...	85%
Product flow rate	...	0.425 m ³ /hr
Operating pressure (at 25°C)	...	18-20 kg/cm ²
Operating Hours	...	10 hrs.
No. of membranes	...	1 nos. (8" dia membranes)

11.2 N.F. FEED WATER LIMITING CONDITIONS:

Turbidity	...	< 1 NTU
S.D.I	...	< 3
Heavy Metal	...	Nil
Organic and bacteria	...	Nil
Oil & Grease	...	Nil
Residual chlorine	...	Nil
Oxidizing materials	...	Nil
Temperature C (Max.)	...	< 30
Colour	...	Colourless.
Odour	...	Odourless.

11.3 Civil Structures For Ro And Nf System

11.3.1 Ro Shed

The size of the Ro Shed shall be 4.0 x 4.0 x 3.5 m, with Galvanoised powder coated / AC Sheet roofing with brickwork using Class-I Bricks and plastered with 15mm thick (CM 1:3) inside outside. The floor level of the ground floor shall be 0.5 m above the finished ground level. Necessary space has been provided to house the RO system (both stage I & II) including the high pressure pumps, panels etc, complete. The floor shall be in RCC 1:1 ½ : 3.

11.3.2 R O Reject I Collection Tank

The size of the Reject I collection tank shall be 1.5 x 1.5 x 1.5m. The Reject I collection tank shall be constructed in RCC M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

11.3.3 RO Reject II Collection Tank

The size of the Reject I collection tank shall be 1.5 x 1.5 x 1.5m. The Reject I collection tank shall be constructed in RCC M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

11.3.4 RO Permeate Collection Tank

The size of the Reject I collection tank shall be 1.5 x 1.5 x 1.5m. The Reject I collection tank shall be constructed in RCC M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

11.3.5 NF Permeate Collection

The size of the Reject I collection tank shall be 1.5 x 1.5 x 1.5m. The Reject I collection tank shall be constructed in RCC M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

11.3.6 NF Reject Collection Tank

The size of the Reject I collection tank shall be 1.5 x 1.5 x 1.5m. The Reject I collection tank shall be constructed in RCC M20. All internal surfaces shall be plastered with 15mm thick smooth cement plaster (CM 1:3) with water proofing compound. All external surfaces above ground level shall be plastered with 12mm thick sand faced plaster (CM 1:3). The surface above ground shall be painted with snowcem of approved shade.

11.3.7 Solar Evaporation Pond

Daily Flow to solar pond	: 0.75 KLD
Total area required	: 162 m ²
Area provided for Solar Evaporation Pan	: 200 m ²

The walls of solar pan shall be constructed by using R.R. stone masonry,. The floors are filled with sand, Over the surface of sand P.C.C. 1:4:8 will be laid after that floor finishing will be carried out. On completion of the floor finish, 2mm thick paulin sheet shall be spread over the flooring, which has high evaporating effect. The rejects from the evaporator shall directly discharge into the solar pond over the paulin sheet surface. The residual salt is scrapped out from the sheet surface after evaporation and will be collected in a HDPE bags and are stored in a AC roofed hollow block shed. This salt will be disposed off in consultation with TNPC Board.

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Construction Procedure of Solar Evaporation Ponds

- The area where Solar Evaporation Pan to be constructed leveled and compacted.
- River sand is spread over for a 150mm thick.
- PCC 1:4:8 of thickness 100 mm is laid over the sand.
- 20mm thick floor plastering is done over the PCC.
- 2mm thick paulin black sheet is laid over the floor.

11.4 List Of Civil Structures For Ro And Nf

SR. NO.	ITEMS	QTY. IN NOS.	DIMENSIONS
1.	RO Room	1	4.0 x 4.0 x 3.5 m
2.	R.O. Platform	1	1 lot
3.	Foundation for pumps, vessels, foundation of equipment, bolts, pipe supports, supporting structures, etc.	--	1 lot
4.	RO Permeate Storage Tank	1	1.5 x1.5 x 1.5 m
5.	RO Rejects Storage Tank	1	1.5 x1.5 x 1.5 m
6.	RO II Rejects Storage Tank	1	1.5 x1.5 x 1.5 m
7.	Nano Permeate Storage Tank	1	1.5 x1.5 x 1.5 m
8.	Nano Rejects Storage Tank	1	1.5 x1.5 x 1.5 m
9.	Solar Evaporation Pond	1	200m ²

11.5 List Of Mechanical Components For Ro

SL. NO.	DESCRIPTION	Stage – I	Stage - II
1.	Sod, Metabisulphite dosing pump	1	Nil
2.	Sod. Metabisulphite tank, HDPE	1	Nil
3.	Acid dosing pump	1	1
4.	Acid tank, HDPE	1	1
5.	Anti-scalant dosing pump	1	1
6.	Anti-scalant tank	1	1
7.	Cartridge Filter, P.P	2	Nil
8.	High Pressure Pump	1	1
9.	Pressure Vessel	1 no - 8" dia, 2E	1 no. - 8" dia, 2E
10.	Membranes	2 - 8" dia	1 - 8" dia
11.	R.O. SS Skid, with pipings	1 lot	1 lot
12.	DOL starter for High pressure pump to trip pump during high / low pressure	1 lot	1lot
13.	RO cleaning system with pump	1set	1set

11.6 List Of Mechanical Components For Nf

SL. NO.	DESCRIPTION	QUANTITY
1.	NF anti-scalant dosing pump	1 no.
2.	Anti-scalant tank	1 no.
3.	NF acid dosing pump and tank	1set
4.	NF Cartridge filter , P.P.	1 no.
5.	NF membranes	8" dia, 1 no.
6.	NF cleaning system	1 no. `

Operation And Maintenance

The Tenderer's scope of work includes operation and maintenance of the equipment and systems installed and meet the guaranteed quality of treated effluent during the seven-year period of operation & maintenance period as detailed in volume 1 for the entire plant.

Cost And Dimension Of Equipments

S.No	Description	Quantity	Dimensions	Cost in Rs.
1	Screen Chamber	1 no.	0.75 x 0.5 x 0.5 m	
2	Collection tank	1 no.	2.5 x 2.5x 2.5 m	
3	Flash mixer	1 no.	0.75 x 0.75 x 0.5 m	
4	Dosing Tanks	2 nos.		
5	Primary Settling Tank	1 no.	1.5 x 1.5 x 1.5 m	
6	Clarified Effluent sump	1 no.	1.5 x 1.5 x 1.5 m	
7	Foundations for PSF/ACF FILTER	1 lot	-	
8	Filtrate collection Sump	1 no.	1.5 x 1.5 x 1.5 m	
9	Sludge Drying beds	6 nos.	2.0 x 1.0 x 1.0 m	
10	Panel / Blower Room	1 No.	5.0 x 4.0 x 3.0 m	

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NIT for supply of Machineries/Equipments
for Trichy Handloom Cluster

List Of Mechanical Equipments

S.No.	Description	Quantity	Dimensions	Cost in Rs.
1.	Bar Screen	1 no.	0.75 x 0.5 x 0.5 m	
2.	Raw Effluent Transfer Pump	1+1 nos.	Capacity:1.5 m3/hr. Head: 15 m Make: Jhonson /Equivalent	
3.	Flash mixer	1 no.	0.75 x 0.75 x 0.75 m LD	
4.	Agitator	2 nos.	-	
6.	Filter Feed pump	1+1 nos.	Flow: 1.5 m3/hr. Head: 30 m Make: Kirloskar / Equivalent	
7.	Pressure Sand Filter	1 no.	1.5 m3/hr	
8.	Activated carbon filter	1 no.	1.5 m3/hr	
9	Piping	1 Lot		
10.	Electrical equipments	1 Lot		
11.	Electro magnetic Flow meter			
12.	Commissioning Charges	LS		
13.	3 month Maintenance charges			

Schedule II (F)

Financial bid

Item No. 6 - Bill of quantity for supply of effluent treatment plant

Item No	The specification offered by the bidders	Qty No	Price / unit			Packing & Forward	Erection & Commission	Freight charges	Other charges	Total price at F.O.R. Destination
			Basic (ex-factory)	Excise Duty	Sales Tax					

Signature and rubberstamp	SCHEDULE I & II (F)	Page 17 of 17
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