INSTALLATION & MAINTENANCE
FOR 5 YEARS OF
REVERSE OSMOSIS (RO) PLANT
FOR
MUNICIPAL CORPORATION
BHATINDA
AT OFFICE OF MUNICIPAL CORPORATION, BATHINDA

ESTIMATED COST:- 8.62 LACS
NO OF RO SYSTEMS:- 1 No.

II.2 RO System Requirements

II.2.1 Scope of the Bidder

1.2.1.1.1. The capacity of the plant shall be the capacity of RO product water in liters per hour (LPH) as in Annexure-I.

1.2.1.2. The technical specifications of each component of RO system for the 400 LPH capacity is enclosed as Annexure-III.

1.2.1.3. The raw water quality characteristics and product water quality are indicated in Annexure I and Annexure II. The bidder has to see that the product water quality in invariably within the limits prescribed in Annexure II for treated water.

1.2.1.4. The reject water should not exceed 40%.

1.2.1.5. The bidder has to supply, install, commission, operate and maintain the RO system for five years.

1.2.1.6. This offer should include all the possible expenses towards spares replacement of membranes consumables and repairing/ reconditioning if any required during the specified period of the five years.

1.2.1.7. The bidder should be have their own testing facilities to handle water testing. However, bidder would analyze the water sample for all parameters as per WHO norms once in a month, may be from their own lab located at Head Quarters or some reputed lab.

1.2.1.8. RO has to be installed at a point and bidder has to connect all the coolers installed in MC office to the RO system. All material i.e. pipes, bends, Tee, Joints etc. has to be supplied and connection by the bidder.

II.2.2 Product Water Quality Parameter Test

The product water quality shall be tested in the Laboratories of the Department of water supply & sanitation or Department approved laboratories located at various places of the State and the report of chemical examination form these laboratories shall be treated as final. The water quality must conform as per WHO standards.

Water quality will be periodically evaluated maximum with an interval of two months and the system should perform consistently.

II.2.2.1.1 The solution should be able to adapt to variable feed water source e.g. The system should be able to adapt to varying amount of fine particulate silt in the raw water and varying TDS levels throughout the year.

II.2.3 The use of cleaning chemicals in the system should be minimal.

II.2.4 The system should ensure prevention of fouling of the downstream RO membranes caused by the presence of organic and microbiological foulants in the raw water.

II.2.5 The system should ensure prevention of a majority of physical foulants from entering into RO membranes so as to ensure clean RO membranes delivering consistent performance.

II.2.6 The system should generate minimal amount of effluents thus giving an environment-friendly solution.

II.2.7 The dependence on operator for day to day functioning should be minimal preference shall be given to bidders providing semi-automated system.

II.2.8 It is desirable that the system should be skid mounted and require ordinary foundation being lighter in weight.

2.3 Scope of Department/ Gram Panchayat

The following items shall not be in the scope of supplier. The Department/ Gram Panchayat of respective village shall provide these items.

- 3 phase power supply at all point in RO plant room.
- The Department shall guarantee minimum 8 hours per day of power supply. If required, the department shall provide back-up power.
- Required land (approx.1000 square feet per facility) for setting up of RO plant.

- In case during the tenure of the project, the ground water dries up and hence the raw water is unavailable. The department shall provide the cost of relocating the plant to some other mutually acceptable location.

3. General Specifications

3.1. The bidder shall install the required equipment and maintain the same for a period of five years from the date of commissioning of plants, as per the conditions prescribed in this document, and in the time frame prescribed at his own cost.

3.2. The bidder shall startup and shut down of water treatment equipment, perform basis daily testing functions, and perform minor routine maintenance to ensure proper operation.

3.3. The bidder will provide training to the system operator. The bidder shall ensure routine inspection of the equipment by the equipment supplier.

3.4. The bidder shall provide trained manpower to maintain the equipment, change filters, and refill chemical storage tanks. Maintaining the required uptime of all the systems to ensure the provisions of quality services to the villagers are the main ingredients of the work.

3.5. The bidder will be responsible for the supply of consumables and chemicals, and any other material required essentially to provide effective services.

3.6. The bidder will install the equipment at the above-maintained facility.

3.7. The bidder shall provide and maintain the electrical and plumbing fittings of all types at the treatment plant in good working condition.

3.8. Non- Discriminatory and Transparent Bidding Procedure

The Department shall ensure that the rules for the bidding process shall apply in a non-discriminatory and transparent manner. No confidential information relating to the project or the bidding process that has the potential to restrict competition or give any bidder any advantage shall be divulged anytime.

3.9 Prohibition against collusion with other prospective bidders.

Each bidder warrants by the bid that the contents of the bid and the bid amount have been arrived at independently. Any bid that is found to have been arrived at through consultation or collusion or any sort of understanding with any other prospective bidder for the purpose of restricting competition shall be deemed to be invalid and the bidder shall loose his security deposit/earnest money deposit.

3.10 Inducement

Any effort by a bidder to influence processing of bids or award of bid by the Department or any officer/agent/advisor thereof may result in the rejection of such bidder's bid. In such a situation involving the rejection of bid the bidder shall loose the bid security/ Earnest money deposit and would be potentially disqualified from other with the Government of Punjab.

Other requirements:

4.1 All the successful bidders will have to ensure collection of the samples from the site and meeting of the design criteria.

4.2 Frequency of replacement of membrane shall invariably be mentioned in the offer. The minimum guaranteed period of membrane should not be less than 3 years.

4.3 Any deviation from the proposed design needs to be approved by the Department.

4.4 Testing and Inspection-

4.5.1 During inspection, the bidder should produce all the documentary evidences having procured and used new and quality components which go into the total system. These documents including guarantee/ warrantee / test certificate of the component manufacturer will be verified and authenticated by the inspection agencies. Such authenticated document should from a part of the total document required for clearing the bill for payment as per the schedule of payment.

4.5.2 Site tests

After erection at site, all components, equipment as described shall be tested to prove satisfactory performance and /or fulfillment of functional requirements without showing any sign of defect as individual equipment and as well as a system. All rotating components of the system as applicable shall run at the rated speed for a period of 7 (Seven) Days. During this period, all the components shall function smoothly without any undue deflection, unbalance vibration, flutter, slipping or sticky motion, excessive play & overheating at bearing parts, sparking etc.

4.6 Packing, forwarding and transportation

All accessories which are likely to get damaged during transit if transported mounted on the equipment shall be removed adequately packed and shipped separately. All inlet and outlet flanges shall be blanked with thick bolted wooden planks. Packing shall be sturdy and adequate to protect all assemblies' components and accessories from injury by corrosion, dampness, heavy rains breakage and vibration encountered during transportation, handling and storage at the plant site.

4.7 Erection and Commissioning (E & C)

The Supplier shall be responsible for satisfying himself and the Department as to the correctness of the electrical and mechanical connections between all equipment in his supply. For all above work, the supplier shall furnish the required services of erection superintendent and other skilled and unskilled labour, erection tools, tackles and other required equipment. The supplier shall take these materials back after the erection is complete.

4.8 Delivery/Commissioning

The delivery and commissioning of all the equipments covered in this specification in 2 months from the date of the confirmed Letter of intent. Earlier completion periods are preferred.

5.1 Technical Criteria

5.1.1 Registered manufacturing and assembling factory capable of delivering the units will be preferred.

6. Schedule of payment

The Department shall make the payment village wise in the following manner:

On supply of RO units	60% of cost of plant
On completion of 15 days successful operation of RO plant.	30% of the balance cost of plant
Maintenance cost on completion of agreement time.	Proportionate every quarter after deducting 10% security balance

7. Guarantee and Warranty

The work under this specification shall be guaranteed to meet the performance requirement as called for in the specifications and annexure in all respects. The supplier shall provide a guarantee that the system/ equipments are new and of high quality and free from defects in design, material and workmanship.

Corporation Engineer
Municipal Commissioner Bathinda

Assistant Corporation Engineer
Municipal Commissioner Bathinda

ANNEXURE I

PRODUCT WATER QUALITY

Sr. NO	Characteristics	Acceptable
1	Turbidity (NTU)	2.5
2	Color (Units on platinum cobalt scale hazen unit)	5
3	Taste and odour	Un objectionable
4	PH	7.0 to 8.5
5	Total dissolved solids (mg/lt)	500
6	Total hardness as (Ca Co30(mg/lt)	200
7	Chlorides (as C.I)(mg/lt)	200
8	Sulphates (as SO4)(mg/lt)	200
9	Fluorides (as F)(mg/lt)	1.0
10	Nitrates (as NO3)(mg/lt)	45
11	Calcium (as Ca)(mg/lt)	75
12	Magnesium (as Mg)(mg/lt)	<30*If there are 250 mg/l of sulphates mg content can be increased to a maximum of 125 mg with the reduction of sulphates @ 1 unit per every 2.5 units of sulphates
13	Iron (as Fe)(mg/lt)	0.1
14	Alkalinity (mg/lt)	200
15	Manganese as MN mg/lt	0.05
16	Copper as Cu mg/I	0.05
17	Zinc as Zn mg/l	5.0
18	Residual free chlorine (mg.lt)	0.2
19	Bacteria (MPN/100 ml)	0-As per Who Standards

Annexure-II

Technical Specification for RO Plant
Capacity from 500 LPH to 2000 LPH

1.0	Inlet Pump	Function – to feed water from storage tank to filter
	Type	Horizontal Centrifugal
	Number	One No.
	Make	Grundfos/Ebara/SUMO/DP pumps/ WILO
	Capacity	As per plant requirement
	Pressure and power	As per plant requirement
2.0	Pressure Sand filter	Function- first step to remove suspended impurities from water
	Type	Vertical
	Flow Velocity	<15M3/Hr/Mt2
	MOC of Vessel	Pentair/Structural/Advance composite
	Backwash time	15-20 Minutes
	Type of operation	Manual
	Multi Port Value (MPV)	As per plant requirement
	MOC of MPV	ABS/Nylon/PP
	Make of MPV	Prahar/Ftltra concept/Aventura/pentair
3.0	Anticipant Dosing System	Function- to inhibit scaling of hardness salt and silica on RO Membranes
	Pump	1 Set
	Make	ASIA LMI/ Injecta / Sonder Prominent
	Quantity	1 No.
	Type	Electronic Diaphragm Type
	Capacity	0-5 LPH
	Quantity of tank	1 No.
	Capacity of Tank	100 ltr.
	MOC of tank	FRP/MSRL
	Make of Tank	Indian
4.0	Micron Cartridge Filter	Function- fine filtration of water for removal of suspended solids up to 5 micron size to prevent chocking/ blockage on RO Membrane
	Flow rate	As per plant requirement
	MOC	FRP/Engineering grade plastic
	NO. of Cartridge housing	As per plant requirement
	Micron Rating	5 Micron
	Flow velocity	2.5 Mtr/See
	MOC of cartridge	PP
	Make	Osmotic/ Ametak- USA / Gopani / Purtex

5.0	High Pressure Pump	Function- to develop required pressure for Reverse Osmosis on RO Membranes
	Type	Vertical Centrifugal Multistage
	MOC	SS
	Number	One No.
	Make	Grundfos/ Ebara
	Capacity	As per plant requirement
	Pressure and power	As per plant requirement
6.0	Pressure Vessel	Function- to house RO Membranes under pressure
	Item	RO Module consisting of membrance housing with RO membrane mounted on skid
	MOC	FRP
	Diameter	As per plant requirement
	Length	As per plant requirement
	Make	Codeline/ Phoenix/ Maxima / Protec/advanced compo
7.0	Membrane	Function- to remove dissolved salt from water by Reverse Osmosis, produce permeate water having less dissolved salt and reject water having highly concentrated salt.
	Type	TFC, Polyamide
	Size	As per plant requirement
	Average Flux	<18 GFD
	Make	DOW Filmtec-USA, / Hydranautics/ Toray Japan
	Operating water Temperature	Ambient Temperature
8.0	PH Correction System	Function- to enhance PH of RO permeate from 5.5-6 to 7-7.5 as per WHO guideline
	Pump	1 Set
	Make	ASIA LMI/ Sonder Prominent
	Quantity	1 No.
	Type	Electronic Diaphragm Type
	Capacity	0-5 LPH
	Quantity	1 No
	Capacity of tank	100 ltrs.
	MOC tank	FRP/MSRL
	Make of tank	Indian
9.0	Ultra Violate System	Function- to disinfect water, will kill bacteria and micro-organisms
	Capacity	As per plant requirement

	Make	Alfa/ Phillips/ ACE Hygiene
10.0	Cleaning in Place (CIP) System	Function- use for chemical cleaning of RO Membranes over a period of time
	Quantity of tank	1 No.
	Capacity of tank	As per plant requirement
	MOC to tank	FRP/ MSRL
	Make of tank	Indian
	Micron Cartridge Filter	
	Flow rate	As per plant requirement
	MOC	FRP/ Engineering Grade Plastic
	No. of Cartridge housing	As per plant requirement
	Micron Rating	5 Micron
	Flow velocity	2.5 Mtr/Sec
	MOC of cartridge	PP
Instrumentation & Controls		
A	Pressure Gauges	Function- to measure pressure
	Quantity	4 No
	Location	Pump outlet, Filter outlet, MCP outlet, post filter outlet
	Range	0-7 Kg/cum2
	Location	Feed pump outlet / Filter outlet
	Quantity	2 No
	Location	High pressure pump discharge and RO reject
	Range	0-20 Kg/ cm2
	Make	Forbes Marshal/ Waree
	MOC	SS
B	Flow Indicator	Function- to measure flow rate at location
	Quantity	3 No.
	Location	RO Feed, RO Product, Reject
	Type	Float type, panel mounted
	Max, operating temperature	40 degree centigrade
	Measuring points	RO Feed, RO Product, Reject
	Make	Flow Max/ Blue & White / FIP / Eureka/ GF

LAY-OUT PLAN OF COMMERCIAL R.O 200,400 and 600 LPH:-

RAW WATER PUMP

↓

Multi Grade Filter (NGMF)

Takes care of the turbidity (physical impurities viz sand, mud, dirt etc)

↓

Carbon Filter (NGMA)

(Takes care of excess chlorine, bad taste, bad colour, bad odour)

↓

Anti scalent Dozing System (Dozing Pump)

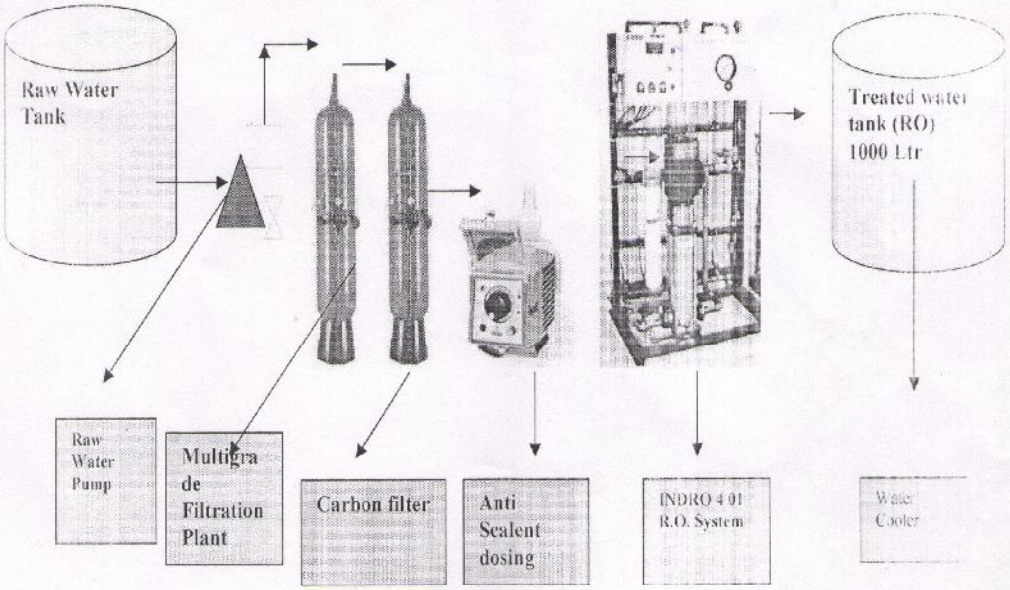
(Protects R.O Membrane from scale depositions)

↓

RO (INDRO)

(Commercial R.O Skid)

Diagram for centralized RO Plants.



QUOTATION: - FOR 400 LPH

Product Description:-	Qty. (units)	Unit Rate (Rs.)
NGMF- 20	01	
NGMA – 20	01	
INDRO 402(400 LPH)	01	
ANTISCALENT SYSTEM	01	
INSTALLATION CHARGES(BY COMPANY PLUMBER)	-	
TOTAL	04	

PROPOSAL FOR 400 LPH RO

1. MULTI GRADE FILTER

(Takes care of the turbidity (physical impurities viz sand, mud, dirt etc)

Product Name	Qty
NGMF- 20 Make Ion Exchange (I) Ltd Model : NGMF -20 Max Flow (m3/h : 3.0 Material of construction : FRP/PVC Treated Water Quality in ppm : 5.0 Effluent volume per backwash(m3) : 1.2 Max Effluent Flow m3/h : 3.0 Inlet and outlet connections (PVC Socket union & Drain connections) : 32 Dimensions Dia(mm) : 335 Lenth (m) : 1400 Depth (mm) : 1200	01

2. Carbon Filter

(Takes care of excess chlorine, bad taste, bad colour, bad odour)

Product Name	Qty
NGMA - 20 Make Ion Exchange (I) Ltd Model : NGMA -20 Max Flow (m3/h : 3.0 Material of construction : FRP/PVC Treated Water Quality in ppm : Nil Effluent volume per backwash(m3) : 0.4 Max Effluent Flow m3/h : 3.0 Inlet and outlet connections (PVC Socket union & Drain connections) : 32 Dimensions Dia(mm) : 285 Lenth (m) : 1540 Depth (mm) : 1350	01

3. ANTI SCLALENT DOSING SYSTEM

(To take care of scaling)

Product Name			Qty
ANTI SCALENT DOSING SYSTEM			01
Chemical Tank Volume : ltr/hr		100	
Max. Frequency Stroke per Min. :		100	
Discharge Capacity:			
Max. Back Pressure	:l/h	1.08	
Max. Back Pressure	:@ Bar	12.0	
Nominal Back Pressure	: l/h	1.38	
Nominal Back Pressure	:@ Bar	6.0	
O.D. x I. D :	mm	6 x 4	
Nominal Power :	watts	11	

REVERSE OSMOSIS SYSTEM *(For drinking purpose)*

Product Name	Qty
Product Description	Qty. (units)
- R.O. SKID - 400 LPH **(Make Ion Exchange)** Dimensions (Basic Unit) : 1200x950x1600mm Flow rate : 400 ltr/hr. Average Recovery : 30% Maximum Permissible TDS in feed : 2500ppm Average TDS Removal : 90 to 95% Minimum feed pressure required at pump inlet (Kg/cm2) : Not less than 1.0 Power Supply : 415V - 50 hz Drive motor (hp/rmp) : 3.0 / 2900 Membrane : Two HYDRAMEM **(Make Ion Exchange)** Pump Make : GRAND FOS	01

BASIS OF DESIGN AND TREATMENT SCHEME

PLANT INTRODUCTION:

The proposed Water Treatment scheme is designed to produce product water at the flow rate of 400 LPH based on Reverse Osmosis Technology.

Note: The proposed water treatment system can even work continuously for 6-8 Hrs per day leaving aside 0.5 – 1 Hrs for the recommended Backwashing of the Filtration system.

RAW WATER ANALYSIS

1. We have designed the proposed Water Treatment System based on following Water Analysis,

Sr. No.	Parameter	Analysis Value.
1	Maximum Permissible TDS in feed ppm	2000
2	Turbidity	1 NTU
3	SDI	4
4	Heavy metals Iron	<1
5	Organics And Bacteria	NIL
6	Oil And Grease	NIL
7	Temperature (°C)	<40.
8	Color	Color Less
9	Odor	Unobjectionable
10	BOD & COD	NIL
11	Maximum Permissible Hardness in feed ppm	450 – 500

2. RO PLANT OPERATING CONDITION:

Sr. No.	Parameter	Value.
1	Feed Flow Rate.	1200
2	Product Flow Rate	400
3	Reject Flow Rate.	600 - 800
4	Recovery	30-35%

3. TREATMENT SCHEME.

Sr. No.	Description
	RAW WATER SORAGE TANK
1	RAW WATER TRANSFER PUMP
2	SAND FILTER
3	ACTIVATED CORBON
4	ANTISCALANT DOSING SYSTEM
5	MICRON FILTER (20 Micron & 5 Micron)
6	HIGH PRESSURE PUMP
7	RO MODULE(MEMBRANE & MEMBRANE HOUSING)
8	FLUSHING /CLEANING SYSTEM
9	PRODUCTS(PURE) WATER STORAGE TANK

The End Water quality shall be achieved subjected to:

2No. Tank for Pure Capacity 1000 Liter @ Rs. 6.25 per liter (Triple Layer) and Raw Water Capacity 3000 Liter @ Rs. 7.50 per liter (Triple Layer)

@ Rs. 28.750/-

Cost for 400 LPH RO System (Ion Exchange India) including making connections the coolers, raw water tanks, clear water tank complete in all respect.

@ Rs. 3,75,000/-

B. AMC and Running for five years detail as :-

1. RO Membrane
2. RO Dosing Chemical
3. Dosing Pump
4. Raw water pump
5. All electrical parts
6. Service technical visit monthly and as per required

Total AMC **@ Rs. 4,50,000/-**

Total cost of complete RO Plant 400 LPH

@ Rs. 8,53,750/-

UPVC										
SIZE INCH	**PIPE**	**COUPLER**	**ELBOW**	**TEE**	**MTA**	**FTA**	**ENDCAP**	**UNION**	**BALLWALL**	**BUSH**
1/2"	**40/- Mtr**	**12/-**	**12/-**	**15/-**	**10/-**	**12/-**	**9/-**	**30/-**	**125/-**	**10/-**
3/4"	**60/- Mtr**	**18/-**	**18/-**	**25/-**	**12/-**	**14/-**	**12/-**	**45/-**	**165/-**	**12/-**
1”	**80/- Mtr**	**24/-**	**24/-**	**30/-**	**15/-**	**18/-**	**17/-**	**55/-**	**205/-**	**18/-**
5/4”	**100/- Mtr**	**31/-**	**30/-**	**35/-**	**25/-**	**27/-**	**22/-**	**75/-**	**360/-**	**24/-**

Pressure pump 0.5 HP approx Rs. 3000/- Branded and 1 HP approx Rs. 5500/- Branded Tank level censor approx Rs. 4500/- Double and Rs. 3000/- Single.