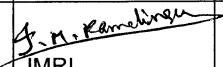
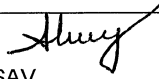
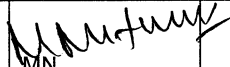


	SPECIFICATION FOR CARTRIDGE FILTER & ELEMENTS	SPEC.NO.ROS:6194
		REV.: 00

**BHARAT HEAVY ELECTRICALS LIMITED,
RANIPET- 632 406**

**TECHNICAL SPECIFICATION
FOR
CARTRIDGE FILTER HOUSING & FILTER ELEMENTS (BWRO)
MAITREE - 2 x 660 MW**

00	01.01.18	 IMRL	 SAV	 MN	Fresh issue
Rev.No	Date	Prepared	Checked	Approved	Remarks

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1.0 SCOPE OF SUPPLY

The intent of this specification is to cover Design, Engineering, Manufacturing, shop testing and supply of Cartridge Filter Assembly for BWRO system.

- a) Pressure vessel suitable for housing of one number High flow Cartridge filter element. Each pressure vessel shall consists of following
 - Pressure vessel with end cap assembly - 1 set
 - Support saddles & Holding strips with SS316 strips - 2 set
 - b) High Flow Cartridge filter elements
 - c) 1 Set of commissioning spares
 - d) 1 Set of mandatory spares
 - e) 1 Set of recommended spares for 3 years O & M (optional).
- 1.1 In case of any deviation, the Bidder shall indicate the same, clause by clause in the deviation schedule. In the absence of the same it will be construed that the bid confirms strictly to the specification.
 - 1.2 The inspection at bidder's / Sub vendor's work before dispatch of all equipment shall be carried out as per agreed QAP. The inspection at bidder's work before dispatch shall be carried out by BHEL / BHEL Authorized agency / Customer / Jointly by Customer & BHEL before dispatch.
 - 1.3 The order of priority of this specification is as follows:
 - Technical requirement / Equipment Specification,
 - General design requirements
 - 1.4 The material shall be dispatched to site as per the BHEL's shipping list approved by customer. The quality plan (QAP) formats will be given by the customer after ordering

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2.0 EQUIPMENT SPECIFICATION:

2.1 GENERAL

- 1) Equipment : High Flow Cartridge filter assembly
- 2) Application : For effective filtration of RO feed water
- 3) Surrounding : Dusty, humid atmosphere
- 4) Installation : Indoor
- 5) Ambient Temperature : 50 Deg.

2.2 PRESSURE VESSEL ASSEMBLY:

- 1) Make / Model : Bidder to specify
- 2) Material of construction : FRP filament wound
- 3) Vessel Size : To house high flow cartridge filter element of size ~ 7" Dia x 60" length
- 4) No.of elements per vessel : One
- 5) Quantity required : 8 Vessels
- 6) Flow rate / housing : $\leq 50 \text{ m}^3/\text{hr.}$
- 7) Design Pressure psi(g) : 90 (Maximum)
- 8) Pressure rating psi(g) : 150 (Maximum)
- 9) Burst Pressure : As per design code
- 10) Feed port :-
 - Port orientation : Side / End port, 1 No per housing
 - Port size : Bidder to decide the port size with Victaulic grooves
 - MOC : SS 316 / Duplex Stainless Steel 2205
- 11) Drain port :-
 - Port orientation : Side port, 1 No per housing
 - Port size : 1" FNPT / Grooved to connect the drain line
 - MOC : SS 316 / Duplex Stainless Steel 2205
- 12) Product port :-
 - Port orientation : Side / End port, 1 No per housing
 - Port size : Bidder to decide the port size with Victaulic grooves
 - MOC : SS316 / DSS 2205 / Engineering Thermoplastic-PVC / PET

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2.3 HIGH FLOW CARTRIDGE FILTER ELEMENT:

- | | |
|--|---|
| 1) Type / Model | : Bidder to specify |
| 2) Element rating | : 5μ Nominal |
| 3) Quantity required | : 8 Nos |
| 4) Filter loading | m3/hr : ≤ 50 m3/hr / Cartridge element |
| 5) MOC | : Polypropylene |
| 6) Size of Filter element | : ~ 7" dia x 60" length |
| 7) End caps | : Nylon / equivalent |
| 8) Seal Type | : Buna-N, 'O' ring |
| 9) Support core | : Polymeric or equivalent |
| 10) Configuration | : Bidder to specify |
| 11) Flow direction | : Bidder to specify |
| 12) DP across cartridge filter element | |
| - Design (Initial) | psi : Bidder to specify |
| - Maximum | psi : Bidder to specify for change of element |

Note: Cartridge filter elements shall be provided with proper sealing arrangement to avoid feed flow mixing with filtrate.

3.0 PERFORMANCE GUARANTEE

The high flow cartridge filters shall be guaranteed for a minimum period of 12 (twelve) months from the date of successful commissioning of the plant (or) 18 months from the date of receipt of all materials at site, whichever is earlier. The date of receipt of last item at site will be reckoned for this purpose.

Any part which proves defective either in design, materials / and / or manufacture within the above guarantee period shall be replaced at free of cost to the owner at site and the provision of this clause shall apply to the portions of the plant so replaced or renewed until the expiration of the guarantee period or from the date of replacement whichever is later.

4.0 SPARES

The bidder shall provide the list of commissioning spares and it shall be delivered along with the main supply well in time before the start-up & commissioning of the plant. The commissioning spares list is indicated in this section. Over and above any if required, are also to be provided by the bidder.

Additional requirements for trouble free commissioning of the equipment / system shall also be included in the list. The price for the commissioning spares shall be included in the main supply and the list shall be provided along with the bid, this

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price will be included for bid evaluation. Any unutilized commissioning spares shall be handed over to the Customer.

In addition to this, bidder shall provide 3 years recommended O&M spares list with price separately along with the bid. Customer reserves the right to buy any of the recommended spares as considered necessary by them during later stage. The price of recommended spares will not be considered for bid evaluation.

The prices of recommended spares shall be consistent with those of the mandatory spares. The validity of prices for these spares shall be up to 1 year from the date of handing over & taking over of the plant.

4.1 Commissioning Spares:

Sl.No	Item Description	Qty.	Remarks
1	High Flow Cartridge Filter element	2 Nos	
2	Any other specific requirement		Bidder to include

4.2 Recommended Spares for 3 Years O&M:

The bidder shall indicate the list of recommended O&M spares for the first three years of normal operation as per the format in **Annexure - 2**

4.3 Mandatory Spares:

The mandatory spares shall be delivered along with the main supply. The Cost of mandatory spares shall be indicated separately and the same is considered for Bid Evaluation.

The list of mandatory spares are given below:

SL. NO.	Name of Items	Qty	Remarks
1)	High Flow Cartridge filter elements	4 Nos	

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5.0 DOCUMENTATION:

The documentation during bid and post order stage shall meet the following requirements.

1. All documents and drawing shall be submitted in English
2. Hard copies of all documents and drawings during bid stage to be submitted in duplicate.
3. Hard copies of all documents for approval shall be submitted in triplicate.
4. Hard copies of all final documents, drawings, manual etc., shall be submitted in bound folder in duplicate.
5. Soft copies of all final documents in MS word / MS office in the form of CD –1 set
6. Soft copies of all final calculations in MS excel/ MS officer in the form of CD–1set
7. Soft copies of all final drawings in Auto Cad, latest version in the form of CD-1set

5.1 DOCUMENTS ALONG WITH BID:

The following drawings / documents are to be enclosed along with the bid for scrutiny.

1. A technical write-up giving detail of capacities and GA drawing.
2. Filled up data sheets as called in the specification – **Annexure -1**
3. Deviation schedule duly filled, if any as per **Annexure – 3**.
4. Un priced commercial offer on the scope of supply
5. Un priced commercial offer for the recommended spares list

Note:

In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in **Annexure - 3**. If there is no deviation “NIL” statement shall be furnished. In the absence of the non-attachment of this **Annexure-3**, it will be construed that the bid confirms strictly to the specification.

5.2 DOCUMENTS AFTER ORDER

The following documents / Drawings and data to be furnished for BHEL / customer approval / information

Phase-I (for approval) within 2 weeks from the date of purchase order receipt:

1. Technical Write-up and design basis
2. GA drawings of all the equipment
 - Pressure vessel / filter housing
 - Cartridge filter
3. Filled up datasheets for approval as per **Annexure – 1**
4. Activity chart / Bar Chart and schedules for drawing submission, manufacturing, and supply.

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Phase-II (for approval) within 4 weeks from the date of purchase order receipt:

1. Detailed assembly & cross sectional drawings with bill of materials
 - Pressure vessel / filter housing
 - Cartridge filter,
2. Duly filled data sheets enclosed as per **Annexure - 1**

Phase-III For information & Review:

1. Erection Manual indicating
 - a. Erection / installation instructions of equipment.
 - b. Field quality checks

Phase-IV (for review):

1. Operation and maintenance manual.
2. Maintenance instruction & assembly
3. Installation drawings

Note:

Bidder to confirm in their offer that these details called in 5.2 will be provided.
The documents under Phase-III & IV shall be submitted before dispatch.

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Annexure - 1

EQUIPMENT DATA SHEET FOR RO DESALINATION PLANT

1. HIGH FLOW CARTRIDGE FILTER ASSEMBLY:

1.1 HIGH FLOW CARTRIDGE FILTER HOUSING ASSEMBLY:

- 1) Make / Model :
- 2) Material of construction :
- 3) Vessel Size :
- 4) Flow rate/housing m3/hr. :
- 5) No.of Housing per skid :
- 6) No.of elements per vessel :
- 7) Design Pressure psi(g) :
- 8) Test pressure psi(g) :
- 9) Pressure rating psi(g) :
- 10) Burst Pressure psi(g) :
- 11) Feed port :-
 - Port orientation :
 - Port size :
 - MOC :
- 12) Drain port :-
 - Port orientation :
 - Port size :
 - MOC :
- 13) Product port :-
 - Port orientation :
 - Port size :
 - MOC :

1.2 HIGH FLOW CARTRIDGE FILTER ELEMENT:

- 1) Type / Model :
- 2) Element rating :
- 3) Filter loading m3/hr :
- 4) MOC :
- 5) Size of Filter element :
- 6) End caps :
- 7) Seal Type :
- 8) Support core :
- 9) Configuration :
- 10) Flow direction :
- 11) DP across cartridge filter element
 - Design (Initial) psi :
 - Maximum psi :

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Annexure – 2

LIST OF RECOMMENDED SPARES

Sl. No.	Description of the equipment	Description of spares	Quantity	Price

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ANNEXURE-3

TECHNICAL DEVIATIONS

Sl. No	Section No.	Clause No.	Page / No.	Specification	Statement of Deviations/variations	Reason for Deviation	cost of withdrawal