



STANDARD OPERATING PROCEDURE

Department: Engineering

TITLE: Operation Of Reverse Osmosis (HSRO) Plant

SOP No.

Revision No.

Effective Date

Supersedes No.

Review Date

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1.0 OBJECTIVE:

The purpose of this SOP is:

- 1.1 To describe the procedure for operation of Reverse Osmosis Plant (HSRO) plant.

2.0 SCOPE:

This SOP is applicable for operation of Reverse Osmosis Plant (HSRO) plant at

3.0 RESPONSIBILITY:

3.1 The Maintenance Operator shall be responsible:

- 3.1.1 Responsible for operation of the Reverse Osmosis Plant.

- 3.1.2 Responsible for recording of operational data's in the performance log sheet.

3.2 The Maintenance Engineer shall be responsible:

- 3.2.1 Responsible for proper operation of the plant.

- 3.2.2 Responsible to take corrective action if any deviation observed.

4.0 ACCOUNTABILITY

Head –Engineering Services

5.0 PROCEDURE:

5.1 OPERATION:

- 5.1.1 Before starting the plant ensure that the Valve (V) V1, V2, V3, V4 & V5 open of MGF are Operational as per SOP.

- 5.1.2 Ensure that anti scalent and sodium bisulphate solutions are ready in respective tanks and its isolation (discharge, sodium bisulphate, antiscalent) provided in RO feed line are kept open.



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- 5.1.3** Then Open valve V-01 (High pressure pump inlet), V-02 (High pressure pump outlet), V-03 (Reject valve). And close V-04 (Feed reject) & (CIP Cartridge filter housing line), V-06 (Reject recycle valve), BFV-02 (Reject line into CIP tank).
- 5.1.4** Open isolation valves of monitoring instruments Niddle Valve-1 (ORP of Feed water).
- 5.1.5** After ensuring the positions of all valves, start the RO plant.
- 5.1.6** It is to be noticed that any other valves in the plant, which is not specified in this SOP are to be closed position and will be performed for other activities.
- 5.1.7** As soon as the feed water pressure reaches to 2 kg/cm^2 , which is provided in the feed water line, the High-pressure pump will start. Other wise the High pressure pump will not get start and the operator should check all systems prior to RO plant for proper functioning.
- 5.1.8** ORP analyzer will sense the free chlorine level in the feed water and if it is present, ORP meter in mv unit and up to 250 mv detects the chlorine level, chlorine level will be nil. If it is more than 250 mv, it will give an Alarm. Then operator should open the feed reject valve V-04 and drain the water till get chlorine nil. As soon as water found Ok.
- 5.1.9** Now water will start to flow through the membranes. As soon as the water comes out from the reject valve BFV, Operator will throttle this valve and simultaneously throttle the reject recycle valve BFV for get the permeate flow @ $8 \text{ m}^3/\text{hr}$. (Reject flow @ $2.67 \text{ m}^3/\text{hr}$, Reject recycle flow @ $3.05 \text{ m}^3/\text{hr}$.)
- 5.1.10** permeate water Conductivity note down it in logbook.
- 5.1.11** Now the permeate water is collected in to SS 316 storage tank for feed to Purified water system and utilities. And the reject water is drained off.
- 5.1.12** Check the feed water pH and permeate water Hardness regular basis and note down in Logbook.



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5.2 CHEMICAL CLEANING OF MEMBRANE:

5.2.1 Check the pressure difference in different stages for find out chocking of membrane on regular basis and record the same in Performance Log book. If it is not within the acceptance criteria, carryout the chemical cleaning of membrane as per ref. SOP.

5.3 REPLACEMENT OF CARTRIDGE FILTER:

5.2.1 Check the pressure difference across the Cartridge filter (5 micron 30”long – 4nos.) and record the same in log book on regular basis. If it crosses 0.5 kg/cm² before the two months from the installation, replace the cartridges or otherwise replace the filters once in every two months whichever is come first.

5.4 SANITIZATION:

5.4.1 Sanitization of RO plant has to be carried out once in a month with hot water as per Ref SOP. (Frequency is decided on the basis of past experience). However QC will monitor the quality parameters related to microorganism and if any changes required in frequency, should be incorporated.

5.5 PREVENTIVE MAINTENANCE:

5.5.1 Preventive maintenance of plant has to be carried out .

5.6 MEMBRANE REPLACEMENT:

5.6.1 Replacement of Membranes to be carried out in three years (Recommended by manufacturer in healthy operational condition).

5.7 PLANT STOPPING PROCEDURE:

5.7.1 To stop the plant.

5.7.2 Then keep to open the reject valve BFV and close the Reject recycle valve BFV.

5.7.3 Close isolation valves.



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6.0 ANNEXURES:

Annexure-I: Performance log sheet of RO plant.

7.0 REFERENCES (S)

Nil

8.0 GLOSSARY

SOP : Standard Operating procedure

No : Number

RO : Reverse Osmosis.

V : Valve.

NaOCl : Sodium Hypochloride.

NaHSO₃ : Sodium Meta bisulphide.

m³/hr : Meter³/Hour.

kg/cm² : Kilogram/Centemeter²



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ANNEXURE-I

Date	
Shift	
Operator	

NOTE: Record the following parameters on hourly basis.

Time (Hrs)	Stage Pressure (Kg/cm ²)		Cartridge filter pressure (kg/cm ²)		Permeate pH	Permeate Hardness (PPM)	Conductivity (μs/cm)	Flow Rate (m ³ /hr)			ORP Meter Reading of feed water mv	Remarks	Operators Signature
	I	II	inlet	outlet				Permeate	Permeate	Reject Recycle			

ACCEPTANCE CRITERIA:

Permeate pH	Permeate Hardness	ORP Meter Reading mv	Stage pressure		Pressure difference across cartridge filter	Flow Rate			Checked by: (Engineer):
			I	II		Permeate	Reject Recycle	Reject	
5.5-7.0	NMT10 PPM	NMT 250	NMT 5KG/CM ²	NMT 3 KG/cm ²	NMT 0.5 kg/cm ²	NMT 8 m ³ /hr	NMT 3.05m ³ /hr	NMT 2.67 m ³ /hr	

TDS : total dissolved solids
 PPM : parts per million
 NMT : not more than