

### REQUIREMENT SPECIFICATIONS

Specification of Reverse Osmosis Water Treatment System with Heat Rinse			
Description of function			
Water plays a vital role in haemodialysis treatment. Reverse osmosis water treatment system compliments our superior standards in water quality and serves our mission to deliver high-quality dialysis.			
General Specification			
S/No	Parameters	Specifications	Comply (Yes/No)
1	<b>Dual-stage RO system:</b> A complete dual stage RO system that consists of Break tank / Soft water tank, valves, indicators, connectors, membranes, pumps, PLC, Online monitoring system etc. Each stages must be able to operate individually.	Required RO Main system constructed with high medical grade materials for heat rinse with dual stage, able to operate individual stages	
2	<b>RO Water disruption loop: (Primary Loop/Main Pipe).</b> The main pipe that allows circulating purified water from the RO system to the Dialysis area and returning back unused RO water to the Break tank / Soft water tank.	High medical grade PEX pipe construction with 100% dead space-free construction and coupling with a double adaptor at the dialysis unit for hot/heat rinse.	
3	<b>RO Water distribution loop: (Secondary Loop/recirculation loop - if).</b> Branch out of lines/circulation from the Primary loop/ Main pipe to individual stations.	<b>Option 1:</b> Secondary loop/recirculation loop with ring piping design to avoid stagnant water, completely made of high-grade PTFE (Teflon) material with 100% dead space-free construction, and reinforced with stainless steel net for high durability for heat rinse  <b>Option 2:</b> Medical/ High-grade PEX pipe/ Reinforced silicone tubing used for secondary/fluid fly loops construction for secondary loop/recirculation tube silicon material with 100% dead space-free construction, and reinforced for high durability for heat rinse.	
4	<b>RO Membrane : Material</b>	Polyamide material - ESPA (Energy saving Polyamide) with heat withstanding capability	
5	<b>RO Membrane : Dimension</b>	Required 8-inch diameters by 40-inch long spiral wound	
Operational Features			

6	Permeate Flow (Based on the number of stations estimated 3 to 6 units of 8-inch membranes in the system)	Refer point 14 for the Requirement of Reverse Osmosis Water Treatment System Capacity	
	Retention capacity	Min 99 % retention capacity of inorganic substances	
	RO Membrane	Rejection Rate : Bacteria & Endotoxin >99%	
	PUB Raw Water pressure	Able to operate with ,Static pressure 2 - 6 bar and Dynamic pressure 2 - 3 bar	
	Membrane cleaning	Required membrane backwash rinsing / regular flushing at a regular interval	
	Auto ON/OFF	Programmable auto ON/OFF function for the entire week/ Month.	
	Disinfection - Heat disinfection	Function to do complete heat disinfection programmable for Auto and Manual.	
	Disinfection - Chemical disinfection	Function to do complete chemical disinfection programmable for Auto and Manual	
	Sampling point	Minimum two sampling points, one at the start of the Primary loop and another one at the End loop.	
	Service menu	Password Secured menu for service technicians	
7	<b>Security Features</b>	Required Dual-stage RO system	
		Able to operate emergency operation functions for Stage 1 and 2- Auto / Manual	
		Able to detect and control Permeate overpressure	
		Able to detect and control Permeate high conductivity	
		Able to detect and control Permeate high temperature	
		Able to detect and control Dry run protection	
		Voltage stabilisation	
		Traceability of alarms	
		Operation and alarm history	
		Permeate Flow	
		Concentrate Flow	
		Membrane pressure	
		Permeate pressure	



8	<b>Monitoring Features</b>	Permeate temperature	
		Raw water, Concentrate and Permeate water conductivity	
		Online Monitoring: History and Event	
		Soft water Hardness (optional)	
		Chlorine & Chloramine (optional)	
9	<b>Pre-treatment Specification:</b>		
	Pre-filters	Replaceable 5 /1 micron filter Assembly (single/dual stage)	
		Feed water inlet filter /100-micron filter assembly/ Multimedia filter	
	Pre-Treatment Piping	UPVC grade with good quality of connectors and pipes	
		Metal flexible hose especially high-pressure handling areas like inlet and outlet of Carbon tanks Softener tanks and Multimedia filter	
	Safety	Backflow Preventer/ Non-returnable valve	
	Softener	Duplex (two) softener with auto and manual backwash function	
		Bypass facility	
		Softener tank capacity: Based on the RO system permeate flow	
		Operating pressure minimum 2 bar	
		Media -Synthetic Resin - Ion-exchanger	
	Activated Carbon Filter	Minimum two charcoal filter with auto and manual backwash	
		Bypass facility for stage 1 and stage 2	
		Carbon tank capacity: Based on the RO system permeate flow	
		Operating pressure minimum 2 bar	
		Media - Activated carbon	
	Pretreatment media headers (Multimedia, Softener, Carbon)	Able to program backwash on particular date & time (To support nocturnal dialysis)	



	Booster Pump	Two pumps with Bypass facility	
	RO Status Indicator	RO status indicator to be installed at Treatment Area including cable and accessories	
10	Warranty period for 3 years	Entire RO system with RO water loop (High medical grade PEX pipe) and Pre- treatment (Multimedia, Softener & Carbon tank controller and Booster Pump and leakage detector)	
11	Educational / Technical Training for BMEs	Minimum Two sessions of Technical training for NKF BMEs during the warranty period.	
12	Disposal of packaging material/	All packing materials and unwanted items to remove from site after commissioning.	
13	Additional Information	Please indicate the number of years of experience in relevant industry (Medical RO system)	
		Please indicate the number of RO systems installed in Singapore. Provide the customer details.	

<b>Requirement of Reverse Osmosis Water Treatment System Capacity</b>			
14	<b>Description</b>	<b>DC</b>	<b>Serangoon Polyclinic</b>
	Estimated Number of Stations		30
	Estimated Possibility of increase in number of stations		2
	Estimated Number of Standby by		5
	Estimated Number of contingency		2
	Estimated Number of midloops		2
	Total Number of water points		41
	Estimated Product Output/permeate flow (Without CDS) option 1		Min 1900 - 2200 L/hr
	Estimated Product Output/permeate flow (With CDS) option 2		Min 2200 - 2500 L/hr
	Estimated target month to issue Purchase Order		May - 2026
	Estimated target month of installation		Sep - 2026
	Layout		Not Available



Authorised Signature: \_\_\_\_\_

Signatory's title: \_\_\_\_\_

Signatory's name: \_\_\_\_\_

Vendor's stamp: \_\_\_\_\_

Vendor's name: \_\_\_\_\_ ☐