

# 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><br>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><br>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<br><br><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   |   |  |                 |

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| 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  |  |



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| 8 | <b>Monitoring Features</b>          | Permeate pressure  |  |
|   |                                     | 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   |  |



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|    | Pretreatment media headers (Multimedia, Softener, Carbon)             | Able to program backwash on particular data & 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.   |  |
| 14 | <b>Requirement of Reverse Osmosis Water Treatment System Capacity</b> |  |  |
|    | DC  | <b>633 Ang Mo Kio</b>  |  |
|    | <b>Description</b>  |  |  |
|    | <b>Estimated Number of Stations</b>                                   | 32   |  |
|    | <b>Estimated Possibility of increase in number of stations</b>        | 1  |  |
|    | <b>Estimated Number of Standby by</b>                                 | 6  |  |
|    | <b>Estimated Number of contingency</b>                                | 2  |  |
|    | <b>Estimated Number of midloops</b>                                   | 2  |  |
|    | <b>Total Number of water points</b>                                   | 43   |  |
|    | <b>Estimated Product Output/permeate flow (Without CDS) option 1</b>  | Min 2000 - 2300 L/hr   |  |
|    | <b>Estimated Product Output/permeate flow (With CDS) option 2</b>     | Min 2300 - 2600 L/hr   |  |
|    | <b>Estimated target month to issue Purchase Order</b>                 | May - 2026   |  |
|    | <b>Estimated target month of installation</b>                         | Nov - 2026   |  |
|    | <b>Layout</b>   | Not Available  |  |



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

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

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

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

Vendor's name: \_\_\_\_\_ ☐