

NANO FILTRATION DESCRIPTION

Task location: US Embassy Nairobi

Objective:

Supply and installation of NANO filtration water to treat raw water shown in the table below to the US standard provided. This shall include installation, integration into the existing system, testing and commissioning. From the day of full commissioning, the vendor shall provide attend to all installation related failures through a period of 6 months with no further charges.

Composition:

At minimum, the proposed plant shall comprise of the following major equipment.

i. Raw water booster pump

For boosting / pressurizing raw water from the storage tank through the system. This pump shall be supplied complete with automatic control system for over pressure and dry run protection. The booster pump will pick the raw water from the borehole water storage tank.

ii. Sand / Carbon Filter

For filtration and removal of suspended particles. System will be complete with backwashing mechanism.

iii. Polishing Filters

For polishing of raw water before feeding into the NF system. This will provide additional safeguard for blockage of NF membranes.

iv. NF system

NANO Filtration unit (Capacity : 6000 lts/hr)

This is the main water treatment system. The system will eliminate bacteria (ecoli, coliforms) and reduce dissolved solids including fluoride, sodium and chlorides giving quality purified water that meets local and international standards for drinking and domestic/industrial use.

v. Backwashing and CIP facility

For backwashing the pretreatment section and cleaning of the NF membranes. The back wash system shall not waste over 10% of the water.

Vi. Unit power/Control system:

415V/50Hz/Three phase or 240V/50Hz/single phase. The system shall have intelligent control system with integration capabilities complete with all relevant transducers.

vii. Bracket system:

The assembly frame shall be made from stainless steel RHS. Base and main supports frame must be fabricated in 50mm x75mm RHS, mounter on the floor using stainless steel anchors and other associated vibration eliminators.

viii. Where items fail to fit into the available interior space, allow for a shade over the provided space adjacent to the pump room.

Allow for integration to the existing PH and CL dosing systems.

Borehole raw water condition:

PARAMETERS	UNITS	RESULTS	KS EAS 12 : 2018 SECOND EDITION 2018
PHYSICAL TESTS			
Ph	pH Units	8.08	8.5 – 8.5
Turbidity	NTU	0.9	< 5.0
Color	PL. Co. APHA	20	15 TCU
Total Suspended Solids	Mg/l	2	NIL
Total Dissolved Solids	Mg/L	73.8	1000
Conductivity	Micro Siemens/cm	154.7	1500
CHEMICAL TESTS (ANIONS)			
Phenolphthalein Alkalinity	Mg/l CaCO ₃	ND	NS
Total Alkalinity	Mg/l CaCO ₃	63	NS
Chloride	Mg/l Cl	15	250
Fluoride	Mg/l F	1.84	1.5
Sulfate	Mg/l SO ₄	8	400
Nitrate	Mg/L NO ₃	0.2	45
Nitrite	Mg/l NO ₂	0.014	0.1
Phosphate	Mg/l PO ₄ ³⁻	0.4	2.2
CHEMICAL TESTS (CATIONS)			
Sodium	Mg/L Na	41	200
Calcium	Mg/l Ca	0.2	150
Magnesium	Mg/l Mg	0.46	100
Iron	Mg/l Fe	0.05	0.3
Manganese	Mg/l Mn	0.035	0.1
Ammonia	Mg/l NH ₃	0.05	0.5
Copper	Mg/l Cu	0.01	1.0
OTHER PARAMETERS			
Total Hardness	Mg/l CaCO ₃	11	300
Calcium Hardness	Mg/l Ca ²⁺	0.051	NS
Magnesium Hardness	Mg/l Mg ²⁺	1.89	NS
Silica	Mg/l SiO ₂	24.8	NS
Free Chlorine	Mg/l Cl ₂	0.02	0.2 – 1.0

US Standards

Constituent	Test Method Valid Data Range	Standards				
		National Primary Drinking Water Standard (MCL)	National Secondary Drinking Water Standard	Practice Standard	Wastewater Effluent Standard	World Health Organization
Alkalinity (Total)	0 - 240 mg/L			> 50 mg/L & < 150 mg/L		
Aluminum (Al)	0 - 0.8 mg/L					
Arsenic (Ar)	0 - 500 µg/L	10 ppb				
Chemical Oxygen Demand (COD)	0 - 1500 mg/L				Typ < 54 mg/L	
Chloride (Cl)	30 - 600 mg/l		250 mg/L			250 mg/L
Chlorine (Free)	0 - 2.0 mg/L	< 4.0 mg/L				.4 mg/L
Chlorine (Free)	0 - 10 mg/L	< 4.0 mg/L				0.4 ppm
Chlorine (Total)	0 - 10 mg/L	< 4.0 mg/L				
Chlorine (Total)	0 - 2.0 mg/L	< 4.0 mg/L				
Color	0 - 500 units		15 units			
Conductivity	10 - 1990 µS/cm			150 - 500 µS/cm		250 microS/cm

Copper (Cu)	0 - 5 mg/L					2 mg/L
Dissolved Oxygen (DO)	0 - 15 mg/L				Typ > 6 - 8 mg/L	
Fluoride (F)	0 - 2 mg/L	4.0 mg/L	2.0 mg/L			1.5 mg/L
Hardness (Ca)	1 - 20 gpg			< 80 mg/L (or 5 gpg)		
Hardness (Total)	1 - 20 gpg			< 120 mg/L (or 7 gpg)		
Hardness (Total)	0 - 425 mg/L			<120 mg/L (or 7 gpg)		
Iron (Fe)	0 - 5 mg/L		0.3 mg/L			
Lead (Pb)	5 - 150 µg/L					0.01 mg/L
Manganese (Mn)	0.2 - 20 mg/L		0.05 mg/L	800 - 500mL @ 5-min 500 - 400mL @ 30-min		0.5 mg/L
Nitrate (NO3) - High Range	0 - 30 mg/L	10 mg/L				50 mg/L
Nitrate (NO3) - Mid Range	0 - 5 mg/L	10 mg/L				
Nitrogen, Ammonia	0 - 50 mg/L				Typ < 3 - 4 mg/L	50 mg/L
Pathogen	Presence-Absence and/or MPN < 0.1 - > 8	Absent (MPN=0)		Absent (MPN=0)	Absent (MPN=0)	
pH	6.2 - 8.4		6.5 - 8.5			
Silica (SiO2)	0 - 75 mg/L			<0.02 ppm (boiler water)		
Sulfate (SO4)	0 - 70 mg/L		250 mg/L			500 mg/L
Taste & Odor	1 -10 Threshold Odor Number		3 threshold units			
Temperature	0° - 110° C					
Total Dissolved Solids (TDS)	10 - 1990 ppm		500 mg/L			
Total Suspended Solids (TSS)	0 - 750 mg/L				<30 mg/L	
Turbidity	0 - 1000 NTU	TT, Typically 0.3 - 0.1 NTU				

Minimum System requirements :

NO.	DESCRIPTI ON	MODEL	QTY	UNIT	MATERIAL
I			Pre treatment system		
1	Feed pump	6m ³ /h, 30m, 0.75KW	1	pcs	SS304
2	Multi media filter	φ400×16 50	1	pcs	FRP
3	Activated carbon filter	φ400×16 50	1	pcs	FRP
4	Auto-filter valve	F67B	2	pcs	Engineering plastic
5	Fillings	1~8mm	285	KG	Quartz sand
6	Fillings	1~2mm	60	KG	Activated carbon
7	Protective filter	φ200×50 0×5	1	pcs	SS304
8	Filter cartridge	5μm, 30"	5	pcs	PP
9	Pressure gage	0.6MPa	3	pcs	SS304
10	Pipe fitting, valve	DN32~ DN15	1	set	U-PVC
II			NF system		
1	High pressure pump	6m ³ /h, 66m, 2.2KW	1	pcs	SS304
2	NF membrane	VNF1- 8040	2	pcs	TFC
3	Membrane housing	8040*1	2	pcs	FRP
4	Pressure gage	2.5/0.6MPa		3	pcs
5	Flow meter	LZS- 32/25	2	pcs	Plastic
6	Conductivity meter	CM-230		1	pcs
7	Pressure-head switch	DB-A3/30		2	pcs
8	Frame	2800×800 ×1650m m	1	set	SS304
9	Pipe fitting, valve	DN25~ DN15	1	set	PVC/Stainless steel
III			Electric control system		
1	Full automatic control system		1	set	

Installation Parameters

- The unit must be fitted with stainless steel mounting and assembly frame with secure and vibration free anchorage onto the floor.
- The system must be silence- at most 35db measured from the nearest occupied space.

Installation contractor qualifications:

- The installation contractor must be a specialist in the Potable water filtration system with over three years' experience (Contact of satisfied customers required).
- The contractor must have technical personnel capable of installation and troubleshooting the system.
- The contractor must possess the capacity to undertake the installation in terms of tools/equipment and financial capability.
- Written workmanship warranty for at least one year and equipment for at least 6 months.
- Full product catalogue details must capture all the design requirements relevant for the task at hand.

TECHNCIAL PROPOSAL TO INCLUDE THE FOLLOWING:

- Catalogue with Clear design features
- Serviceability
- Controls reliability
- System certification
- Proof of installation contractor competence as per scope above.