Project summary (www.crenger.com)

Table 1. General data

No	Category	Value
1	Project id	S1000
2	Client id	any
3	Budget No	01
4	Country	Other
5	Description	standard SWRO plant of 96000 m3/day
6	Annotation	null
7	Keywords	seawater:technical:pressure filters:ERI:continuous:closed:non_classified
8	Operation mode	costant RO feed pressure
9	Seismic design category	non_classified
10	Scope	DPS

The plant includes the following basic processes and implementations.
Table 2. Process configuration

intake	pretreatment	RO and posttreatment
1. intake rotating band screen 2. intake vertical pump	1. pressure filter 2. pressure filter 3. cartridge filter	1. seawater reverse osmosis membranes 2. ERI energy recovery device 3. brackish water reverse osmosis membranes 4. lime milk dosing 5. product delivery

Mechanical design shall be conducted for the design point corresponding to the minimum water temperature, maximum RO membrane fouling and the design unit production. Mechanical design of the chemical dosing systems shall additionally met the maximum summer flowrates requirement.

Table 3. Fluid velocities for metal piping

No	Service	Water & Brine	Air	Chemicals
1	manifold suction	1.4	26	1.7
2	manifold discharge	4	43.3	1.7
3	suction	1.7	26	1.7

No	Service	Water & Brine	Air	Chemicals
4	discharge	5.6	51.9	1.7
5	auxiliary	5.6	69.3	1.7
6	dosing	2.2	86.6	1.7
7	sampling	6.7	86.6	1.7
8	drainage	2.2	86.6	1.7
9	throttling	7.8	86.6	1.7

Table 4. Fluid velocities for non-metal piping

No	Service	Water & Brine	Air	Chemicals
1	manifold suction	1	16.8	1.2
2	manifold discharge	2	27.9	1.2
3	suction	1.3	16.8	1.2
4	discharge	2.8	33.5	1.2
5	auxiliary	2.8	44.7	1.2
6	dosing	1.1	55.9	1.2
7	sampling	3.4	55.9	1.2
8	drainage	1.1	55.9	1.2
9	throttling	3.9	55.9	1.2

Table 5. Feed water parameters

Description	Units	Mean 100%	Max 10%	Max 1%
Feed temperature	oC	22	28	31
Feed TDS	kg/kg	0.0385	0.039	0.0395
Feed turbidity	NTU	10	12	20
Feed TOC	ppm	6	8	10
Feed COD	ppm	8	10	20
Feed oil and grease	ppm	0.1	0.2	0.5

Description	Units	Mean 100%	Max 10%	Max 1%
Feed SiO2	ppm	0.5	1	2
Feed pH		7.4	7.6	7.7
Feed source		0	0	0

Table 6. Design

No	Category	Units	Value
1	Maximum fluid temperature	oC	28
2	Minimum fluid temperature	oC	11
3	Maximum site temperature	oC	40
4	Minimum site temperature	oC	5
5	Maximum site humidity	kg/kg	0.8
6	Maximum noise level	dB	85
7	Plant production	kg/s	1160
8	SWRO recovery		0.45
9	BWRO feed ratio		0

Table 7. CI&E

No	Category	Units	Value
1	Motor electrical design		NEMA
2	Motor mechanical design		NEMA
3	Low 1 phase voltage		220
4	Low 1 voltage		415
5	Low 2 voltage		715
6	Medium voltage		6600
7	High voltage		11000
8	Voltage frequency		50
9	Instrument power supply		240

No	Category	Units	Value
10	PLC voltage		24
11	Control air pressure	kPa	650
12	Control		decentralized control
13	FieldBus		null
14	Instrument threading		NPT

Table 8. Mechanical

No	Category	Units	Value
1	Units		metric
2	Motor overload factor		1.1
3	Pump performance ANSI tolerance		0.1
4	Piping overload capacity		1.1
5	RO membranes design fouling		0.72
6	Unit production	kg/s	290
7	Service life	years	25
8	Standards		ansi

Table 9. Pump material selection chart (SD - superduplex, DU - duplex)

Fluid	Impeller	Casing	Shaft
Seawater & brine	SD, DU(t<26oC)	SD, DU(t<26oC)	SD, DU(t<26oC)
Brackish water	DU, 904L	DU, 904L	DU, 904L
Product & service water	SS316, Bronze	SS316, Cast iron	SS316, Steel

The plant downtime due to the component failure shall be not more than 4 hours. The plant shall be equipped with the water storage sufficient for 4-hour supply.