



WATER APPLICATION VALUE ENGINE

DOW WATER & PROCESS SOLUTIONS

WAVE Program Version: 1.58.584

Calculation Engine Version: 01.10.22.00

Database Version: 11.1



Project Name: MOZAMBICO
Case Name: Case 60qual
Customer:
Prepared by: Wave Tango
Company: DOW
Country:
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Project Notes:

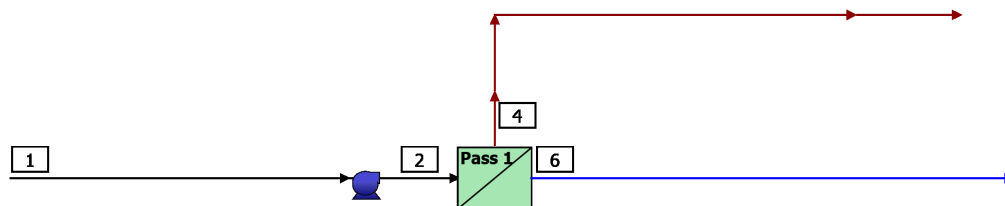
Case #: 1 of: 1
Case Notes: Case 3

Keywords:

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RO Detailed Report

RO System Flow Diagram



#	Description	Flow (m³/h)	TDS (mg/L)	Pressure (bar)
1	Raw Feed to Pump	10.0	12,341	0.0
2	Net Feed to Pass 1	9.98	12,360	34.9
4	Total Concentrate from Pass 1	3.51	35,006	33.5
6	Total Permeate from Pass 1	6.48	51.40	0.0

RO System Overview

Total # of Trains	1	Online =	1	Standby =	0	RO Recovery	64.8 %
System Flow Rate	(m³/h)	Net Feed =	10.0	Net Product =	6.48		

Pass	Pass 1
Stream Name	mozambicoOKOK
Water Type	Well Water (SDI < 3)
Number of Elements	40
Total Active Area (m²)	316
Feed Flow per Pass (m³/h)	9.98
Feed TDS ^a (mg/L)	12,360
Feed Pressure (bar)	34.9
Flow Factor	0.85
Permeate Flow per Pass (m³/h)	6.48
Pass Average flux (LMH)	20.5
Permeate TDS ^a (mg/L)	51.40
Pass Recovery	64.9 %
Average NDP (bar)	17.4
Specific Energy (kWh/m³)	1.87
Temperature (°C)	25.0
pH	7.2
Chemical Dose	
RO System Recovery	64.8 %
Net RO System Recovery	64.8%

Footnotes:

^aTotal Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Flow Table (Stage Level) - Pass 1

Stage	Elements	#PV	#Els per PV PV	Feed				Concentrate			Permeate			
				Feed Flow	Recirc Flow	Feed Press	Boost Press	Conc Flow	Conc Press	Press Drop	Perm Flow	Avg Flux	Perm Press	Perm TDS
				(m ³ /h)	(m ³ /h)	(bar)	(bar)	(m ³ /h)	(bar)	(bar)	(m ³ /h)	(LMH)	(bar)	(mg/L)
1	SW30HRLE-4040	5	8	9.98	0.00	34.9	0.0	3.51	33.5	1.4	6.48	20.5	0.0	51.39

RO Solute Concentrations - Pass 1

Concentrations (mg/L as ion)				
	Feed	Concentrat e	Permeate	
		Stage1	Stage1	Total
NH ₄ ⁺	0.00	0.00	0.00	0.00
K ⁺	14.60	41.39	0.09	0.09
Na ⁺	3,300	9,357	17.25	17.25
Mg ⁺²	810.2	2,303	1.38	1.38
Ca ⁺²	200.5	569.7	0.33	0.33
Sr ⁺²	0.00	0.00	0.00	0.00
Ba ⁺²	0.00	0.00	0.00	0.00
CO ₃ ⁻²	1.67	16.74	0.00	0.00
HCO ₃ ⁻	233.5	637.5	1.59	1.59
NO ₃ ⁻	10.08	28.34	0.18	0.18
Cl ⁻	7,443	21,120	30.30	30.30
F ⁻	0.90	2.55	0.01	0.01
SO ₄ ⁻²	314.9	895.7	0.16	0.16
SiO ₂	12.00	33.95	0.10	0.10
Boron	0.00	0.00	0.00	0.00
CO ₂	10.11	16.21	11.38	11.38
TDS ^a	12,341	35,006	51.39	51.40
pH	7.2	7.3	5.3	5.3

Footnotes:

^aTotal Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Design Warnings

None

RO Flow Table (Element Level) - Pass 1

Stage	Element	Element Name	Recovery (%)	Feed Flow (m ³ /h)	Feed Press (bar)	Feed TDS (mg/L)	Conc Flow (m ³ /h)	Perm Flow (m ³ /h)	Perm Flux (LMH)	Perm TDS (mg/L)
1	1	SW30HRLE-4040	12.0	2.00	34.9	12,361	1.80	0.24	30.3	21.87
1	2	SW30HRLE-4040	12.6	1.80	34.6	14,036	1.50	0.22	28.0	26.77
1	3	SW30HRLE-4040	13.1	1.50	34.3	16,047	1.30	0.20	25.4	33.51
1	4	SW30HRLE-4040	13.3	1.30	34.1	18,445	1.20	0.18	22.5	43.02
1	5	SW30HRLE-4040	13.2	1.20	33.9	21,261	1.00	0.15	19.4	56.76
1	6	SW30HRLE-4040	12.6	1.00	33.8	24,474	0.90	0.13	16.0	77.05
1	7	SW30HRLE-4040	11.5	0.90	33.7	27,978	0.80	0.10	12.8	107.5
1	8	SW30HRLE-4040	9.9	0.80	33.6	31,574	0.70	0.08	9.7	153.9

Footnotes:

*Total Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Solubility Warnings

Warning	Pass No
Stiff & Davis Stability Index > 0	1
Anti-scalants may be required. Consult your anti-scalant manufacturer for dosing and maximum allowable system recovery.	1

RO Chemical Adjustments

	Pass 1 Feed	RO 1 st Pass Conc
pH	7.2	7.3
Langelier Saturation Index	0.2	1.2
Stiff & Davis Stability Index	-0.4	0.1
TDS ^a (mg/l)	12,341	35,006
Ionic Strength (molal)	0.27	0.77
HCO ₃ ⁻ (mg/L)	233.5	637.5
CO ₂ (mg/l)	10.10	16.21
CO ₃ ⁻² (mg/L)	1.67	16.74
CaSO ₄ (% saturation)	2.8	9.4
BaSO ₄ (% saturation)	0.0	0.0
SrSO ₄ (% saturation)	0.0	0.0
CaF ₂ (% saturation)	5.2	84.0
SiO ₂ (% saturation)	9.6	27.2
Mg(OH) ₂ (% saturation)	0.0	0.1

Footnotes:

*Total Dissolved Solids includes ions, SiO₂ and B(OH)₃. It does not include NH₃ and CO₂

RO Utility and Chemical Costs

Service Water

	Flow Rate (m ³ /h)	Unit Cost (\$/m ³)	Hourly Cost (\$/h)	Hourly Cost (\$/d)
Non-Product Feed Water				
Pass 1	3.5	0.1400	0.49	11.81
Total Non-product Feed Water Cost	3.5		0.49	11.81
Waste Water Disposal				
Pass 1	3.5	0.6900	2.43	58.22
Total Waste Water Disposal	3.5		2.43	58.22
Total Service Water Cost				70.03

Electricity

Peak Power	(kW)	12.1
Energy	(kWh/d)	291.2
Electricity Unit Cost	(\$/kWh)	0.0900
Electricity Cost	(\$/d)	26.2
Specific Energy	(kWh/m ³)	1.87

Pump	Flow Rate (m ³ /h)	Power (kW)	Energy (kWh/d)	Cost (\$/d)
Pass 1				
Feed	9.98	12.14	291.24	26.21
Pass 1 Total Electrical Cost		12.14	291.24	26.21

Chemical

Chemical	Unit Cost (\$/kg)	Dose (mg/L)	Volume (L/d)	Cost (\$/d)
Total Chemical Cost				0.0

Utility and Chemical Cost	(\$/d)	96.2
Specific Water Cost	(\$/m ³)	0.619

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