



ENGINEERING DATA SHEET (Reverse flow regeneration)

These data provide information to calculate the silica leakage and operating capacity of Amberlite IRA458RF CI used for water demineralisation with reverse flow (counterflow) regeneration. The properties of Amberlite IRA458RF CI are described in the Product Data Sheet PDS 0428 A.

SILICA LEAKAGE

The average silica leakage is obtained by multiplying the basic leakage value from Table 1 by the correction factors A, B, C and K* from Tables 2 to 4.

$$\text{Leak} = \text{Leak}_0 \times A \times B \times C \times K$$

*K (the influence of sodium leakage) can be determined from the graph given in the EDS 0299 A.

Table 1 : Basic Silica Leakage versus NaOH Regenerant Level

NaOH g/L	Leakage ppm SiO ₂ (Leak ₀)
30	0.035
40	0.020
50	0.014
60	0.011
80	0.007

Table 2 : Leakage Correction Factor A vs Silica to Total Anions Ratio

SiO ₂	Factor A
1	0.2
5	1.0
10	2.0
20	4.0
30	6.0

Table 3 : Leakage Correction Factor B versus Water Temperature

Water °C	Factor B
5	0.7
10	0.8
15	1.0
20	1.2
25	1.5
30	2.2

Table 4 : Leakage Correction Factor C versus Regenerant Temperature

NaOH °C	Factor C
10	1.65
15	1.37
20	1.16
25	1.00
30	0.87

Table 5 : Suggested Operating Conditions

Maximum operating temperature _____	35°C
Minimum bed depth _____	1000 mm (preferably > 1400 mm)
Service flow rate _____	5 to 40 BV*/h
Maximum linear velocity _____	40 m/h
Regenerant _____	NaOH
Level _____	30 to 80 g/L
Flow rate _____	2 to 8 BV/h (minimum contact time : 30 minutes)
Concentration _____	2 to 4 %
Slow rinse _____	2 BV at regeneration flow rate
Fast rinse _____	4 to 8 BV at service flow rate

* 1 BV (Bed volume) = 1 m³ solution per m³ resin

OPERATING CAPACITY

The operating capacity of Amberlite IRA458RF Cl is obtained by multiplying the basic capacity value from table 6 by the correction factors D to G from tables 7 to 10.

$$\text{Cap} = \text{Cap}_0 \times \text{D} \times \text{E} \times \text{F} \times \text{G}$$

Table 6 : Basic Capacity versus NaOH Regenerant Level (reverse flow regeneration)

NaOH g/L	Capacity eq/L (Cap ₀)
30	0.50
40	0.61
50	0.66
60	0.70
70	0.73
80	0.75

Table 7 : Capacity Correction Factor D versus Sulphate to Total Anions Ratio

SO ₄ %	Factor D
0	0.94
25	0.97
50	1.00
75	1.03
99	1.06

Table 8 : Capacity Correction Factor E versus CO₂ to Total Anions Ratio

CO ₂ %	Factor E
0	0.97
20	1.00
30	1.02
50	1.05
75	1.08
99	1.12

Table 9 : Capacity Correction Factor F versus Silica to Total Anions Ratio and NaOH Temperature (°C)

	5	10	20	30 % SiO ₂
5°C	0.96	0.93	0.87	0.83
10	0.97	0.94	0.89	0.85
15	0.98	0.95	0.91	0.87
20	0.99	0.96	0.92	0.89
25	1.00	0.98	0.94	0.90
30	1.01	0.99	0.96	0.92

Table 10 : Capacity Correction Factor G vs Silica Endpoint (ΔSiO_2 = difference between average leakage and endpoint)

ΔSiO_2 (ppb)	Factor G
50	0.90
100	0.95
200	1.00
300	1.04

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