PUROLITE®
ION EXCHANGE RESINS

ISO 9002 BSI REGISTERED FIRM FM 40352

C-100H

Strong Acid Cation Exchange Resin in Hydrogen Form

(For use in water demineralization)

Technical Data

PRODUCT DESCRIPTION

Purolite C-100H is a premium grade cation exchanger that can be used in water demineralization. **C-100H** is produced exactly the same as **Purolite C-100**, using a crosslinked styrene divinylbenzene polymer matrix with 8% crosslinking. Bead stability and a minimum of 95% whole clear beads make **C-100H** a premium grade gel without the added cost of buying an upgraded cation product. The data presented herein are applicable for hydrogen cycle cation exchange operation only.

For sodium cycle information see our **C-100** bulletin.

Typical Physical & Chemical Characteristics	
Polymer Matrix Structure	Crosslinked Polystyrene Divinylbenzene
Physical Form and Appearance	Black or Amber Spherical beads
Whole Bead Count	90% min.
Functional Groups	$R\text{-}SO_3^-$
Ionic Form, as shipped	H^+
Shipping Weight (approx.)	800 g/l (50 lb/ft³)
Screen Size Range:	
- U.S. Standard Screen	16 - 50 mesh, wet
Particle Size Range	+1.2 mm <5%, -0.3 mm <1%
Moisture Retention, Na^+ form	49 - 55%
Swelling $Na^+ \rightarrow H^+$	5% max.
Specific Gravity, moist Na^+ Form	1.29
Total Exchange Capacity, H^+ form,	
wet, volumetric	1.8 eq/l min.
dry, weight	4.9 eq/kg min.
Operating Temperature, Na^+ Form	140ºC (280ºF) max.
pH Range, Stability	0 - 14

Standard Operating Conditions (Co-Current Demineralization of Water)				
Operation	**Rate**	**Solution**	**Minutes**	**Amount**
Service	8 - 40 BV/h 1.0 - 5.0 gpm/ft^3	Influent water	per design	per design
Backwash	refer to Fig. 2	Influent water 5º - 30ºC (40º - 80ºF)	5 – 20	1.5 – 4 BV 10 – 20 gal/ft^3
Regeneration	2 - 7 BV/h 0.2 - 0.8 gpm/ft^3	0.5 - 5% H_2SO_4 4 - 10% HCl	30	64 - 160 g/l 4 -10 lb/ft^3
Rinse, (slow)	2 - 7 BV/h 0.2 - 0.8 gpm/ft^3	Decationized water	60	2 - 3 BV 15 - 20 gal/ft^3
Rinse, (fast)	8 - 40 BV/h 1.0 - 5.0 gpm/ft^3	Decationized water	60	3 - 4 BV 20 - 30 gal/ft^3
Backwash Expansion 50% to 75% Design Rising Space 100% "Gallons" refer to U.S. Gallon = 3.785 litres				

Stepwise Regeneration of Purolite C-100H				
Regeneration Level - lbs (66°Be) H_2SO_4/ft^3 resin	**Lbs (66°Be) H_2SO_4 2%**	**Lbs (66°Be) H_2SO_4 4%**	**Lbs (66°Be) H_2SO_4 6%**	**Lbs (66°Be) H_2SO_4 8%**
3	2	1	-	-
4	2	2	-	-
5	2	3	-	-
6	2	3	1	-
7	2	3	2	-
8	2	3	3	-
9	2	3	3	1
10	2	3	3	2

Purolite C-100H when exhausted with a high amount of calcium should be regenerated with hydrochloric acid to prevent precipitation. Due to availability and cost, hydrochloric acid may not be the regenerant of choice. Then, sulfuric acid can be used. High amounts of calcium can cause precipitation but could be minimized if a stepwise regeneration is used. By starting your regeneration with a low percentage of sulfuric acid (2% or less) and gradually increasing, precipitation can be avoided (see table above).

HYDRAULIC CHARACTERISTICS

The pressure drop (headloss) across a properly classified bed of ion-exchange resin depends on particle size distribution, bed depth, and voids volume of the exchanger; and on the flowrate and viscosity (and hence on the temperature) of the influent solution. Anything affecting any of these parameters, for example the presence of particulate matter filtered by the bed, abnormal compaction of the resin bed, or the incomplete classification of the resin will have an adverse effect, and result in an increased headloss. Typical values of pressure drop across a bed of **Purolite C-100H** are given for a range of operating flow rates in Fig. 1.

During upflow backwash, the resin bed should be expanded in volume by between 50 and 75%, in order to free it from any particulate matter from the influent solution, to clear the bed of bubbles and voids, reclassify the resin particles as much as possible ensuring minimum resistance to flow. Backwash should be commenced gradually to avoid an initial surge with consequent carryover of resin particles. Bed expansion increases with flow rate and decreases with temperature, as shown in Fig. 2, below. Care should always be taken to avoid loss by accidental over-expansion of the bed.

Fig. 1 PRESSURE DROP VS FLOW RATE

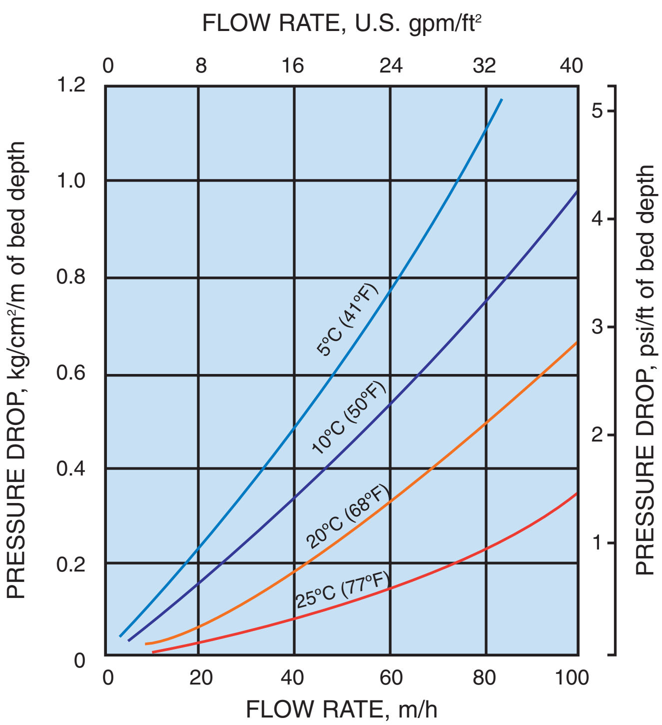
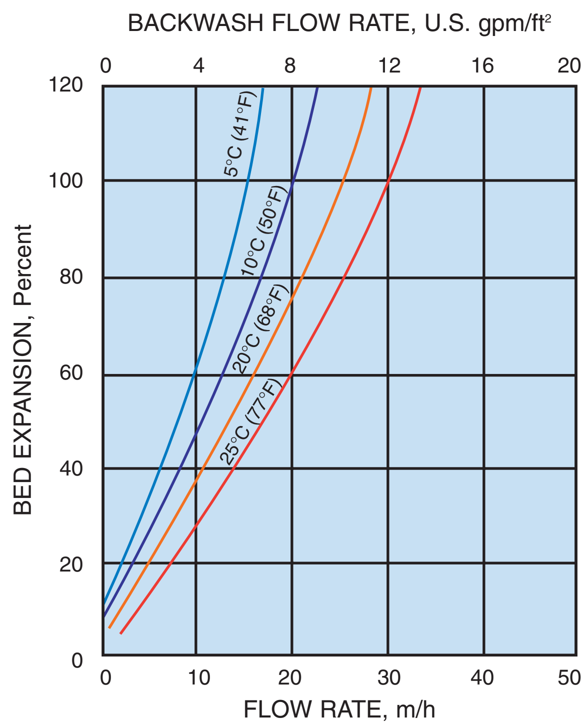


Fig. 2 BACKWASH EXPANSION



Conversion of Units	
1 m/h (cubic meters per square meter per hour)	= 0.341 gpm/ft² = 0.409 U.S. gpm/ft²
1 kg/cm²/m (kilograms per square cm per meter of bed)	= 4.33 psi/ft = 1.03 atmos/m = 10 ft H_2O/ft

CAPACITY

PUROLITE C-100 SULFURIC ACID REGENERATION (STEPWISE)

Influent 200 ppm TDS as $CaCO_3$ 36" Bed Depth 2 gal/min/ft³

Fig. 3

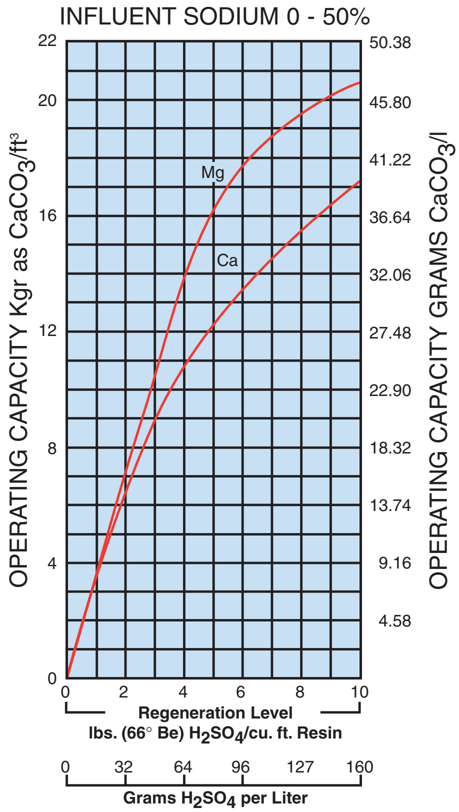


Fig. 4

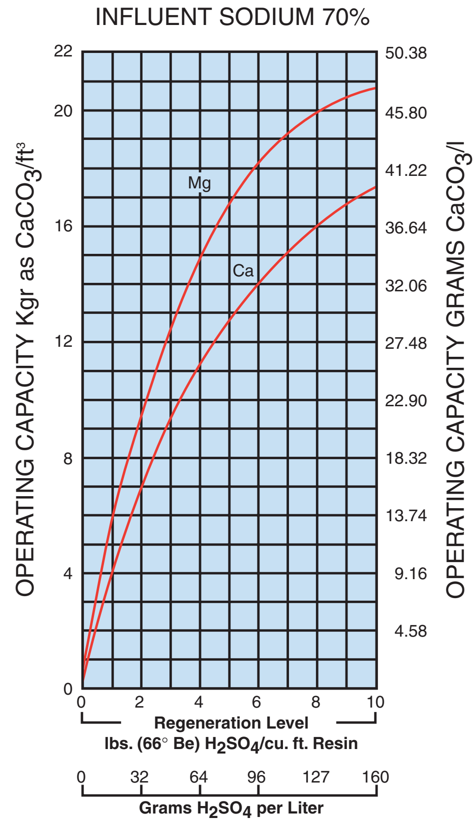


Fig. 5

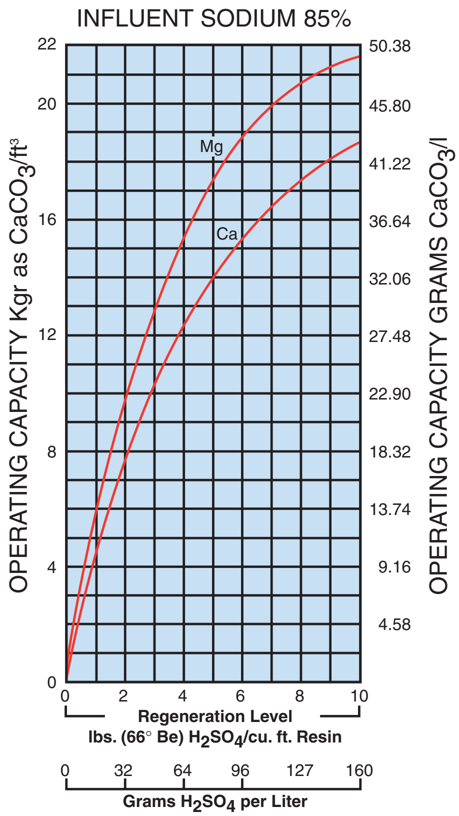
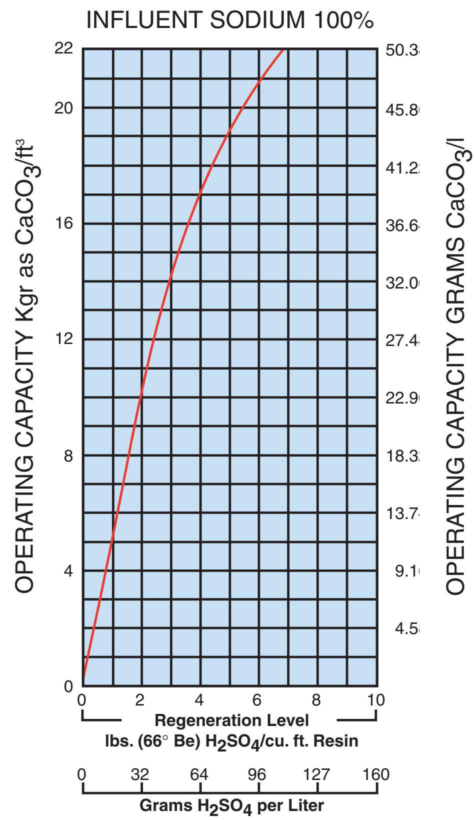


Fig. 6



CHEMICAL AND THERMAL STABILITY

Purolite C-100H is insoluble in dilute or moderately concentrated acids, alkalies, and in all common solvents. However, exposure to significant amount of free chlorine, "hypochlorite" ions, or other strong oxidizing agents over long periods of time will eventually break down the crosslinking. This will tend to increase the moisture retention of the resin, decreasing mechanical strength, as well as generating small amounts of extractable breakdown products. Like all conventional polystyrene sulphonated resins, it is thermally stable to higher than 150°C (300°F) in the alkali (for instance, sodium) or alkaline earth (calcium and magnesium) salt forms. The free acid form tends to hydrolyse in water at temperatures appreciably higher than 120°C (250°F) thereby losing capacity, as the functional groups are gradually replaced by hydroxyl groups.

Fig. 7

FLOWRATE CORRECTION

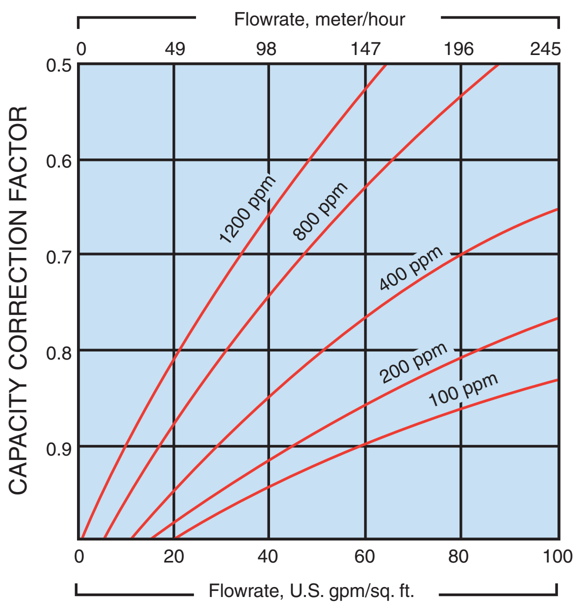
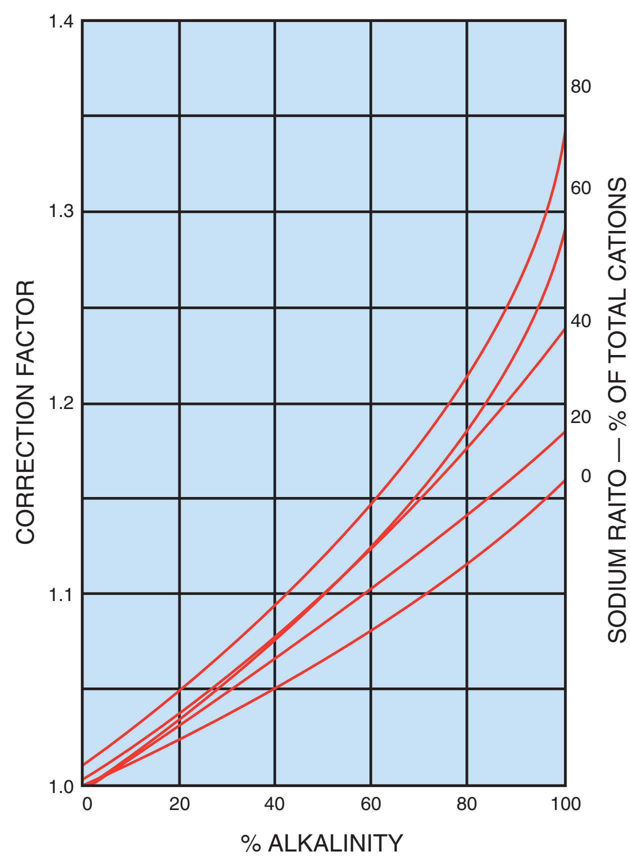


Fig. 8

ALKALINITY CORRECTION



EXAMPLE

Regeneration at 6 pounds H_2SO_4 at 10 gpm/sq.ft.

Cations		Anions	
Ca	100	HCO_3	160
Mg	100	Cl	140
Na	<u>200</u>	SO_4	<u>100</u>
	400		400

Temperature 60°F

1. Determine your base operating capacity from Figure 3.
2. Determine alkalinity correction from Figure 8.
3. Determine your flowrate correction Figure 7.
4. Determine temperature correction "K" from Figure 18.

Base Operating Capacity x Alkalinity Correction x Flowrate Correction x "K" Temperature Correction

15.5 x 1.07 x 1.0 x .96 = 15.9 Kilograins/ft^3

5. Leakage is determined from Figure 9 through Figure 14.

PUROLITE C-100H
CATION LEAKAGE CHARACTERISTICS

Fig. 9

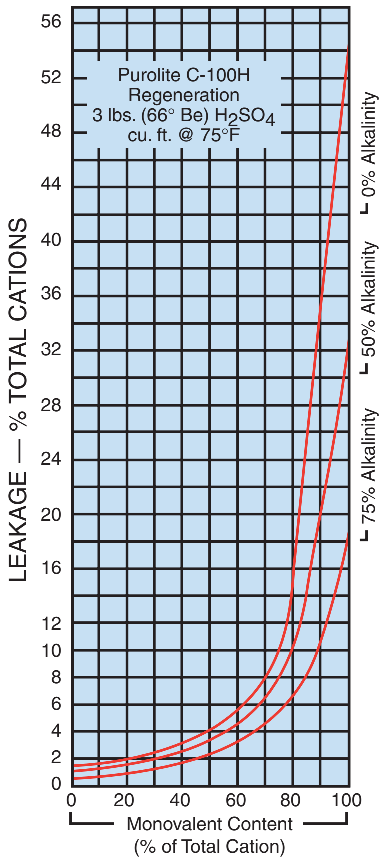


Fig. 10

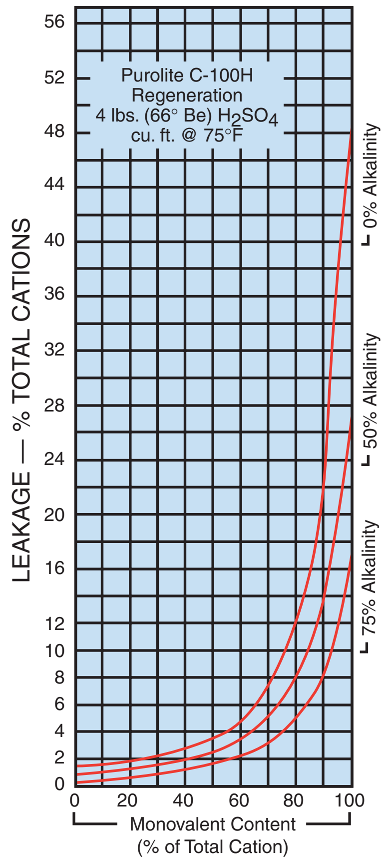


Fig. 11

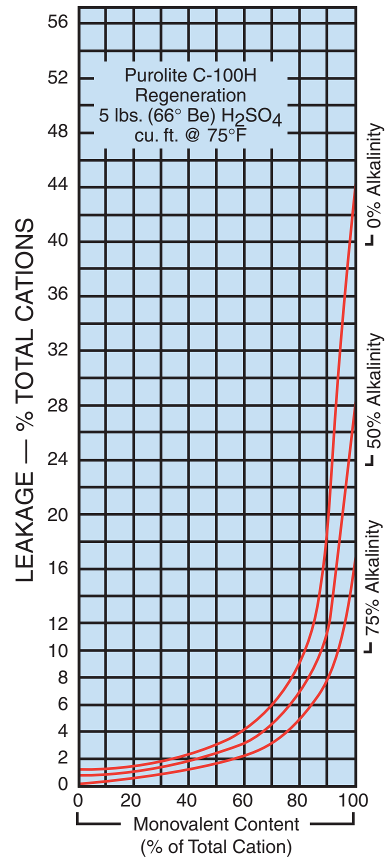


Fig. 12

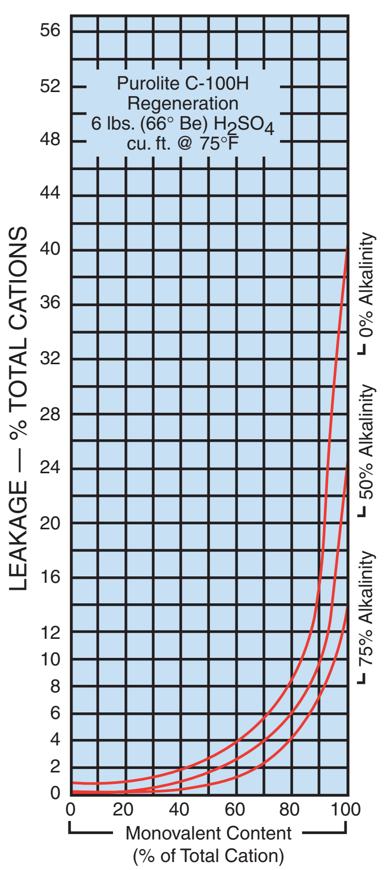


Fig. 13

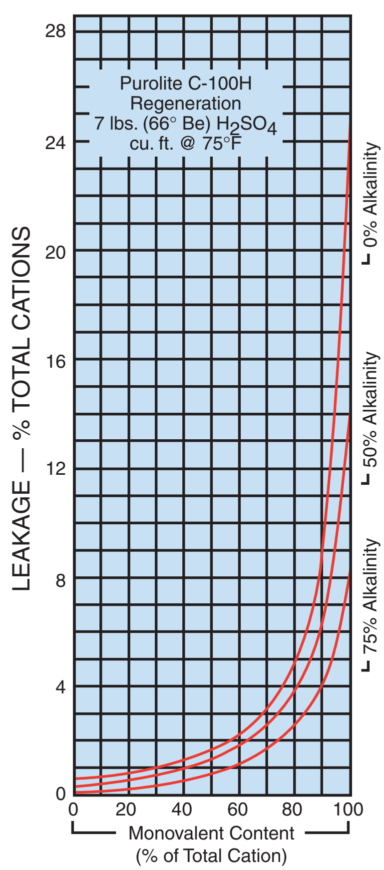
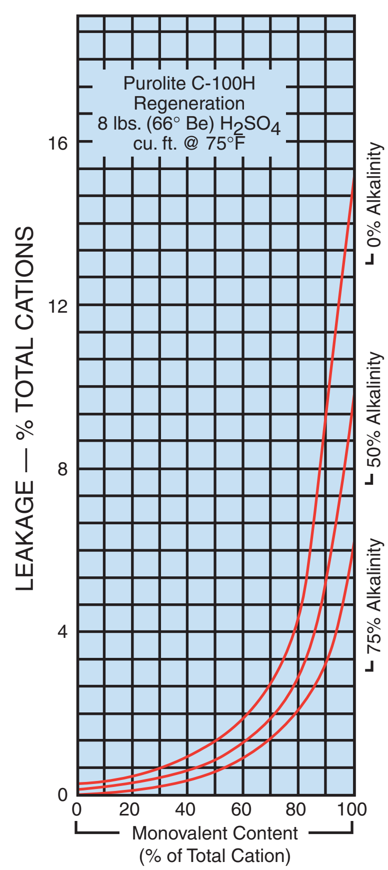


Fig. 14



PUROLITE C-100H
CATION LEAKAGE CHARACTERISTICS

OPERATING CAPACITY — TO END POINT 500 ppb Na
H_2SO_4 REGENERATION — STEPWISE — COUNTER CURRENT

Fig. 15

INFLUENT SODIUM 0 - 50%

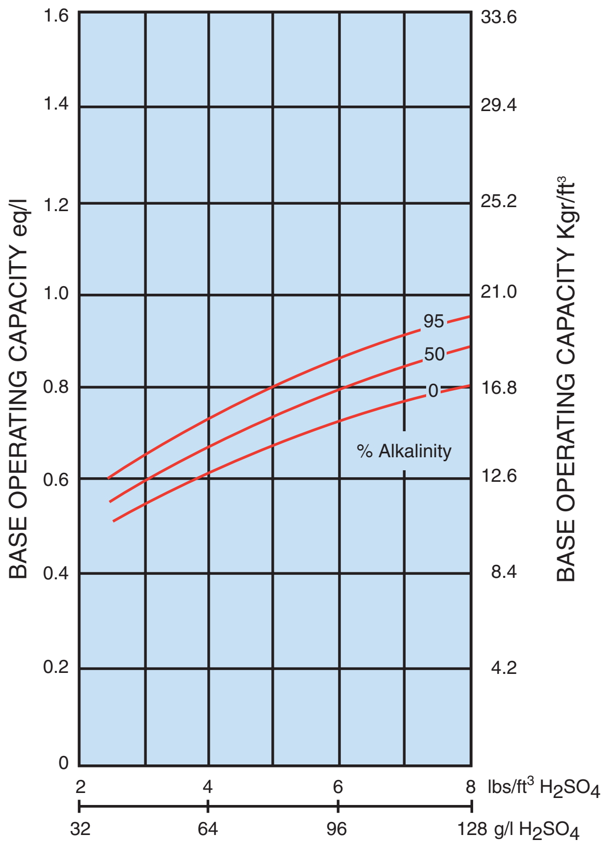


Fig. 16

INFLUENT SODIUM 75%

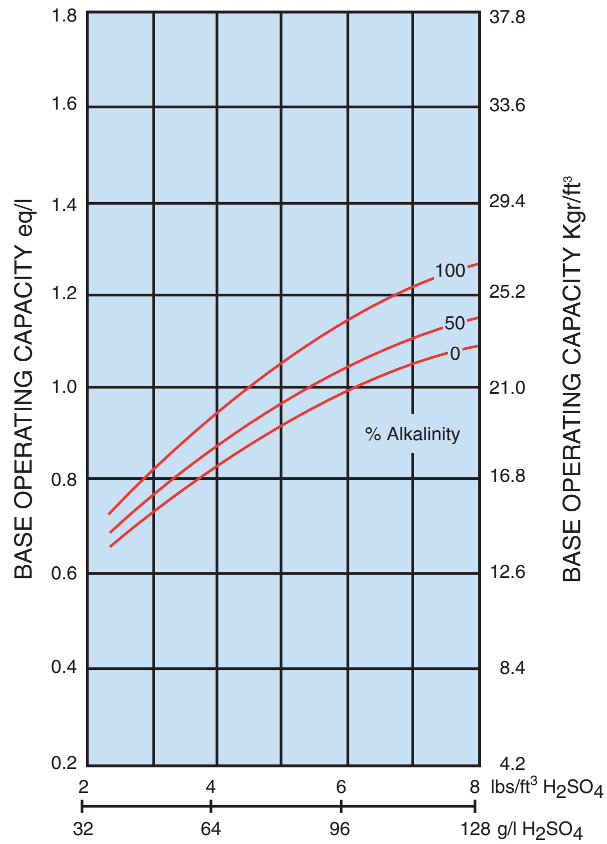


Fig. 17

LEAKAGE

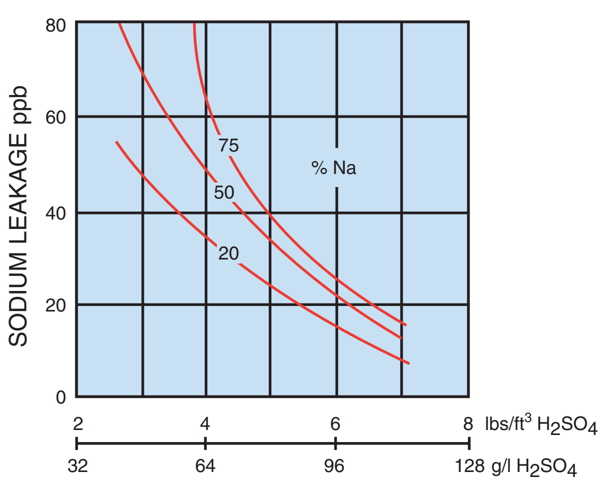
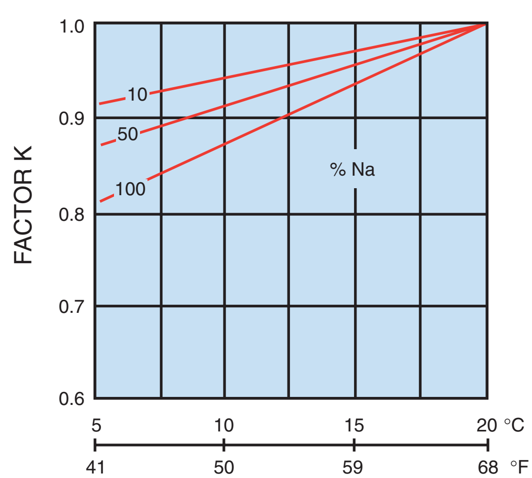


Fig. 18

CAPACITY CORRECTION FOR WATER TEMPERATURE



PUROLITE C-100H
(COUNTER CURRENT REGENERATION)

OPERATING CAPACITY — TO END POINT 500 ppb Na
HCl REGENERATION — COUNTER CURRENT

Fig. 19

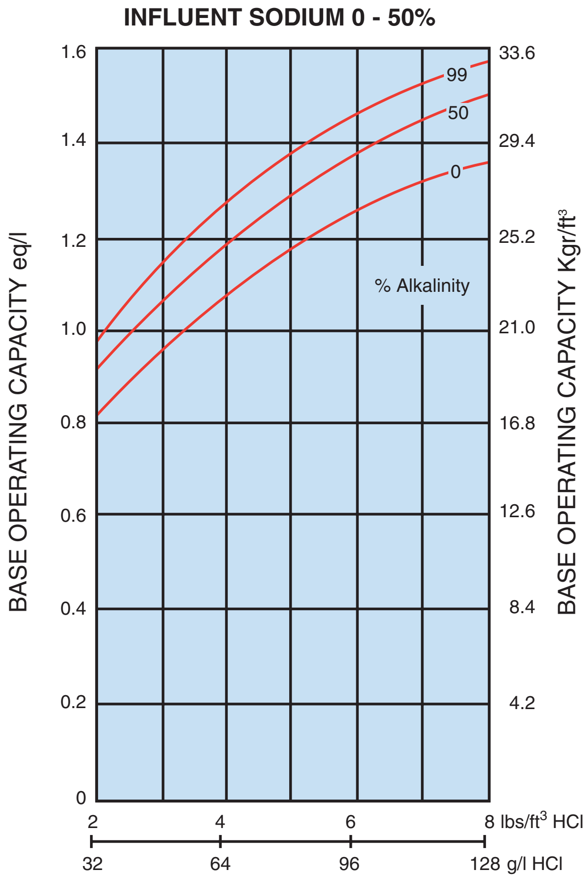
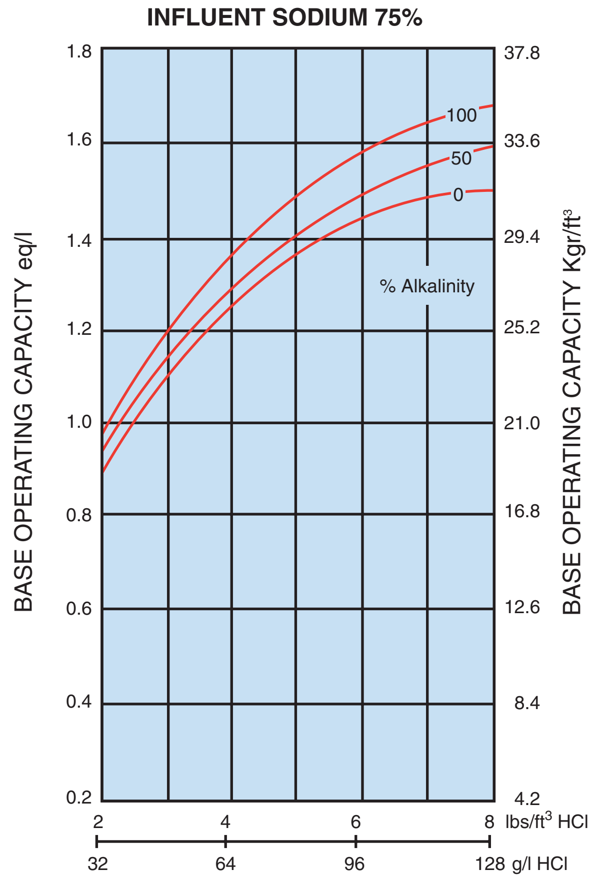


Fig. 20



SODIUM LEAKAGE

Fig. 21

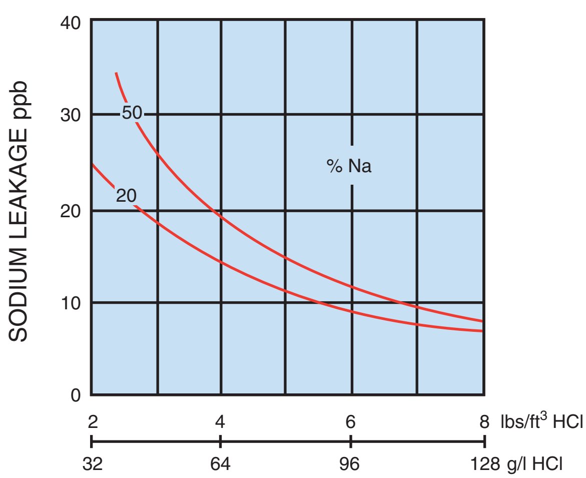


Fig. 22