Nitrate II
PRODUCT DATA SHEET

Product Description

Nitrate II is a Type II, strongly basic gel anion exchange resin with outstanding operating capacity and excellent regeneration efficiency. Nitrate II removes all ions including silica and CO2, however, it operates best on waters having a high percentage of strong acids (FMA). Nitrate II can be used in all types of demineralization equipment where regeneration efficiency and high operating capacities are needed. Nitrate II has excellent physical stability which allows for long life and better efficiency within the operating bed. Whole bead counts are a minimum of 92% clear beads with mechanical strengths ranging over 300 grams. Nitrate II can be regenerated with sodium chloride to remove alkalinity from different water supplies. This de-alkalization by ion exchange prevents the formation of insoluble carbonate precipitates and stops corrosion due to the formation of carbonic acid. Nitrate II can also remove nitrates when regenerated with salt. In some de-alkalization cases, small amounts of caustic is used in combination with salt during the regeneration in order to enhance the resin operation. This addition gives higher operating capacity and lower silica leakage. Nitrate II is a Type II strong base anion devoid of taste and odor. Nitrate II meets the requirements of paragraph 173.25 of the FDA Code of Federal Regulations no. 21. Capacities and Leakages of Nitrate II is based on the regenerant reaching the bed at either 70°C or 95°F. With some water supplies, it will be necessary to preheat the bed prior to the introduction of the regenerant. In water supplies where the alkalinity is in excess of 50%, keep in mind that you may be unable to achieve these leakages and capacities.
This is because CO2 passing from the cation reacts with anionic sites forming HCO3. During the regeneration process of the anion, HCO3 is displaced by NaOH. Additional NaOH then reacts with the HCO3 forming Na2CO3. Since the above leakages and capacities are based on having excess NaOH above theory, it may be necessary to compensate for this problem.

Typical Physical & Chemical Characteristics	
Polymer Matrix Structure	Polystyrene Crosslinked divinylbenzene
Physical Form and Appearance	Clear Spherical Beads
Whole Bead Count	92% min.
Functional Groups	$R(CH_3)_2(C_2H_40H)N^+$
Ionic Form, as shipped	Cl^-
Shipping Weight (approx.)	680 g/l (42.5 lb/ft^3)
Screen Size Range: - US. Standard Screen	16 - 50 mesh, wet
Particle Size Range	+1200 mm <5%, -300 mm <1%
Chemical Resistance	Unaffected by dilute acids, alkalies and most solvents
Moisture Retention, Cl^- form	40 - 45%
Swelling Salt ➔ OH	10% max.
Total Exchange Capacity, Cl^- form, wet, volumetric dry, weight	 1.45 - 1.6 eq/l min. 3.5 - 3.7 eq/kg min.
Operating Temperature, OH^- Form Cl^- Form	105°F: max, [Recommended 95°F] 170°F: max.
pH Range, Stability	No Limitations

Standard Operating Conditions (Two-Stage Demineralizer)				
Operation	**Rate**	**Solution**	**Minutes**	**Amount**
Service	1.0 - 5,0 gpm/ft^3	Effluent from Cation exchanger	per design	per design
Backwash	Refer to Fig. 1	Influent water	5 - 20	10 - 25 gal/ft^3
Regeneration	0.2 - 0.8 gpm/ft^3	4% NaOH	60	4 - 10 lb/ft^3
Rinse, (slow)	0.2 - 0.8 gpm/ft^3	Decationized water	60	15 - 30 gal/ft^3
Rinse, (fast)	1.0 - 5.0 gpm/ft^3	Decationized water	-	25 - 45 gal/ft^3
Backwash Expansion 50% to 75% Design Rising Space 100% "Gallons" refer to U.S. Gallon = 3,785 liters				

Hydraulics

Pressure drop of a fluid passing through an ion exchange column is related to the flow rate, viscosity and temperature of the fluid. Typical values of pressure drop are found in Figure 2. Backwash removes all particulate matter filtered out by the exchanger and regrades the bed eliminating any channels which may have formed. Normally a backwash rate that expands the bed 50- 75% for 5 to 10 minutes or till the effluent is clear is recommended. Flow rate for the backwash should be achieved gradually to prevent resin loss. See Figure I.

Regeneration

Nitrate II is supplied in the chloride form and must be regenerated with a good grade of sodium hydroxide. Both the slow and fast rinse remove the excess regenerant from the exchanger bed. The slow rinse displaces the regenerant while the fast rinse rinses out all excess regenerant.

Influent Limitation	
Maximum Free Chlorine	0.05 ppm
Maximum Turbidity	5 A.P.H.A, Units
Maximum Iron and Heavy Metals	0.1 ppm

Fig. 1 BED EXPANSION VS. BACKWASH FLOW RATE

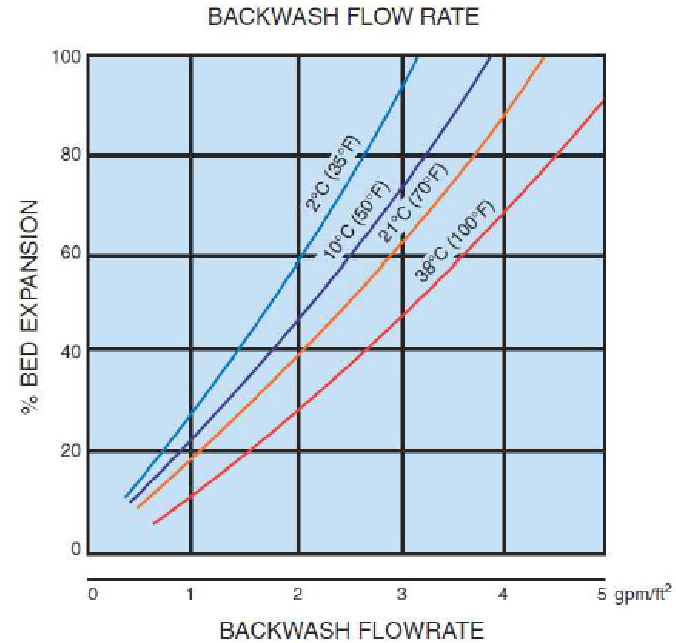
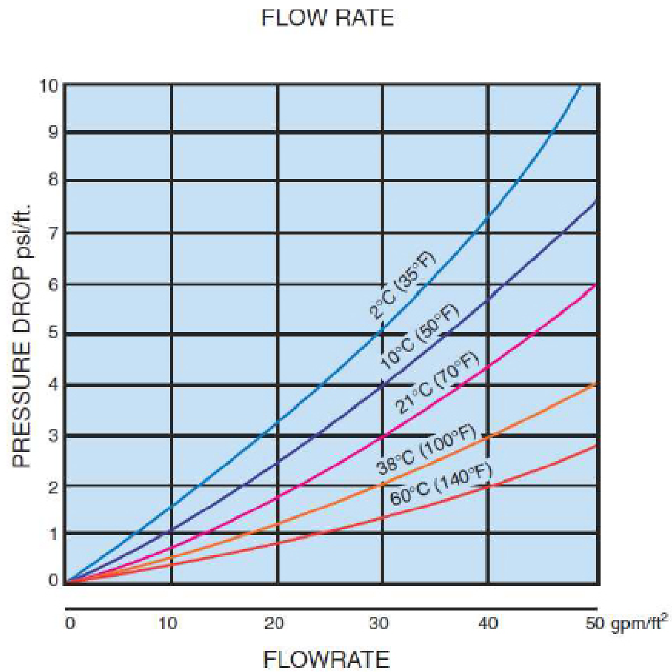
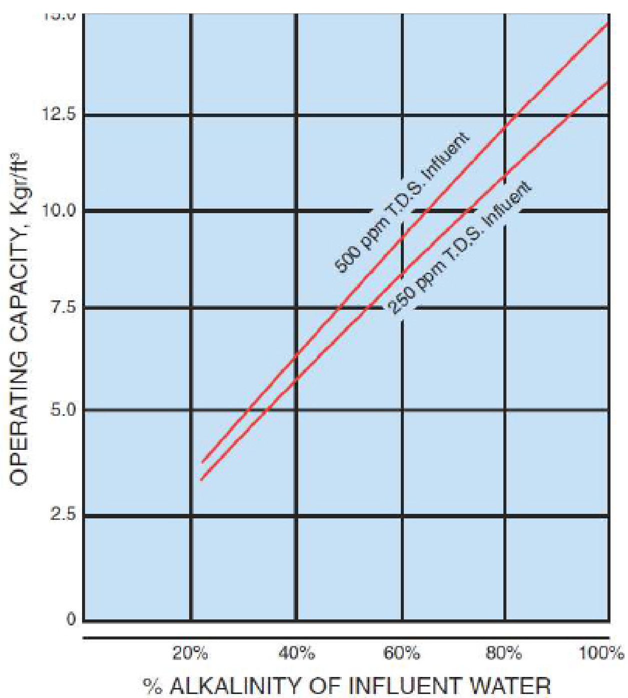


Fig.2 PRESSURE DROP VS. FLOW RATE



DEALKALIZATION CAPACITY

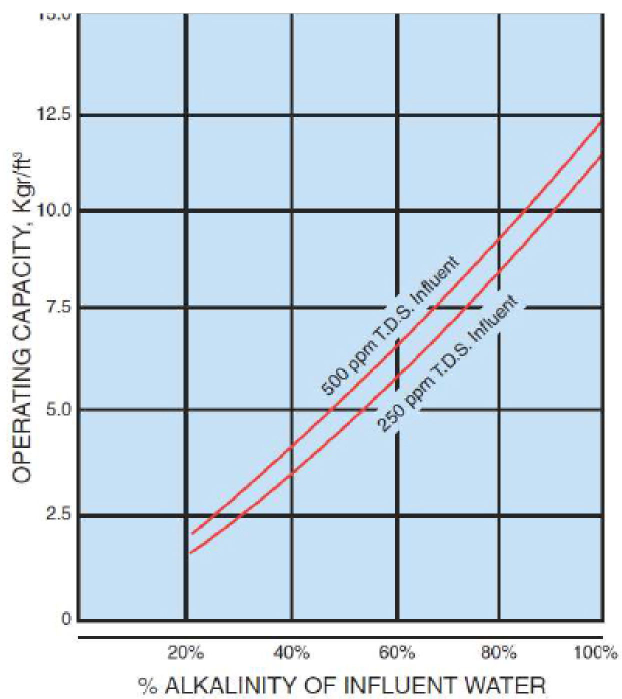
Fig. 3 CAPACITY FOR DEALKALIZATION



Capacity for Dealkalization
5 lbs. NaCl/ft³
0.25 lbs. NaOH/ft³

Down Flow Regeneration
30 inch Bed Depth
Flowrate of 2 gpm/ft³
To 10% Alkalinity End Point

Fig. 4 CAPACITY FOR DEALKALIZATION

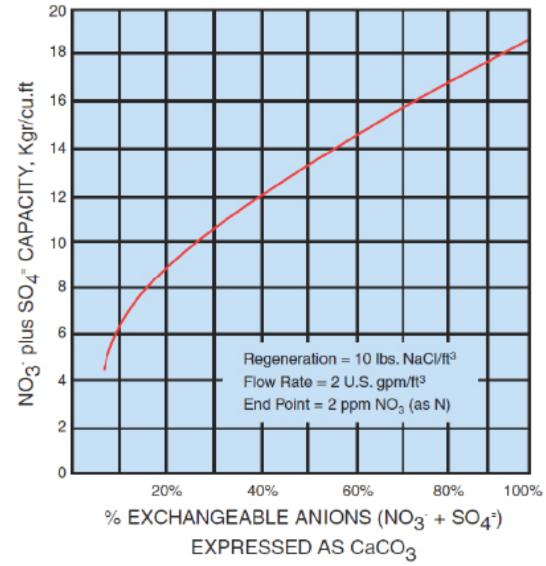


Capacity for Dealkalization
5 lbs. NaCl/ft³

Down Flow Regeneration
30 inch Bed Depth
Flowrate of 2 gpm/ft³
To 10% Alkalinity End Point

NITRATE REMOVAL

CAPACITY FOR NITRATE (NO_3)
PLUS SULFATE (SO_4) REMOVAL



CAPACITY IN KILOGRAINS/ft³

lbs. NaOH/ft³ @ 21°C (70°F) 100% Concentration	% Silica of Total Anion Analysis			
	10%	20%	30%	40%
4	20.0	19.0	17.9	17.3
5	22.7	21.0	19.9	19.0
6	24.0	22.6	21.8	20.4
7	25.2	23.7	23.1	21.8
8	25.8	24.6	24.0	22.9
9	26.3	25.2	24.7	23.7
10	26.6	25.5	25.0	24.3

BASE OPERATING CAPACITY Kgr

lbs. NaOH/ft³ @ 35°C (95°F) 100% Concentration	% Silica of Total Anion Analysis			
	10%	20%	30%	40%
4	22.9	22.0	21.0	20.1
5	24.1	23.1	22.2	21.3
6	25.0	24.0	23.0	22.2
7	26.0	24.9	23.8	23.1
8	26.7	25.4	24.5	23.8
9	26.9	26.0	25.2	24.4
10	27.0	26.2	25.4	24.6

BASE OPERATING CAPACITY Kgr

Chloride Correction

Percent chlorides have a direct effect on the capacity of Nitrate II, The chloride correction factor must be multiplied by the capacity to determine your true capacity.

% Chlorides	0	10	20	30	40	50	60	70	80	90	100
Correctional Factor	1.00	.93	.91	.88	.87	.86	.84	.83	.82	.81	.80

Example: Base operating Capacity x Chloride Correction = Operating Capacity

SILICA LEAKAGE as ppm $CaC0_3$

lbs. NaOH/ft³ @ 21°C (70°F) 100% Concentration	% Silica of Total Anion Analysis			
	10%	20%	30%	40%
4	0.22	0.49	0.83	1.24
5	0.13	0.30	0.41	0.58
6	0.08	0.15	0.26	0.39
7	0.06	0.10	0.18	0.27
8	0.05	0.08	0.14	0.21
9	0.04	0.07	0.13	0.18
10	0.02	0.05	0.11	0.15

BASE SILICA LEAKAGE ppm $CaCO_3$

lbs. NaOH/ft³ @ 35°C (95°F) 100% Concentration	% Silica of Total Anion Analysis			
	10%	20%	30%	40%
4	0.10	0.20	0.33	0.50
5	0.05	0.11	0.18	0.25
6	0.04	0.06	0.10	0.16
7	0.03	0.05	0.08	0.11
8	0.02	0.04	0.06	0.09
9	0.01	0.03	0.05	0.08
10	0.01	0.03	0.05	0.07

BASE SILICA LEAKAGE ppm $CaCO_3$

Silica Correction Factor

Sodium leaking through the cation will pass through the anion linking with the hydroxide group to form NaOH. As NaOH migrates down the anion bed, silica is pushed off as in the regeneration process. The higher the sodium, the higher the silica leakage.

EFFECT OF SODIUM LEAKAGE 0N SILICA LEAKAGE

Regenerant Leakage	lbs. NaOH			
	4	6	8	10
1 ppm Na	1.15	1.1	1.05	1.02
3 ppm Na	1.38	1.25	1.15	1.11
5 ppm Na	1.6	1.4	1.27	1.18
7 ppm Na	1.9	1.6	1.35	1.2

Example: Base Silica Leakage x Correction Factor for Silica Leakage = Silica Leakage