INDION® 820

Description

INDION 820 is a macroporous strongly basic Type II onion exchange resin. It is a high capacity new generation resin based on cross linked polystyrene matrix and has quaternary ammonium functional groups.

INDION 820 is produced by a unique manufacturing technique which gives it optimum porosity and improved kinetics. It gives higher operating exchange capacity due to greater utilisation of the exchange sites as compared to other conventional macroporous resins. This feature, combined with its high basicity, permits absorption of large sized soluble organic molecules and their subsequent Elution during regeneration. Thus, while INDION 820 ensures complete removal of soluble organics from the water, it exhibits excellent resistance to organic fouling compared to other conventional resins.

INDION 820 has very good stability against physical and chemical attrition. This results in lesser generation of fines and therefore higher operating life for the resin.

INDION 820 is generally employed in demineralising applications of raw material containing high organic levels.

Characteristics

Appearance	:	Off white to brown opaque beads
Matrix	:	Styrene divinyl benzene copolymer
Functional Group	:	Benzyl dimethyl ethanolamine
Ionic form as supplied	:	Chloride
Total exchange capacity	:	1.0 meq/ml, minimum
Moisture holding capacity	:	49 - 56 %
Shipping weight *	:	670 kg/m^3, approximately
Particle size range	:	0.3 to 1.2 mm
> 1.2 mm	:	5.0%, maximum
< 0.3 mm	:	1.0%, maximum
Uniformity co - efficient	:	1.7, maximum
Effective size	:	0.45 to 0.55 mm
Maximum operating temperature	:	40°C in OH form
		75°C in Cl form
Operating pH range	:	0 to 14
Volume change	:	Cl to OH, 16 % maximum
Resistance to reducing agents	:	Good
Resistance to oxidizing agents	:	Generally good, chlorine should be absent

* Weight of resin, as supplied, occupying 1 m^3 in a unit after backwashing and draining.

Applications

Two stage de-ionising

INDION 820 is recommended as the anion exchange resin in the second stage of a de - ionising pair with INDION 225 cation exchange resin in the first stage.

When used in a two stage de-ionising plant upstream of mixed bed unit, INDION 820 will protect the strong base anion exchange resin in the latter unit against organic fouling. At the same time, it will assist in the production of final treated water with a low residual of organic matter.

INDION 820 is particularly recommended for use in a two stage de - ionising plant for the removal of mineral acid anions and some silica, while keeping running costs down.

If treated water with the lowest possible level of residual silica is required, two stage treatments should be followed by mixed bed de - ionising using a Type 1 anion exchange resin such as INDION 810.

Typical operating data

Two stage/multiple stage de-ionising	Co-flow regeneration	Counter current regeneration
Bed depth	0.75 m, minimum	1.0 m, minimum
Treatment flow rate	60 $m^3/h\ m^2$, maximum	60 $m^3/h\ m^2$, maximum
Pressure loss	Refer Figure 12	Refer Figure. 12
Bed expansion	Refer Figure 13	Refer Figure 13
Back wash	3 $m^3/h\ m^2$ for 5 -10 minutes or till effluent is clear	3$m^3/h\ m^2$ for 5 to 10 minutes or till effluent is clear *
Regenerant	Sodium hydroxide (2 - 4% w/v)	Sodium hydroxide (2 - 4% w/v)
Regenerant flow rate	4.5 - 18 $m^3/h\ m^2$	4.5 - 18 $m^3/h\ m^2$
Regenerant injection time	30 minutes	30 minutes
Slow rinse	2 - 3 bv at injection flow rate	2 - 3 bv at injection flow rate
Final rinse	6 - 10 bv at treatment flow rate	Approximately 5 bv at treatment flow rate

1bv (bed volume) = 1 m^3 fluid/m^3 of resin
* After a set number of regenerations

Operating exchange capacity

Two stage de-ionising

Co-flow regeneration

The operating exchange capacity of INDION 820 in two stage de-ionising system in co-flow mode is obtained by multiplying the basic capacity value from Figure 1 by the correction factors A (SO_4/EMA, %) & B (SiO_2/TA, %) from figures 2 & 3.

Counter current regeneration (CCR)

The operating exchange capacity of INDION 820 in two stage de-ionising system in Countercurrent mode is obtained by multiplying the basic capacity value from Figure 6 by the correction factors D (SO_4/EMA, %) & E (SiO_2/TA, %) from figures 7 & 8.

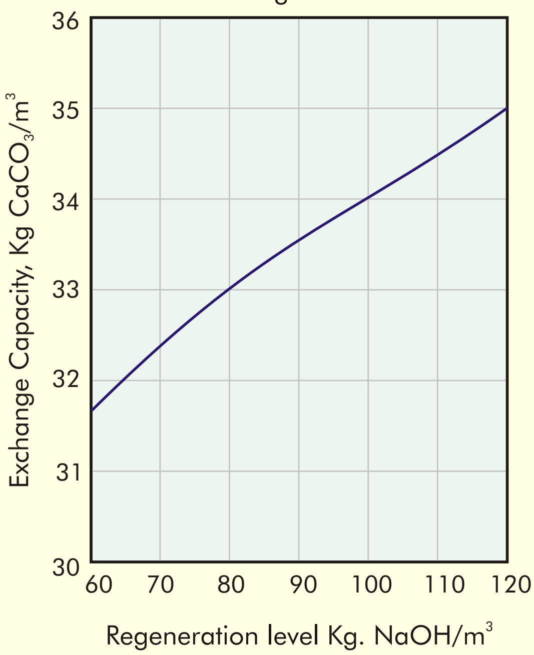
Exhaustion rate

The operating capacity data is related to exhaustion time greater than 10 hours. Figure 11 shows the correction factor to be applied to operating capacity (after applying correction factors for SO4/EMA, % & SiO2/TA, %) with exhaustion time for both co-flow and counter current regeneration.

CO -FLOW

Basic Exchange Capacity at Different Regeneration Level

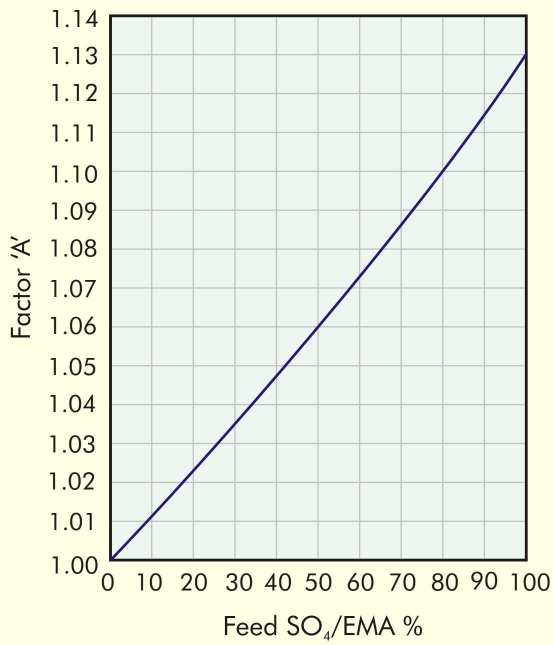
Figure 1



CO - FLOW

Factor 'A' for Feed So_4/EMA %

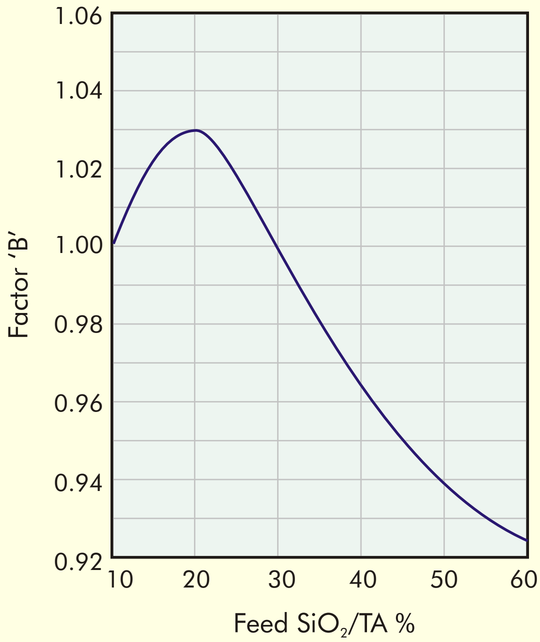
Figure 2



CO - FLOW

Factor 'B' for Feed SiO_2/TA %

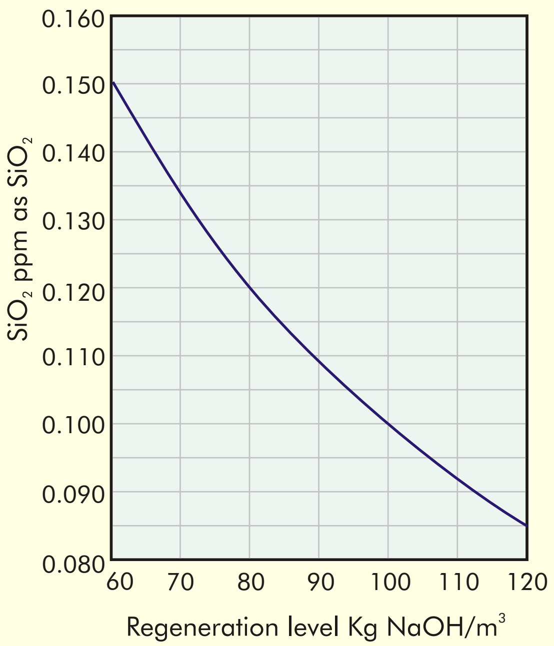
Figure 3



CO - FLOW

SiO_2 Leakage Lek^0

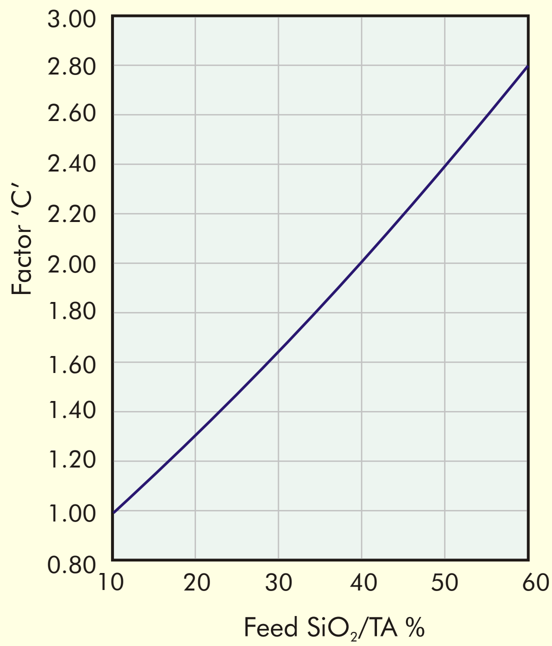
Figure 4



CO - FLOW SiO_2 LEAKAGE

Factor 'C' for Feed SiO_2/TA %

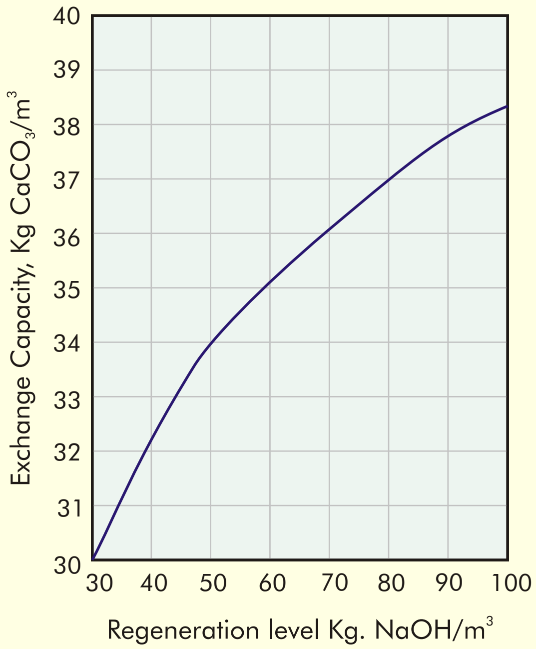
Figure 5



CCR

Basic Exchange Capacity at Different Regeneration Level

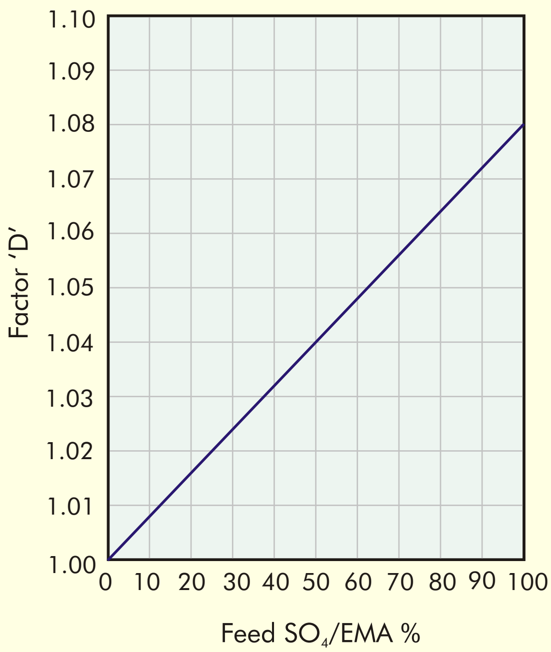
Figure 6



CCR

Factor 'D' for Feed SO_4/EMA %

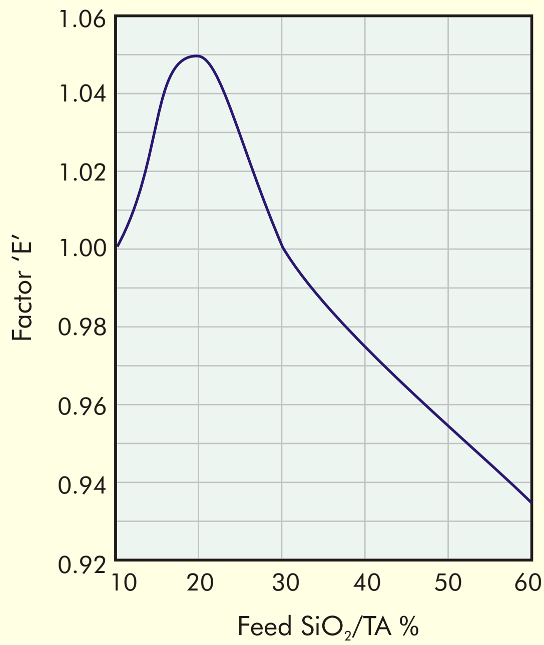
Figure 7



CCR

Factor 'E' for Feed SiO_2/TA %

Figure 8



Treated water quality

Two stage de-ionising

The quality of treated water from a two stage deionising plant using INDION 820 as the anion exchanger is determined by:

- Regeneration level employed.
- Level of sodium ion leakage from the cation exchanger.
- Silica to total anion ratio of water fed to the anion exchanger.

Sodium ions leaking from the cation exchanger are converted to NaOH as the water passes through the anion exchanger.

Each ppm of sodium leakage, expressed as $CaCO_3$, increases conductivity of the water leaving the anion exchanger by approximately 5 microsiemens/cm at 20°C .

The values for residual silica in the treated water at various regeneration levels and for different Silica to total anion ratios can be obtained by :

Co-flow regeneration

Multiplying the value from figure 4 by the correction factor C from figure 5.

Counter current regeneration

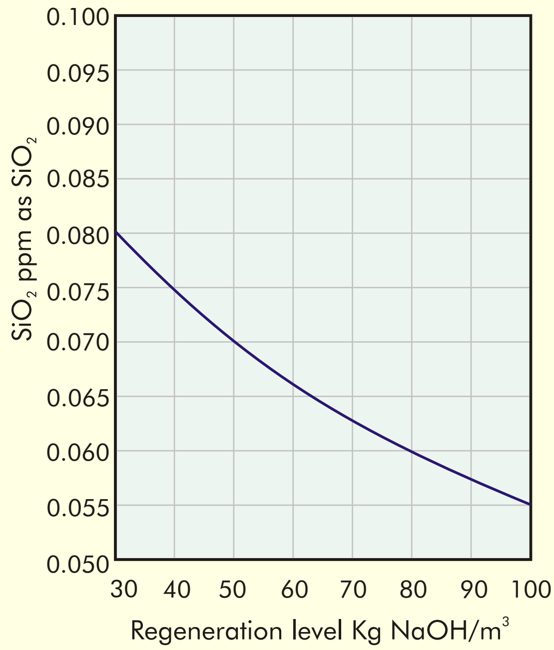
Multiplying the value from figure 9 by the correction factor F from figure10 .

These values assume zero sodium slip and for every ppm of sodium leakage as $CaCO_3$, the residual silica increases by 25% .

CCR

SiO_2 Leakage Lek^0

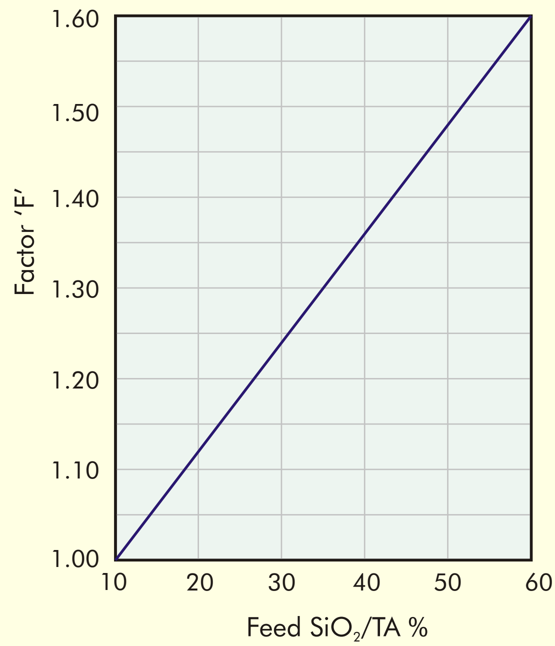
Figure 9

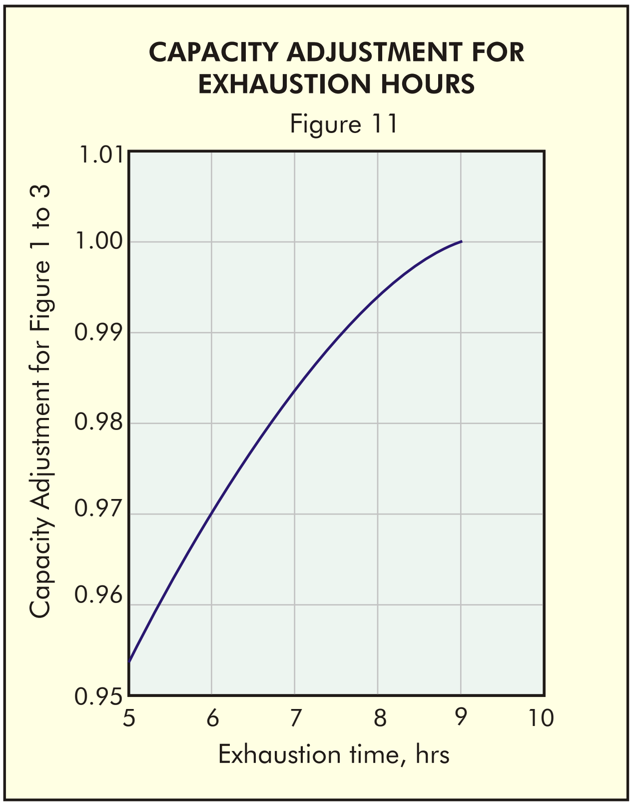


CCR

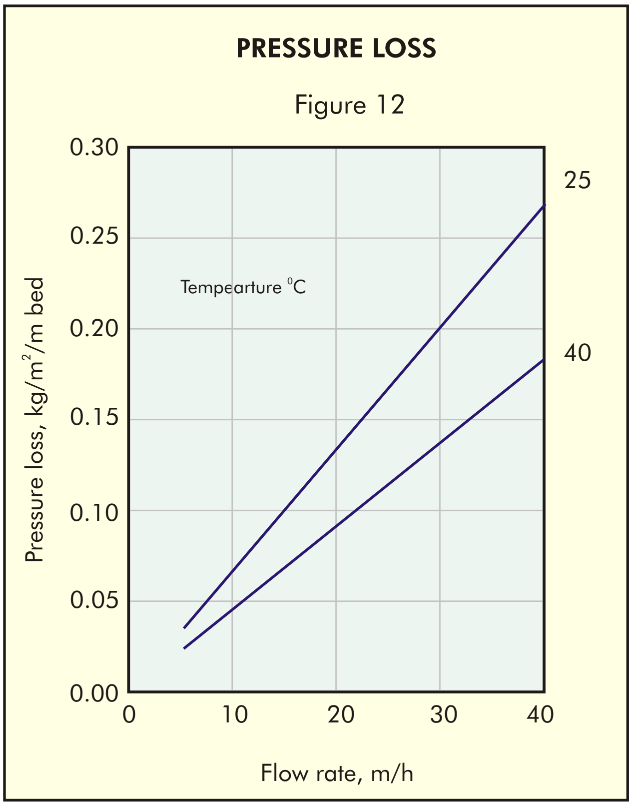
Factor 'F' for Feed SiO_2/TA %

Figure 10

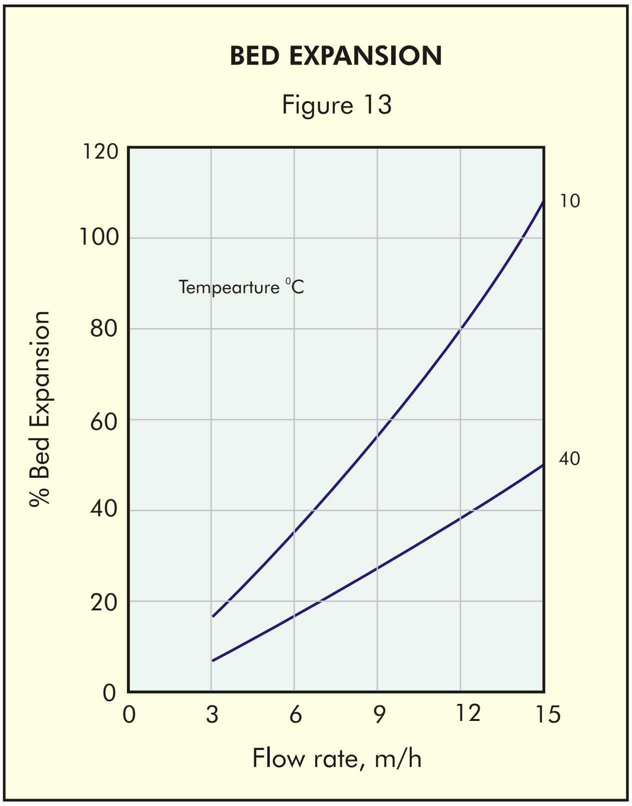




CAPACITY ADJUSTMENT FOR
EXHAUSTION HOURS
Figure 11
Capacity Adjustment for Figure 1 to 3
1.01
1.00
0.99
0.98
0.97
0.96
0.95
5
6
7
8
9
10
Exhaustion time, hrs



PRESSURE LOSS
Figure 12
Pressure loss, kg/m2/m bed
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Tempearture °C
25
40
0
10
20
30
40
Flow rate, m/h



BED EXPANSION
Figure 13
% Bed Expansion
120
100
80
60
40
20
0
Tempearture °C
10
40
0
3
6
9
12
15
Flow rate, m/h

Use of good quality regenerants

All ion exchange resins are subject to fouling and blockage of active groups by precipitated iron. Hence the iron content in the feed water should be low and the regenerant sodium hydroxide must be essentially free from iron and heavy metals. All resins, especially the anion exchangers are prone to oxidative attack resulting in problems such as loss of capacity, resin clumping, etc. Therefore sodium hydroxide should have as low a chlorate content as possible. Good quality regenerant of technical or chemically pure grade should be used to obtain best results.

Packing

HDPE Lined bags	25/ 50 lts	LDPE bags	1 cft / 25 lts
Super sack	1000 lts	Super sack	35 cft
MS drums with liner bags	180 lts	Fiber drums with liner bags	7 cft

Storage

Ion exchange resins require proper care at all times. The resin must never be allowed to become dry. Regularly open the plastic bags and check the condition of the resin when in storage. If not moist, add enough clean demineralised water and keep it in completely moist condition. Always keep the resin drum in the shade. Recommended storage temperature is between 20^0 C - 40^0 C.

Safety

Acid and alkali solutions used for regeneration are corrosive and should be handled in a manner that will prevent eye and skin contact. If any oxidising agents are used, necessary safety precautions should be observed to avoid accidents and damage to the resin.

INDION range of Ion Exchange resins are produced in a state of the art ISO 9001 and ISO 14001 certified manufacturing facilities at Ankleshwar, in the state of Gujarat in India. This product data sheet (issue 09/2008) replaces previous issues.

ION EXCHANGE (INDIA) LTD

THE POWER BEHIND WATER

Total Environment Solutions

CORPORATE OFFICE

Tiecicon House, Dr. E. Moses Road, Mahalaxmi, Mumbai 400 011
Tel: 022-3989 0909 Fax: 022-2493 8737
E-mail: ieil@ionexchange.co.in ; hocro@ionexchange.co.in

INTERNATIONAL DIVISION

R-14, T.T.C MIDC, Thane-Belapur Road, Rabale, Navi Mumbai 400 705
Tel: 022-3989 0909/3047 2400 Fax: 022-2769 7918
E-mail: rabcrointl@ionexchange.co.in; export.sales@ionexchange.co.in

REGIONAL OFFICES

- **Chennai** - Tel: 044-3910 2900/ 3989 0909 Fax: 044-2815 3361
  E-mail: checro@ionexchange.co.in
- **Delhi** - Tel: 011-3989 0909/3054 3200 Fax: 011-2577 4837
  E-mail: delcro@ionexchange.co.in
- **Kolkata** - Tel: 033-3989 0909/3043 3400 Fax: 033-2400 4345
  E-mail: calcro@ionexchange.co.in
- **Vashi** - Tel: 022-3989 0909/3913 2300 Fax: 022-2788 9839
  E-mail: mumcro@ionexchange.co.in

BRANCH OFFICES

- **Bangalore** - Tel:-080-3251 6205, Cell:09341247700
  E-mail: bngcro@ionexchange.co.in
- **Chandigarh** - Tel: 0172-274 5011 Fax: 0172-274 4594
  E-mail: delcro@ionexchange.co.in
- **Hyderabad** - Tel: 040-3066 3101/02/03 Fax: 040-3066 3104
  E-mail: hydcro@ionexchange.co.in
- **Lucknow** - Tel: 0522-301 3401/02 Fax: 0522- 301 3401
  E-mail: luk.general@ionexchange.co.in
- **Pune** - Tel: 020-3062 6160 Fax: 020-2714 6109
  E-mail: pun.general@ionexchange.co.in
- **Vadodara** - Tel: 0265-239 6506/6507 Fax: 0265-239 8508
  E-mail: brdcro@ionexchange.co.in
- **Vizag** - Tel: 0891-324 6253
  E-mail: sales.vizag@ionexchange.co.in

FACTORIES

• Ankleshwar • Hosur • Patancheru • Rabale • Verna

ALL INDIA NETWORK OF SERVICE COMPANIES AND DEALERS

Visit us at : www.ionindia.com