ENGINEERING BULLETIN

Supergel™ SGA550OH

This Engineering Bulletin provides typical chemical and physical characteristics, recommended operating conditions, hydraulic characteristics, pressure drop and other operational data for Purolite's Supergel™ SGA550OH strong base anion uniform particle size resin used for condensate polishing applications.

Purolite®

Purolite SGA550OHis a specialized uniform particle size gel polystyrene quaternary amine strong base anion exchange resin with exceptional physical strength and osmotic shock resistance. The resin performs especially well in high-flow, mixed bed water demineralization applications such as make-up water or condensate polishing. Additionally, uniform grading and excellent chemical and physical stability ensure fast exchange kinetics and low pressure drop at the high flow velocities experienced within external regenerated CPP systems. The resin is also ideal in related systems where consistent particle size and kinetics are important factors for near-perfect bed separation prior to regeneration, as well as the production of high-purity treated water. The resin can be used as an anion component in primary demineralizer systems or within mixed bed systems along with Purolite SGC650H strong acid cation resin.

Table 1 – Supergel™ SGA550OH typical chemical and physical characteristics

Polymer structure	Supergel polystyrene cross-linked with divinylbenzene
Appearance	Spherical beads
Functional group	Quaternary amine
Ionic form as shipped	Hydroxide – OH^- / Carbonate – CO_3^{2-}
Total capacity (OH^- form)	1.1 eq/l (24 Kgr/ft^3) (minimum)
Moisture retention (OH^- form)	55% – 65%
Mean diameter (µm)	570 $^+/_-$ 50
Uniformity coefficient	1.1 – 1.2 (maximum)
Reversible swelling ($Cl^-\rightarrow OH^-$)	24% (maximum)
Reversible swelling ($CO_3^{2-}\rightarrow OH^-$)	14% (maximum)
Specific gravity (OH^- form)	1.07
Specific gravity (CO_3^{2-}form)	1.09
Shipping weight	660 – 700 g/l (41.3 – 43.8 lb/ft^3)
pH limits	0 – 14
Breaking weight	800 g (approximately)
Osmotic shock resistance (% whole beads after cycling)	90%

Table 2 – Supergel™ SGA550OH recommended operating conditions

Operating temperature (OH^- form)	60°C (140°F) (maximum)
Operating temperature (Cl^- form)	100°C (212°F) (maximum)
Bed depth	450 mm (1.5 ft) (minimum)
Flow rate (Service/Fast Rinse)	5 – 60 m/h (2 – 24 gpm/ft^2)
Flow rate (Service Condensate Polishing)	40 – 150 m/h (16 – 60 gpm/ft^2)
Flow rate (Regeneration Displacement Rinse)	1 – 10 m/h (0.4 – 4 gpm/ft^2)
Total rinse requirement	2 – 5 Bed Volumes
Regeneration type	4 – 8% NaOH
Regeneration temperature	50°C (120°F) (maximum)
Backwash	See backwash data, page 2

Hydraulic characteristics

The pressure drop across a properly classified bed of ion-exchange resin depends on the particle size distribution, bed depth and void volume of the exchanger as the linear flow rate and the viscosity (hence the temperature) of the influent solution. Anything affecting these parameters, such as the presence of particulate matter in the condensate filtered out by the bed and abnormal compaction of the resin bed, will have an adverse effect and result in an increase pressure drop. The excellent physical stability and osmotic shock resistance of Purolite Sugergel products helps prevent pressure drop increase during operation. Typical values of pressure drop across a bed of Purolite's Supergel SGA550OH are given for a range of flow rates and temperatures in Figure 1.

Figure 1 – Pressure drop SGA550OH

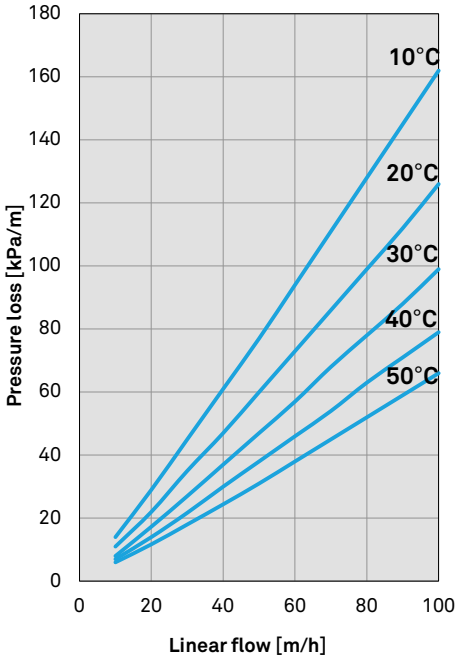


Figure 2 – Backwash expansion SGA550OH

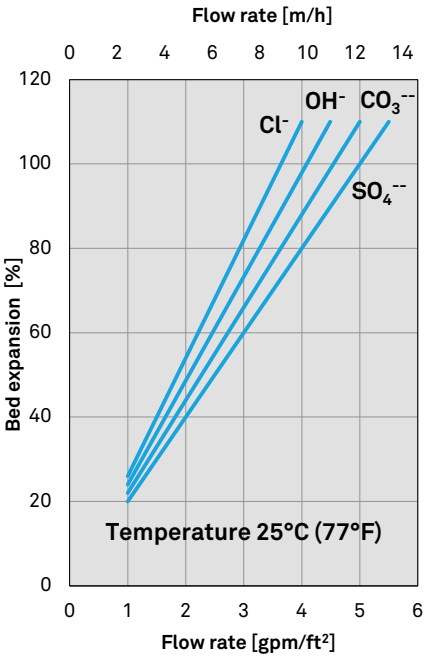


Figure 2 shows the backwash expansion for various ionic forms as a function of linear flow at a temperature of 25°C. For other temperatures use the following:

L = L25°C [1+0.008 (1.8Tc – 45)] where L = flow in m/h and T = Temperature in °C
L = L77°F [1+0.008 (Tc – 77)] where L = flow in gpm/ft^2 and T = Temperature in °F

Performance characteristics

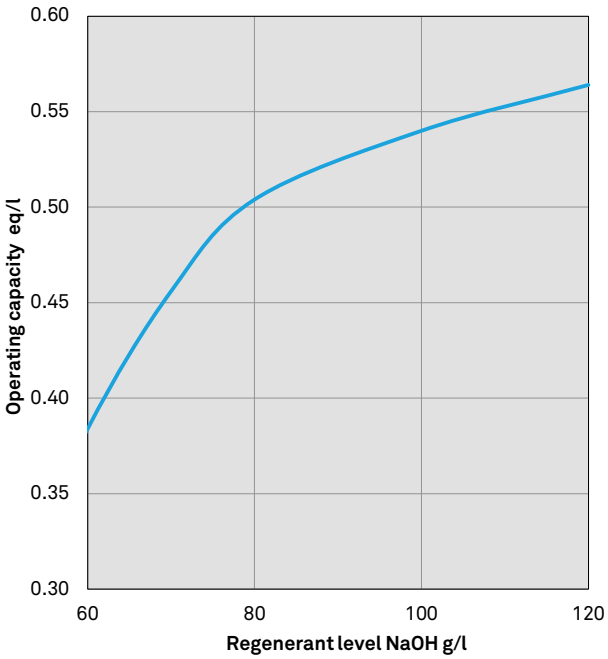
Purolite SGA550OH is a uniform particle size resin with a small mean bead diameter. This means that there is very little variation in particle size compared to standard grade resins. The main advantages of this characteristic are:

- Increased regeneration efficiency
- Improved operating capacity
- Improved treated water leakage
- Reduced chemical consumption
- Better exchange kinetics especially at higher flow rates
- Less rinse water demand
- Better mixed bed separation

Additionally, uniform particle size resin will generally produce more water of better quality at lower operating costs.

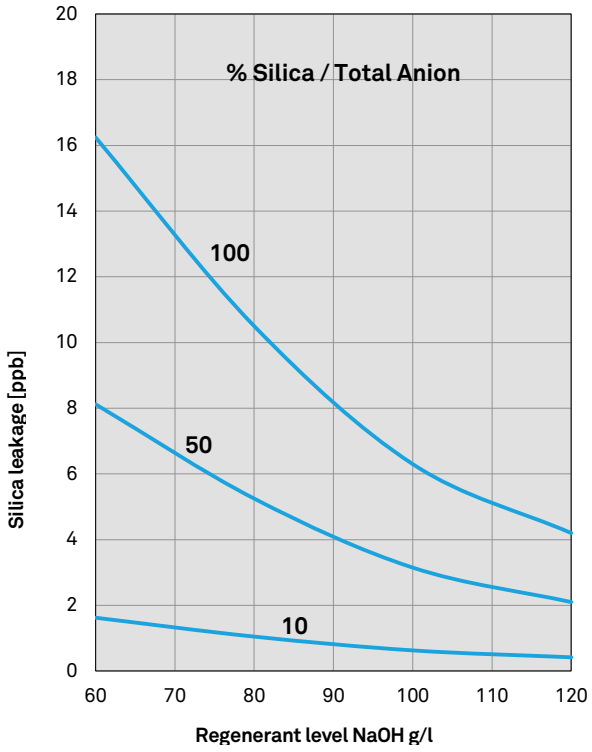
Figure 3 shows typical operating capacity data for Purolite SGA550OH in a condensate polishing mixed bed application.

Figure 3 – SGA550OH operating capacity in a polishing mixed bed



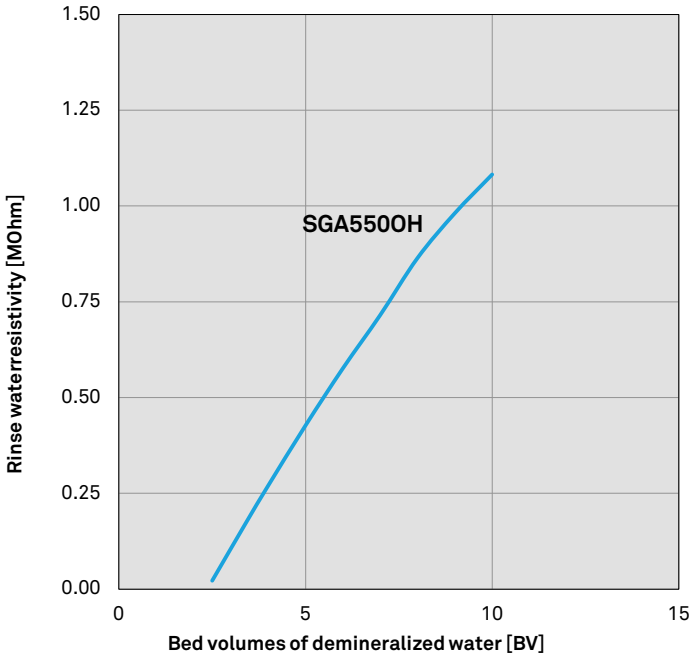
Typical leakage data in a condensate polishing mixed bed application is given in Figure 4. Silica leakage is not only dependent on the regeneration level, but also on other factors like regeneration temperature, condensate temperature and influent silica concentration. As such, the leakage illustration is presented for guidance only.

Figure 4 – SGA550OH silica leakage in a polishing mixed bed



The excellent rinse properties of Purolite SGA550OH results in lower rinse water demand compared to standard grade resins. Figure 5 shows a typical rinse profile for SGA550OH.

Figure 5 – Rinse properties of SGA550OH



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