

Purolite™ Supergel™ SGC650H Strong Acid Cation Resin

This Engineering Bulletin provides typical chemical and physical characteristics, recommended operating conditions, hydraulic characteristics, pressure drop and other operational data for Purolite SGC650H strong acid cation uniform particle size resin used for condensate polishing applications.

Purolite SGC650H Strong Acid Cation Resin

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Introduction

Purolite SGC650H is a uniform particle size, Supergel grade poly (styrene sulfonate) strong acid cation exchange resin that incorporates exceptional physical strength with excellent osmotic shock resistance. These properties make the resin especially well-suited for high-flow, mixed bed water demineralization applications such as makeup 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 before regeneration and high-purity treated water production. The resin can be used as a lead cation in primary demineralizer systems or within mixed bed systems along with Purolite SGA550 anion resin (Purolite SGC650 is sodium form version of this resin).

TABLE 1 Purolite SGC650H Typical Chemical and Physical Characteristics

Characteristics	Description/Value
Polymer Structure	Gel polystyrene crosslinked with divinylbenzene
Appearance	Spherical beads
Functional Group	Sulfonic acid
Ionic Form	H ⁺ form
Total Capacity (min.)	2.0 eq/L (43.7 Kgr/ft ³) (H ⁺ form)
Moisture Retention	46–50% (H ⁺ form)
Mean Diameter	670 ± 50 (µm)
Uniformity Coefficient	1.1–1.2
Reversible Swelling (Na ⁺ → H ⁺) (max.)	10%
Specific Gravity	1.21
Shipping Weight (approx.)	770–790 g/L (48.1–49.4 lb/ft ³)
Temperature Limits	120 °C (248.0 °F)

TABLE 2 Purolite SGC650H Recommended Operating Conditions

Characteristics	Description/Value
Operating Temperature (H ⁺ Form)	130 °C (265 °F) (max.)
Bed Depth	450 mm (1.5 ft) (min.)
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	3–6 Bed Volumes
Regeneration Type	1–10% H ₂ SO ₄ or 3–8% HCl
Backwash	See backwash data (Page 5)

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 increase pressure drop. The excellent physical stability and osmotic shock resistance of Purolite products help prevent pressure drop increase during operation. Typical values of pressure drop across a bed of Purolite SGC650H are given for a range of flow rates and temperatures in Figure 1.

FIGURE 1

**Pressure Drop
Purolite SGC650H**

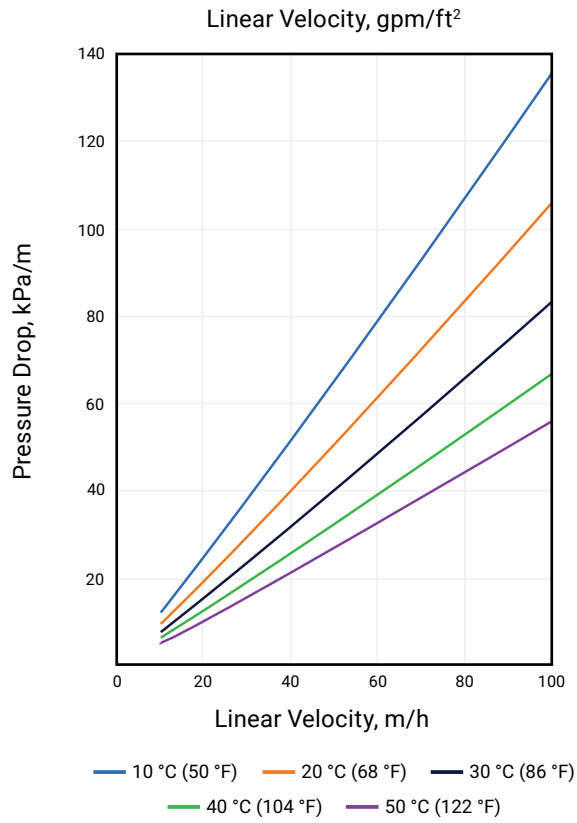


FIGURE 2

**Backwash Expansion
Purolite SGC650H**

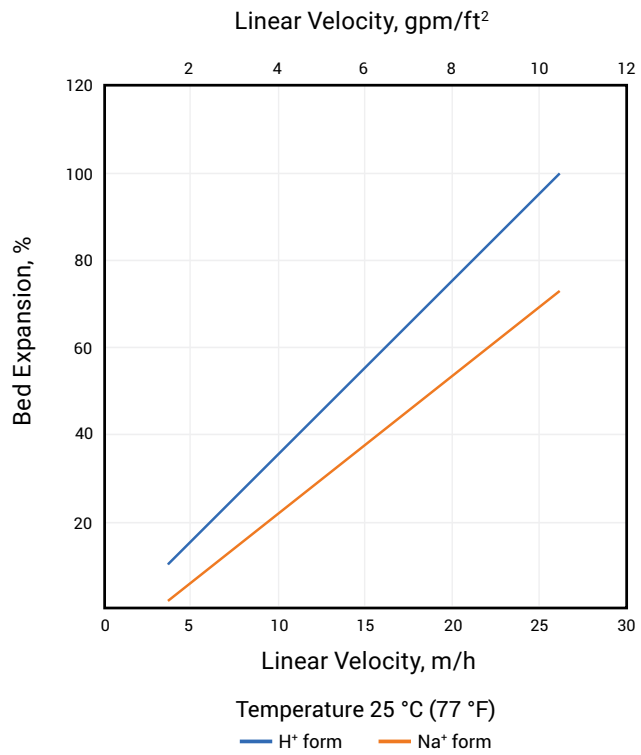


Figure 2 shows the backwash expansion for various ionic forms as a function of linear flow at a temperature of 25 °C. For other temperatures use the following:

$L = L_{25\text{ °C}} [1 + 0.008 (1.8T_c - 45)]$ where L = flow in m/h and T = Temperature in °C

$L = L_{77\text{ °F}} [1 + 0.008 (T_c - 77)]$ where L = flow in gpm/ft² and T = Temperature in °F

Performance Characteristics

Purolite SGC650H is a uniform particle size resin with a small mean bead diameter. This means all beads have a particle size very close to the mean diameter compared to standard grade resins. The main advantages of a uniform particle size 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

A 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 SGC650H in a condensate polishing mixed bed application.

FIGURE 3

**Purolite SGC650H
Operating Capacity in a
Polishing Mixed Bed**

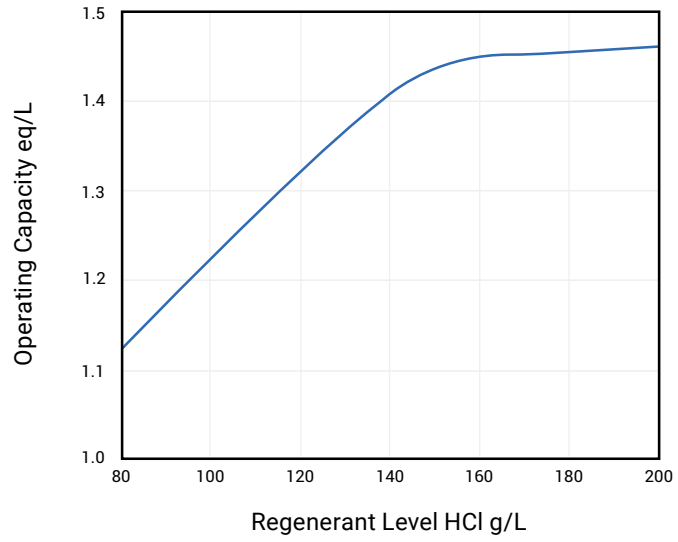
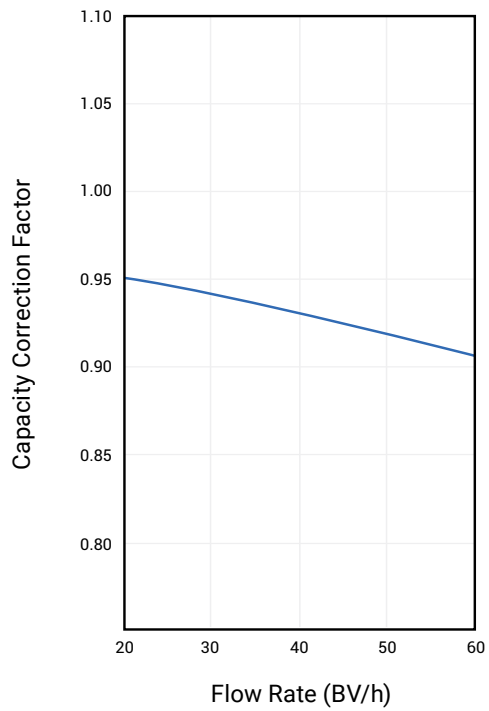


Figure 4 shows the flow rate capacity correction factor for [Supergel SGC650H](#).

FIGURE 4

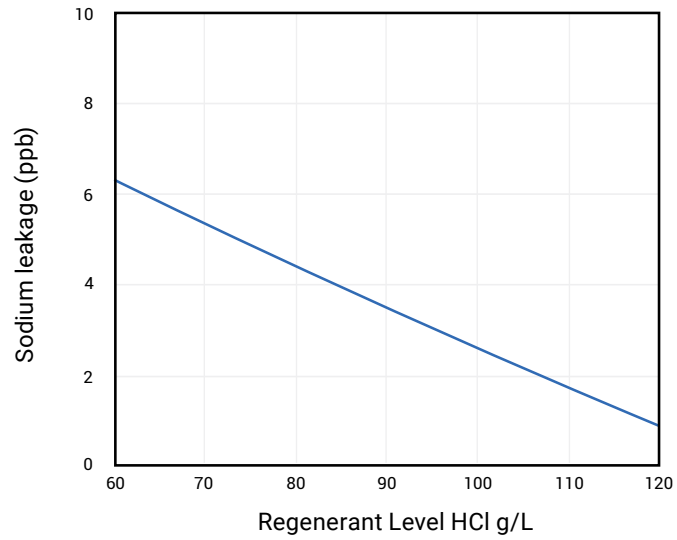
**Purolite SGC650H
Capacity Correction
for Flow Rate**



Typical leakage data in a condensate polishing mixed bed application is given in Figure 5. Note that illustrated leakage is meant for guidance only as it is dependent upon many process factors.

FIGURE 5

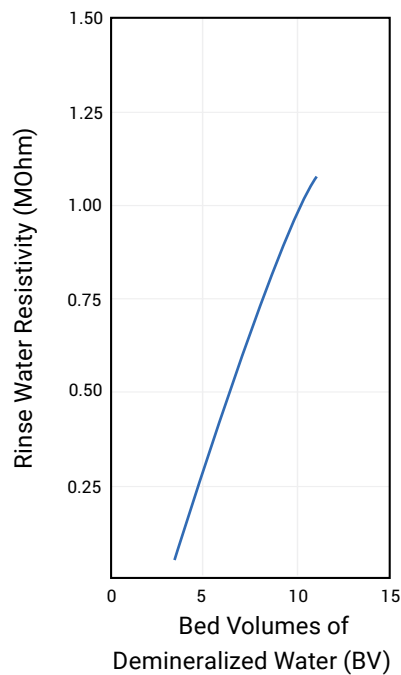
**Purolite SGC650H
Sodium Leakage in
Polishing Mixed Bed**



The excellent rinse properties of [Purolite SGC650H](#) results in reduced rinse water demand compared to standard grade resins. Figure 6 shows a typical rinse profile for Supergel SGC650H.

FIGURE 6

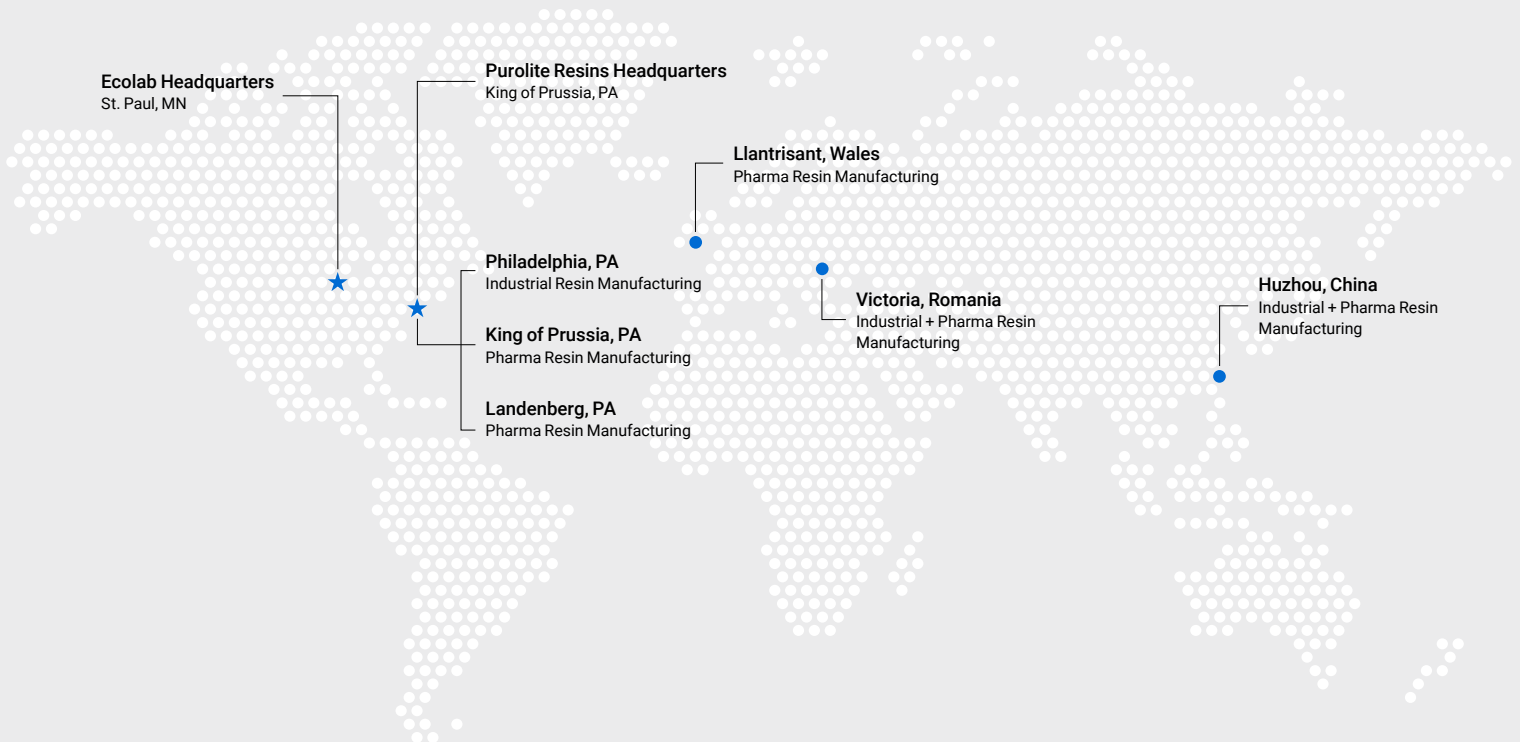
**Rinse Properties of
Purolite SGC650H**



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P-000266-NPOLD-0426-R3-ENG-PCO