

**AMBERLITE™ IRN99 Resin**

Nuclear Grade High Capacity Gel Cation Exchange Resin for the Power Industry

Description

AMBERLITE™ IRN99 Resin is a nuclear grade, gel type, strong acid cation exchange resin with a combination of very high capacity and oxidative stability that enables a completely new level of performance in nuclear power applications. It is sold in the fully regenerated Hydrogen form and intended for use in non-regenerable single bed or mixed bed nuclear systems which demand the ultimate in effluent purity, operating capacity, and resin life. The particle size of AMBERLITE IRN99 Resin is specifically designed to give an optimized balance of pressure drop, exchange kinetics, and resistance to separation from the anion exchange resin, AMBERLITE IRN78, when used in a mixed bed.

In BWR condensate polishing, AMBERLITE IRN99 Resin can help to achieve the lowest possible reactor water sulfate levels. The exceptionally high DVB crosslinker level of AMBERLITE IRN99 Resin gives it the best oxidative stability of any gel cation resin available, thus minimizing the release of sulfonic acid leachables. Also AMBERLITE IRN99 is made at a particle size which reduces the chance of creating a separated cation resin layer at the bottom on the mixed bed service vessel.

The very high total capacity of AMBERLITE™ IRN99 Resin, typically 2.5 eq/L, delivers another important benefit, not only in BWR condensate polishing, but also in other nuclear applications such as PWR steam generator blowdown treatment, PWR primary system CVCS resin beds, and even radioactive waste demineralizers. The high total cation exchange capacity can produce a 15–30% increase in operating throughput. Since the nuclear grade resins from all these applications are generally disposed of as rad waste, high capacity and long resin bed life are critical to minimizing rad waste disposal cost and volume. For most users, rad waste disposal cost will often exceed resin purchase cost, so high resin capacity directly translates into savings in these nonregenerable nuclear applications. Furthermore, longer bed life means fewer bed change-outs, less work, less resin handling, and less chance for radiation exposure.

Typical Physical and Chemical Properties

Physical form	Dark amber translucent beads
Matrix	Polystyrene divinylbenzene copolymer
Functional groups	Sulfonic acid
Conversion to H ⁺ form, min.	99%
Total volume capacity (H ⁺ form)	2.4 eq/L (52.4 kgr/ft ³ as CaCO ₃)
Moisture retention capacity (H ⁺ form)	37–43% (H ⁺ form)
Shipping density	840 g/L (52 lbs/ft ³)
Fines content < 0.300 mm, max	0.1%
Coarse beads > 0.850 mm, max	1.0%
Uniformity coefficient, max.	1.2
Friability average, g/bead min.	350
Friability > 200 g/bead, min.	95%
Na, dry basis, max.	50 mg/kg
Al, dry basis, max.	50 mg/kg
Fe, dry basis, max.	50 mg/kg
Cu, dry basis, max.	10 mg/kg
Heavy metals as Pb, max.	10 mg/kg

Suggested Operating Conditions

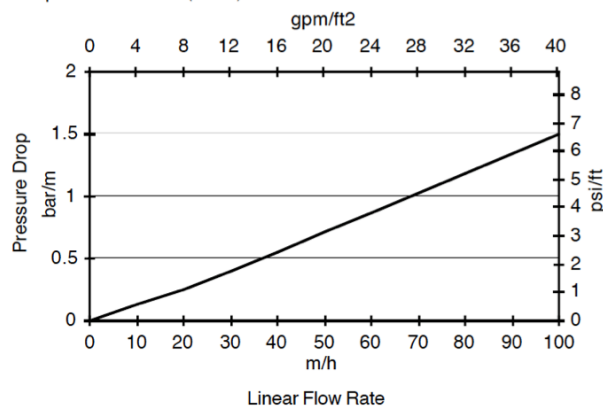
Operating temperature	15–60°C / 60–140°F
Minimum bed depth	900 mm (3 ft)
Service flow rate for condensate polishing (LV)	120 m/h (50 gpm/ft ²) max.
Service flow rate for other applications (SV)	8–50 BV ³ /h (1.0–6.3 gpm/ft ³)

Hydraulic Characteristics

Figure 1 shows the pressure drop data for AMBERLITE™ IRN99 Resin as a single component resin, as a function of service flow rate and water temperature. Pressure drop data are for clean, classified beds which have not accumulated solids during the service run. The pressure drop of a mixed bed can be approximated by summing the component pressure drops.

Figure 1. Pressure Drop Data

Temperature = 20° C (68° F)



For other temperatures use:

$$P_T = P_{20^\circ\text{C}} / (0.026 T_{\text{C}} + 0.48), \text{ where } P \equiv \text{bar/m}$$

$$P_T = P_{68^\circ\text{F}} / (0.014 T_{\text{F}} + 0.05), \text{ where } P \equiv \text{psi/ft}$$

Packaging

25 liter bags or 7 cubic foot drum

**Product
Stewardship**

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

