

**DOWEX™ MONOSPHERE™ MR-3 UPW**

A Separable Uniform Particle Size Mixed Bed Ion Exchange Resin for Ultrapure Water Production

Product	Resin ratio	Matrix	Functional group
DOWEX™ MONOSPHERE™ MR-3 UPW	Note*	Styrene-DVB, gel	Sulfonic acid and quaternary ammonium

Guaranteed Sales Specifications		H ⁺ form	OH ⁻ form
Total exchange capacity, min.	eq/L	1.9	1.0
	kgr/ft ³ as CaCO ₃	41.5	21.9
Water content	%	46 - 51	55 - 65
Bead size distribution†			
Mean particle size	µm	650 ± 50	590 ± 50
Uniformity coefficient, max.		1.1	1.1
Whole uncracked beads, min.	%	95	95
Crush strength			
Average, min.	g/bead	500	350
> 200 g/bead, min.	%	95	95

Typical Physical and Chemical Properties		H ⁺ form	OH ⁻ form
Particle density	g/mL	1.22	1.08
Shipping weight**	g/L		689
	lbs/ft ³		43

Recommended Operating Conditions

- Maximum operating temperature 60°C (140°F)
- Resin bed depth, min. 800 mm (2.6 ft)
- Flow rates:
Service 10 - 60 m/h (4 - 24 gpm/ft²)
- Pressure drop see Figure 1

UPW Mixed Resin Specific Properties

- Cationic resin conversion to H 99.9% min.
- Anionic resin conversion to:
OH 95% min.
CO₃ 5% max.
Cl 0.1% max.
- Rinse characteristics:
UPW grade resins are rinsed with +17.5 Megaohm.cm water to meet stringent ionic and organic residuals
 - Ionic conductivity rinse down to 0.055 µS/cm 1 bed volume
(see Figure 2)
 - TOC rinse down to 2 ppb (+) (see Figure 2) 50 bed volumes

Note* Resin ratio of anion to cation is volumetrically optimized to achieve maximum removal of boron and silica.

† For additional particle size information, please refer to Particle Size Distribution Cross Reference Chart (Form No. 177-01775).

(+) delta TOC ppb measured in/out

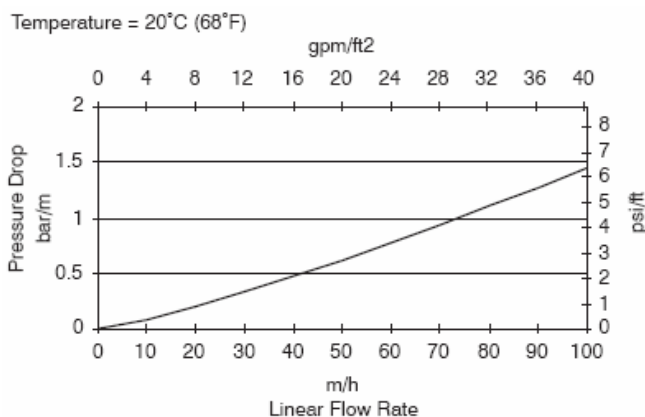
** As per the backwashed and settled density of the resin, determined by ASTM D-2187.

Typical Properties and Applications

DOWEX™ MONOSPHERE™ MR-3 UPW grade resin is recommended as a working or polishing mixed bed to complement two bed ion exchange or reverse osmosis systems. It can be used as a regenerable mixed bed since the color difference and particle size difference will allow a visually good separation to achieve optimal regeneration. Very low ionic load to a regenerable mixed bed can occasionally lead to clumping, especially when the mixed bed is operated to a boron or silica break. An improvement in the manufacturing process of DOWEX MONOSPHERE 550A UPW grade will eliminate cation/anion clumping under normal regeneration conditions.

The UPW grade is characterized by the high conversion to ionic sites (95.0% min.) and a volumetric ratio that allows a higher exchange of boron and silica. As shown in Figure 2, the excellent rinse characteristics also allow a very efficient on-line operation.

Figure 1. Pressure Drop Data

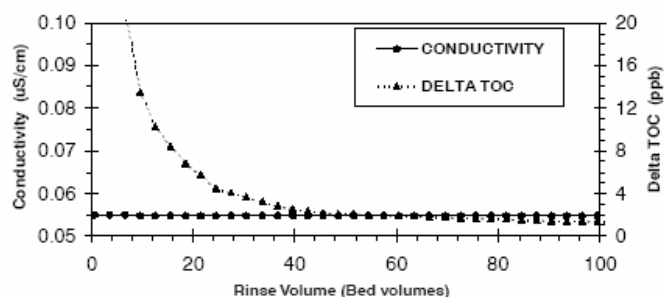


For other temperatures use:

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

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

Figure 2. Conductivity and TOC Rinsedown Curves



Warning: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

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