



## DOWEX™ MONOSPHERE™ MR-450 UPW

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

Product	Resin ratio	Matrix	Functional group
DOWEX™ MONOSPHERE™ MR-450 UPW	Note*	Styrene-DVB, gel	Sulfonic acid and quaternary ammonium

Guaranteed Sales Specifications		H <sup>+</sup> form	OH <sup>-</sup> form
Total exchange capacity, min.	eq/L kgr/ft <sup>3</sup> as CaCO <sub>3</sub>	1.9 41.5	1.0 21.9
Water content	%	46 - 53	55 - 65
Bead size distribution <sup>†</sup>			
Mean particle size	μm	360 ± 50	590 ± 50
Uniformity coefficient, max.		1.1	1.1
Whole uncracked beads, min.	%	95	95
Crush strength			
Average, min.	g/bead	350	350
> 200 g/bead, min.	%	95	95

Typical Physical and Chemical Properties		H <sup>+</sup> form	OH <sup>-</sup> form
Particle density	g/mL	1.22	1.08
Shipping weight**	g/L lbs/ft <sup>3</sup>	704 44	704 44

### 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/ft<sup>2</sup>)
- Pressure drop see Figure 1

### UPW Mixed Resin Specific Properties

- Cationic resin conversion to H 99.7% min.
- Anionic resin conversion to:
  - OH 95% min.
  - CO<sub>3</sub> 5% max.
  - Cl 0.1% max.
- Rinse characteristics:  
UPW grade resins are rinsed to meet stringent ionic and organic residuals
  - Ionic conductivity rinse down to 0.055 μS/cm (see Figure 2) 2 bed volumes
  - TOC rinse down to 4 ppb (+) (see Figure 2) 45 bed volumes

Note\* Resin ratio of anion to cation is volumetrically optimized to achieve maximum removal of boron, silica and other sensitive ions.

<sup>†</sup> 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-450 UPW grade resin is a non-separable homogeneous mixed bed resin. It is recommended as a point of use or non-regenerable mixed bed in the polishing loop to achieve sub ppb levels of soluble silica, boron, sodium, potassium, sulfate, chloride, zinc, iron and aluminum. This non-regenerable mixed bed resin is used for two to three years before replacement. The UPW grade product is characterized by the very high conversion to ionic sites (95.0% min.), excellent rinse profiles for conductivity and (delta) TOC and superior crush strength. This homogeneous mixed bed contains 360 micron cation and a 590 micron anion (mean particle size) thus providing efficient kinetics to achieve a higher operating capacity.

Figure 1. Pressure Drop Data

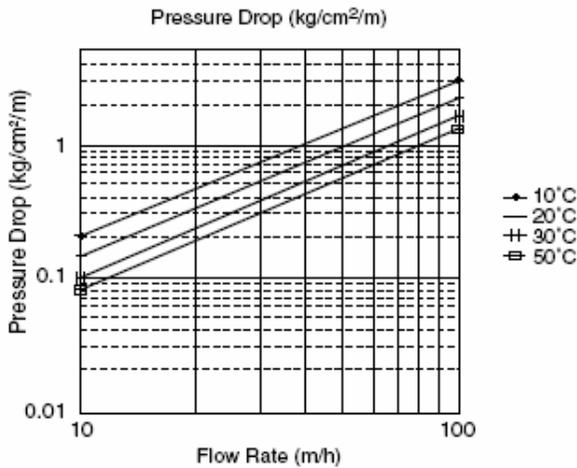
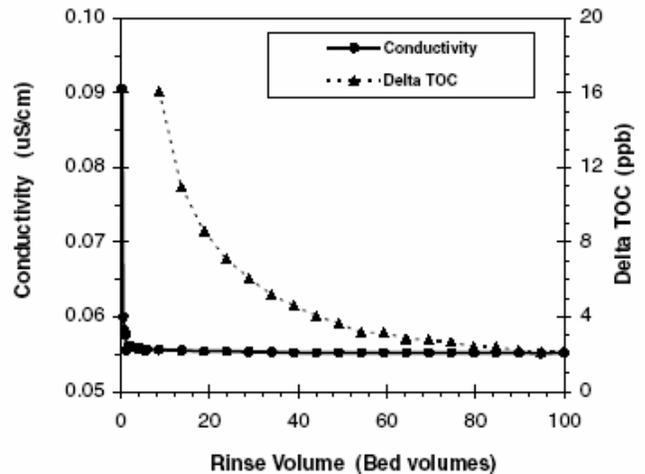


Figure 2. Conductivity and TOC Rinsedown Curves



### For other temperatures use:

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

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

### DOWEX™ Ion Exchange Resins

For more information about DOWEX resins, call the Dow Water Solutions business:

North America: 1-800-447-4369  
 Latin America: (+55) 11-5188-9222  
 Europe: (+32) 3-450-2240  
 Pacific: +60 3 7958 3392  
 Japan: +813 5460 2100  
 China: +86 21 2301 9000

<http://www.dowwatersolutions.com>

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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