



# DOWEX MONOSPHERE MR-450 UPW

**A Non-Separable Uniform Particle Size Mixed Bed Ion Exchange Resin for Ultra Pure 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	1.9	1.0
	kg/ft <sup>3</sup> as CaCO <sub>3</sub>	41.5	21.9
Water content	%	46 - 53	55 - 65
Bead size distribution†			
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
>200 g/bead, min.	%		95

Typical Physical and Chemical Properties		H <sup>+</sup> form	OH <sup>-</sup> form
Particle density, approx.	g/ml	1.22	1.08
Shipping weight, approx.	g/l		704
	lbs/ft <sup>3</sup>		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, min.			99.7%
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

(+) delta TOC ppb measured in/out

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

†For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 177-01775/CH 171-476-E).

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# DOWEX Ion Exchange Resins

For more information about DOWEX resins,  
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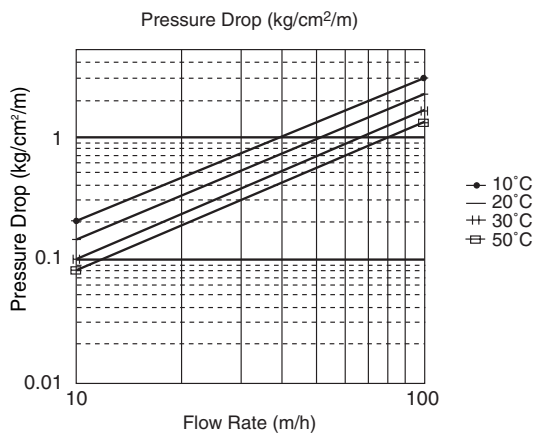
## Typical properties and applications:

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,

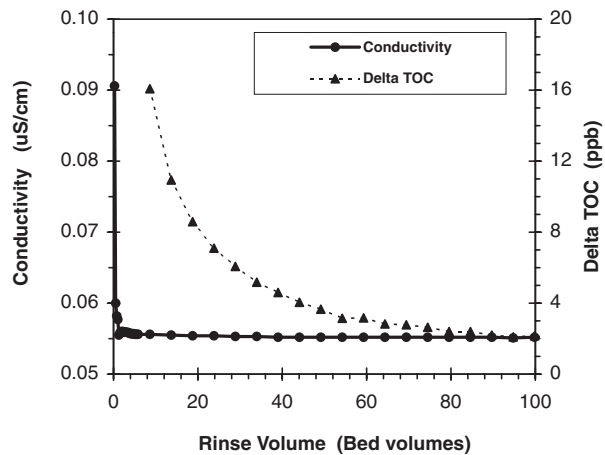
zinc, iron and aluminum. This non-regenerable mixed bed resin is used for two to three years before replacement. The UPW grade product is characterized by the very high conversion to ionic sites (95.0% min.), excellent rinse profiles

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:

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

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

**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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