



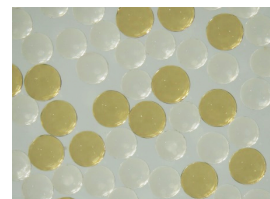
## Product Data Sheet

### **AmberTec™ MR-300 UPW H/OH Ion Exchange Resin**

Separable, Uniform Particle Size, Mixed Bed Ion Exchange Resin for Demineralization Applications and Final Polishing for the Semiconductor Industry

#### **Description**

AmberTec™ MR-300 UPW H/OH Ion Exchange Resin is an ultrapure water-grade, mixed resin recommended as a working or polishing mixed bed to complement 2-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 the anion component will eliminate cation/anion clumping under normal regeneration conditions.



The ratio of anion to cation in AmberTec™ MR-300 UPW H/OH is volumetrically optimized to achieve maximum removal of boron and silica.

Semiconductor-grade is characterized by the high conversion to ionic sites ( $\geq 95.0\%$ ). As shown in Figure 2, the excellent rinse characteristics also allow very efficient online operation.

#### **Applications**

- Regenerable, polishing mixed bed
- Working mixed bed following reverse osmosis
- Non-regenerable, polishing mixed bed

#### **Historical Reference**

AmberTec™ MR-300 UPW H/OH Ion Exchange Resin has previously been sold as DOWEX MONOSPHERE™ MR-3 UPW Ion Exchange Resin.

## Typical Properties

|                               | Cation Resin                             | Anion Resin                                   |
|-------------------------------|------------------------------------------|-----------------------------------------------|
| <b>Physical Properties</b>    |                                          |                                               |
| Copolymer                     | Styrene-divinylbenzene                   | Styrene-divinylbenzene                        |
| Matrix                        | Gel                                      | Gel                                           |
| Type                          | Strong acid cation                       | Strong base anion, Type I                     |
| Functional Group              | Sulfonic acid                            | Trimethylammonium                             |
| Physical Form                 | Dark amber, translucent, spherical beads | White to yellow, translucent, spherical beads |
| <b>Chemical Properties</b>    |                                          |                                               |
| Ionic Form as Shipped         | H <sup>+</sup>                           | OH <sup>-</sup>                               |
| Total Exchange Capacity       | ≥ 1.9 eq/L                               | ≥ 1.1 eq/L                                    |
| Water Retention Capacity      | 46 – 51%                                 | 55 – 65%                                      |
| Ionic Conversion              |                                          |                                               |
| H <sup>+</sup>                | ≥ 99%                                    |                                               |
| OH <sup>-</sup>               |                                          | ≥ 95.0%                                       |
| CO <sub>3</sub> <sup>2-</sup> |                                          | ≤ 5.0%                                        |
| Cl <sup>-</sup>               |                                          | ≤ 0.1%                                        |
| <b>Particle Size</b> §        |                                          |                                               |
| Particle Diameter             | 650 ± 50 µm                              | 590 ± 50 µm                                   |
| Uniformity Coefficient        | ≤ 1.1                                    | ≤ 1.1                                         |
| < 300 µm                      | ≤ 0.2%                                   | ≤ 0.2%                                        |
| <b>Purity</b>                 |                                          |                                               |
| Metals, dry basis             |                                          |                                               |
| Na                            | ≤ 25 mg/kg                               | ≤ 25 mg/kg                                    |
| Fe                            | ≤ 25 mg/kg                               | ≤ 25 mg/kg                                    |
| Cu                            | ≤ 15 mg/kg                               | ≤ 15 mg/kg                                    |
| Al                            | ≤ 15 mg/kg                               | ≤ 15 mg/kg                                    |
| <b>Stability</b>              |                                          |                                               |
| Whole Uncracked Beads         | ≥ 95%                                    | ≥ 95%                                         |
| Friability                    |                                          |                                               |
| Average                       | ≥ 500 g/bead                             | ≥ 350 g/bead                                  |
| > 200 g/bead                  | ≥ 95%                                    | ≥ 95%                                         |
| <b>Density</b>                |                                          |                                               |
| Shipping Weight               | 689 g/L (AmberTec™ MR-300 UPW H/OH)      |                                               |

§ For additional particle size information, please refer to the [Particle Size Distribution Cross Reference Chart](#) (Form No. 45-D00954-en).

## Suggested Operating Conditions

|                                                            |                       |
|------------------------------------------------------------|-----------------------|
| Temperature Range (H <sup>+</sup> /OH <sup>-</sup> form) ‡ | 15 – 25°C (59 – 77°F) |
| pH Range (Stable)                                          | 0 – 14                |

‡ Operating at elevated temperatures, for example above 60 – 70°C (140 – 158°F), may impact the purity of the loop and resin life. Contact our technical representative for details.

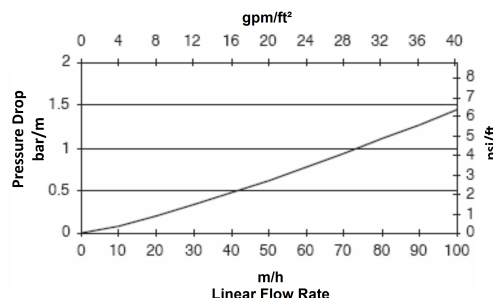
For additional information regarding recommended minimum bed depth, operating conditions, and regeneration conditions for [mixed beds](#) (Form No. 45-D01127-en) or [separate beds](#) (Form No. 45-D01131-en) in water treatment, please refer to our Tech Facts.

## Hydraulic Characteristics

Estimated pressure drop for AmberTec™ MR-300 UPW H/OH Ion Exchange Resin as a function of service flowrate at 20°C (68°F) is shown in Figure 1. These pressure drop expectations are valid at the start of the service run with clean water. Estimated pressure drop at other water temperatures can be calculated with the provided equations.

**Figure 1: Pressure Drop**

Temperature = 20°C (68°F)



**For other temperatures use:**

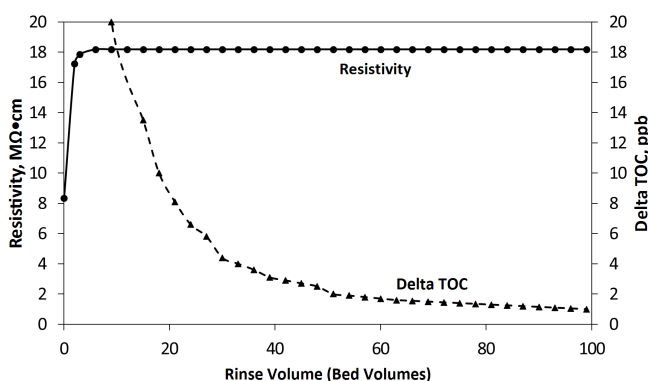
$$P_T = P_{20^\circ\text{C}} / (0.026T_{\text{°C}} + 0.48), \text{ where } P \equiv \text{bar/m}$$

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

## UPW Rinse Properties

AmberTec™ UP Ion Exchange Resins are especially processed and controlled in Quality to ensure the purest treated water quality for semiconductors applications. Typical rinse curves for resistivity and total organic carbon (TOC) to DTOC = 2 ppb as a function of rinse volume (in bed volumes) is shown in Figure 2.

**Figure 2: Resistivity and TOC Rinse Performance**



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Please be aware of the following:

- **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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