

MBD-10

**MIXED BED RESINS
AVAILABLE in GRADES:
-NG -SC -LTOC -ULTRA**

RESINTECH MBD-10 is a mixture of hydroxide form Type One strong base gel anion exchange resin and hydrogen form strong acid sulfonated gelular polystyrene cation exchange resin in a 1:1 (H/OH) ratio. It is available in Nuclear (NG), Semiconductor (SC), Low TOC (LTOC) and ULTRA Grades.

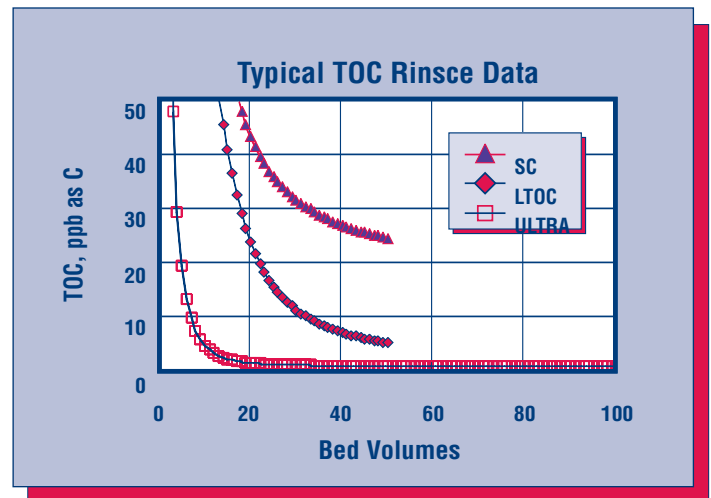
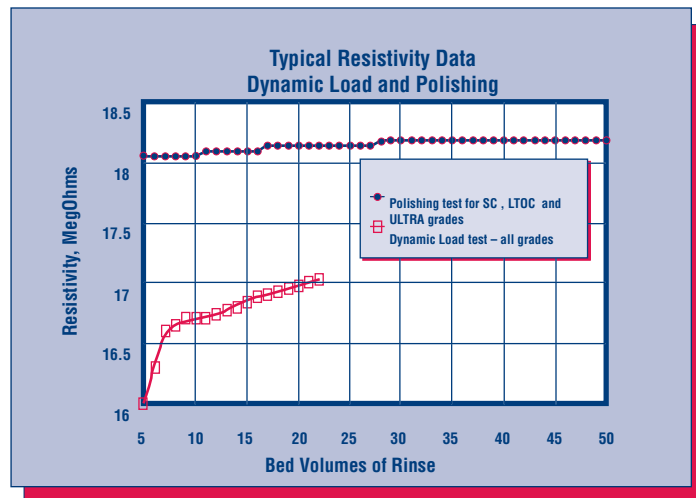
GRADE	Product name	Description
NG	RESINTECH MBD-10-NG	General purpose mixed beds and PEDI. Tested to 15+ megohm under dynamic load
SC	RESINTECH MBD-10-SC	Similar to NG grade. Tested to 18 megohm as a polisher. Rinses to below 50 ppb TOC in under 50 bed volumes
LTOC	RESINTECH MBD-10-LTOC	Similar to SC grade. Rinses to below 10 ppb TOC in under 50 bed volumes
ULTRA	RESINTECH MBD-10-ULTRA	Uniquely low in Organic and Inorganic impurities

RESINTECH MBD-10 is supplied as moist, tough, colored, spherical beads. The anion resin is light in color. The cation resin is dark brown to black. The color difference between the cation and anion resins makes it easy to determine the degree and completeness of the separation step during the backwash step of the regeneration process. It also allows visual inspection of the resin after the regeneration and re-mix process has been completed.

The component resins in *RESINTECH MBD-10* are designed to provide maximum life and operating capacity in regenerable systems. *RESINTECH MBD-10* is specifically formulated to maintain high capacity and excellent water quality over hundreds of exhaustion and regeneration cycles.

FEATURES & BENEFITS

- Complies with FDA Regulations For Potable Water
- Highest Operating Capacity
- Ease of Separation
- Superior Thermal & Physical Stability
- Low Silica Leakage
- Available in Low Leachable TOC Grades
- Performance Tested



RESINTECH® MBD-10

PERCENT CONVERSIONS TO IONIC FORM

Grade	CG8-H		SBG1-OH	
	% H	% OH	% Cl + SO ₄	% CO ₃
NG	>99	>90*	<10	*
SC	>99	>95*	<5	*
LTOC	>99	>95*	<5	*
ULTRA	>99.9	>98*	<2	*

* dioxides measured in anion component prior to mixing. The CO₃ level measured immediately after production is held to the same specifications as the SO₄. Actual CO₃ levels may change during storage and shipment due to adsorption of CO₂ from the atmosphere. We recommend keeping all containers sealed closed until use. For longer storage times, gas barrier packaging (mylar) is suggested. Contact our technical department for more information.

PHYSICAL PROPERTIES

Functional Structure:

Cation

RSO₃⁻H⁺ (Hydrogen form gelular sulfonated polystyrene copolymer)

Anion

R₄N⁺OH⁻ (Hydroxyl form Type One gel strong base alkyl quaternary ammonium polystyrene copolymer)

Physical Form:

Spherical Beads

Screen Size Distribution:

+16 mesh (US Std.)	< 2 Percent
-45 mesh (US Std.)	< 2 Percent

Volume Ratio (as shipped):

Anion	60%
Cation	40%

Total Capacity:

Cation	1.95 meq/mL min. (Na ⁺ form)
Anion	1.40 meq/mL min. (Cl ⁻ form)

Column Operating Capacity:

0.60 meq/mL (13 Kgrs/cu. ft.) min. to electrolyte breakthrough during initial cycle

Moisture Content:

As shipped 60% max.

Maximum Operating Temperature:

Non-regenerable	80°C* (175 °F)
Regenerable	60°C (140 °F)
*6 month typical resin life @ 80°C	

Limitations of ResinTech MBD-10

Extended exposure to strong oxidizers, such as chlorine, hydrogen peroxide and concentrated nitric acid, degrade the structural backbone of the resin and should be avoided.

Operating Flow Rate

Typical 2 to 10 gpm/cu.ft.

pH Range:

0 to 14

Metals Content (typical ppm dry wt)

Iron (Fe)	<100 ppm
Copper (Cu)	< 50 ppm
Lead (Pb)	< 50 ppm

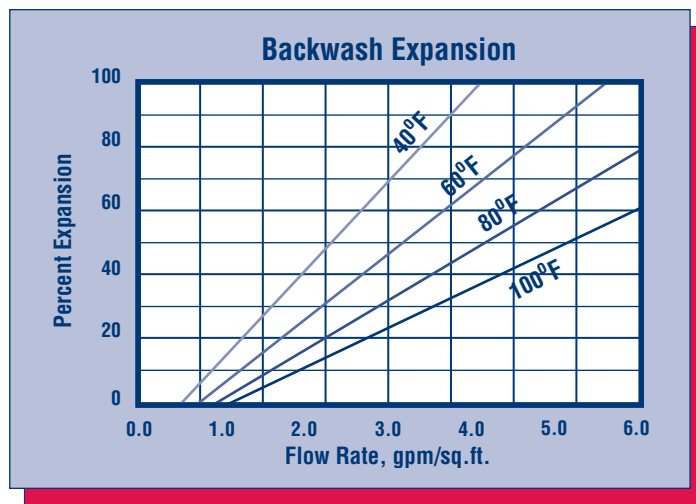
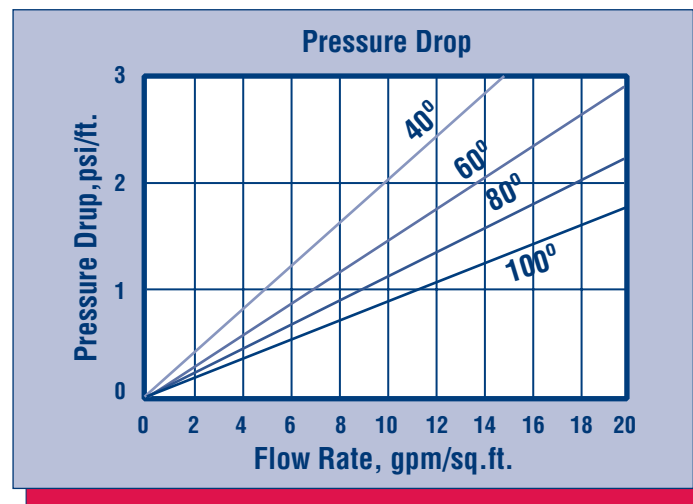
Approximate Shipping Weight:

43 lbs./cu.ft. (720g/l)

Standard Packaging:

5 or 7-cu.ft. plastic lined fiber drums

HYDRAULIC PROPERTIES



PRESSURE DROP

The graph above shows the expected pressure loss per foot of bed depth as a function of flow rate at various temperatures.

BACKWASH

The Backwash step is used to separate the components prior to regeneration and to remove particles. The separation is optimized at a bed expansion of 50 to 75%.

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GENERAL PERFORMANCE SPECIFICATIONS

Specifications	Nuclear Grade	Semiconductor Grade	Low TOC Grade	ULTRA Grade
Resistivity in Polishing 18 megohm water @ 60 BV/Hr., Megohm	>15**	>18	>18	>18
* Leachable TOC @ 25 BV from Start Up., (ppb as C)	No Spec.	No Spec.	<25	<25
* Leachable TOC @ 50 BV from Start Up., (ppb as C)	No Spec.	<50	<10	<5
* Leachable TOC @ 100 BV from Start Up., (ppb as C)	No Spec.	No Spec.	No Spec.	1

* Leachable TOC measured at 0.5 bed volumes per minute at 25° C

** Influent > 1 megohm

FEATURES & BENEFITS

The ResinTech family of mixed bed products covers most of the possible combinations of cation and anion resins that are used in mixed resin deionizing systems. In addition to standard products, ResinTech can provide custom mixes of almost any kind as well as separate components used for any of the mixed products. The following is a brief description of our most commonly used mixed beds

The workhorse mixed beds:

RESINTECH MBD-10 Made from 40% CG8- H-BL (dark) and 60% SBG1-OH

A sturdy, general purpose product with high capacity and high temperature resistance. Best choice for single use applications, cartridges, and for severe operating conditions.

RESINTECH MBD-15 Made from 36% CG8-H-BL (dark) and 64% SBG1P-OH

Almost identical to RESINTECH MBD-10, but with a more porous anion resin for better resistance to organic fouling and efficient regeneration.

RESINTECH MBD-20 Made from 44% CG8-H-BL (dark) and 56% SBG2-OH

Made with a Type II anion for the highest possible regeneration efficiency and high regenerable operating capacity, for non-demanding applications.

ResinTech also offers most mixed beds in several grades as discussed below:

Nuclear Grade (NG)

This is general purpose grade. The cation component is at least 99% regenerated and the anion component is at least 90% regenerated. The product is fully tested to insure its ability to achieve greater than 15 megohm resistivity effluents under dynamic load.

Semiconductor Grade (SC)

Premium grade mixed bed, similar to NG grade but made with additional processing steps to reduce leachable TOC levels and ensure its ability to produce 18 megohm resistivity. The cation component is at least 99% in the hydrogen form and the anion component is at least 95% regenerated. The product is fully tested to ensure its ability to achieve 18 megohm resistivity. Each batch is tested to ensure it will rinse to below 50 ppb of leachable TOC in less than 50 bed volumes from start of service.

Low TOC Grade (LTOC)

Higher grade than the otherwise similar SC grade. This grade of product undergoes more extensive processing than SC grades to produce even lower leachable TOC levels. The cation component is at least 99% in the hydrogen form and the anion component is at least 95% regenerated. The product is fully tested to ensure its ability to achieve 18 megohm resistivity. Each batch is also tested to ensure its ability to rinse to below 25 ppb of leachable TOC in less than 25 bed volumes from start up and to below 10 ppb in less than 50 bed volumes.

ULTRA Grade

Highest quality grade of mixed bed resin, with the lowest possible ionic impurities and the lowest possible TOC leachables. The cation component is at least 99.9% in the hydrogen form and the anion component is at least 98% regenerated. The product is fully tested to ensure its ability to achieve 18 megohm resistivity. Each batch is also tested to ensure its ability to rinse to below 5 ppb of leachable TOC in less than 50 bed volumes from start up and less than 1 ppb after 100 bed volumes. ResinTech ULTRA products are also available with narrow range mesh sizes for both components and with an inert resin interface.

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RESINTECH® MBD-10

Many manufacturing processes require extremely high purity water for washing, rinsing and process applications. The more sophisticated the process, the more stringent the specifications which define "ultrapure water". Water purity requirements are defined by TOC as well as conductivity values. Mixed bed resins are usually employed as a final stage in the de-ionization process.

Performance tested

In addition to traditional quality control, procedures are run on the component resins to determine their chemical and physical properties. All ResinTech mixed beds are tested under dynamic conditions simulating actual operating conditions to test the performance capabilities of the product under controlled conditions. Each batch must pass a battery of these performance tests which vary in difficulty in accordance with the grade of the resin. These tests measure:

- Ability to produce high resistivity in polishing situations.
- The kinetic ability to remove ions at a high rate while maintaining high resistivity under dynamic load conditions.
- The ability to produce low TOC effluents free of leachable TOC.

Highest operating capacity

RESINTECH MBD-10 and *MBD-15* are both widely used mixed beds. The difference between them is the anion resin component. *RESINTECH SBG1*, a standard porosity gel Type One resin, is used to make *RESINTECH MBD-10*, while *RESINTECH SBG1P*, a highly porous Type One gel resin, is used to make ResinTech MBD-15.

RESINTECH SBG1 has a higher total capacity than *RESINTECH SBG1P*. This gives *RESINTECH MBD-10* a higher operating capacity in polishing applications where the major anion load is from silica and bicarbonates. At low regeneration levels and for high percentages of chlorides the highly porous *RESINTECH SBG1P* gives ResinTech MBD-15 higher operating capacity as well as better resistance to organic fouling than *RESINTECH MBD-10*.

Lowest leachable TOC

In ultrapure water, the final mixed bed polishers are a potential source of TOC, especially when new resins are first placed into service. The tight polymer structure of *RESINTECH SBG1* minimizes TOC leaching during start up and throughout its operating life. For this reason, *RESINTECH MBD-10* is recommended for polishing applications where the lowest possible TOC effluents must be maintained, especially where virgin resins are used.

Longer life

In PEDI and in return condensate polishing applications, regeneration levels are higher than in in-place regenerated mixed beds. At higher regeneration levels the differences in operating capacities between the standard and porous gel-type resins is minimal. In high stress applications, the lower swelling and higher crosslinking of *RESINTECH SBG1* gives it greater resistance to both physical and chemical deterioration. *RESINTECH MBD-10* is the resin of choice for physically demanding applications.

Low silica leakage

The regenerant temperature during anion resin regeneration is a major factor in determining the level of silica removal at typical regeneration caustic dose levels. *RESINTECH SBG1* is a highly crosslinked Type One resin and has the highest thermal stability of all the strongly basic anion resins. *RESINTECH MBD-10* can withstand regeneration and operating temperatures up to 140 Deg. F. Regeneration temperatures are usually limited due to materials of construction to below 140 Deg. F. Otherwise, *RESINTECH SBG1* can be regenerated in some cases at even higher temperatures without sacrificing performance or life.

Complies with FDA regulations for potable water

RESINTECH MBD-10 conforms to paragraph 21 CFR173.25 of the Food Additives Regulations of the FDA.

Typical uses

Typical uses of *RESINTECH MBD-10* include almost all applications that require deionized water. Just some of the many proven uses include:

- Portable Exchange DI
- Rinsing of semiconductor wafers
- Make-up of chemical solutions
- Laboratory uses
- Condensate polishing
- Product purification
- Photographic solutions and rinsing
- Radwaste
- Cartridge demineralizers
- Hemodialysis
- Boiler feedwater
- Pharmaceutical applications

***CAUTION:DO NOT MIX ION EXCHANGE RESIN WITH STRONG OXIDIZING AGENTS.** Nitric acid and other strong oxidizing agents can cause explosive reactions when mixed with organic materials,such as ion exchange resins.

Material Safety Data Sheets (MSDS) are available for all ResinTech Inc.products.To obtain a copy,contact your local ResinTech sales representative or our corporate headquarters. They contain important health and safety information.That information may be needed to protect your employees and customers from any known health and safety hazards associated with our products.We recommend that you secure and study the pertinent MSDS for our products and any other products being used These suggestions and data are based on information we believe to be reliable.They are offered in good faith.However we do not make any guarantee or warranty. We caution against using these products in an unsafe manner or in violation of any patents;further we assume no liability for the consequences of any such actions.

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