POWERLINE®

Graver Technologies

KEEPING THE LINES OF COMMUNICATION OPEN | SPRING 2013

GRAVEX® NUCLEAR GRADE RESINS SET THE INDUSTRY STANDARD

Gravex® Offers High Performance and High Capacity for Nuclear Primary Side Ion Exchange Applications

Removing and controlling radionuclides continues to be an important nuclear power industry goal to improve overall plant operation, prevent accumulation within system piping and promote worker safety. In PWR plants, ion exchange media reduce isotopes of cesium, cobalt, antimony and iron in primary side applications like chemical and volume control systems (CVCS), and, in the secondary side, condensate polishers, steam generators blowdown demineralizers and radwaste. Additionally, ion exchange media also manages radionuclides – isotopes of cobalt, copper and iron – in condensate polishers, reactor water cleanup, fuel pool and radwaste applications in BWR plants.

Three Lines of Innovative Gravex Resin Products

As the global technology leader in nuclear ion exchange applications, Graver Technologies has developed an extensive family of innovative Gravex® brand products that set the standard for nuclear grade resins, offering advantages that include enhanced performance, stability, increased capacity and improved ability to remove radionuclides in particulate form. Product extensions – Gravex® High Capacity Nuclear Grade Resins and Gravex® Macroporous Nuclear Grade Resins – to the Gravex® Nuclear Grade Resins line have found quick acceptance among nuclear customers. "Gravex resins meet the stringent nuclear grade specifications, so they are ideally suited for primary side CVCS applications because they offer high purity – low chloride, low metals, low leachables – high capacity, and conversion of both cation and anion products as well as the mixed beds," says Al Tavares, ion exchange product manager. "However, many customers are transitioning to high capacity resins either completely or in mixed beds in multiple primary side applications.

Gravex resins are available in three product lines:

- **Gravex Macroporous Nuclear Grade Resins:** Tailored specifically for CVCS applications but also suited to radwaste treatment and spent fuel pool, these resins enhance filtration of fine particulate radionuclides including isotopes of cobalt, nickel, iron and silver. The high capacity, highly crosslinked cation used in this product improves selectivity for multivalent ionic metal species. They are ideal for cleanup after outages to help maintain restart schedules and to boost

performance during normal operations. These polystyrene macroporous resins are available in the following types: GR-1-5 NG, GR-2-17 NG, GR-3-17 NG, GR-7-17 NG and GR-4-17 NG.

- **Gravex High Capacity Nuclear Grade Resins:** In CVCS applications, this series of higher crosslinked cation exchange resins is designed to increase the run times of the cation and mixed beds because the cation capacity is up to 30 percent higher than standard cations. The longer bed life helps to reduce radwaste disposal volumes. Also suited for steam generator blowdown demineralizer systems, fuel pool treatment and selective radionuclide removal from liquid radwaste, these polystyrene, gel-type resins are more resistant to thermal and oxidative degradation and are available in the following types: GR-1-9 NG, GR-2-16 NG, GR-3-16 NG, GR-7-16 NG and GR-4-7 NG.

- **Gravex Nuclear Grade Resins:** These well-proven, traditional Gravex nuclear grade resins have been used throughout the nuclear industry since 1979. They continue to meet all required specifications, including enhanced processing to meet the more current TOC and "post UV" chloride and sulfate limits.

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These resins are available in the following types: GR-1-9 NG, GR-2-0 NG, GR-3-9 NG and GR 4-9 NG.

Gravex Offers Reliable High Quality

As with all of its products, Graver strives to offer the best available technology on the market backed by stringent QA/QC, testing and certification. All Gravex resins have been regenerated and processed to deliver the highest possible performance in nuclear applications. Customers electing mixed beds also receive exceptionally uniform blending. "They are the most uniformly blended products available and have the same cation to anion ratio in every package," Tavares says.

Please contact your Graver representative for more information about these innovative products.

GRAVER TECHNOLOGIES: A MARMON WATER COMPANY

Marmon Water's Strong Corporate Backing Supports Graver's Industry Leadership

In our global economy, customers have lots of choices when making purchases. While many factors influence purchases – quality, delivery, brand reputation, price, and so on – the company behind the product is a significant consideration. Does it build on a history of excellence? Is it committed to creating better products and solutions? Does its corporate structure provide strength, support innovation, give good customer service and encourage future success?

Customers have choices for various products and technologies. As you make decisions among vendors, we wanted to highlight one of the reasons customers choose Graver as the world's best source for condensate polishing and high purity water technologies: our well-financed, diversified, long-term, stable corporate background.

Graver Technologies: Part of Berkshire Hathaway's Marmon Group

International conglomerate Berkshire Hathaway, with Warren Buffett as CEO, owns the Marmon Group – a 50-year-old association of three autonomous companies consisting of 11 diverse business sectors with more than 150 independent manufacturing, technology and service companies. With annual revenues of more than $7 billion, Marmon provides the strength of an efficient, well-financed corporate parent. One of its business sectors is water treatment: Marmon Water LLC.

These well-known water technology companies comprise the Marmon Water LLC sector:

- **EcoWater:** Specializing in residential water treatment, EcoWater is the world's leading producer of residential water softeners.
- **Ecodyne:** Providing water treatment systems for major industrial markets including power generation, oil and gas and the chemical industry.
- **Graver Water Systems:** the leader in condensate polishing and ion exchange equipment systems for the power generation industry.
- **KX Technologies:** Developing technology and manufacturing filters and systems to purify residential drinking water.
- **Graver Technologies:** Specializing in ion exchange resins, adsorbents, filters and industrial filtration, Graver products address all ion exchange and filtration needs for nuclear, fossil and combined cycle electric generating stations.

Graver's other segments also remove trace contaminants in their respective market segments.

Marmon Water: Covering the Waterfront

Graver Technologies' president, John McPeak, summarizes Marmon Water's presence in the global marketplace. "No other company covers the global water treatment industry like Marmon Water with its industrial, commercial and residential segments," he explains. "Marmon Water's commitment, investment level, technology and innovation set global standards. EcoWater is now the leading water softener brand in China, for example, as well as the world's largest manufacturer of home water softeners. Ecodyne is the leader in specialized water treatment technology for the Canadian oil sands industry. KX Technology leads the world in patented carbon block and other technologies for drinking water. In the USA, nearly 90 percent of nuclear power plants use some level of Graver's technologies, systems, services and products."

> ***"It's important for customers to understand the many factors that differentiate Graver from competitors."***

Many companies in the condensate polishing/high purity water treatment market segment focus on one single product or on distribution. Graver Technologies provides a variety of solutions and is a technology and water treatment innovator with staunch corporate backing, a long history of success, commitment to the future, global reach and world-class capabilities. "It's important for customers to understand the many factors that differentiate Graver from competitors," McPeak concludes. "Being a Marmon Water company is a strong factor in developing and providing innovative solutions to our entire customer base."

To learn more about Graver Technologies, visit www.gravertech.com or contact your local Graver representative.

POROPLATE® TRUMPS OTHER METAL MEDIA CHOICES

Poroplate® Metal Media Excels in Precoat Septa, Filtration, Cup Strainers, Underdrain Laterals and Separation Applications

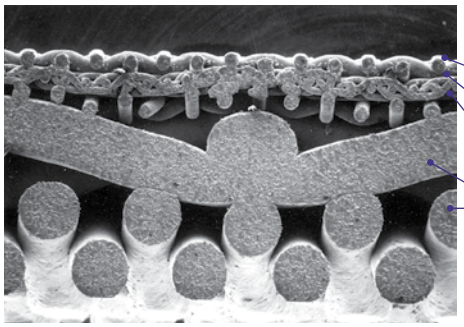
The Challenge: Metal media in nuclear separation applications have been inadequate for many years, causing a variety of difficulties in ion exchange systems. Screen, too flexible and with low mechanical strength, deforms and distorts, allowing resin to bleed through. Wedgewire has the lowest open area of any filter media, resulting in the highest pressure differential of any filter media. When specified flow through a wedgewire component is exceeded, differential pressure increases rapidly. Slots clog with resin, further increasing differential pressure; sulfates and sulfonates leach from the trapped cation exchange resin as it degrades over time.

The Remedy: Specify Graver Technologies Poroplate® sintered metal media for nuclear separation applications.

The Performance: Poroplate offers key features, improved performance and extended durability that other metal media cannot match. Poroplate offers nearly five times the open area of wedgewire strainers and greatly decreases flow resistance. It is constructed of diffusion–bonded, stainless steel wire-cloth and perforated plate. The resulting laminate possesses millions of independent wire bonds, which enable maximum resistance to abrasion, fatigue, oxidation and corrosion. This resistance far exceeds that offered by media constructed with powdered metal construction. Further, only Poroplate offers the combination of low differential pressure drop and high collapse strength. The low uniform differential pressure across the entire length of the septa allows for better, more consistent and uniform precoating. High collapse strength facilitates aggressive backwashing without distortion of the septa.

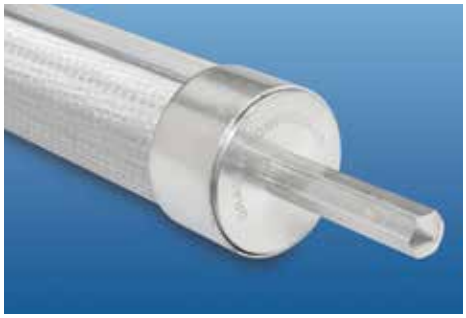
The Difference: Available in a variety of filtration ratings, Poroplate is a sintered metal media. Competing sintered metal processes may introduce impurities that can cause blockages. Blockages create irregular differential pressure profiles, compromising uniform pore sizes during the sintering process. Poroplate is manufactured through a proprietary clean sintering process – two hours at 2,000+°F under controlled pressure and atmosphere – that produces superior sintered media.

The Applications: Poroplate yields superior performance in applications that require precoat septa such as PowerGuard® with Poroplate: RWCU, radwaste, fuel pool and resin traps.



Cross Section of PowerGuard Media

- *Protective Guard Layer*
- *Fine Mesh for Exacting Particle Size Control*
- *Flow Distribution Layer*
- *Two Coarse Back-up Layers for Strength and Rigidity*



"Poroplate™ is the best metal media to use in nuclear power industry separation applications and should replace screen and wedgewire filter assemblies."

PowerGuard with Poroplate offers the best combination of excellent precoating on a durable septum while stopping resin entrapment and bleedthrough. Poroplate is also ideal media for filtration, cup strainers, underdrain laterals and any other separation application in nuclear power facility ion exchange systems. Differential pressure across deep bed vessels can be reduced by 10 psi or more.

The Conclusion: Poroplate is the best metal media to use in nuclear power industry separation applications and should replace screen and wedgewire filter assemblies.

For more information about Poroplate and its exceptional performance in nuclear separation applications, please visit:
http://www.purolator-facet.com/pdfs/filtseptart.pdf
http://www.gravertech.com/pr_lpf_cp_13.html

Poroplate® trademark of Purolator Facet Inc.

PERSONNEL NEWS

Graver Technologies recently appointed David Marchese as vice president and general manager of the Utilities Division, which includes the ion exchange and utility filter segments. David joins Graver from Air Liquide, where he acted as director of sales and marketing for 14 years. Prior to that, he spent nine years with Betz Laboratories (now GE Water) as a project and applications engineer. David holds a Bachelor of Science degree in chemical engineering from the University of Delaware and a Masters of Business Administration from Villanova University.

NANODEX™ FILTER PAPERS, PART III

Nanodex™ Tracks System and Plant Performance by Monitoring Radionuclide and Corrosion Products

In this issue, we continue our Q&A about Graver's new patented Nanodex™ Ion Exchange Filter Papers for diverse quantitative analyses in the power industry, especially nuclear, to monitor corrosion products, measure activity levels and satisfy fuel warranty requirements. Previous Q&A installments can be found in previous *Powerline* issues available on Graver's website.

Q: What are the characteristics of the two types of Nanodex filter disks?

A: Nanodex AX 100 anion exchange filter disks contain strongly basic, quaternary ammonium functional sites in the chloride form, which can be converted to the desired ionic form (i.e. hydroxide) as required.

Customers frequently use them to measure iodide and other anionic radionuclides and anions. Featuring uniform resin distribution throughout the hydrophilic paper, these disks are the highest ion exchange capacity analytical filter disks available on the market.

Each Nanodex AX 100 box contains 50 47-millimeter disks with 10 disks in each sealed polyethylene bag.

Nanodex CX 200 cation exchange filter disks contain strongly acidic, sulfonic acid functional sites in the hydrogen form. Customers frequently use these disks, which fit standard bench-top and inline filter holdings and housings, to measure corrosion products, other cations and cationic radionuclides. Featuring consistent ion exchange capacity and utilization, these disks easily enable customers to quantify ions removed through X-ray fluorescence or atomic absorption. CX 200 product boxes contain 100 47-millimeter disks,with 10 disks per sealed polyethylene bag.

Stay tuned for our next Powerline issue about water treatment products and equipment for Combined Cycle Gas Turbine facilities!

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