KNORR-BREMSE

News Release

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FOR IMMEDIATE RELEASE

LATEST TESTING SHOWS RAPID EFFECTIVENESS OF KNORR BRAKE COMPANY'S 3-STAGE AIR FILTRATION AND PURIFICATION SYSTEM IN ELIMINATING THE MOST CHALLENGING VIRUSES FROM RAIL VEHICLES

Certified Testing Focused on Short Contact Times Demonstrates the System Works Quickly to Protect Passengers from a Spectrum of Viruses and Bacteria, Including COVID-19

WESTMINSTER, Md. – March 29, 2021 – As riders begin to return to public transportation, a new round of efficacy tests – focused on reduced contact times – conducted by Knorr Brake Company on its 3-Stage Air Filtration & Purification System for rail vehicles shows the antimicrobial system is 99.9% effective in removing even the most difficult-to-eradicate contagions after just 1 minute. The testing demonstrated even higher efficacy rates against more easily inactivated viruses and bacteria and against all categories of aerosolized viruses after 3 and 5 minutes of contact time. This second set of testing once again reinforces the patent-pending system's power as the only proven three-stage solution in the market today.

This testing provides a strong body of evidence that the system helps to safeguard passengers and operations personnel from potential exposure to a broad spectrum of viruses, bacteria, and hazardous airborne particulates, including COVID-19 and its variants. As such, the system supports healthy air quality for all rail vehicle passengers and personnel.

Knorr Brake Company (KBC) launched its air filtration system in North America in June 2020 as an engineered filtration and purification solution for use with rail vehicle HVAC systems. A subsidiary of Munich, Germany-based Knorr-Bremse, Knorr Brake Company manufactures braking systems, passenger doors, and climate-control equipment for all types of passenger rail customers. Knorr-Bremse is the global market leader for braking and other systems for rail and commercial vehicles.

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Certified Lab Results Confirm Effectiveness

KBC's patent-pending comprehensive 3-Stage system guards against the spread of contagion by continuously cleansing the recirculated air during train operation. Configured by Merak North America, a division of KBC, it is the only such system of its kind with certified independent laboratory results demonstrating its performance and effectivity.

As with previous laboratory tests of the 3-Stage system, conducted in August 2020, the shorter contact time aerosol tests – completed in February 2021 – were performed by Microchem Laboratory, an independent, certified ISO 17025 accredited laboratory located in Round Rock, Texas.

The U.S. Environmental Protection Agency (EPA) requires that any device claiming viral and bacterial removal efficacy must have documentation and records evidencing the mandatory testing undertaken. The engineering teams at KBC have worked closely with the EPA in the development of the 3-Stage system to ensure thorough and complete testing prior to and after the system's release.

"Our most recent set of additional test data helps to fill in the area of critical time intervals for operators with high station stop density," said Jason Connell, Knorr Brake Company president and CEO. "And it provides conclusive, scientifically backed data showing that the filtration and purification process works quickly and thoroughly as intended for their application."

Connell noted that KBC continues its ongoing work with the EPA to conduct a battery of additional independent tests in the EPA-operated aerosol testing facility to gain still further insights into the operation and efficacy of the 3-Stage engineered solution.

Fast Eradication of the Most Challenging Viruses

The latest tests, conducted after 1-, 3-, and 5-minute contact times, were performed with MS2 Bacteriophage (MS2), a small virus that is recognized by the EPA as one of the most difficult types to inactivate and, therefore, is considered a representative virus screening tool. The MS2 virus particulate is smaller than others, such as the COVID-19 virus. Because of its size, MS2 is harder to capture, more difficult to irradiate in terms of surface area, and requires significantly more radiation to inactivate.

Additional testing was performed with another live microorganism, E. coli, using the same shortened contact times to demonstrate the system's efficacy against bacterium.

The unit under test was a retro-modified railcar HVAC unit that integrated the blower fans and the three filtration/purification technologies that are part of the 3-Stage system.

At 1 minute, testing showed that the 3-Stage Air Filtration & Purification System achieved 99.896% efficacy against MS2. After 5 minutes, the system reached 99.98%, which is just under sanitation level, or 99.99% – the equivalent to using standard hand sanitizer. And as soon as 1 minute, the 3-Stage system achieved up to 99.998% efficacy against E. coli.

These results integrate with the company's earlier independent aerosol testing conducted in August 2020 by Microchem Laboratory, which found that the system eliminates a minimum 99.99993% of virus cells after just 15 minutes, and a minimum 99.99998% of virus cells after 30 minutes.

In comparing the different reductions of virus particles for different time periods, it may be more meaningful to consider actual viral load concentrations per meter as an indication of the system's efficacy, rather than percentage reduction differences. Even though percentage values may appear high, they may not be as indicative of the actual number of virus that remain, since an aerosolized virus experiences natural die-off and gravitational settling. In terms of order of magnitude, when compared to a result of 99.9%, there are roughly 5,000 times fewer virus per cubic meter with a result of 99.99998%.

"The results definitively demonstrate that the 3-Stage Air Filtration & Purification System is effective not only on the continuing threat of the COVID-19 virus and its variants, but that it will provide the same level of protection against natural bacteria, H1N1 influenza, E. coli, staph, H3N2 influenza, plus the fungus that causes black mold – elements critical to contain for ongoing safe operation throughout the year," said Connell.

He continued, "By deploying this system, rail operators will be able to optimize their existing cleaning regimens and further streamline ongoing maintenance. It will also enable operators to promote the use of a proven, independently validated filtration and purification system, encouraging people to come back to public transport, and contributing to restored ridership levels and increased revenue."

Three Potent Stages of Filtration and Purification

The 3-Stage system improves air quality in three interlocking steps.

- Step one, the filtration process, incorporates electrostatic discharge to actively target viruses, and then uses physical filtration to remove the charged particles and reduce and halt transmission.
- The second step, the UVGI (Ultraviolet Germicidal Irradiation) purification process, protects by directly inactivating organisms – eradicating them with UV-C

radiation. The UVGI module is safely contained within the roof-mounted HVAC unit and therefore poses no risk of exposure to passengers or maintenance personnel.

- The third step is the disinfection process, which works through bipolar ionization. The ions travel through the air and attack pollutants, chemically decomposing them into harmless water and carbon dioxide. In addition, the ions can travel deeply through the air distribution ducts of the car and into the vehicle interior to provide purification on surfaces in the passenger area.

KBC's unique, patent-pending 3-Stage system works continuously during vehicle operation to filter and purify the recirculated air. The system treats particles by energizing them: When coming in contact with car surfaces, the particles engage with – and eliminate – bacteria and viruses that remain, guarding against any unwanted spread. It also continues to provide additional purification long after the unit is powered off.

The combination of filtration, purification, and disinfection provides a solution superior to any one of the technologies acting alone. UV-C, for example, is proven to deactivate viruses. But by itself – in a single pass and by exposure time on the filter alone – UV-C does not guarantee that all viruses are rendered inactive or filtered out. The 3-Stage system's layers of additional filtration can arrest and kill viruses beyond the UV-C.

Company officials note that the 3-Stage system does not eliminate the need for riders to adhere to local, state, and national health recommendations and practices concerning face masks or other personal protective equipment (PPE).

About Knorr Brake Company

Since 1973, Knorr Brake Company has been the innovative leader in supplying North American rail market customers, including light rail vehicles, metro, and high-speed trains. With its headquarters in Westminster, Maryland, the company operates sales and service facilities in Carmel, New York; and Union City, California. KBC's subsidiaries – IFE North America LLC (passenger door systems) and Merak North America LLC (climate-control systems) – are co-located in Westminster. Knorr Brake Company is a member of the Munich, Germany-based Knorr-Bremse, the global market leader in braking systems and a leading supplier of other safety-critical rail and commercial vehicle systems. Contact Knorr Brake Company at knorrbrakecorp.com and follow us on LinkedIn at linkedin.com/company/knorr-brake-company. To learn more about career opportunities at KBC, please visit www.kbnajobs.com.

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