



## *News Release*

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**FOR IMMEDIATE RELEASE**  
**Photos Included**

**TEST RESULTS FROM INDEPENDENT U.S. LAB VALIDATE EFFICACY OF**  
**KNORR BRAKE COMPANY'S NEW 3-STAGE AIR FILTRATION AND PURIFICATION**  
**SYSTEM FOR RAIL TRANSIT VEHICLES**

*Patent-Pending HVAC Filtration Technology Works Continuously to Remove or Eliminate a Minimum 99.99998% of Airborne Particulates, Bacteria, and Viruses, Including COVID-19*

**WESTMINSTER, Md. – Sept. 29, 2020** – Testing by an independent, certified U.S. laboratory of a new air filtration system launched in North America by Knorr Brake Company (KBC), a subsidiary of Knorr-Bremse, has demonstrated that the 3-stage technology for use in rail transit vehicles is, at minimum, 99.99998% effective in eliminating airborne viruses and bacteria, including COVID-19.

The powerful engineered solution – configured by Merak North America, a division of KBC – is the only one of its kind in the market.

KBC launched its 3-Stage Air Filtration & Purification System for rail transit vehicles in June 2020 as an engineered solution offering passengers and operations personnel protection against potential exposure to COVID-19, as well as other viruses, bacteria, and hazardous airborne particulates. The comprehensive HVAC filtration system guards against the spread of contagion by continuously cleansing the recirculated air during train operation.

Independent aerosol testing conducted in August 2020 by Microchem Laboratory, an ISO 17025 accredited facility in Texas, 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.

When it was introduced, KBC reported that – based on early testing – the patent-pending, 3-Stage system removed or eliminated up to 99.9% of airborne particulates, bacteria, and viruses. In terms of order of magnitude, 99.99998% effectiveness equates to roughly 5,000 times fewer virus cells per cubic meter than with a result of 99.9%.

The Microchem Laboratory testing was performed with MS2 Bacteriophage, which is a small, non-enveloped virus recognized by the Environmental Protection Agency (EPA) as one of the most difficult types of viruses to inactivate, and therefore considered by the EPA to be a representative viral screening tool.

“The results demonstrate that our 3-Stage Air Filtration & Purification System acts to clean both the air and the vehicle’s interior surface. Not only does it target the COVID-19 virus, but it will also provide the same level of protection against other viruses that recur annually in cold and flu season. This year, in particular, this is especially important,” said Rich Bowie, Knorr Brake Company vice president, marketing, sales & systems. “By deploying the system, rail operators will be able to enhance safety measures beyond the cleaning regimens already put in place.”

Bowie noted that most air filtration solutions utilize a single technology, but the 3-Stage system of filtration, purification, and disinfection outperforms any one of the steps alone. Field-proven, the system components are already in place in multiple locations around the globe, including the U.S., where transit authorities are piloting the 3-Stage system.

As a part 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.

### **Three Potent Stages**

The 3-Stage Air Filtration & Purification System targets airborne particulates, including PM10, PM2.5, and smaller; plus pollutants such as TVOC, ammonia, toluene, formaldehyde, and acetaldehyde. It also takes aim at viruses and bacteria – including COVID-19, natural bacteria, H1N1 influenza, E. coli, staph, H3N2 influenza, plus the fungus that causes black mold.

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

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Sept. 29, 2020/Page 3

- 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. UVGI is long known and has been proven to kill bacteria, mold, and viruses. 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 3-stage filtration system – not just a filter or an aromatic sanitizer spray – 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. This guards against any unwanted spread for riders and operators. 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).

## **Integrating the System**

The 3-Stage Air Filtration & Purification System does not require special or time-consuming integration, as it works with the existing electrical voltages present on the vehicle and can be fully integrated into the HVAC unit without needing car modifications.

Designed for tramway/light rail, regional and intercity passenger vehicles, and metro cars, the 3-Stage system is easily retrofitted into existing HVAC units and available on new equipment.

Retrofit typically takes approximately two hours per HVAC unit. The modular product design is created to fit the widest range of HVAC unit sizes and shapes, with all mechanical integration arranged to enable a straightforward installation that limits downtime. Because each unit is lightweight, at less than 10 lbs, the solution will not compromise train performance.

Transit authorities can also save costs with the system: The upgraded HVAC filters last 5-10 years, depending on service environment. And with low power consumption and zero secondary pollution, the 3-Stage system helps reduce the train operation's carbon footprint with no ozone generation.

Commenting on the latest testing development, Bowie said, "We're driven to create the best solutions. The 3-Stage system will enable operators to publicize the deployment of a proven, independently validated filtration and purification system, which will begin to restore confidence and encourage the traveling public to come back to public transport – plus begin to restore passenger ridership levels to previous levels, increasing revenue."

## **PHOTOS AND CAPTIONS**



File names: *3-Stage System Components* (left); *3-Stage Integrated Unit on Test Stand* (right)

**Caption for 3-Stage System Components (left):**

**3-Stage Air Filtration & Purification System components: the electrostatic discharge dielectric filtration [top]; the Ultraviolet Germicidal Irradiation Light (UVGI) [middle]; the bipolar ionizer [bottom left]; and the system's voltage inverter [bottom center].** While the train is in operation, the 3-Stage system continuously works to filter and purify the air in the passenger compartment to deliver maximum protection against viruses, bacteria, and pollutants. The electrostatic discharge dielectric filter provides physical filtration of the recirculated air; the UVGI purifies the air, eradicating organisms; and the bipolar ionizer disinfects the air plus provides surface sterilization within the passenger compartment.

**Caption for 3-Stage Integrated Unit on Test Stand (right):**

**A cutaway of a roof-mounted subway HVAC unit on its side in the KBC test lab. The retrofittable 3-Stage Air Filtration & Purification System is in place in the lower half of the unit.** The patent-pending HVAC filtration technology works continuously to remove or eliminate a minimum 99.99998% of airborne particulates, bacteria, and viruses, including COVID-19. KBC's unique 3-stage filtration system – not just a filter or an aromatic sanitizer spray – 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. This guards against any unwanted spread for riders and operators. It also continues to provide additional purification long after the unit is powered off.

**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](http://knorrbrakecorp.com) and follow us on LinkedIn at [linkedin.com/company/knorr-brake-company](https://www.linkedin.com/company/knorr-brake-company). To learn more about career opportunities at KBC, please visit [www.kbnajobs.com](http://www.kbnajobs.com).

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