Confirmed Inactivation Effect of Flash Streamer Technology Against Coronavirus (SARS-CoV-2) Variants

Daikin Industries, Ltd., mother company of Daikin Europe N.V., and Osaka University's Research Institute for Microbial Diseases[1] have tested and confirmed the effectiveness of the Flash Streamer technology against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants[2].

Brussels, April 2022 – The research confirmed that the Flash Streamer technology inactivates more than 99.9% of the SARS-CoV-2 Alpha, Beta, Gamma and Omicron variants, and 99.8% of the Delta variant after 4 hours of exposure to Streamer discharge compared to without Streamer. This means the Flash Streamer technology can be used to improve indoor air quality when the air is contaminated with these respiratory viruses.

As a specialist in indoor air quality management, Daikin not only develops new technologies, but also continuously verifies their effectiveness and relevance to solve societal challenges such as today's pandemic.

Inactivation of more than 60 types of harmful substances

Daikin's unique air purification Flash Streamer technology was developed in 2004 and since then the company has conducted tests with many public research institutes around the world. Following these tests, it has been confirmed that the Flash Streamer technology inactivates over 60 types of harmful substances, such as bacteria, allergens and viruses, including the influenza virus, RSV (Respiratory Syncytial Virus) and mouse noroviruses. In July 2020, the inactivation effect against the SARS-CoV-2 strain isolated in the early stages of the pandemic has also been confirmed.

Osaka University, which Daikin commissioned to test the effectiveness of the Flash Streamer technology against variants of the SARS-CoV-2, prove that it inactivates the Alpha, Beta, Delta, Gamma and Omicron variants.

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[1] The test is conducted by Professor Tatsuo Shioda and Assistant Professor Tadahiro Sasaki for the Department of Virus Infections, Research Institute for Microbial Diseases, Osaka University.

[2] The test described herein only concerns the patented Flash Streamer technology. The effects of products equipped with the Flash Streamer technology or the effects in actual use environment may differ. For more information on the Daikin products incorporating the Flash Streamer technology, please refer to the relevant product information.

Takashi Namikawa, Senior Engineer of Daikin's Technology and Innovation Center for this project, says: "I am delighted that this shows that our technology has the potential to be applied to solve societal issues of improving the indoor air quality in schools or offices. This is very significant for Daikin and for society".

Experimental Results

Irradiation with Streamer discharge for 4 hours inactivated more than 99.9% of the Alpha, Beta, Gamma and Omicron variants and 99.8% of the Delta variant of SARS-CoV-2, compared to without Streamer discharge.

Explanatory video

Learn more about the main features and characteristics of Daikin's patented Flash Streamer technology, the evaluation method and the test results.
Daikin Streamer Technology, Inactivation of Coronavirus, Omicron and Other Strains]

Evaluation method

In the verification test, hCoV-19/Japan/QHN002/2020 strain (Alpha variant), hCoV-19/South Africa/KRISP-EC-K005321/2020 strain (Beta variant), hCoV-19/Japan/TY7-503/2021 strain (Gamma variant), hCoV-19/USA/PHC658/2021 strain (Delta variant) and hCoV-19/Japan/ TY38-873/2021 strain (Omicron variant) were used. Two acrylic boxes of about 31 litres were prepared, and a Streamer discharge device was installed in one of the boxes. Six-well plate with 0.5 ml/well of virus solution were placed on Seesaw shaker in both boxes. Streamer irradiation was performed with shaking. After 1, 2, and 4 hours, the virus solution was collected, and the virus titer was measured by $TCID_{50}$ using Vero E6/TMPRSS2 cells.

Flash Streamer technology

The Flash Streamer technology is a technology that uses Streamer discharge to perform oxidative decomposition of harmful substances. It is a type of plasma discharge featuring an innovative air purification technology that stably generates high-speed electrons. When combined with air components, these high-speed electrons have a capability for powerful oxidative decomposition, and this capability enables Streamer discharge to continuously remove odors, bacteria and indoor air pollutants such as formaldehyde.

The mechanisms of the Flash Streamer technology and the test results are also introduced in our website "DAIKIN Streamer Research Institute".

Types of viruses that have been tested so far

In addition to in the table mentioned viruses, the effectiveness against 7 types of bacteria such as Legionella and Pseudomonas aeruginosa, 30 types of allergens such as cedar pollen and Dermatophagoides farinae (excrement/carcass), and 19 types of harmful chemical substances have been verified by public institutions.

Tested Viruses	Institute	Report Date
Avian influenza virus (Type A, H5N1)	Vietnam National Institute of Hygiene and Epidemiology	16-Apr-2009
Influenza virus (Type A, H1N1)		14-Sep-2009
Influenza virus (Type A, H3N2)	Shanghai City Disease Control Center etc.	8-Feb-2010
RS virus	Wakayama Medical University	13-Apr-2012
Adenovirus, Coxsackie virus, Enterovirus, Echovirus, Measles virus	Kitasato Environmental Science Center	23-Jun-2017
Mouse norovirus	University of Tokyo	11-Oct-2018
SARS-CoV-2 strain isolated in the early stages of the pandemic	Okayama University of Science	16-Jul-2020

About

About Daikin

We care for the air. We deploy our years of experience in air conditioning and our passion for innovative technologies to make the air that we live in the best possible air. And we want to do that while caring for the environment and protecting future generations. By 2050 Daikin aims to be carbon neutral in all its actions and the products and solutions it sells. That is our mission at Daikin.

Daikin Industries Ltd.

Daikin Industries Ltd. based in Osaka, Japan, employs around 80,000 people worldwide and achieved sales of around 18,45 billion euros in financial year 2020 (April 20 – March 21). The company is the global market leader for heat pump and air conditioning systems, as well as air filtration. Daikin Industries Ltd. is the only air conditioning manufacturer in the world that develops and produces all important components such as refrigerants, compressors and electronics in-house.

Daikin Europe N.V.

Daikin Europe N.V. is a subsidiary of Daikin Industries Ltd. and a major European producer of air conditioners, heat pumps and refrigeration equipment, with approximately 13.000 employees across 24 affiliates across Europe, the Middle East and Africa. It has 14 major manufacturing facilities based in Belgium, the UK, Czech Republic, Germany, Italy, Spain, Turkey and Austria. The headquarters of the Daikin Europe Group are in Belgium, with offices in Ostend, Ghent and Brussels. The company was established in 1972. Production of equipment in Ostend started in 1973.

Daikin Airconditioning Central Europe

Daikin Airconditioning Central Europe was founded in 1999 with its headquarters in Vienna, Austria. The company's portfolio comprises products and solutions for heating, cooling, ventilation and refrigeration. More than 560 professionals and 2,500 partners are in charge of pre-sales, sales and after-sales-services in 16 countries across Central and Eastern Europe in Austria, Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Kosovo, Montenegro, North Macedonia, Moldavia, Poland, Romania, Serbia, Slovakia and Slovenia.

More information can be found on www.daikin.eu and on www.daikin.com.

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