

This document is an English translation for understanding the contents of the Daikin press release that introduces the results of experiments using the Streamer discharge device. The effect of products equipped with Streamer technology or the effect in the actual use environment may differ. This English translation cannot be used in association with products, including sales promotion (such as proposal materials for product sales).



Daikin Confirms Effectiveness of Streamer Technology to Inactivate 4 Types of Coronavirus (SARS-CoV-2) variants, including Delta variant

More than 99.9% inactivation against Alpha, Beta, and Gamma variants, 99.8% against Delta variant after 4 hours

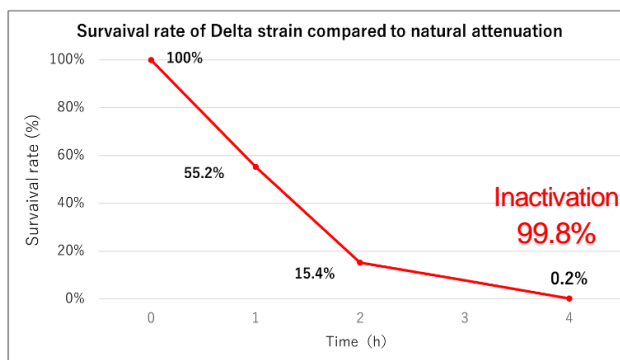
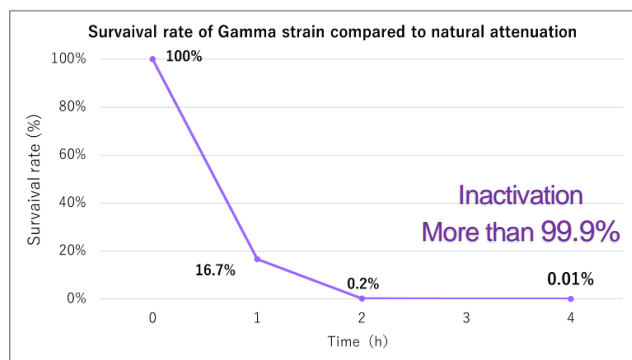
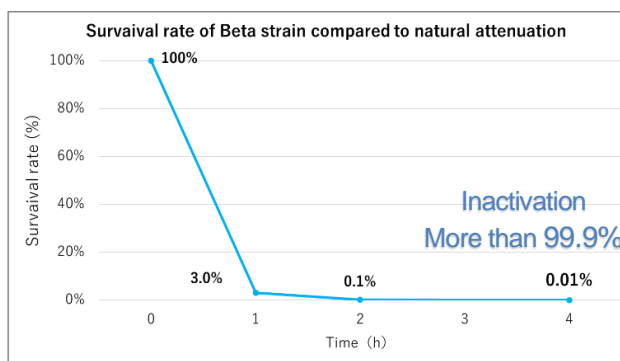
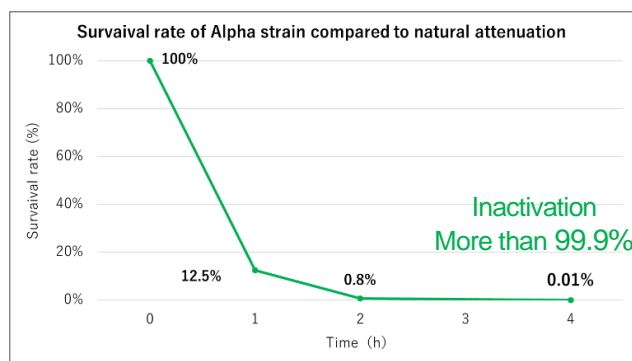
Daikin Industries, Ltd., in collaboration with Professor Tatsuo Shioda and Assistant Professor Tadahiro Sasaki, Department of Virus Infections, Research Institute for Microbial Diseases, Osaka University, have demonstrated that Daikin’s unique Streamer technology has more than 99.9% inactivation effects against Alpha, Beta, and Gamma variants, and 99.8% against Delta variant, which are Coronavirus (SARS-CoV-2) variants.

In seeking to verify the effectiveness of Streamer technology since 2004, Daikin has previously demonstrated over 60 types of harmful substances, such as bacteria, allergens, and viruses including influenza virus (type A, H5N1), RSV, and mouse noroviruses with public institutions, to be suppressed or inactivated by Streamer technology. In July 2020, more than 99.9% inactivation effect against the conventional strain of Coronavirus has also been demonstrated. From the latest study, Daikin has confirmed that Streamer technology inactivates more than 99.9% of the Alpha, Beta, and Gamma variants, and 99.8% of the Delta variant after 4 hours of Streamer discharge when compared to without Streamer.

This demonstration shows the results of experiments using a device that generated Streamer discharge under test conditions and does not indicate the effectiveness of an actual Streamer product in use under actual conditions (living space).

■ **Experimental Results**

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



■ **Explanation Video of This Verification Test**

The video explains the features of Streamer technology and the evaluation method and result of this verification test.

Daikin YouTube URL : <https://www.youtube.com/watch?v=YZSIAEQz4Co> (Japanese)

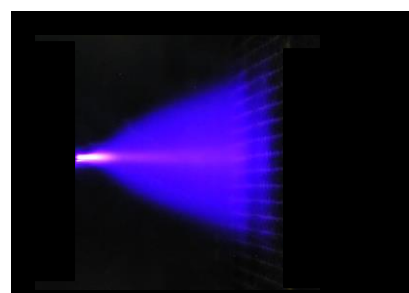
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■ **Evaluation Method**

In the verification test, hCoV-19/Japan/QHN002/2020 strain (Alpha), hCoV-19/South Africa/KRISP-EC-K005321/2020 strain (Beta), hCoV-19/Japan/TY7-503/2021 strain (Gamma) hCoV-19/USA/PHC658/2021 strain (Delta) were used. Two acrylic boxes of about 31L were placed in a safety cabinet in the BSL-3 facility, and Streamer discharge device was installed in one of the acrylic boxes. Seesaw shakers with a 6-well plate were placed in both boxes, and 0.5 ml of virus solution was placed in each well of the plate. Streamer irradiation was performed on one 6-well plate while stirring with a seesaw shaker. After 1, 2, and 4 hours, the virus solution was collected, and the virus titer was measured by the TCID50 method using Vero E6/TMPRSS2 cells.

■ **Streamer Technology**

Streamer technology is a technology that uses Streamer discharge, which Daikin developed in 2004, 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,” a feat which had proven difficult up to that time. Its oxidative decomposition capability is much greater than that of conventional plasma discharge (glow discharge). Moreover, 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.



Streamer Discharge

To date, Daikin has been collaborating with universities and public research institutes to demonstrate the effectiveness of this technology for highly virulent influenza viruses (A-type H5N1), weakly virulent influenza viruses (A-type H1N1), mouse norovirus, and toxins and bacteria that cause food poisoning.

■ **Types of viruses that have been demonstrated so far**

Demonstrated Viruses	Testing organization	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
The conventional strain of SARS-CoV-2	Okayama University of Science	16-Jul-2020

In addition to the above 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.