Daikin announces world’s first laser technology for remote detection of R32 refrigerant leaks

**Brussels, November 30th 2023 – Our mother company, Daikin Industries, Ltd., along with Tokyo Gas Engineering Solutions Corporation and RIKEN National Research and Development Agency announce the development of the world’s first laser-based technology that remotely detects leaks of HFC-32 (R32) refrigerant. Additionally, Daikin and TGES have jointly collaborated on a prototype for a portable R32 detector that incorporates this technology and demonstrates the capability to remotely detect R32 up to 10 meters away. In the future, the two companies are looking to further boost detection sensitivity of this device and conduct on-site testing in 2024 with the aim for commercialization in 2025.**

Air conditioning, heating and refrigerating systems contain an enclosed gas called refrigerant that is essential for the heating and cooling of air. Hydrofluorocarbons (HFC) are the most commonly used substance for refrigerants. Global warming mitigation requires both an urgent reduction of the Global Warming Potential (GWP) of refrigerants used in mentioned systems, as well as taking measures to prevent leaks of those refrigerants. R32 has gained worldwide recognition as a low GWP refrigerant and is currently used in more than 130 countries. With greater global attention being focused on R32 refrigerant leaks, Daikin and its partners hope to help curtail greenhouse gas emissions through the practical application of this technology and utilize its capability to accurately and efficiently detect R32 leaks.

Currently, on-site inspections for air conditioner refrigerant leaks typically employ an air sampling method\*1 in which after sales service personnel carry the inspection equipment to areas of suspected leakage points to take and evaluate air samples. Because air conditioners and piping are often installed in high places, such as ceilings, requiring a stepladder or are located in narrow spaces that are difficult for after sales service personnel to enter, considerable time and effort are often required for leak inspections. Worker safety may also be a concern, and getting inspection equipment near the air conditioner may be extremely difficult. However, by aiming a laser from a distance and irradiating the path in the vicinity of the targeted object, this newly developed portable detector can efficiently confirm the presence of a R32 leak. Compared to conventional air sampling methods, this is expected to significantly reduce work hours and improve safety while ensuring a prompt countermeasure.

Moreover, this technology and detector can detect refrigerant blends that contain R32, including the previously mainstream refrigerant R410A\*2. In addition to detecting refrigerant leaks from equipment in use, this detector can also be used in various other situations within the circular economy of refrigerants, such as detecting leaks from discarded equipment and monitoring leaks at refrigerant reclamation plants, to curb greenhouse gas emissions even further. In the future, three parties will aim to contribute to a sustainable society through implementation of this technology and detector.

\*1 This method detects refrigerant that comes in contact with a sensor built into the testing equipment.

\*2 R410A is a refrigerant that is a 50:50 blend of R32 and R125 and has a global warming potential that is approximately three times more than that of R32.

**Overview of R32 remote detection**

This detector emits an infrared laser with a wavelength corresponding to the near-infrared absorption wavelength band unique to R32 that was jointly identified by RIKEN and Daikin\*3 and uses a lens to collect light that is diffusely reflected from walls. It applies the high-sensitivity detection technology used in TGES’s remote detector for detecting methane\*4, the main component of natural gas, and adapts it for R32 to measure the attenuation of reflected light that occurs when R32 is present in the laser beam path. Detection is possible up to a distance of approximately 10 meters and through windows.

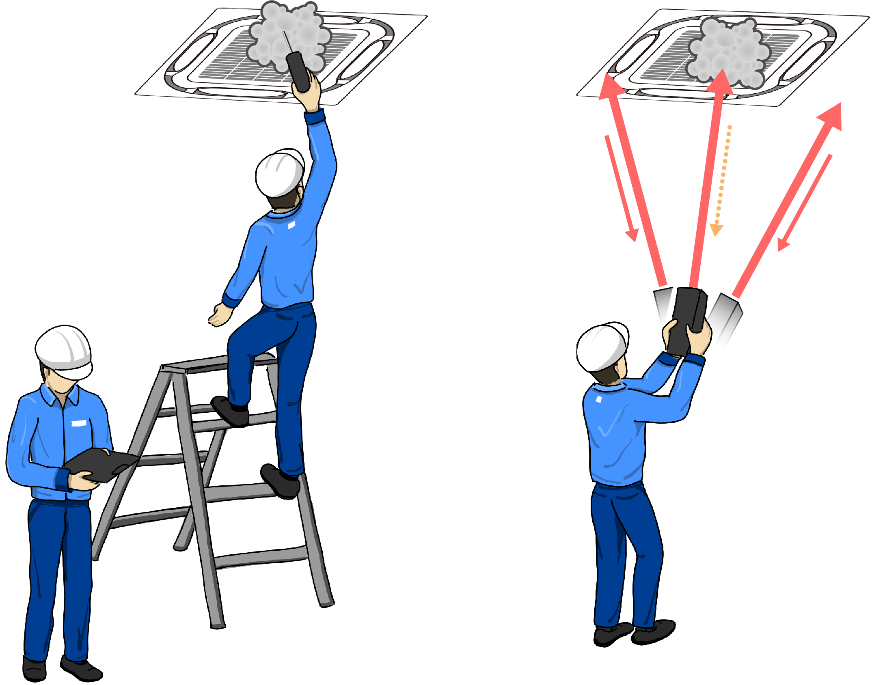
\*3 Japanese Patent No. 7114832

\*4 Developed in 2001 as the world’s first for detecting natural gas leaks, the Laser Methane detector has been used in 30 countries around the world.

Diagram of a laser beam

Description automatically generated

Current air sampling inspection methods in use require constantly moving a stepladder to individually check potential leakage points for multiple indoor air conditioner units. Because this detector can efficiently detect from a distance, a significant reduction in required work hours and improved safety are expected along with prompt execution of countermeasures.



Current inspection method

Inspection using this detector



Prototype model of a portable R32 detector

**A partnership for innovation: three parties contribute to initiatives for detection development technology and detectors using lasers**

Because of the increasing worldwide popularity of R32, countermeasures for preventing leaks have become increasingly more important. RIKEN, which has optical remote gas detection technology using lasers, and Daikin, which has know-how in refrigerant leak countermeasures, began development of technology that could efficiently detect R32 in the air by using lasers and succeeded in identifying the near-infrared absorption wavelength band unique to R32 that is necessary for this technology. From there, Daikin collaborated with TGES, which in 2001 commercialized the world's first remote methane detector using a laser, to apply unique sensitivity enhancement technology and create a prototype model for a hand-held, portable R32 detector. Daikin and RIKEN worked to develop equipment that can emit lasers at highly accurate wavelengths and detect wavelengths with high sensitivity that correspond to a specified wavelength.

This initiative is based on the premise that R32 (CH2F2) could also be detected with a laser since R32 has a structure similar to methane (CH4), and methane has the property of strongly absorbing near-infrared rays at a specific wavelength. Three parties have been involved in conducting demonstrations for this collaborative creation activity. Going forward, Daikin and TGES will work to further improve detection sensitivity and reduce the size of the detector so that it can easily be utilized on-site. Commercialization of this detector is planned for some time in 2025.

**Main specifications of the remote R32 detector**

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| Items | Details |
| Gas to be detected | R32 |
| Detection level | 1-50,000 ppm-m |
| Detection accuracy | ±10％　@100-1,000 ppm-m |
| Detection speed | 0.1 sec |
| Detection distance | Up to 10 m |
| Power supply | Dedicated battery |
| Laser safety class | Guide light（red）: Class 2, Measuring light（infrared）: Class 1 |
| Operating temperature range | -17℃ to 50℃ |
| Dimensions | 150（W）× 300（D）× 150（H）mm |
| Weight | 500 g |

**About Daikin**

**Daikin Europe N.V.**

Daikin Europe N.V. is a subsidiary of the global group Daikin Industries, and the leading provider of heating, cooling, ventilation, air purification and refrigeration (HVAC&R) technology in Europe, Middle East and Africa. Daikin designs, manufactures, and brings to market a broad portfolio of products, maintenance services as well as turnkey solutions for residential, commercial, and industrial purposes. To date Daikin Europe has over 13,700 employees across more than 57 consolidated subsidiaries. It has 14 manufacturing facilities based in Belgium, the Czech Republic, Germany, Italy, Spain, Austria, the United Kingdom, Turkey, the United Arab Emirates, and the Kingdom of Saudi Arabia. The headquarters of the Daikin Europe group are in Ostend, Belgium. The company was established in 1972, production in Europe started in 1973.

**About Daikin Industries Ltd.**

Daikin Industries was founded in 1924, in Osaka, Japan. The global group employs over 96,000 people worldwide and is the market leader for heat pump and air conditioning systems, as well as air filtration. It is the only manufacturer in the world that develops and manufactures heating, ventilation, air conditioning and refrigeration equipment, as well as refrigerants in-house. The company achieved € 28.2 billion sales turnover in fiscal year 2022 (1 April 2022 – 31 March 2023).

Read more on [www.daikin.eu](http://www.daikin.eu/) and [www.daikin.com](http://www.daikin.com/).

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