

**AGC Develops New Composition of AMOLEA™ 1123,  
a Next-Generation Refrigerant with Low Global Warming Potential  
—Development of the World’s First Fluorinated Refrigerant for Air Conditioners  
with a GWP Below 10 Enters the Final Stage—**

**Tokyo, May 13, 2022**—AGC (AGC Inc.; Headquarters: Tokyo, President: Yoshinori Hirai), a world-leading manufacturer of glass, chemicals, and high-tech materials, has successfully developed a new composition of AMOLEA™ 1123 (HFO-1123) based refrigerant, a low-GWP\*<sup>1</sup> refrigerant that is expected to be the next-generation standard for air conditioners, in cooperation with the University of Tokyo\*<sup>2</sup>. With this, AGC is on track to resolve the safety issue that had been one of the challenges for the practical application of AMOLEA™ 1123, and the development of the world’s first refrigerant with GWP below 10 for air conditioners has entered to the final stage.

Hydrofluorocarbons (HFCs)\*<sup>3</sup>, which are currently used as refrigerants in air conditioning equipment such as residential air conditioners, have a high GWP and a large environmental impact. As such, the Kigali Amendment\*<sup>4</sup> to the Montreal Protocol has mandated a significant reduction in the production and consumption of HFCs. In particular, refrigerants used in air conditioners for homes and stores account for the majority of the global market, making the development of refrigerants with low GWP an urgent issue.

To solve this issue, AGC’s hydrofluoro-olefin (HFO) AMOLEA™1123 is expected to be a candidate for reducing HFC. AMOLEA™ 1123 is an HFO developed by AGC in 2014 as part of Japan’s New Energy and Industrial Technology Development Organization (NEDO) funded project. It is a refrigerant that combines extraordinary high environmental performance with a GWP of less than 1, while maintaining the same performance as the currently used HFC R410A (GWP 2090 / 2090 times greenhouse effect compared to CO<sub>2</sub>).

The University of Tokyo and AGC has succeeded in developing a safe composition that suppresses the rapid pressure increase due to the decomposition of AMOLEA™ 1123 to a certain level by adding propane, based on the findings of the NEDO project "Development of Technology and Assessment Techniques for Next-Generation Refrigerants with a Low GWP Value " commissioned by the University of Tokyo. The new composition of AMOLEA™ 1123 (GWP 0.3 or greenhouse effect of 1/3 of CO<sub>2</sub>) consists of a certain percentage of propane (R290: GWP 3 or greenhouse effect of 3 times of CO<sub>2</sub>), which is a versatile refrigerant with low GWP. With this achievement, the development of a refrigerant with a GWP of 10 or less has made significant progress and entered the final stage.

Based on the results of this development, AGC will sequentially launch new refrigerants with ultra-low GWP and high safety, for use in a variety of equipment, including residential and commercial air conditioners. In addition, as

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a next-generation refrigerant for electric vehicles, AMOLEA™ 1123 mixed refrigerant (AMOLEA™ 10X) with a GWP of 10 or less, which will be applied for ASHRAE\*5 in June 2022, is under consideration for certification in 2025 by SAE\*6.

Under its **AGC plus-2023** management policy, the AGC Group has set the promotion of sustainability management as one of the key strategies and is committed to contributing to solving social issues through material innovation. The AGC Group will continue to contribute to the prevention of climate change through the development of next-generation, low environmental impact refrigerants.

< Notes >

\*1 Global Warming Potential (GWP)

A coefficient that indicates the impact on global warming. A number that represents how much warming capacity a refrigerant has based on carbon dioxide, which is a type of natural refrigerant. The GWP of CO<sub>2</sub> is set at 1.

\*2 The University of Tokyo

This development was carried out in cooperation with the Graduate School of Frontier Sciences at the University of Tokyo.

\*3 Hydrofluorocarbons (HFCs)

It is used as a chlorofluorocarbon substitute because it does not contain chlorine which depletes the ozone layer. However, it has the same strong greenhouse effect as chlorofluorocarbons. The greenhouse effect of HFCs is 675 to 2,090 times higher than CO<sub>2</sub>.

\*4 Kigali Amendment to the Montreal Protocol

At the 28th meeting of the Conference of the Parties to the Montreal Protocol held in 2016 in Kigali, the capital of Rwanda, an amendment was made to the Protocol ("Kigali Amendment") that establish, among other requirements, obligations to phase out the production and consumption of alternative refrigerant HFCs. Developed countries are required to reduce their production and consumption by 85% relative to the base year by 2036.

\*5 ASHRAE

An American scientific society involved in heating, refrigerating, and air-conditioning that establishes standards for the performance and safety of related equipment and refrigerants and is also responsible for their certification.

(Website: <https://www.ashrae.org/home>)

\*6 SAE

Society of Automotive Engineers, Inc.

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