Daikin's Policy

and Comprehensive Actions on the Environmental Impact of Refrigerants

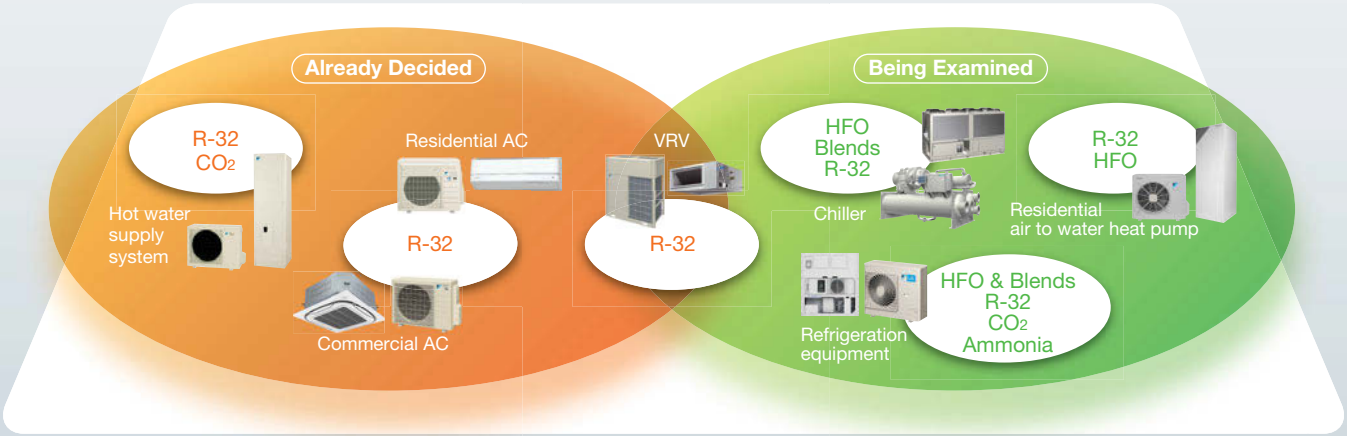
Daikin provides homes, businesses and industries worldwide with cooling, heating and refrigeration solutions. We also produce fluorochemicals for a wide range of applications such as solar panels, storage batteries, protective coatings, automotive parts and refrigerants.

We are constantly mindful of the environmental and climate change impact of our products and we are committed to delivering cost-effective solutions to meet these challenges. For example, we have a long history of continually and regularly improving the energy efficiency of our air conditioning and heat pump products as well as extensive experience in adopting refrigerants with a lower environmental impact.

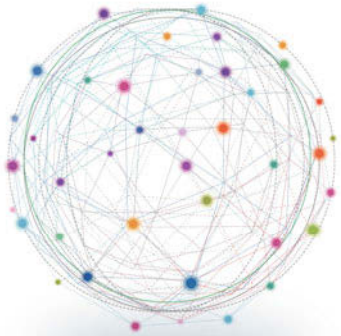
Daikin believes in "diversity of refrigerant choice." To reduce the environmental impact of a refrigerant throughout its lifecycle, we evaluate various aspects comprehensively to select the appropriate refrigerant for each application.

Daikin's Refrigerant Direction

The following summary shows our direction of refrigerant choice for various products in the Daikin product portfolio.



Note: Other refrigerants not listed above are also applied in products outside of Daikin's portfolio, some examples include hydrocarbons (R-600a, R-290) for refrigerators and window air conditioners or HFO refrigerants for mobile air conditioners.



Key Considerations for Refrigerant Choice

At Daikin we assess four basic factors when making the best balanced refrigerant choice for each application: safety, environmental impact, energy efficiency and cost-effectiveness.

Daikin's View:
Evaluation Index of Refrigerant Selection (common for all application)

Safety

A refrigerant must be safe to use through the entire lifecycle of the equipment. This includes transport, storage, installation, use, servicing, recovery and recycling.

This means that possible hazards such as toxicity or flammability characteristics, as well as the risk of human error, must be evaluated for each type of application. While non-flammable and low-toxicity refrigerants may have safety benefits, they may not be ideal from an environmental point of view. In addition, some refrigerants may be acceptably safe for one type of equipment but not sufficiently safe for others. Thorough risk assessments are therefore needed for each application.

Environmental Impact

A core consideration in refrigerant choice is its environmental impact. This impact includes a refrigerant's ozone depleting potential (ODP*1) and its potential global warming impact: this is expressed as its CO_2 equivalent, which is the refrigerant quantity multiplied with its global warming potential (GWP*2). Heat transfer capacity and heat exchange efficiency of refrigerants are also important characteristics that result in reductions in refrigerant quantity and allow more compact equipment design. Environmental considerations also include the impact of the refrigerant production process and a refrigerant's potential to be recycled and reused.

Energy Efficiency

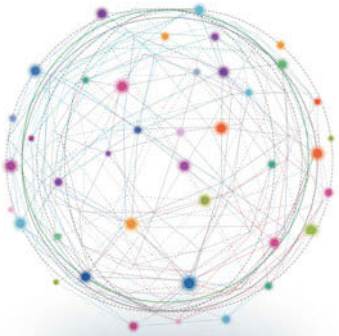
Daikin carefully considers a refrigerant's potential to improve the energy efficiency of its equipment in both cooling and heating function across an extreme range of climate conditions including very hot and very cold environments. This is an important consideration as energy consumption for cooling, heating and refrigeration has a substantial impact on the total energy consumption of buildings and countries. Depending on how electricity is generated in each country, its efficient use also has a large indirect impact on climate change by reducing CO_2 emissions. Therefore, energy efficiency is critical in choosing the right refrigerant for a given application.

Cost-Effectiveness

It is important to provide consumers access to affordable solutions for their homes and businesses. In addition, in order to reduce the environmental impact, cost effectiveness should be considered in terms of dissemination. For instance, is the refrigerant easy and inexpensive to install and maintain? Does the refrigerant allow for compact cost-efficient designs to minimize investment costs? Does a refrigerant contribute to reducing overall system operation and maintenance costs? Is recycling of the refrigerant feasible and cost-effective? Would possible risk mitigation measures be cost-effective? These are factors to consider when selecting cost effective refrigerants.

*1 *ODP: "Ozone-depleting potential"– A value indicating the intensity of ozone layer destruction by various substances based on the ODP of CFC-11 as a standard.*

*2 *GWP: "Global warming potential"– A value indicating the degree of contribution to global warming of various GHGs based on CO_2 as a standard. (Example: R-410A: 2,090, R-32: 675)*



Daikin's Challenge in Achieving a Sustainable Refrigerant and Equipment Lifecycle

Daikin strives to continuously reduce its environmental impact by enhancing the energy efficiency of equipment, replacing current refrigerants with those having less environmental impact and providing solutions throughout the lifecycle of refrigerant and equipment. Daikin will further work to realize sustainability in the lifecycle through initiatives with various stakeholders and by developing new technologies.

Action on Refrigerant and Goals

1 Role as a Refrigerant Manufacturer

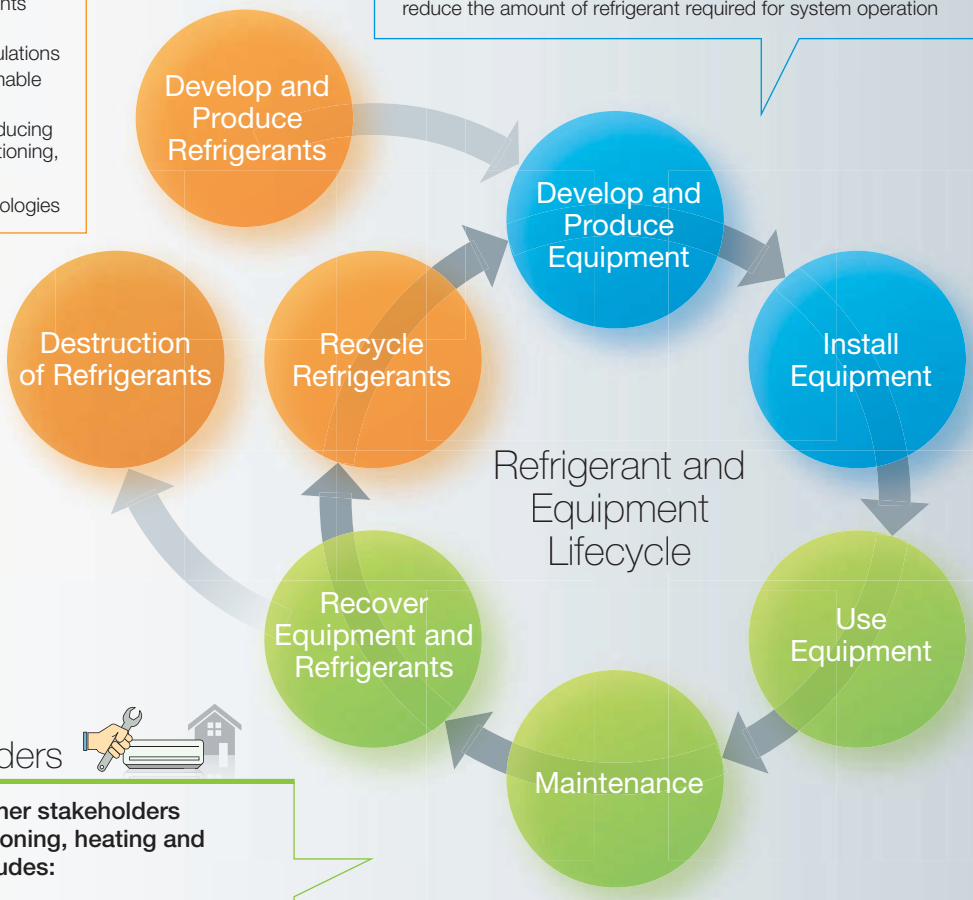
Daikin will continue to provide refrigerants that meet diverse needs, aiming to achieve a more sustainable air conditioning, heating and refrigeration sector. This includes:

- Development and production of refrigerants with the following properties:
  - Compliance with all environmental regulations
  - Emphasis on system safety and reasonable cost for customers
  - Improving the energy efficiency and reducing the environmental impact of air conditioning, heating and refrigeration equipment
- Establishment of recycling/reusing technologies

2 Role as an Equipment Manufacturer

Daikin will continue to improve the energy efficiency of equipment and systems and we will continue to select optimal refrigerants that meet various needs. This includes:

- Selection of the optimal refrigerant for each application through cooperation with various refrigerant manufacturers, including both fluorochemical and non-fluorochemical refrigerants
- Equipment designs that minimize refrigerant emissions and that reduce the amount of refrigerant required for system operation



3 Collaborating with Other Stakeholders

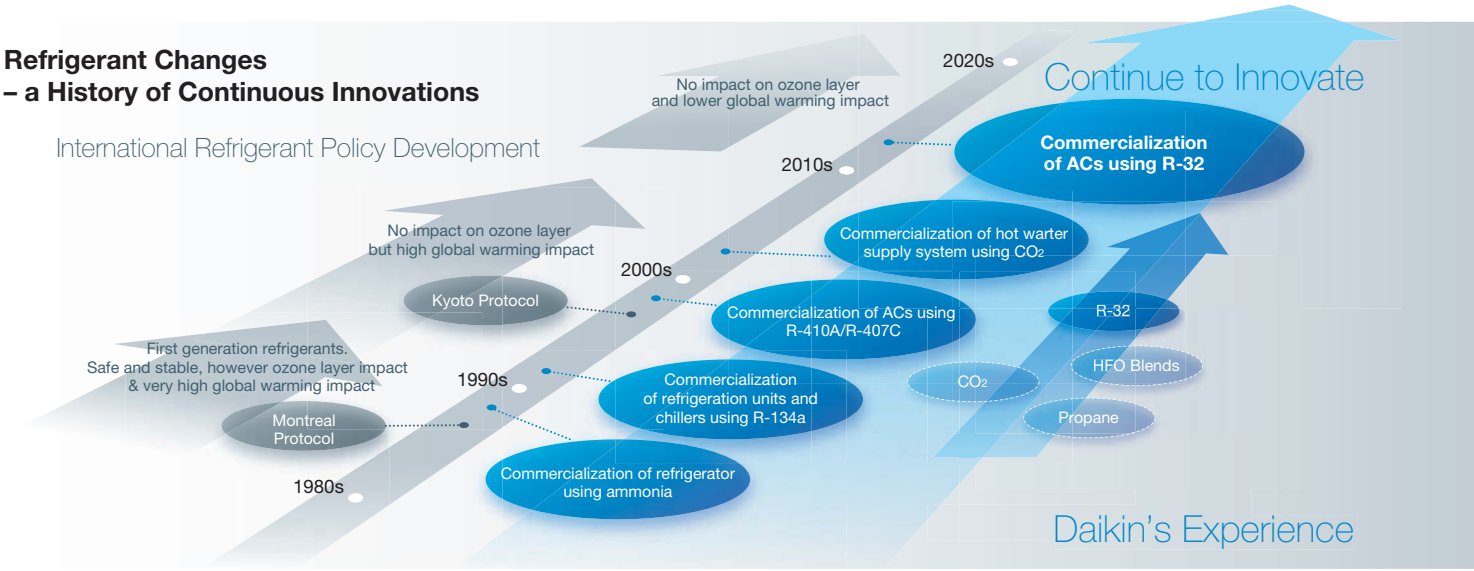
Daikin continues to work with other stakeholders towards a sustainable air conditioning, heating and refrigeration industry, which includes:

- Support the recovery of refrigerants by developing recovery technology
- Improve installation procedures to prevent leaks
- Provide education and technical training to support the proper management of refrigerants
- Establish schemes for recovery, recycling and destruction

Daikin's Expertise in Reducing Environmental Impact of Cooling, Heating and Refrigerating Equipment

Daikin has a long history of global innovation leadership to reduce the environmental impact of cooling, heating and refrigeration, as well as a unique position and expertise that comes from both manufacturing equipment and refrigerants.

Refrigerant Changes
– a History of Continuous Innovations



Daikin was an early adopter of non-ozone depleting refrigerants and recently we were the first to introduce air-conditioning and heat pump technology utilizing the refrigerant HFC-32 (herein after called "R-32"), starting in Japan in November 2012. R-32 is an important example of a refrigerant that strikes a good balance by providing a lower GWP value (compared, for example, to R-410A and R-22), its energy efficiency benefits, its potential to reduce refrigerant charges while being cost-efficient and its safety. Today, Daikin and many other manufactures have already installed millions of R-32 units worldwide, resulting in substantial direct and indirect climate benefits as well as significant energy savings for the end user.

Next Steps:

The Sooner, The Better, for the Future

Daikin supports international efforts to reduce the environmental impact of refrigerants such as the commitments and further discussions under the Montreal Protocol and other international climate negotiations. We also support national legislative initiatives on refrigerants in various regions, such as Japan, the European Union and the USA. We encourage regional and local incentives for products that are moving to refrigerants with a lower environmental impact, while also providing energy efficiency and other benefits. In short, we believe that public policy that supports this transition is important to minimizing the environmental impact of refrigerants in the air conditioning, heat pump and refrigeration industry. For its part, Daikin will work with governments, our business partners and stakeholders to continue to work to accelerate the move towards better refrigerant alternatives.

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Air Conditioners and Heat Pumps

(Split type and single package type AC/HP for cooling, heating and residential hot water supply)

Equipment Characteristics and Market Requirements

Basic factors for refrigerant selection: Safety, Environmental Impact, Energy Efficiency, Cost-Effectiveness

Equipment Characteristics and Requirements		Key Points for the Selection of Refrigerant
Residential AC, Commercial AC, VRV	Reduced power consumption, and low operating cost	Energy Efficiency
	Can be used safely throughout the lifecycle of equipment	Safety
	Low equipment cost (compact designs)	Cost-Effectiveness
	Easy installation and maintenance	Ease of installation and servicing
Residential Hot Water Supply Unit	Efficiently produces high-temperature water using less energy	Energy Efficiency
	Smaller water tank	Ease of installation and servicing
Combined Cooling, Heating and Residential Hot water Supply	Can operate efficiently at low ambient temperature conditions	Energy Efficiency
	Can use existing water piping of boiler	Ease of installation and servicing

Selection of Optimal Refrigerant for Each Equipment Type

Daikin has assessed various refrigerants (R-32, blends, natural refrigerants, HFO, etc.) based on 4 criteria (environmental impact, energy efficiency, safety and cost-effectiveness), and we have applied some of these refrigerants in selected applications.

After examining its key properties, Daikin has concluded that R-32 is an optimal refrigerant for direct expansion type cooling and heating equipment (including single package products), and we are launching R-32 products into the worldwide market region by region.

Furthermore, Daikin has already conducted several R-32 risk assessments and continues to do so with larger size systems, and is contributing to international standard making.

In fall of 2015, Daikin announced that it is offering companies worldwide free access to 93 patents to encourage companies to develop and commercialize air conditioning and heat pump equipment using R-32.

If all presently used R-410A refrigerant is replaced by R-32, the total CO_2 equivalent impact of HFCs could be reduced by up to 24% in 2030, compared to business as usual scenarios, along with a significantly reduced amount of indirect CO_2 emissions due to lower energy consumption.

On the other hand, the amount and temperature of hot water that is required for domestic use varies depending on weather conditions, housing environment and lifestyle. For example, where a large amount of hot water is necessary, CO_2, which can produce higher temperature water, is more appropriate; in systems combined with a heating unit that uses less hot water, R-32 is more appropriate. We are proactively promoting development of a variety of products by selecting suitable refrigerants that meet different needs for various applications.

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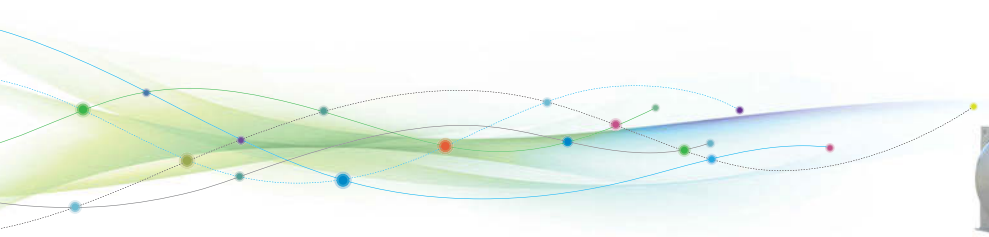


Chillers and Air Side Equipment

(Applied products)

Equipment Characteristics and Market Requirements

Basic factors for refrigerant selection: Safety, Environmental Impact, Energy Efficiency, Cost-Effectiveness

Main Application			Equipment Characteristics and Requirements	Key Points for the Selection of Refrigerant
Overall applied equipment		• Air conditioning (AC) and heat pump (HP) • Process applications	• Reduce operating cost of the entire system combining heat source and air side equipment	Energy Efficiency, Safety, Reliability
Water-cooled	Water-cooled chiller	• AC and HP for large space • Refrigeration of goods	• Installation in a machine room in a building • Maximize useful space in a building	Safety Reduced installation space
Water-cooled	Industrial brine chiller for refrigeration	• Refrigeration, freezing, and cold storage of goods	• Stable temperature of chilled fluid supplied to the area to be refrigerated • Response to high discharge gas temperature	Reliability Stability
Air-cooled	Air-cooled chiller	• Residential AC and HP market and light commercial market • AC and HP for large spaces	• Wide range of product lineup including small-sized chillers for applications from residential to light commercial use, as well as large-sized chillers for large spaces such as factories, etc.	Meets a wide range of applications

Selection of Optimal Refrigerant for Each Equipment Type

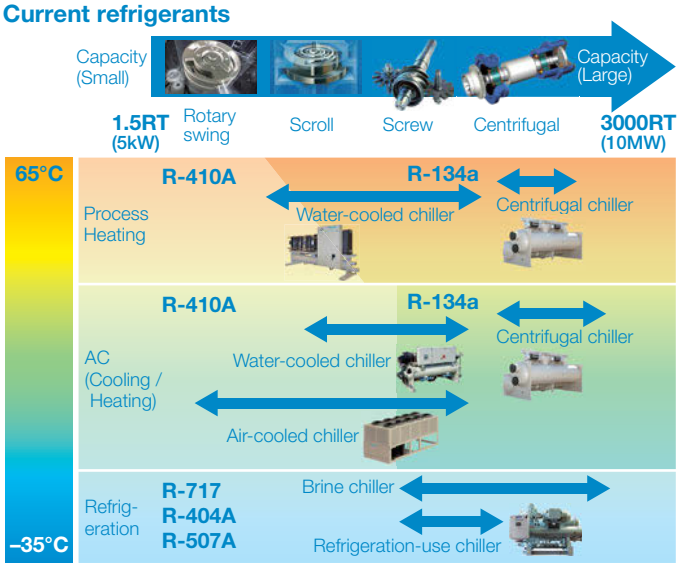
At present, R-410A, R-134a, ammonia, etc. are used as refrigerants for applied equipment depending on the application.

In order to mitigate global warming, we have selected the optimal refrigerant depending on various applications of equipment, considering energy efficiency and reduction of total GWP as priorities.

In the future, we will consider a wide range of refrigerants depending on the capacity and application temperature zone, including R-32, HFO refrigerants and blends, and select the optimum refrigerant for each application.

Furthermore, we will maximize our contribution to the mitigation of global warming by providing optimum systems and managing refrigerants combining the heat source, air side equipment and controls based on users' needs.

Current refrigerants



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Refrigeration Equipment

(Commercial refrigeration applications)

Equipment Characteristics and Market Requirements

Commercial refrigeration applications require precise temperature control for the storages and retail displays of food and beverages.

Basic factors for refrigerant selection: Safety, Environmental Impact, Energy Efficiency, Cost-Effectiveness

Equipment Characteristics and Requirements	Key Points for the Selection of Refrigerant
Ability to be safely used in environments with open flames	Safety
Operate with low running cost	Cost-Effectiveness Energy Efficiency
Easy installation and maintenance Availability of compatible equipment and parts	Ease of installation and servicing
Keep temperature in the warehouse stable to maintain and manage product temperature	Reliability

Medium Temperature AC

Example applications

- food processing factories
- food packaging areas
- agriculture facilities etc…

Refrigeration Split System

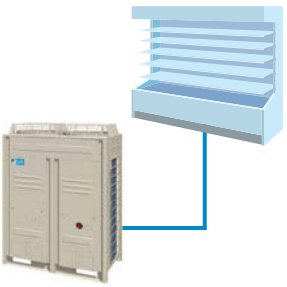
Example applications

- cold storage
- stores
- supermarkets etc…

Condensing Unit

Example applications

- supermarkets
- factories etc…



Convenience Pack System

Example applications

- convenience stores etc…

Selection of Optimal Refrigerant for Each Equipment Type

In the commercial refrigeration industry, R-404A has primarily been promoted as an alternative refrigerant for R-22 conversion. Daikin has contributed to the mitigation of global warming ahead of the industry by converting to R-410A instead, which has a GWP less than half of that of R-404A and excels in energy efficiency.

For further contribution to the mitigation of global warming Daikin is researching and conducting risk assessments of the use of R-32, HFO refrigerants (including blends), CO_2, etc. as the next alternative refrigerant. The alternative refrigerant candidates will be determined based on the best solution depending on the operation and regional environments.

Refrigeration Equipment (Marine container)

Equipment Characteristics and Market Requirements

Container refrigeration units which transport cargo require accurate temperature and humidity control for worldwide intermodal transportation.

Basic factors for refrigerant selection: Safety, Environmental Impact, Energy Efficiency, Cost-Effectiveness

Equipment Characteristics and Requirements	Key Points for the Selection of Refrigerant
Safe and reliable transport of cargo with accurate temperature and humidity control	Safety Reliability
Reduction of TCO (Total Cost of Ownership)	Cost-Effectiveness Energy Efficiency
The maintenance of equipment is possible throughout the world at sea and in the ports	Global availability, Ease of installation and servicing
Variation of ambient temperature from +50°C to –30°C Internal temperature setting from 30°C to –30°C	Capacity
Ability to operate without major problems for 12-14 years	Reliability, Compatibility

Selection of Optimal Refrigerant for Each Equipment Type

Daikin has been using R-134a refrigerant for marine containers. In order to reduce the impact on global warming, conversion to a refrigerant that contributes less to global warming is called for in the marine transportation industry.

Daikin is researching the use of R-32, which has excellent properties, to meet the requirements of marine containers as well as HFO refrigerants (including blends) and other alternative candidates. In order to safely use these refrigerants Daikin is conducting risk assessments and is an active participant in activities working to create and satisfy international standards.

Refrigeration Equipment (AC & refrigeration for vessels)

Equipment Characteristics and Market Requirements

AC for ship crew living quarters and refrigeration units for food storage aboard passenger ships, LNG vessels, container ships and car carrier ships, etc.

Basic factors for refrigerant selection: Safety, Environmental Impact, Energy Efficiency, Cost-Effectiveness

Equipment Characteristics and Requirements	Key Points for the Selection of Refrigerant
Low equipment and running costs	Cost-Effectiveness Energy Efficiency
Maintenance of equipment is possible throughout the world at sea and in the ports	Global availability, Safety, Ease of installation and servicing
Can be used safely and securely on vessels (enclosed space)	Safety

Selection of Optimal Refrigerant for Each Equipment Type

Daikin currently uses R-404A refrigerant for AC & refrigeration on vessels. In order to reduce the impact on global warming, a shift to a refrigerant that contributes less to global warming is called for in refrigerants for vessels.

In response to the situation, Daikin has completed R-407C product lineup and is further researching other alternatives.

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