

# Hydrocarbon Refrigerants

High quality natural refrigerants



# Cool by nature. Meet environmental regulations with hydrocarbon refrigerants.

As a world renowned company with far-reaching technical expertise, Linde is ideally positioned to make a valuable contribution to the protection of our environment. We have therefore committed ourselves to the responsible use of natural resources, the development of clean technologies and the replacement of harmful substances with eco-friendly alternatives.

Whether your application is air conditioning, commercial refrigeration, process chilling or heat extraction, we can help you meet environmental regulations.

Our high quality range of hydrocarbon refrigerants can provide you with a cost efficient solution that perfectly suits your requirements. It's a natural choice.

## Introduction

Hydrocarbon refrigerants include a number of products including R290 (propane), R600a (isobutane), R1150 (ethene/ethylene), R1270 (propene/propylene), R170 (ethane) and various blends of these products.

Linde has been a leading supplier of refrigerants for over 40 years, operating in 40 countries in 5 continents. We have long experience working with natural refrigerants including hydrocarbons, and can provide technical and product stewardship support. Our industrial gases heritage provides extensive experience in logistics and a wide product range including leak detection, cutting and welding gases.

Linde ensures that specific products are typically at least 99.5% pure with minimal levels of critical impurities including moisture and unsuitable hydrocarbons. This makes it ideal for use in all types of refrigeration systems. Linde Hydrocarbon Refrigerants – Cool by nature.

## Background

Along with other natural refrigerants, hydrocarbons such were used in refrigeration from the mid 1800s through to the 1930s. Due to their low environmental impact, hydrocarbons have been regaining popularity since the 1990s. They are now a common alternative to fluorocarbons in a number of applications, from small scale such as domestic refrigerators, to use on a large scale in chemical and petrochemical plants.

## Advantages of hydrocarbon refrigerants

- Zero ozone depletion potential
- Very low global warming potential (<8)\*
- Excellent thermodynamic properties leading to high energy efficiency
- Good compatibility with components
- Low charges allowing smaller heat exchangers and piping dimensions

## Common applications

Hydrocarbon refrigerants have a wide range of applications. This includes commercial refrigeration, chill cabinets and vending machines, cold storage and food processing, industrial refrigeration, transport refrigeration, small air conditioning systems, large air conditioning and chiller systems, heat pumps and water heaters.

## Product safety

Hydrocarbon refrigerants have some different chemical properties than fluorocarbon refrigerants; the primary difference are their classification as extremely flammable.

Therefore the handling and use of hydrocarbons requires adequate safety measures. This is especially true if a system is being considered for retrofitting – replacing a non-flammable fluorocarbon with a hydrocarbon. Our highly experienced experts are available to provide advice on how to handle and use our products in the safest way.

\* Indirect GWP (100 year), IPCC, 2007



Hydrocarbon refrigerants are used to chill or freeze food and beverages ensuring perfect product quality.

## Purity

Impurities such as other hydrocarbons can impact the vapour pressure of the refrigerant gas, lowering overall system efficiency. Sulphur can cause corrosion, and a mixture of saturated and unsaturated hydrocarbons can react with system components. Moisture leads to hydrolysis, corrosion and compressor failure. Therefore it is critical to ensure that the system uses the correct grade of product.

## Linde advantage: high quality hydrocarbon refrigerants

Linde can provide you an assured level of quality. Our hydrocarbon refrigerants are typically at least 99.5% pure with minimal levels of critical impurities including moisture (typically<sup>†</sup> <10ppm), unsuitable hydrocarbons (typically <0.5%) and sulphur. This makes them ideal for use in refrigeration systems.

On request Linde can produce UL Classified R290 and R600a for manufacturers producing equipment to the UL471 standard.

## Product types

### Typical specifications<sup>†</sup>

R-code	Product	Trade names
R170	High purity Ethane	
R290	High purity Propane	CARE <sup>®</sup> 40
R600a	High purity Isobutane	CARE <sup>®</sup> 10
R1150	High purity Ethylene	
R1270	High purity Propene	CARE <sup>®</sup> 45
	High purity Propane/Isobutane blend	CARE <sup>®</sup> 30
	High purity Propane/Ethane blend	CARE <sup>®</sup> 50

These products are commonly available in a variety of sizes of packages to meet your needs. This includes returnable cylinders (typical contents 3-50kg), and drum tanks (typical contents<sup>†</sup> 300-500kg). Larger packages of some products are also available in some countries.

## Further information

For local specifications, or to order, please contact your local Linde supplier. You can also visit us at [www.linde-gas.com/refrigerants](http://www.linde-gas.com/refrigerants)

<sup>†</sup> Exact specifications vary locally please refer to your local Linde supplier.

# Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

**Linde – ideas become solutions.**

**Linde AG**

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