

Helium

The special element

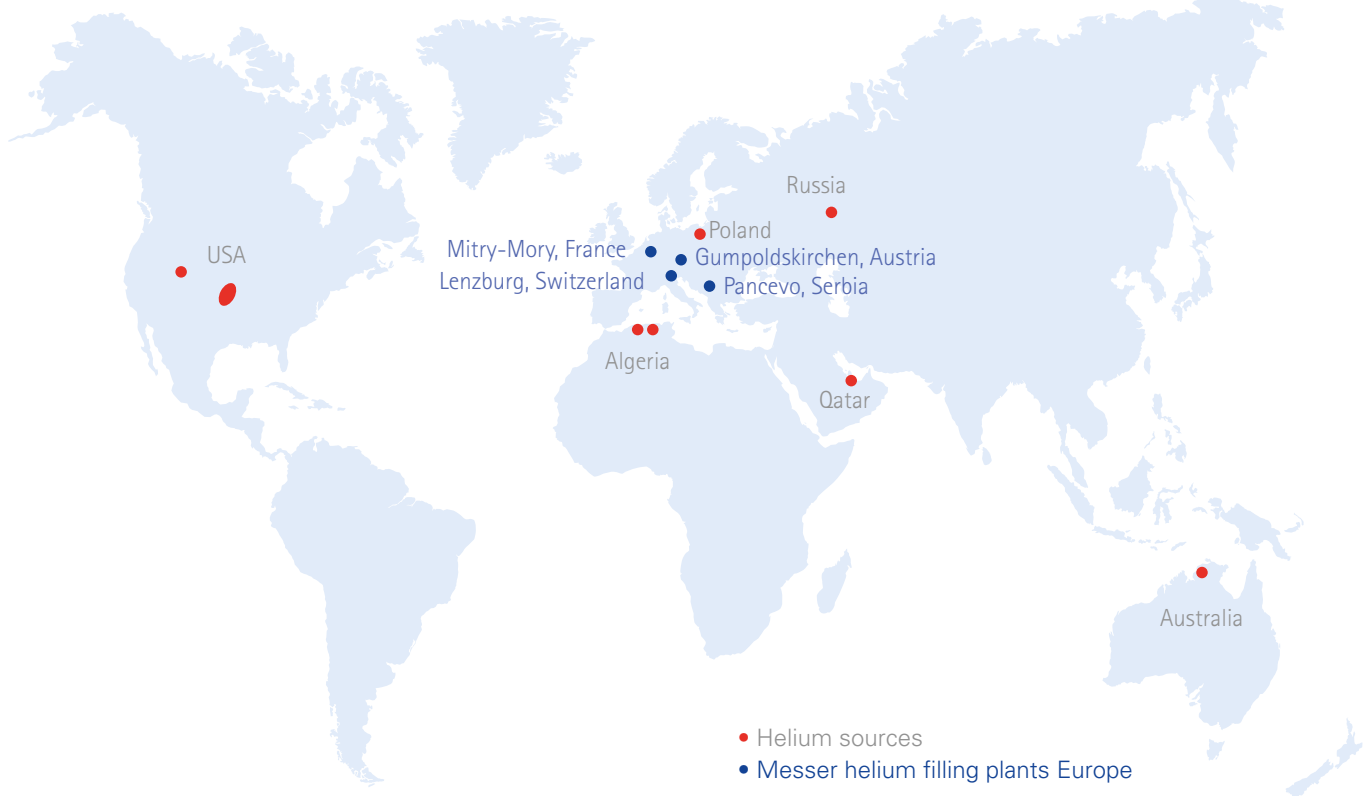


The inert gas helium has a number of special properties. Helium ...

- has the lowest molecular weight of all gases, except hydrogen
- is an absolutely inert gas. It does not form chemical compounds even at high temperatures
- is hardly soluble in metals and molten metals
- penetrates even the smallest gaps and pores due to its small atomic diameter
- has the lowest boiling point of all gases in a liquid state at 4.2 K or -269 °C, making the coldest liquid of all.

It is all these properties that make helium indispensable for many applications.

There are only traces of helium in the atmosphere of approx. 5 ppmv, making the extraction of helium from air very complicated and generally uneconomical. On the other hand due to special geological conditions there are a few natural gas sources on earth which show increased content of helium thus enabling an economical extraction.



- Helium sources
- Messer helium filling plants Europe

Worldwide logistics

Currently, helium is extracted from natural gas in the USA, Russia, Algeria, Qatar, Poland and Australia. Large helium liquefiers are operated at each of these locations. To transport liquid helium economically, Messer uses special super vacuum insulated tank containers (TCs) with a maximum capacity of approx. 40,000 l each. The Messer Group has a fleet of its own helium containers.

Once they are filled, the TCs are transported by road and, if necessary, by sea to the filling plants of Messer. Messer operates helium filling plants in Europe, China and the US. In Europe, these are located in Mitry-Mory (France), Lenzburg (Switzerland), Gumpoldskirchen (Austria) and Pancevo (Serbia).



Tank container for liquid helium

In Gumpoldskirchen Messer operates a storage tank for liquid helium (capacity of 120,000 l). In this way short-term fluctuations of the primary helium supply in Europe can be bridged.

Transfilling

In our filling plants we transfill the liquid helium from the tank containers to smaller super vacuum insulated liquid containers (dewars). The amount of helium is determined by weighing the container. The unavoidable flash gas during the transfer process is collected and cleaned by low temperature adsorption when indicated. By means of compressors it is then filled as gaseous helium in pressurized gas cylinders.

Perfected equipment

In order to prevent mostly losses by evaporation, liquid helium is delivered in special super vacuum insulated transport containers. To respond our customers' requirements we provide dewars from 50 to 450 l depending on the needed quantity.

For withdrawing the liquid helium, the dewars have to be fitted with a suitable stinger. By connecting a helium gas cylinder the pressure in the dewar is increased until the liquid helium can be withdrawn through the outlet.

If required, specially trained service technicians from Messer can provide support during the transfer process.



120,000 l horizontal tank container for liquid helium



Dewars of different sizes



Transfilling of liquid helium

For many applications indispensable

Due to its special properties, helium is also used in a large number of very specialized applications.

Liquid helium is used as a cooling agent wherever extremely low temperatures (below -200 °C) have to be generated but conventional refrigerators cannot be used for economic reasons. Often these are applications connected with superconductivity. Of greatest technical importance are magnetic resonance imaging (MRI) or nuclear magnetic resonance spectroscopy (NMR) and the operation of superconductive magnets in particle accelerators.

Apart from what is probably its best known use as a lifting gas for balloons and airships, gaseous helium is also used in a wide range of technical applications. Thus helium is used in many processes in cutting and welding as well as in laser technology due to its high thermal conductivity or as coolant in manufacturing optical fibers.

Its high diffusibility also makes it, for example, an ideal carrier gas in gas chromatography or the most widely used detection gas in leak detection.

Just as there are many different applications, there are also widely differing requirements regarding quality and delivery form of gaseous helium. The purity of helium ranges from balloon gas to „6.0“, i.e. a purity of 99.9999%, and the form of delivery from 1 l pressure cans to 200 and 300 bar cylinders and bundles up to trailers which provide at 300 bar a capacity of up to 4000 m^3 of gaseous helium.



Liquid helium cools MRI scanners



Gaseous helium for gas chromatographs

Service and support

Since helium is a scarce and valuable product, it must be used as efficiently as possible. Our technical customer service team provides support in optimising helium use and thus minimising helium losses.

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