Cryogenic adsorber. Model He.

Application area

The cryogenic adsorber is recommended for clean-up of the helium gas in a liquefier or refrigerator system which has been opened and exposed to the atmosphere. It is especially effective for removal of air and moisture and saves time compared with the usual procedure of pumping and purging.

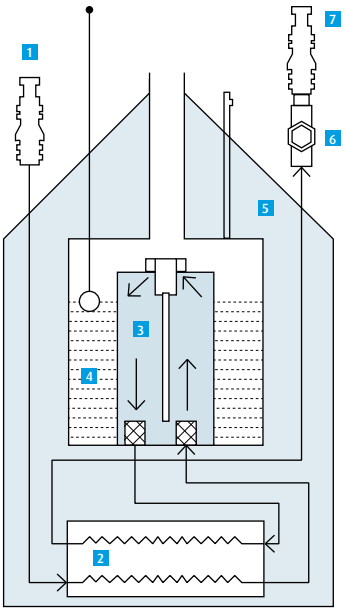
The most important requirement to obtain continuous operation of a liquefaction/refrigeration system over extended periods of time is the elimination of contaminants from the helium process stream within the system. While solid particles or dirt may plug the system or damage moving parts, gaseous contaminants that can condense and solidify at low temperature must also be removed. Gaseous contaminants could enter the system during installation or from helium gas replenishment sources. Contamination may also result from the introduction of air into the system through small leaks, especially when the system is being operated at sub-atmospheric pressure.

After the system has been decontaminated, the adsorber may serve an alternate purpose, which is to remove impurities from helium gas replenishment sources. The pure helium supply source or make-up gas should be 99.995 % pure; no more than 50 ppm (parts per million) impurities are allowed. However, since it is difficult to control impurities when there are different sources, it is recommended that the gas be passed through a cryogenic adsorber before introducing it as pure make-up gas to the liquefier/refrigerator.

Description

Gas enters the unit at 13–17 bar and passes through a heat exchanger, where it is cooled by the outlet gas stream. It then enters a stainless steel vessel cooled by liquid nitrogen, containing adsorbent material for impurities.

The stream continues through the heat exchanger to the outlet side of the unit. The addition of a liquid nitrogen level control permits unattended operation of the unit for extended periods. Periodically, the unit must be warmed up and regenerated.



1 Helium inlet
2 Heat exchanger
3 Activated charcoal
4 Liquid nitrogen
5 Powered insulation
6 Relief valve (20.7 bar(g), 300 psi)
7 Helium outlet

Schematic drawing

Duration

The required duty period before regeneration (four to eight hours) depends on the impurity level in the gas. Liquid nitrogen consumption is one liter per hour (static) and two liters per hour (operating). 25 liters are required to charge the system. The helium flow rate at 17 bar is 95 Nm^3/h maximum with 2 bar pressure drop. The output gas has a reduced impurity level of less than 5 ppm and a dew point of less than 211 Kelvin (–62°C).

Duty period before regeneration	Depends on impurity level in gas
Liquid nitrogen consumption	1l/h (static) 2l/h (operation) 25 liters (required to charge system)
Flow rate @ 17 bar (250 psi)	95 Nm^3/h (60 SCFM) maximum with 2 bar (30 psi) pressure drop
Output purity	Reduces impurity level to less than 5 ppm(v) and dew point to less than 211 Kelvin (–62°C)

Linde Kryotechnik AG
Daettlikonerstrasse 5, 8422 Pfungen, Switzerland
Phone +41 52 304-0555, www.linde-kryotechnik.ch, info@linde-kryotechnik.ch

Linde Cryogenics
A Division of Linde Engineering North America Inc.
6100 South Yale Avenue, Suite 1200, Tulsa, Oklahoma 74136, USA
Phone +1 918 477-1200, Fax +1 918 477-1100, www.leamericas.com

40354_LCS_0519