



FOCUS: MBE

Backed by Cryotech's
one year warranty.
All products come with
Cryotech's renown
customer service from
conceptual design to
implementation.

MBE Applications

Cryotech is a leader in vacuum insulated closed loop LN2 piping systems for MBE applications.

Our turnkey vacuum jacketed LN2 piping systems incorporate:

System Design

Cryotech will work with your end users and facilities staff to design an appropriate, state of the art, LN2 piping system to meet your budget and your specific MBE requirements.

Cryotech has over twenty years of experience designing and installing LN2 systems for MBEs.

Our systems are built to last a lifetime. Each system we install comes with a full 3 year warranty.

Complete system approach

In addition to dimensioning and designing your system, Cryotech engineers will work directly with your liquid supplier and MBE manufacturer to ensure a seamless installation.

Room to Grow

All Cryotech piping systems are completely modular. If your expansion takes you to a new location, Cryotech engineers will work with you to use the components of your existing system in designing a new system. If your system needs an addition, Cryotech will provide you with the most economical solution available. Each system can be expanded at any system bayonet joint.

Applications: MBE Closed Loop System



Molecular Beam Epitaxy (MBE) is an ultra high vacuum evaporation process widely used in the manufacture of compound semiconductor devices for the telecommunications industry as well as for optoelectronics and laser applications. MBE is a high speed process performed at very low pressures inside a stainless steel chamber equipped with pumps to remove as much of the room air as possible.

Along with external pumps, which remove gas molecules from the chamber, MBE systems typically have several cryoshrouds (cooling panels filled with LN2) in the UHV chamber in order to control temperature and cryopump gases in the growth area. The key to stable vacuum levels in the MBE and successful device growths is to have cryoshrouds that are constantly wetted with liquid nitrogen (LN2). The liquid nitrogen cools the panel walls to a temperature of -195.8°C . Most gas molecules hitting the cooled surface will cling until the panels are warmed. This extremely clean environment limits the levels of impurities and contaminants found in the grown layers. In addition because of the full saturation of LN2 at its coldest point (under atmospheric pressure) tools run at peak efficiency.



Cryotech provides vacuum insulated closed loop LN2 piping systems utilizing liquid/vapor phase separators and triaxial feed/coaxial return piping to provide low pressure, ultra-pure LN2. The vacuum jacketed piping from Cryotech allows the LN2 to be delivered from the bulk tank to a Cryotech Phase Separator where the gas is separated from the liquid. The pipe drops that are connected to the phase separator slope down to tools and gravity feed LN2 to them.

In a closed loop system, the LN2 is recirculated back to the phase separator via return pipes connected to the phase separator from the tool. These pipes are designed to flow LN2 back to the headspace inside the phase separator reusing the LN2 in a continual loop, providing completely wetted surfaces within the cryoshrouds, while maintaining constant LN2 temperatures at low pressure with minimal gas. The gas is then vented to the atmosphere, leaving pure LN2 at the desired temperature to be delivered to the cryoshroud.

Another option incorporates a supply feed to the chamber. The LN2 level in the shroud is controlled via sensors and inlet valves. The LN2 is not returned back to the phase separator and recirculated.

Cryotech is a leader in vacuum insulated closed loop systems for MBE applications. We are familiar with all makes/models of MBE's and manufactures mating bayonet assemblies for warm, frost free connections to all MBE equipment in use today. Our system design expertise and complete system approach allow us to provide the best solution for each individual application.

Our vacuum insulated piping systems help reduce losses due to minimal ice buildup. By providing the best quality LN2 customers can achieve higher throughput and longer system uptime, both of which can result in lower costs per wafer.



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