

LIQUID NITROGEN PIPING

CHALLENGE

- Effectively pump at low pressure
- Efficient supply of high-quality, single-phase LN₂ at low pressure

SOLUTION

The Epitaxy process takes place inside an ultra-high vacuum chamber in order to make materials with high purity and precision. To achieve such low pressures, liquid nitrogen cyroshrouds are used to pump out residual gases. The combination of a modulating inlet phase separator and Triax supply piping ensures sub-cooled, single-phase LN₂ circulates through the shroud, and subsequently effective cryo-pumping. Vacuum jacketing on phase separator, piping, and chamber connections ensure a frost free and efficient connection.

HOW IT WORKS

- Two-phase LN₂ is supplied to the phase separator, mounted above the MBE
- A modulating inlet valve maintains LN₂ level through a differential level-control system
- The hydrostatic head of the liquid causes the LN₂ to be slightly sub-cooled when fed into the shroud
- As the LN₂ picks up heat, its density lowers, and passive flow is achieved
- Warm LN₂ and any gas is returned to the phase separator

ADVANTAGES

- Clean, frost free cooling
- Low pressure single phase liquid
- Completely wetted surfaces are maintained
- Variety of internal diameter piping to accommodate a range of flow rates
- Years of experience as cryogenic experts