

AIR
PRODUCTS



Liquid Hydrogen Tanks

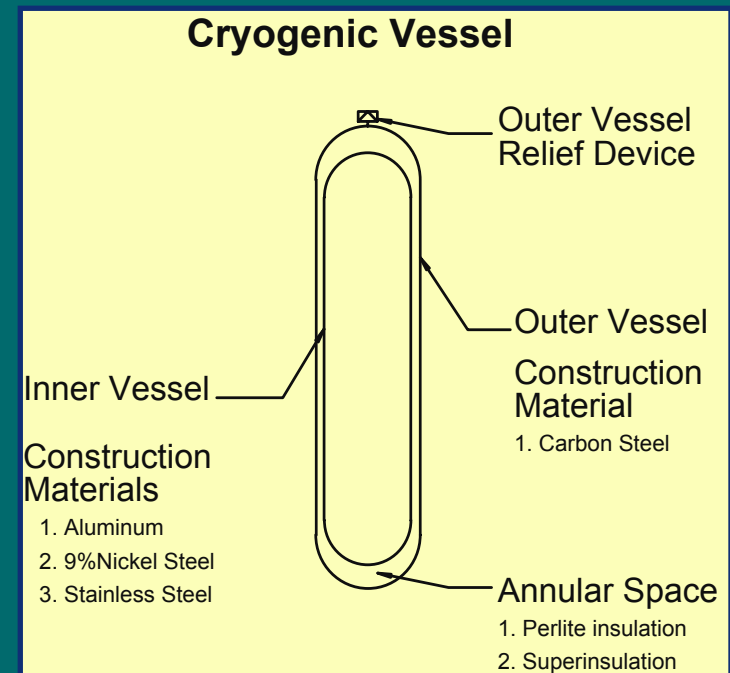
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Liquid Hydrogen

- In liquid state, hydrogen is – 423F
- Approximately 100 to 120 degrees F colder than liquid oxygen or liquid nitrogen
- Most materials except helium will freeze at liquid hydrogen temperatures

Liquid Hydrogen Storage Tanks

- Due to low temperature, specially designed tanks are required
- Tank design is similar to thermos bottle
- Inner vessel contains liquid hydrogen
- Outer vessel jacket for insulation
- Annular space between vessels is under vacuum and contains insulating materials



Liquid Hydrogen Storage Tanks

- Inner vessel designed and stamped per ASME boiler and pressure vessel code
- Connections provided for filling and withdrawing hydrogen
- Piping in space between inner vessel and outer jacket is all welded construction

Liquid Hydrogen Storage Tanks

- Outer vessel designed for vacuum
- Outer vessel protected with a relief device if inner vessel develops a leak.
- Vacuum decay results in reduced performance
 - Increased heat from atmosphere into the liquid hydrogen
 - Time reduced that liquid hydrogen can be stored
- Outer vessel equipped with connections to monitor and restore vacuum

Liquid Hydrogen Storage Tanks

- Liquid hydrogen tanks used successfully for over 40 years
- Hundreds of installations at industrial sites
- Industrial experience being applied to fueling of autos powered by hydrogen

Questions?

Thank you

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