Gas Phase Storage for 400 T Argon

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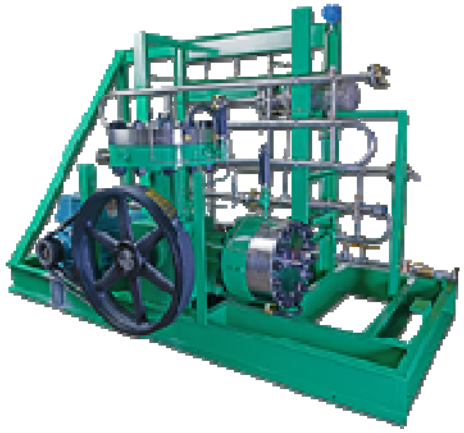
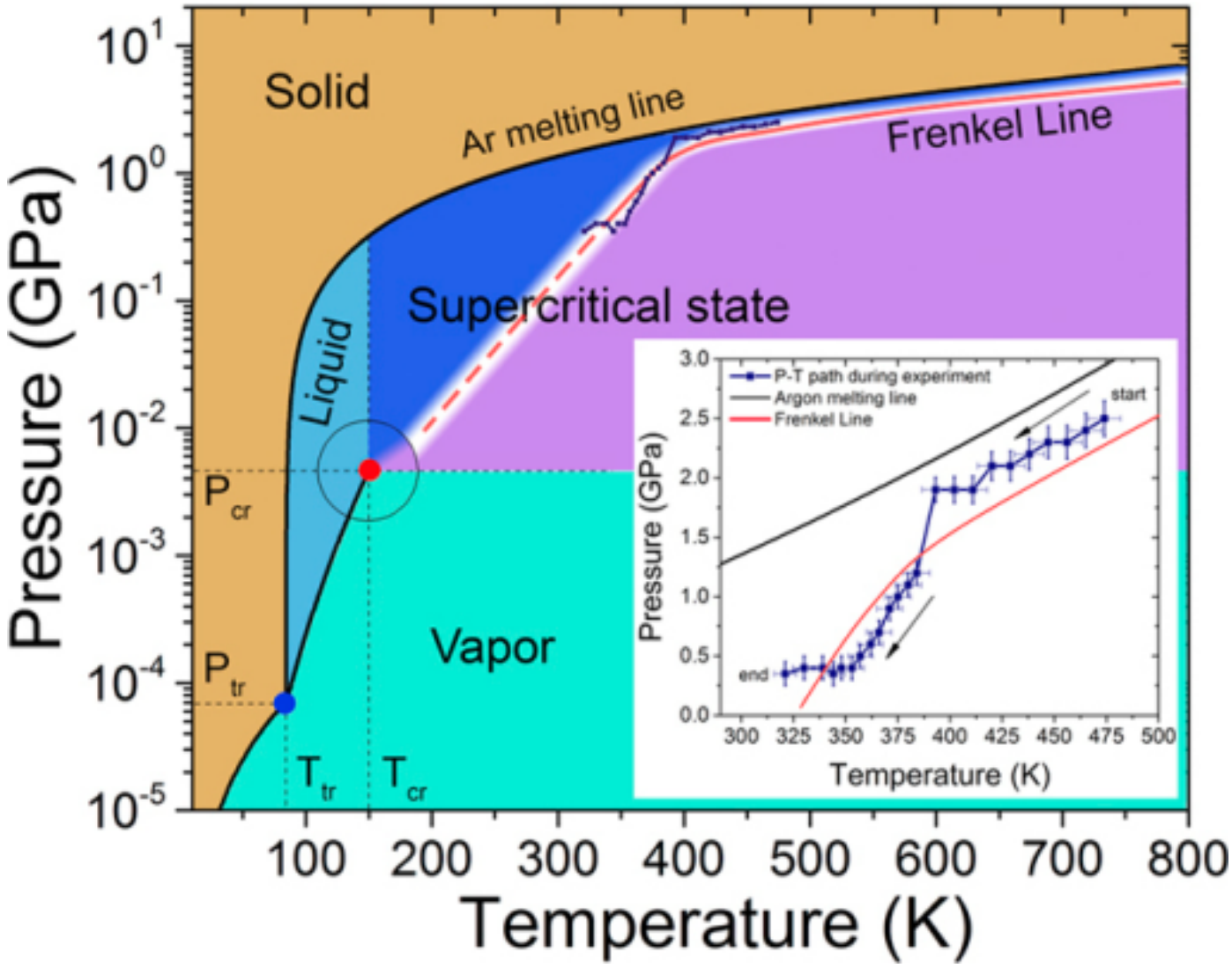
High Pressure Tube Skids

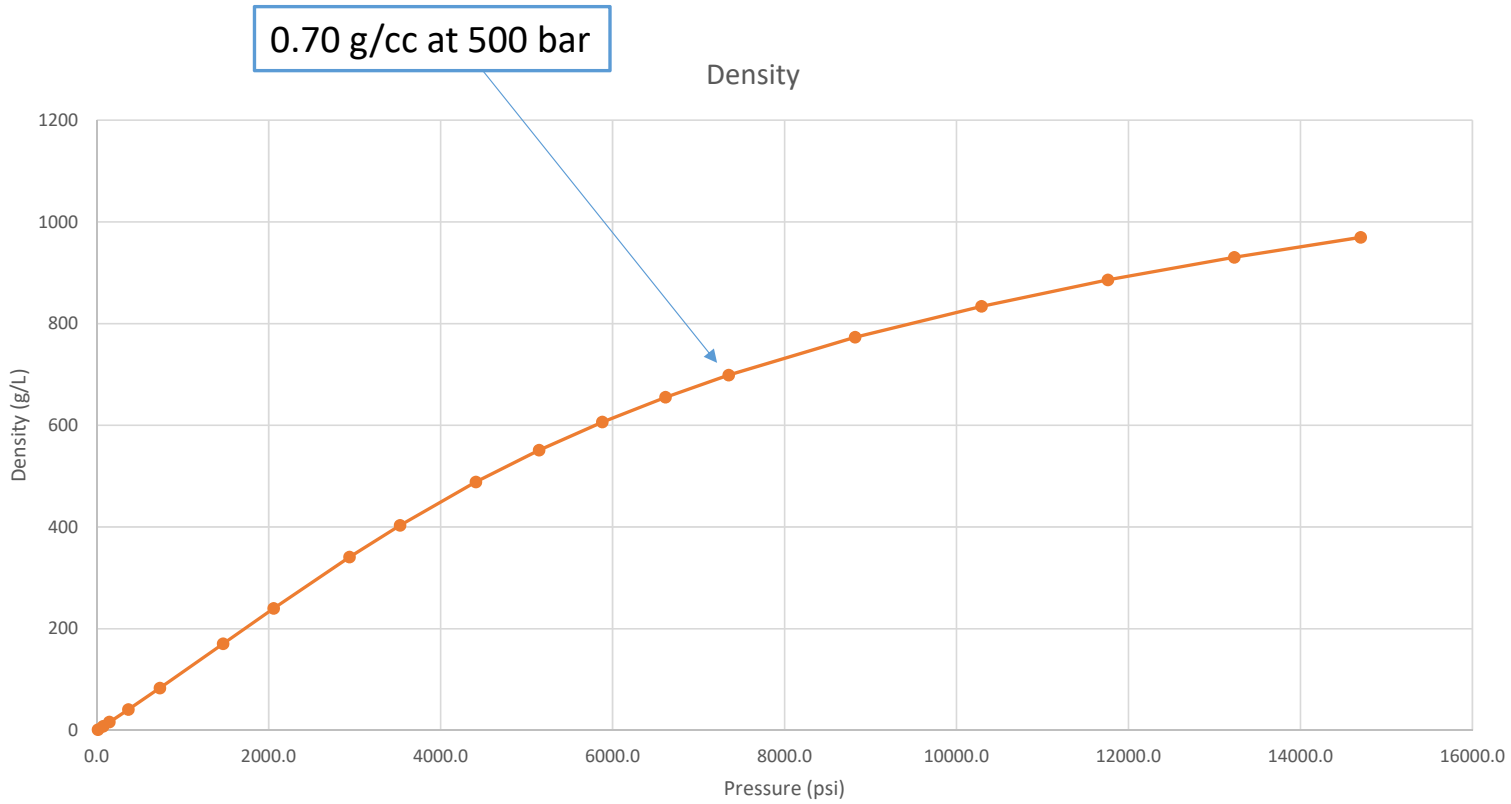


Can get hydrogen cylinders up to 12,000psi
Common requirement is 500 bar (7,350psi)
Can compress with metal diaphragm compressors (for hazardous gases)

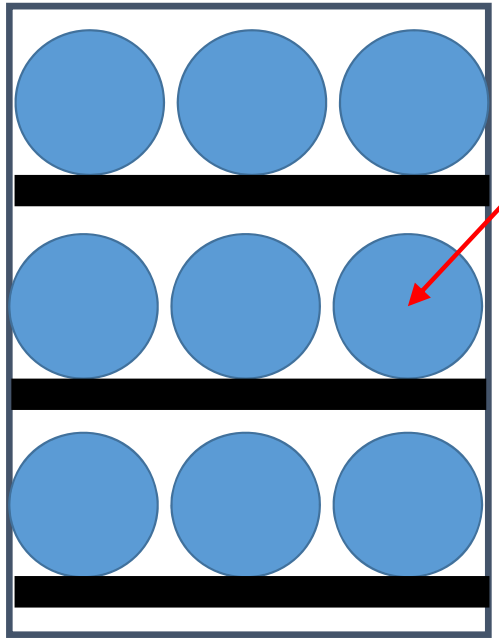
Argon Phases



Argon Density at 300K



Single Tube Skid (custom design)

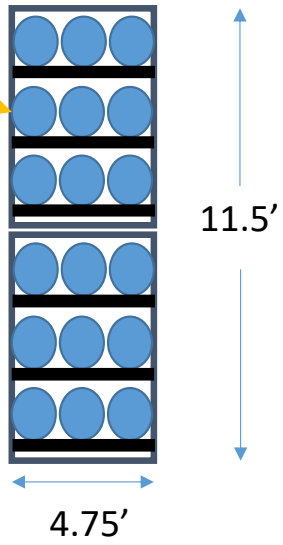


Each tube 45cm OD x 300cm long
Assume 1cm wall -> 43cm ID
Volume = 435 L
For density 0.7 g/cc, net mass = 305 kg Argon (500 bar @ 300K)

Each skid 145cm (W) x 175cm (H) x 335cm (L)

Tubes:	9
Storage Volume:	3,900 L
Storage Mass:	2,740 kg
Foot print area:	4.86m3 (52.3 sqft)

Can stack 2-high, and store across drift
so that drift length requirement is
4.75’ + 2.25’ (access) = 7’ linear drift length



For 400 Tonnes
Number cylinders: 1314
Number skids: 146
Linear drift: 510 feet

Refs for Argon Properties

- **Measurement and correlation of the (pressure, density, temperature) relation of argon I. The homogeneous gas and liquid regions in the temperature range from 90 K to 340 K at pressures up to 12 MPa (**R.Gilgen,R.Kleinrahm,W.Wagner)
- **Fluid phases of argon** (Leslie V. Woodcock)
- **Thermodynamic Properties of Argon from the Triple Point to 300 K at Pressures to 1000 Atmospheres (**Gosman, A.L., McCarty, R.D., Hust, J.G.)