



QWIK GUIDE: LOW-TEMP INSULATION: PETRO/CHEM/PHARMA

BACKGROUND:

Petrochemical, chemical, and pharmaceutical plants are increasingly focused design and management of their lower-temperature and cryogenic processes, not only to reduce energy loss but to improve process efficiencies - - and in the case of chemical and pharmaceutical to enable more selective and specialized chemical reactions at very low temperatures. At these low and cryogenic temperatures the selection of the pipe and equipment insulant and the design of the insulation system becomes *Mission Critical*. This Qwik Guide considers the role of the *insulation* in these efforts since it has a material impact not only on life-cycle cost (material/labor capital cost plus long-term operation/maintenance costs) but also on life-cycle-performance and risk. Some key risks include:

- 1) EPC¹ schedule delays
- 2) operational energy/process inefficiencies
- 3) outage/curtailments
- 4) poor system resilience (e.g. from incidents, extreme weather events)
- 5) inherently low *margins-of-error*
- 6) inherent inflexibility (e.g. in process modifications, more cycling, expansion)



DUE DILIGENCE PROCESS:

All petro/chem/pharma facilities need insulation on low temperature/cryogenic piping, tanks, and equipment - - whether for basic cooling systems with working fluids with refrigerants or water, or for product fluids such as ethylene or propylene, or to enable cryogenic processes such as lithiations or alkylations. Consider a sample of 100 linear feet of 20 inch diameter petro/chem/pharma pipe; depending on the insulant selected:

- 1) Board feet of the insulant can range from well under 5,000 to well over 8,000 (a 60% differential)
- 2) Capital cost of the insulants (in required thickness, and ignoring amounts of vapor barriers, jackets, etc.): can vary by >200%
- 3) Installed cost of the *insulation system* can vary by ~300%
- 4) Weight of the insulants: can vary by 600% - - with the heavier insulants approximately 70% of the weight per foot of a 20 inch pipe (0.365 inch wall) resulting in increased structural support cost.

SUMMARY

It is not possible to fully discuss life-cycle-performance/risk in adequate detail within this one page; yet the insulant selection stage is a critical step in the process. Being better informed of course means mitigating risks and potentially improving performance, yet being *better informed* does not simply mean *more information*. *What information is pertinent? What information is factual? Is there full-disclosure of all pertinent facts?*

Read our more comprehensive article "Insulation: Mission Critical" in the Resource section of our website. Or call or email us with your specific questions or needs!

¹ EPC = Engineering, Procurement, Construction