AEROFLEX

TECHNICAL BULLETIN

No: TB25
March 1, 2022

Calculating the Correct Aerocel® Insulation Thickness for Condensation Control

Insulation thickness determines success or failure when insulating below-ambient (cold) piping & equipment systems. For under-insulated systems, condensation will build up on the insulation surface and eventually cascade over building components and spaces below. Uncontrolled condensation can lead to corrosion under insulation (CUI), saturated insulation, thermal energy loss, mold & mildew growth, and system failure.

To ensure success when designing a mechanical insulation system for condensation control, it's important to gather the following variables to calculate the correct insulation thickness for the given application:

- Pipe type (copper, iron, PVC, etc.)
- Pipe size
- Process (line) temperature
- Ambient temperature (annual average high)
- Relative humidity (annual average high)
- Wind speed (average for exterior applications)
- Insulation type (thermal conductivity varies which directly affects thickness)
- Jacket material

Once these values are confirmed, they can be plugged into the following free mechanical insulation industry calculator programs:

- North American Insulation Manufacturer's Association (NAIMA) 3E Plus® - https://insulationinstitute.org/tools-resources/free-3e-plus/?cn-reloaded=1
- National Insulation Association's Mechanical Insulation Design Guide (MIDG) - https://insulation.org/training-tools/designguide/simple-calculators/

Please keep in mind that these programs will calculate the ***minimum*** insulation thickness for your application. National model energy standards and adopted codes, such as ASHRAE 90.1 and the International Energy Conservation Code® (IECC®), may require a greater thickness than the calculated minimum for pipe insulation.

For example, a thickness calculation may suggest 1/2" thickness to control condensation on chilled water piping. However, the local adopted energy code requires a minimum of 1.0".

While this information is not freely available on ASHRAE's website without purchasing the standard, minimum insulation thicknesses are available on IECC's website at https://codes.iccsafe.org/content/IECC2021P2/chapter-4-ce-commercial-energy-efficiency#IECC2021P2_CE_Ch04_SecC404.4.