Freeze Protection of Pipes with Mechanical Pipe Insulation

When pipes are exposed to freezing ambient temperatures, still fluids such as water will eventually freeze and cause system and property damage to the surrounding environment.

While mechanical pipe insulation can buy time and prolong fluids in pipes from freezing, it will not prevent fluids from freezing in piping systems.

For example, still water at 55ºF in a 6” IPS pipe insulated with 2” thick elastomeric insulation exposed to freezing temperatures of 0ºF will eventually freeze in approximately 23 hours. The length of time is determined by the variables noted above and the pipe insulation type. Insulation with lower thermal conductivity (K-value) will generally provide greater freeze protection.

To provide long-term freeze protection, a heat trace cable is recommended to be installed on the pipe and below the insulation. It’s important to note that the heat trace cable selected should be self-regulating and not exceed the maximum operating temperature of the pipe insulation.

When installing pipe insulation over a pipe with heat trace cable, it’s critical to install an insulation tube with an inside diameter (ID) one size larger (i.e. 1-3/8” instead of 1-1/8”) to allow annular air space for the cable while not compressing or stretching the pipe insulation. Still air between a pipe and insulation provides excellent thermal conductivity.

For freeze protection calculations, the National Insulation Association offers an easy-to-use calculator here.

AEROFLEX EPDM™ closed-cell elastomeric pipe insulation is often installed over self-regulating heat trace cables not exceeding 257ºF continuous.

To learn more, click here.

Source:
National Insulation Association, Estimated Time To Freezing For Water In An Insulated Pipe Calculator - https://insulation.org/training-tools/designguide/simple-calculators/estimate-time-to-freezing-for-water-in-an-insulated-pipe-calculator/