

## SUPPORT OF PRE-INSULATED ANNEALED COILED COPPER

### SUMMARY

When supporting pre-insulated annealed coiled copper refrigeration piping (line sets), care must be taken to avoid compression of the insulation on below ambient temperature lines. This is especially critical in humid areas. This includes humid weather areas as well as indoor spaces such as locker rooms, kitchens, nursing homes, etc. Even assuming proper insulation thickness was installed to prevent condensation, it is possible for the insulation to be compressed at the time of installation or the insulation may compress over time if not supported properly. Below ambient piping insulation **MUST** be continuous, including at or through the piping supports. For pre-insulated annealed copper (line sets) it is common for the insulation and piping to be supported by Unistrut or clevis hangers only. Sometimes pipe insulation shields are used. These are **NOT** proper ways to support the piping and insulation. The insulation will compress over time, with the resulting insulation thickness less than what is required to prevent condensation. Not only will there be condensation at this point in the piping, but the insulation will eventually absorb water which will necessitate replacement.

The following will describe the recommended method for supporting both straight lengths and pre-insulated annealed copper coils (line sets) operating at below ambient temperature conditions.

### ANALYSIS

Refrigeration piping operating below ambient temperatures must be insulated to reduce heat transfer, provide rated equipment capacity, comply with energy efficiency codes, and also importantly to prevent condensation on the pipe or insulation surface. A consulting engineer or designer familiar with the equipment manufacturers requirements, code requirements, and the effects of humidity and dewpoint should establish the minimum insulation thickness required to satisfy the most stringent of the above conditions. In hot, humid climates the insulation thickness may be determined by condensation prevention. The ambient air temperature, dew point and line temperature must be analyzed to establish the insulation thickness. **If the insulation is compressed to a thickness that is less than the desired insulation thickness**, the possibility of condensation occurs. The presence of water greatly increases the chances for building damage (finishes and structure), as well as the possibility of mold. Insulation of insufficient thickness and in the presence of condensation will absorb water and the insulation value is lost. This leads to more condensation and the worsening cycle continues. With open cell insulations this occurs very rapidly. With closed cell elastomeric foam insulation, the process is delayed, but even closed cell foam will eventually absorb water if not properly installed.

### PROPER SUPPORT METHOD

In order to have the piping insulation be continuous through the piping supports, the installing contractor should use rigid foam piping inserts (Reftekk CUSH-A-THERM) at ALL piping support points. This insures that the insulation is continuous and is not compressed at the support point. Since straight length piping is generally field insulated, this is a common installation method.

When using pre-insulated annealed copper coils (line sets), the use of rigid foam piping inserts at all pipe support points is not easily done. If supports are on 6' centers, this necessitates cutting the factory insulation every 6' and installing the rigid foam insert, gluing the insulation to each end of the insert and taping the joint. For conventional air conditioning piping and VRV/VRF systems, the high-pressure liquid line rarely operates below ambient temperature, so is not critical with respect to condensation. For VRV/VRF systems, the high-pressure (hot) gas lines are also not critical with respect to condensation. A word of caution: some VRV/VRF systems change the high-pressure gas line to a low-pressure gas (suction) line when in 100% cooling mode. This line will operate below ambient temperature with similar temperatures as the low-pressure gas (suction) line.

In cooling mode, the low-pressure gas (suction) line for heat pump systems and the low-pressure gas (suction) line (outdoor unit to mode selection box and mode selection box to indoor unit) will operate well below ambient temperature. These lines must be supported properly to prevent condensation.

## **SOLUTION**

The recommended method for supporting the low-pressure gas (suction) lines is to use straight lengths of copper or uninsulated annealed copper coils supported on rigid foam pipe inserts and field insulate the piping.

It is possible to cut the insulation on pre-insulated lines at each support point and install rigid foam pipe supports.

Another method is to use 12" to 18" long pipe insulation saddles and increase the insulation thickness at each saddle. Since the insulation can compress, by as much as 50% over time, this would require doubling the insulation thickness at each support point. Doing this however does not guarantee that the insulation may compress more than desired. Reftekk does not recommend this method.

## **CONCLUSION**

Condensation must be prevented on below ambient piping to minimize the chance of mold, damage to building components and provide the building owner with a long-life insulated piping installation. The only way to do this is to prevent moisture penetration of the pipe insulation system using manufacturer recommended installation procedures and proper support of the pipe and insulation. Proper pipe support will prevent compression of the insulation and the resulting loss of insulation value.

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