Aquatherm Technical Bulletin

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Piping Condensation and Aquatherm

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Condensation on any surface depends on the temperature of the surface, the ambient air temperature and the ambient relative humidity level. The relative humidity level is the amount of moisture or water vapor that is contained in the air at a certain temperature compared to the maximum theoretical amount of vapor that the air could contain. All air contains some amount of moisture. The total amount of moisture in the air is dependent on the temperature of the air, the location of the air and local weather conditions. As temperature decreases, the amount of moisture the air can contain decreases, and any "extra" moisture condenses out of the air. When piping is transporting chilled water, the colder pipe surface cools the air surrounding it. When the temperature of the surface reaches a point below what we call the dew point, the moisture in the air begins to condense on the colder surface and thus we have condensation or "sweating". This "sweating" can be annoying, and if allowed to continue can cause damage to ceilings, walls, floors, furniture, equipment and storage below or in the area. Moisture that drips from sweating pipes can lead to mold and rot of building products and materials causing a host of other problems such as insect attack and costly mold clean up.

The only solution to condensation problems is to insulate the pipes and equipment where sweating can occur. Insulation provides a barrier between the warm moist air and the colder surface of the pipe or piece of equipment. However, if there is a crack in the insulation or there is a point where the insulation doesn't quite cover the pipe, condensation will occur on the bare spot or in the crack of the insulation of the pipe. It doesn't do any good to provide insulation if it isn't installed properly and completely.

Aquatherm PP-R, RP(RCT) pipe has a high thermal resistance value, giving a level of natural insulation. Aquatherm piping systems are more energy efficient than metal piping systems, and therefore provides some resistance to sweating or condensation. But even **Aquatherm piping cannot be guaranteed to not sweat** when exposed to the proper conditions.

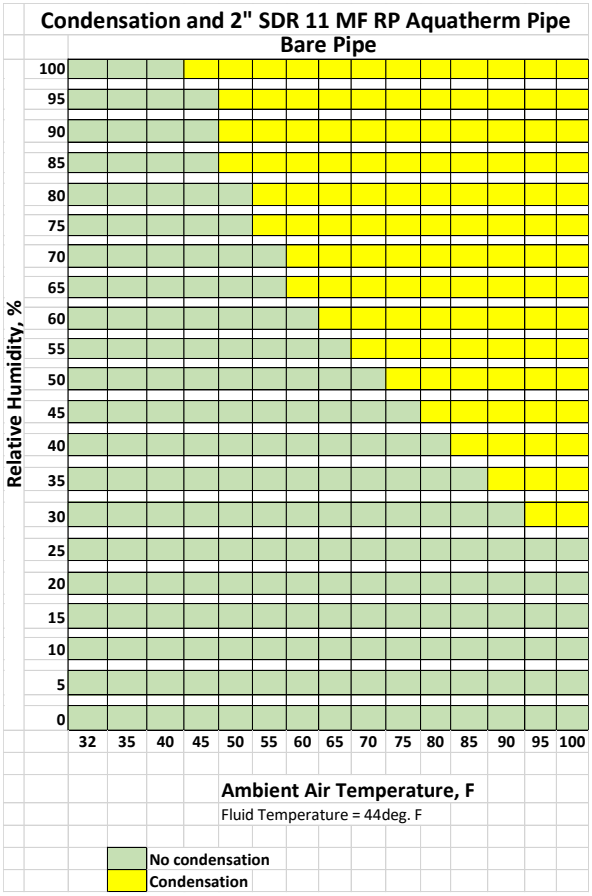
It is impossible to predict, in a general sense, the conditions whether or not a pipe will sweat. Situations change and atmospheric conditions fluctuate. Even locations or areas of the country where there is usually low relative humidity can have periods of higher than normal humidity and the pipes that should not have had problems with condensation will begin to experience problems. Piping located in higher humidity areas of buildings such as bathrooms or shower rooms definitely need to have insulation installed.

It is, therefore, the position of Aquatherm that all piping installations where **cold or chilled water** is to be carried in the piping **or** where the **surface temperature of the piping is expected to be below the ambient temperature shall be insulated per code**.

Of course, there are instances where the insulation thickness can be reduced because of the fact that the PP-R, RP(RCT) piping is naturally thermally resistant, but those cases need to be evaluated and calculated on an individual basis with the central idea that all piping needs to be insulated. It also goes without saying that all heated (hot) water systems need to be insulated per code as well.

The only exceptions to the insulation requirements are direct buried chilled water piping and most domestic cold water piping. The major energy codes do not require underground, direct buried chilled or cold water piping to be insulated.

Should there be questions or situations arise we, the Aquatherm Engineering Group, will be happy to consult with you on an individual basis on this issue. Contact: Engineering@aquatherm.com or call (801)805-6657.



Revisions:
1. 2 Nov. 2021 - Add RP and condensation graph