

AquaSAFE™ Attic Insulation Instruction Sheet

This document is intended to provide guidelines for insulating Uponor AquaSAFE™ multipurpose residential fire sprinkler systems that include piping installed in attics. These are recommendations only and are not intended to provide a guarantee against freezing or over pressurization. All state and local building code requirements must always be followed and supersede any recommendations made herein.

The Uponor AquaSAFE multipurpose fire sprinkler system uses flexible Uponor AquaPEX® piping to integrate the fire sprinklers with a home's cold-water plumbing. Because water-filled residential fire sprinkler piping is often installed in attics, care must be taken to protect the piping from excessive cold and heat. Although the flexibility of Uponor AquaPEX piping makes it more resistant to freeze damage than rigid pipe, it must still be properly insulated to ensure proper performance.

According to the NFPA (National Fire Protection Association), sprinkler piping must be maintained between 40°F to 120°F. In regions that experience extreme temperatures, proper insulation of any piping is essential.

A determination of the level of insulation necessary to meet the NFPA standards is dependent upon four variables:

1. T_i : The temperature of the indoor, conditioned living space
2. T_o : The temperature of the outdoor, unconditioned attic space
3. R_i : The R-value of the insulation between the piping and the conditioned living space below
4. R_o : The R-value of the insulation above the piping

Use the following formulas to determine the amount of insulation required above the piping:

- **For cold regions:** $R_o = R_i (T_o - 40) / (40 - T_i)$
- **For hot regions:** $R_o = R_i (T_o - 120) / (120 - T_i)$

Note: All temperatures are in °F.



Protection From Heat

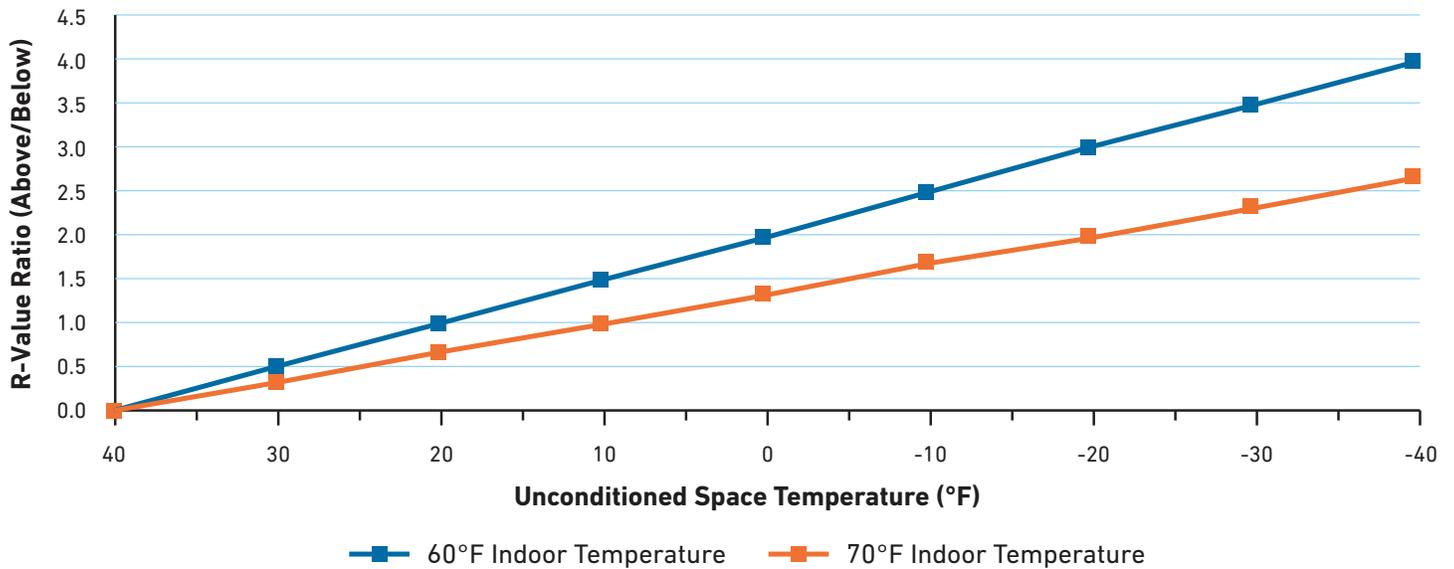
In excessively hot conditions, a 2:1 ratio of R_o : R_i calculated in accordance with the formulas on the left will maintain the temperature of the piping below 120°F for unconditioned attic temperatures of 180°F with a conditioned space temperature as high as 85°F.

Protection From Cold

In cold climates, the graph on the following page shows the acceptable R_o : R_i ratios for various attic temperatures (T_o) and conditioned-space temperatures (T_i).

If local conditions differ from those provided on the graph, calculate insulation levels using the formulas on the left.

R-Value Ratio vs. Attic Temperature — Protection From Cold



Preferred Installation Method

To achieve maximum protection of piping from extreme hot or cold temperatures, only install insulation above the piping. This will maximize the effectiveness of the insulation and allow the piping to remain closer to the temperature of the living space below (see **Figure 1**).

If fire sprinkler piping is installed in this fashion, the formulas on the previous page indicate that insulating the attic according to the U.S. Department of Energy¹ guidelines will also properly protect the piping from excessively cold or hot temperatures.

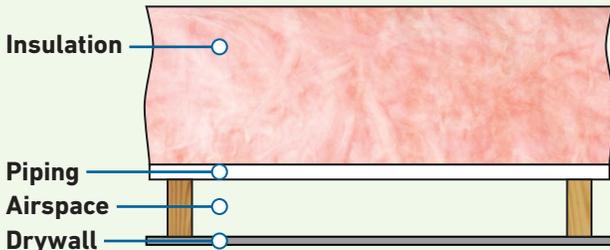


Figure 1: Preferred installation method

¹Insulation Fact Sheet, United States Department of Energy. www1.eere.energy.gov/library/pdfs/insulation_fact_sheet.pdf

Alternative Installation Method

If any insulation is allowed beneath the piping, thereby insulating it from the conditioned living space as demonstrated below (in **Figure 2**), install additional insulation above the piping to maximize protection.

The ratio of the R-value above the piping (R_o) over the R-value under the piping (R_i) must be high enough to keep the temperature of the piping between the required 40°F to 120°F.

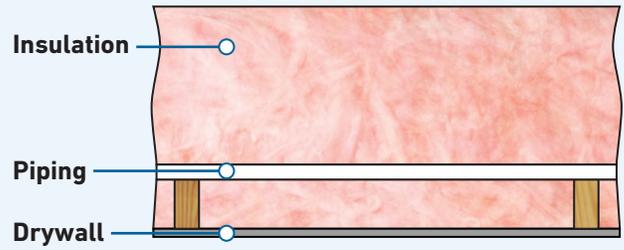


Figure 2: Alternative installation method

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