

**BUILDING TECHNOLOGIES PROGRAM**

**2012 IECC**

**Insulation Requirements in Residential Buildings for Mechanical and Service Hot-Water Piping**

The intent of the pipe insulation requirements is to reduce temperature changes while fluids are being transported through piping associated with heating, cooling or service hot water (SHW) systems, thereby saving energy and reducing operating costs.

Uninsulated piping systems that transport fluids can create water temperature irregularities, which ultimately requires additional heating or cooling and associated energy costs to bring the water to operating temperature. Any piping that carries heated or cooled water, including piping systems with external heating (e.g., heat trace or impedance heating), should be thermally insulated to reduce heat loss or gain, allowing the fluid to be delivered at the intended temperature. The addition of insulation can also improve the comfort of the occupants and reduce energy consumption by reducing heat losses (or gains) as the fluid moves throughout the home.

The 2012 International Energy Conservation Code (IECC) requires any piping associated with heating or cooling that carries fluids with an operating temperature of 55 °F and lower or 105 °F and higher to be insulated to a minimum of R-3 (see Code Citations for additional detail). Any insulated piping in areas exposed to weather, such as refrigerant piping associated with a split system air conditioner, is required to be further



protected from exposure to sunlight, moisture, and wind—all of which can damage the insulation materials over time. This protection must shield the insulation from solar radiation. The 2012 IECC prohibits the use of adhesive tapes as shielding.

The 2012 IECC requires piping associated with service hot water systems to be insulated to a minimum of R-3 under several circumstances, including hot water piping 3/4 of an inch or more in diameter; piping to kitchen outlets, a distribution manifold, or to multiple dwelling units; and other connections (see Code Citations for additional detail). Hot water piping less than 3/4-inch in diameter must also be insulated to a minimum of R-3 depending on the run length of the piping segment.





2012 IECC

Pipe Insulation Requirements in Residential Buildings (Continued)

**Plan Review**

Identify any HVAC system piping.

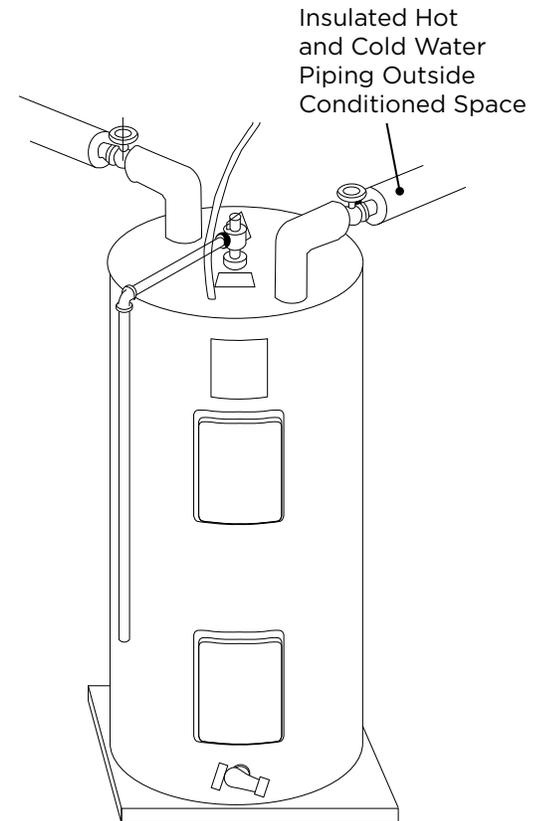
1. Verify the operating temperature of fluids to be transported connected to a mechanical system and if capable of carrying fluids 55 °F and lower or 105 °F and higher, the plans call out for at least R-3 insulation regardless of location.
2. Verify if the piping will be exposed to sunlight or weather; if so, determine the shielding that will be installed to protect the piping insulation.
3. Verify that all 3/4-inch-diameter or larger piping associated with service hot water will be insulated, as well as any piping as described in Section R403.4.2 of the 2012 IECC.
4. Verify the run length of any piping under 3/4 of an inch in diameter associated with SHW for any insulation requirements as described in Section R403.4.2 of the 2012 IECC.



**Inspection**

1. Verify that mechanical system piping carrying fluids 55 °F and lower or 105 °F and higher are insulated to a minimum of R-3 and that weather and sunlight insulation shielding has been properly installed when exposed to weather conditions. Note that adhesive tapes are not an accepted shielding material under the 2012 IECC.
2. Verify all SHW piping, per the plans, is insulated to at least R-3 and any other SHW piping does not exceed the allowable run length.

**Code Citations**





## 2012 IECC

### Pipe Insulation Requirements in Residential Buildings *(Continued)*

**2012 IECC, Section R403.3 Mechanical system piping insulation (Mandatory)**

Mechanical system piping capable of carrying fluids above 105 °F (41 °C) or below 55 °F (13 °C) shall be insulated to a minimum of R-3.

**2012 IECC, Section R403.3.1 Protection of piping insulation**

Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance, and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.

**2012 IECC, Section R403.4.2 Hot water pipe insulation (Prescriptive)**

Insulation for hot water pipe with a minimum thermal resistance (R-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4-inch nominal

diameter.

2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table 403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Table R403.4.2 Maximum Run Length (feet)<sup>a</sup>

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	> 3/4
Maximum Run Length	30	20	10	5

For SI: 1 inch = 25.4 mm, 1 foot 304.88 mm.

<sup>a</sup> Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

\*Copyright 2011, International Code Council, Inc. Washington, DC. Reproduced with permission. All rights reserved. 2012 International Energy Conservation Code.

