

# 2016

## **BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS**

**FOR THE 2016 BUILDING  
ENERGY EFFICIENCY  
STANDARDS**

**TITLE 24, PART 6, AND ASSOCIATED  
ADMINISTRATIVE REGULATIONS  
IN PART 1.**



JUNE 2015  
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**CALIFORNIA ENERGY COMMISSION**  
Edmund G. Brown Jr., Governor

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## SECTION 120.3 – REQUIREMENTS FOR PIPE INSULATION

Nonresidential, high-rise residential, and hotel/motel buildings shall comply with the applicable requirements of Sections 120.3(a) through 120.3(c).

(a) **General Requirements.** The piping conditions listed below for space-conditioning and service water-heating systems with fluid temperatures listed in TABLE 120.3-A, shall have the amount of insulation specified in Subsection (c):

1. **Space Cooling Systems.** All refrigerant suction, chilled water and brine lines.
2. **Space Heating Systems.** All steam, steam condensate and hot water lines.
3. **Service water-heating systems.**
  - A. Recirculating system piping, including the supply and return piping of the water heater.
  - B. The first 8 feet of hot and cold outlet piping for a nonrecirculating storage system.
  - C. The inlet pipe between the storage tank and a heat trap in a nonrecirculating storage system.
  - D. Pipes that are externally heated.

Insulation conductivity shall be determined in accordance with ASTM C335 at the mean temperature listed in TABLE 120.3-A, and shall be rounded to the nearest 1/100 Btu-inch per hour per square foot per °F.

(b) **Insulation Protection** Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind, including but not limited to, the following:

1. Insulation exposed to weather shall be installed with a cover suitable for outdoor service. The cover shall be water retardant and provides shielding from solar radiation that can cause degradation of the material.
2. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall have a Class I or Class II vapor retarder. All penetrations and joints of which shall be sealed.

(c) **Insulation Thickness**

1. For insulation with a conductivity in the range shown in TABLE 120.3-A for the applicable fluid temperature range, the insulation shall have the applicable thickness shown in TABLE 120.3-A.
2. For insulation with a conductivity outside the range shown in TABLE 120.3-A for the applicable fluid temperature range, the insulation shall have a minimum thickness as calculated with:

*INSULATION THICKNESS EQUATION*

$$T = PR \left[ \left( 1 + \frac{t}{PR} \right)^{\frac{K}{k}} - 1 \right]$$

WHERE:

- T = Minimum insulation thickness for material with conductivity *K*, inches.
- PR = Pipe actual outside radius, inches.
- t = Insulation thickness from TABLE 120.3-A, inches.
- K = Conductivity of alternate material at the mean rating temperature indicated in TABLE 120.3-A for the applicable fluid temperature range, in Btu-inch per hour per square foot per °F.
- k = The lower value of the conductivity range listed in TABLE 120.3-A for the applicable fluid temperature range, Btu-inch per hour per square foot per °F.