

K-Flex Insulation and California Title 24 2013 Building Energy Efficiency Standards For Residential and Nonresidential Buildings

The above referenced standard, commonly referred to as “Title 24”, went into effect on October 1, 2005. This standard addresses every aspect of building energy efficiency. There are several sections that are pertinent to users of K-Flex USA insulation products. Note: The 2016 codes have been published and will go into effect on January 1, 2017.

SUBCHAPTER 3 – NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, HOTEL / MOTEL OCCUPANCIES, AND COVERED PROCESSES – MANDATORY REQUIREMENTS

SECTION 120.3 – REQUIREMENTS FOR PIPE INSULATION

This section covers all “space conditioning” and “service water-heating” applications. Insulation thickness requirements are listed in TABLE 120.3-A, and are dependent upon insulation thermal conductivity (k-factor), system type, line temperature and line size (diameter). Insulation thickness requirements range from 0.5 to 3.5 inches for line sizes and temperatures where K-Flex USA products can be used. **It is important to note that when installed within the building envelope, the insulation is required to meet ASTM E84 25 / 50 within plenums or as commonly specified, which limits use of K-Flex USA products to a maximum 2” thickness for (NBR/PVC) elastomeric insulation.** Section 120.3 also has requirements for protection of insulation materials installed outdoors, as well as protection from possible maintenance-related damage. It should also be noted that piping operating between 60°F to 105°F does not require insulation.

TABLE 120.3-A PIPE INSULATION THICKNESS

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)				
			< 1	1 to <1.5	1.5 to < 4	4 to < 8	8 and larger
			INSULATION THICKNESS REQUIRED (in inches)				
Space heating, Hot Water systems (steam, steam condensate and hot water) and Service Water Heating Systems							
Above 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.31	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5
Space cooling systems (chilled water, refrigerant and brine)							
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5

Note: Refer to product literature for maximum operating temperatures for K-Flex USA insulation products.

SECTION 120.4 – REQUIREMENTS FOR AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS

Ducts and plenums must also meet the requirements of the 2013 California Mechanical Code (CMC). Minimum supply- and return-air duct insulation R-value requirement is R-8 for outdoors, in a space between the roof and an insulated ceiling, in a space directly under a roof with fixed vents or openings to the outside or unconditioned spaces, in an unconditioned crawlspace, or in other unconditioned spaces. For all other locations, the minimum R-value for supply-air ducts is R-4.2 (or higher depending upon CMC section 605 requirements). These requirements can be attained with either duct liner or duct wrap. **ASTM E84 25/50 requirements are applicable to all duct liner applications and all duct wrap insulation installed within the building envelope. K-Flex Duct® Liner Gray meets these requirements up to 2” thickness (R-8.0).**

Section 120.4 (c) requires that all R-values are based on insulation only, excluding air films, vapor barriers, or other duct components.

SUBCHAPTER 7 – LOW-RISE RESIDENTIAL BUILDINGS – MANDATORY FEATURES AND DEVICES

SECTION 150.0 – MANDATORY FEATURES AND DEVICES

SECTION 150 (j) – Water System Piping and Insulation for Piping, Tanks and Cooling System Lines.

2. Water piping and cooling system line insulation thickness and conductivity.

Piping shall be insulated to the thicknesses as follows:

- A. All domestic hot water system piping conditions listed below, whether buried or unburied, must be insulated and the insulation thickness shall be selected based on the conductivity range in TABLE 120.3-A and the insulation level shall be selected from the fluid temperature range based on the thickness requirements in TABLE 120.3-A:
 - i. The first 5 feet (1.5 meters) of hot and cold water pipes from the storage tank.
 - ii. All piping with a nominal diameter of 3/4 inch (19 millimeter) or larger.
 - iii. All piping associated with a domestic hot water recirculation system regardless of pipe diameter
 - iv. Piping from the heating source to storage tank or between tanks.
 - v. Piping buried below grade.
 - vi. All hot water pipes from the heating source to kitchen fixtures.

Exceptions to Section 150.0 include cold domestic water piping, condensate drains, roof drains, vents or waste piping. Protection of insulation installed below grade on domestic hot water pipes is also a requirement of Section 150.0.

Summary: Always review insulation thickness requirements in specific jurisdictions to assure that the correct insulation thickness is installed and complies with code. Pipe insulation thicknesses greater than 2” can be attained by nesting two layers of insulation. Larger pipe sizes may require use of sheet insulation for the second layer.

