

**DOCKETED**

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**pipe insulation protection**

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*Additional submitted attachment is included below.*

**BUILDING ENERGY EFFICIENCY MEASURE PROPOSAL TO  
THE  
CALIFORNIA ENERGY COMMISSION**

**FOR THE 2025 UPDATE TO THE  
CALIFORNIA ENERGY CODE, TITLE 24, PART 6  
BUILDING ENERGY EFFICIENCY STANDARDS  
PIPE INSULATION PROTECTION**

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SECTION 120.3 – REQUIREMENTS FOR PIPE INSULATION

Pipe Insulation Protection

Residential HVAC, Nonresidential HVAC

*Prepared by: Airex*

March 2022

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*New proposal for code update for Pipe insulation Protection 120.3b 1,2*

**New proposal for code update for Pipe insulation Protection 120.3B**

1,2

B. Insulation Protection. Pipe Insulation shall be protected from damage due to sunlight, moisture, ~~wind equipment maintenance~~, and physical damage. Protection shall, at minimum, include the following:

1. Pipe insulation including termination ends exposed to weather shall be protected by a cover suitable for outdoor service, The cover shall be water retardant and provide shielding from solar radiation that can cause degradation of the material. Cover shall be removable for not less than 6 feet from the equipment for maintenance.

Adhesive tape shall not be used to provide this protection.

2. Pipe insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include, or be protected by, a Class I or Class II vapor retarder. All penetrations, termination ends, seams, and joints shall be sealed.

3 Pipe insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve

In 2 This change removes the word “equipment maintenance” as the term is not specific. ASHRAE and the 2012,2018 IECC code and commentary define it as physical damage brought on by someone stepping on it, dropping tools on it, taking it apart, weed whackers etc.

This change then just puts the words “physical damage”.

A. In A. Pipe insulation including termination ends.

This change addresses the problems associated with pipe insulation installation and the substantial increase in pinhole leaks due to moisture, corrosion from a lack of protection of insulation termination ends. When pipe insulation termination ends are unprotected, the insulation will degrade from that end by sunlight, UV, and heat but also from moisture. Moisture/rain absorbed by the insulation through cracks, seams and importantly the gap between the tube and insulation that becomes a freeway for water to run down the insulation system and cause lost efficiency, degradation can and lead to corrosion and pinhole leaks in the tubing. Sealing the term.

The termination ends must be sealed to prevent air and water intrusion. Air entering the insulation from unprotected and unsealed ends allow moisture from condensation into the insulation system.

In the ASTM C1710 Standard Guide for Installation of Flexible Closed Cell Preformed Insulation in Tube and Sheet Form:

4.2 “All seams, butt joints, cutouts and termination points shall be sealed”

Acidity of the moisture will lead to corrosion and make little pinholes in copper. Moisture ingress is consistent with entry from the termination ends of the insulation between the tube and the insulation. Long term stagnation has been cited as an industry known conditions conducive to the corrosion. Formicary corrosion or “ants nest corrosion has become a big problem leading to contractors replacing piping and insulation.

It only takes a 1% moisture gain to equal to a 7.5 % reduction in thermal efficiency in the insulation. Some insulation material such a fiberglass, wool will be ruined by moisture intrusion. Some materials require the ends to be sealed to prevent ambient air entering the system. As air flow within the system can decrease T system performance from moisture condensation in and on the insulation.

This proposal states that protection be removable no less than 6 feet from the equipment to allow equipment maintenance without having to destroy the insulation or purchase additional pipe insulation to replaced. Pipe insulation is distributed and sold in minimum 6-foot sections.

Equipment maintenance will vary with how hard the unit operates, exterior temperature, preventive maintenance program, and other factors however, on every occasion, every

maintenance provides an excuse for the Freon line insulation to be touched and removed. The intent is clear that the protection be removable and independent of the pipe insulation for maintenance without damaging the pipe insulation

Protective covering must also be removable to protect from physical damage so if the protection covering does get damaged from stepping on it, dropping tools on it, birds, lawn trimmers etc. it can be repaired or replaced. To protect from equipment maintenance the first 6 feet of protection shall be removable. In the same manner that tape is not allowed as protection. When it is removed it destroys the insulation. Removable protection will allow the insulation to not be destroyed during maintenance.

Removable protection will also allow for Mechanical inspection by the AHJ as required by the California Mechanical code. **1111.4 Visual Inspection** refrigerant piping & joints shall be exposed to view for visual inspection and acceptance by the AHJ prior to being covered or enclosed [ASHRAE 15.8.9]

Keeping the insulations thermal conductivity integrity and ensuring the insulation system last the life of the mechanical system and avoiding the costly replacement of the insulation. Repairing pipe insulation that's repaired with adhesives then the adhesive seams are left to moisture, sun, and heat exposure leading to degradation. The sealants or adhesives life is reduced by this exposure to sun and moisture damage.

Removable protection is vital to ensure insulation can retard heat and condensation to provide energy savings and safety.

Insulation manufactures with adhered plastic coatings are now stating that their insulation while it may be UV resistance, it will only protect for about a year without additional protection in the form of jacketing or coverings. Line set manufactures are also stating that for protection longevity it must be jacketed on or stating for protection longevity the coated insulation must have additional protection.

Removable protection comes in many different products and from many manufactures it can be as simple as bent sheet metal, piping covers, jackets, pre fit channel systems & gutter systems, preformed covers, cladding, pipe, etc.

California will gain the energy saving it has intended to gain from pipe insulation but is lost due to the unprotected and unsealed termination ends and moisture caused lost efficiency.

The US Energy Department reports the US replaces 3 million heating and cooling systems a year. While I do not have what the figure is for California if we look at it on a US level at 3 million equipment replaced a year with 6 feet of insulation manufactured and purchased equals 9 million feet a year which would be a substantial saving to California. Usage.

By having removal protection for the first 6 feet. Would reduce 9 million feet of insulation manufacturing per year. As with elastomeric insulation production that average .8 liters to produce 6 feet of insulation. Based on the reduction of 9 million feet would save 758 barrels of oil a year and reduce CO2 by 405 metric tons or the equivalent of removing 88 cars a

year. Again, while this is based on total US replacement, California stands to benefit greatly by this proposed code change.

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**Cost Impact:**

The code change proposal will neither increase nor decrease the cost of construction. As removal cover are already being used.

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ASTM C1710

