# **65-407** **PUBLIC UTILITY COMMISSION -- ENERGY PROGRAMS**

 (formerly 19-530, Department of Economic and Community Development, Energy Conservation Division)

**Chapter 400:** **ENERGY EFFICIENCY STANDARDS FOR SUBSIDIZED MULTI-FAMILY RESIDENCES**

1. **SUMMARY**

 Section 1415 G of the Energy Efficiency Building Performance Standards Act, 10 MRSA, Chapter 214, Sections 1410-1420, prohibits the installation of electric heat as a primary heating system in any multi-family residence when public funds are used to subsidize all or part of the construction, renovation or remodeling of that residence. The building owner may petition the Commissioner of the Department of Economic and Community Development (DECD) for a waiver to the prohibition. A waiver shall only be granted if the proposed design meets the additional energy efficiency requirements specified in the 10 MRSA, 1415 G and in this rule.

 This rule defines terms used in the Statute and the rule, establishes procedures to be used by subsidy providers and the Energy Conservation Division (ECD) to inform property owners of the requirements, establishes procedures for the owner to certify compliance, establishes inspection procedures for ECD to verify that actual construction meets the standards, sets some minimum acceptable energy efficient construction practices to be used on projects receiving a waiver, establishes standards for infiltration control and ventilation to provide acceptable indoor air quality, and establishes criteria for showing compliance with the insulation requirements using the performance compliance alternative.

2. **DEFINITIONS**

 "Addition" means new conditioned space which is attached to an existing building.

 "Air Barrier" means a material installed to retard air infiltration and/or wind wash. An air barrier material may perform more than one function, such as, but not limited to, also being a vapor retarder, or either an exterior or interior building sheathing.

 "Annual energy consumption," as used in 10 MRSA, 1415-G {4), means annual energy consumption for space conditioning calculated in Btu's.

 "ASHRAE 90" means the current standard for energy conservation in new building design developed and approved by the American Society of Heating Refrigerating and Air-Conditioning Engineers.

 "Assessed value" means the equalized assessed value of the building established on the most recent April 1st

 "Btu" means "British thermal unit, n approximately the amount of heat required to raise one pound of water from 59F (Fahrenheit) to 60F.

 "Capillary break" means a material or system installed to stop the movement of moisture into a building by capillary action. A capillary break may be provided by either one of two general methods: 1) use of a material that has pore sizes so small as to be essentially nonexistent, such as, but not limited to, sheet polyethylene and sheet metal: or, 2) use of material that has pore sizes so large that water cannot move through it by capillarity, such as, but not limited to, a 3 inch thick layer of clean 3/4 inch crushed stone.

 "Ceiling" means the overhead section of a room, including over the tops of walls enclosing that room. Ceilings may have any slope from horizontal up to, but not including vertical.

 "Common room" means rooms or areas in the building open to all occupants of the building or which provide services to the building, such as, but not limited to, entries, halls, lounges, utility rooms, public restrooms, central kitchens, and central dining rooms.

 "Degree day, heating" is a unit, based upon temperature difference and time, used in estimating heating energy consumption. For any one day, when the mean outdoor temperature is less than a 65 degrees Fahrenheit reference temperature, there are as many Degree Days as degrees Fahrenheit temperature difference between the mean temperature for the day and the reference temperature. Annual Heating Degree Days (HDD) are the sum of the degree days over a calendar year.

 "Dwelling unit" means one or more rooms providing living facilities for one or more persons. This includes units providing complete, independent living facilities with permanent provisions for living, sleeping, eating, cooking and sanitation, and units providing independent living facilities with some shared or common use areas, such as, but not limited to, bathrooms, kitchens, living rooms, and/or dining rooms.

 "Electric space heating equipment" means any heating system which derives more than 50% of its heat energy input from electricity and has a Heating Seasonal Performance Factor (HSPF) not in compliance with ASHRAE 90.1-1989.

 "Foundation" means a wall below the floor nearest grade serving as a support for a wall, column or other structural part of a building.

 "Heat energy input" means energy supplied to produce heat, exclusive of energy supplied to transport and distribute the heat produced.

 "Heating Seasonal Performance Factor" means the combined effects of heat pump heating and performance losses due to coil frost, defrost, cycling under part-load conditions and use of supplemental resistance heat during defrost as defined by the equation:

 Total heating provided during heating season, in Btu

 HSPF =

 Total energy consumed by the system, in watthours

 The HSPF is listed by manufacturers on equipment labels for each of six regions defined in test procedures issued by the US Department of Energy in the Code of Federal Regulations (CFR) Title 10, Part 430 (1-1-92).

 "Infiltration" means the uncontrolled movement of air into and out of the conditioned space through cracks and interstices in the building envelope.

 "Insulation" means material primarily used to slow down heat flow, and is limited to materials defined as insulation by the Federal Trade Commission in 16 CFR Chapter 1, Part 460 (1-1-92), "Labeling and Advertising of Home Insulation."

 "Minimum unit R-value" means the R-value of an overall window unit. The overall R-value is the area weighted average of the R-values for the window frame, the edge of the glass, and the center of the glass, as defined and prescribed in the 1989 ASHRAE Handbook of Fundamentals, or using Window 4.0, the PC computer program developed by Lawrence Berkeley Laboratory.

 "Positive heat supply" means heat deliberately supplied to a space by design, such as, but not limited to, a supply register, a radiator, or a heating element.

 "Public funds, guarantees, or bond proceeds" means any funds provided to a person by any federal, state, county, or municipal governmental or quasi-governmental agency to be used for constructing, renovating, or remodeling multi-family residential buildings as defined in 10 MRSA, 1415-G (1). This includes, but is not limited to: grants, interest subsidies, funds from the repayment of previously provided public funds, and donations of land or services. This phrase shall hereafter be called "public funds."

 "R-value" is an indication of the amount of resistance to heat flow. Only R-values stated in labels, fact sheets, ads, or other promotional material must be established through tests that meet the requirements of the Federal Trade Commission as contained in 16 CFR Part 460 (1-1-92) - "Labeling and Advertising of Home Insulation" are acceptable. R-values for unlabeled products shall be those found in the ASHRAE 1989 Handbook of Fundamentals, Chapter 22 - Thermal and Water Vapor Transmission Data.

 R-values may be rounded to the nearest 1/10th for tested R-values of less than 10, and to the nearest whole number for R-values of 10 or more.

 "Shall be insulated to" means that insulation rated at the prescribed R-value shall be installed.

 "Space conditioning" means energy consumed to provide heating or cooling to a building by a heating, ventilating or air conditioning system.

 "Standard building" means a hypothetical building which is designed to comply with the prescriptive standards listed in 10 MRSA §1415-G (3) for the purposes of being used as a base case when demonstrating compliance with the standards using the performance-based compliance procedure.

 "Subsidized housing" means a residence which is constructed, renovated, or remodeled with the use of any public funds, guarantees, or bond proceeds as defined above.

 "Thermal transmittance {U or U-value)" means the coefficient of heat transmission (air to air). It is the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films. The U-value applies to combinations of different materials used in series along the heat flow path, single materials that comprise a building section, cavity air spaces, and surface air films on both sides of a building element. It is expressed in units of

 Btu/degrees Fahrenheit x Feet squared x Hour.

 "Unheated space" means a space which is neither a conditioned space nor has any provisions for receiving a positive heat supply.

 "Vapor barrier" see "vapor retarder."

 "Vapor retarder" means a material installed to retard water vapor diffusion into building component assemblies. The retarder shall have a maximum permeance rating of 1.0 as defined in the 1989 ASHRAE Handbook of Fundamentals. A vapor retarder may perform more than one function, such as, but not limited to, an air barrier, referred to as an "air/vapor barrier." Building papers, sometimes called "house wraps," n designed to be applied to the outside of building serve only as air barriers and are not vapor retarders.

 "Wall" means a vertical element of a building used primarily to enclose or separate spaces.

 "Wind wash" means the uncontrolled wind driven movement of air through installed building insulation.

3. **COMPLIANCE PROCEDURE**

 A. Information Package

 An information package about the requirements of 10 MRSA 1415-G shall be prepared by the Energy Conservation Division (ECD). The packet shall contain a description of the requirements for subsidized multi-family residences, instructions on how to apply for a waiver if the owner wishes to install electric heat, a summary of the energy efficiency standards to be fulfilled in order to attain a waiver, and a certificate for the owner to complete and sign, certifying compliance with the requirements. The certificate will also require information about the location of the project, the nature of the construction, the time period of constructions the specified heating equipment, and the name address and phone of the owner, designer, engineer, and builder. This packet shall be distributed to known grantors of public funds for multi-family residential construction.

 The grantor shall provide the owner of the proposed construction, renovation, or remodeling project with the information package containing the requirements of 10 MRSA 1415-G.

 B. Certification Notice to DECD

 Prior to providing or agreeing to provide a subsidy, the grantor shall require that the owner provide either:

 1) signed certification that the primary heating system will not be electric, or

 2) an approved waiver from the Commissioner of the Department of Economic and Community Development.

 No subsidy shall be granted without either 1 or 2.

 The grantor shall forward the original signed certification to the ECD at the time of pre-construction approval to provide the public funds. The building owner, and the grantor shall each retain a copy of the certification.

 C. Waiver

 If the owner chooses to install an electric primary heating system, he/she shall complete a waiver application and submit it to the ECD for review. Within 5 business days of receipt of the initial application, the ECD shall review the application to assure that all of the required information has been completed. If more information is required, the owner will be notified that he must provide additional information.

 Within 30 days of receipt of a completed application the Commissioner of DECD shall issue a written approval or denial of the waiver request. Approval or denial shall be based solely on whether or not the proposed design meets the energy efficiency requirements specified by the law and this rule A waiver approval shall be dated, numbered, and signed by the Commissioner of DECD.

 D. Inspection

 The person constructing a building project that has received a waiver must notify the ECD at 624-6800 to schedule an inspection at the following construction stages:

 1) after foundation insulation is installed,

 2) after wall and ceiling insulation and vapor retarder have been installed, and

 3) after the ventilation system is installed.

 The ECD shall schedule any inspection to take place within two full working days following notification. The system to be inspected may not be covered by continuing construction progress prior to the end of the two day inspection period. If the ECD does not inspect within 2 full working days, then the work subject to inspection may be covered and continued without further delay.

4. **MANDATORY COMPLIANCE**

 A. Applicability

 The standards specified in this rule apply only to those subsidized multi-family residences for which a waiver has been granted permitting the installation of a primary electric heating system. All other subsidized multi-family residences shall comply with the mandatory energy efficiency standards prescribed in 10 MRSA, Chapter 214 which apply to all other multi-family residences, regardless of funding sources.

 B. Multiple occupancy

 When a building contains more than one type of occupancy, such as, but not limited to, residential and commercial, then each portion of the building shall conform to the requirements for the type of occupancy contained therein. Areas of a building shared by more than one type of occupant shall meet the more stringent requirements.

 C. Transition Provision

 This standard shall take effect January 1, 1992. Projects demonstrating substantial activity and contract commitments before this date which have received either

 1) a building permit, or

 2) a plumbing permit,

 shall not be required to comply with 10 MRSA, 1415-G.

 Multi-phase projects must comply with this section for phases of the project where construction has not started by January 1, 1992, or where construction has not been continuous.

 D. Additions

 Additions to subsidized multi-family residences must meet the minimum standards stated in 10 MRSA, Section 1415-C that apply to all residential buildings, unless a waiver is granted, in Which case the addition must meet standards specified in 10 MRSA, 1415-G.

 Additions are new construction. Additions that are to be built with a primary electric heating system must comply with the waiver requirements. Only the addition must comply with the waiver conditions, and characteristics of the existing building may not be considered in performing any energy analysis of the addition used to demonstrate compliance with 10 MRSA, 1415-G.

 E. Appurtenant Structures

 Structures appurtenant to subsidized multi-family residences, such as, but not limited to, recreation buildings, dining halls, and offices, must comply with the provisions of this section of the law.

5. **ACCEPTED PRACTICES**

 A. Frost Line

 For determining compliance with this section of the Standards, the design frost line shall be those listed in Table 1 for each zone as found on the Zone Map.

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| **Table 1**Design 1 frost line for conforming tothe requirements of Maine'sEnergy Efficiency Building Performance Standardswhen installing insulation onfoundations or slab-on-grade floors. |
| Zone | Design Frost Line in Feet Below Grade |
| 123 | 4 feet5 feet6 feet |

 B. Ceiling Insulation

 Ceiling insulation shall be installed in a manner which maintains the minimum depth of insulation needed to achieve the minimum specified R-value. The measurement shall be taken at the outside edge of the exterior wall framing.

 C. Maintenance of R-value

 The following measures shall be installed to maintain the integrity of the R-value of the installed insulation:

 1. Wind Wash - A continuous air barrier must be provided at the following locations to mitigate wind wash:

 a) the exterior edge of ceiling insulation; and

 b) cantilevered floors and bay windows, including corners with adjoining vertical walls above and below.

 2. Moisture and Vapor Control

 a) A continuous vapor retarder shall be installed on all walls and ceilings which face outdoors or unheated spaces. The retarder shall be installed at or near the warm (interior) side of the insulation, but in no case may be placed more than 1/3 of the R-value into the insulation.

 b) A vapor retarder or a capillary break shall be installed under all slabs. The retarder may be covered by a thin layer of sand to protect it from damage during the construction of the slab.

 c) A vapor retarder shall be installed on top of all dirt crawl space floors. All joints in the retarder shall be lapped and sealed. The edges of the retarder shall be wrapped up onto the foundation walls a minimum of 6 inches, then sealed and mechanically fastened to the foundation.

6. **INFILTRATION**

 A. Air Barrier

 A continuous air barrier shall be installed over the inside face of framing in ceilings which face an outdoor or unheated space, and over either the inside or outside face of framing in walls which face an outdoor or unheated space. The ceiling and wall barriers must be sealed to each other.

 B. Sealing of Gaps and Joints

 Gaps between the rough and finish frames around windows and doors, joints between walls and foundations, all penetrations through the infiltration barrier, such as, but not limited to, those for plumbing electrical conduits, wires or boxes, and ducts, shall be sealed with permanent tape, caulk, sealant, or gaskets.

 C. Separate Dwelling Units

 All walls, ceilings, and floors that separate different dwelling units, or sleeping rooms designed to be occupied by residents from different families shall be sealed against air movement from one unit to another. Air barrier material shall be continuous. All penetrations through the air barrier separating dwelling units shall be sealed with permanent tape, caulk, sealant, or gaskets.

7. **VENTILATION FOR ACCEPTABLE INDOOR AIR QUALITY**

 A. Intent of Ventilation Requirements

 This ventilation requirement is intended to insure that fresh air be supplied and stale air exhausted for each dwelling unit independently of ventilation air and rates in other parts of the building and the building as a whole.

 B. Dwelling Units

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 Each dwelling unit shall have balanced mechanical ventilation designed to provide outside air in conformance with ASHRAE 62-1989, "Ventilation for Acceptable Indoor Air Quality". Fresh air is not to be supplied to dwelling units from common rooms. System adjusting shall be completed by an independent testing and balancing agency acceptable to the engineer of record.

 C. Common rooms

 Common rooms, located in any building required to comply with this standard, shall have balanced mechanical ventilation designed to provide outside air in conformance with ASHRAE 62-1989.

 D. Operations Manual

 An operations manual for the ventilation system(s) shall be provided to the building manager. An operations manual for the ventilation system located in the individual dwelling unit shall be provided to each tenant. The operation manual shall provide an overview of how the ventilation system functions to assure indoor air quality, operation instructions for any controls located in the dwelling unit, the name of the person to call for service (may be different for tenants than for managers), and a schedule for any regular maintenance to be performed by the tenant or manager.

8. **PERFORMANCE COMPLIANCE ALTERNATIVE**

 A. Scope

 This Section establishes criteria for the design of buildings in terms of the building's annual energy usage.

 B. Analysis Criteria

 1. Compliance with this Section requires an analysis of the annual space conditioning energy usage, hereafter called "energy usage", of the proposed building design and a comparison of such usage with the energy usage of a standard building design.

 2. A proposed building design will be deemed to meet the requirements of 10 MRSA §1415-G (3) if the energy usage of the proposed building design is not greater than that of a standard building design. The standard design shall be based on the criteria specified by 10 MRSA 1415-G (3), and this rule for insulation levels, infiltration controls, and ventilation.

 3. The standard building design shall be substantially identical to the proposed building design in the following respects:

 a) Function and design requirements;

 b) Size, shape, geometry, and orientation;

 c) Operating schedule, temperature, humidity, ventilation and footcandles; and

 d) Internal heat gains from occupants and equipment.

 C. Analysis Procedure

 1. The energy usage of the standard building design and the proposed building design shall be determined through use of identical energy analysis procedures.

 a) The energy usage shall be expressed as total Btu usage per year of conditioned floor area for both the proposed building design and the standard building design.

 b) The energy usage from various energy sources shall be converted to Btu per year of conditioned floor area for the purposes of comparing the annual energy usage.

 2. The analysis procedure shall account for the operation of the building and its systems through a full year operating period.

 3. The analysis of the annual energy usage of the standard building design and the proposed building design shall be based on the same outdoor weather conditions including temperatures, solar radiation, wind, and humidity of typical days in the year representing seasonal variation.

 D. Documentation

 The analysis of the annual energy usage of the proposed building design and the standard building design shall be prepared by a licensed architect, engineer, or State certified energy auditor. The analysis shall provide technical data on the proposed building design, the standard building design, and the data used to verify that the requirements of this Standard are met.

EFFECTIVE DATE UNDER 19-530, DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT, ENERGY CONSERVATION DIVISION:

 December 23, 1992, filing 92-484

EFFECTIVE DATE (ELECTRONIC CONVERSION):

 May 15, 1996

NON-SUBSTANTIVE CORRECTIONS:

 April 13, 2000 - Zone Map added in electronic format

MOVED TO 65-407, PUBLIC UTILITIES COMMISSION:

 July 1, 2003 - PL 2003 c.20

Nonsubstantive edits made by agency to ensure accessibility; APAO Accessibility Check: August 20, 2025

Note: the Zone Map follows; other attachments to this Chapter are available from the Energy Resources Division.

