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ORIGINAL

[Signature]
CITY OF BELLEVUE, WASHINGTON

ORDINANCE NO. 2192

AN ORDINANCE establishing minimum thermal insulation standards for new residential occupancies which are heated and/or cooled mechanically.

WHEREAS, it is in the public interest to provide a reasonable degree of conservation of critical energy supplies by establishing minimum thermal insulation standards for residential occupancies in the City which are heated and/or cooled mechanically, now, therefore,

THE CITY COUNCIL OF THE CITY OF BELLEVUE, WASHINGTON DOES ORDAIN AS FOLLOWS:

Section 1. The following new sections are hereby adopted and shall be designated as chapter 23.24 of the Bellevue City Code:

Chapter 23.24
Thermal Insulation Standards

23.24.010 APPLICATION AND SCOPE. This ordinance shall apply to all hotels, motels, apartment houses, dwellings, lodging houses and other residential buildings which are heated and/or cooled mechanically for which building permit applications are made after the effective date hereof. These occupancies shall be so constructed that the indicated component parts will not exceed the maximum "U" or "C" values where specified in Tables A through D. In lieu of the "U" or "C" value listed, installed insulation with the minimum "R" value (insulation material only) listed for each location shall be deemed to satisfy these requirements.

23.24.020 ALTERNATE MATERIALS, METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEM. "U" VALUES. The provisions of this ordinance are not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that any such variance from the standards herein established has been approved by the Building Official.

The Building Official shall approve such variance provided the proposed design complies with the intent of this ordinance in that the alternate material, method of construction, design or insulating system proposed is at least equivalent in energy conservation characteristics to the requirements established by this ordinance. The Building Official may require the submission of sufficient evidence or proof to substantiate any claims made regarding the proposed installation.

Where the stated "U" value of the roof deck, ceiling, wall or floor cannot be practically obtained, such "U" value may be increased to the minimum figure attainable for that component and the "U" value for other components shall be decreased so that the overall heat loss of the building does not exceed the total heat loss that would have resulted by conforming to the stated "U" values.

23.24.030 DEFINITIONS: For the purpose of this ordinance the following definitions shall apply:

ASHRAE - The American Society of Heating, Refrigeration and Air Conditioning Engineers.

GLAZING - All transparent or translucent materials in exterior openings.

SPECIAL GLAZING - Glazing which has a maximum "U" value of .65. Double insulating glass with at least 1/4 inch air space or approved storm sash will be considered to provide the "U" value required.

EXTERIOR WALL AREA - The gross area of wall surfaces of heated spaces including glazing and doors which are exposed to outside temperatures. (Includes foundation walls of heated spaces below grade.)

INFILTRATION - The influx of outside or unconditioned air into a mechanically heated or cooled space.

THERMAL RESISTANCE ("R" Value) - The measure of the resistance of a material or building component to the passage of heat. The resistance value "R" of mass type insulations shall be for material only.

"U" VALUE - The total heat flow through a given construction assembly, air to air expressed in BTU/hr per square foot per degree F temperature difference. Mathematically $U = \frac{1}{R_T}$ in which R_T equals the sum of the resistance (R) for the individual components of the assembly. "U" factors shall be calculated according to ASHRAE methods and shall not consider the effect of occasional framing members such as studs or joists.

"C" VALUE (Thermal conductance) - The amount of heat transferred through one sq. ft. of a building material of given thickness in one hour when there is one degree temperature difference between the surfaces of the material. Units of measurement are: (BTU per hour)/(square foot)/(degree fahrenheit).

SLAB ON GRADE FLOORS - is when the surface of the slab floor is less than 12" below the exterior grade.

UNHEATED SPACES - Any space exposed to outside temperatures and not provided with a heat supply capable of maintaining a minimum temperature of 60°F. This will include, but not be limited to, ventilated crawl spaces, attics, unheated garages and unheated basement areas.

23.24.040 GROUND COVER - LOOSE FILL INSULATION.

1. Ground Cover. A minimum of 4 mil (0.004 inch) polyethylene or equivalent must be installed under slab floors and in crawl space areas.
2. Loose Fill Insulation. Blown or poured type loose fill insulation may be used in attic spaces where the slope of the roof is not less than 2-1/2 feet in 12 feet and there is at least 30 inches of "clear headroom" at the roof ridge.

("Clear headroom" is defined as the distance from the top of the bottom chord of the truss or ceiling joist to the underside of the roof sheathing.)

When eave vents are installed, adequate baffling of the vent openings shall be provided to deflect the incoming air above the surface of the blown or poured insulation. Baffles shall be made of wood or other durable material and shall be installed at approximately a 60° angle from the horizontal. Baffles shall be in place at the time of framing inspection. In lieu of a framing baffle, batt or blanket insulation with an equivalent "R" value for ceilings as specified in Table A may be installed from the outer edge of the exterior wall extending a minimum of 2 feet in towards the heated space.

23.24.050 COMPLIANCE. Upon completion of the installation of insulation, a card certifying that the insulation has been installed in conformance with the requirements of these regulations shall be completed and signed by the building contractor and insulation applicator. For this purpose, any certification card which contains all the essential data may be used. The insulation compliance card insulation shall indicate the "R" value of insulation (material only) installed in the ceilings, walls, floors, on the perimeter and ducts. When loose fill insulation is used the card shall show the square footage and the number and weight of bags installed to obtain the "R" value listed. The card must be posted at a conspicuous location within the building and will indicate the installation date.

23.24.060 TABLE A: Ceilings and above Grade Exterior Wall Sections Thermal Design Standards.

TABLE A

Maximum "U" Values of Ceiling and above Grade Exterior Wall Sections Excluding Doors and Windows. Minimum "R" values shown are for Insulation Material Only when Used in Standard Construction.

<u>Masonry (2) (3)</u> <u>Construction</u>		<u>Frame (2) (3) (4)</u> <u>Construction</u>							
<u>Roof Deck (1)</u>		<u>Ceilings</u>		<u>Walls</u>		<u>Ceilings</u>		<u>Walls</u>	
<u>"U"</u>	<u>"R"</u>	<u>"U"</u>	<u>"R"</u>	<u>"U"</u>	<u>"R"</u>	<u>"U"</u>	<u>"R"</u>	<u>"U"</u>	<u>"R"</u>
.09	8	.05	19	.10	8	.05	19	.07	11

The following apply to the above table as indicated:

- (1) Indicates construction using rigid insulation installed on the roof deck. When adequate space within the roof cavity is available and insulation is to be installed on the ceiling, use values shown for "Ceilings" with a properly installed vapor barrier.
- (2) Wall sections shall include a properly installed vapor barrier.
- (3) Skylights used in the ceiling or roof deck shall have a "U" value not to exceed .70 (double insulating glass with at least 1/4 inch air space or double-walled plastic bubbles will be considered to provide the "U" value required.)
- (4) When cathedral type closed beam ceilings are used the ceiling rafters must be of sufficient size to provide a minimum of one inch vented air space above the insulation. A properly installed vapor barrier is required for this type of construction.

23.04.070 TABLE B: Glazing Thermal Design Standards.

1. When more than 20 percent of the exterior wall area of the total heated space consists of glazing, at least one-half shall be "Special Glazing". However if the glazing exceeds 40 percent of the exterior wall area, at least 90 percent must be "Special Glazing". For this purpose, exterior walls enclosing heated spaces in the entire structure shall be included in calculating the overall percentage of glazing.
2. All door and window openings from heated spaces to the exterior or to unheated spaces shall be weather-stripped, caulked, gasketed or otherwise treated to minimize infiltration.

23.04.080 TABLE C: Floor Sections, Foundation Walls and Slab on Grade Thermal Design Standards.

1. Floor sections over unheated spaces: Maximum "U" value .08, Minimum insulation "R" value 9.
2. Slab on grade floors: The perimeter of heated spaces shall be insulated to provide a maximum "U" value of .20, minimum insulation "R" value 4. Insulation shall be installed in one of the following methods:
 - a. Perimeter edge insulation shall be installed vertically to completely isolate the slab from the perimeter foundation and extend under the slab horizontally a minimum of 12 inches from the edge toward the interior of the slab.
 - b. Perimeter insulation shall be installed vertically to completely isolate the slab from the perimeter foundation and extend below grade to the foundation footing or a minimum of 12 inches.
 - c. Where the type of construction precludes the use of insulation between the slab and foundation wall, perimeter insulation shall be installed vertically on the outside of the foundation wall from the top edge of the slab or foundation wall and extending below grade a minimum of 12 inches or to the foundation footing. The portion of insulation above grade shall be bonded to the foundation wall and flashing installed to protect it from physical damage and exposure to excess moisture.

- 3. Crawl Space Plenums: When a crawl space is used as a supply or return air plenum, the perimeter walls of the plenum area from the interior ground level to the sub flooring shall be insulated to provide a maximum "U" value of .15, minimum insulation "R" value 6.
- 4. Foundation Walls of Heated Basements for any finished area shall be insulated to provide a maximum "U" value of .15, minimum insulation "R" value 6. Foundation walls of heated basements for unfinished areas shall require the same values if 50 percent or more of the foundation walls are above grade.
- 5. Insulation shall not be required in floors over either heated basements or crawl space plenum areas.

23.24.090 TABLE D: Duct Insulation. When supply and return air ducts used for heating and/or cooling are located in unheated spaces, they shall be insulated to provide a maximum "C" value of .30 at 75°F mean temp. minimum insulation "R" value 3.5.

Provided, insulation may be omitted on ducts located entirely in an interior wall or floor space or in any area which is provided with a heat supply capable of maintaining a minimum temperature of 60°F.

Section 2. This ordinance shall take effect and be in force five days after its passage, approval and legal publication.

PASSED by the City Council this _____ day of _____, 1975, and signed in authentication of its passage this _____ day of _____, 1975.

(SEAL)

Richard M. Foreman, Mayor

Approved as to form:

Lee Kraft, City Attorney

Attest:

Patricia K. Weber, City Clerk

Published _____