



CITY OF FAIRBANKS ENERGY CODE

PREFACE

In an effort promote greater conservation of energy along with providing a more comfortable and durable dwelling, effective January 1, 1994 the City of Fairbanks will begin implementation of an energy code. It will apply to all new residential construction and is hoped to provide basic assurance that reasonable minimum thermal standards have been complied with. As well, this code has been reviewed by AHFC and found to provide minimum acceptable thermal standards for future financing through their corporation.

In order to provide a broad range of options for those already familiar with the State Building Energy Efficiency Standard (BEES), the entire BEES has been adopted by the City. However, it has been amended in a significant way to include the addition of a fifth method of compliance. This method has been called the **Fairbanks Prescriptive Thermal Standard** and is intended to provide a simple, yet comprehensive method of compliance with BEES when enforced in conjunction with our current family of codes.

In general the energy code adopted by the City of Fairbanks consists of the following two parts:

Part I - This portion represents the amended Uniform Building and Mechanical Code sections that pertain to energy efficiency.

Part II - This portion represents the adoption of the State of Alaska Building Energy Efficiency Standards (BEES) to includes the following sub-components:

a) The **administrative amendments** to BEES which in general gives the City Building Department and the Building Official autonomy with regard to the enforcement of the Standard, and

b) The **amendment adding Chapter 8** - a fifth option for compliance with BEES which we call the Fairbanks Prescriptive Thermal Standard.

The pages to follow represents the adopted code sections or applicable portions thereof followed by an "**EXPLANATION**" of the section. Consult the Building Department for interpretation or further explanation of these provisions.

PART I

ENERGY AMENDMENTS TO THE 2000 INTERNATIONAL RESIDENTIAL CODE

LIGHT AND VENTILATION

R303.1 Habitable Rooms (Light and Ventilation)

Replace this section and the exceptions with the following:

All habitable rooms shall be provided with natural light by means of exterior glazed openings with an area of not less than 5 percent of the floor area of such rooms with a minimum area of 5 square feet, except minimum requirements shall govern. Natural ventilation shall be provided by openings to the exterior of not less than 4 percent of the floor area of habitable rooms. Such openings shall be readily controllable by the building occupants. In lieu of required exterior openings for natural ventilation, a mechanical ventilating system may be provided. Such system shall be capable of continuously supplying a minimum of 0.35 air changes per hour of outside air for all habitable rooms in the residence.

EXPLANATION

This amendment allows for exterior window area to be only 1/2 of that required by the unamended IRC. It is justified by the fact that light is least available in the winter months while the heat loss through these openings is the greatest.

Should the Fairbanks Prescriptive Thermal Standard be chosen as a compliance method, glazing area is further limited by the 12 % rule in section 8.1.

VENTILATION

R303.3 Bathrooms

Delete this section in its entirety, rename and replace as follows:

Bathrooms, water closet compartments and similar rooms shall have a mechanical ventilating system connected directly to the outside capable of providing five air changes per hour. Moisture exhaust ducts shall be smooth and rigid. All moisture exhaust ducts located in an unconditioned space shall be insulated with a minimum R-11 and installed so as not to create low points where condensation may collect.

Kitchens shall have mechanical exhaust ventilation provided directly above or immediately adjacent to the primary cooking appliance. All vents shall be connected directly to the exterior. A total exhaust ventilation rate for the structure shall be a minimum of 80 cfm per 1000 square feet of habitable floor space. All exhaust ducts shall be equipped with a back draft damper.

Structures of unusually tight construction containing fuel-burning appliances, including fireplaces and mechanically exhausted range-top cooking appliances shall be provided with supplemental supply air in accordance with the Mechanical Code. A draft activated damper allowing air to flow into the structure when depressurization exceeds 10 pascals may be installed within a supply air duct.

EXPLANATION

This amendment eliminates reliance on openable windows only as a source of ventilation within bathrooms, laundry rooms and the like. These rooms are a major contributor to indoor humidity and it is recognized that windows are rarely used if even openable during winter months. Recirculation fans do not affect excessive water vapor and are no longer an acceptable alternative. Likewise, mechanical exhaust ventilation is required at the kitchen range which represents a significant contribution to indoor air pollution. The total exhaust ventilation rate of 80 CFM per 1000 SF is approximately twice that required by BEES and ASHRAE 62-1989, (i.e.: .35 ACH), yet is generally achievable without the installation of additional exhaust fans.

This, however, is exhaust ventilation only, and may depressurize the home if multiple fans are used simultaneously. In this case, additional supply air by means of an openable window, door, or makeup air duct would continue to be acceptable options. Unlike the Chapter 2 requirement of BEES, a "hole in the wall" is not mandatory unless an appliance sensitive to the need for supply air is in use within the structure. In most cases, such an appliance will be installed within the garage in the form of a boiler. Experience shows that the combustion air for a typical boiler within a garage will be satisfied at significantly less than that required by the unamended UMC. (see the Mechanical Inspector for Dept Policy)

GROUND VAPOR RETARDER

IBC Section 1202.3.1 Openings for Under-Floor Ventilation

Delete section 1202.3, 1202.3.1 and 1202.3.2 in their entirety and replace with the following:

Each under-floor space shall be ventilated by an approved mechanical means or by openings in exterior foundation walls. Such openings shall have a net area of not less than 0.1 square foot for each 150 square feet of under-floor area. There shall be two openings located as close to corners as practical on opposite sides to provide cross ventilation. The openings shall be covered with corrosion resistant wire mesh approximately 1/4" in size. All structures with a crawl space shall have a minimum 6 mil ground vapor retarder to prevent the flow of water vapor from soils into the heated building interior.

EXPLANATION

This amendment requires a ground vapor retarder in all cases rather than as an option to achieve the ventilation reduction. Crawl Space ventilation is reduced to only one tenth of that formerly required.

ATTIC VENTILATION

IBC Section 1202.2 Attic Spaces

Delete in its entirety (including exception) and replace with the following:

Enclosed attics and enclosed rafter spaces formed where ceilings are applied direct to the underside of the roof rafters or trusses shall have cross ventilation for each separate space by ventilating openings protected against the entrance of snow and rain. The net free ventilation area for each space shall be not less than 1/150 of that area of the space ventilated. One-half of this required ventilating area shall be provided in the upper one-third portion of the space to be ventilated and the remaining required ventilating area shall be evenly distributed at eave vents. A minimum continuous opening of 1.5 inches in width shall be provided at the eave vents. The openings shall be covered with corrosion-resistant metal mesh covering.

EXPLANATION

This amendment clarifies the area and positioning requirements for attic ventilation and eliminates the option of reducing ventilation area by one half. It further requires that continuous eave vents be installed having an opening of at least 1.5 inches similar to that required in BEES.

UNIFORM MECHANICAL CODE

UMC 301 Equipment

Add the following sentence:

Equipment shall conform to the requirements of this code and shall meet or exceed the manufacturer's federal requirements (National Appliance Efficiency Act) for energy-efficient performance at time of installation.

EXPLANATION

The provisions of this act require that a specific efficiency rating be attained for newly manufactured heating appliances. For instance a new, oil fired boiler must achieve a fuel utilization efficiency of not less than 80 percent. Factory new appliances, if installed properly will automatically comply with these provisions. Used appliances may require testing to verify compliance.

PART II

**STATE OF ALASKA BUILDING ENERGY
STANDARD**

ADOPTION

The State of Alaska Building Energy Efficiency Standard (BEES) published September 1, 1991 as promulgated by the Department of Community and Regional Affairs is adopted effective 1-1-94 and amended as follows:

AMENDMENTS

1. 2 Purpose.

Replace this section with the following:

The purpose of this standard is to regulate the design and construction of the exterior envelopes for the purpose of effective conservation of energy within a residential building as governed by the 1991 Uniform Building Code. A residential building shall be as defined by Section 1201 of the 1991 Uniform Building Code.

EXPLANATION:

These energy standards will apply to all new residential construction within the City of Fairbanks to include apartment houses and hotels.

1.3 Policies

Delete in its entirety.

EXPLANATION:

This section regarding State of Alaska policies and intent is not relevant.

1.5 Compliance Methods

A fifth method of compliance has been added to this Standard.

Fairbanks Prescriptive Thermal Standard - Chapter 8. In order to obtain compliance with Chapter 8, all local building code amendments, including

local amendments to the State of Alaska Building Energy Efficiency Standard, shall be incorporated in the design and construction of a residential building. Compliance with Chapter 8, (Fairbanks Prescriptive Thermal Standards), shall be considered equivalent to the provisions set forth in the State of Alaska Building Energy Efficiency Standard.

Compliance with the Performance Method (Chapter 4) and the Building Budget Method (Chapter 5) shall be substantiated by calculations and a detailed plan review of thermal characteristics prepared by a licensed professional Architect or Engineer.

EXPLANATION:

The Fairbanks Prescriptive Thermal Standards (Chapter 8) represents one of five methods of compliance with BEES. It is intended to be equivalent to the least restrictive of the other four options, yet represents a simple prescriptive approach. This section calls attention to the fact that all other construction codes adopted by the City must be complied with in addition to the provisions of Chapter 8 in order to provide compliance with the amended BEES. In other words, Chapter 8 (as follows) and the collective Fairbanks building code requirements are stand-alone documents - **The State of Alaska BEES need not be consulted whatsoever under this option.**

Furthermore, in an effort to avoid the delays and expense associated with the review of the **Performance and Budget Methods** it is required that professional designers provide the Building Department with the appropriate evidence of compliance upon application for a building permit.

1.6 Alternate Materials And Construction Methods.

This section is revised as follows:

The provisions of this Standard do not prevent the use of a material or method of construction not specifically prescribed by this Standard provided the alternative has been approved and its use authorized as complying with this Standard by the Building Official. For the purpose of this standard a complete and comprehensive design prepared by a licensed professional designer shall provide prima facie evidence of compliance with the intent of these provisions. The Building Official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding alternatives. The details of any action granting

approval of an alternate will be recorded and entered in the files of the Building Department.

EXPLANATION

This provision leaves all authority for the approval of alternate methods and materials with the Building Official rather than a State of Alaska official. As well, it is stated that a comprehensive design prepared by a registered professional shall be exempt from further review with regard to energy provisions. This is believed to be appropriate in that professional designers should be capable of providing a complete and integrated design as part of their overall package.

CHAPTER 8

FAIRBANKS PRESCRIPTIVE THERMAL STANDARDS

EXTERIOR GLAZING

8.1

The total area of exterior glazed openings shall not exceed 12 percent of the floor area of the conditioned spaces.

EXPLANATION

This equates to the 12% window to wall ratio used at a break point in the Energy Rated Homes Method.

VAPOR RETARDER

8.2

A. All exterior wall, ceiling, roof and floor assemblies which enclose heated spaces and which are exposed to outdoor ambient temperatures shall be protected against water vapor transmission.

B. All such assemblies shall have installed, on the heated side of insulation or air spaces, an approved vapor retarder. The vapor retarders shall be installed such that as a minimum 75% of the required R-Value will be located on the cold side of the vapor retarder.

C. An approved vapor retarder shall be a membrane with a minimum perm rating of 0.06 perms (equivalent to 6 mil. polyethylene sheeting).

D. The vapor retarder shall be continuous and shall be installed to remain continuous for the lifetime of the structure. "Continuous" shall be defined as without penetrations, openings or holes, to the extent achievable using good workmanship. The vapor retarder shall be lapped a minimum of 24 inches or one framing member.

EXPLANATION

This language is believed to adequately address the subject without unnecessary details and complexity.

DOMESTIC WATER HEATING

8.3

Compliance with domestic hot water heating can be achieved by any of the following options:

A. DOMESTIC HOT WATER STORAGE TANKS. Domestic hot water storage tanks when installed in an unconditioned space shall be insulated to a minimum R-16 when the primary source of heating is electric. If the primary source of heating is non-electric, a minimum R-10 insulation is required. Domestic hot water storage tanks when installed in a conditioned space shall be insulated to a minimum R-5 regardless of energy source.

B. TANKLESS COILS. Tankless coils shall be installed in accordance with the manufacturer's instructions and recommendations to assure proper hot water flow during normal usage.

C. EXTERNAL TYPE SIDE-ARM WATER HEATERS. External type side-arm water heaters shall be insulated in accordance with Option "A".

EXPLANATION

One of these options must be chosen depending on the means of hot water storage. A garage with a means of temperature control will be considered a conditioned space. Option A - This option will require thermal resistance of a minimum R-5 for hot water heaters in a typical installation and up to R-16 if installed within an unconditioned space such as an under-floor crawl space.

Option B - This option applies to a standard boiler without any additional means for storage. The flow restrictor supplied with the appliance must be installed in accordance with the manufacturers recommendations.

Option C - This option would most typically apply to storage tanks that are heated by means of a circulation loop from the boiler. Unless installed within an unconditioned space, these tanks must have a minimum thermal resistance equal to that required with option A.

THERMAL ENVELOPE REQUIREMENTS

8.4

The following minimum thermal envelope insulation requirements shall be provided under the City of Fairbanks Prescriptive Thermal Standards described in this chapter.

Minimum R-Value Requirement

Ceiling ¹	38
Above Grade Wall	21
Exposed Floor ²	38
Slab ³⁴	10
Windows	3
Doors	7
Rim Joist ⁵	19
Below Grade Wall ⁶	10

Footnotes:

- 1. Ceiling insulation may be reduced to R-30 over exterior wall top plates to accommodate differing roof design.**
- 2. This shall not apply to floors over a conditioned or semi-conditioned space such as a crawl space.**
- 3. Concrete slab-on-grade foundations with thickened perimeters shall not have insulation placed beneath the footing portion unless bearing upon entirely non-frost-susceptible soils.**

4. Horizontally placed slab insulation shall be required only around the perimeter 24 inches. Slab insulation may be omitted if the foundation wall adjacent to such slab is fully insulated and a thermal break is provided between the foundation wall and the slab edge.

5. The rim joist area shall be insulated and sealed to prevent air infiltration. A continuous bead of flexible sealant is required between the floor sheathing and the top surface of the rim joist. A continuous bead of flexible sealant is also required between the sill plate and the bottom of the rim joist. Refer to typical Standard Foundation Detail SFD-1.

6. The required insulation shall extend above grade such that insulation is provided for the entire vertical height of the foundation wall. The insulation shall be protected by an approved metal flashing. Refer to typical Standard Foundation Wall Detail SFD-1.

EXPLANATION

These thermal resistance values are thought to be practical and in common use within Interior Alaska. While values in excess of these may be desirable, it is believed that the minimum R - values adopted by government should indeed be minimums. As well, these values appear to satisfy the state subsidized Four Star Energy Rated Home criteria found in BEES. Consult a building inspector should questions arise with regard to the application of these requirements or the footnotes.