Alaska Housing Finance Corporation

Alaska-Specific Amendments to IECC 2018

November 28, 2018

This document is a list of Alaska-specific amendments to the International Energy Conservation Code 2018, First Printing, August, 2017 (IECC 2018) adopted by the Alaska Housing Finance Corporation (AHFC) on Wednesday, November 28, 2018. It is meant to be read in conjunction with the IECC 2018 and ASHRAE 62.2 2016 which may be purchased at local bookstores or online. These amendments comprise both the Commercial and Residential Building Energy Efficiency Standards (BEES) for AHFC-funded residential mortgage loans and energy rebates, and energy retrofits of public buildings. These amendments supplant the BEES amendments to IECC 2012 for commercial and residential projects as adopted on June 18, 2014 and together with the IECC 2018 and other referenced standards therein constitute the "Alaska BEES." These amendments are numbered and organized by the chapter and section numbers found in the IECC 2018 and follow immediately:

R101.1 Title.

This code shall be known as the Alaska Building Energy Efficiency Standard (BEES) for projects financed by the Alaska Housing Finance Corporation (AHFC), and shall be cited as such. It is referred to herein as "this code."

R101.5.2 BEES Certification

Certification that a building meets the thermal and ventilation requirements of the Alaska Building Energy Efficiency Standard (BEES) as adopted by 15 AAC 155.010 shall be recognized through the PUR-101 Form.

R101.5.2.1 BEES Certification using the Energy Rating Compliance Path.
For AHFC PUR-101 certification under the energy rating (performance) path, the energy rater shall rely on inspection and documentation as specified by the AHFC Energy Rating Program provided for in Section R405.3 (Performance-based compliance).

R101.5.3

BEES Certification using the prescriptive method only applies to residential portions of mixed-use buildings where the performance-based method is not possible. For buildings where the performance method is possible, the prescriptive method is not a compliance path.

R102.1 General.

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, The code official shall have the authority to approve an alternative material, design or method of construction upon application of the owner or the owner's authorized agent. The code official shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code for strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the code official shall respond to the applicant, in writing, stating the reasons why the alternative was not approved.

R102.1.1 Above code programs.

The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy-efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy-efficiency program shall be considered to be in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.

Section R103 BEES Compliance Documents

R103.1 General

Technical reports and other supporting data shall be submitted with the AkWarm Energy Rating file as described in the AK HERS Guidelines or in the AHFC Minimum Construction Guidelines.

SECTION R105 INSPECTIONS

R105.1 GENERAL.

All BEES inspections shall be as indicated in the AHFC Minimum Construction Standards.

R109 Board of Appeals

R109.1 General.

In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code shall follow the Alaska Administration Code 15 AAC 150.210 Appeal for Reconsideration.

Section 202 General Definitions

CODE OFFICIAL. The officer or other designated duly authorized representative of AHFC

R301.1

Climate zones from Figure A301.1 or Table A301.1 shall be used for determining applicable requirements from Chapter 4.

Figure A301.1 Alaska Census Area

Table A301.1(1) Climate Zones for Alaska by Census Area

Table A301.1(1) Climate Zones for Alaska by Census Area

Zone 6	Zone 7	Zone 8	Zone 9
Juneau	Aleutians East	Bethel	North Slope
Ketchikan Gateway	Aleutians West	Denali	
Prince of Wales	Anchorage	Fairbanks North Star	
Sitka	Bristol Bay	Nome	
Skagway-Hoonah- Angoon	Dillingham	Northwest Arctic	
Wrangell-Petersburg	Kenai Peninsula	Southeast Fairbanks	
Yakutat	Kodiak Island	**Kusilvak** [Wade-Hampton]	
Haines	Lake and Peninsula	Yukon-Koyukuk	
	Matanuska-Susitna		
	Valdez-Cordova		

Table A301.1(2) Climate Zones for Alaska by HDD[a]

Table A301.1(2) - Climate Zones for Alaska by HDD[a]			
IECC zones for Alaska	HDD[a] Range (IECC)	Old BEES Climate Regions	HDD[a] Range (Old BEES)
Zone 6	7200 - 9000	Region 1 – Southeast	7000-10,700
Zone 7	9000 -12,600	Region 2 - Southcentral	8600-13,500
Zone 8	12,600 - 16,800	Region 3&4 - Interior & Western	11,300-17,700
Zone 9	16,800 - 21,000	Region 5 – Arctic Slope	16,900-20,300

R303.1.1 Building thermal envelope insulation.

An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation that is 12 inches (305 mm) or greater in width. Alternatively, the insulation installers shall provide a certification that indicates the type, manufacturer and *R*-

value of insulation installed in each element of the *building thermal envelope*. For blown-in or sprayed insulation, the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be indicated on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and the *R*-value of the installed thickness shall be indicated on the certification. For insulated siding, the *R*-value shall be on a label on the product's package and shall be indicated on the certification.
The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Exception: For roof insulation installed above the deck, the *R*-value shall be labeled as required by the material standards specified in Table 1508.2 of the *International Building Code* or Table R906.2 of the *International Residential Code*, as applicable.

R303.1.1.1 Blown-in or sprayed roof and ceiling insulation.

The thickness of blown-in or sprayed roof/and ceiling insulation shall be written in inches (mm) on markers that are installed at not less than one for every 300 square feet (28 m^2) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers not less than 1 inch (25 mm) in height. Each marker shall face the attic access opening. The thickness and installed *R*-value of sprayed polyurethane foam insulation shall be indicated on the certification provided by the insulation installer.

R401.1 Scope.

This chapter applies to residential buildings and the residential portion of buildings with mixed occupancies constructed under the IRC.

R401.2 Compliance.

Projects shall comply with one of the following:

1. Sections R401 through R404. Prescriptive method can only be used for residential portions of mixed-use buildings.
2. Section R405 and the provisions of Sections R401 through R404 indicated as "Mandatory."
3. THE ALASKA AKWARM BEES RATING APPROACH IN SECTION R406

R401.3 Certificate (Mandatory).

A permanent certificate shall be completed by the Energy Rater and made available to the owner to be posted on a wall in the space where the furnace is located, a utility room, electrical

panel or an approved location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the predominant *R*-values of insulation installed in or on ceiling/s, roofs, walls, foundation components such as slabs, *basement walls,* crawl space walls and floor)s and ducts outside *conditioned spaces*; *U*-factors of fenestration and the *solar heat gain coefficient* (SHGC) of fenestration, and the results from any required duct system and *building* envelope air leakage testing performed on the *building*. Where there is more than one value for each component, the certificate shall indicate the value covering the largest area. The certificate shall indicate the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters.

R402.1 General (Prescriptive) Certain Group R Division 2 occupancy designated dwelling units must comply with the relevant Code sections listed in the 2018 IBC, IMC as adopted & approved by the Authority Having Jurisdiction.

R402.1 - R402.3 (Prescriptive).

IECC 2018 Sections R402.1 through R402.3, describe the prescriptive method for compliance and establish minimum thermal envelope insulation, fenestration requirements, duct insulation levels, and lighting equipment specifications for *residential* buildings. IECC 2018 Tables 402.1.1 and 402.1.3 shall be replaced with Tables R-A402.1.1 and R-A402.1.3, respectively. In these replacement tables, below, only the zones applicable to Alaska are given (i.e., 6-9). These zones are defined in Chapter 3[RE].

Table R-A402.1.1 Nominal Insulation and Glazing Minimum R-values by Component

Climate Zone	Windows, Doors & Skylights	Ceiling[a]	Exterior Wood Frame Wall	Floor	Below Grade Wall[b]	Slab[c] & Depth	Crawl Space Wall[b]
6	3.33	54 or 43	25	38	15/19	15, 4ft	15/19
7	3.33	54 or 43	25	38	15/19	15, 4ft	15/19
8	4.5	59 or 48	30	38	15/19	15, 4ft	15/19
9	5	65 or 52	35	43	NR	NR	NR

a. The smaller value may be used with a properly sized, energy-heel truss. Zones 6 and 7 may use a 13" energy heel truss.
b. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home.
c. R-5 shall be added to the required slab edge R-values for heated slabs.
d. A vapor retarder may be installed within the thermal insulation so long as the R-value of the thermal insulation on the warm side of the vapor retarder does not exceed one third of the total R-value. [Note that "one third" is a general statewide maximum and more restrictive values may be needed in the colder climate zones.

Table R-A402.1.3 Assembly Insulation and Glazing Maximum U-factors[a]							
Climate Zone	Windows, Doors & Skylights	Ceiling	Exterior Wood Frame Wall	Floor	Below Grade Wall	Slab	Crawl Space Wall
6	0.30	0.023	0.048	0.028	0.050	0.067	0.050
7	0.30	0.023	0.048	0.028	0.050	0.067	0.050
8	0.22	0.021	0.042	0.028	0.050	0.067	0.050
9	0.20	0.020	0.036	0.026	NR	NR	NR

a. Nonglazing U-factors shall be obtained from measurement, calculation or an approved source.

R402.2.1 Ceilings with attic spaces.

Where Section R402.1.2 requires R-38 insulation in the ceiling, installing R-30 over 100 percent of the ceiling area requiring insulation shall satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Where Section R402.1.2 **requires R-43, R-48, or R-52 shall be deemed to satisfy the requirement for R-54, R-59, or R-65, respectively, wherever the full height of the uncompressed R-43, R-48, or R-52 insulation extends over the wall top plate at the eaves. In all cases, the installed insulation shall not compromise required attic ventilation clearances.** This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.4 and the Total UA alternative in Section R402.1.5.

R402.1.2 Insulation and Fenestration Criteria

Add the following statement to end **"If continuous exterior insulation is used to meet building thermal envelope criteria, a dew-point calculation must be performed to show that condensation within the building envelope assembly is adequately addressed."**

R402.2.2 Ceilings without attic spaces.
Where Section R402.1.2 requires insulation *R*-values greater than R- 30 in the ceiling and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation *R*-value for such roof/ceiling assemblies shall be R-30. Insulation shall extend over the top of the wall plate to the outer edge of such plate and shall not be compressed. This reduction of insulation from the requirements of Section R402.1.2 shall be limited to 500 square feet (46 m^2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.4 and the Total UA alternative in Section R402.1.5.

R402.2.4 Access hatches and doors.
Access doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weather-stripped **and sealed to prohibit air movement** and insulated to a level equivalent to the insulation on the surrounding surfaces. Access that prevents damaging or compressing the insulation shall be provided to all equipment. Where loose-fill insulation is installed, a wood-framed or equivalent baffle or retainer shall be installed to prevent the loose-fill insulation from spilling into the living space when the attic access is opened. The baffle or retainer shall provide a permanent means of maintaining the installed *R*- value of the loose-fill insulation.

R402.2.5 Mass walls.
Mass walls where used as a component of the building thermal envelope shall be one of the following:

1. Above-ground walls of concrete block, concrete, insulated concrete form, masonry cavity, brick but not brick veneer, adobe, compressed earth block, rammed earth, solid timber or solid logs.
2. Any wall having a heat capacity greater than or equal to 6 Btu/ft2 • °F (123 kJ/~~m~~ • K).

R402.2.8 Floors.
Floor framing-cavity insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. **Insulation installed around systems in the flooring, shall be installed per the manufacturer's instructions.**

Exception: As an alternative, the floor framing-cavity insulation shall be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing

where combined with insulation that meets or exceeds the minimum wood frame wall *R*- value in Table R402.1.2 and that extends from the bottom to the top of all perimeter floor framing members.

R402.2.11 Crawl Space Walls

As an alternative to insulating floors over crawl spaces, crawl space walls shall be insulated provided that the crawl space is not vented to the outdoors. Crawl space wall insulation shall be permanently fastened to the **exterior wall surface** and shall extend downward from the floor to the **footer** and then vertically or horizontally for not less than an additional 24 inches (610 mm). Exposed earth in unvented crawl spaces foundation shall be covered with a continuous Class 1 vapor retarder in accordance with the International Building Code or International Residential Code, as applicable. Joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (153 mm) up stem walls and shall be attached to the stem walls.

R402.4.1.2 Testing.

The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour in Climate Zones 1 and 2, and **four** air changes per hour in Climate Zones 3 through 8. Testing shall be conducted in accordance with ICC 380, ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weather-stripping or other infiltration control measures.

2. Dampers including exhaust, intake, makeup air, back-draft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.

3. Interior doors, if where installed at the time of the test, shall be open.

4. Exterior door or interior terminations for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.

5. Heating and cooling systems, if where installed at the time of the test, shall be turned off.

6. Supply and return registers, if where installed at the time of the test, shall be fully open.

R402.4.3 Fenestration air leakage.
Windows, skylights and sliding glass doors shall have an air infiltration rate of not greater than 0.3 cfm per square foot (1.5 L/s/m), and for swinging doors, not greater than 0.5 cfm per square foot (2.6 L/s/m), when tested in accordance with NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

R403.1 Controls (Mandatory).

Not less than one thermostat shall be provided for each separate heating and cooling system.

Exception – Solid fuel burning devices that are not designed to be controlled with a thermostat. Example: Fireplace

R403.1.1 Programmable thermostat.
The thermostat controlling the primary heating or cooling system of the dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures of not less than 55°F (13°C) to not greater than 85°F (29°C). The thermostat shall be programmed initially by the manufacturer with a heating temperature set point of not greater than 70°F (21°C) and a cooling temperature set point of not less than 78°F (26°C).

R403.3.1 Insulation (Prescriptive).
Installing supply and return ducts in other portions of the building shall be insulated to not less than R-6 for ducts 3 inches (76 mm) in diameter and not less than R-4.2 for ducts smaller than 3 inches (76 mm) in diameter.

Exception: Ducts or portions thereof located completely inside the *building thermal envelope.*

R403.3.5 Building cavities (Mandatory).

Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:

1. These cavities or spaces shall not be used as a plenum for supply air.
2. These cavities or spaces shall not be part of a required fire- resistance-rated assembly.
3. Stud wall cavities shall not convey air from more than one floor level.

4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fire-blocking in accordance with Section R602.8.
5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

R403.3.6 Ducts buried within ceiling insulation.

Ducts are to be installed inside the continuous air barrier and building thermal envelope of the dwelling.

EXCEPTION: SECTIONS OF THE SUPPLY DUCT THAT ARE LESS THAN 3 FEET (914 MM) FROM THE SUPPLY OUTLET SHALL NOT BE REQUIRED TO COMPLY WITH THESE REQUIREMENTS.]

R403.3.7 Ducts located in conditioned space.

For ducts to be considered as inside a conditioned space, such ducts shall comply with either of the following:

1. The duct system shall be located completely within the continuous air barrier and within the building thermal envelope.

R403.4 Mechanical system piping insulation (Mandatory).

Mechanical system piping capable of carrying fluids greater than 105^0 F (41^0 C) or less than 55^0 F (13^0 C) shall be insulated to an R-Value of not less than R-3.

R403.5.1.2 Heat trace systems.

Heat trace systems should be installed in such a manner as to prohibit water in piping from freezing. They should be installed per the manufactures instructions.

R403.5.1 Heated water circulation and temperature maintenance systems (Mandatory).
Heated water circulation systems shall be in accordance with Section R403.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.5.1.2. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.

R403.5.1.1 Circulation systems.
Heated water circulation systems **should** be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot

water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

R403.5.3 Hot water pipe insulation (Prescriptive).

Insulation for hot water piping with a minimum thermal resistance, (R-value), of not less than R-3 shall be applied to the following:

1. Piping 3/4 inch (19.1 mm) and larger in nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping located outside the conditioned space.
4. Piping from the water heater to a distribution manifold.
5. Piping located under a floor slab.
6. Buried in piping.
7. Supply and return piping in recirculation systems other than demand recirculation systems.

R403.6 Mechanical ventilation (Mandatory).

The building shall be provided with ventilation that complies with the requirements of the ANSI / ASHRAE Standard 62.2-2016 [*International Residential Code* or *International Mechanical Code*,] as applicable, or with other approved means of ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

R403.3.7 Ducts located in condition space.

For ducts to be considered as inside a conditioned space, such ducts shall comply with the following:

1. The duct system shall be located completely within the continuous air barrier and within the building thermal envelope.

R404.1 Lighting equipment.

Not less than 90 percent of the permanently installed lighting fixtures contain only high-efficacy lamps.

Exception: Low-voltage lighting.

Section R405

Simulated Performance Alternative

R405.1 Scope

Performance ratings in Alaska shall be performed based on the AK HERS Guidelines.

R405.3 Performance-based compliance.

Compliance based on simulated energy performance requires that a proposed residence (*proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's State Energy Data System Prices and Expenditures reports. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exception: The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.0. The source energy multiplier for fuels other than electricity shall be 0.8 for Spruce / Birch wood, 1.0 for Coal, #1 & #2 Oil, Propane, and Natural Gas, and 1.5 for Special Hydro.

Section R406

Energy Rating Index Compliance Alternative

R406.1 Scope

The criteria (score) in Alaska showing compliance shall be based on the AK HERS Guidelines.

Section R501

Existing Buildings – General Advisory only. Best Building practices

ASHRAE 62.2-2016 – Section 4 – Dwelling-Unit Ventilation

4.1.1 Total Ventilation Rate

The total required ventilation rate (Q_{tot}) shall be as specified in **Table R-A4.1a** or, alternatively, calculated using **Equation R-A4.1a.**

(Equation **R-A4.1a**) Ventilation rate in cubic feet per minute = (**0.03** x total square foot area of house) + **10** x (number of bedrooms +1)

Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table R-A4.1a or determined by Equation R-A4.1a.

Table R-A4.1a, Ventilation Air Requirements, cfm					
Floor Area	Bedrooms				
(ft^2)	1	2	3	4	5
<500	30	38	45	53	60
501-1000	45	53	60	68	75
1001-1500	60	68	75	83	90
1501-2000	75	83	90	98	105
2001-2500	90	98	105	113	120
2501-3000	105	113	120	128	135
3001-3500	120	128	135	143	150
3501-4000	135	143	150	158	165
4001-4500	150	158	165	173	180
4501-5000	165	173	180	188	195

4.1.3 **Different Occupant Density**. Replace "4.1a and 4.1b" with "**R-A4.1a**", "Equation 4.1" with "**Equation RA4.1a**", and "7.5 cfm (3.5 L/s)" with "**10 cfm**."

4.2 System Type. Add the following two sentences after the first one: **"Supply-only systems are not permitted in Alaska. Balanced, heat-recovery ventilation systems as described in Appendix C2.1 that provide well distributed ventilation throughout the entire occupied space**

are strongly recommended in Alaska".

ASHRAE 62.2-2016 – Section 6 – Other Requirements

6.6 Ventilation Opening Area. After the second sentence, add: "Ventilation air through an exterior door or operable window shall not be considered as part of a mechanical ventilation system design and shall not be included in a calculation showing compliance with the required minimum ventilation rate."

6.8 Air Inlets. Replace the second sentence with "The intake shall be placed so that entering air is not obstructed by snow, plantings, or other material, and shall be located at least 18 inches above an adjacent finished grade." Add an additional exception: "(d) A ventilation system's supply and exhaust vents on the exterior of a building may be separated less than 10 feet as long as they are separated a minimum of 6 feet horizontally. They may be separated less than this if they are part of a system engineered to prevent entrainment of the exhaust air. Care should be taken to locate an intake vent where it can be easily cleaned at regular intervals."

ASHRAE 62.2-2016 – Section 7 – Air-moving Equipment

7.1 Selection and Installation. Add at end of subsection: "A ventilation appliance shall be located in a place that is accessible and convenient to access for annual or more frequent maintenance (changing of filters, oiling, cleaning, etc.)".

ASHRAE 62.2-2016 – Informative Appendix C (not part of standard)

C1.0 Exhaust Ventilation. For exhaust-only systems, passive intake vents should be provided where the sum of the intake capacity is at least equal to the exhaust rate and no single intake vent is rated at more than 25 cfm." In very cold climates, intakes that do not temper the incoming ventilation air have proven sufficiently problematic, that their use is strongly discouraged. A mechanical system with balanced supply and exhaust fan rates is strongly preferred. C2.0 Distribution and Circulation of Supply Air. A ventilation system should be designed and installed to uniformly mix and circulate supply air throughout the occupiable space. Supply air should be introduced into a room in a manner that does not create human discomfort and is not potentially damaging to the building. There should be adequate air circulation into and out of a room at all times. A door or transom louver, undercut door, wall transfer fan, return grille or other means should be used.

This is the end of the amendments to ANSI/ASHRAE Standard 62.2-2016.

Numbering resumes according to the IECC 2018:

C101.1Title.

This code shall be known as the **Alaska Building Energy Efficiency Standards (Alaska BEES)**

C103,C104, C107, C108 & C109

AHFC'S administration requirements for the Alaska Energy Efficiency Revolving Loan Program can be found online at:

https://www.ahfc.us/efficiency/non-residential-buildings/energy-efficiency-revolving-loan-fund-aeerlp/

Chapter 2 [CE] – Definitions.

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative **of the Alaska Housing Finance Corporation**.

C301.1General.

Climate zones from **Figure A301.1 or Table A301.1(1)** shall be used for determining the applicable requirements from Chapter 4. Locations not indicated in **Table A301.1** shall be assigned a *climate zone* in accordance with Section C301.3.

Figure A301.1 Alaska Census Area

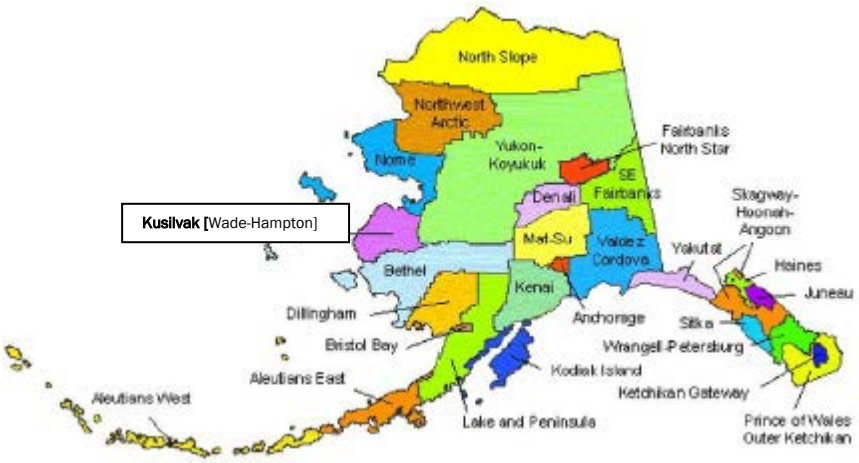

Table A301.1(1) Climate Zones for Alaska by Census Area			
Zone 6	Zone 7	Zone 8	Zone 9
Juneau	Aleutians East	Bethel	North Slope
Ketchikan Gateway	Aleutians West	Denali	
Prince of Wales	Anchorage	Fairbanks North Star	
Sitka	Bristol Bay	Nome	
Skagway-Hoonah-Angoon	Dillingham	Northwest Arctic	
Wrangell-Petersburg	Kenai Peninsula	Southeast Fairbanks	
Yakutat	Kodiak Island	**Kusilvak** [Wade Hampton]	
Haines	Lake and Peninsula	Yukon-Koyukuk	
	Matanuska-Susitna		
	Valdez-Cordova		

Table A301.1(2) - Climate Zones for Alaska by HDD[a]			
IECC zones for Alaska	HDD[a] Range (IECC)	Old BEES Climate Regions	HDD[a] Range (Old BEES)
Zone 6	7200 - 9000	Region 1 - Southeast	7000-10,700

Zone 7	9000 -12,600	Region 2 - Southcentral	8600-13,500
Zone 8	12,600 -16,800	Region 3&4 - Interior & Western	11,300-17,700
Zone 9	16,800 -21,000	Region 5 – Arctic Slope	16,900-20,300

a. HDD = Heating Degree Day (based on 65 degrees Fahrenheit)

CHAPTER 4 [CE] - Commercial Energy Efficiency

C401.2 Application.

Commercial buildings shall comply with

1. The requirements of ANSI/ASHRAE/IESNA 90.1 **as amended in Appendix A of this document.**

C402.1 General (Prescriptive).

Throughout this section IECC 2012 Tables C402.1.2, C402.2(1), and C402.3 shall be replaced with Tables C-A402.1.2, C-A402.2(1), and C-A402.3 respectively, below.

Table C-A402.1.2 Opaque Thermal Element Assembly Requirements[a]

Climate Zone	6		7		8		9	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs								
Insulation entirely above deck	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028	U-0.025	U-0.025
Metal Buildings	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029	U-0.025	U-0.025
Attic and other	U-0.021	U-0.021	U-0.021	U-0.021	U-0.020	U-0.020	U-0.017	U-0.017
Walls, Above Grade								
Mass	U-0.066	U-0.066	U-0.050	U-0.050	U-0.040	U-0.040	U-0.033	U-0.033
Metal building	U-0.052	U-0.052	U-0.048	U-0.039	U-0.042	U-0.039	U-0.034	U-0.034
Metal framed	U-0.057	U-0.057	U-0.048	U-0.048	U-0.037	U-0.037	U-0.032	U-0.032
Wood framed and other	U-0.051	U-0.051	U-0.050	U-0.050	U-0.036	U-0.036	U-0.030	U-0.030
Walls, Below Grade								
Below grade wall[b]	C-0.100	C-0.100	C-0.079	C-0.079	C-0.067	C-0.067	C-0.050	C-0.050
Floors								
Mass	U-0.060	U-0.057	U-0.055	U-0.051	U-0.051	U-0.051	U-0.048	U-0.048
Joist/Framing	U-0.033	U-0.033	U-0.033	U-0.033	U-0.026	U-0.026	U-0.023	U-0.023
Slab-on-Grade Floors								
Unheated slabs	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40	NR	NR
Heated slabs	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55	NR	NR

a. When heated slabs are placed below-grade, walls must meet the *F*-factor requirements for perimeter insulation according to the heated slab-on-grade construction.

Table C-A402.2 Opaque Thermal Element Requirements [a]

Climate Zone	6		7		8		9	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs								
Insulation entirely above deck	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci	R-40ci	R-40ci
Metal buildings (with R-5 thermal blocks)[a, b]	R-25 + R-11LS	R-25 + R-11LS	R-30 + R-11LS	R-30 + R-11LS	R-30 + R-11LS	R-30 + R-11LS	R-19 + R-21LS	R-19 + R-21LS
Attic and other	R-49	R-49	R-49	R-49	R-49	R-49	R-60	R-60
Walls, Above Grade								
Mass	R-15.2ci	R-15.2ci	R-20ci	R-20ci	R-25ci	R-25ci	R-30ci	R-30ci
Metal building	R-13 + R-13ci	R-13 + R-13ci	R-19 + R-10ci	R-19 + R-10ci	R-21 + R-10ci	R-21 + R-10ci	R-21 + R-15ci	R-21 + R-15ci
Metal framed	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-11.4ci	R-13 + R-15.6	R-13 + R-17.5ci	R-13 + R-17.5ci	R-13 + R-20.1ci	R-13 + R-20.1ci
Wood framed and other	R-11 + R-10.4ci	R-11 + R-10.4ci	R-11 + R-11.4ci	R-11 + R-11.4ci	R-13 + R-15.6ci	R-13 + R-15.6ci	R-13 + R-22.8ci	R-13 + R-22.8ci
Walls, Below Grade								
Below grade wall[c]	R-10ci	R-10ci	R-12.5ci	R-12.5ci	R-15ci	R-15ci	R-20ci	R-20ci
Floors								
Mass	R-14.6ci	R-14.6ci	R-16.7ci	R-16.7ci	R-18.8ci	R-18.8ci	R-20.9ci	R-20.9ci
Joist/framing[d]	R-30/38	R-30/38	R-30/38	R-30/38	R-38/43	R-38/43	R-43/50	R-43/50
Slab-on-Grade Floors								
Unheated slabs	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 48" below	R-15 for 48" below	NR[e]	NR[e]
Heated slabs[c]	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	NR[e]	NR[e]
Opaque Doors								
Swinging	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.
LS = Liner System – A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA 90.1 Appendix A.
b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C-A402.1.2.
c. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
d. Steel floor joist systems shall be insulated to the larger value; wood systems to the smaller value.
e. No general recommendation. Slab-on-grade foundations in this zone will have to be engineered in order to not melt the underlying permafrost and still support the structure. A vapor retarder may be installed within the thermal insulation so long as the R-value of the thermal insulation on the warm side of the vapor retarder does not exceed one third of the total R-value. [Note that "one third" is a general statewide maximum and more restrictive values may be needed in the colder climate zones.

Table C-A402.3 Building Envelope Requirements: Fenestration

Climate Zone	6	7	8	9
Vertical fenestration				
***U*-factors**				
Fixed / Operable fenestration	0.33	0.286	0.25	0.20
Entrance doors	.77	.77	0.77	0.77
SHGC ≤				
SHGC: PF < 0.25	0.40	0.40	0.45	0.45
Skylights (3% maximum)				
U-factor	0.35	0.33	0.286	0.25
SHGC	0.40	NR	NR	NR

NR = No requirement.

C402.2.1Roof assembly.

The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.1.3, based on construction materials used in the roof assembly. Insulation installed on a suspended ceiling having removable ceiling tiles shall not be considered as part of the minimum thermal resistance of the roof insulation. Continuous insulation board shall be installed in not less than 2 layers and the edge joints between each layer of insulation shall be staggered.

Exceptions:

1. Replace Exception 1 with: **Continuously insulated tapered roof assemblies with an average R-value of not less than that specified in Table C-A402.2 and having not less than R-12.5 at each roof drain location**
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.1.3.
3. Two layers of insulation are not required where insulation tapers to the roof deck, such as at roof drains.

C402.2.1.2 Baffles. (New Subsection).

When eave vents are installed, baffling of the vent openings shall be provided to deflect the incoming air above the surface of the insulation.

C402.2.4 Slabs-on-grade perimeter insulation.

The minimum thermal resistance (R-value) of the insulating material shall be as specified in Table C-A402.2 and shall be installed on the exterior side of the wall. This insulation shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the floor, whichever is less.

C402.5.1.2.2 Assemblies.

Assemblies of materials and components with an average air leakage not greater than 0.04 cfm/ft^2 (0.2 L/s • m^2) under a pressure differential of 0.3 inch of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E2357, ASTM E1677 or ASTM E283 shall comply with this section. Assemblies listed in Items 1 through 3 shall be deemed to comply, provided that joints are sealed and the requirements of Section C402.5.1.1 are met. Curtain wall and store front systems shall incorporate exterior openings for ventilation and drainage of the assembly.

1. Concrete masonry walls coated with either one application of block filler or two applications of a paint or sealer coating.
2. Masonry walls constructed of clay or shale masonry units with a nominal width of 4 inches (102 mm) or more.
3. A Portland cement/sand parge, stucco or plaster not less than $^1/_2$ inch (12.7 mm) in thickness.

C402.5.2Air leakage of fenestration.

The air leakage of fenestration assemblies shall meet the provisions of Table C402.5.2. Testing shall be in accordance with the applicable reference test standard in Table C402.5.2 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

Exceptions:

1. Field-fabricated fenestration assemblies that are sealed in accordance with Section C402.5.1.
2. Fenestration in buildings that comply with the testing alternative of Section C402.5 are not required to meet the air leakage requirements in Table C402.5.2.
3. This does not include required moisture channels and exterior openings for ventilation and drainage in curtain wall and store front systems. These shall be maintained open and functional.

C402.5.7 Vestibules.

Building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so

that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following:

1. Buildings in *Climate Zones* 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space that is less than 3,000 ft2 in area and is separate from the building entrance.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. Doors that have an air curtain with a velocity of not less than 6.56 feet per second (2 m/s) at the floor that have been tested in accordance with ANSI/AMCA 220 and installed in accordance with the manufacturer's instructions. Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3.

C402.6 Moisture Control (Mandatory)

The building design shall incorporate both interior and exterior moisture control strategies to prevent the accumulation of moisture within insulated assemblies. Exterior moisture control shall comply with the IBC. Interior moisture control shall comply with section C402.5.1. Should insulated assemblies become wet, or start out wet, the design strategy shall allow the assembly to dry to either the exterior or the interior. Materials shall be allowed to dry prior to enclosure.

C402.6.1 Interior Moisture Control

Methods to control moisture accumulation within insulated assemblies from the building interior shall address both vapor diffusion and air leakage. Vapor diffusion shall be controlled by the installation of a class I or II vapor retarder on the warm-in-winter side of the insulation. The vapor retarder shall be continuous and seams shall be lapped 6 inches minimum. Penetrations and seams shall be sealed with approved tape or sealant to control air leakage. Where duct work is located in dropped ceilings adjacent to attics and exterior walls, the vapor retarder continuity shall be maintained above the dropped ceiling.

Exceptions:

1. A vapor retarder is not required in construction where moisture or its freezing will not damage materials.
2. A vapor retarder is not required on basement and crawlspace walls designed to dry to the interior.
3. A vapor retarder is not required at cantilevered floor assemblies where the floor decking consists of nominal ¾ inch OSB or other approved material having a perm rating of less than one. Joints shall be sealed in an approved manner. Joint sealing is not required where the deck is covered with concrete or a gypsum based floor topping.
4. The rim joist does not require a vapor retarder when insulated to a minimum value of R-21 with spray foam having a minimum density of 2 pounds per cubic foot.
5. A class 3 vapor retarder may be used on walls insulated to a minimum value of R-21 with spray foam having a minimum density of 2 pounds per cubic foot.
6. Up to one-third of the total installed insulation R-value may be installed on the warm side of the vapor retarder.
7. Factory manufactured insulated panels consisting of a metal skin encapsulating and bonded to a foam plastic core do not require a vapor retarder.

C403.3.1Equipment sizing (Mandatory).

The output capacity of heating and cooling equipment shall be not greater than that of the smallest available equipment size that exceeds the loads calculated in accordance with Section C403.1.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that are configured to sequence the operation of each unit based on load.
3. The total heating system may include a safety factor of up to 20%.

C403.7.7Shutoff dampers (Mandatory).

Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class I motorized dampers. The dampers shall have an air leakage rate not greater than 4 cfm/ft^2 (20.3 L/s • m^2) of damper surface area at 1.0 inch water gauge (249 Pa) and shall be labeled by an approved agency when tested in accordance with AMCA 500D for such purpose.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation, unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exception: Nonmotorized gravity dampers shall be an alternative to motorized dampers for exhaust and relief openings as follows:

1. In buildings less than three stories in height above grade plane.
2. In buildings of any height located in *Climate Zones* 1, 2 or 3.
3. Where the design exhaust capacity is not greater than 300 cfm (142 L/s).
4. **Motorized dampers shall not be required for exhaust systems where grease, lint, and similar particulates may accumulate on the damper and create a fire hazard.**

Nonmotorized gravity dampers shall have an air leakage rate not greater than 20 cfm/ft^2 (101.6 L/s • m^2) where not less than 24 inches (610 mm) in either dimension and 40 cfm/ft^2 (203.2 L/s • m^2) where less than 24 inches (610 mm) in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge (249 Pa) when tested in accordance with AMCA 500D for such purpose. The dampers shall be labeled by an approved agency.

C403.11.3 Piping insulation (Mandatory).

Piping serving as part of a heating or cooling system shall be thermally insulated in accordance with Table C403.11.3.

Exceptions:

1. Factory-installed piping within HVAC equipment tested and rated in accordance with a test procedure referenced by this code.

2. Factory-installed piping within room fan-coils and unit ventilators tested and rated according to AHRI 440 (except that the sampling and variation provisions of Section 6.5 shall not apply) and AHRI 840, respectively.
3. Piping that conveys fluids that have a design operating temperature range between 60°F (15°C) and 105°F (41°C).
4. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
5. Strainers, control valves, and balancing valves associated with piping 1 inch (25 mm) or less in diameter.
6. Direct buried piping that conveys fluids at or below 60°F (15°C).
7. Piping within baseboard radiation assemblies and piping that is intended to serve as a terminal heating device.
8. If approved by the AHFC Representative, Table C-A403.2.8 may replace Table C403.2.8, provided that the conductivity of the pipe insulation is less than or equal to 0.27 Btu per inch/h. ft2.oF.

Table C-A403.2.8 Minimum Pipe Insulation (thickness in inches)

Table C-A403.2.8 Minimum Pipe Insulation (thickness in inches)

FLUID	NOMINAL PIPE DIAMETER	
	≤ 1.5" [a]	> 1.5"
Steam	1.5	3
Hot Water	1.5	2
Chilled water, brine or refrigerant	1.5	1.5

a. For piping smaller than 1.5 inch and located in partitions within *conditioned spaces*, reduction of these thicknesses by 0.5 inch shall be permitted.

C407.5.2 Thermal blocks.

The *standard reference design* and *proposed design* shall be analyzed using identical thermal blocks as specified in Section C407.5.2.1, C407.5.2.2 or C407.5.2.3.

Exception: When modeling a simple building and using a software tool that Page 8 of 22 does not use thermal blocks.

C407.6 Calculation software tools.

Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between

the *standard reference design* and the *proposed design* and shall include the following capabilities.

1. Building operation for a full calendar year (8,760 hours).
2. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
3. Ten or more thermal zones.
4. Thermal mass effects.
5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
6. Part-load performance curves for mechanical equipment.
7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
8. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings including, but not limited to, *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF.

Exception: The AHFC Representative may approve the use of a simpler software tool, such as AkWarm-R if the building is sufficiently simple to be modeled by the proposed software tool

Appendix A: Amendments to ANSI/ASHRAE/IESNA 90.1 The following amendments refer to the ANSI/ASHRAE/IESNA Standard 90.1-2010 and are numbered according to that standard.

5.5-1 – 5.5-8. Tables 5.5-1 through 5.5-8 in ANSI/ASHRAE/IESNA Standard 90.1 describe the prescriptive method for compliance and establish minimum thermal envelope insulation and fenestration requirements for non-residential buildings. These tables shall be replaced with BEES tables C-A402.1.2, CA402.2(1), and C-A402.3. In these replacement tables, found in Chapter 4 [CE] of this document, only the zones applicable to Alaska are given (i.e., 6- 9). These zones are defined in Chapter 3[RE].

5.5.4.2.1 Vertical Fenestration Area.

Replace with: The total vertical fenestration area shall be less than 30% of the above grade wall area.

5.8.1.2 Compliance with Manufacturers' Requirements.

Delete the exception in this section.

11.2.1 Simulation Program. Add at end of section:

"AkWarm-C may be approved by the Code Official as a qualified simulation program that may be used to meet the general requirements of the energy cost budget method, provided that the subject building is not too complex to be modeled by AkWarm-C."