

## SUBCHAPTER 13-6 RESIDENTIAL BUILDING COMPLIANCE METHODS

### SECTION 13-600 ADMINISTRATION

**13-600.0 Methods of compliance.** This chapter provides three Methods by which residential buildings may be brought into compliance with this code.

**Method A, the Whole Building Performance Method.** This is a performance based code compliance method which considers energy use for the whole building, both for the envelope and its major energy-consuming systems. Under this method, points are calculated for the energy-consuming elements of an as-built house and simultaneously for a baseline house of the same configuration and orientation. The as-built points shall be less than the baseline points to comply with this code. Applicable prescriptive requirements described in Sections 601 through 612 shall also be met.

Method A may be applied to demonstrate code compliance for new residential construction, both single-family detached and multiple-family attached structures, and to additions to existing residential buildings. Existing buildings not exempt from this code may be brought into compliance by this method in accordance with the provisions of Section 101.4.2.

**Method B, the Component Prescriptive Method.** This is a prescriptive code compliance Method for residences of three stories or less and additions. Using this method, a residence would meet or exceed all requirements for one of several pre-packaged lists of minimum construction requirements.

**Exceptions:** Method B shall not be applied in the following cases:

1. New construction, excluding additions, which is only heated or cooled but not both.
2. New construction, including additions, which incorporates steel stud walls, single assembly roof/ceiling construction or skylights.
3. Residences with raised floors other than continuous stem wall structures except for Package C in north Florida, Package D in central Florida, and Package B in south Florida.

**Method C, Limited Applications Prescriptive Method.** This is a prescriptive code compliance method for residential additions of 600 square feet (56 m<sup>2</sup>) or less, renovations to existing residential buildings; heating, cooling, and water heating systems of existing buildings; and site-added components of manufactured homes and manufactured buildings. To comply by this method, all energy-related components or systems being installed or changed in the addition or renovation shall meet the minimum prescriptive levels listed for that component.

**13-600.0.ABC Compliance criteria.** Residential buildings demonstrating compliance with this code by Method A shall meet all of the criteria given in the text as specific to Method A for 1, 2, 3 and 4 below. Residential buildings utilizing Methods

B or C for code compliance shall meet all criteria specific to that Method for 1, 3 and 4 below.

1. Prescriptive requirements.
2. Performance calculation procedures.
3. Certification of compliance.
4. Reporting.

**13-600.1.ABC Prescriptive requirements.** Basic prescriptive requirements shall be met for all buildings. The Section number followed by the combined number and letters “.1.ABC” indicates these basic prescriptive requirements (i.e., prescriptive requirements that shall be met by buildings complying by either Method A, B or C) in Sections 601 through 612. Prescriptive requirements specific to Method A, B or C (i.e., “.1.B” is specific to Method B) shall be met when complying with the code by that method. Prescriptive requirements for Methods B or C may be more stringent than the basic prescriptive requirements and shall supersede them.

**13-600.1.A Prescriptive requirements specific to Method A.** Prescriptive requirements specific to Method A are included in the text under the applicable building component section. Primary compliance is by Form 600A which is a performance-based method.

**13-600.1.B Prescriptive requirements specific to Method B.** All of the prescriptive requirements listed for one of the five or six alternate compliance packages of building components listed on Table 6B-1 of Form 600B shall be met or exceeded. No substitutions or variations less energy efficient than the established levels and standards listed for each component type shall be permitted for the compliance package chosen.

Any practice, system, or rating for which the multiplier in Method A is lower than the multiplier of the prescribed practice or system in the same climate zone may be used to comply with the compliance package prescriptives. No components or systems shall be installed with efficiencies less than the basic prescriptive requirements for that component or system.

**13-600.1.C Prescriptive requirements specific to Method C.** Method C is a prescriptive code compliance method. It requires meeting or exceeding the prescriptive requirements specific to this method described in Sections 601 through 612 and listed on Tables 6C-1, 6C-2 and 6C-3 of Form 600C, where applicable.

**13-600.1.C.1 Additions.** Prescriptive requirements shall apply only to building components and equipment being added to an addition or replaced in an existing building to service an addition. Existing components or systems in a residence need not meet the prescriptive requirements. Substitutions or variations that are less energy efficient than the prescribed efficiency levels and standards listed shall not be permitted.

**13-600.1.C.2 Renovations.** Prescriptive requirements shall apply only to those components or systems being repaired or replaced.

**13-600.1.C.3 Manufactured homes and manufactured buildings.** Prescriptive requirements specified for manufactured homes and manufactured buildings shall be met for all site-installed components and features of such buildings at the time of first setup. Complete code compliance shall be demonstrated for manufactured buildings.

**13-600.2 Performance calculation procedures.**

**13-600.2.A Performance calculation procedures for Method A.** The calculation procedures contained in Form 600A shall be used to demonstrate code compliance of the building design for residential buildings complying by Method A of this chapter. The building components' efficiency levels specified in this performance compliance calculation are the minimum efficiencies allowed to be installed in the building unless a recalculation is submitted to the building department.

The Method A calculation shall result in either a pass or fail status for a building. To pass, the total points calculated for the as-built house shall be less than or equal to the total points calculated for the baseline house.

Energy points shall be calculated for an as-built house and a baseline house using actual house configuration and component net areas. Cooling points, heating points and water heating points shall be calculated separately and then summed. For a complete description of how to complete Form 600A, see the *Residential Instruction Manual*.

**13-600.2.A.1 General.**

**13-600.2.A.1.1 Multipliers.** Multipliers are provided on Form 600A for commonly installed technologies for each building component. Multipliers for some less commonly installed technologies are provided in Appendix 13-C to this chapter and are referenced by the appropriate code section.

Interpolations of multipliers are allowed by the procedure described in Section 1.3 of Appendix 13-C of this chapter where rated efficiencies of installed components fall within a range. Extrapolations of multipliers above the highest value given or below the lowest values given shall not be permitted. Multipliers are interpolated automatically in the FLA/RES computer program.

**13-600.2.A.1.2 Insulation R-values.** R-values used to determine the appropriate multiplier for the insulation level installed shall be the R-value of the added insulation only. Appendix 13-C, Section 1.2, contains general rules for insulation which shall be followed.

**13-600.2.A.1.3 Areas.** Areas used in the calculation shall be the actual net areas for each component determined from the plans and specifications of the building to be constructed.

**13-600.2.A.1.4 Use of fenestration U-factors and SHGCs in FLA/RES.** The FLA/RES computer program shall permit the user to input specific U-factors and SHGCs for fenestration products (windows, doors and skylights), and shall allow credit for actual values input by users. In the absence of such actual values, the computer program shall incorporate the appropriate default values for the standard default window types (single, double, clear and tinted) (see Table 601.1.ABC.1).

**13-600.2.A.2 Residences not heated or not cooled.** Residences which are heated or cooled, but not both, shall complete

both summer and winter calculations. The baseline system multiplier divided by the multiplier for an R-6 duct from Form 600A shall be used for the heating or cooling system not installed. The duct multiplier for the duct system to be installed shall be used for both calculations.

If an addition or part of an addition is claimed to be exempt from the code because it will be neither heated nor cooled, the exempt area shall be fully separated from the conditioned area by walls or doors.

**13-600.2.A.3 Additions.**

**13-600.2.A.3.1 Additions complying alone.** Additions to existing buildings shall follow the same Method A calculation procedure as new construction with the following qualifications.

1. Calculations shall be conducted using only the components of the addition itself, including those preexisting components which separate the addition from unconditioned spaces.
2. Heating and cooling system multipliers shall be equal to the baseline system multiplier unless new equipment is installed to replace existing equipment or to service the addition specifically. Addition of new equipment may qualify for multizone credit (see Section 607.2.A.3.2) if all other criteria are met. The multiplier for the new ductwork to supply the addition shall be used in the calculation.
3. Water heating is not included in the calculation unless a supplemental water heater is installed, an existing water heater is replaced, or an alternative water heater (gas, solar, HRU, dedicated heat pump) is installed to gain credit.

**13-600.2.A.3.2 Additions unable to comply alone.** Section 101.2.2 allows additions to either comply with the code requirements for the addition alone or by demonstrating that the entire building including the addition complies with the code requirements for new buildings. Section 101.4.2.1 contains restrictions which shall apply if the entire building is used to demonstrate compliance.

**13-600.2.A.4 Multiple-family occupancies.**

**13-600.2.A.4.1 Common conditioned spaces.** Common conditioned spaces occurring in multifamily buildings that are not part of specific tenancy units, such as corridors, lobbies, recreation rooms, offices, etc., shall be calculated using one of the following procedures.

1. No energy use calculation is required for common areas if less than 5 percent of the building area is used for such common areas.
2. Corridors, lobbies and similar areas shall be calculated using Subchapter 13-4.
3. Nonresidential occupancies within a multifamily structure such as cafeterias, offices, and gyms shall be calculated in accordance with Subchapter 13-4.

**13-600.2.A.5 Worst-case calculations.** Residential occupancies which are identical in configuration, square footage, and building materials may comply with the code by performing a worst-case calculation. When submitting worst-case calculations, copies of the Form 600A shall be submitted or referenced

with each set of plans, dependent on the requirements of the building department.

**13-600.2.B Performance calculation procedures for Method B.** No performance requirements exist for Method B.

**13-600.2.C Performance calculation procedures for Method C.** No performance requirements exist for Method C.

**13-600.3 Certification of compliance.**

**13-600.3.ABC.1 Code compliance preparation.**

**13-600.3.ABC.1.1 Single-family residential, duplexes, townhouses.** No license or registration is required to prepare the code compliance form for single-family residential, duplexes and townhouses. The person preparing the compliance form shall certify that the plans and specifications covered by the form, or amendments thereto, are in compliance with Chapter 13 of the *Florida Building Code, Building*.

**13-600.3.ABC.1.2 Multiple-family residential.** Form preparation for multiple-family dwellings, with the exception of duplexes and townhouses as exempted by Section 481.229, *Florida Statutes*, shall be made a part of the plans and specifications for the building and require signing and sealing by an architect or engineer registered in the state of Florida with the exception of buildings excluded by Section 481.229, *Florida Statutes*, or Section 471.003, *Florida Statutes*. Calculations for buildings falling within the exception of Section 471.003, *Florida Statutes*, may be performed by air conditioning or mechanical contractors licensed in accordance with Chapter 489, *Florida Statutes*, or by state of Florida certified commercial building energy raters.

**13-600.3.ABC.2 Code compliance certification.** The building's owner, the owner's architect, or other authorized agent legally designated by the owner shall certify to the building official that the building is in compliance with Chapter 13 of the *Florida Building Code, Building* prior to receiving the permit to begin construction or renovation.

|| All Subchapter 13-6 compliance calculations and certifications shall be made using the 600 series forms or the FLA/RES computer program printout for the climate zone in which the building will be constructed.

If, during the building construction or renovation, alterations are made in the design, materials, or equipment which would diminish the energy performance of the building, an amended copy of the compliance certification shall be submitted to the building department agency by the building owner or his or her legally authorized agent on or before the date of final inspection.

The certified compliance form shall be made a part of the plans and specifications submitted for permitting the building.

|| **13-600.3.ABC.3 Forms.** Code compliance by this subchapter shall be demonstrated by completing and submitting to the building official the appropriate forms described below. An original form or FLA/RES-04, **Version 4.5**, computerized printout, accompanied by a copy of the front page of the form as provided in Section 600.4, shall be submitted to the building department to demonstrate compliance with this code before a building permit is issued.

The code compliance form used shall be specific to the climate zone in which the building will be located. (See Appendix 13-A of the chapter for climate zone locations.)

Forms are available from the local jurisdiction permitting offices or may be obtained from the Department of Community Affairs, Codes and Standards Section, 2555 Shumard Oak Blvd., Tallahassee, Florida 32399-2100. Copies of Subchapter 6 forms may be found in Appendix 13-D of this chapter or online at [www.floridabuilding.org](http://www.floridabuilding.org).

**13-600.3.ABC.3.1 EPL display card.** The building official shall require that an energy performance level (EPL) display card be completed and certified by the builder to be accurate and correct before final approval of a residential building for occupancy. The EPL display card contains information indicating the energy performance level and efficiencies of components installed in a dwelling unit. The EPL display card shall be included as an addendum to the sales contract for both presold and nonpresold residential buildings in accordance with Section 553.9085, *Florida Statutes*.

**13-600.3.ABC.3.2 Form 600D-04 (desuperheater, heat recovery unit water heater efficiency certification).** This form shall be submitted when credit is being taken for water heating with a heat recovery unit. The form is used to demonstrate that the net superheat recovery is equal to or greater than the 50 percent minimum required to obtain credit. The form shall be affixed to the heat recovery unit by the manufacturer.

**Exception:** If the heat recovery unit is listed in the current ARDM Directory of Certified Refrigerant Desuperheater Heat Recovery Unit Water Heaters as meeting the net heat recovery minimum and the unit bears the ARDM label signifying compliance with this code, the label shall serve as a certification in place of Form 600D-04.

**13-600.3.A Forms used for Method A compliance.** Form 600A-04R or a printout of the FLA/RES-04 computer program, **Version 4.5**, shall be used to demonstrate code compliance by Method A, the whole building performance method. The correct form for the location where the residence will be built or a printout of the FLA/RES-04 computer program, **Version 4.5**, for the appropriate climate zone shall be submitted to the building department to demonstrate compliance by Subchapter 13-6 before a building permit is issued. Signatures on this form by persons authorized under the provisions of section 600.3.ABC.2 shall constitute certification of code compliance by Method A of this subchapter.

Form 600A-04 shall remain on file at the building department.

**13-600.3.B Forms used for Method B compliance.** Form 600B-04R shall be completed and submitted to the building department to demonstrate that all prescriptive requirements have been met. Form 600B-04R contains the compliance packages used to demonstrate code compliance by Method B of Subchapter 13-6, the component prescriptive method. A completed and signed form specific to the location where the residence will be built shall be submitted to the building department to obtain a building permit. Signatures on this form by persons authorized under the provisions of Section 600.3.ABC.2 shall constitute certification of code compliance by Method B of this subchapter.

Form 600B-04R shall remain on file at the building department.

**13-600.3.C Forms used for Method C compliance.** Form 600C-04R shall be completed and submitted to the building department to demonstrate that all prescriptive requirements have been met for buildings complying with the code by Method C, the limited applications prescriptive method. Form 600C-04R contains the requirements for code compliance for additions of 600 square feet (58 m<sup>2</sup>) or less, for renovations, for building systems, and for site-added components of manufactured buildings and manufactured homes. A completed and signed form specific to the location where the residence will be built shall be submitted to the building department to obtain a building permit. Signatures on this form by persons authorized under the provisions of Section 600.3.ABC.2 shall constitute certification of code compliance by Method C of this subchapter.

Form 600C-04R shall remain on file at the building department.

**13-600.4 Reporting.** A copy of the front page of the 600 series form submitted to demonstrate code compliance shall be sent by the building department to the Department of Community Affairs on a quarterly basis for reporting purposes.

**SECTION 13-601  
FENESTRATIONS (GLAZING)**

**13-601.1 Prescriptive requirements.**

**13-601.1.ABC Basic prescriptive requirements for Methods A, B and C.**

**13-601.1.ABC.1 Glazing types.** Windows shall contain at least the minimum efficiency glazing type certified to be in compliance with the code.

*U*-factors (thermal transmittances) or SHGC for glazed fenestration products shall be determined in accordance with NFRC 100, *Procedure for Determining Fenestration Product U-factors* or NFRC 200, *Procedures for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence* by an accredited, independent laboratory and labeled and certified by the manufacturer.

When a manufacturer has not determined *U*-factor or SHGC in accordance with NFRC 100 or 200 for a particular product line, compliance with the building envelope requirements of this code shall be determined by assigning such products default *U*-factor or SHGC in accordance with Table 601.1.ABC.1. Product features must be verifiable for the product to qualify for the default value associated with those features. Where the existence of a particular feature cannot be determined with reasonable certainty, the product shall not receive credit for that feature. Where a composite of materials from two different product types are used, the product shall be assigned the higher *U*-factor or SHGC.

Glazing in doors shall be considered fenestrations.

**13-TABLE 601.1.ABC.1  
DEFAULT WINDOW ENERGY VALUES FOR RESIDENTIAL  
APPLICATIONS**

Type	U-factor	Solar Heat Gain Coefficient (SHGC)
Single pane clear	1.30	0.75
Single pane tint	1.30	0.64
Double pane clear	0.87	0.66
Double pane tint	0.87	0.55

**13-601.1.ABC.2 Window infiltration.** Windows shall meet the minimum air infiltration requirements of Section 606.1.

**13-601.1.ABC.3 Overhangs.** Nonpermanent shading devices such as canvas awnings shall not be considered overhangs. Permanently attached wood and metal awnings may be considered overhangs.

**13-601.1.A Prescriptive requirements specific to Method A.** Windows shall meet the air infiltration requirements in Section 606.1.

**13-601.1.B Prescriptive requirements specific to Method B.** All glass, including sliding glass doors and glass in exterior doors which has an area one-third or more of the total door area, shall meet the criteria in Sections 601.1.B.1 through 601.1.B.3 for the compliance package chosen on Table 6B-1 of Form 600B and the air infiltration requirements in Section 606.1.2.

**13-601.1.B.1 Percentage of glass.** The percentage of glass area to conditioned floor area shall not exceed the maximum acceptable percentage specified for the compliance package chosen. Three values are designated: 15 percent, 20 percent and 25 percent. Buildings containing greater than 25 percent glass area to conditioned floor area shall use Method A to demonstrate compliance with the code.

When glass in existing exterior walls is being removed or enclosed by an addition, an amount equal to the total area of this glass may be subtracted from the total glass area prior to determining the installed glass percentage.

**13-601.1.B.2 Glass type.** All glass shall have an energy efficiency equal to or greater than that of the prescribed type for the compliance package chosen. Four glass types are considered. In order of increasing energy efficiency, the designations are as follows: single pane, clear (SC); single pane, tinted (ST); double pane, clear (DC); and double pane, tinted (DT). The designation tinted glass shall mean manufactured tinted glass, reflective films, and solar screens.

**13-601.1.B.3 Overhang.** All glass areas shall be under at least the length of overhang specified on Table 6B-1 of Form 600B for the compliance package chosen. The overhang length (OH) prescribed in the package shall represent the distance the roof or soffit projects out horizontally from the face of the glass.

**Exceptions:**

1. Glass on the gabled ends of a house.
2. Glass in the lower stories of a multistory house.

Louvers and other exterior shading devices which are adjustable shall be treated as overhangs. Slats shall be arranged so no solar radiation penetrates the overhang during the cooling season.

**13-601.1.C Prescriptive requirements specific to Method C.**

**13-601.1.C.1 Additions.** All glazing shall meet the minimum criteria given on Table 6C-2 of Form 600C for new glazing installed in an addition complying by this section. The maximum percentage of glass to floor area allowed for additions of 600 square feet (56 m<sup>2</sup>) or less shall be 50 percent. All new glazing shall meet the OH and the SHGC criteria of one of the alternative requirement sets in Table 6C-2 on Form 600C for the type of glass and the percentage of glass to floor area categories on the form for glass installed in the addition. Glass windows and doors that were previously located in an existing exterior wall that is being removed or enclosed by an addition do not have to comply with the overhang and solar heat gain coefficient requirements listed on Table 6C-2 of Form 600C when reinstalled as part of the addition.

The total glazing area calculated shall include the areas of windows, sliding glass doors, all areas which exceed one-third the area of the door in which they are located, and double the area of all skylights or other nonvertical roof glass. When glass in existing exterior walls is being removed or enclosed by an addition, an amount equal to the total area of this glass may be subtracted from the total glass area prior to determining the installed glass percentage.

**13-601.1.C.1.1** In cases where an overhang length or solar heat gain coefficient falls between two glass percentage ranges and the glass type is the same throughout the addition, the specific glass percentage allowed may be determined by using the following equations:

**Overhang (OH):**

Glass % Allowed = Low% Glass +

$$\frac{\text{High\% Glass} - \text{Low\% Glass}}{\text{OH}_{\text{High\%}} - \text{OH}_{\text{Low\%}}} \times [\text{OH}_{\text{Installed}} - \text{OH}_{\text{Low\%}}]$$

**Solar heat Gain Coefficient (SHGC):**

Glass % Allowed = Low% Glass +

$$\frac{\text{High\% Glass} - \text{Low\% Glass}}{\text{SHGC}_{\text{High\%}} - \text{SHGC}_{\text{Low\%}}} \times [\text{SHGC}_{\text{Installed}} - \text{SHGC}_{\text{Low\%}}]$$

**13-601.1.C.2 Renovations.** New windows installed in renovations may be of any glass type and solar heat gain coefficients where glass areas are under an overhang of at least 2 feet (610 mm) whose lower edge does not extend further than 8 feet (2438 mm) from the overhang. Glass areas that do not meet this criteria shall be either single-pane tinted, double-pane clear, or double-pane tinted. All skylights or nonvertical glass shall be double paned or single paned with a diffuser.

**Exception:** These requirements apply only to glass that is being replaced.

**13-601.2 Performance calculation procedures.**

**13-601.2.A Performance calculation procedures for Method A.**

**13-601.2.A.1 Glass orientation and multipliers.** Multipliers are provided on Form 600A by the glass orientation: N, NE, E, SE, S, SW, W, NW or H (horizontal). Any nonvertical glass shall be calculated as horizontal glass.

Glass which is demonstrated to be shaded during all times of the year may be treated as north-facing glass.

**13-601.2.A.2 Glass types and multipliers.** Multipliers are provided on Form 600A by glazing type, either single- or double-paned glass with either clear or tinted shading.

Glazing types with *U*-values and solar heat gain coefficients no higher than those for glass may be treated as glass for the Method A calculation. Glass blocks may use the double-pane multiplier for the SHGC specified for the product.

Where a SHGC for glazed fenestration products (windows, glazed doors and skylights) has been determined in accordance with NFRC 200, *Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence* by an accredited, independent laboratory and labeled and certified by the manufacturer to be 0.57 or lower, a more favorable multiplier may be obtained from Section 2.1 of Appendix 13-C of this chapter based on the climate zone in which it will be installed.

**13-601.2.A.3 Glass overhangs and multipliers.** Overhang factors shall be determined from Tables 6A-1 and 6A-10 on Form 600A by matching either the overhang ratio or the overhang length (in feet) with the orientation of the glass it shades. The overhang ratio shall be calculated by the following equation:

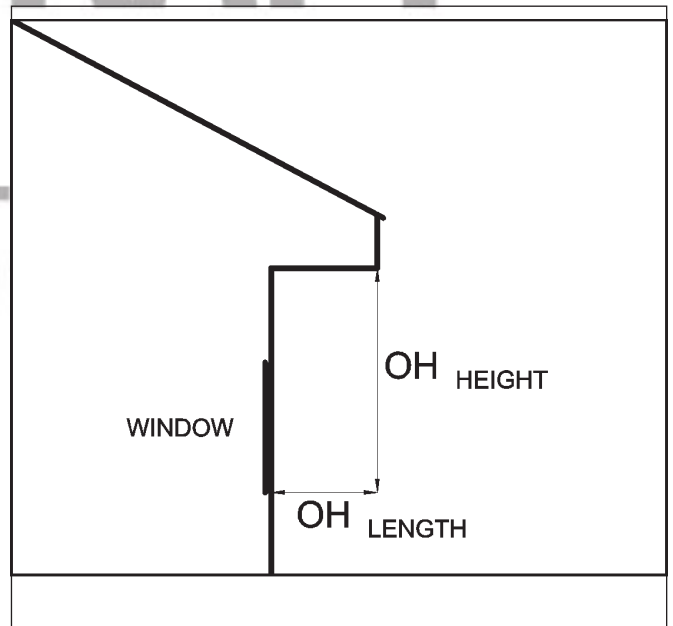


FIGURE 6.1

$$\text{OH Ratio} = \frac{\text{OH}_{\text{Length}}}{\text{OH}_{\text{Height}}}$$

where:

OH Length = The horizontal measure of how far a window overhang projects out from the glass surface.

OH Height = The vertical measure of the distance from the bottom of a window to the bottom of the overhang.

**13-601.2.A.3.1** To select the overhang factor by the overhang length, no part of the glass shall be more than 8 feet (2438 mm) below the overhang.

**13-601.2.A.3.2** The overhang ratio for adjustable exterior shading devices shall be determined for the overhang at its most extended position.

**13-601.2.A.3.3** All glazing areas of a residence, including windows, sliding glass doors, glass in doors, skylights, etc. shall include the manufacturer's frame area in the total window area. Window measurements shall be as specified on the plans and specifications for the residence.

When a window in existing exterior walls is enclosed by an addition, an amount equal to the area of this window may be subtracted from the glazing area for the addition for that overhang and orientation.

## SECTION 13-602 WALLS

### 13-602.1 Prescriptive requirements.

#### 13-602.1.ABC Basic prescriptive requirements for Methods A, B and C.

**13-602.1.ABC.1 Wall insulation.** Walls shall be insulated to at least the level certified to be in compliance with this code.

Insulation *R*-values claimed shall be in accordance with the criteria described in Section 1.2 of Appendix 13-C of this chapter.

**13-602.1.ABC.1.1 Common walls.** Walls common to two separate conditioned tenancies shall be insulated to a minimum of *R*-11 for frame walls, and to *R*-3 on both sides of common masonry walls.

**13-602.1.ABC.1.2 Walls considered ceiling area.** Wall areas that separate conditioned living space from unconditioned attic space (such as attic knee walls, walls on cathedral ceilings, skylight chimney shafts, gambrel roofs, etc.) shall be considered ceiling area and have a minimum insulation value of *R*-19.

**13-602.1.ABC.2 Wall infiltration.** Walls shall meet the minimum air infiltration requirements of Section 606.1.

#### 13-602.1.A Prescriptive requirements specific to Method A.

**13-602.1.A.1** Walls considered lightweight concrete block in Method A shall have an aggregate density of no greater than 105 pounds per cubic foot (1682 kg/m<sup>3</sup>).

**13-602.1.A.2** Walls considered polystyrene bead aggregate block in Method A shall be composed of at least 60-percent

polystyrene beads by volume, and shall achieve at least an *R*-8 insulation value when tested to ASTM C 236.

**13-602.1.A.3** Walls shall meet the air infiltration requirements in Section 606.1.

#### 13-602.1.B Prescriptive requirements specific to Method B.

Walls shall be either wood frame or masonry construction, including face brick, to comply with this Method. All exterior and adjacent walls shall be insulated to the minimum *R*-value given on Table 6B-1 of Form 600B for the compliance package chosen in accordance with the criteria in Section 1.2 of Appendix 13-C of this chapter.

#### 13-602.1.C Prescriptive requirements specific to Method C.

**13-602.1.C.1 Additions.** All walls shall be insulated to the minimum *R*-value given on Table 6C-1 of Form 600C for the type of construction used in the addition.

**13-602.1.C.1.1 Frame walls.** The minimum insulation level installed in wood or metal frame walls shall be *R*-11 for 2 feet by 4 feet (610 mm by 1219 mm) walls and *R*-19 for 2 feet by 6 feet (610 mm by 1829 mm) walls.

**13-602.1.C.1.2 Concrete or masonry walls.** The minimum *R*-value of insulation added to exterior and adjacent masonry walls shall be *R*-7 in north Florida (Zones 1 through 3) and *R*-5 in central and south Florida (Zones 4 through 9).

**13-602.1.C.2 Renovations.** Minimum insulation levels installed in renovated walls shall be not less than those specified in Sections 602.1.C.1.1 through 602.1.C.1.2. These requirements apply only to those walls being renovated.

**13-602.1.C.3 Manufactured homes and manufactured buildings.** Marriage walls between sections of double wide or multiple units shall be sealed with long-life caulk or gasketing and shall be mechanically fastened in accordance with the manufacturer's instructions. See also the Section 610.1.C.3 requirements for ducts located in marriage walls of multiple unit manufactured homes and buildings.

#### 13-602.2 Performance calculation procedures.

##### 13-602.2.A Performance calculation procedures for Method A.

**13-602.2.A.1 Wall types and multipliers.** Walls shall be identified as either exterior, adjacent or common and as wood frame, concrete block, steel stud or log walls. Multipliers for the type of wall to be installed shall be determined from Tables 6A-2 and 6A-11 on Form 600A. Multipliers for lightweight concrete block and polystyrene bead aggregate block shall be taken from Section 2.2 of Appendix 13-C of this chapter.

Interpolation of multipliers for efficiencies falling within ranges may be made in accordance with Section 1.3 of Appendix 13-C of this chapter.

**13-602.2.A.1.1** Exterior or adjacent walls consisting of more than one construction type or *R*-value shall be treated as separate walls.

**13-602.2.A.1.2** Walls separating an addition from the preexisting conditioned spaces shall not be included in the calculation.

**13-602.2.A.1.3** Common walls separating conditioned tenancies shall not be included in the as-built house envelope calculation.

**13-602.2.A.1.4** Walls that separate conditioned living space from unconditioned attic space, such as walls supporting cathedral ceilings and gambrel roofs, and skylight shafts, etc. shall be considered ceiling area for this calculation procedure.

**13-602.2.A.2 Wall area determination.** Net wall area (gross wall area of the building less all doors and windows) taken from the plans and specifications shall be used in the compliance calculation.

## SECTION 13-603 DOORS

### 13-603.1 Prescriptive requirements.

#### 13-603.1.ABC Basic prescriptive requirements for Methods A, B and C.

**13-603.1.ABC.1 Door types allowed.** All exterior and adjacent doors other than glass doors shall be solid core wood, wood panel, or insulated doors. Hollow core doors shall not be used in either exterior or adjacent walls. Doors may have glass sections.

**13-603.1.ABC.2 Door infiltration.** Doors shall meet the minimum air infiltration requirements for doors contained in Section 606.1.ABC.1.1.

**13-603.1.A Prescriptive requirements specific to Method A.** Blank for numbering consistency.

**13-603.1.B Prescriptive requirements specific to Method B.** Blank for numbering consistency.

**13-603.1.C Prescriptive requirements specific to Method C.** Blank for numbering consistency.

### 13-603.2 Performance calculation procedures.

#### 13-603.2.A Performance calculation procedures for Method A.

**13-603.2.A.1 Door types and multipliers.** Doors shall be identified as either exterior or adjacent, based on the type of wall in which they are located, and as wood or insulated. Multipliers for the type of door to be installed shall be determined from Tables 6A-3 and 6A-12 on Form 600A.

**13-603.2.A.2 Door area determination.** Door areas shall be determined from the measurements specified on the plans for each exterior and adjacent door.

All sliding glass doors and glass areas in doors shall be included in the glazing calculation and meet the requirements of Section 601 unless the glass is less than one-third of the area of the door.

## SECTION 13-604 CEILINGS

### 13-604.1 Prescriptive requirements.

#### 13-604.1.ABC Basic prescriptive requirements for Methods A, B and C.

**13-604.1.ABC.1 Ceiling insulation.** Ceilings shall have an insulation level of at least R-19, space permitting. For the purposes of this code, types of ceiling construction that are considered to have inadequate space to install R-19 include sin-

gle assembly ceilings of the exposed deck and beam type and concrete deck roofs. Such ceiling assemblies shall be insulated to at least a level of R-10.

Ceiling insulation R-values claimed shall be in accordance with the criteria described in Section 1.2 of Appendix 13-C of this chapter.

**13-604.1.ABC.1.1 Ceilings with blown-in insulation.** Ceilings with a rise greater than 5 and a run of 12 (5 over 12 pitch) shall not be insulated with blown-in insulation. Blown-in (loose fill) insulation shall not be used in sections of attics where the distance from the top of the bottom chord of the trusses, ceiling joists or obstructions (such as air conditioning ducts) to the underside of the top chord of the trusses at the ridge is less than 30 inches (762 mm) or where the distance from any point of 30 inches (762 mm) minimum clearance out to the ceiling surface in the roof eave area that is to be insulated is greater than 10 feet (3048 mm).

In every installation of blown-in (loose fill) insulation, insulation dams (for installations up to R-19 only); or insulation chutes, insulation baffles, or similar devices (for installations over R-19) shall be installed in such a manner so as to restrict insulation from blocking natural ventilation at the roof eave area to the attic space. Such devices shall be installed in spaces between all rafters of the roof structure and shall extend from the eave plate line to the attic area. In all cases, including the use of batt insulation, the insulation shall not be installed so as to block natural ventilation flow.

In that portion of the attic floor to receive blown insulation, reference marks or rules shall be placed within every 6 feet to 10 feet (1829 mm to 3048 mm) throughout the attic space. The reference marks shall show the height to which the insulation must be placed in order to meet the planned insulation level. Such marks shall be used by the building official to verify the claimed insulation level. The reference marks or rules may be placed on truss webs or other appropriate roof framing members. Each reference mark or rule shall be visible from at least one attic access point.

**13-604.1.ABC.1.2 Common ceilings/floors.** Wood, steel and concrete ceilings/floors common to separate conditioned tenancies shall be insulated to a minimum R-11, space permitting.

**13-604.1.ABC.1.3 Roof decks over dropped ceiling plenum.** Roof decks shall be insulated to R-19 if the space beneath it will be used as a plenum of the air distribution system. Plenums shall meet all criteria of Section 610.1.ABC.3.6.

**13-604.1.ABC.2 Ceiling infiltration.** Ceilings shall meet the minimum air infiltration requirements of Section 606.1.

#### 13-604.1.A Prescriptive requirements specific to Method A.

**13-604.1.A.1 Walls considered ceiling area.** Wall areas that separate conditioned living space from unconditioned attic space (such as attic knee walls, walls on cathedral ceilings, skylight chimney shafts, gambrel roofs, etc.) shall be considered ceiling area. Such areas shall be included in calculations of ceiling area and shall have a minimum insulation value of R-19.

**13-604.1.A.2 Ceiling air infiltration.** Ceilings shall meet the air infiltration requirements of Section 606.1.ABC.

**13-604.1.B Prescriptive requirements specific to Method B.**

All ceilings separating conditioned and unconditioned spaces shall be insulated to at least the minimum *R*-value given in Table 6B-1 of Form 600B for the compliance package chosen.

Buildings with single assembly roof/ceilings shall not comply by this method.

**13-604.1.C Prescriptive requirements specific to Method C.**

**13-604.1.C.1 Additions.** All roof/ceilings shall be insulated to the minimum *R*-value given on Table 6C-1 of Form 600C for the type of construction used in the addition. The minimum *R*-value for insulation added to ceilings shall be:

- |  |      |
|--|------|
| 1. Under attic ceilings:                                 | R-30 |
| 2. Enclosed single assembly ceilings:                    |      |
| Frame  | R-19 |
| Metal pans   | R-13 |
| 3. Open single assembly attic ceilings, exposed decking: | R-10 |
| 4. Common frame ceilings:                                | R-11 |

**13-604.1.C.2 Renovations.** Minimum insulation levels installed in renovated roofs/ceilings shall be not less than those specified in Section 604.1.C.1. These requirements apply only to roofs/ceilings that are being renovated.

**13-604.2 Performance calculation procedures.****13-604.2.A Performance calculation procedures for Method A.**

**13-604.2.A.1 Ceiling types and multipliers.** Ceilings shall be identified as either under attic, single assembly, or concrete deck roof. Multipliers for the type of ceiling to be installed shall be determined from Tables 6A-4 and 6A-13 on Form 600A or from Section 2.4 of Appendix 13-C of this chapter.

Interpolation of multipliers for efficiencies falling within ranges may be made in accordance with Section 1.3 of Appendix 13-C of this chapter.

**13-604.2.A.1.1** If different ceiling types or *R*-values are used in a house, each type or *R*-value shall be treated separately.

**13-604.2.A.1.2** Common ceilings shall not be included in the house envelope calculation.

**13-604.2.A.1.3** Ceilings separating an addition from the preexisting conditioned spaces shall not be included in the calculation.

**13-604.2.A.2 Ceiling area determination.** As-built ceiling area shall be the actual ceiling area exposed to attic or single assembly roof conditions, including walls that separate conditioned living space from unconditioned attic space. Baseline ceiling area shall be the total floor area within the conditioned space located directly below the roof.

**SECTION 13-605  
FLOORS****13-605.1 Prescriptive requirements.****13-605.1.ABC Basic prescriptive requirements for Methods A, B and C.**

**13-605.1.ABC.1 Floor Insulation.** Insulation *R*-values claimed shall be in accordance with the criteria described in Section 1.2 of Appendix 13-C of this chapter.

**13-605.1.ABC.1.1** Wood, steel and concrete floors/ceilings common to two separate conditioned tenancies in multifamily applications shall be insulated to a minimum of R-11, space permitting.

**13-605.1.ABC.1.2** For insulated slab-on-grade floors, the exposed vertical edge of the slab shall be covered with exterior slab insulation extending from the top of the slab down to at least the finished grade level. Extending the insulation to the bottom of the footing or foundation wall is recommended.

**13-605.1.ABC.2 Floor infiltration.** Floors shall meet the minimum air infiltration requirements of Section 606.1.

**13-605.1.A Prescriptive requirements specific to Method A.**

**13-605.1.A.1 Floor vent area.** In raised floors supported by stem walls with under floor insulation, the vent area for the subfloor space shall not exceed 1 square foot (.0929 m<sup>2</sup>) per 150 square feet (14 m<sup>2</sup>) of floor area when utilizing the stem wall with under floor insulation multipliers.

In raised floors supported by stem walls with stem wall insulation, the vent area for the subfloor space shall not exceed  $\frac{1}{10}$  square foot (.009 m<sup>2</sup>) of open vent area per 150 square feet (14 m<sup>2</sup>) of floor area when utilizing the stem wall with stem wall insulation multipliers. A continuous vapor barrier shall be applied over the ground under the floor.

**13-605.1.A.2 Floor infiltration.** Floors shall meet the air infiltration requirements in Section 606.1.ABC.

**13-605.1.B Prescriptive requirements specific to Method B.**

Floors under conditioned space shall be either slab-on-grade, raised wood with continuous stem walls, or raised concrete floors with continuous stem walls. All raised wood and raised concrete floors having stem walls that separate conditioned from unconditioned spaces shall be insulated to the minimum *R*-value given on Table 6B-1 of Form 600B for the Compliance package chosen. Slab-on-grade floors need not be insulated to comply with this section.

Raised wood and concrete floors of post and pier construction may only comply with this section by the following compliance packages:

Location	Package
North Florida (Zones 1 - 3)	C
Central Florida (Zones 4 - 6)	D
South Florida (Zones 7 - 9)	B

**13-605.1.C Prescriptive requirements specific to Method C.**

**13-605.1.C.1 Additions.** All floors shall be insulated to the minimum *R*-value given on Table 6C-1 of Form 600C for the type of construction used. Minimum *R*-values for insulation added to floors shall be:

- 1. Raised wood, north Florida (Zones 1 - 3) R-19
- 2. Raised wood, central and south Florida (Zones 4 - 9) R-11
- 3. Raised concrete, north Florida R-7
- 4. Raised concrete, central and south Florida R-5
- 5. Slab-on-grade None

**13-605.1.C.2 Renovations.** Minimum insulation levels installed in renovated floors shall be not less than those specified in Sections 605.1.C.1. Requirements apply only to floors which are being renovated.

**13-605.2 Performance calculation procedures.**

**13-605.2.A Performance calculation procedures for Method A.**

**13-605.2.A.1 Floor types and multipliers.** Floors shall be identified as either slab-on-grade, raised floors (wood or concrete), adjacent or common. Wood floors shall be further subdivided into post or pier construction, stem walls with under floor insulation, and stem wall with stem wall insulation. See section 202 for definitions of these types of floors. Multipliers for the type of floor to be installed shall be determined from Tables 6A-5 and 6A-14 on Form 600A, or from Table 6C-10 in Section 2.5 of Appendix 13-C of this chapter for stem walls with stem wall insulation.

Interpolation of multipliers for efficiencies falling within ranges may be made in accordance with Section 1.3 of Appendix 13-C of this chapter.

**13-605.2.A.1.1** If the floor area consists of more than one type of construction or *R*-value, each floor system shall be treated separately.

**13-605.2.A.1.2** Common floors shall not be included in the calculation.

**13-605.2.A.1.3** Floors separating an addition from the preexisting conditioned spaces shall not be included in the calculation.

**13-605.2.A.2 Floor perimeter/area determination.** Slab-on-grade floor points shall be determined based on the perimeter of the slab which encloses the conditioned space, including both exterior and adjacent wall linear footage for single-family residential applications. In multiple-family applications, the slab perimeter between two conditioned tenancies shall be ignored. Raised floor points shall be determined based on the conditioned floor area of floors above unconditioned space.

**SECTION 13-606  
AIR INFILTRATION**

**13-606.1 Prescriptive requirements.**

**13-606.1.ABC Basic prescriptive requirements for Methods A, B and C.** Buildings shall be constructed and sealed in such a way as to prevent excess air infiltration.

**Caution:** Caution should be taken to limit the use of materials and systems which produce unusual or excessive levels of indoor air contaminants.

**13-606.1.ABC.1 Infiltration levels allowed.**

**13-606.1.ABC.1.1 Exterior doors and windows.** Exterior doors and windows shall be designed to limit air leakage into or from the building envelope. Manufactured doors and windows shall have air infiltration rates not exceeding those shown in Table 606.1.ABC.1.1. These rates shall be determined from tests conducted at a pressure differential of 1.567 pound per square foot (8kg/m<sup>2</sup>), which is equivalent to the impact pressure of a 25 mph wind. Compliance with the criteria of air leakage shall be determined by testing to AAMA/NWWDA 101/I.S. 2 or ASTM E 283, as appropriate. Site-constructed doors and windows shall be sealed in accordance with Section 606.1.ABC.1.2.

**TABLE 13-606.1.ABC.1.1  
ALLOWABLE AIR INFILTRATION RATES**

Frame Type	Windows (cfm per square foot of window area)	Doors (cfm per square foot of door area)	
		Sliding	Swinging
Wood	0.3	0.3	0.5
Aluminum	0.3	0.3	0.5
PVC	0.3	0.3	0.5

**13-606.1.ABC.1.2 Exterior joints or openings in the envelope.** Exterior joints, cracks, or openings in the building envelope that are sources of air leakage shall be caulked gasketed, weatherstripped or otherwise sealed in accordance with the criteria in Sections 606.1.ABC.1.2.1 through 606.1.ABC.1.2.5.

**13-606.1.ABC.1.2.1 Exterior and adjacent walls.** Exterior and adjacent walls shall be sealed at the following locations:

1. Between windows and doors and their frames;
2. Between windows and door frames and the surrounding wall;
3. Between the foundation and wall assembly sill-plates;
4. Joints between exterior wall panels at changes in plane, such as with exterior sheathing at corners and changes in orientation;
5. Openings and cracks around all penetrations through the wall envelope such as utility services and plumbing;
6. Between the wall panels and top and bottom plates in exterior and adjacent walls. In frame construction, the crack between exterior and adjacent wall bottom plates and floors shall be sealed with caulking or gasket material. Gypsum board or other wall paneling on the interior surface of exterior and adjacent walls shall be sealed to the floor; and
7. Between walls and floor where the floor penetrates the wall.
8. Log walls shall meet the criteria contained in Section 4.2 of Appendix 13-C of this chapter.

**Exception:** As an alternative to Items 1 through 7 above for frame buildings, an infiltration barrier may be installed in the exterior and adjacent walls. The infiltration barrier shall provide a continuous air barrier from the foundation to the top plate of the

ceiling of the house, and shall be sealed at the foundation, the top plate, at openings in the wall plane (windows, doors, etc.), and at the seams between sections of infiltration barrier material. When installed on the interior side of the walls, such as with insulated face panels with an infiltration barrier, the infiltration barrier shall be sealed at the foundation or subfloor.

**13-606.1.ABC.1.2.2 Floors.** Penetrations and openings in raised floors, greater than or equal to  $\frac{1}{8}$  inch (3 mm) in the narrowest dimension, shall be sealed unless backed by truss or joist members against which there is a tight fit or a continuous air barrier.

**Exception:** Where an infiltration barrier is installed in the floor plane of a house with raised floors. The infiltration barrier shall create a continuous air barrier across the entire floor area, and shall be sealed at the perimeter, at openings in the floor plane (grilles, registers, crawl space accesses, plumbing penetrations, etc.), and at seams between sections of infiltration barrier material.

**13-606.1.ABC.1.2.3 Ceilings.** Ceilings shall be sealed at the following locations:

1. Between walls and ceilings.
2. At penetrations of the ceiling plane of the top floor of the building (such as chimneys, vent pipes, ceiling fixtures, registers, open shafts, or chases) so that air flow between the attic or unconditioned space and conditioned space is stopped.
3. Large openings, such as shafts, chases soffits, opening around chimneys, and dropped ceiling spaces (such as above kitchen cabinets, bathroom vanities, shower stalls, and closets), shall be sealed with an airtight panel or sheeting material and sealed to adjacent top plates (or other framing members) so that a continuous air barrier separates the spaces below and above the ceiling plane.
4. Gaps between ceiling gypsum board and the top plate shall be sealed with a sealant to stop air flow between the attic and the interior of wall cavities.
5. The attic access hatch, if located in the conditioned space shall have an airtight seal.

**Exception:** Where an infiltration barrier is installed in the ceiling plane of the top floor of the house. The infiltration barrier shall: create a continuous air barrier across the entire ceiling plane, be continuous across the tops of interior and exterior walls, and be sealed at the perimeter, at openings in the ceiling plane (grilles, registers, attic accesses, plumbing penetrations, vent pipes, chimneys, etc.), and at seams between sections of infiltration barrier material.

**13-606.1.ABC.1.2.4 Recessed lighting fixtures.** Recessed lighting fixtures installed in ceilings that abut an attic space shall meet one of the following requirements:

1. Type IC rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity and sealed or gasketed to prevent air leakage into the unconditioned space.
2. Type IC or non-IC rated, installed inside a sealed box [minimum of  $\frac{1}{2}$ -inch-thick (12.7 mm)] gypsum wall board, preformed polymeric vapor barrier, or other air tight assembly manufactured for this purpose) and maintaining required clearances of not less than  $\frac{1}{2}$ -inch-thick (12.7 mm)

from combustible material and not less than 3 inch (76 mm) from insulation material.

3. Type IC rated, with no more than 2.0 cfm (.00094 m<sup>3</sup>/s) air movement from the conditioned space to the ceiling cavity when measured in accordance with ASTM E 283. The fixture shall be tested at 75 Pa and shall be labeled.

**13-606.1.ABC.1.2.5 Multistory houses.** In multistory houses, the perimeter of the floor cavity (created by joists or trusses between floors) shall have an air barrier to prevent air flow between this floor cavity and outdoors or buffer zones of the house (such as a space over the garage).

1. Air-tight panels, sheathing, or sheeting shall be installed at the perimeter of the floor cavity. The panels, sheathing, or sheeting material shall be sealed to the top plate of the lower wall and the bottom plate of the upper wall by mastic or other adhesive caulk, or otherwise bridge from the air barrier of the upper floor to the air barrier of the lower floor.
2. Joints between sections of panels, sheathing, or sheeting shall be sealed.
3. All fireplaces and wood stoves shall have flue dampers.

**13-606.1.ABC.1.3 Additional infiltration requirements.** The following additional requirements shall be met:

1. All exhaust fans vented to the outdoors shall have dampers. This does not apply to combustion devices with integral exhaust ductwork, which shall comply with the *Florida Building Code, Fuel Gas*.
2. All combustion space heaters, furnaces, and water heaters shall be provided with adequate combustion air. Such devices shall comply with NFPA or the locally adopted code.

**Caution:** Caution should be taken to limit the use of materials and systems which produce unusual or excessive levels of indoor air contaminants.

**13-606.1.ABC.1.4 Apertures or openings.** Any apertures or openings in walls, ceilings or floors between conditioned and unconditioned space (such as exits in the case of hydrostatic openings in stairwells for coastal buildings) shall have dampers which limit air flow between the spaces.

**13-606.2 Performance calculation procedures.**

**13-606.2.A Performance calculation procedures for Method A.**

**13-606.2.A.1 Infiltration multipliers.** Infiltration multipliers shall be determined from Tables 6A-6 and 6A-15 on Form 600A.

**13-606.2.A.2 Infiltration area determination.** The area to be considered in the Infiltration calculation of Method A shall be the total conditioned floor area of the building.

## SECTION 13-607 SPACE COOLING SYSTEMS

**13-607.1 Prescriptive requirements.**

**13-607.1.ABC Basic prescriptive requirements For Methods A, B and C.**

**13-607.1.ABC.1 Equipment sizing.** A cooling and heating load calculation shall be performed on the building and shall be at-

tached to the Form 600 submitted when application is made for a building permit, or in the event the mechanical permit is obtained at a later time, the calculation shall be submitted with the application for the mechanical permit. Cooling and heating design loads, for the purpose of sizing HVAC equipment and designing HVAC systems, shall be determined for the dwelling spaces (typically rooms or zones) served by each piece of equipment in accordance with ACCA Manual J, ACCA Manual N, or the ASHRAE *Cooling and Heating Load Calculation Manual*. This code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing in excess of the capacity limitations in Section 13-607.1.ABC.1.1. **System sizing calculations shall not include loads created by local intermittent mechanical ventilation such as standard kitchen and bathroom exhaust systems. The engineered ventilation requirement of the various procedures shall not be used as an infiltration rate when estimating infiltration loads.**

#### Exceptions:

1. Where mechanical systems are designed by an engineer registered in the state of Florida, the engineer has the option of submitting a signed and sealed summary sheet in lieu of the complete sizing calculation(s). Such summary sheet shall include the following (by zone):

Project name/owner  
 Project Address  
 Sizing Method Used  
 Area in square feet  
 Outdoor dry bulb used  
 Total heating required with outside air  
 Outdoor wet bulb used  
 Total sensible gain  
 Relative humidity  
 Total latent gain  
 Indoor dry bulb  
 Total cooling required with outside air  
 Grains water (difference)

2. Systems installed in existing buildings not meeting the definition of renovation in Section 202.

**13-607.1.ABC.1.1 Cooling equipment capacity.** Cooling only equipment shall be selected so that its total capacity is not less than the calculated total load but not more than **1.15 times greater than the total** load calculated according to the procedure selected in Section 13-607.1.ABC.1, or the closest available size provided by the manufacturer's product lines. The corresponding latent capacity of the equipment shall not be less than the calculated latent load.

**The published value for ARI total capacity is a nominal, rating-test value and shall not be used for equipment sizing. Manufacturer's expanded performance data shall be used to select cooling-only equipment. This selection shall be based on the outdoor design dry bulb temperature for the load calculation (or entering water temperature for water-source equipment), the blower CFM provided by the expanded performance data, the design value for entering wet bulb temperature and the design value for entering dry bulb temperature.**

**Design values for entering wet bulb and dry bulb temperature shall be for the indoor dry bulb and relative humidity used for the**

**load calculation and shall be adjusted for return side gains if the return duct(s) is installed in an unconditioned space.**

**The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described herein.**

#### Exceptions:

- 1: Attached single- and multiple-family residential equipment sizing may be selected so that its cooling capacity is less than the calculated total load but not less than 80 percent of that load.
- 2: When signed and sealed by a Florida-registered engineer, in attached single- and multiple-family units, the capacity of equipment may be sized in accordance with good design practice.

**13-607.1.ABC.1.2 Extra capacity required for special occasions.** Residences requiring excess cooling or heating equipment capacity on an intermittent basis, such as anticipated additional loads caused by major entertainment events, shall have equipment sized or controlled to prevent continuous space cooling or heating within that space by one or more of the following options:

1. A separate cooling or heating system is utilized to provide cooling or heating to the major entertainment areas.
2. A variable capacity system sized for optimum performance during base load periods is utilized.

**13-607.1.ABC.2 Controls.** Each mechanical supply and exhaust ventilation system shall be equipped with a readily accessible switch or other means for shut off or volume reduction and shut off when ventilation is not required. Automatic or manual dampers installed for the purpose of shutting off ventilation systems shall be designed with tight shutoff characteristics to minimize air leakage.

**Exception:** Manual dampers for outdoor air intakes may be used for single- and multiple-family residential buildings or for fan system capacities of less than 5,000 cfm (2.4 m<sup>3</sup>/s).

**13-607.1.ABC.2.1 Zoning for temperature control.** In one- and two-family dwellings, at least one thermostat for regulation of space temperature shall be provided for each separate HVAC system or zone.

**13-607.1.ABC.2.2 Control setback and shutoff.** The thermostat required in Section 13-607.1.ABC.2.1, or an alternate means including, but not limited to, a switch or clock, shall provide a readily accessible manual or automatic means for reducing the energy required for heating and cooling during periods of nonuse or reduced need including, but not limited to, unoccupied periods or sleeping hours.

**13-607.1.ABC.2.3 Humidity control.** Where a humidistat is used for comfort dehumidification, it shall be capable of being set to prevent the use of fossil fuel or electricity to reduce humidities below 60 percent.

**13-607.1.ABC.3 Equipment performance standards.**

**13-607.1.ABC.3.1 Equipment ratings.** Equipment efficiency ratings shall be obtained from a nationally recognized certification program directory, or from a manufacturer's rating certi-

fied to be in compliance with an approved Department of Energy (DOE) or Air-conditioning and Refrigeration Institute (ARI) rating procedure. Equipment efficiencies shall be based on the standard rating conditions contained in the test standard referenced in Subchapter 13-3 that is appropriate for that equipment. The procedure for determining the integrated part-load value (IPLV) for a piece of equipment shall be the one provided in the appropriate ARI test standard for the type of equipment referenced. Minimum ratings for products covered under the National Appliance Energy Conservation Act of 1987 shall be those determined for Region IV and used for the Federal Trade Commission’s required appliance labeling.

Cooling system efficiencies shall be rated as follows:

1. Central air conditioning equipment under 65,000 Btu/h (312 m<sup>3</sup>/kw) capacity, both split-system and single-package equipment, single or three phase, shall be rated with a seasonal energy efficiency ratio (SEER).
2. Packaged terminal air conditioners and heat pumps shall be rated with an energy efficiency ratio (EER).
3. Room air conditioners shall be rated by an energy efficiency ratio (EER).
4. Central air conditioning equipment over 65,000 Btu/h (312 m<sup>3</sup>/kw) shall be rated with an energy efficiency ratio (EER).
5. Water-cooled and evaporatively cooled central systems under 135,000 Btu/h (648m<sup>3</sup>/kw) shall be rated with an energy efficiency ratio (EER).
6. Large capacity air-cooled, evaporatively- cooled and water source unitary air-conditioning systems may also be rated with an IPLV.
7. Heat-operated cooling equipment and gas-driven heat pumps shall be rated with a COP-cooling.

**13-607.1.ABC.3.1.1 Equipment efficiency verification.** Equipment covered under the Federal Energy Policy Act of 1992 (EPACT) shall comply with U.S. Department of Energy certification requirements. For other equipment, if a certification program exists for a product covered in Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be either listed in the certification program or, alternatively, the ratings shall be verified by an independent laboratory test report. If no certification program exists for a product covered in Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Products covered in Table 13-607.1.ABC.3.2G shall have efficiency ratings supported by data furnished by the manufacturer. Where components, such as indoor or outdoor coils, from different manufacturers are used, a Florida-registered engineer shall specify component efficiencies whose combined efficiency meets the minimum equipment efficiency requirements in Section 13-607.1.ABC.3.2.

**13-607.1.ABC.3.2 Minimum efficiencies for cooling equipment.**

**13-607.1.ABC.3.2.1 Mandatory provisions.** Equipment shown in Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D shall meet the minimum performance for that equipment at the specified

rating conditions when tested in accordance with the specified test procedure. Omission of minimum performance requirements for equipment not listed in Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D does not preclude use of such equipment. Equipment not listed in Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D has no minimum performance requirements. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements, unless otherwise exempted by footnotes in the table. However, equipment covered under the Federal Energy Policy Act of 1992 (EPACT) shall have no minimum efficiency requirements for operation at minimum capacity or other than standard rating conditions. Equipment used to provide water heating functions as part of a combination system shall satisfy all stated requirements for the appropriate space heating or cooling category.

Tables 13-607.1.ABC.3.2A through 13-607.1.ABC.3.2D contain the minimum efficiency requirements for equipment covered by this section of the code. The tables are organized to cover the following types of equipment:

Table 13-607.1.ABC.3.2A, Air Conditioners and Condensing Units.

Table 13-607.1.ABC.3.2B, Heat Pumps.

Table 13-607.1.ABC.3.2D, Packaged Terminal and Room Air Conditioners and Heat Pumps.

**13-607.1.A Prescriptive requirements specific to Method A.**

**13-607.1.A.1 Ceiling fan credit.** Houses for which ceiling fan credit is claimed in accordance with the criteria of Section 13-607.2.A.3.1 shall have ceiling fans installed with minimum fan blade diameters of no less than those listed in Table 13-607.1A.1 for the size and shape of the room.

Where a primary living area is an “L-shaped” room and the smaller portion of this area is 8 feet by 10 feet (2438 mm by 3048 mm) or larger, a fan shall be installed in both the larger and smaller portions of the primary living area. This shall not include spaces designed to be dining rooms or dining areas. Areas separated by permanently fixed archways, walls, or dividers shall be considered separate rooms.

**TABLE 13-607.1.A.1  
FAN SIZING TABLE**

LONGEST WALL LENGTH (feet)	MINIMUM FAN SIZE (inches)
≤ 12	36
> 12 - 16	48
> 16 - 17.5	52
> 17.5 - 25	56
> 25	2 fans (minimum of 48 inches each)

For SI: 1 inch = 25.4, 1 foot = 304.8 mm.

**13-607.1.A.2 Multizone practice credit.** Houses for which multizone practice credit is claimed in accordance with the criteria of Section 13-607.2.A.3.2 shall meet the following criteria:

1. A separate thermostatic control shall be provided for each zone which provides independent conditioning.
2. Zones shall be completely separated from one another by walls, ceilings, floor and totally closing doors and shall be configured such that air exchange between them does not exist in a free flow manner. Doors between zones shall not exceed a total of 40 square feet (4 m<sup>2</sup>).

**TABLE 13-607.1.ABC.3.2A  
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS – MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency <sup>2</sup>	Test Procedure <sup>1</sup>		
Air Conditioners, Air Cooled	<65,000 Btu/h <sup>3</sup>	All	Split System	13.0 SEER	ARI 210/240		
			Single Package	13.0 SEER			
	≥65,000 Btu/h and <135,000 Btu/h	All other	Electric Resistance (or None)	Split System and Single Package		10.3 EER	
			Split System and Single Package	10.1 EER			
	≥135,000 Btu/h and <240,000 Btu/h	All other	Electric Resistance (or None)	Split System and Single Package		9.7 EER	ARI 340/360
			Split System and Single Package	9.5 EER			
	≥240,000 Btu/h and <760,000 Btu/h	All other	Electric Resistance (or None)	Split System and Single Package	9.5 EER, 9.7 IPLV		
			Split System and Single Package	9.3 EER, 9.5 IPLV			
	>760,000 Btu/h	All other	Electric Resistance (or None)	Split System and Single Package	9.2 EER, 9.4 IPLV		
			Split System and Single Package	9.0 EER, 9.2 IPLV			
Through-the-Wall, Air Cooled	<30,000 Btu/h <sup>3</sup>	All	Split System	10.9 SEER	ARI 210/240		
			Single Package	10.6 SEER			
Small-Duct High-Velocity, Air Cooled	<65,000 Btu/h <sup>3</sup>	All	Split System or Single Package	11.0 SEER <sup>4</sup>	ARI 210/240		
Space Constrained Products, Air Conditioners	<65,000 Btu/h <sup>3</sup>	All	Split System or Single Package	12.0 SEER	ARI 210/240		
Air Conditioners, Water and Evaporatively Cooled	<65,000 Btu/h	All	Split System and Single Package	12.1 EER	ARI 210/240		
			Electric Resistance (or None)	Split System and Single Package		11.5 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All other	Split System and Single Package	11.3 EER			
			Electric Resistance (or None)	Split System and Single Package	11.0 EER	ARI 340/360	
	≥135,000 Btu/h and <240,000 Btu/h	All other	Split System and Single Package	10.8 EER			
			Electric Resistance (or None)	Split System and Single Package	11.0 EER, 10.3 IPLV		
≥240,000 Btu/h	All other	Split System and Single Package	10.8 EER, 10.1 IPLV				
		Split System and Single Package	10.8 EER, 10.1 IPLV				
Condensing Units, Air Cooled	≥135,000 Btu/h			10.1 EER, 11.2 IPLV	ARI 365		
Condensing Units, Water or Evaporatively Cooled	≥135,000 Btu/h			13.1 EER, 13.1 IPLV			

For SI: 1 Btu/h = .2931 W.

- Subchapter 13-3 contains a complete specification of the reference test procedure, including the referenced year version of the test procedure.
- IPLVs are only applicable to equipment with capacity modulation.
- Single-phase, air-cooled air-conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.
- As granted by U.S. Department of Energy letter of exception, specific to individual companies. SDHV products without a letter of exception shall have the same efficiency as air-cooled air conditioners.

**TABLE 13-607.1.ABC.3.2B  
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS – MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency <sup>2</sup>	Test Procedure <sup>1</sup>
Air Cooled (Cooling Mode)	<65,000 Btu/h <sup>3</sup>	All	Split System	13.0 SEER	ARI 210/240
			Single Package	13.0 SEER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.1 EER	
		All other	Split System and Single Package	9.9 EER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.3 EER	ARI 340/360
		All other	Split System and Single Package	9.1 EER	
≥240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.0 EER 9.2 IPLV		
	All other	Split System and Single Package	8.8 EER 9.0 IPLV		
Through-the-Wall, Air Cooled	<30,000 Btu/h <sup>3</sup>	All	Split System	10.9 SEER	ARI 210/240
			Single Package	10.6 SEER	
Small-Duct High-Velocity, Air Cooled, Cooling Mode	<65,000 Btu/h <sup>3</sup>	All	Split System	11.0 SEER <sup>4</sup>	ARI 210/240
Water Source (Cooling Mode)	<17,000 Btu/h	All	86°F Entering Water	11.2 EER	ISO-13256-1
	≥17,000 Btu/h and <135,000 Btu/h	All	86°F Entering Water	12.0 EER	
Groundwater Source (Cooling Mode)	<135,000 Btu/h	All	59°F Entering Water	16.2 EER	
Ground Source (Cooling Mode)	<135,000 Btu/h	All	77°F Entering Water	13.4 EER	
Air Cooled (Heating Mode)	<65,000 Btu/h <sup>3</sup> (Cooling Capacity)		Split System	7.7 HSPF	ARI 210/240
			Single Package	7.7 HSPF	
	≥65,000 Btu/h and <135,000 Btu/h (Cooling Capacity)		47°F db/43°F wb Outdoor Air 17°F db/15°F wb Outdoor Air	3.2 COP 2.2 COP	
	≥135,000 Btu/h (Cooling Capacity)		47°F db/43°F wb Outdoor Air 17°F db/15°F wb Outdoor Air	3.1 COP 2.0 COP	ARI 340/360
Through-the-Wall (Air Cooled, Heating Mode)	<30,000 Btu/h <sup>3</sup> (Cooling Capacity)		Split System	7.1 HSPF	ARI 210/240
			Single Package	7.0 HSPF	
Small-Duct High-Velocity (Air Cooled, Heating Mode)	<65,000 Btu/h <sup>3</sup> (Cooling Capacity)		Split System or Single Package	6.8 HSPF <sup>4</sup>	ARI 210/240
Space Constrained Products, Heat Pumps	<65,000 Btu/h <sup>3</sup>		Split System or Single Package	7.4 HSPF	ARI 210/240
Water-Source (Heating Mode)	<135,000 Btu/h (Cooling Capacity)		68°F Entering Water	4.2 COP	ISO-13256-1
Groundwater Source (Heating Mode)	<135,000 Btu/h (Cooling Capacity)		50°F Entering Water	3.6 COP	
Ground Source (Heating Mode)	<135,000 Btu/h (Cooling Capacity)		32°F Entering Water	3.1 COP	

For SI: 1 Btu/h = .2931W, °C = [(°F) - 32]/1.8

1. Subchapter 13-3 contains a complete specification of the reference test procedure, including the referenced year version of the test procedure.
2. IPLVs and Part Load rating conditions are only applicable to equipment with capacity modulation.
3. Single-phase, air-cooled heat pumps <65,000 Btu/h are regulated by NAECA. SEER and HSPF values are those set by NAECA.
4. As granted by U.S. Department of Energy letter of exception, specific to individual companies. SDHV products without a letter of exception shall have the same efficiency as air-cooled air-conditioners.

**TABLE 13-607.1.ABC.3.2D**  
**ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS, SINGLE-PACKAGE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS, AND ROOM AIR CONDITIONERS HEAT PUMPS — MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency <sup>1</sup>	Test Procedure <sup>2</sup>
PTAC (Cooling Mode), New Construction	7,000 ≥Btu/h <8,000	95°F db Outdoor Air	11.0 EER	ARI 310/380
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using EER= 12.5 – (0.213 x Cap/1000)] <sup>3</sup>	10.8 EER	
	9,000 ≤Btu/h < 10,000		10.6 EER	
	10,000 ≤Btu/h < 11,000		10.4 EER	
	11,000 ≤Btu/h < 12,000		10.2 EER	
	12,000 ≤Btu/h < 13,000		9.9 EER	
	13,000 ≤Btu/h < 14,000		9.7 EER	
	14,000 ≤Btu/h < 15,000		9.5 EER	
>15,000 Btu/h	9.3 EER			
PTAC (Cooling Mode), Replacements <sup>2</sup>	7,000 ≥Btu/h <8,000	95°F db Outdoor Air	9.4 EER	
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using EER= 10.9 – (0.213 x Cap/1000)] <sup>3</sup>	9.2 EER	
	9,000 ≤Btu/h < 10,000		9.0 EER	
	10,000 ≤Btu/h < 11,000		8.8 EER	
	11,000 ≤Btu/h < 12,000		8.6 EER	
	12,000 ≤Btu/h < 13,000		8.3 EER	
	13,000 ≤Btu/h < 14,000		8.1 EER	
	14,000 ≤Btu/h < 15,000		7.9 EER	
>15,000 Btu/h	7.7 EER			
PTHP (Cooling Mode), New Construction	7,000 ≥Btu/h <8,000	95°F db Outdoor Air	10.8 EER	
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using EER= 12.3 – (0.213 x Cap/1000)] <sup>3</sup>	10.6 EER	
	9,000 ≤Btu/h < 10,000		10.4 EER	
	10,000 ≤Btu/h < 11,000		10.2 EER	
	11,000 ≤Btu/h < 12,000		10.0 EER	
	12,000 ≤Btu/h < 13,000		9.7 EER	
	13,000 ≤Btu/h < 14,000		9.5 EER	
	14,000 ≤Btu/h < 15,000		9.3 EER	
>15,000 Btu/h	9.1 EER			
PTHP (Cooling Mode), Replacements <sup>2</sup>	7,000 ≥Btu/h <8,000	95°F db Outdoor Air	9.3 EER	
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using EER= 10.8 – (0.213 x Cap/1000)] <sup>3</sup>	9.1 EER	
	9,000 ≤Btu/h < 10,000		8.9 EER	
	10,000 ≤Btu/h < 11,000		8.7 EER	
	11,000 ≤Btu/h < 12,000		8.5 EER	
	12,000 ≤Btu/h < 13,000		8.2 EER	
	13,000 ≤Btu/h < 14,000		8.0 EER	
	14,000 ≤Btu/h < 15,000		7.8 EER	
>15,000 Btu/h	7.6 EER			
PTHP (Heating Mode), New Construction	7,000 ≥Btu/h <8,000	47°F db Outdoor Air	3.02 COP	
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using COP= 3.2 – (0.026 x Cap/1000)] <sup>3</sup>	2.99 COP	
	9,000 ≤Btu/h < 10,000		2.97 COP	
	10,000 ≤Btu/h < 11,000		2.94 COP	
	11,000 ≤Btu/h < 12,000		2.91 COP	
	12,000 ≤Btu/h < 13,000		2.89 COP	
	13,000 ≤Btu/h < 14,000		2.86 COP	
	14,000 ≤Btu/h < 15,000		2.84 COP	
>15,000 Btu/h	2.81 COP			
PTHP (Heating Mode), Replacements <sup>2</sup>	7,000 ≥Btu/h <8,000	47°F db Outdoor Air	2.72 COP	
	8,000 ≤Btu/h < 9,000	[Based on capacity at lower range using COP= 2.9 – (0.026 x Cap/1000)] <sup>3</sup>	2.69 COP	
	9,000 ≤Btu/h < 10,000		2.67 COP	
	10,000 ≤Btu/h < 11,000		2.64 COP	
	11,000 ≤Btu/h < 12,000		2.61 COP	
	12,000 ≤Btu/h < 13,000		2.59 COP	
	13,000 ≤Btu/h < 14,000		2.56 COP	
	14,000 ≤Btu/h < 15,000		2.54 COP	
>15,000 Btu/h	2.51 COP			

(continued)

SPVAC (Cooling Mode)	All Capacities	95°F db/75°F wb Outdoor Air	8.6 EER	ARI 390
SPVHP (Cooling Mode)	All Capacities	95°F db/75°F wb Outdoor Air	8.6 EER	
SPVHP (Heating Mode)	All Capacities	47°F db/43°F wb Outdoor Air	2.7 COP	
Room Air Conditioners with Louvered Sides	8,000 <Btu/h		9.7 EER	ANSI/AH AM RAC-1
	>8,000 <14,000 Btu/h		9.8 EER	
	>14,000 <20,000 Btu/h		9.7 EER	
	>20,000 Btu/h		8.5 EER	
Room Air Conditioners, without Louvered Sides	<8,000 Btu/h		9.0 EER	
	>8,000 Btu/h		8.5 EER	
Room Air Conditioner Heat Pumps with Louvered Sides	<20,000 Btu/h		9.0 EER	
	>20,000 Btu/h		8.5 EER	
Room Air Conditioner Heat Pumps without Louvered Sides	<14,000 Btu/h		8.5 EER	
	>14,000 Btu/h		8.0 EER	
Room Air Conditioner, Casement only	All Capacities		8.7 EER	
Room Air Conditioner, Casement-Slider	All Capacities		9.5 EER	

For SI: 1 Btu/h = .2931 W, °C = [(°F) - 32]/1.8

1. Subchapter 13-3 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
2. Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) high and less than 42 inches (1067 mm) wide.
3. Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7,000 Btu/h, use 7,000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

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**Exceptions:**

- a. Where one zone consists of multiple rooms which may be isolated with closeable doors and are served by one air conditioning system, separation criteria may be met by providing separate return air ducts to each room. The common space connecting the rooms shall be part of another zone.
  - b. Between lower and upper floors in a multiple-story home.
3. No zone shall constitute more than 75 percent of the total conditioned floor area.

**13-607.1.A.3 Ventilation credit.**

**13-607.1.A.3.1 Cross ventilation credit.** Houses for which credit is claimed for cross ventilation in accordance with the criteria in Section 13-607.2.A.3.3 shall have provided operable aperture areas totaling a minimum of 12 percent of the floor area of the room for all primary living areas and main bedrooms.

Insect screens shall be provided for all windows and doors to be considered operable aperture area. All screened entry doors and interior doors in the ventilated areas shall be provided with either (1) mechanically attached door stops (or similar devices) to hold the door in an open position or (2) operable louvers.

The total aperture area shall be provided by a minimum of two distinct windows. Each window shall provide not more than 70 percent of the total aperture area. The windows (or sliding glass doors) shall be placed in adjacent or opposite walls. The windows may be placed on a single outside wall if wing walls are used.

Where wing walls are included in the building design for ventilation purposes, they shall be placed between windows to create a high-pressure and a low-pressure zone on each window. Wing walls shall extend from the ground to eave height, be located on the windward side of the building, and extend outward from the building a distance at least equal to one-half the width of the window.

**NOTE:** This technique is effective only for areas which experience significant and continuous winds during the cooling months.

**13-607.1.A.3.2 Whole house fan credit.** Houses for which whole house fan credit is claimed shall have installed a whole house fan sized to provide a minimum of 20 air changes per hour for the entire house. The fan installed shall have a free air cfm rating of at least three times the square footage of the conditioned area of the house. To ensure adequate air exhaust, the house attic shall have gable, ridge or wind turbine vents whose total opening area is equal to four times the ceiling cutout area for the whole house fan. Soffit vents shall not be included in the exhaust vent area.

**13-607.1.A.4 Attic radiant barrier credit.** Houses for which attic radiant barrier credit is claimed in accordance with the criteria of Section 13-607.2.A.3.4 shall have installed a radiant barrier that meets the following criteria:

1. It shall be fabricated over a ceiling insulated to a minimum of R-19 with conventional insulation. The radiant barrier credit shall not be used as a means to achieve partial or

whole compliance with the minimum attic insulation level of R-19 prescribed in Section 13-604.1.ABC.1. Either a sheet type or spray applied interior radiation control coating (IRCC) may be used.

2. It shall be installed in one of three prescribed configurations or a configuration otherwise approved by the Florida Building Commission (see Figure 13-607.1A.4).

3. If the radiant barrier material has only one surface with high reflectivity or low emissivity it shall be facing downward toward the ceiling insulation.

4. The attic airspace shall be vented in accordance with Section 2309.7 of the *Florida Building Code, Building*.

5. The radiant barrier system shall conform to ASTM C 1313, *Standard Specification for Sheet Radiant Barriers for Building Construction Applications*, or ASTM C 1321, *Standard Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction* as appropriate for the type of radiant barrier to be installed. The operative surface shall have an emissivity not greater than 0.06 for sheet radiant barriers or 0.25 for interior radiation control coatings as demonstrated by independent laboratory testing according to ASTM C 1371.

6. The radiant barrier system (RBS) shall conform with ASTM C 1158, *Use and Installation of Radiant Barrier Systems (RBS) in Building Constructions for Sheet Radiant Barriers*, or ASTM C 1321, *Standard Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction* for IRCC systems.

7. The radiant barrier shall be installed so as to cover gable ends without closing off any soffit, gable or roof ventilation.

**13-607.1.A.5 White roof credit.** Houses for which a white roof credit is claimed in accordance with Section 13-607.2.A.3.6 shall have an installed roof that meets the following criteria:

1. Roof type may only be metal, concrete, tile or single-ply membrane for residential construction.

2. Roof must be white with a tested total solar reflectance of 65 percent or greater when evaluated in accordance with ASTM E 903. Roof shall have a surface emissivity of 80 percent or greater. Testing of a qualifying sample of the roofing material shall be performed by an approved independent laboratory and product labeling commensurate with these results shall be provided by the manufacturer.

**13-607.1.B Prescriptive requirements specific to Method B.** Houses complying by Method B shall meet the following cooling equipment efficiencies:

1. All central cooling systems of less than 65,000 Btu/h capacity shall have a SEER equal to or greater than the prescribed value on Table 6B-1 of Form 600B for the compliance package chosen.

2. Packaged terminal air conditioners (PTACs), packaged terminal heat pumps (PTHPs), room air conditioners, and equipment not covered by U.S. Department of Energy (DOE) rules shall have an EER equal to the prescribed SEER level on Table 6B-1 of Form 600B for the compliance package chosen.

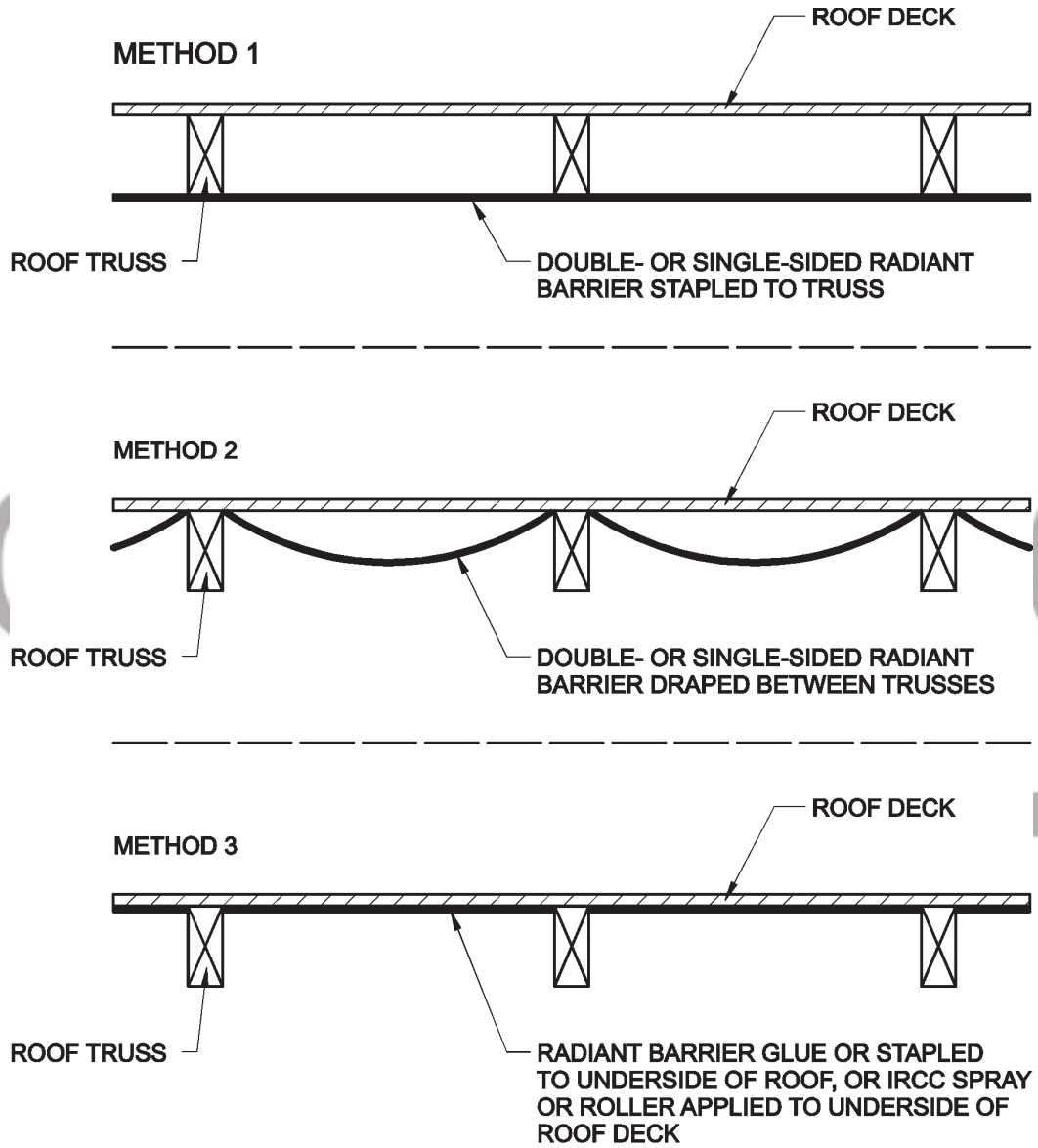


FIGURE 13-607.1.A.4  
ACCEPTABLE ATTIC RADIANT BARRIER CONFIGURATIONS

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**13-607.1.B.1 Additions.** Where cooling equipment is to be installed in an addition, the requirements of Section 13-607.1.B shall be met only when equipment is installed to specifically serve the addition or is being installed in conjunction with the construction of the addition.

**13-607.1.C Prescriptive requirements specific to Method C.**

**13-607.1.C.1 Additions.** All new air conditioners installed in additions complying by Method C shall meet the minimum efficiencies in Section 13-607.1.ABC.3.2.

Minimum equipment efficiencies shall be met only when equipment is installed to specifically serve the addition or is being installed in conjunction with the construction of the addition.

**13-607.1.C.2 Renovations.** Minimum efficiencies for cooling equipment to be added or replaced in renovations shall not be less than those specified in Section 13-607.1.ABC.3.2.

**13-607.1.C.3 Manufactured homes and manufactured buildings.** Minimum efficiencies for site-installed cooling equipment in manufactured homes shall not be less than those specified in Section 13-607.1.ABC.3.2.

**13-607.1.C.4 Building systems.** Newly manufactured cooling systems installed in existing buildings shall meet minimum requirements for that system in Section 13-607.1.ABC (see also Section 13-101.6).

**13-607.2 Performance calculation procedures.**

**13-607.2.A Performance calculation procedures for Method A.**

**13-607.2.A.1 Types of cooling systems and multipliers.** Space cooling systems are characterized as primarily electric vapor compression systems, although cooling may also be provided by gas-driven vapor compression and gas-fired absorption cycle air conditioners. Multipliers shall be determined for air conditioners based on the appropriate efficiency rating for the system to be installed from Table 6A-9 on Form 600A.

Interpolation of multipliers for efficiencies falling within ranges may be made in accordance with Section 13-C1.3 of Appendix 13-C of this chapter.

For gas-driven and absorption cycle air conditioners fueled by natural gas or other fuels, the cooling system multipliers (CSM) in Table 6-13 of Section 13-C5.1, Appendix 13-C of this chapter, apply.

**13-607.2.A.2 Multiple cooling systems.** Where two or more cooling systems of the same type are installed with different levels of efficiency serving different parts of the house, a single system multiplier may be calculated. To select a multiplier for a dual system, the efficiency ratings for the two systems shall be combined based on the percentage of the total capacity supplied by each system. The new effective efficiency rating shall be calculated by Equation 13-6-2 in Section 13-C5.2 of Appendix 13-C of this chapter.

**13-607.2.A.3 Cooling credit multipliers.** Cooling credit multipliers (CCM) are given for certain technologies which reduce energy used for air conditioning. Cooling credit may be obtained for the options in Sections 13-607.2.A.3.1 through 13-607.2.A.3.4. Where more than one cooling credit is taken,

the multipliers for each option shall be multiplied together to obtain one multiplier.

**13-607.2.A.3.1 Ceiling fans.** Ceiling fan credit may be taken if one or more ceiling fans are installed in each of the bedrooms and a minimum of one ceiling fan is installed in all primary living areas (living rooms, family rooms, or great rooms). Prescriptive requirements in Section 13-607.1.A.1 shall be met. The cooling credit multiplier (CSM) shall be determined from Table 6A-19 on Form 600A.

Credit shall not be taken for both ceiling fans and cross ventilation.

**13-607.2.A.3.2 Multizone practice.** Multizone credit may be taken if two or more spaces (zones) are completely separated from one another by walls, ceilings, floor and totally closing doors and the prescriptive requirements in Section 13-607.1.A.2 are met. The multizone credit multiplier shall be determined from Table 6A-19 on Form 600A.

**13-607.2.A.3.3 Ventilation.** Ventilation cooling credit may be taken for either cross ventilating a house or by installing a whole house fan, but credit shall not be taken for both. Credit shall not be taken for both cross ventilation and ceiling fans. The prescriptive requirements in Section 13-607.1.A.3.1 or Section 13-607.1.A.3.2 shall be met for cross ventilation or whole-house fans, respectively. Cooling credit for ventilation shall be determined from Table 6A-19 on Form 600A.

**13-607.2.A.3.4 Attic radiant barriers.** Cooling credit may be taken for attic radiant barriers where a radiant barrier system is to be installed in one of the configurations depicted in Figure 13-6-2 that meets all the prescriptive requirements in Section 13-607.1.A.4. Cooling credit shall be taken against the ceiling load by multiplying the summer point multiplier for the ceiling configuration and insulation level chosen from Table 6A-4 on Form 600A by a credit multiplier of the following:

- Sheet type radiant barriers:
  - 0.70 (all climate zones)
- Interior Radiation Control Coatings:
  - 0.849 North Florida
  - 0.864 Central Florida
  - 0.865 South Florida

**13-607.2.A.3.5 Programmable thermostats.** Cooling credit may be taken for programmable thermostats capable of being set as follows:

- Summer: 78°F (26°C) from 3 p.m. to 9 a.m.
- 83°F (28°C) from 9 a.m. to 3 p.m.

The cooling credit multiplier for this thermostat shall be determined from Table 6A-19 on Form 600A.

**13-607.2.A.3.6 White roofs.** Cooling credit may be taken for white roofs where a white roof is installed of an approved configuration and solar reflectance. Cooling credit shall be taken against the ceiling load by multiplying the summer point multiplier for the ceiling configuration and insulation level chosen on Form 600A by a credit multiplier of 0.55.

**13-607.2.A.4 Additions.** Space cooling may be provided by existing or newly installed equipment. Systems in operation before the construction of the addition shall be considered existing systems and shall comply with criteria in Section

13-600.2.A.3.1. New systems may be replacements of existing equipment or equipment installed to condition only the addition. New equipment may qualify for the multizone credit if structural requirements are met as per Section 13-607.1.A.2.

**13-607.2.A.5 Internal gains.** Internal gains shall be considered for both the baseline and as-built conditions. The multiplier for internal gains shall be determined from Table 6A-6 on Form 600A.

## SECTION 13-608 SPACE HEATING SYSTEMS

### 13-608.1 Prescriptive requirements.

#### 13-608.1.ABC Basic prescriptive requirements for Methods A, B, and C.

**13-608.1.ABC.1 Equipment sizing.** An HVAC equipment sizing calculation shall be performed on the building in accordance with the criteria in Section 13-607.1.ABC.1 and shall be attached to the Form 600 submitted when application is made for a building permit. This code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing in excess of the capacity limitations in Sections 13-608.1.ABC.1.1 through 13-608.1.ABC.1.4. System sizing calculations shall not include loads due to intermittent local mechanical ventilation such as standard kitchen and bathroom exhaust systems. The engineered ventilation requirement of this code shall not be used as an infiltration rate when estimating infiltration load.

**13-608.1.ABC.1.1 Heat pumps.** Heat pump sizing shall be based on the cooling requirements as calculated according to Section 13-607.1.ABC.1 and the heat pump total cooling capacity shall not be more than 1.15 times greater than the design cooling load even if the design heating load is 1.15 times greater than the design cooling load. The published value for ARI total capacity is a nominal, rating-test value and shall not be used for equipment sizing. Manufacturer's expanded performance data shall not be used to determine heat pump cooling capacity. This selection shall be based on the outdoor design dry bulb temperature for the load calculation (or entering water temperature for water-source equipment), the blower CFM provided by the expanded performance data, the design value for entering wet bulb temperature and the design value for entering dry bulb temperature.

The design values for entering wet bulb temperature shall be for the indoor dry bulb and relative humidity used for the load calculation and shall be adjusted for return side gains if the return duct(s) is installed in an unconditioned space.

Capacity at the design heating temperature may be determined by interpolation or extrapolation of manufacturers' performance data, as allowed by the manufacturer, if these data are not available for the design temperature. The auxiliary capacity plus refrigeration cycle heating capacity shall not exceed 120 percent of the calculated heating requirements at the 99-percent design dry bulb temperature.

The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described herein.

**13-608.1.ABC.1.2 Electric resistance furnaces.** Electric resistance furnaces shall be sized within 4 kW of the design requirements calculated according to the procedure selected in Section 13-607.1.ABC.1.

**13-608.1.ABC.1.3 Fossil fuel heating equipment.** The capacity of fossil fuel heating equipment with natural draft atmospheric burners shall not be less than the design load calculated in accordance with Section 13-608.1.ABC.1.

**13-608.1.ABC.1.4 Extra capacity required for special occasions.** Residences requiring excess heating capacity on an intermittent basis shall comply with Section 13-607.1.ABC.1.2.

**13-608.1.ABC.2 Controls.** Requirements specified for controls in Section 13-607.1.ABC.2 shall apply for space heating systems. Lowering thermostat set points to reduce energy consumption of heating systems shall not cause energy to be expended to reach the reduced setting.

**13-608.1.ABC.2.1 Heat pump auxiliary heat control.** Heat pumps equipped with internal electric-resistance heaters shall have controls that prevent supplemental heater operation when the heating load can be met by the heat pump alone during both steady-state operation and setback recovery. Supplemental heater operation is permitted during outdoor coil defrost cycles. Two means of meeting this requirement are (1) a digital or electronic thermostat designed for heat pump use that energizes auxiliary heat only when the heat pump has insufficient capacity to maintain setpoint or to warm up the space at a sufficient rate, or (2) a multistage space thermostat and an outdoor air thermostat wired to energize auxiliary heat only on the last stage of the space thermostat and when outside air temperature is less than 40°F (4°C).

**Exception:** Heat pumps whose minimum efficiency is regulated by NAECA and whose HSPF rating both meets the requirements shown in Table 13-607.1.ABC.3.2B and includes all usage of internal electric resistance heating.

#### 13-608.1.ABC.3 Equipment performance standards.

**13-608.1.ABC.3.1 Equipment ratings.** Equipment efficiency ratings shall be obtained from a nationally recognized certification program directory, from a manufacturer's rating certified to be in compliance with an approved Department of Energy (DOE) or Air-conditioning and Refrigeration Institute (ARI) rating procedure. Equipment efficiencies shall be based on the standard rating conditions contained in the test standard referenced in Subchapter 13-3 that is appropriate for that equipment. Minimum ratings for products covered under the National Appliance Energy Conservation Act of 1987 shall be those determined for Region IV and used for the Federal Trade Commission's required appliance labeling.

**13-608.1.ABC.3.1.1 Mix-matched equipment.** Ratings for unitary central heat pump systems less than 65,000 Btu/h, using evaporator/(condenser) coils manufactured by independent companies, shall meet all requirements of Section 13-607.1.ABC.3.1.1.

**13-608.1.ABC.3.2 Minimum efficiencies for heating equipment.** Tables 13-607.1.ABC.3.2.B, 13-607.1.ABC.3.2D, and 13-608.1.ABC.3.2E through 13-608.1.ABC.3.2F contain the minimum efficiency requirements for equipment covered by

this section of the code. The tables are organized to cover the following types of equipment:

Table 13-607.1.ABC.3.2B, Heat Pumps.

Table 13-607.1.ABC.3.2D, Packaged Terminal Air Conditioners and Heat Pumps.

Table 13-608.1.ABC.3.2E, Furnaces, Duct Furnaces and Unit Heaters.

Table 13-608.1.ABC.3.2F, Gas- and Oil-Fired Boilers.

Gas-fired and oil-fired forced air furnaces with input ratings >225,000 Btu/h shall also have an intermittent ignition or inter-

rupted device (IID) and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for furnaces where combustion air is drawn from the conditioned space. All furnaces with input ratings >225,000 Btu/h, including electric furnaces, that are not located within the conditioned space shall have jacket losses not exceeding 0.75 percent of the input.

**13-608.1.ABC.3.2.2 Central electric furnaces.** Central electric furnaces greater than 10 kW shall be divided into at least two stages and controlled by an outdoor thermostat, multistage indoor thermostat, or combinations thereof.

**TABLE 13-608.1.ABC.3.2E  
WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS. MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Subcategory or Rating Condition	Minimum Efficiency <sup>1</sup>	Test Procedure <sup>2</sup>
Warm Air Furnace, Gas-Fired	<225,000 Btu/h	Maximum Capacity <sup>4</sup>	78% AFUE or ;80% E <sub>t</sub> <sup>4</sup>	DOE 10 CFR, Part 430 or ANSI Z 21.47
	≥225,000 Btu/h		80% E <sub>c</sub> <sup>3</sup>	ANSI Z21.47
Warm Air Furnace, Oil-Fired	<225,000 Btu/h	Maximum Capacity <sup>5</sup>	78% AFUE or ;80% E <sub>t</sub> <sup>4</sup>	DOE 10 CFR, Part 430 or UL 727
	≥225,000 Btu/h		81% E <sub>t</sub> <sup>6</sup>	UL 727
Warm Air Duct Furnaces, Gas-Fired	All Capacities	Maximum Capacity <sup>5</sup>	80% E <sub>c</sub> <sup>7</sup>	ANSI Z83.8
Warm Air Unit Heaters, Gas-Fired	All Capacities	Maximum Capacity <sup>5</sup>	80% E <sub>c</sub> <sup>7</sup>	ANSI Z83.8
Warm Air Unit Heaters, Oil-Fired	All Capacities	Maximum Capacity <sup>5</sup>	80% E <sub>c</sub> <sup>7</sup>	UL 731

For SI: 1 Btu/h = .2931 W.

- E<sub>t</sub> = thermal efficiency. See test procedure for detailed discussion.
- Subchapter 13-3 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
- E<sub>c</sub> = combustion efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
- Combination units not covered by NAECA (three-phase power or cooling capacity greater than or equal to 65,000 Btu/h) may comply with either rating.
- Minimum and maximum ratings as provided for and allowed by the unit's controls.
- E<sub>t</sub> = thermal efficiency. Units must also include an IID, have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
- E<sub>c</sub> = combustion efficiency (100% less flue losses). See test procedure for detailed discussion.

**TABLE 13-608.1.ABC.3.2F  
GAS- AND OIL-FIRED BOILERS MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type <sup>4</sup>	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency <sup>1</sup>	Test Procedure <sup>2</sup>
Boilers, Gas-Fired	<300,000 Btu/h	Hot water	80% AFUE	DOE 10 CFR Part 430
		Steam	75% AFUE	
	≥300,000 Btu/h and <2,500,000	Maximum Capacity <sup>3</sup>	75% E <sub>t</sub> <sup>1</sup>	H.I. Htg Boiler Std.
		>2,500,000 Btu/h <sup>4</sup>	Hot Water	
Boilers, Oil-Fired	<300,000 Btu/h		80% AFUE	DOE 10 CFR Part 430
	≥300,000 Btu/h and ≤250,000,000 Btu/h	Maximum Capacity <sup>3</sup>	78% E <sub>t</sub> <sup>1</sup>	H.I. Htg Boiler Std.
		>2,500,000 Btu/h <sup>4</sup>	Hot Water	
	>2,500,000 Btu/h <sup>4</sup>	Steam	83% E <sub>c</sub>	
Oil-Fired (Residual)	≥300,000 Btu/h and ≤250,000,000 Btu/h	Maximum Capacity <sup>3</sup>	78% E <sub>t</sub> <sup>1</sup>	H.I. Htg Boiler Std.
	>2,500,000 Btu/h <sup>4</sup>	Hot Water	83% E <sub>c</sub>	
	>2,500,000 Btu/h <sup>4</sup>	Steam	83% E <sub>c</sub>	

For SI: 1 Btu/h = .2931 W.

- E<sub>t</sub> = thermal efficiency. See reference documents for detailed information.
- Subchapter 13-3 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
- Minimum and maximum ratings as provided for and allowed by the unit's controls.
- These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers, and to all package boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.

**13-608.1.A Prescriptive requirements specific to Method A.**

**13-608.1.A.1 Multizone practice credit.** Houses for which multizone practice credit is claimed in accordance with the criteria of Section 608.2.A.4 shall meet the requirements in Section 607.1.A.2.

**13-608.1.A.2 Attic radiant barrier credit.** Houses for which attic radiant barrier credit is claimed in accordance with the criteria of Section 608.2.A.4.1 shall meet all the requirements in Section 607.1.A.3.

**13-608.1.A.3 Programmable thermostat credit.** Houses for which programmable thermostat credit is claimed shall have one or more features on the thermostat which prevent supplemental heat from being automatically engaged.

**13-608.1.B Prescriptive requirements specific to Method B.** Space heating systems are categorized as electric or gas and oil. Heating equipment shall meet the applicable minimum efficiencies listed on Table 6B-1 of Form 600B as allowed by the compliance package chosen.

Where heating equipment is to be installed in an addition, these requirements shall be met only when equipment is installed to specifically serve the addition or is being installed in conjunction with the construction of the addition.

**13-608.1.B.1 Electric space heating.** Electric heating systems are designated on Table 6B-1 of Form 600B as either STRIP or a number representing a heat pump heating seasonal performance factor (HSPF).

STRIP = Electric resistance heat or any heat pump with an HSPF of 6.8 or greater;

HSPF level = Any electric heat pump with that HSPF or a higher efficiency; Electric resistance heat shall not be installed.

**NOTE:** Heat pumps containing electric resistance supplemental heat have associated basic prescriptive requirements in Section 608.1.ABC.3.2.2.

**13-608.1.B.2 Gas and oil space heating.** Gas and oil heating systems may be installed for all compliance packages. If installed, they shall have a minimum annual fuel utilization efficiency (AFUE) as listed on Table 6B-1 of Form 600B.

**Gas instantaneous (tankless) water heaters that meet the requirements established for such equipment by this code may be installed for all compliance packages.**

**13-608.1.C Prescriptive requirements specific to Method C.**

**13-608.1.C.1 Additions.** New heating equipment to be added or replaced in small additions complying by Method C shall meet the minimum efficiencies in Section 608.1.ABC.3.2. Minimum equipment efficiencies shall be met only when equipment is installed to specifically serve the addition or is being installed in conjunction with the construction of the addition.

**13-608.1.C.2 Renovations.** Minimum efficiencies for heating equipment to be added or replaced in renovations shall not be less than those specified in Section 608.1.ABC.3.2.

**13-608.1.C.3 Manufactured homes and manufactured buildings.** Minimum efficiencies for site-installed heating equipment in manufactured homes shall not be less than those specified in Section 608.1.ABC.3.2.

**13-608.1.C.4 Building systems.** Newly manufactured heating systems installed in existing buildings shall meet the minimum requirements for that system in Section 608.1.ABC (see Section 101.6 for exceptions).

**13-608.2 Performance calculation procedures.****13-608.2.A Performance calculation procedures for Method A.**

**13-608.2.A.1 Types of heating systems and multipliers.** Space heating systems are characterized as either heat pumps, electric resistance or combustion. Heat pumps (reverse cycle air conditioning) can be either electric or gas-driven. Typical combustion systems are natural gas and liquid petroleum gas (propane). Multipliers shall be determined for the type of heating system to be installed and its efficiency rating from Table 6A-17 on Form 600A.

Interpolation of multipliers for efficiencies falling within ranges may be made in accordance with Section 1.3 of Appendix 13-C of this chapter.

**13-608.2.A.2 Multiple heating systems.** Where two or more heating systems of the same type are installed with different levels of efficiency serving different parts of the house, a single system multiplier may be calculated. To select a multiplier for a dual system, the efficiency ratings for the two systems shall be combined based on the percentage of the total capacity supplied by each system. The new effective efficiency rating shall be calculated according to the formula in Section 5.2 of Appendix 13-C of this chapter.

Where two or more dissimilar systems, such as electric and fuel-fired systems, are utilized, separate calculations shall be made for the separate zones of the structure serviced by each.

**13-608.2.A.3 Heating credit multipliers.** Heating credit multipliers (HCM) are given for certain technologies which reduce energy use or cost, including natural gas and other fuels. Heating credit may be taken for the options in Sections 608.2.A.3.1 through 608.2.A.3.4. Where more than one heating credit is taken, the multipliers for each option shall be multiplied together to obtain one multiplier.

**13-608.2.A.3.1 Attic radiant barriers.** Attic radiant barrier credit may be taken when an attic radiant barrier is installed which is compliant with all requirements in Section 607.1.A.4. Heating credit shall be taken against the ceiling load by multiplying the winter point multiplier for the ceiling configuration and insulation level chosen from Table 6A-13 on Form 600A by a credit multiplier of the following:

Sheet type radiant barriers	0.85 (all climate zones)
Interior radiation control coatings	0.912 North Florida
	0.905 Central Florida
	0.899 South Florida

**13-608.2.A.3.2 Multizone practice.** Multizone credit may be taken if the prescriptive construction requirements in Section 607.1.A.2 have been met. The heating credit multiplier for multizone systems shall be determined from Table 6A-18 on Form 600A.

**13-608.2.A.3.3 Natural gas furnaces.** Natural gas credit may be taken when a natural gas furnace is to be installed. The HCM shall

be determined from Table 6A-18 on Form 600A based on the annual fuel utilization efficiency (AFUE) rating of the furnace.

**13-608.2.A.3.4 LP-gas.** LP-gas credit may be taken when a liquid petroleum (propane) furnace is to be installed. The HCM shall be determined from Table 6A-18 on Form 600A based on the AFUE rating of the furnace.

**13-608.2.A.3.5 Hydronic space gas water heating.** Heating system credit multipliers to be used for combined gas storage tank water heating and space heating systems shall be determined from Table 13-6A-21 on Form 600A based on the effective space heating efficiency ( $CA_{afue}$ ) as listed by the GAMA where the system has been tested to ANSI/ASHRAE 124 or may utilize the heating system credit multipliers for the water heater recovery efficiency and climate zone on Table 13-6C-15 in Section 5.1.2 of Appendix 13-C of this chapter if not so tested. Heating system multipliers for combined gas instantaneous (tankless) water heating and space heating systems shall be determined from Table 13-6C-15.1 in Section 5.1.2 of Appendix 13-C based on the Thermal Efficiency ( $E_t$ ) rating of the gas instantaneous (tankless) water heater in accordance with ANSI test method Z21.10.3. A gas instantaneous (tankless) water heater shall be as defined in Section 13-612.1.ABC.3.2.3.

**13-608.2.A.3.6 Programmable thermostats.** Heating credit may be taken for programmable thermostats capable of being set as follows:

Winter:           72°F (22°C) from 7 am - 11 pm  
                      67°F (19°C) from 11 pm - 7 am

The heating credit multiplier for this thermostat shall be determined from Table 6A-18 on Form 600A. The prescriptive requirements in Section 608.1.A.3 shall be met.

**13-608.2.A.3.7 White roofs.** A heating multiplier shall be taken when a white roof system is installed which is compliant with all requirements in Section 607.1.A.5. Heating credit shall be taken against the ceiling load by multiplying the winter point multiplier for the ceiling configuration and insulation level chosen on Form 600A by a credit multiplier of 1.044. Credit shall not be taken for both Attic radiant barrier and white roofs in conjunction.

**13-608.2.A.4 Additions.** Space heating may be provided by existing or newly installed equipment. Systems in operation before the construction of the addition shall be considered existing systems. New systems may be replacements of existing equipment or equipment installed to condition only the addition. New equipment may qualify for the multizone credit if structural requirements are met as per Section 607.1.A.2.

**13-608.2.A.5 Infiltration.** Infiltration shall be considered for both the baseline and as-built conditions. The multiplier for infiltration shall be determined from Table 6A-15.

**13-608.2.A.6 Internal gains.** Internal gains shall be considered for both the baseline and as-built condition. The multiplier for internal gains shall be determined from Table 6A-15.

## SECTION 13-609 VENTILATION SYSTEMS

### 13-609.1 Prescriptive requirements.

#### 13-609.1.ABC Basic prescriptive requirements for Methods A, B and C.

**13-609.1.ABC.1 Buildings operated at positive indoor pressure.** Residential buildings designed to be operated at a positive indoor pressure or for mechanical ventilation shall meet the following criteria:

1. The design air change per hour minimums for residential buildings in ASHRAE 62, *Ventilation for Acceptable Indoor Air Quality*, shall be the maximum rates allowed for residential applications where pressurization is provided.
2. No ventilation or air-conditioning system make-up air shall be provided to conditioned space from attics, roof tops, crawlspaces, attached enclosed garages or outdoor spaces adjacent to swimming pools or spas.

**Exception:** Makeup air may be taken from rooftops for multistory multiple-family buildings.

3. If ventilation air is drawn from enclosed space(s), then the walls of the space(s) from which air is drawn shall be insulated to a minimum of R-11 and the ceiling shall be insulated to a minimum of R-19, space permitting, or R-10 otherwise.

**13-609.2 Performance calculation procedures.** Blank for numbering consistency. See also Section 607.2.A.3 for ventilation credit multipliers.

## SECTION 13-610 AIR DISTRIBUTION SYSTEMS

### 13-610.1 Prescriptive requirements.

#### 13-610.1.ABC Basic prescriptive requirements for Methods A, B and C.

**13-610.1.ABC.1. Air distribution system sizing and design.** All air distribution systems shall be sized and designed in accordance with recognized engineering standards such as ACCA Manual D or other standards based on the following:

1. Calculation of the supply air for each room shall be based on the greater of the heating load or sensible cooling load for that room.
2. Duct size shall be determined by the supply air requirements of each room, the available static pressure and the total equivalent length of the various duct runs.
3. Friction loss data shall correspond to the type of material used in duct construction.

**13-610.1.ABC.2 Air distribution system insulation requirements.** All air distribution system components which move or contain conditioned air, including but not limited to, air filter enclosures, air ducts and plenums located in or on buildings shall be thermally insulated in accordance with the requirements of Sections 610.1.ABC.2.1 through 610.1.ABC.2.3.

**13-610.1.ABC.2.1 Insulation required.** The minimum installed thermal resistance ( $R$ -value) for air distribution system components shall be as specified in Table 610.1.ABC.2.1.

**Exception:** Air distribution system component insulation (except where required to prevent condensation) is not required in the following cases:

1. Within conditioned space.

2. Exhaust air ducts.
3. Factory-installed plenums, casings, or ductwork furnished as a part of HVAC equipment tested and rated in accordance with Section 607.1.ABC.3 or 608.1.ABC.3.

**TABLE 13-610.1.ABC.2.1  
MINIMUM INSULATION LEVELS  
AIR DISTRIBUTION SYSTEM COMPONENTS<sup>1</sup>**

Location	R-Value
On roof	R-6
Exterior of building	R-6
Attic with ceiling insulation	R-6
Between conditioned floors <sup>2</sup>	R-4.2
Enclosed attached garages	R-4.2
Unconditioned basement	R-4.2
Vented crawlspace	R-4.2

1. See Section 610.1.ABC.3.5, Air-handling units.
2. Except where perimeter walls to the between floor space are insulated.

**13-610.1.ABC.2.2 R-value determination.** All duct insulation and factory-made ducts shall be labeled with *R*-values based on flat sections of insulation only at installed thickness and excluding any air film resistance. The thermal resistance (*R*) shall be determined using the relationship  $R = t/k$  where *t* (inches) is the installed thickness and *k* (Btu-in/hr-ft<sup>2</sup>-°F) is the measured apparent thermal conductivity at 75°F (24°C) mean temperature and at installed thickness tested in accordance with ASTM C 518 or ASTM C 177.

The installed thickness of duct insulation used to calculate *R*-values shall be determined as follows:

1. Duct board, duct liner and factory-made rigid ducts not normally subjected to compression shall use the nominal insulation thickness.
2. Duct wrap shall have an assumed installed thickness of 75 percent of nominal thickness (25-percent compression).
3. Factory-made flexible air ducts shall have the installed thickness and calculated *R*-values determined in accordance with Paragraph 3.4 of the ADC Standard, *Flexible Duct Performance & Installation Standards*.

**13-610.1.ABC.2.3 Condensation control.** Additional insulation with vapor barrier shall be provided where the minimum duct insulation requirements of Section 610.1.ABC.2 are determined to be insufficient to prevent condensation.

**13-610.1.ABC.2.4 Fibrous glass duct liner.** Fibrous glass duct liner shall be fabricated and installed in accordance with the provisions of the NAIMA *Fibrous Glass Duct Liner Standard*.

**13-610.1.ABC.3 Air distribution system construction and installation.** Ducts shall be constructed, braced, reinforced and installed to provide structural strength and durability. All transverse joints, longitudinal seams and fitting connections shall be securely fastened and sealed in accordance with the applicable standards of this section.

As an alternative to compliance with specific criteria of Sections 610.1.ABC.3.0.4 through 610.1.ABC.3.2.1, 610.1.ABC.3.3.1 through 610.1.ABC.3.3.2, and 610.1.ABC.3.3.6, air ducts and duct systems complying with the applicable requirements of the following standards shall be deemed as meeting the intent of this code. Where these standards do not address the specific closure details of

the code, in the manner required by the subsequent sections of this code, the requirements of the code shall govern.

1. SMACNA, HVAC Duct Construction Standards, Metal and Flexible.
2. NAIMA, Fibrous Glass Duct Construction Standards.
3. ADC, Flexible Duct Performance and Installation Standards.
4. ASHRAE Handbook–HVAC Systems and Equipment.
5. UL 181.
6. UL181A: Part I; Part II; Part III.
7. UL 181B: Part I; Part II.

**13-610.1.ABC.3.0 General.** All enclosures which form the primary air containment passageways for air distribution systems shall be considered ducts or plenum chambers and shall be constructed and sealed in accordance with the applicable criteria of this section.

**13-610.1.ABC.3.0.1 Mechanical fastening.** All joints between sections of air ducts and plenums, between intermediate and terminal fittings and other components of air distribution systems, and between subsections of these components shall be mechanically fastened to secure the sections independently of the closure system(s).

**13-610.1.ABC.3.0.2 Sealing.** Air distribution system components shall be sealed with approved closure systems.

**13-610.1.ABC.3.0.3 Space provided.** Sufficient space shall be provided adjacent to all mechanical components located in or forming a part of the air distribution system to assure adequate access for: (1) construction and sealing in accordance with the requirements of Section 610.1.ABC.3 of this code; (2) inspection; and (3) cleaning and maintenance. A minimum of 4 inches (102 mm) is considered sufficient space around air-handling units.

**Exception:** Retrofit or replacement units not part of a renovation are exempt from the minimum clearance requirement.

**13-610.1.ABC.3.0.4. Product application.** Closure products shall be applied to the air barriers of air distribution system components being joined in order to form a continuous barrier or they may be applied in accordance with the manufacturer’s instructions or appropriate industry installation standard where more restrictive.

**13-610.1.ABC.3.0.5 Surface preparation.** The surfaces upon which closure products are to be applied shall be clean and dry in accordance with the manufacturer’s installation instructions.

**13-610.1.ABC.3.0.6 Approved mechanical attachments.** Approved mechanical attachments for air distribution system components include screws, rivets, welds, interlocking joints crimped and rolled, staples, twist in (screw attachment), and compression systems created by bend tabs or screw tabs and flanges or by clinching straps. Mechanical attachments shall be selected to be appropriate to the duct system type.

**13-610.1.ABC.3.0.7 Approved closure systems.** The following closure systems and materials are approved for air distribution construction and sealing for the applications and pressure classes prescribed in Sections 610.1.ABC.3.1 through 610.1.ABC.3.8:

1. Metal closures.
  - a. Welds applied continuously along metal seams or joints through which air could leak.
  - b. Snaplock seams, and grooved, standing, double-corner, single-corner and Pittsburgh-lock seams, as defined by SMACNA, as well as all other rolled mechanical seams. All seams shall be rolled or crimped
2. Gasketing, which achieves a 25/50 flame spread/smoke-density-development rating under ASTM E 84 or UL 723, provided that it is used only between mated surfaces which are mechanically fastened with sufficient force to compress the gasket and to fill all voids and cracks through which air leakage would otherwise occur.
3. Mastic closures. Mastics shall be placed over the entire joint between mated surfaces. Mastics shall not be diluted. Approved mastics include the following:
  - a. Mastic or mastic-plus-embedded fabric systems applied to fibrous glass ductboard that are listed and labeled in accordance with UL 181A, Part III.
  - b. Mastic or mastic-plus-embedded fabric systems applied to nonmetal flexible duct that are listed and labeled in accordance with UL 181B, Part II.
  - c. Mastic ribbons, which achieve a 25/50 flame spread/smoke density development rating under ASTM E 84 or UL 723, provided that they may be used only in flange-joints and lap-joints, such that the mastic resides between two parallel surfaces of the air barrier and that those surfaces are mechanically fastened.
4. Tapes. Tapes shall be applied such that they extend not less than 1 inch onto each of the mated surfaces and shall totally cover the joint. When used on rectangular ducts, tapes shall be used only on joints between parallel rigid surfaces and on right angle joints. Approved tapes include the following:
  - a. Pressure-sensitive tapes.
    - 1) Pressure-sensitive tapes applied to fibrous glass ductboard that are listed and labeled in accordance with UL 181A, Part I.
    - 2) Pressure-sensitive tapes applied to nonmetal flexible duct that are listed and labeled in accordance with UL 181B, Part I.
  - b. Heat-activated tapes applied to fibrous glass ductboard that are listed and labeled in accordance with UL 181A, Part II.
5. Aerosol sealant. Such sealants shall be installed by manufacturer-certified installers following manufacturer instructions and shall achieve 25/50 flame spread/smoke-density-development ratings under ASTM E 84 or UL 723.

**13-610.1.ABC.3.1 Metal duct, rigid and flexible.** All transverse joints, longitudinal seams and duct wall penetration of ducts and joints with other air distribution system components shall be mechanically attached and sealed using approved closure systems for that pressure class specified in Section 610.1.ABC.3.1.1 or Section 610.1.ABC.3.1.2.

**13-610.1.ABC.3.1.1 Pressures less than 1-inch water gauge, approved closure systems.** The following closure systems are approved for rigid metal duct designed to be operated at pressures less than 1-inch w.g. when they conform to the approved closure and mechanical attachment requirements of Section 610.1.ABC.3.0:

1. Continuous welds.
2. Snaplock seams, and grooved, standing, double-corner, single-corner and Pittsburgh-lock seams and all other rolled mechanical seams.
3. Mastic, mastic-plus-embedded fabric, or mastic ribbons.
4. Gaskets.
5. Pressure-sensitive tape.

**13-610.1.ABC.3.1.2 Pressures 1-inch water gauge or greater, approved closure systems.** The following closure systems are approved for rigid metal duct designed to be operated at pressures 1-inch w.g. or greater and flexible duct when they conform to the approved closure and mechanical attachment requirements of Section 610.1.ABC.3.0:

1. Continuous welds.
2. Mastic or mastic-plus-embedded fabric systems.
3. Gaskets.

**13-610.1.ABC.3.1.3 High pressure duct systems.** High pressure duct systems designed to operate at pressures greater than 3-inch water gauge (4-inch water gauge pressure class), shall be tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual*. The tested duct leakage class, at a test pressure equal to the design duct pressure class rating, shall be equal to or less than Leakage Class 6. Leakage testing may be limited to representative sections of the duct system but in no case shall such tested sections include less than 25 percent of the total installed duct area for the designated pressure class.

**13-610.1.ABC.3.2 Fibrous glass duct, rigid.** All rigid fibrous glass ducts and plenums shall be constructed and erected in accordance with the provisions of the NAIMA *Fibrous Glass Duct Construction Standards*.

All joints, seams and duct wall penetrations including, but not limited to, the joints between sections of duct and between duct and other distribution system components shall be mechanically attached and sealed using approved closure systems as specified in Section 610.1.ABC.3.2.1.

**13-610.1.ABC.3.2.1 Approved closure systems.** The following closure systems are approved for rigid fibrous glass ducts when they conform to the approved closure and mechanical attachment requirements of Section 610.1.ABC.3.0:

1. Heat-activated tapes.
2. Pressure-sensitive tapes.
3. Mastics or mastic-plus-embedded fabric systems.

**13-610.1.ABC.3.2.2 Mechanical fastening.** Attachments of ductwork to air-handling equipment shall be by mechanical fasteners. Where access is limited, two fasteners on one side shall be acceptable when installed in accordance with Section 610.1.ABC.3.0.6.

**13-610.1.ABC.3.3 Flexible duct systems, nonmetal.** Flexible nonmetal ducts shall be joined to all other air distribution system components by either terminal or intermediate fittings. All duct collar fittings shall have a minimum  $\frac{5}{8}$  inch (16 mm) integral flange for sealing to other components and a minimum 3-inch (76 mm) shaft for insertion into the inner duct core.

Flexible ducts having porous inner cores shall not be used.

**Exception:** Ducts having a nonporous liner between the porous inner core and the outer jacket. Fastening and sealing requirements shall be applied to such intermediate liners.

All joints of flexible ducts to fittings and fittings to other air distribution system components shall be mechanically attached and sealed as specified in Sections 610.1.ABC.3.3.1 through 610.1.ABC.3.3.6.

**13-610.1.ABC.3.3.1 Duct core to duct fitting, mechanical attachment.** The reinforced core shall be mechanically attached to the duct fitting by a drawband installed directly over the wire-reinforced core and the duct fitting. The duct fitting shall extend a minimum of 2 inches (51 mm) into each section of duct core. When the flexible duct is larger than 12 inches (303 mm) in diameter or the design pressure exceeds 1-inch water gauge, the drawband shall be secured by a raised bead or indented groove on the fitting.

**13-610.1.ABC.3.3.2 Duct core to duct fitting, approved closure systems.** The reinforced lining shall be sealed to the duct fitting using one of the following sealing materials which conforms to the approved closure and mechanical attachment requirements of Section 610.1.ABC.3.0:

1. Gasketing.
2. Mastic, mastic-plus-embedded fabric, or mastic ribbons.
3. Pressure-sensitive tape.
4. Aerosol sealants, provided that their use is consistent with UL 181.

**13-610.1.ABC.3.3.3 Duct outer jacket to duct collar fitting.** The outer jacket of a flexible duct section shall be secured at the juncture of the air distribution system component and intermediate or terminal fitting in such a way as to prevent excess condensation. The outer jacket of a flexible duct section shall not be interposed between the flange of the duct fitting and the flexible duct, rigid fibrous glass duct board, or sheet metal to which it is mated.

**13-610.1.ABC.3.3.4 Duct collar fitting to rigid duct, mechanical attachment.** The duct collar fitting shall be mechanically attached to the rigid duct board or sheet metal by appropriate mechanical fasteners, either screws, spin-in flanges, or dovetail flanges.

**13-610.1.ABC.3.3.5 Duct collar fitting to rigid duct, approved closure systems.** The duct collar fitting's integral flange shall be sealed to the rigid duct board or sheet metal using one of the following closure systems/materials which conforms to the approved closure and mechanical attachment standards of Section 610.1.ABC.3.0:

1. Gasketing.
2. Mastic or mastic-plus-embedded fabric systems.

3. Mastic ribbons when used to attach a duct collar to sheet metal.

4. Pressure-sensitive tape.

5. Aerosol sealants, provided that their use is consistent with UL 181.

**13-610.1.ABC.3.3.6 Flexible duct installation and support.**

Flexible ducts shall be configured and supported so as to prevent the use of excess duct material, prevent duct dislocation or damage, and prevent constriction of the duct below the rated duct diameter in accordance with the following requirements:

1. Ducts shall be installed fully extended. The total extended length of duct material shall not exceed 5 percent of the minimum required length for that run.

2. Bends shall maintain a center line radius of not less than one duct diameter.

3. Terminal devices shall be supported independently of the flexible duct.

4. Horizontal duct shall be supported at intervals not greater than 5 feet (1524 mm). Duct sag between supports shall not exceed  $\frac{1}{2}$  inch (12.7 mm) per foot of length. Supports shall be provided within  $1\frac{1}{2}$  feet (38 mm) of intermediate fittings and between intermediate fittings and bends. Ceiling joists and rigid duct or equipment may be considered to be supports.

5. Vertical duct shall be stabilized with support straps at intervals not greater than 6 feet (1829 mm).

6. Hangers, saddles and other supports shall meet the duct manufacturer's recommendations and shall be of sufficient width to prevent restriction of the internal duct diameter. In no case shall the material supporting flexible duct that is in direct contact with it be less than  $1\frac{1}{2}$  inches (38 mm) wide.

**13-610.1.ABC.3.4 Terminal and intermediate fittings.** All seams and joints in terminal and intermediate fittings, between fitting subsections and between fittings and other air distribution system components or building components shall be mechanically attached and sealed as specified in Section 610.1.ABC.3.4.1 or 610.1.ABC.3.4.2.

**13-610.1.ABC.3.4.1 Fittings and joints between dissimilar duct types, approved closure systems.** Approved closure systems shall be as designated by air distribution system component material type in Section 610.1.ABC.3.

**Exception:** When the components of a joint are fibrous glass duct board and metal duct, including collar fittings and metal equipment housings, the closure systems approved for fibrous glass duct shall be used.

**13-610.1.ABC.3.4.2 Terminal fittings and air ducts to building envelope components, approved closure systems.** Terminal fittings and air ducts which penetrate the building envelope shall be mechanically attached to the structure and sealed to the envelope component penetrated and shall use one of the following closure systems/materials which conform to the approved closure and mechanical application requirements of Section 610.1.ABC.3.0:

1. Mastics or mastic-plus-embedded fabrics.

2. Gaskets used in terminal fitting/grille assemblies which compress the gasket material between the fitting and the wall, ceiling or floor sheathing.

**13-610.1.ABC.3.5 Air-handling units.** All air-handling units shall be mechanically attached to other air distribution system components. Air-handling units located outside the conditioned space shall be sealed using approved closure systems conforming to the approved closure and mechanical application requirements of Section 610.1.ABC.3.1.

**13-610.1.ABC.3.5.1 Approved closure systems.** Systems conforming to the product and application standards of Section 610.1.ABC.3.0 may be used when sealing air-handling units.

**13-610.1.ABC.3.5.2 Air-handling units.** Air-handling units shall be allowed in attics if the following conditions are met:

1. The service panel of the equipment is located within 6 feet (1829 mm) of an attic access.
2. A device is installed to alert the owner or shut the unit down when the condensation drain is not working properly.
3. The attic access opening is of sufficient size to replace the air handler.
4. A notice is posted on the electric service panel indicating to the homeowner that the air handler is located in the attic. Said notice shall be in all capitals, in 16 point type, with the title and first paragraph in bold:

**NOTICE TO HOMEOWNER**

**A PART OF YOUR AIR-CONDITIONING SYSTEM, THE AIR HANDLER, IS LOCATED IN THE ATTIC. FOR PROPER, EFFICIENT, AND ECONOMIC OPERATION OF THE AIR-CONDITIONING SYSTEM, YOU MUST ENSURE THAT REGULAR MAINTENANCE IS PERFORMED.**

**YOUR AIR-CONDITIONING SYSTEM IS EQUIPPED WITH ONE OR BOTH OF THE FOLLOWING: (1) A DEVICE THAT WILL ALERT YOU WHEN THE CONDENSATION DRAIN IS NOT WORKING PROPERLY OR (2) A DEVICE THAT WILL SHUT THE SYSTEM DOWN WHEN THE CONDENSATION DRAIN IS NOT WORKING. TO LIMIT POTENTIAL DAMAGE TO YOUR HOME, AND TO AVOID DISRUPTION OF SERVICE, IT IS RECOMMENDED THAT YOU ENSURE PROPER WORKING ORDER OF THESE DEVICES BEFORE EACH SEASON OF PEAK OPERATION.**

**13-610.1.ABC.3.6 Cavities of the building structure.** Cavities in framed spaces, such as dropped soffits and walls, shall not be used to deliver air from or return air to the conditioning system unless they contain an air duct insert which is insulated in accordance with Section 610.1.ABC.2 and constructed and sealed in accordance with the requirements of Section 610.1.ABC.3 appropriate for the duct materials used.

**Exception:** Return air plenums.

Cavities designed for air transport such as mechanical closets, chases, air shafts, etc. shall be lined with an air barrier and sealed in accordance with Section 610.1.ABC.3.7 and shall be insulated in accordance with Section 610.1.ABC.2.

Building cavities which will be used as return air plenums shall be lined with a continuous air barrier made of durable nonporous materials. All penetrations to the air barrier shall be sealed with a suitable long-life mastic material.

**Exception:** Surfaces between the plenum and conditioned spaces from which the return/mixed air is drawn.

Building cavities beneath a roof deck that will be used as return air plenums shall have an insulated roof with the insulation having an *R*-value of at least *R*-19.

**13-610.1.ABC.3.7 Mechanical closets.** The interior surfaces of mechanical closets shall be sheathed with a continuous air barrier as specified in Section 610.1.ABC.3.7.1 and shall be sealed with approved closure systems as specified in Section 610.1.ABC.3.7.2. All joints shall be sealed between air barrier segments and between the air barriers of walls and those of the ceiling, floor and door framing. All penetrations of the air barrier including, but not limited to, those by air ducts, plenums, pipes, service lines, refrigerant lines, electrical wiring, and condensate drain lines shall be sealed to the air barrier with approved closure systems.

**Exception:** Air passageways into the closet from conditioned space that are specifically designed for return air flow.

Through-wall, through-floor and through-ceiling air passageways into the closet shall be framed and sealed to form an air-tight passageway using approved air duct materials and approved closure systems.

Duct penetrations through any part of the ceiling, walls or floor of a mechanical closet shall have sufficient space between surrounding ceiling, walls or floor and any duct or plenum penetration to allow for sealing of the penetration and inspection of the seal.

Clothes washers, clothes dryers, combustion water heaters and atmospheric combustion furnaces shall not be located in mechanical closets used as return air plenums.

**13-610.1.ABC.3.7.1 Approved air barriers.** The following air barriers are approved for use in mechanical closets:

1. One-half-inch-thick (12.7 mm) or greater gypsum wallboard, taped and sealed.
2. Other panelized materials having inward facing surfaces with an air porosity no greater than that of a duct product meeting Section 22 of UL 181 which are sealed on all interior surfaces to create a continuous air barrier.

**13-610.1.ABC.3.7.2 Approved closure systems.** The following closure systems are approved for use in mechanical closets:

1. Gypsum wallboard joint compound over taped joints between gypsum wallboard panels.
2. Sealants complying with the product and application standards of Section 610.1.ABC.3.2.1 for fibrous glass ductboard.
3. A suitable long-life caulk or mastic compliant with the locally adopted mechanical code for all applications.

**13-610.1.ABC.3.8 Enclosed support platforms.** Enclosed support platforms located between the return air inlet(s) from conditioned space and the inlet of the air-handling unit or fur-

nace, shall contain a duct section constructed entirely of rigid metal, rigid fibrous glass duct board, or flexible duct which is constructed and sealed according to the respective requirements of Section 610.1.ABC.3. and insulated according to the requirements of Section 610.1.ABC.2.

The duct section shall be designed and constructed so that no portion of the building structure, including adjoining walls, floors and ceilings, shall be in contact with the return air stream or function as a component of this duct section.

The duct section shall not be penetrated by a refrigerant line chase, refrigerant line, wiring, pipe or any object other than a component of the air distribution system.

Through-wall, through-floor and through-ceiling penetrations into the duct section shall contain a branch duct which is fabricated of rigid fibrous glass duct board or rigid metal and which extends to and is sealed to both the duct section and the grille side wall surface. The branch duct shall be fabricated and attached to the duct insert in accordance with Section 610.1.ABC.3.2 or Section 610.1.ABC.3.1, respective to the duct type used.

#### **13-610.1.A Prescriptive requirements specific to Method A.**

**13-610.1.A.1 Air-tight duct credit.** Houses for which air-tight duct credit is claimed in accordance with the criteria of Section 610.2.A shall have demonstrated that their air distribution system(s) is(are) substantially leak free. "Substantially leak free" shall mean distribution system air leakage to outdoors no greater than 3 cfm per 100 square feet of conditioned floor area and distribution system total air leakage to indoors and outdoors no greater than 9 cfm per 100 square feet of conditioned floor area at a pressure differential of 25 Pascal (0.10 in. w.c.) across the entire air distribution system, including the manufacturer's air handler enclosure. Distribution system total air leakage no greater than 3 cfm per 100 square feet of conditioned floor area at a pressure difference of 25 Pascal across the entire system, including the manufacturer's air handler enclosure, shall be deemed to meet this requirement without measurement of distribution system air leakage to outdoors. Substantially leak free air distribution systems shall be certified by means of a test report prepared by a state-approved performance tester. A state-approved performance tester means a Class 1 Florida Energy Gauge Certified Energy Rater or recognized test and balance agent.

#### **13-610.1.B Prescriptive requirements specific to Method B.**

**13-610.1.B.1 Ducts installed.** All ducts shall be insulated to at least the level required by Table 6B-1 on Form 600B for the compliance package chosen.

where:

R-6 = all ductwork shall be insulated to at least R-6 or shall be located in conditioned space.

TESTED = Demonstrated by testing to meet the criteria of Section 610.1.A.1.

Systems which have no ducts, such as PTACs and room air conditioners, qualify as ducts in conditioned space.

**13-610.1.B.2 Air-handler location.** Buildings complying with this code by compliance Method B shall not have air handlers installed in attics.

#### **13-610.1.C Prescriptive requirements specific to Method C.**

**13-610.1.C.1 Additions.** New ducts that are installed to serve an addition shall either be insulated to R-6 or be installed in conditioned space as designated on Table 6C-1 of Form 600C.

**Exception:** Only new or replacement ducts installed as part of the addition shall meet this requirement.

**13-610.1.C.2 Renovations.** Replacement duct systems that are not in conditioned space shall be insulated to levels specified in Section 610.1.C.1.

**Exception:** Only new or replacement ducts installed as part of the renovation shall meet this requirement.

**13-610.1.C.3 Manufactured homes and manufactured buildings.** Site-installed components and features of the air distribution system(s) of manufactured homes shall be insulated, constructed, sealed and supported in accordance with the requirements of Sections 610.1.ABC.2 and 610.1.ABC.3. The duct connection between the air distribution systems of separate units of multiple unit manufactured homes and buildings shall be installed, sealed and inspected according to the provisions of this code.

Manufactured homes and buildings having interior furnaces and site-installed single package air conditioners which share the same supply registers shall have an automatic backflow damper installed between the air conditioning unit and the factory-installed duct to prevent the functioning of return grilles as supply registers and to prevent the forced passage of conditioned air through inactive air handlers when another system is in operation.

**13-610.1.C.4 Building systems.** Newly manufactured air distribution system components installed in existing buildings shall meet the minimum requirements for air distribution systems contained in Sections 610.1.ABC.2 through 610.1.ABC.8, as appropriate. See Section 101.6 for exceptions.

#### **13-610.2 Performance calculation procedures.**

##### **13-610.2.A Performance calculation procedures specific to Method A.**

**13-610.2.A.1 Duct types and multipliers.** Duct systems shall include both supply and return air sections and are characterized as being located in either conditioned, attic with radiant barrier, or unconditioned space. Multipliers for the type of duct system and insulation level to be installed shall be determined from Table 6A-7 and 6A-16 on Form 600A. Additional duct multipliers can be found in Tables 6-18, 6-19 and 6-20 in Section 5.4 of Appendix 13-C of this chapter.

Systems having no return air ducts or plenums between the air intake and the air handler, such as those in mechanical closets which communicate with the conditioned space, shall be considered systems with return ducts in conditioned space.

For ductwork to qualify as being in conditioned space, it shall be located on the conditioned side of the envelope insulation and be situated in such a manner that any air leakage will be discharged into the conditioned space.

**13-610.2.A.1.1 Multiple duct systems.** Where parts of the structure are to be served by ductwork of different  $R$ -values, or by ducts in conditioned space, the duct calculation shall be performed by one of the following methods.

1. The multiplier for the lowest installed  $R$ -value may be used.
2. Each of the duct multipliers for the different  $R$ -values may be multiplied by the percent of total duct length which has this insulation rating. The results are then summed. Equation 6-3 in Section 5.4 of Appendix 13-C of this chapter may be used to calculate the new duct multiplier.

**13-610.2.A.1.2 Duct area determination.** An estimate of the linear footage of duct is utilized by the FLA/RES computer program.

**13-610.2.A.1.3 Additions.** If ducts are added to supply conditioned air to the addition, the duct multipliers corresponding to the new duct's  $R$ -value shall be used. If conditioning is provided by existing ducts and registers or diffusers, a duct multiplier of 1.0 shall be assumed.

**13-610.2.A.2 Air-handling units.** Air-handler multipliers from Tables 6A-7A and 6A-16A for the summer and winter space conditioning loads, respectively, shall be entered into the as-built AHU boxes on Form 600A and calculated as part of the cooling and heating loads for the building.

**13-610.2.A.2.1 Factory-sealed air-handling unit credit.** A factory-sealed air-handling unit credit multiplier of 0.95 may be used if the unit has been tested and certified by the manufacturer to have achieved a 2 percent or less leakage rate at 1-inch water gauge when all air inlets, air outlets and condensate drain port(s), when present, are sealed at an air pressure of 1-inch water gauge with no greater than 2-percent design cubic foot per minute discharge.

**13-610.2.A.3 Air-tight duct credit.** An air-tight duct credit multiplier of 1.0 may be taken if the duct work has been demonstrated to be "substantially leak free" in accordance with the provisions of Section 610.1.A.1.

## SECTION 13-611 PIPING

**13-611.1 Prescriptive requirements.**

**13-611.1.ABC Basic prescriptive requirements for Methods A, B and C.**

**13-611.1.ABC.1 Piping insulation.** All piping installed to service buildings and within buildings, including the vapor line of HVAC refrigerant piping, shall be thermally insulated in accordance with Table 611.1.ABC.1, except as stated herein (for service water heating systems, see Section 612.1.ABC.5).

**Exceptions:** Piping insulation is not required in the following cases:

1. Piping installed within HVAC equipment.
2. Piping containing fluid at temperatures between 55°F and 120°F (13°C to 49°C).
3. Piping within the conditioned space.

4. Piping within basements or unvented crawl spaces (plenums) having insulated walls.

**13-611.1.ABC.1.1 Other insulation thicknesses.** Insulation thickness in Table 611.1.ABC.1 are based on insulation having thermal resistance in the range of 4.0 to 4.6°F-ft<sup>2</sup>-h/Btu- per inch of thickness on a flat surface at a mean temperature of 75°F (24°C)

Minimum insulation thickness shall be increased for materials having  $R$ -values less than 4.0°F-ft<sup>2</sup>-h/Btu-in. or may be reduced for materials having  $R$ -values greater than 4.6°F-ft<sup>2</sup>-h/Btu-in. as follows:

1. For materials with thermal resistivity greater than  $R$ -4.6, the minimum insulation thickness may be reduced as follows:

New minimum thickness =

$$\frac{4.6 \times \text{Table 611.1.ABC.1 Thickness}}{\text{Actual Resistivity}}$$

2. For material with thermal resistivity less than  $R$ -4.0, the minimum insulation thickness shall be increased as follows:

New minimum thickness =

$$\frac{4.0 \times \text{Table 611.1.ABC.1 Thickness}}{\text{Actual Resistivity}}$$

**611.2 Performance calculation procedures.** Blank for numbering consistency.

## SECTION 13-612 WATER HEATING SYSTEMS

**13-612.1 Prescriptive requirements.**

**13-612.1.ABC Basic prescriptive requirements for Methods A, B and C.**

**13-612.1.ABC.1 Sizing.** Blank for numbering consistency.

**13-612.1.ABC.2 Controls.**

**13-612.1.ABC.2.1 Storage water heater temperature controls.**

**13-612.1.ABC.2.1.1 Automatic controls.** Service water heating systems shall be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use. The minimum temperature setting range shall be from 100°F to 140°F (38°C to 60°C).

**13-612.1.ABC.2.1.2 Shut down.** A separate switch or a clearly marked circuit breaker shall be provided to permit the power supplied to electric service systems to be turned off. A separate valve shall be provided to permit the energy supplied to the main burner(s) of combustion types of service water heating systems to be turned off.

**13-612.1.ABC.2.2 Heat traps.** Storage water heaters not equipped with integral heat traps and having vertical pipe risers shall have heat traps installed on both the inlets and outlets. External heat traps shall consist of either a commercially available

heat trap or a downward and upward bend of at least 3 1/2 inches (89 mm) in the hot water distribution line and cold water line located as close as possible to the storage tank.

**13-612.1.ABC.2.3 Swimming pool and spa temperature controls.**

\*\* **13-612.1.ABC.2.3.1 On-off switch required.** All pool and spa heaters shall be equipped with an on-off switch mounted for easy access to allow the heater to be shut off without adjusting the thermostat setting and to allow restarting without relighting the pilot light.

**13-612.1.ABC.2.3.2 Covers required.** Spas and heated swimming pools shall be equipped with a cover designed to minimize heat loss.

**Exception:** Outdoor pools deriving over 70 percent of the energy for heating from nondepletable on site-recovered sources computed over an operating season are exempt from this requirement.

**13-612.1.ABC.2.3.3 Time clocks on private pools.** Time clocks shall be installed on private pools so that the pump can be set to run during off-peak electric demand periods and can be set for the minimum time necessary to maintain the water in a clear and sanitary condition in keeping with applicable health standards.

**Exceptions:** Pumps connected to swimming pool solar water heating systems or any pool legally considered a public pool.

\*\* **13-612.1.ABC.2.3.4 Pool heater efficiency.** All gas- and oil-fired pool heaters when tested in accordance with ANSI Z 21.56 shall have a minimum thermal efficiency of 78 percent.

Heat pump pool heaters shall be tested in accordance with ARI 1160, Table 2. Standard Rating Conditions-Low Air Temperature, and shall have a minimum COP of 4.0.

**13-612.1.ABC.2.4 Showers.** Showers used for other than safety reasons shall be equipped with flow control devices to limit the water discharge to a maximum of 2.50 gpm (.16 L/S) per shower head at a distribution pressure of 80 psig (552 kPa) when tested in accordance with the procedures of ANSI A112.18.1M. Flow-restricting inserts used as a component part of a showerhead shall be mechanically retained at the point of manufacture.

**13-612.1.ABC.3 Equipment performance standards.**

**13-612.1.ABC.3.1 Electric water heater efficiencies.**

**13-612.1.ABC.3.1.1 Storage capacities of 120 gallons or less.** All automatic electric storage water heaters having a storage capacity of 120 gallons (454 L) or less and an input rating of 12 kw or less shall, when tested in accordance with the DOE Uniform Test Method for Measuring the Energy Consumption of Water Heaters, Appendix E to Subpart B, 10 CFR Part 430, meet the performance minimums listed in Table 612.1.ABC.3.2.

**13-612.1.ABC.3.1.2 Storage capacities greater than 120 gallons.** Performance minimums for electric storage water heaters with capacities greater than 120 gallons (454 L) or an input rate greater than 12 kw shall have a standby loss of .30+27/V<sub>T</sub> percent/hour or less, where V<sub>T</sub> is the tested storage volume in gallons and tested in accordance with ANSI test method Z21.10.3.

**TABLE 611.1.ABC.1  
MINIMUM PIPE INSULATION**

Piping System Types	Fluid Temperature Range°F	Runouts <sup>2</sup> (inches)	Insulation for Pipe < 1"	Thickness Sizes <sup>1</sup> 1.25 - 2"
<b>HEATING SYSTEMS</b>				
Steam and hot water	201 - 250	1.0	1.5	1.5
Low pressure/temp.	120 - 200	0.5	1.0	1.0
Low temperature	Any	1.0	1.0	1.5
Steam condensate (for feed water)				
<b>COOLING SYSTEMS</b>				
Chilled water, refrigerant or brine	40 - 55 Below 40	0.5 1.0	0.5 1.0	0.75 1.50

For SI: 1 inch = 25.4 mm, °C = [(°F)-32]/1.8

- For piping larger than 1 inch diameter and exposed to outdoor ambient temperatures, increase thickness by 0.5 inch.
- Runouts to individual thermal units (not exceeding 12 feet in length).
- The required minimum thicknesses do not consider water vapor transmission and condensation. Additional insulation, vapor retarders, or both, may be required to limit water vapor transmission and condensation.

**TABLE 13-612.1.ABC.3.2  
MINIMUM PERFORMANCE STANDARDS  
WATER HEATING EQUIPMENT: FIRED STORAGE WATER HEATER MINIMUM ENERGY FACTORS (EF)**

TYPE / VOLUME	TANK VOLUME (GALLONS)								
	20	30	40	50	65	75	80	100	120
ELECTRIC: Up to 120 gallon or 12kW input	.94	.93	.92	.90	.88	—	.86	.84	.81
GAS: Up to 100 gallon or 75,000 Btu/h input	.63	.61	.59	.58	.55	.53	—	.48	—
OIL: Up to 50 gallon or 75,000 Btu/h input	—	.53	.51	.50	—	—	—	—	—

### 13-612.1.ABC.3.2 Gas- and oil-fired water heater efficiencies.

**13-612.1.ABC.3.2.1 Tanks with input ratings of 75,000 Btu/h or less (Gas) or 105,000 Btu/h or less (oil).** All gas- and oil-fired automatic storage water heaters with capacities of 100 gallons or less and an input rating of 75,000 Btu/h or less (gas) or 105,000 Btu/h or less (oil) shall, when tested in accordance with the DOE Uniform Test Method for Measuring the Energy Consumption of Water Heaters, Appendix E to Subpart B, 10 CFR Part 430, meet the performance minimums listed in Table 612.1.ABC.3.2.

**13-612.1.ABC.3.2.2 Tanks with input ratings greater than 75,000 Btu/h (gas) or greater than 105,000 Btu/h (oil).** All gas-fired storage water heaters with input ratings greater than 75,000 Btu/h but less than or equal to 155,000 Btu/h, and all oil-fired storage water heaters with input ratings greater than 105,000 Btu/h but less than or equal to 155,000 Btu/h, shall have a steady-state combustion efficiency  $E_t$  of .78 or less and a standby loss of  $1.30+114/V_T$  (in percent/hour) or less, where  $V_T$  is the tested storage volume in gallons. All gas- and oil-fired storage water heaters with input ratings greater than 155,000 Btu/h shall have a steady-state combustion efficiency  $E_t$  of .78 or more and a standby loss of  $1.30+95/V_T$ , where  $V_T$  is the tested storage volume in gallons.

**13-612.1.ABC.3.2.3 Gas instantaneous or tankless water heaters.** All gas-fired instantaneous (tankless) water heaters that a) initiate heating based on sensing water flow; b) are designed to deliver water at a controlled temperature of less than 180 °F (82 °C); c) have an input less than 200,000 Btu/h (210 MJ/h); d) have a manufacturer's specified storage capacity of less than 2 gallons (7.6 L), and, e) have either a fixed or variable burner input shall, when tested in accordance with the DOE Uniform Test Method for Measuring the Energy Consumption of Water Heaters, Appendix E to Subpart B, Title 10 CFR 430, meet the performance minimums established in Title 10 CFR 430.32, Energy and Water Conservation Standards and Effective Dates.

**13-612.1.ABC.3.3 Unfired storage tanks.** All unfired storage tanks shall have a standby loss of 6.5 Btu/h/ft<sup>2</sup> or less, based on an 80°F (27°C) water-air temperature difference.

**13-612.1.ABC.3.4 Solar water heating systems.** Solar systems for domestic hot water production are rated by the annual solar energy factor of the system. The solar energy factor of a system shall be determined from the Florida Solar Energy Center *Directory of Certified Solar Systems*. Solar collectors shall be tested in accordance with ISO Standard 9806, *Test Methods for Solar Collectors*, and SRCC Standard TM-1, *Solar Domestic Hot Water System and Component Test Protocol*. Collectors in installed solar water heating systems should meet the following criteria:

1. Be installed with a tilt angle between 10 degrees and 40 degrees of the horizontal; and
2. Be installed at an orientation within 45 degrees of true south.

**13-612.1.ABC.3.5 Combination service water heating and space heating equipment.** Service water heating equipment used to provide additional functions (e.g. space heating) as part

of a combination (integrated) system shall comply with minimum performance requirements for water heating equipment.

Combination systems utilizing a storage tank water heater as the heat source for space heating purposes with input ratings of 105,000 Btu/h (360 m<sup>3</sup>/kW) or less shall utilize a water heater listed by the Gas Appliance Manufacturer's Association (GAMA). Changeouts of burners or heating elements to increase capacity shall not be made unless the unit has been listed at that capacity by GAMA.

Combination systems utilizing a storage tank water heater as the heat source for space heating purposes with input ratings greater than 105,000 Btu/h (360 m<sup>3</sup>/kW) shall comply with the criteria of Section 13-412.1.ABC.3.4, Subchapter 13-4.

Combination systems utilizing a gas-fired instantaneous (tankless) water heater (defined in Section 13-612.1.ABC.3.2.3) as the heat source for space heating purposes shall comply with the criteria of Section 13-608.2.A.3.5.

**13-612.1.ABC.4 Pumps.** Circulating hot water systems shall be arranged so that the circulating pump(s) can be conveniently turned off (automatically or manually) when the hot water system is not in operation.

**13-612.1.ABC.5 Piping insulation.** Circulating hot water systems (including piping for waste heat recovery systems (HRUs)) shall be insulated with insulation of at least 1/2 inch (12.7 mm) minimum thickness with a thermal conductivity no greater than 0.28 Btu/in./h.ft<sup>2</sup>F.

Pipe insulation buried underground shall be as specified by the manufacturer for underground use.

**13-612.1.A Prescriptive requirements specific to Method A.** Blank for numbering consistency.

**13-612.1.B Prescriptive requirements specific to Method B.** Water heating systems are categorized as electric resistance, gas and oil and other. Water heating equipment shall meet the applicable minimum efficiencies listed on Table 6B-1 of Form 600B as allowed by the compliance package chosen.

Compliance packages which do not allow the use of electric resistance water heating shall not be used for an addition unless a dedicated heat pump, heat recovery unit, or solar system already exists or is being installed in conjunction with the addition.

**13-612.1.B.1 Electric resistance water heating.** To install electric resistance water heating in compliance with the Table 6B-1 compliance packages on Form 600B, the following criteria are specified: Energy Factor (EF) or not allowed.

where:

EF 0.92 = requires an electric water heater with an EF of 0.92 or greater or other water heating system.

Not allowed = electric resistance water heaters shall not be installed; gas or Other system may be installed.

**Exception:** Where electric resistance water heating systems are prohibited, they may be installed in conjunction with an other water heating systems: a dedicated heat pump, a heat recovery system, or a solar water heating system.

**13-612.1.B.2 Gas and oil water heating.** Houses with gas and oil water heating systems installed shall meet the following efficiencies to comply by any compliance package in Method B:

Energy Factor = 0.59 or greater. Some packages allow only the use of natural gas systems.

**13-612.1.B.3 Other water heating systems.** Water heating systems as described in Sections 13-612.1.B.3.1 through 13-612.1.B.3.2 are considered other hot water systems and may be used to comply with any of the compliance packages.

Where an electric resistance water heating system(s) is installed in conjunction with a dedicated heat pump, heat recovery unit, or solar water heater, the energy factor (EF) for the tank(s) shall be 0.92 or greater. Where natural gas water heating systems are installed in conjunction with these systems, the EF for the tank(s) shall be 0.59 or greater.

**13-612.1.B.3.1 Dedicated heat pump.** Dedicated heat pumps, which are also known as heat pump water heaters, may be considered either with tank (an integral unit) or without tank (add on to another water heater) and shall meet the criteria of Section 13-612.1.B.3 for the tank on which it is attached. No minimum rating is required for this equipment.

**13-612.1.B.3.2 Heat recovery units (HRU).** Heat recovery units shall demonstrate compliance with Florida Standard FL-1 (see Appendix 13-E of this chapter) and shall have a minimum net useful heat exchange effect of 50 percent. A copy of Form 600D (see Appendix 13-D of this chapter) shall be prominently displayed on the heat recovery unit, with test results clearly visible for inspection through a transparent, weather-proof envelope.

**Exception:** An ARDM Certified Refrigerant Desuperheater seal affixed to the unit, clearly visible for inspection, may be substituted for Form 600D; the seal certifies that the unit meets the requirements of Chapter 13 of the *Florida Building Code, Building*.

The following conditions shall be met for a heat recovery unit to be allowed other hot water system status:

1. The HRU shall be installed on the air conditioning system serving the daytime primary living areas (family room, living room, kitchen, dining room and adjacent bedrooms and bathrooms).
2. The HRU shall be installed on either the sole water heater for the residence, or on all water heaters in the residence.
3. The HRU shall be installed in conjunction with a storage water heater which meets the minimum performance criteria of Section 13-612.1.ABC. This water heater shall be sized as follows:
  1. Two bedroom and up single-family:  
50-gallon tank minimum
  2. Two bedroom and up multiple-family  
and one bedroom single-family:  
40-gallon tank minimum
  3. One bedroom multiple-family:  
30-gallon tank minimum

**13-612.1.B.3.3 Solar.** Solar water heaters shall have an EF of at least 1.5 to be allowed *other* hot water system status. The EF of

a system shall be determined from a Florida Solar Energy Center *Directory of Certified Solar Systems*.

**13-612.1.C Prescriptive requirements specific to Method C.** New water heating equipment installed in small additions and renovations shall meet the minimum efficiencies given on Table 6C-1 of Form 600C.

**13-612.1.C.1 Additions.** All new water heaters installed in an addition shall meet the minimum efficiencies listed in Section 13-612.1.ABC.3, Table 13-612.1.ABC.3.2. ||

**Exception:** Only water heating systems which are being replaced or installed as part of the addition shall meet this requirement.

**13-612.1.C.2 Renovations.** Minimum efficiencies for water heating equipment installed in renovations shall be not less than those listed in Table 13-612.1.ABC.3.2 and Section 13-612.1.ABC.3. ||

**Exception:** Only water heating systems which are being replaced or installed as part of the renovation shall meet this requirement.

**13-612.1.C.3 Building systems.** New water heating systems installed in existing buildings shall meet the minimum requirements for that system in Section 13-612.1.ABC.

## 13-612.2 Performance calculation procedures.

### 13-612.2.A Performance calculation procedures for Method A.

**13-612.2.A.1 Water heater types and multipliers.** Water heating systems are characterized as electric resistance, natural gas, other fuels (including propane and oil) (with tank), gas instantaneous (tankless), integral heat pump water heater (with tank), or solar water heating system (with tank). HWM or HWCM for the water heating system to be installed shall be determined from Table 13-6A-22 or Table 13-6A-23 on Form 600A based on the EF of the system. For combined gas storage tank water heating and space heating systems tested to ANSI/ASHRAE 124, the EF used shall be the effective water heating efficiency ( $CA_{ep}$ ) listed for the appliance by the Gas Appliance Manufacturer's Association (GAMA). For combined gas instantaneous (tankless) water heating and space heating systems, the EF used shall be determined in accordance with the DOE Uniform Test Method for Measuring the Energy Consumption of Water Heaters, Appendix E to Subpart B, Title 10 CFR 430. See also Section 13-C6.1, Service hot water multipliers, Form 600A, Supplemental, in Appendix 13-C for additional hot water multipliers. ||\*\*

**13-612.2.A.1.1 Multiple water heating systems.** Where two or more water heating systems are installed with different levels of efficiency, a single multiplier shall be calculated as per the equation in Section 5.2 of Appendix 13-C of this chapter.

**13-612.2.A.2 Water heater area determination.** Water heating requirements are estimated based on the number of bedrooms in the residence. Any room which has an area of 70 square feet (7 m<sup>2</sup>) or more and a clothes storage closet, and is not part of the common living area, shall be considered a bedroom for calculation purposes.

**13-612.2.A.3 Water heater credit multipliers.** Hot water credit multipliers (HWCM) may be taken if supplemental wa-

ter heating systems or alternate systems with a backup water heating system are installed which meet the criteria in Sections 612.2.A.3.1 through 612.2.A.3.3. HWCM shall be determined from Table 6A-23 on Form 600A for the alternate water heating system installed. Both a hot water multiplier (HWM) and a credit multiplier (HWCM) shall be used in the hot water calculation.

Electric resistance or natural gas water heating systems may be installed as backup to alternate water heating systems when the backup equipment meets a minimum efficiency of EF 0.92.

**13-612.2.A.3.1 Waste heat recovery unit.** Credit may be claimed for installation of a waste heat recovery unit (HRU) on either an air conditioner or a heat pump where the heat recovery unit meets all the criteria for this section. Credit multipliers shall be determined from Table 6A-23 on Form 600A based on the type of system to which the HRU is attached.

Multiple HRUs on multiple air conditioners are allowed. If more than one air conditioning system is installed in a residence and only one HRU is installed, the HRU shall be attached to the system serving the daytime primary living areas (family room, living room, kitchen, dining room and adjacent bedrooms and bathrooms) to obtain credit.

If the HRU is installed in a residence which has only one water heater, the entire HRU credit may be claimed. If more than one water heater is installed in the residence, credit may be claimed based on the gallon capacity of the water heater to which it is coupled and the total capacity of the water heaters in the residence by entering a calculation for each water heating system as follows:

$$\text{Total \# Bedrooms} \times \frac{\text{Gallons with HRU}}{\text{Total Gallons}} \times \text{HWCM} \times \text{HWM} = \text{Hot Water Points, System \#1}$$

$$\text{Total \# Bedrooms} \times \frac{\text{Gallons without HRU}}{\text{Total Gallons}} \times 1 \times \text{HWM} = \text{Hot Water Points, System \#2}$$

$$\text{Equals} = \text{Total Hot Water Points}$$

To obtain credits under the code, a storage water heater which meets the minimum performance criteria of Section 612.1.ABC shall be used in conjunction with the HRU. This water heater shall provide service hot water to the water circuit with the most fixtures in the residence and shall be sized as follows.

1. Two bedroom and up, single-family 50 gallon (189 L) tank min.
2. Two bedroom and up, multiple-family, and one bedroom single-family 40 gallon (151 L) tank min.
3. One bedroom multiple-family 30 gallon (114 L) tank min.

To obtain credit, a heat recovery unit shall be tested by an independent testing laboratory under the standard rating conditions specified in Florida Standard FL-1 (see Appendix E of this chapter) and shall have a minimum net useful heat exchange effect of 50 percent. A copy of Form 600D (see Appendix D of this chapter) shall be prominently displayed on the heat recovery unit, with test results clearly visible for inspection through a

transparent, weatherproof envelope. An ARDM certified refrigerant desuperheater seal affixed to the unit, clearly visible for inspection, may be substituted for the 600D form. This seal indicates that the unit meets Chapter 13 of the *Florida Building Code, Building*.

**13-612.2.A.3.2 Dedicated heat pump.** These systems are characterized as either an add-on to a conventional water heater or as a separate integral system. The credit multiplier shall be determined from Table 6A-23 on Form 600A based on the EF of the system installed.

**13-612.2.A.3.3 Integrated heat pumps.** These systems are characterized as either an add-on to a conventional water heater or as a separate integral system. The credit multiplier shall be determined from Table 6A-23 on Form 600A based on the combined cooling performance factor (CCPF) and the combined heating performance factor (CHPF) of the system installed. An equivalent dedicated heat pump EF shall be calculated according to:

$$EF = \frac{\frac{q_w}{EF_{sep}}}{\frac{q_c(95).CLH + q_{wot}}{CCPF} + \frac{DHR.HLH.C + q_{whs}}{CHPF} - \frac{q_c(95).CLH}{SEER} - \frac{DHR.HLH.C}{HSPF}}$$

where the various terms are defined in ASHRAE 137 and the DOE waiver granted to NORDYNE and published in the Federal Register Vol. 61, No. 55, Wednesday, March 20, 1996, pages 11395-11400.

**13-612.2.A.3.4 Solar water heater.** These systems are characterized as either an add-on to a conventional water heater or as a separate system (with tank). The credit multiplier for an add-on solar system (without tank) shall be determined from Table 6A-23 on Form 600A based on the EF of the system installed.

**13-612.2.A.4 Additions.** Water heating shall be considered in Method A calculations if any of the following conditions are met.

1. Existing systems are replaced during construction;
2. Additional water heaters are installed; or
3. A gas, solar, HRU or dedicated heat pump is installed to gain calculation credits.

# FLORIDA BUILDING CODE

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