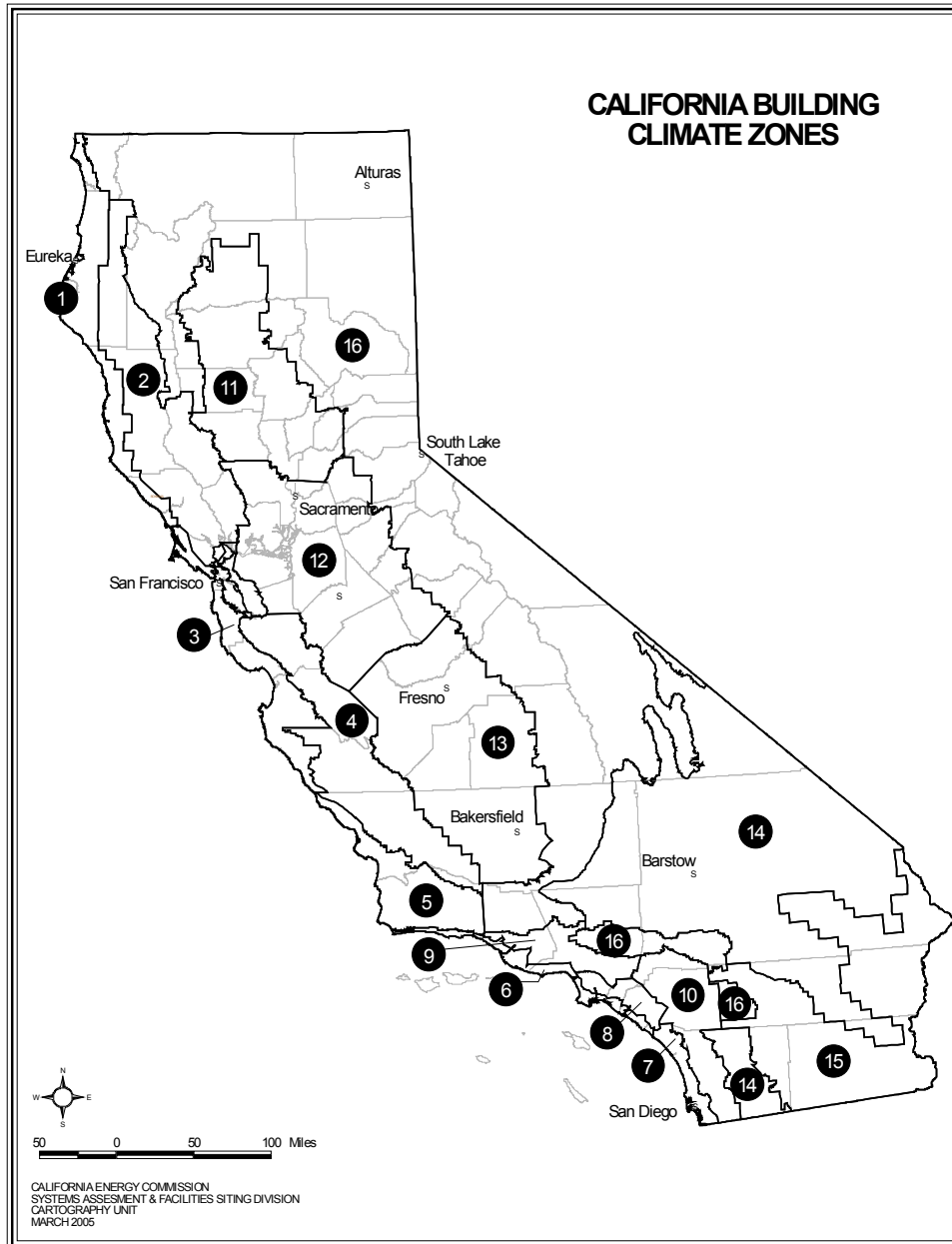


# Appendix B

## APPLICABLE TABLES AND LANGUAGE FROM THE ENERGY STANDARDS AND RACM

Appendix B is a collection of common used tables and language that are referenced in the *Residential Compliance Manual* which includes excerpts from the *2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings* and the *Appliance Efficiency Regulations*.

FIGURE 100.1-A—CALIFORNIA CLIMATE ZONES



**TABLE 100.0-A - APPLICATION OF STANDARDS**

Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/ Alterations
General Provisions		100.0, 100.1, 100.2, 110.0			
Nonresidential, High-Rise Residential, And Hotels/Motels	General	120.0	140.0, 140.2	140.0, 140.1	141.0
	Envelope (conditioned)	110.6, 110.7, 110.8, 120.7	140.3		
	Envelope (unconditioned process spaces)	N.A.	140.3(c)		
	HVAC (conditioned)	110.2, 110.5, 120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4		
	Water Heating	110.3, 120.3, 120.8, 120.9	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6		
	Indoor Lighting (unconditioned and parking garages)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	
	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 130.5	N.A.		
	Pool and Spa Systems	110.4, 110.5, 150.0(p)	N. A.		141.0
	Solar Ready Buildings	110.10	N.A.		141.0(a)
Covered Processes <sup>1</sup>	Envelope, Ventilation, Process Loads	110.2, 120.6	140.9	140.1	120.6, 140.9
Signs	Indoor and Outdoor	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H
Low-Rise Residential	General	150.0	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)
	Envelope (conditioned)	110.6, 110.7, 110.8, 150.0(a), 150.0(b), 150.0(c), 150.0(d), 150.0(e), 150.0(g)			
	HVAC (conditioned)	110.2, 110.5, 150.0(h), 150.0(i), 150.0(j), 150.0(m), 150.0(o)			
	Water Heating	110.3, 150.0(j, n)			
	Indoor Lighting (conditioned, unconditioned and parking garages)	110.9, 130.0, 150.0(k)			
	Outdoor Lighting	110.9, 130.0, 150.0(k)			
	Pool and Spa Systems	110.4, 150.0(p)	N. A.	N.A.	150.2(a), 150.2(b)
	Solar Ready Buildings	110.10	N. A.	N.A.	N.A.
<sup>1</sup> Nonresidential, high-rise and hotel/motel buildings that contain covered processes may conform to the applicable requirements of both occupancy types listed in this table.					

**TABLE 110.2-A - ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS – MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Efficiency <sup>a,b</sup>		Test Procedure <sup>c</sup>
		Before 1/1/2016	After 1/1/2016	
Air conditioners, air cooled both split system and single package	≥ 65,000 Btu/h and < 135,000 Btu/h	11.2 EER 11.4 IEER	11.2 EER 12.9 IEER	ANSI/AHRI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h	11.0 EER 11.2 IEER	11.0 EER 12.4 IEER	ANSI/AHRI 340/360
	≥ 240,000 Btu/h and < 760,000 Btu/h	10.0 EER 10.1 IEER	10.0 EER 11.6 IEER	
	≥ 760,000 Btu/h	9.7 EER 9.8 IEER	9.7 EER 11.2 EER	
Air conditioners, water cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	12.1 EER 12.3 IEER	12.1 EER 13.9 IEER	ANSI/AHRI 340/360
	≥135,000 Btu/h and < 240,000 Btu/h	12.5 EER 12.5 IEER	12.5 EER 13.9 IEER	ANSI/AHRI 340/360
	≥240,000 Btu/h and < 760,000 Btu/h	12.4 EER 12.6 IEER	12.4 EER 13.6 IEER	ANSI/AHRI 340/360
	≥ 760,000 Btu/h	12.2 EER 12.4 IEER	12.2 EER 13.5 IEER	ANSI/AHRI 340/360
Air conditioners, evaporatively cooled	≥65,000 Btu/h and < 135,000 Btu/h	12.1 EER <sup>b</sup> 12.3 IEER <sup>b</sup>		ANSI/AHRI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h	12.0 EER <sup>b</sup> 12.2 IEER <sup>b</sup>		ANSI/AHRI 340/360
	≥240,000 Btu/h and < 760,000 Btu/h	11.9 EER <sup>b</sup> 12.1 IEER <sup>b</sup>		ANSI/AHRI 340/360
	≥ 760,000 Btu/h	11.7 EER <sup>b</sup> 11.9 IEER <sup>b</sup>		ANSI/AHRI 340/360
Condensing units, air cooled	≥ 135,000 Btu/h	10.5 EER 11.8 IEER		ANSI/AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h	13.5 EER 14.0 IEER		
Condensing units, evaporatively cooled	≥ 135,000 Btu/h	13.5 EER 14.0 IEER		

a. IEERs are only applicable to equipment with capacity control as specified by ANSI/AHRI 340/360 test procedures

b. Deduct 0.2 from the required EERs and IEERs for units with a heating section other than electric resistance heat.

c. Applicable test procedure and reference year are provided under the definitions.

**TABLE 110.2-B - UNITARY AND APPLIED HEAT PUMPS, MINIMUM EFFICIENCY REQUIREMENTS**

Equipment Type	Size Category	Efficiency <sup>a, b</sup>		Test Procedure <sup>c</sup>
		<u>Before 1/1/2016</u>	<u>After 1/1/2016</u>	
Air Cooled (Cooling Mode) both split system and single package	≥ 65,000 Btu/h and < 135,000 Btu/h	11.0 EER 11.2 IEER	11.0 EER 12.2 IEER	ANSI/AHRI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h	10.6 EER 10.7 IEER	10.6 EER 11.6 IEER	
	≥ 240,000 Btu/h	9.5 EER 9.6 IEER	9.5 EER 10.6 IEER	
Water source (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	86°F entering water	13.0 EER	ISO-13256-1
Groundwater source (cooling mode)	< 135,000 Btu/h	59°F entering water	18.0 EER	ISO-13256-1
Ground source (cooling mode)	< 135,000 Btu/h	77°F entering water	14.1 EER	ISO-13256-1
Water source water- to-water (cooling mode)	< 135,000 Btu/h	86°F entering water	10.6 EER	ISO-13256-2
Groundwater source water-to-water (cooling mode)	< 135,000 Btu/h	59°F entering water	16.3 EER	ISO-13256-1
Ground source brine- to-water (cooling mode)	< 135,000 Btu/h	77°F entering water	12.1 EER	ISO-13256-2
Air Cooled (Heating Mode) Split system and single package	≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)	47° F db/43° F wb outdoor air	3.3 COP	ANSI/AHRI 340/360
		17° F db/15° F wb outdoor air	2.25 COP	
	≥ 135,000 Btu/h (cooling capacity)	47° F db/43° F wb outdoor air	3.2 COP	
		17° F db/15° F wb outdoor air	2.05 COP	

**TABLE 110.6-A - DEFAULT FENESTRATION PRODUCT U-FACTORS**

FRAME	PRODUCT TYPE	SINGLE PANE <sup>3,</sup> 4 U-FACTOR	DOUBLE PANE <sup>1,3,</sup> 4 U-FACTOR	GLASS BLOCK <sup>2,3</sup> U-FACTOR
Metal	Operable	1.28	0.79	0.87
	Fixed	1.19	0.71	0.72
	Greenhouse/garden window	2.26	1.40	N.A.
	Doors	1.25	0.77	N.A.
	Skylight	1.98	1.30	N.A.
Metal, Thermal Break	Operable	N.A.	0.66	N.A.
	Fixed	N.A.	0.55	N.A.
	Greenhouse/garden window	N.A.	1.12	N.A.
	Doors	N.A.	0.59	N.A.
	Skylight	N.A.	1.11	N.A.
Nonmetal	Operable	0.99	0.58	0.60
	Fixed	1.04	0.55	0.57
	Doors	0.99	0.53	N.A.
	Greenhouse/garden windows	1.94	1.06	N.A.
	Skylight	1.47	0.84	N.A.
<p>1. For all dual-glazed fenestration products, adjust the listed U-factors as follows:</p> <ol style="list-style-type: none"> <li>Add 0.05 for products with dividers between panes if spacer is less than 7/16 inch wide.</li> <li>Add 0.05 to any product with true divided lite (dividers through the panes).</li> </ol> <p>2. Translucent or transparent panels shall use glass block values when not rated by NFRC 100.</p> <p>3. Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NA6.</p> <p>4. Windows with window film applied that is not rated by NFRC 100 shall use the default values from this table.</p>				

**TABLE 110.6-B DEFAULT SOLAR HEAT GAIN COEFFICIENT (SHGC)**

FRAME TYPE	PRODUCT	GLAZING	FENESTRATION PRODUCT SHGC		
			Single Pane <sup>2,3</sup> SHGC	Double Pane <sup>2,3</sup> SHGC	Glass Block <sup>1,2</sup> SHGC
Metal	Operable	Clear	0.80	0.70	0.70
	Fixed	Clear	0.83	0.73	0.73
	Operable	Tinted	0.67	0.59	N.A.
	Fixed	Tinted	0.68	0.60	N.A.
Metal, Thermal Break	Operable	Clear	N.A.	0.63	N.A.
	Fixed	Clear	N.A.	0.69	N.A.
	Operable	Tinted	N.A.	0.53	N.A.
	Fixed	Tinted	N.A.	0.57	N.A.
Nonmetal	Operable	Clear	0.74	0.65	0.70
	Fixed	Clear	0.76	0.67	0.67
	Operable	Tinted	0.60	0.53	N.A.
	Fixed	Tinted	0.63	0.55	N.A.

.Translucent or transparent panels shall use glass block values when not rated by NFRC 200.  
 .Visible Transmittance (VT) shall be calculated by using Reference Nonresidential Appendix NA6.  
 .Windows with window film applied that is not rated by NFRC 200 shall use the default values from this table.

**TABLE 150.1-A COMPONENT PACKAGE-A**

		Climate Zone																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
<b>Building Envelope Insulation</b>	<b>Roofs/Ceilings</b>	<b>Option A (meets §150.1(c)9A)</b>	Continuous Insulation Above Roof Rafter	Roofing Type	No Air Space <sup>1</sup>	NR	NR	NR	R 8	NR	NR	NR	R 8	R 8	R 8	R 8	R 8	R 8	R 8	R 8		
			With Air Space <sup>2</sup>		NR	NR	NR	R 6	NR	NR	NR	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	R 6	
			Ceiling Insulation	R 38	R 38	R 30	R 38	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	
		Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR		
		<b>Option B (meets §150.1(c)9A)</b>	Below Roof Deck Insulation <sup>3</sup>	Roofing Type	No Air Space	NR	NR	NR	R 18	NR	NR	NR	R 18	R 18	R 18	R 18	R 18	R 18	R 18	R 18	R 18	R 18
			With Air Space		NR	NR	NR	R 13	NR	NR	NR	R 13	R 13	R 13	R 13	R 13	R 13	R 13	R 13	R 13	R 13	
	Ceiling Insulation		R 38	R 38	R 30	R 38	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38		
	Radiant Barrier	NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			
	<b>Option C (meets §150.1(c)9B)</b>	Ceiling Insulation	R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38			
		Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR		

			Climate Zone																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>Building Envelope Insulation</b>	<b>Walls</b>	Above Grade	Framed <sup>4</sup>	U 0.051	U 0.051	U 0.051	U 0.051	U 0.051	U 0.065	U 0.065	U 0.051	U 0.051	U 0.051	U 0.051	U 0.051	U 0.051	U 0.051	U 0.051	
			Mass Wall Interior <sup>5</sup>	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.059 R 17
			Mass Wall Exterior <sup>6</sup>	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.1025 R 8.0	U 0.125 R 8.0
		Below Grade	Below Grade Interior <sup>7</sup>	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.066 R 15
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Below Grade Exterior <sup>8</sup>	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.100 R 10	U 0.100 R 10	U 0.053 R 19
	<b>Floors</b>	Slab Perimeter	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	U 0.58 R 7.0	
		Raised	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	
		Concrete Raised	U 0.092 R 8.0	U 0.092 R 8.0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.092 R 8.0	U 0.138 R 4.0	U 0.092 R 8.0	U 0.092 R 8.0	U 0.138 R 4.0	U 0.092 R 8.0	
	<b>Building Envelope</b>	<b>Roofing Products</b>	Low-sloped	Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.63	NR	0.63	NR
Thermal Emittance			NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	NR	0.75	NR	
Steep Sloped		Aged Solar Reflectance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.20	0.20	0.20	0.20	0.20	0.20	NR	
		Thermal Emittance	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.75	0.75	0.75	0.75	0.75	0.75	NR	
<b>Building Envelope</b>	<b>Fenestration</b>	Maximum U-factor	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32		
		Maximum SHGC	NR	0.25	NR	0.25	NR	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
		Maximum Total Area	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	
		Maximum West Facing Area	NR	5%	NR	5%	NR	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	



			Climate Zone																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
HVAC SYSTEM	Space Heating <sup>11</sup>	Electric-Resistance Allowed	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	
		If gas, AFUE	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
		If Heat Pump, HSPF <sup>9</sup>	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
	Space cooling	SEER	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MIN	
		Refrigerant Charge Verification or Fault Indicator Display	NR	REQ	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	
		Whole House Fan <sup>10</sup>	NR	NR	NR	NR	NR	NR	NR	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR	
	Central System Air Handlers	Central Fan Integrated Ventilation System Fan Efficacy	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	
	Ducts <sup>12</sup>	Roof/Ceiling Options A & B	Duct Insulation	R-8	R-8	R-6	R-8	R-6	R-6	R-6	R-8	R-8	R-8	R-8	R-8	R-8	R-8	R-8	
			§150.1(c)9A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Roof/Ceiling Option C	Duct Insulation	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6	R-6
			§150.1(c)9B	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
	Water Heating	All Buildings	System Shall meet Section 150.1(c)8																

**FOOTNOTE REQUIREMENTS TO TABLE 150.1-A:**

1. Install the specified R-value with no air space present between the roofing and the roof deck.
2. Install the specified R-value with an air space present between the roofing and the roof deck. Such as standard installation of concrete or clay tile.
3. R-values shown for below roof deck insulation are for wood-frame construction with insulation installed between the framing members.
4. U-factors can be met by cavity insulation alone or with continuous insulation alone, or with both cavity and continuous insulation that results in a U-factor equal to or less than the U-factor shown. Use Reference Joint Appendices JA4 Table 4.3.1, 4.3.1(a), or Table 4.3.4 to determine alternative insulation products to meet the required maximum U-factor.
5. Mass wall has a thermal heat capacity greater than or equal to 7.0 Btu/h-ft<sup>2</sup>. "Interior" denotes insulation installed on the inside surface of the wall.
6. Mass wall has a thermal heat capacity greater than or equal to 7.0 Btu/h-ft<sup>2</sup>. "Exterior" denotes insulation installed on the exterior surface of the wall.
7. Below grade "interior" denotes insulation installed on the inside surface of the wall.
8. Below grade "exterior" denotes insulation installed on the outside surface of the wall.
9. HSPF means "heating seasonal performance factor."
10. When whole house fans are required (REQ), only those whole house fans that are listed in the Appliance Efficiency Directory may be installed. Compliance requires installation of one or more WHFs whose total airflow CFM is capable of meeting or exceeding a minimum 2 cfm/square foot of conditioned floor area as specified by Section 150.1(c)12.
11. A supplemental heating unit may be installed in a space served directly or indirectly by a primary heating system, provided that the unit thermal capacity does not exceed 2 kilowatts or 7,000 Btu/hr and is controlled by a time-limiting device not exceeding 30 minutes.
12. For duct and air handler location: REQ denotes location in conditioned space. When the table indicates ducts and air handlers are in conditioned space, a HERS verification is required as specified by Reference Residential Appendix RA3.1.4.3.8

**TABLE 150.2-B AGED SOLAR REFLECTANCE INSULATION TRADE OFF TABLE**

<b>Aged Solar Reflectance</b>	<b>Roof Deck Insulation R-value</b>	<b>Aged Solar Reflectance</b>	<b>Roof Deck Insulation R-value</b>
0.62-0.60	2	0.44-0.40	12
0.59-0.55	4	0.39-0.35	16
0.54-0.50	6	0.34-0.30	20
0.49-0.45	8	0.29-0.25	24

**Residential Table – Vintage Table Values****TABLE R3-50 – DEFAULT ASSUMPTIONS FOR EXISTING BUILDINGS – VINTAGE TABLE VALUES**

Default Assumptions for Year Built (Vintage)

Conservation Measure	Before 1978	1978 to 1983	1984 to 1991	1992 to 1998	1999 - 2000	2001- 2003	2004- 2005	2006 and 2012	2013 and Later
<b>INSULATION U-FACTOR</b>									
Roof/Ceiling	0.079	0.049	0.049	0.049	0.049	0.049	0.049	0.049	
Wall	0.356	0.110	0.110	0.102	0.102	0.102	0.102	0.102	
Raised Floor –Crawl Space	0.099	0.099	0.099	0.046	0.046	0.046	0.046	0.046	
Cool Roof	0.10	0.10	0.10	0.10	0.10	0.10	0.10	Pres Pkg.	
Radiant Barrier	None	None	None	None	None	None	Pres Pkg.	Pres Pkg.	
Raised Floor-No Crawl Space	0.238	0.238	0.238	0.064	0.064	0.064	0.064	0.064	
Slab Edge F-factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	
Ducts	R-2.1	R-2.1	R-2.1	R-4.2	R-4.2	R-4.2	R-4.2	Pres Pkg.	
<b>LEAKAGE</b>									
Building (SLA)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	
Duct Leakage Factor (See Table 4-13)	0.86	0.86	0.86	0.86	0.86	0.89	0.89	0.89	
<b>FENESTRATION</b>									
U-factor	Use Standards Table 110.6-A , §110.6 for all Vintages								
SHGC	Use Standards Table 110.6-B , §110.6 for all Vintages								
Shading Dev.	Use Table R3-27 and R3-28 for all Vintages in the Residential ACM Manual – Performance Approach								
<b>SPACE HEATING EFFICIENCY</b>									
Gas Furnace (Central) AFUE	0.75	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Gas Heater (Room) AFUE	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	
Hydronic/Comb Hydronic	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
Heat Pump HSPF	5.6	5.6	6.6	6.6	6.8	6.8	6.8	7.4	
Electric Resistance HSPF	3.413	3.413	3.413	3.413	3.413	3.413	3.413	3.413	
Electric Resistance Radiant HSPF	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	
<b>SPACE COOLING EFFICIENCY</b>									
All Types, SEER	8.0	8.0	8.9	9.7	9.7	9.7	9.7	13.0	
<b>WATER HEATING</b>									
Energy Factor	0.525	0.525	0.525	0.525	0.575	0.575	0.575	0.575	

## Appliance Efficiency Standards from Section 1605.1

**Table B-3**  
Standards for Room Air Conditioners and Room Air-Conditioning Heat Pumps

<i>Appliance</i>	<i>Louvered Sides</i>	<i>Cooling Capacity (Btu/hr)</i>	<i>Minimum Combined EER</i>
Room Air Conditioner	Yes	< 6,000	11.0
Room Air Conditioner	Yes	≥ 6,000 – 7,999	11.0
Room Air Conditioner	Yes	≥ 8,000 – 13,999	10.9
Room Air Conditioner	Yes	≥ 14,000 – 19,999	10.7
Room Air Conditioner	Yes	≥ 20,000 – 27,999	9.4
Room Air Conditioner	Yes	≥ 28,000	9.0
Room Air Conditioner	No	< 6,000	10.0
Room Air Conditioner	No	≥ 6,000 – 7,999	10.0
Room Air Conditioner	No	≥ 8,000 – 10,999	9.6
Room Air Conditioner	No	≥ 11,000 – 13,999	9.5
Room Air Conditioner	No	≥ 14,000 – 19,999	9.3
Room Air Conditioner	No	≥ 20,000	9.4
Room Air Conditioning Heat Pump	Yes	< 20,000	9.8
Room Air Conditioning Heat Pump	Yes	≥ 20,000	9.3
Room Air Conditioning Heat Pump	No	< 14,000	9.3
Room Air Conditioning Heat Pump	No	≥ 14,000	8.7
Casement-Only Room Air Conditioner	Either	Any	9.5
Casement-Slider Room Air Conditioner	Either	Any	10.4

**Table B-6**  
Standards for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps

<i>Appliance</i>	<i>Cooling Capacity (Btu/hour)</i>	<i>Minimum Efficiency</i>	
		<i>Minimum EER</i>	<i>Minimum COP</i>
Packaged Terminal Air Conditioners	< 7,000	11.7	—
	≥ 7,000 < 15,000	13.8 – (0.300 x Cap <sup>1</sup> )	—
	≥ 15,000	9.3	—
Packaged Terminal Heat Pumps	< 7,000	11.9	3.3
	≥ 7,000 < 15,000	14.0 – (0.300 x Cap <sup>1</sup> )	3.7 - (0.052 x Cap <sup>1</sup> )
	≥ 15,000	9.5	2.9

<sup>1</sup> Cap means cooling capacity in thousand British thermal units per hour (Btu/h) at 95°F outdoor dry-bulb temperature.

**Table C-3  
Standards for Air-Cooled Air Conditioners and Air-Source Heat Pumps Subject to EPCa  
(Standards Effective January 1, 2010 do not apply To Single Package Vertical Air Conditioners)**

Appliance	Cooling Capacity (Btu/hr)	System Type	Minimum Efficiency			
			Effective January 1, 1994 <sup>1</sup> or January 1, 1995 <sup>2</sup>	Effective June 15, 2008	Effective January 1, 2010	
					Air Conditioners	Heat Pumps
Air-cooled unitary air conditioners and heat pumps (cooling mode)	< 65,000 *	Split system	10.0 SEER <sup>1</sup>	13.0 SEER		
	< 65,000 *	Single package	9.7 SEER <sup>1</sup>	13.0 SEER		
	≥ 65,000 and < 135,000	All	8.9 EER <sup>1</sup>		11.2 EER <sup>3</sup> 11.0 EER <sup>4</sup>	11.0 EER <sup>3</sup> 10.8 EER <sup>4</sup>
	≥ 135,000 and < 240,000	All	8.5 EER <sup>2</sup>		11.0 EER <sup>3</sup> 10.8 EER <sup>4</sup>	10.6 EER <sup>3</sup> 10.4 EER <sup>4</sup>
	≥ 240,000 and < 760,000	All			10.0 EER <sup>3</sup> 9.8 EER <sup>4</sup>	9.5 EER <sup>3</sup> 9.3 EER <sup>4</sup>
Air-cooled unitary air-conditioning heat pumps (heating mode)	< 65,000 *	Split system	6.8 HSPF <sup>1</sup>	7.7 HSPF		
	< 65,000 *	Single package	6.6 HSPF <sup>1</sup>	7.7 HSPF		
	≥ 65,000 and < 135,000	All	3.0 COP <sup>1</sup>		3.3 COP	
	≥ 135,000 and < 240,000	All	2.9 COP <sup>2</sup>		3.2 COP	
	≥ 240,000 and < 760,000	All			3.2 COP	
<p>* Three phase models only.</p> <p><sup>3</sup> Applies to equipment that has electric resistance heat or no heating.</p> <p><sup>4</sup> Applies to equipment with all other heating-system types that are integrated into the unitary equipment.</p>						

**Table C-4  
Standards for Evaporatively-Cooled Air Conditioners**

Appliance	Cooling Capacity (Btu per hour)	Minimum Efficiency							
		Effective Prior to October 29, 2012		Effective January 10, 2011		Effective †October 29, 2012 or ‡October 29, 2013		Effective *June 1, 2013 or **June 1, 2014	
		Minimum EER	COP	Minimum EER	COP	Minimum EER	COP	Minimum EER	COP
Water-cooled air conditioners and evaporatively cooled air conditioners	< 17,000	12.1	—						
Water-source heat pumps	< 17,000	11.2	4.2						
Water-source VRF multi-split heat pumps	< 17,000	—	4.2			12.0 <sup>†</sup>	4.2		
Water-cooled air conditioners and evaporatively cooled air conditioners	≥ 17,000 and < 65,000	12.1	—						
Water-source heat pumps, including VRF	≥ 17,000 and < 65,000	12.0	4.2						
Water-cooled air conditioners and evaporatively cooled air conditioners	≥ 65,000 and < 135,000	11.5 <sup>1</sup>	—					12.1 <sup>1*</sup>	—
Water-source heat pumps, including VRF	≥ 65,000 and < 135,000	12.0	4.2					11.9 <sup>*</sup>	4.2
Water-cooled air conditioners	≥ 135,000 and < 240,000	11.0	—					12.5 <sup>1***</sup>	—
Evaporatively cooled air conditioners	≥ 135,000 and < 240,000	11.0	—					12.0 <sup>1***</sup>	—
Water-source heat pumps	≥ 135,000 and < 240,000	11.0	2.9					12.3 <sup>**</sup>	2.9
Water-source VRF multi-split heat pumps	≥ 135,000 and < 760,000					10.0 <sup>††</sup>	3.9 <sup>††</sup>		
Water-cooled air conditioners	≥ 240,000 and < 760,000	11.0 <sup>1</sup>	—	11.0 <sup>1</sup>	—			12.4 <sup>1***</sup>	—
Evaporatively cooled air conditioners	≥ 240,000 and < 760,000	11.0 <sup>1</sup>	—	11.0 <sup>1</sup>	—			11.9 <sup>1***</sup>	—
Water-source heat pumps	≥ 240,000 and < 760,000	11.0 <sup>1</sup>	—	11.0 <sup>1</sup>	—			12.2 <sup>**</sup>	—

<sup>1</sup> Deduct 0.2 from the required EER for units with heating sections other than electric resistance heat. For VRF multi-split heat pumps this applies to units with heat recovery.

**Table C-5**  
**Standards for Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps**  
**Manufactured on or After January 1, 2010**

<i>Appliance</i>	<i>Cooling Capacity (BTU/hr)</i>	<i>System Type</i>	<i>Minimum Efficiency</i>	
			<i>Cooling Mode</i>	<i>Heating Mode</i>
Single package vertical air conditioners	< 65,000	Single-phase	9.0 EER	N/A
	< 65,000	3-phase	9.0 EER	N/A
	≥ 65,000 and < 135,000	All	8.9 EER	N/A
	≥ 135,000 and < 240,000	All	8.6 EER	N/A
Single package vertical heat pumps	< 65,000	Single-phase	9.0 EER	3.0 COP
	< 65,000	3-phase	9.0 EER	3.0 COP
	≥ 65,000 and < 135,000	All	8.9 EER	3.0 COP
	≥ 135,000 and < 240,000	All	8.6 EER	2.9 COP

**Table E-2**  
**Standards for Gas Wall Furnaces, Floor Furnaces, and Room Heaters**

<i>Appliance</i>	<i>Design Type</i>	<i>Capacity (Btu per hour)</i>	<i>Minimum AFUE (%)</i>	
			<i>Effective Before April 16, 2013</i>	<i>Effective On or After April 16, 2013</i>
Wall furnace	Fan	≤ 42,000	73	75
Wall furnace	Fan	> 42,000	74	76
Wall furnace	Gravity	≤ 10,000	59	65
Wall furnace	Gravity	> 10,000 and ≤ 12,000	60	
Wall furnace	Gravity	> 12,000 and ≤ 15,000	61	
Wall furnace	Gravity	> 15,000 and ≤ 19,000	62	
Wall furnace	Gravity	> 19,000 and ≤ 27,000	63	
Wall furnace	Gravity	> 27,000 and ≤ 46,000	64	
Wall furnace	Gravity	> 46,000	65	67
Floor furnace	All	≤ 37,000	56	57
Floor furnace	All	> 37,000	57	58
Room heater	All	≤ 18,000	57	61
Room heater	All	> 18,000 and ≤ 20,000	58	
Room heater	All	> 20,000 and ≤ 27,000	63	66
Room heater	All	> 27,000 and ≤ 46,000	64	67
Room heater	All	> 46,000	65	68

**Table E-3**  
**Standards for Gas- and Oil-Fired Central Boilers and Electric Residential Boilers**

<i>Appliance</i>	<i>Minimum AFUE (%)</i>	
	<i>Effective January 1, 1992</i>	
	<i>75</i>	<i>Effective September 1, 2012</i>
Gas steam boilers with single phase electrical supply	80	80 <sup>1</sup>
Gas hot water boilers with single phase electrical supply	—	82 <sup>1,2</sup>
Oil steam boilers with single phase electrical supply	—	82
Oil hot water boilers with single phase electrical supply	—	84 <sup>2</sup>
Electric steam residential boilers	—	NONE
Electric hot water residential boilers	80	NONE <sup>2</sup>
All other boilers with single phase electrical supply	—	—
<sup>1</sup> No constant burning pilot light design standard effective September 1, 2012. <sup>2</sup> Automatic means for adjusting temperature design standard effective September 1, 2012. (Boilers equipped with tankless domestic water heating coils do not need to comply with this requirement.)		



**Table F-2  
Standards for Large Water Heaters Effective October 29, 2003**

<i>Appliance</i>	<i>Input to Volume Ratio</i>	<i>Size (Volume)</i>	<i>Minimum Thermal Efficiency (%)</i>	<i>Maximum Standby Loss<sup>1,2</sup></i>
Gas storage water heaters	< 4,000 Btu/hr/gal	Any	80	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Gas instantaneous water heaters	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	80	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Gas hot water supply boilers	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	80	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Oil storage water heaters	< 4,000 Btu/hr/gal	any	78	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Oil instantaneous water heaters	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	78	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Oil hot water supply boilers	≥ 4,000 Btu/hr/gal	< 10 gal	80	–
		≥ 10 gal	78	$Q/800 + 110(V_r)^{1/2}$ Btu/hr
Electric storage water heaters	< 4,000 Btu/hr/gal	Any	–	$0.3 + 27/V_m$ %/hr

<sup>1</sup> Standby loss is based on a 70°F temperature difference between stored water and ambient requirements. In the standby loss equations,  $V_r$  is the rated volume in gallons,  $V_m$  is the measured volume in gallons, and Q is the nameplate input rate in Btu/hr.

<sup>2</sup> Water heaters and hot water supply boilers having more than 140 gallons of storage capacity are not required to meet the standby loss requirement if the tank surface is thermally insulated to R-12.5, if a standing pilot light is not installed, and for gas- or oil-fired storage water heaters, there is a flue damper or fan-assisted combustion.

**Table F-3  
Standards for Small Federally-Regulated Water Heaters**

<b>Appliance</b>	<b>Rated Storage Volume (gallons)</b>	<b>Minimum Energy Factor</b>	
		<b>Effective January 20, 2004</b>	<b>Effective April 16, 2015</b>
Gas-fired storage-type water heaters	≤ 55	$0.67 - (.0019 \times V)$	$0.675 - (0.0015 \times V)$
	> 55		$0.8012 - (0.00078 \times V)$
Oil-fired water heaters (storage and instantaneous)	Any	$0.59 - (.0019 \times V)$	$0.68 - (.0019 \times V)$
Electric storage water heaters (excluding tabletop water heaters)	≤ 55	$0.97 - (.00132 \times V)$	$0.960 - (0.0003 \times V)$
	> 55		$2.057 - (0.00113 \times V)$
Electric tabletop water heaters	Any	$0.93 - (.00132 \times V)$	$0.93 - (.00132 \times V)$
Gas-fired instantaneous water heaters	Any	$0.62 - (.0019 \times V)$	$0.82 - (.0019 \times V)$
Electric instantaneous water heaters (excluding tabletop water heaters)	Any	$0.93 - (.00132 \times V)$	$0.93 - (.00132 \times V)$
Heat pump water heaters	Any	$0.97 - (.00132 \times V)$	$0.97 - (.00132 \times V)$

V = Rated storage volume in gallons.

