

Part IV—Energy Conservation

CHAPTER 11 ENERGY EFFICIENCY

SECTION N1101 GENERAL

N1101.1 Scope. This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

Exception: Portions of the building envelope that do not enclose *conditioned space*.

N1101.2 Compliance. Compliance shall be demonstrated by either meeting the requirements of the *International Energy Conservation Code* or meeting the requirements of this chapter. Climate zones from Figure N1101.2 or Table N1101.2 shall be used in determining the applicable requirements from this chapter.

N1101.2.1 Warm humid counties. Warm humid counties are identified in Table N1101.2 by an asterisk.

N1101.3 Identification. Materials, systems and *equipment* shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this chapter.

N1101.4 Building thermal envelope insulation. An *R*-value identification *mark* shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or more wide. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the area covered and *R*-value of installed thickness shall be listed on the certificate. The insulation installer shall sign, date and post the certificate in a conspicuous location on the job site.

N1101.4.1 Blown or sprayed roof/ceiling insulation. The thickness of blown in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 ft² (28 m²) throughout the *attic* space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) high. Each marker shall face the *attic* access opening. Spray polyurethane foam thickness and installed *R*-value shall be listed on the certificate provided by the insulation installer.

N1101.4.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value *mark* is readily observable upon inspection.

N1101.5 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled U*-factor shall be assigned a default *U*-factor from Tables N1101.5(1) and N1101.5(2). The solar heat gain coefficient (SHGC) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer. Products lacking such a *labeled SHGC* shall be assigned a default SHGC from Table N1101.5(3).

N1101.6 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the CFR Title 16, Part 460, in units of h · ft² · °F/Btu at a mean temperature of 75°F (24°C).

N1101.7 Installation. All materials, systems and *equipment* shall be installed in accordance with the manufacturer's installation instructions and the provisions of this code.

N1101.7.1 Protection of exposed foundation insulation. Insulation applied to the exterior of *basement* walls, crawl space walls, and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches (152 mm) below *grade*.

N1101.8 Above code programs. The *building official* or other authority having *jurisdiction* shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this chapter. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this chapter.

N1101.9 Certificate. (Section deleted)

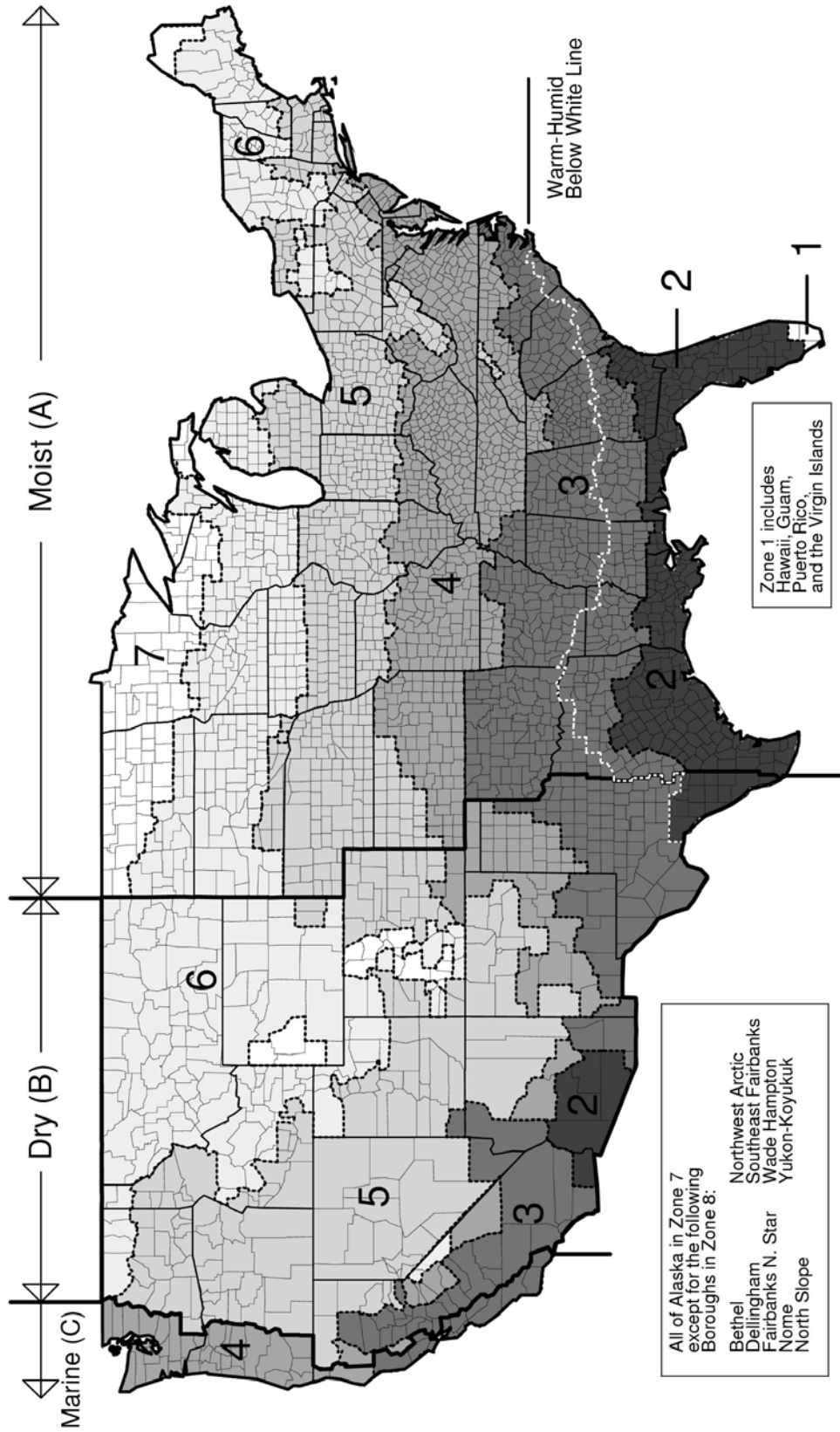


FIGURE N1101.2
CLIMATE ZONES

TABLE N1101.2
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

UNITED STATES					
Alabama					
3A Autauga*	3A Pickens				
2A Baldwin*	3A Pike				
3A Barbour*	3A Randolph				
3A Bibb	3A Russell*				
3A Blount	3A Shelby				
3A Bullock*	3A St. Clair				
3A Butler*	3A Sumter				
3A Calhoun	3A Talladega				
3A Chambers	3A Tallapoosa				
3A Cherokee	3A Tuscaloosa				
3A Chilton	3A Walker				
3A Choctaw*	3A Washington*				
3A Clarke*	3A Wilcox*				
3A Clay	3A Winston				
3A Cleburne	Alaska				
3A Coffee*	7 Aleutians East	3B Graham			
3A Colbert	7 Aleutians West	3B Greenlee			
3A Conecuh*	7 Anchorage	2B La Paz			
3A Coosa	8 Bethel	2B Maricopa			
3A Covington*	7 Bristol Bay	3B Mohave			
3A Crenshaw*	7 Denali	5B Navajo			
3A Cullman	8 Dillingham	2B Pima			
3A Dale*	8 Fairbanks North Star	2B Pinal			
3A Dallas*	7 Haines	3B Santa Cruz			
3A Dekalb	7 Juneau	4B Yavapai			
3A Elmore*	7 Kenai Peninsula	2B Yuma			
3A Escambia*	7 Ketchikan Gateway	Arkansas			
3A Etowah	7 Kodiak Island	3A Arkansas	3A Lonoke		
3A Fayette	7 Lake and Peninsula	3A Ashley	4A Madison		
3A Geneva*	7 Matanuska-Susitna	4A Baxter	4A Marion		
3A Greene	8 Nome	4A Benton	3A Miller*		
3A Hale	8 North Slope	4A Boone	3A Mississippi		
3A Henry*	8 Northwest Arctic	3A Bradley	3A Monroe		
3A Houston*	7 Prince of Wales-Outer ketchikan	4A Carroll	3A Montgomery		
3A Jackson	7 Sitka	3A Chicot	3A Nevada		
3A Jefferson	7 Skagway-Hoonah-Angoon	3A Clark	4A Newton		
3A Lamar	8 Southeast Fairbanks	3A Clay	3A Ouachita		
3A Lauderdale	7 Valdez-Cordova	3A Cleburne	3A Perry		
3A Lawrence	8 Wade Hampton	3A Cleveland	3A Phillips		
3A Lee	7 Wrangell-Petersburg	3A Columbia*	3A Pike		
3A Limestone	7 Yakutat	3A Conway	3A Poinsett		
3A Lowndes*	8 Yukon-Koyukuk	3A Craighead	3A Polk		
3A Macon*	Arizona		3A Pope		
3A Madison	5B Apache	3A Crawford	3A Prairie		
3A Marengo*	3B Cochise	3A Crittenden	3A Pulaski		
3A Marion	5B Coconino	3A Cross	3A Randolph		
3A Marshall	4B Gila	3A Dallas	3A Saline		
2A Mobile*		3A Desha	3A Scott		
3A Monroe*		3A Drew	4A Searcy		
3A Montgomery*		3A Faulkner	3A Sebastian		
3A Morgan		3A Franklin	3A Sevier*		
3A Perry*		4A Fulton	3A Sharp		
		3A Garland	3A St. Francis		
		3A Grant	4A Stone		
		3A Greene	3A Union*		
		3A Hempstead*	3A Van Buren		
		3A Hot Spring	4A Washington		
		3A Howard	3A White		
		3A Independence	3A Woodruff		
		4A Iazard	3A Yell		
		3A Jackson	California		
		3A Jefferson	3C Alameda	3C Marin	
		3A Johnson	6B Alpine	4B Mariposa	
		3A Lafayette*	4B Amador	3C Mendocino	
		3A Lawrence	3B Butte	3B Merced	
		3A Lee	4B Calaveras	5B Modoc	
		3A Lincoln	3B Colusa	6B Mono	
		3A Little River*	3B Contra Costa	3C Monterey	
		3A Logan	4C Del Norte	3C Napa	
			4B El Dorado	5B Nevada	
			3B Fresno	3B Orange	
			3B Glenn	3B Placer	
			4C Humboldt	5B Plumas	
			2B Imperial	3B Riverside	
			4B Inyo	3B Sacramento	
			3B Kern	3C San Benito	
			3B Kings	3B San Bernardino	
			4B Lake	3B San Diego	
			5B Lassen	3C San Francisco	
			3B Los Angeles	3B San Joaquin	
			3B Madera	3C San Luis Obispo	
				3C San Mateo	
				3C Santa Barbara	
				3C Santa Clara	
				3C Santa Cruz	
				3B Shasta	
				5B Sierra	
				5B Siskiyou	
				3B Solano	
				3C Sonoma	
				3B Stanislaus	
				3B Sutter	
				3B Tehama	
				4B Trinity	
				3B Tulare	
				4B Tuolumne	
				3C Ventura	
				3B Yolo	
				3B Yuba	
				Colorado	
				5B Adams	
				6B Alamosa	
				5B Arapahoe	
				6B Archuleta	
				4B Baca	
				5B Bent	
				5B Boulder	
				6B Chaffee	
				5B Cheyenne	
				7 Clear Creek	
				6B Conejos	
				6B Costilla	
				5B Crowley	
				6B Custer	
				5B Delta	

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

5B Denver	District of Columbia	2A Pinellas*	3A Coweta	4A Lumpkin
6B Dolores	4A (all)	2A Polk*	3A Crawford	3A Macon*
5B Douglas		2A Putnam*	3A Crisp	3A Madison
6B Eagle	Florida	2A Santa Rosa*	4A Dade	3A Marion*
5B Elbert	2A Alachua*	2A Sarasota*	4A Dawson	3A McDuffie
5B El Paso	2A Baker*	2A Seminole*	2A Decatur*	2A McIntosh*
5B Fremont	2A Bay*	2A St. Johns*	3A Dekalb	3A Meriwether
5B Garfield	2A Bradford*	2A St. Lucie*	3A Dodge*	2A Miller*
5B Gilpin	2A Brevard*	2A Sumter*	3A Dooly*	2A Mitchell*
7 Grand	1A Broward*	2a Suwannee*	3A Dougherty*	3A Monroe
7 Gunnison	2A Calhoun*	2A Taylor*	3A Douglas	3A Montgomery*
7 Hinsdale	2A Charlotte*	2A Union*	3A Early*	3A Morgan
5B Huerfano	2A Citrus*	2A Volusia*	2A Echols*	4A Murray
7 Jackson	2A Clay*	2A Wakulla*	2A Effingham*	3A Muscogee
5B Jefferson	2A Collier*	2A Walton	3A Elbert	3A Newton
5B Kiowa	2A Columbia*	2A Washington*	3A Emanuel*	3A Oconee
5B Kit Carson	2A DeSoto*		2A Evans*	3A Oglethorpe
7 Lake	2A Dixie*	Georgia	4A Fannin	3A Paulding
5B La Plata	2A Duval*	2A Appling*	3A Fayette	3A Peach*
5B Larimer	2A Escambia*	2A Atkinson*	4A Floyd	4A Pickens
4B Las Animas	2A Flagler*	2A Bacon*	3A Forsyth	2A Pierce*
5B Lincoln	2A Franklin*	2A Baker*	4A Franklin	3A Pike
5B Logan	2A Gadsden*	3A Baldwin	3A Fulton	3A Polk
5B Mesa	2A Gilchrist*	4A Banks	4A Gilmer	3A Pulaski*
7 Mineral	2A Glades*	3A Barrow	3A Glascock	3A Putnam
6B Moffat	2A Gulf*	3A Bartow	2A Glynn*	3A Quitman*
5B Montezuma	2A Hamilton*	3A Ben Hill*	4A Gordon	4A Rabun
5B Montrose	2A Hardee*	2A Berrien*	2A Grady*	3A Randolph*
5B Morgan	2A Hendry*	3A Bibb	3A Greene	3A Richmond
4B Otero	2A Hernando*	3A Bleckley*	3A Gwinnett	3A Rockdale
6B Ouray	2A Highlands*	2A Brantley*	4A Habersham	3A Schley*
7 Park	2A Hillsborough*	2A Brooks*	4A Hall	3A Screven*
5B Phillips	2A Holmes*	2A Bryan*	3A Hancock	2A Seminole*
7 Pitkin	2A Indian River*	3A Bulloch*	3A Haralson	3A Spalding
5B Prowers	2A Jackson*	3A Burke	3A Harris	4A Stephens
5B Pueblo	2A Jefferson*	3A Butts	3A Hart	3A Stewart*
6B Rio Blanco	2A Lafayette*	3A Calhoun*	3A Heard	3A Sumter*
7 Rio Grande	2A Lake*	2A Camden*	3A Henry	3A Talbot
7 Routt	2A Lee*	3A Candler*	3A Houston*	3A Taliaferro
6B Saguache	2A Leon*	3A Carroll	3A Irwin*	2A Tattall*
7 San Juan	2A Levy*	4A Catoosa	3A Jackson	3A Taylor*
6B San Miguel	2A Liberty*	2A Charlton*	3A Jasper	3A Telfair*
5B Sedgwick	2A Madison*	2A Chatham*	2A Jeff Davis*	3A Terrell*
7 Summit	2A Manatee*	3A Chattahoochee*	3A Jefferson	2A Thomas*
5B Teller	2A Marion*	4A Chattooga	3A Jenkins*	3A Tift*
5B Washington	2A Martin*	3A Cherokee	3A Johnson*	2A Toombs*
5B Weld	1A Miami-Dade*	3A Clarke	3A Jones	4A Towns
5B Yuma	1A Monroe*	3A Clay*	3A Lamar	3A Treutlen*
	2A Nassau*	3A Clayton	2A Lanier*	3A Troup
Connecticut	2A Okaloosa*	2A Clinch*	3A Laurens*	3A Turner*
5A (all)	2A Okeechobee*	3A Cobb	3A Lee*	3A Twiggs*
	2A Orange*	3A Coffee*	2A Liberty*	4A Union
Delaware	2A Osceola*	2A Colquitt*	3A Lincoln	3A Upson
4A (all)	2A Palm Beach*	3A Columbia	2A Long*	4A Walker
	2A Pasco*	2A Cook*	2A Lowndes*	3A Walton
				2A Ware*

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

3A Warren	6B Teton	4A Lawrence	5A Allen	5A Noble
3A Washington	5B Twin Falls	5A Lee	5A Bartholomew	4A Ohio
2A Wayne*	6B Valley	5A Livingston	5A Benton	4A Orange
3A Webster*	5B Washington	5A Logan	5A Blackford	5A Owen
3A Wheeler*		5A Macon	5A Boone	5A Parke
4A White	Illinois	4A Macoupin	4A Brown	4A Perry
4A Whitfield	5A Adams	4A Madison	5A Carroll	4A Pike
3A Wilcox*	4A Alexander	4A Marion	5A Cass	5A Porter
3A Wilkes	4A Bond	5A Marshall	4A Clark	4A Posey
3A Wilkinson	5A Boone	5A Mason	5A Clay	5A Pulaski
3A Worth*	5A Brown	4A Massac	5A Clinton	5A Putnam
	5A Bureau	5A McDonough	4A Crawford	5A Randolph
	5A Calhoun	5A McHenry	4A Daviess	4A Ripley
	5A Carroll	5A McLean	4A Dearborn	5A Rush
	5A Cass	5A Menard	5A Decatur	4A Scott
	5A Champaign	5A Mercer	5A De Kalb	5A Shelby
	4A Christian	4A Monroe	5A Delaware	4A Spencer
	5A Clark	4A Montgomery	4A Dubois	5A Starke
	4A Clay	5A Morgan	5A Elkhart	5A Steuben
	4A Clinton	5A Moultrie	5A Fayette	5A St. Joseph
	5A Coles	5A Ogle	4A Floyd	4A Sullivan
	5A Cook	5A Peoria	5A Fountain	4A Switzerland
	4A Crawford	4A Perry	5A Franklin	5A Tippecanoe
	5A Cumberland	5A Piatt	5A Fulton	5A Tipton
	5A Dekalb	5A Pike	4A Gibson	5A Union
	5A De Witt	4A Pope	5A Grant	4A Vanderburgh
	5A Douglas	4A Pulaski	4A Greene	5A Vermillion
	5A DuPage	5A Putnam	5A Hamilton	5A Vigo
	5A Edgar	4A Randolph	5A Hancock	5A Wabash
	4A Edwards	4A Richland	5A Hendricks	5A Warren
	4A Effingham	5A Rock Island	5A Henry	4A Warrick
	4A Fayette	4A Saline	5A Howard	4A Washington
	5A Ford	5A Sangamon	5A Huntington	5A Wayne
	4A Franklin	5A Schuyler	4A Jackson	5A Wells
	5A Fulton	5A Scott	5A Jasper	5A White
	4A Gallatin	4A Shelby	5A Jay	5A Whitley
	5A Greene	5A Stark	4A Jefferson	
	5A Grundy	4A St. Clair	4A Jennings	Iowa
	4A Hamilton	5A Stephenson	5A Johnson	5A Adair
	5A Hancock	5A Tazewell	4A Knox	5A Adams
	4A Hardin	4A Union	5A Kosciusko	6A Allamakee
	5A Henderson	5A Vermilion	5A Lagrange	5A Appanoose
	5A Henry	4A Wabash	5A Lake	5A Audubon
	5A Iroquois	5A Warren	5A La Porte	5A Benton
	4A Jackson	4A Washington	4A Lawrence	6A Black Hawk
	4A Jasper	4A Wayne	5A Madison	5A Boone
	4A Jefferson	4A White	5A Marion	6A Bremer
	5A Jersey	5A Whiteside	5A Marshall	6A Buchanan
	5A Jo Daviess	5A Will	4A Martin	6A Buena Vista
	4A Johnson	4A Williamson	5A Miami	6A Butler
	5A Kane	5A Winnebago	4A Monroe	6A Calhoun
	5A Kankakee	5A Woodford	5A Montgomery	5A Carroll
	5A Kendall		5A Morgan	5A Cass
	5A Knox	Indiana	5A Newton	5A Cedar
	5A Lake	5A Adams		6A Cerro Gordo
	5A La Salle			

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

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6A Cherokee	5A Page	4A Ellsworth	5A Rooks	2A Jefferson
6A Chickasaw	6A Palo Alto	4A Finney	4A Rush	2A Jefferson Davis*
5A Clarke	6A Plymouth	4A Ford	4A Russell	2A Lafayette*
6A Clay	6A Pocahontas	4A Franklin	4A Saline	2A Lafourche*
6A Clayton	5A Polk	4A Geary	5A Scott	3A La Salle*
6A Clinton	5A Pottawattamie	5A Gove	4A Sedgwick	3A Lincoln*
5A Crawford	5A Poweshiek	5A Graham	4A Seward	2A Livingston*
5A Dallas	5A Ringgold	4A Grant	4A Shawnee	3A Madison*
5A Davis	6A Sac	4A Gray	5A Sheridan	3A Morehouse
5A Decatur	5A Scott	5A Greeley	5A Sherman	3A Natchitoches*
6A Delaware	5A Shelby	4A Greenwood	5A Smith	3A Orleans*
5A Des Moines	6A Sioux	5A Hamilton	4A Stafford	3A Ouachita*
6A Dickinson	5A Story	4A Harper	4A Stanton	2A Plaquemines*
5A Dubuque	5A Tama	4A Harvey	4A Stevens	2A Pointe Coupee*
6A Emmet	5A Taylor	4A Haskell	4A Sumner	2A Rapides*
6A Fayette	5A Union	4A Hodgeman	5A Thomas	3A Red River*
6A Floyd	5A Van Buren	4A Jackson	5A Trego	3A Richland*
6A Franklin	5A Wapello	4A Jefferson	4A Wabaunsee	3A Sabine*
5A Fremont	5A Warren	5A Jewell	5A Wallace	2A St. Bernard*
5A Greene	5A Washington	4A Johnson	4A Washington	2A St. Charles*
6A Grundy	5A Wayne	4A Kearny	5A Wichita	2A St. Helena*
5A Guthrie	6A Webster	4A Kingman	4A Wilson	2A St. James*
6A Hanilton	6A Winnebago	4A Kiowa	4A Woodson	2A St. John the Baptist*
6A Hancock	6A Winneshiek	4A Labette	4A Wyandotte	2A St. Landry*
6A Hardin	5A Woodbury	5A Lane		2A St. Martin*
5A Harrison	6A Worth	4A Leavenworth	Kentucky	2A St. Mary*
5A Henry	6A Wright	4A Lincoln	4A (all)	2A St. Tammany*
6A Howard		4A Linn		2A Tangipahoa*
6A Humboldt	Kansas	5A Logan	Louisiana	2A Tensas*
6A Ida	4A Allen	4A Lyon	2A Acadia*	2A Terrebonne*
5A Iowa	4A Anderson	4A Marion	2A Allen*	3A Union*
5A Jackson	4A Atchison	4A Marshall	2A Ascension*	2A Vermilion*
5A Jasper	4A Barber	4A McPherson	2A Assumption*	3A Vernon*
5A Jefferson	4A Barton	4a Meade	2A Avoyelles*	2A Washington*
5A Johnson	4A Bourbon	4A Miami	2A Beauregard*	3A Webster*
5A Jones	4A Brown	5A Mitchell	3A Bienville*	2A West Baton Rouge*
5A Keokuk	4A Butler	4A Montgomery	3A Bossier*	3A West Carroll
6A Kossuth	4A Chase	4A Morris	3A Caddo*	2A West Feliciana*
5A Lee	4A Chautauqua	4A Morton	2A Calcasieu*	3A Winn*
5A Linn	4A Cherokee	4A Nemaha	2A Caldwell*	
5A Louisa	5A Cheyenne	4A Neosho	2A Cameron*	
5A Lucas	4A Clark	5A Ness	3A Catahoula*	
6A Lyon	4A Clay	5A Norton	3A Claiborne*	
5A Madison	5A Cloud	4A Osage	3A Concordia*	
5A Mahaska	4A Coffey	5A Osborne	3A De Soto*	
5A Marion	4A Comanche	4A Ottawa	2A East Baton Rouge*	
5A Marshall	4A Cowley	4A Pawnee	3A East Carroll	
5A Mills	4A Crawford	5A Phillips	2A East Feliciana*	
6A Mitchell	5A Decatur	4A Pottawatomie	3A Franklin*	
5A Monona	4A Dickinson	4A Pratt	2A Evangeline*	
5A Monroe	4A Doniphan	5A Rawlins	3A Grant*	
5A Montgomery	4A Douglas	4A Reno	2A Iberia*	
5A Muscatine	4A Edwards	5A Republic	2A Iberville*	
5A O'Brien	4A Elk	4A Rice	3A Jackson*	
6A Osceola	5A Ellis	4A Riley		

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

6A Somerset	6A Dickinson	5A St. Clair	6A Meeker	3A Clay
6A Waldo	5A Eaton	5A St. Joseph	7 Mille Lacs	3A Coahoma
6A Washington	6A Emmet	5A Tuscola	6A Morrison	3A Copiah*
6A York	5A Genesee	5A Van Buren	6A Mower	3A Covington*
	6A Gladwin	5A Washtenaw	6A Murray	3A DeSoto
	7 Gogebic	5A Wayne	6A Nicollet	3A Forrest*
	6A Grand Traverse	6A Wexford	6A Nobles	3A Franklin*
	5A Gratiot		7 Norman	3A George*
	5A Hillsdale		6A Olmsted	3A Greene*
	7 Houghton		7 Otter Tail	3A Grenada
	6A Huron		7 Pennington	2A Hancock*
	5A Ingham		7 Pine	2A Harrison*
	5A Ionia		6A Pipestone	3A Hinds*
	6A Iosco		7 Polk	3A Holmes
	7 Iron		6A Pope	3A Humphreys
	6A Isabella		6A Ramsey	3A Issaquena
	5A Jackson		7 Red Lake	3A Itawamba
	5A Kalamazoo		6A Redwood	2A Jackson*
	6A Kalkaska		6A Renville	3A Jasper
	5A Kent		6A Rice	3A Jefferson*
	7 Keweenaw		6A Rock	3A Jefferson Davis*
	6A Lake		7 Roseau	3A Jones*
	5A Lapeer		6A Scott	3A Kemper
	6A Leelanau		6A Sherburne	3A Lafayette
	5A Lenawee		6A Sibley	3A Lamar*
	5A Livingston		6A Stearns	3A Lauderdale
	7 Luce		6A Steele	3A Lawrence*
	7 Mackinac		6A Stevens	3A Leake
	5A Macomb		7 St. Louis	3A Lee
	6A Manistee		6 Swift	3A Leflore
	6A Marquette		6A Todd	3A Lincoln*
	6A Mason		6A Traverse	3A Lowndes
	6A Mecosta		6A Wabasha	3A Madison
	6A Menominee		7 Wadena	3A Marion*
	5A Midland		6A Waseca	3A Marshall
	6A Missaukee		6A Washington	3A Monroe
	5A Monroe		6A Watonwan	3A Montgomery
	5A Montcalm		7 Wilkin	3A Neshoba
	6A Montmorency		6A Winona	3A Newton
	5A Muskegon		6A Wright	3A Noxubee
	6A Newaygo		6A Yellow Medicine	3A Oktibbeha
	5A Oakland			3A Panola
	6A Oceana			2A Pearl River*
	6A Ogemaw			3A Perry*
	7 Ontonagon			3A Pike*
	6A Osceola			3A Pontotoc
	6A Oscoda			3A Prentiss
	6A Otsego			3A Quitman
	5A Ottawa			3A Rankin*
	6A Presque Isle			3A Scott
	6A Roscommon			3A Sharkey
	5A Saginaw			3A Simpson*
	6A Sanilac			3A Smith*
	7 Schoolcraft			2A Stone*
	5A Shiawassee			3A Sunflower

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

3A Tallahatchie	4A Greene	5A Scotland	5A Rockingham	4B Socorro
3A Tate	5A Grundy	4A Scott	5A Stafford	5B Taos
3A Tippah	5A Harrison	4a Shannon	6A Sullivan	5B Torrance
3A Tishomingo	4A Henry	5A Shelby		4B Union
3A Tunica	4A Hickory	4A St. Charles	New Jersey	4B Valencia
3A Union	5A Holt	4A St. Clair	4A Atlantic	
3A Walthall*	4A Howard	4A Ste. Genevieve	5A Bergen	New York
3A Warren*	4A Howell	4A St. Francois	4A Burlington	5A Albany
3A Washington	4A Iron	4A St. Louis	4A Camden	6A Allegany
3A Wayne*	4A Jackson	4A St. Louis (city)	4A Cape May	4A Bronx
3A Webster	4A Jasper	4A Stoddard	4A Cumberland	6A Broome
3A Wilkinson*	4A Jefferson	4A Stone	4A Essex	6A Cattaraugus
3A Winston	4A Johnson	5A Sullivan	4A Gloucester	5A Cayuga
3A Yalobusha	5A Knox	4A Taney	4A Hudson	5A Chautauga
3A Yazoo	4A Laclede	4A Texas	5A Hunterdon	5A Chemung
	4A Lafayette	4A Vernon	5A Mercer	6A Chenango
Missouri	4A Lawrence	4A Warren	4A Middlesex	6A Clinton
5A Adair	5A Lewis	4A Washington	4A Monmouth	5A Columbia
5A Andrew	4A Lincoln	4A Wayne	5A Morris	5A Cortland
5A Atchison	5A Linn	4A Webster	4A Ocean	6A Delaware
4A Audrain	5A Livingston	5A Worth	5A Passaic	5A Dutchess
4A Barry	5A Macon	4A Wright	4A Salem	5A Erie
4A Barton	4A Madison		5A Somerset	6A Essex
4A Bates	4A Maries	Montana	5A Sussex	6A Franklin
4A Benton	5A Marion	6B (all)	4A Union	6A Fulton
4A Bollinger	4A McDonald		5A Warren	5A Genesee
4A Boone	5A Mercer	Nebraska		5A Greene
5A Buchanan	4A Miller	5A (all)	New Mexico	6A Hamilton
4A Butler	4A Mississippi		4B Bernalillo	6A Herkimer
5A Caldwell	4A Moniteau	Nevada	5B Catron	6A Jefferson
4A Callaway	4A Monroe	5B Carson City (city)	3B Chaves	4A Kings
4A Camden	4A Montgomery	5B Churchill	4B Cibola	6A Lewis
4A Cape Girardeau	4A Morgan	3B Clark	5B Colfax	5A Livingston
4A Carroll	4A New Madrid	5B Douglas	4B Curry	6A Madison
4A Carter	4A Newton	5B Elko	4B DeBaca	5A Monroe
4A Cass	4A Newton	5B Esmeralda	3B Dona Ana	6A Montgomery
4A Cedar	5A Nodaway	5B Eureka	3B Eddy	4A Nassau
5A Chariton	4A Oregon	5B Humboldt	4B Grant	4A New York
4A Christian	4A Osage	5B Lander	4B Guadalupe	5A Niagara
5A Clark	4A Ozark	5B Lincoln	5B Harding	6A Oneida
4A Clay	4A Pemiscot	5B Lyon	3B Hidalgo	5A Onondaga
5A Clinton	4A Perry	5B Mineral	3B Lea	5A Ontario
4A Cole	4A Pettis	5B Nye	4B Lincoln	5A Orange
4a Cooper	4A Phelps	5B Pershing	5B Los Alamos	5A Orleans
4A Crawford	5A Pike	5B Storey	3B Luna	5A Oswego
4A Dade	4A Platte	5B Washoe	5B McKinley	6A Otsego
4A Dallas	4A Polk	5B White Pine	5B Mora	5A Putnam
5A Daviess	4A Pulaski		3B Otero	4A Queens
5A DeKalb	5A Putnam	New Hampshire	4B Quay	5A Rensselaer
4A Dent	5A Ralls	6A Belknap	5B Rio Arriba	4A Richmond
4A Douglas	4A Randolph	6A Carroll	4B Roosevelt	5A Rockland
4A Dunklin	4A Ray	5A Cheshire	5B Sandoval	5A Saratoga
4A Franklin	4A Reynolds	6A Coos	5B San Juan	5A Schenectady
4A Gasconade	4A Ripley	6A Grafton	5B San Miguel	6A Schoharie
5A Gentry	4A Saline	5A Hillsborough	5B Santa Fe	6A Schuyler
	5A Schuyler	6A Merrimack	4B Sierra	

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

5A Seneca	3A Greene	5A Watauga	7 Towner	5A Lucas
6A Steuben	4A Guilford	3A Wayne	7 Traill	5A Madison
6A St. Lawrence	4A Halifax	4A Wilkes	7 Walsh	5A Mahoning
4A Suffolk	4A Harnett	3A Wilson	7 Ward	5A Marion
6A Sullivan	4A Haywood	4A Yadkin	7 Wells	5A Medina
5A Tioga	4A Henderson	5A Yancey	7 Williams	5A Meigs
6A Tompkins	4A Hertford			5A Mercer
6A Ulster	3A Hoke	North Dakota	Ohio	5A Miami
6A Warren	3A Hyde	6A Adams	4A Adams	5A Monroe
5A Washington	4A Iredell	7 Barnes	5A Allen	5A Montgomery
5A Wayne	4A Jackson	7 Benson	5A Ashland	5A Morgan
4A Westchester	3A Johnston	6A Billings	5A Ashtabula	5A Morrow
6A Wyoming	3A Jones	7 Bottineau	5A Athens	5A Muskingum
5A Yates	4A Lee	6A Bowman	5A Auglaize	5A Noble
	3A Lenoir	7 Burke	5A Belmont	5A Ottawa
North Carolina	4A Lincoln	6A Burleigh	4A Brown	5A Paulding
4A Alamance	4A Macon	7 Cass	5A Butler	5A Perry
4A Alexander	4A Madison	7 Cavalier	5A Carroll	5A Pickaway
5A Alleghany	3A Martin	6A Dickey	5A Champaign	4A Pike
3A Anson	4A McDowell	7 Divide	5A Clark	5A Portage
5A Ashe	3A Mecklenburg	6A Dunn	4A Clermont	5A Preble
5A Avery	5A Mitchell	7 Eddy	5A Clinton	5A Putnam
3A Beaufort	3A Montgomery	6A Emmons	5A Columbiana	5A Richland
4A Bertie	3A Moore	7 Foster	5A Coshocton	5A Ross
3A Bladen	4A Nash	6A Golden Valley	5A Crawford	5A Sandusky
3A Brunswick*	3A New Hanover*	7 Grand Forks	5A Cuyahoga	4A Scioto
4A Buncombe	4A Northampton	6A Grant	5A Darke	5A Seneca
4A Burke	3A Onslow*	7 Griggs	5A Defiance	5A Shelby
3A Cabarrus	4A Orange	6A Hettinger	5A Delaware	5A Stark
4A Caldwell	3A Pamlico	7 Kidder	5A Erie	5A Summit
3A Camden	3A Pasquotank	6A LaMoure	5A Fairfield	5A Trumbull
3A Carteret*	3A Pender*	6A Logan	5A Fayette	5A Tuscarawas
4A Caswell	3A Perquimans	7 McHenry	5A Franklin	5A Union
4A Catawba	4A Person	6A McIntosh	5A Fulton	5A Van Wert
4A Chatham	3A Pitt	6A McKenzie	4A Gallia	5A Vinton
4A Cherokee	4A Polk	7 McLean	5A Geauga	5A Warren
3A Chowan	3A Randolph	6A Mercer	5A Greene	4A Washington
4A Clay	3A Richmond	6A Morton	5A Guernsey	5A Wayne
4A Cleveland	3A Robeson	7 Mountrail	4A Hamilton	5A Williams
3A Columbus*	4A Rockingham	7 Nelson	5A Hancock	5A Wood
3A Craven	3A Rowan	6A Oliver	5A Hardin	5A Wyandot
3A Cumberland	4A Rutherford	7 Pembina	5A Harrison	
3A Currituck	3A Sampson	7 Pierce	5A Henry	Oklahoma
3A Dare	3A Scotland	7 Ramsey	5A Highland	3A Adair
3A Davidson	3A Stanly	6A Ransom	5A Hocking	3A Alfalfa
4A Davie	4A Stokes	7 Renville	5A Holmes	3A Atoka
3A Duplin	4A Surry	6A Richland	5A Huron	4B Beaver
4A Durham	4A Swain	7 Rolette	5A Jackson	3A Beckham
3A Edgecombe	4A Transylvania	6A Sargent	5A Jefferson	3A Blaine
4A Forsyth	3A Tyrrell	7 Sheridan	5A Knox	3A Bryan
4A Franklin	3A Union	6A Sioux	5A Lake	3A Caddo
3A Gaston	4A Vance	6A Slope	4A Lawrence	3A Canadian
4A Gates	4A Wake	6A Stark	5A Licking	3A Carter
4A Graham	4A Warren	7 Steele	5A Logan	3A Cherokee
4A Granville	3A Washington	7 Stutsman	5A Lorain	3A Choctaw

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

4B Cimarron	3A Sequoyah	5A Berks	5A Venango	3A Williamsburg
3A Cleveland	3A Stephens	5A Blair	5A Warren	3A York
3A Coal	4B Texas	5A Bradford	5A Washington	
3A Comanche	3A Tillman	4A Bucks	6A Wayne	South Dakota
3A Cotton	3A Tulsa	5A Butler	5A Westmoreland	6A Aurora
3A Craig	3A Wagoner	5A Cambria	5A Wyoming	6A Beadle
3A Creek	3A Washington	6A Cameron	4A York	5A Bennett
3A Custer	3A Washita	5A Carbon		5A Bon Homme
3A Delaware	3A Woods	5A Centre	Rhode Island	6A Brookings
3A Dewey	3A Woodward	4A Chester	5A (all)	6A Brown
3A Ellis		5A Clarion		6A Brule
3A Garfield	Oregon	6A Clearfield	South Carolina	6A Buffalo
3A Garvin	5B Baker	5A Clinton	3A Abbeville	6A Butte
3A Grady	4C Benton	5A Columbia	3A Aiken	6A Campbell
3A Grant	4C Clackamas	5A Crawford	3A Allendale*	5A Charles Mix
3A Greer	4C Clatsop	5A Cumberland	3A Anderson	6A Clark
3A Harmon	4C Columbia	5A Dauphin	3A Bamberg*	5A Clay
3A Harper	4C Coos	4A Delaware	3A Barnwell*	6A Codrington
3A Haskell	5B Crook	6A Elk	3A Beaufort*	6A Corson
3A Hughes	4C Curry	5A Erie	3A Berkeley*	6A Custer
3A Jackson	5B Deschutes	5A Fayette	3A Calhoun	6A Davison
3A Jefferson	4C Douglas	5A Forest	3A Charleston*	6A Day
3A Johnston	5B Gilliam	5A Franklin	3A Cherokee	6A Deuel
3A Kay	5B Grant	5A Fulton	3A Chester	6A Dewey
3A Kingfisher	5B Harney	5A Greene	3A Chesterfield	5A Douglas
3A Kiowa	5B Hood River	5A Huntingdon	3A Clarendon	6A Edmunds
3A Latimer	4C Jackson	5A Indiana	3A Colleton*	6A Fall River
3A Le Flore	5B Jefferson	5A Jefferson	3A Darlington	6A Faulk
3A Lincoln	4C Josephine	5A Juniata	3A Dillon	6A Grant
3A Logan	5B Klamath	5A Lackawanna	3A Dorchester*	5A Gregory
3A Love	5B Lake	5A Lancaster	3A Edgefield	6A Haakon
3A Major	4C Lane	5A Lawrence	3A Fairfield	6A Hamlin
3A Marshall	4C Lincoln	5A Lebanon	3A Florence	6A Hand
3A Mayes	4C Linn	5A Lehigh	3A Georgetown*	6A Hanson
3A McClain	5B Malheur	5A Luzerne	3A Greenville	6A Harding
3A McCurtain	4C Marion	5A Lycoming	3A Greenwood	6A Hughes
3A McIntosh	5B Morrow	6A McKean	3A Hampton*	5A Hutchinson
3A Murray	4C Multnomah	5A Mercer	3A Horry*	6A Hyde
3A Muskogee	4C Polk	5A Mifflin	3A Jasper*	5A Jackson
3A Noble	5B Sherman	5A Monroe	3A Kershaw	6A Jerauld
3A Nowata	4C Tillamook	4A Montgomery	3A Lancaster	6A Jones
3A Okfuskee	5B Umatilla	5A Montour	3A Laurens	6A Kingsbury
3A Oklahoma	5B Union	5A Northampton	3A Lee	6A Lake
3A Okmulgee	5B Wallowa	5A Northumberland	3A Lexington	6A Lawrence
3A Osage	5B Wasco	5A Perry	3A Marion	6A Lincoln
3A Ottawa	4C Washington	4A Philadelphia	3A Marlboro	6A Lyman
3A Pawnee	5B Wheeler	5A Pike	3A McCormick	6A Marshall
3A Payne	4C Yamhill	6A Potter	3A Newberry	6A McCook
3A Pittsburg		5A Schuylkill	3A Oconee	6A McPherson
3A Pontotoc	Pennsylvania	5A Snyder	3A Orangeburg	6A Meade
3A Pottawatomie	5A Adams	5A Somerset	3A Pickens	5A Mellette
3A Pushmataha	5A Allegheny	5A Sullivan	3A Richland	6A Miner
3A Roger Mills	5A Armstrong	6A Susquehanna	3A Saluda	6A Minnehaha
3A Rogers	5A Beaver	6A Tioga	3A Spartanburg	6A Moody
3A Seminole	5A Bedford	5A Union	3A Sumter	6A Pennington
			3A Union	

(continued)

TABLE N1101.2—continued
 CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

6A Perkins	3A Henderson	4A Williamson	3B Crane	3A Henderson*
6A Potter	4A Henry	4A Wilson	3B Crockett	2A Hidalgo*
6A Roberts	4A Hickman		3B Crosby	2A Hill*
6A Sanborn	4A Houston		3B Culberson	4B Hockley
6A Shannon	4A Humphreys		4B Dallam	3A Hood*
6A Spink	4A Jackson		3A Dallas*	3A Hopkins*
6A Stanley	4A Jefferson		3B Dawson	2A Houston*
6A Sully	4A Johnson		4B Deaf Smith	3B Howard
5A Todd	4A Knox		3A Delta	3B Hudspeth
5A Tripp	3A Lake		3A Denton*	3A Hunt*
6A Turner	3A Lauderdale		2A DeWitt*	4B Hutchinson
5A Union	4A Lawrence		3B Dickens	3B Irion
6A Walworth	4A Lewis		2B Dimmit*	3A Jack
5A Yankton	4A Lincoln		4B Donley	2A Jackson*
6A Ziebach	4A Loudon		2A Duval*	2A Jasper*
	4A Macon		3A Eastland	3B Jeff Davis
	3A Madison		3B Ector	2A Jefferson*
	4A Marion		2B Edwards*	2A Jim Hogg*
	4A Marshall		3A Ellis*	2A Jim Wells*
	4A Maury		3B El Paso	3A Johnson*
	4A McMinn		3A Erath*	3B Jones
	3A McNairy		2A Falls*	2A Karnes*
	4A Meigs		3A Fannin	3A Kaufman*
	4A Monroe		2A Fayette*	3A Kendall*
	4A Montgomery		3A Fisher	2A Kenedy*
	4A Moore		4B Floyd	3B Kent
	4A Morgan		3B Foard	3B Kerr
	4A Obion		2A Fort Bend*	3B Kimble
	4A Overton		3A Franklin*	3B King
	4A Perry		2A Freestone*	2B Kinney*
	4A Pickett		2B Frio*	2A Kleberg*
	4A Polk		3B Gaines	3B Knox
	4A Putnam		2A Galveston*	3A Lamar*
	4A Rhea		3B Garza	4B Lamb
	4A Roane		3A Gillespie*	3A Lampasas*
	4A Robertson		3B Glasscock	2B La Salle*
	4A Rutherford		2A Goliad*	2A Lavaca*
	4A Scott		2A Gonzales*	2A Lee*
	4A Sequatchie		4B Gray	2A Leon*
	4A Sevier		3A Grayson	2A Liberty*
	3A Shelby		3A Gregg*	2A Limestone*
	4A Smith		2A Grimes*	4B Lipscomb
	4A Stewart		2A Guadalupe*	2A Live Oak*
	4A Sullivan		4B Hale	3A Llano*
	4A Sumner		3B Hall	3B Loving
	3A Tipton		3A Hamilton*	3B Lubbock
	4A Trousdale		4B Hansford	3B Lynn
	4A Unicoi		3B Hardeman	2A Madison*
	4A Union		2A Hardin*	3A Marion*
	4A Van Buren		2A Harris*	3B Martin
	4A Warren		3A Harrison*	3B Mason
	4A Washington		4B Hartley	2A Matagorda*
	4A Wayne		3B Haskell	2B Maverick*
	4A Weakley		2A Hays*	3B McCulloch
	4A White		3B Hemphill	2A McLennan*

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

2A McMullen*	3B Stonewall	6B Rich	4C Wahkiakum	5A Upshur
2A Medina*	3B Sutton	5B Salt Lake	5B Walla Walla	4A Wayne
3B Menard	4B Swisher	5B San Juan	4C Whatcom	5A Webster
3A Midland	3A Tarrant*	5B Sanpete	5B Whitman	5A Wetzel
2A Milam*	3B Taylor	5B Sevier	5B Yakima	4A Wirt
3A Mills*	3B Terrell	6B Summit		4A Wood
3B Mitchell	3B Terry	5B Tooele	West Virginia	4A Wyoming
3A Montague	3B Throckmorton	6B Uintah	5A Barbour	
2A Montgomery*	3A Titus*	5B Utah	4A Berkeley	Wisconsin
4A Moore	3B Tom Green	6B Wasatch	4A Boone	6A Adams
3A Morris*	2A Travis*	3B Washington	4A Braxton	7 Ashland
3B Motley	2A Trinity*	5B Wayne	5A Brooke	6A Barron
3A Nacogdoches*	2A Tyler*	5B Weber	4A Cabell	7 Bayfield
3A Navarro*	3A Upshur*		4A Calhoun	6A Brown
2A Newton*	3B Upton	Vermont	4A Clay	6A Buffalo
3A Nolan	2B Uvalde*	6A (all)	5A Doddridge	7 Burnett
2A Nueces*	2B Val Verde*		5A Fayette	6A Calumet
4B Ochiltree	3A Van Zandt*	Virginia	4A Gilmer	6A Chippewa
4B Oldham	2A Victoria*	4A (all)	5A Grant	6A Clark
2A Orange*	2A Walker*	Washington	5A Greenbrier	6A Columbia
3A Palo Pinto*	2A Waller*	5B Adams	5A Hampshire	6A Crawford
3A Panola*	3B Ward	5B Asotin	5A Hancock	6A Dane
3A Parker*	2A Washington*	5B Benton	5A Hardy	6A Dodge
4B Parmer	2B Webb*	5B Chelan	5A Harrison	6A Door
3B Pecos	2A Wharton*	4C Clallam	4A Jackson	7 Douglas
2A Polk*	3B Wheeler	4C Clark	4A Jefferson	6A Dunn
4B Potter	3A Wichita	5B Columbia	4A Kanawha	6A Eau Claire
3B Presidio	3B Wilbarger	4C Cowlitz	5A Lewis	7 Florence
3A Rains*	2A Willacy*	5B Douglas	4A Lincoln	6A Fond du Lac
4B Randall	2A Williamson*	6B Ferry	4A Logan	7 Forest
3B Reagan	2A Wilson*	5B Franklin	5A Marion	6A Grant
2B Real*	3B Winkler	5B Garfield	5A Marshall	6A Green
3A Red River*	3A Wise	5B Grant	4A Mason	6A Green Lake
3B Reeves	3A Wood*	5C Grays Harbor	4A McDowell	6A Iowa
2A Refugio*	4B Yoakum	4C Island	4A Mercer	7 Iron
4B Roberts	3A Young	4C Jefferson	5A Mineral	6A Jackson
2A Robertson*	2B Zavala*	4C King	4A Mingo	6A Jefferson
3A Rockwall*		4C Kitsap	5A Monongalia	6A Juneau
3B Runnels	Utah	5B Kittitas	4A Monroe	6A Kenosha
3A Rusk*	5B Beaver	5B Klickitat	4A Morgan	6A Kewaunee
3A Sabine*	6B Box Elder	4C Lewis	5A Nicholas	6A La Crosse
3A San Augustine*	6B Cache	5B Lincoln	5A Ohio	6A Lafayette
2A San Jacinto*	6B Carbon	4C Mason	5A Pendleton	7 Langlade
2A San Patricio*	6B Daggett	6B Okanogan	4A Pleasants	7 Lincoln
3A San Saba*	5B Davis	4C Pacific	5A Pocahontas	6A Manitowoc
3B Schleicher	6B Duchesne	6B Pend Oreille	5A Preston	6A Marathon
3B Scurry	5B Emery	4C Pierce	4A Putnam	6A Marinette
3B Shackelford	5B Garfield	4C San Juan	4A Raleigh	6A Marquette
3A Shelby*	5B Grand	4C Skagit	5A Randolph	6A Menominee
4B Sherman	5B Iron	5B Skamania	4A Ritchie	6A Milwaukee
3A Smith*	5B Juab	4C Snohomish	4A Roane	6A Monroe
3A Somervell*	5B Kane	5B Spokane	5A Summers	6A Oconto
2A Starr*	5B Millard	6B Stevens	5A Taylor	7 Oneida
3A Stephens	6B Morgan	4C Thurston	5A Tucker	6A Outagamie
3B Sterling	5B Piute		4A Tyler	6A Ozaukee

(continued)

TABLE N1101.2—continued
CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

Key:

A—Moist, B—Dry, C—Marine, Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a warm-humid location.

6A Pepin	6A Trempealeau	6B Campbell	7 Sublette	Northern Mariana Islands 1A (all)*
6A Pierce	6A Vernon	6B Carbon	6B Sweetwater	
6A Polk	7 Vilas	6B Converse	7 Teton	
6A Portage	6A Walworth	6B Crook	6B Uinta	
7 Price	7 Washburn	6B Fremont	6B Washakie	
6A Racine	6A Washington	5B Goshen	6B Weston	
6A Richland	6A Waukesha	6B Hot Springs		
6A Rock	6A Waupaca	6B Johnson		
6A Rusk	6A Waushara	6B Laramie		
6A Sauk	6A Winnebago	7 Lincoln		
7 Sawyer	6A Wood	6B Natrona	US TERRITORIES	
6A Shawano		6B Niobrara	American Samoa	
6A Sheboygan	Wyoming	6B Park	1A (all)*	
6A St. Croix	6B Albany	5B Platte	Guam	
7 Taylor	6B Big Horn	6B Sheridan	1A (all)*	
				Virgin Islands 1A (all)*

TABLE N1101.5(1)
DEFAULT GLAZED FENESTRATION U-FACTORS

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			Single	Double
Metal	1.2	0.8	2	1.3
Metal with thermal break	1.1	0.65	1.9	1.1
Nonmetal or metal clad	0.95	0.55	1.75	1.05
Glazed block	0.6			

TABLE N1101.5(2)
DEFAULT DOOR U-FACTORS

DOOR TYPE	U-FACTOR
Uninsulated metal	1.2
Insulated metal	0.6
Wood	0.5
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

TABLE N1101.5(3)
DEFAULT GLAZED FENESTRATION SHGC

SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
Clear	Tinted	Clear	Tinted	
0.8	0.7	0.7	0.6	0.6

**SECTION N1102
BUILDING THERMAL ENVELOPE**

N1102.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table N1102.1 based on the climate zone specified in Table N1101.2.

N1102.1.1 R-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer’s settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

N1102.1.2 U-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table

N1102.1.2 shall be permitted as an alternative to the *R*-value in Table N1102.1.

N1102.1.3 Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table N1102.1.2, (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table N1102.1. The UA calculation shall be done using a method consistent with the *ASHRAE Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

**TABLE N1102.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^k	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE AND DEPTH	CRAWL SPACE ^e WALL R-VALUE
1	1.2	0.75	0.35 ^j	30	13	3/4	13	0	0	0
2	0.65 ⁱ	0.75	0.35 ^j	30	13	4/6	13	0	0	0
3	0.50 ⁱ	0.65	0.35 ^{e, j}	30	13	5/8	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13 + 5 ^h	13/17	30 ^f	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13 + 5 ^h	15/19	30 ^g	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	30 ^g	10/13	10, 4 ft	10/13

- a. *R*-values are minimums. *U*-factors and solar heat gain coefficient (SHGC) are maximums. R-19 batts compressed in to nominal 2 × 6 framing cavity such that the *R*-value is reduced by R-1 or more shall be marked with the compressed batt *R*-value in addition to the full thickness *R*-value.
- b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
- c. The first *R*-value applies to continuous insulation, the second to framing cavity insulation; either insulation meets the requirement.
- d. R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less, in zones 1 through 3 for heated slabs.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation is not required in warm-humid locations as defined by Figure N1101.2 and Table N1101.2.
- g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- h. “13+5” means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25% or less of the exterior, R-5 sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25% of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.
- i. For impact-rated fenestration complying with Section R301.2.1.2, the maximum *U*-factor shall be 0.75 in zone 2 and 0.65 in zone 3.
- j. For impact-resistant fenestration complying with Section R301.2.1.2 of the *International Residential Code*, the maximum SHGC shall be 0.40.
- k. The second *R*-value applies when more than half the insulation is on the interior.

N1102.2 Specific insulation requirements.

N1102.2.1 Ceilings with attic spaces. When Section N1102.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Similarly R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the *U*-factor alternative approach in Section N1102.1.2 and the Total UA alternative in Section N1102.1.3.

N1102.2.2 Ceilings without attic spaces. Where Section N1102.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section N1102.1 shall be limited to 500 square feet (46 m²) of ceiling area. This reduction shall not apply to the *U*-factor alternative approach in Section N1102.1.2 and the Total UA alternative in Section N1102.1.3.

N1102.2.3 Access hatches and doors. Access doors from *conditioned spaces* to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all *equipment* which prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the *attic* access is opened and to provide a permanent means of maintaining the installed *R*-value of the loose fill insulation.

N1102.2.4 Mass walls. Mass walls, for the purposes of this chapter, shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs.

N1102.2.5 Steel-frame ceilings, walls and floors. Steel-frame ceilings, walls and floors shall meet the insulation requirements of Table N1102.2.5 or shall meet the *U*-factor requirements in Table N1102.1.2. The calculation of the *U*-factor for a steel-frame envelope assembly shall use a series-parallel path calculation method.

Exception: In climate zones 1 and 2, the continuous insulation requirements in Table N1102.2.5 shall be permitted to be reduced to R-3 for steel frame wall assemblies with studs spaced at 24 inches (610 mm) on center.

N1102.2.6 Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

N1102.2.7 Basement walls. *Exterior walls* associated with conditioned basements shall be insulated from the top of the *basement wall* down to 10 feet (3048 mm) below *grade* or to the *basement* floor, whichever is less. Walls associated with unconditioned basements shall meet this requirement unless the floor overhead is insulated in accordance with Sections N1102.1 and N1102.2.6.

N1102.2.8 Slab-on-grade floors. Slab-on-grade floors with a floor surface less than 12 inches below *grade* shall be insulated in accordance with Table N1102.1. The insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below *grade* shall be extended the distance provided in Table N1102.1 by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil. The top edge of the insulation installed between the *exterior wall* and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the *exterior wall*. Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

TABLE N1102.1.2
EQUIVALENT *U*-FACTORS^a

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

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

b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.17 in zone 1, 0.14 in zone 2, 0.12 in zone 3, 0.10 in zone 4 except Marine and the same as the frame wall *U*-factor in Marine zone 4 and in zones 5 through 8.

c. Basement wall *U*-factor of 0.360 in warm-humid climates as defined by Figure N1101.2 and Table N1101.2.

TABLE N1102.2.5
STEEL-FRAME CEILING, WALL AND FLOOR INSULATION (*R*-VALUE)

WOOD FRAME <i>R</i> -VALUE REQUIREMENT	COLD-FORMED STEEL EQUIVALENT <i>R</i> -VALUE ^a
Steel Truss Ceilings^a	
R-30	R-38 or R-30 + 3 or R-26 + 5
R-38	R-49 or R-38 + 3
R-49	R-38 + 5
Steel Joist Ceilings^b	
R-30	R-38 in 2 × 4 or 2 × 6 or 2 × 8 R-49 in any framing
R-38	R-49 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10
Steel Framed Wall	
R-13	R-13 + 5 or R15 + 4 or R-21 + 3 or R-0 + 10
R-19	R-13 + 9 or R-19 + 8 or R-25 + 7
R-21	R-13 + 10 or R-19 + 9 or R-25 + 8
Steel Joist Floor	
R-13	R-19 in 2 × 6 R-19 + R-6 in 2 × 8 or 2 × 10
R-19	R-19 + R-6 in 2 × 6 R-19 + R-12 in 2 × 8 or 2 × 10

For SI: 1 inch = 25.4 mm.

a. Cavity insulation *R*-value is listed first, followed by continuous insulation *R*-value.

b. Insulation exceeding the height of the framing shall cover the framing.

N1102.2.9 Crawl space walls. As an alternative to insulating floors over crawl spaces, insulation of crawl space walls shall be permitted when the crawl space is not vented to the outside. Crawl space wall insulation shall be permanently fastened to the wall and extend downward from the floor to the finished *grade* level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder. All joints of the vapor retarder shall overlap by 6 inches (152 mm) and be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be attached to the stem wall.

N1102.2.10 Masonry veneer. Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

N1102.2.11 Thermally isolated sunroom insulation. The minimum ceiling insulation *R*-values shall be R-19 in zones 1 through 4 and R-24 in zones 5 through 8. The minimum wall *R*-value shall be R-13 in all zones. New wall(s) separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

N1102.3 Fenestration.

N1102.3.1 *U*-factor. An area-weighted average of fenestration products shall be permitted to satisfy the *U*-factor requirements.

N1102.3.2 Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50 percent glazed shall be permitted to satisfy the solar heat gain coefficient (SHGC) requirements.

N1102.3.3 Glazed fenestration exemption. Up to 15 square feet (1.4 m²) of glazed fenestration per *dwelling unit* shall be permitted to be exempt from *U*-factor and SHGC requirements in Section N1102.1. This exemption shall not apply to the *U*-factor alternative approach in Section N1102.1.2 and the Total UA alternative in Section N1102.1.3.

N1102.3.4 Opaque door exemption. One side-hinged opaque door assembly up to 24 square feet (2.22 m²) in area is exempted from the *U*-factor requirement in Section N1102.1.1. This exemption shall not apply to the *U*-factor alternative approach in Section N1102.1.2 and the Total UA alternative in Section N1102.1.3.

N1102.3.5 Thermally isolated sunroom *U*-factor. For zones 4 through 8 the maximum fenestration *U*-factor shall be 0.50 and the maximum skylight *U*-factor shall be 0.75. New windows and doors separating the sunroom from *conditioned space* shall meet the *building thermal envelope* requirements.

N1102.3.6 Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and solar heat gain coefficient (SHGC) in Table N1102.1.

N1102.4 Air leakage.

N1102.4.1 Building thermal envelope. The *building thermal envelope* shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.

1. All joints, seams and penetrations.
2. Site-built windows, doors and skylights.
3. Openings between window and door assemblies and their respective jambs and framing.
4. Utility penetrations.
5. Dropped ceilings or chases adjacent to the thermal envelope.
6. Knee walls.
7. Walls and ceilings separating the garage from *conditioned spaces*.
8. Behind tubs and showers on *exterior walls*.
9. Common walls between *dwelling units*.
10. Attic access openings.
11. Rim joists junction.
12. Other sources of infiltration.

N1102.4.2 Air sealing and insulation. Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section N1102.4.2.1 or N1102.4.2.2.

N1102.4.2.1 Testing option. Tested air leakage is less than 7 ACH when tested with a blower door at a pressure of 50 pascals (0.007 psi). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed; including exhaust, intake, makeup air, back draft, and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.

N1102.4.2.2 Visual inspection option. The items listed in Table N1102.4.2, applicable to the method of construction, are field verified. Where required by the code official, an *approved* party independent from the installer

of the insulation, shall inspect the air barrier and insulation.

N1102.4.3 Fireplaces. New wood-burning fireplaces shall have gasketed doors and outdoor combustion air.

N1102.4.4 Fenestration air leakage. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cubic foot per minute per square foot [$1.5(L/s)/m^2$], and swinging doors no more than 0.5 cubic foot per minute per square foot [$2.5(L/s)/m^2$], when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory, and listed and *labeled* by the manufacturer.

Exception: Site-built windows, skylights and doors.

N1102.4.5 Recessed lighting. Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

SECTION N1103 SYSTEMS

N1103.1 Controls. At least one thermostat shall be installed for each separate heating and cooling system.

N1103.1.1 Programmable thermostat. Where the primary heating system is a forced air furnace, at least one thermostat per *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

N1103.1.2 Heat pump supplementary heat. Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

N1103.2 Ducts.

N1103.2.1 Insulation. Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

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

N1103.2.2 Sealing. All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1 of the *International Residential Code*. Verification of compliance with this section shall be in accordance with either Section N1103.2.2.1 or Section N1103.2.2.2.

N1103.2.2.1 Testing option. Duct tightness shall be verified by either of the following:

1. Post-construction test: Leakage to outdoors shall be less than or equal to 8 cfm (3.78 L/s) per 100 square feet (9.29 m²) of conditioned floor area or a total leakage less than or equal to 12 cfm (5.66 L/s) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 6 cfm (2.83 L/s) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (1.89 L/s) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: Duct tightness test is not required if the air handler and all ducts are located within conditioned space.

When this option is chosen, testing shall be performed by approved qualified individuals, testing agencies or contractors. Testing and results shall be as prescribed in Section N1103.2.2 and approved recognized industry standards.

N1103.2.2.2 Visual inspection option. In addition to the inspection of ducts otherwise required by this code, when the air handler and all ducts are not within conditioned space and this option is chosen to verify duct tightness, duct tightness shall be considered acceptable when the requirements of Section N1103.2.2 are field verified.

N1103.2.3 Building cavities. Building framing cavities shall not be used as supply ducts.

N1103.3 Mechanical system piping insulation. Mechanical system piping capable of carrying fluids above 105°F (40°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.

N1103.4 Circulating hot water systems. All circulating service hot water piping shall be insulated to at least R-2. Circulating hot water systems shall include an automatic or *readily*

accessible manual switch that can turn off the hot water circulating pump when the system is not in use.

N1103.5 Mechanical ventilation. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

N1103.6 Equipment sizing. Heating and cooling *equipment* shall be sized as specified in Section M1401.3.

N1103.7 Snow melt system controls. Snow- and ice-melting systems supplied through energy service to the building shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (5°C).

N1103.8 Pools. Pools shall be provided with energy conserving measures in accordance with Sections N1103.8.1 through N1103.8.3.

N1103.8.1 Pool heaters. All pool heaters shall be equipped with a *readily accessible* on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas or LPG shall not have continuously burning pilot lights.

N1103.8.2 Time switches. Time switches that can automatically turn off and on heaters and pumps according to a pre-set schedule shall be installed on swimming pool heaters and pumps.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Where pumps are required to operate solar- and waste-heat-recovery pool heating systems.

N1103.8.3 Pool covers. Heated pools shall be equipped with a vapor retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12.

SECTION N1104 LIGHTING SYSTEMS

N1104.1 Lighting equipment. A minimum of 50 percent of the lamps in permanently installed lighting fixtures shall be *high-efficacy lamps*.

**TABLE N1102.4.2
AIR BARRIER AND INSULATION INSPECTION**

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material.
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of floor.
Crawlspace walls	Insulation is permanently attached to walls. Exposed earth in unvented crawlspaces is covered with Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are airtight, IC rated and sealed to drywall. Exception—fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior wall	Air barrier extends behind boxes or air sealed type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

