United States
Department of
Agriculture

Rural Development

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Rural Development Texas AN No.516 (1924)

August 23, 1999

SUBJECT: Plans and Specification Requirements for Single Family Housing (RD Instruction 1924-A)

TO: All Offices
Rural Development, Texas

PURPOSE/INTENDED OUTCOME: This Texas Administrative Notice (AN) is issued to clarify plan certification for single family housing (SFH) dwellings. Specifically, it addresses development plans, specifications, foundation plans, and certification requirements for 502 direct and guaranteed loans.

COMPARISON WITH PREVIOUS AN: This AN replaces Texas AN No.506 (1924) which expired on May 31, 1999.

IMPLEMENTATION RESPONSIBILITIES: For Section 502 SFH loans, building plans and specifications must be certified as meeting the appropriate Rural Development standard (Council of American Building Officials (CABO) One and Two Family Dwelling Code and CABO Model Energy Code (MEC), 1992 Thermal Requirements). Attachment I provides options for wall, ceiling, window and slab insulation for meeting the CABO-MEC 1992 Thermal Requirements. Form FmHA 1924-25 should be used for the "Plan Certification." This certification does not cover the plot plan, foundation plan, or soil bearing characteristics of the site. The acceptability of plot plans and foundation plans remains the responsibility of Rural Development. Required plans and specifications shall be as described in FmHA Instruction 1924-A, Exhibit C.

For guaranteed SFH loans, the lender must certify that architectural or engineering plans and specifications for dwellings (including a plot plan, a soils map, and foundation design) have been received and are retained in the lender's file. The certification will ensure that the plans meet the appropriate Rural Development standard (CABO and CABO-MEC 1992).

EXPIRATION DATE: July 31, 2000

FILING INSTRUCTIONS:
Following RD Instr. 1924-A

Rural Development is an Equal Opportunity Lender.
Complaints of discrimination should be sent to:
Secretary of Agriculture, Washington, D.C. 20250

Because of adverse soil conditions in Texas, Rural Development recognizes two options for the design of single family housing concrete slabs:

OPTION 1. A standard design for Texas prepared by Rural Development based on the soil plasticity index (P.I.). The P.I. range for the soil may be obtained from the USDA, Natural Resources Conservation Service soil survey. In determining the plasticity index, a depth of 60 inches should be evaluated. The upper limit of the published P.I. range should be used for selecting one of the standard foundation designs.

OPTION 2. An individual design for each dwelling and site by a registered professional engineer. The engineered foundation plans shall be sealed by a professional engineer registered in Texas and accompanied by soils boring information from a certified, qualified testing laboratory. The design engineer shall also inspect the foundation preparation prior to placement of concrete and provide a follow-up certification that the foundation was constructed in accordance with plans and specifications. A post tension foundation is considered as an individual design and an engineered foundation. For post tension foundations, the design engineer shall inspect the foundation preparation prior to placement of concrete and at the time of cable tensioning. Cables should be pre-tensioned and then tensioned to capacity when concrete reaches design strength.

Certification of plans by a code official does not validate the use of individual foundation plan designs. Individual engineered foundations must bear the seal and signature of a registered professional engineer. The guaranteed SFH lender is responsible for ensuring appropriate foundation plans fully comply with one of the above options.

The Texas "Single Family Housing Construction Guide" is to familiarize and assist Rural Development personnel in their understanding of house construction. It is not intended to preclude Rural Development instructions, nationally recognized building codes, or the CABO Model Energy Code.

If you have any questions, please feel free to call Lee Wiederhold, P.E., Technical Support Section, at (254) 742-9790.

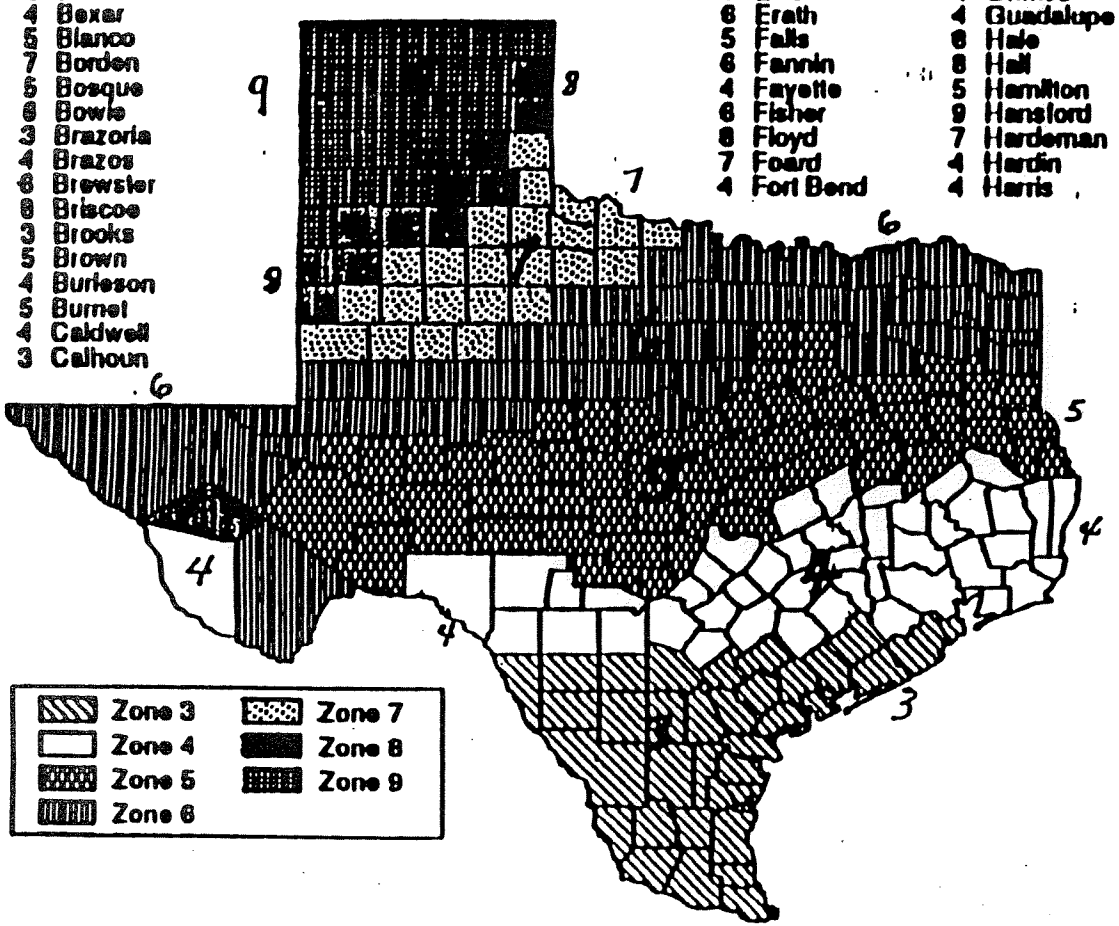
Steven A. Carriker

STEVEN A. CARRIKER
State Director

Attachment

TEXAS --

Zone	County
5	Anderson
6	Andrews
4	Angelina
3	Aransas
6	Archer
9	Armstrong
3	Atascosa
4	Austin
9	Bailey
4	Bandera
4	Bastrop
7	Baylor
3	Bee
5	Bell
4	Bexar
5	Blanco
7	Borden
5	Bosque
6	Bowie
3	Brazoria
4	Brazos
6	Brewster
6	Briscoe
3	Brooks
5	Brown
4	Burleson
5	Burnet
4	Caldwell
3	Calhoun
6	Callahan
3	Cameron
6	Camp
9	Carson
6	Cass
9	Castro
4	Chambers
5	Cherokee
7	Childress
6	Clay
6	Cochran
6	Coke
5	Coleman
6	Collin
7	Collingsworth
4	Colorado
4	Comal
6	Comanche
5	Concho
6	Cooke
5	Coryell
7	Cottle
5	Crane
5	Crockett
7	Crosby
6	Culberson
9	Dallam
5	Dallas
7	Dawson
3	De Witt
9	Deaf Smith
6	Delta
6	Denton
7	Dickens
3	Dimmit
6	Donley
3	Duval
6	Eastland
6	Ector
4	Edwards
6	El Paso
5	Ellis
6	Erath
5	Falls
6	Fannin
4	Fayette
6	Fisher
6	Floyd
7	Foard
4	Fort Bend
6	Franklin
5	Freestone
3	Frio
7	Gaines
3	Galveston
7	Garza
5	Gillespie
6	Glasscock
3	Goliad
4	Gonzales
9	Gray
6	Grayson
5	Gregg
4	Grimes
4	Guadalupe
6	Hale
6	Hall
5	Hamilton
9	Hansford
7	Hardeman
4	Hardin
4	Harris
6	Harrison
9	Hartley
6	Haskell
4	Hays
6	Hemphill
5	Henderson
3	Hidalgo
5	Hill
6	Hockley
6	Hood
6	Hopkins
5	Houston
6	Howard
6	Hudspeth
6	Hunt
9	Hutchinson
5	Irion
6	Jack
3	Jackson
4	Jasper
6	Jeff Davis
4	Jefferson
3	Jim Hogg
3	Jim Wells
5	Johnson
6	Jones
3	Kames
6	Kaufman
5	Kendall
3	Kenedy
7	Kent
5	Kerr
5	Kimble
7	King
4	Kinney
3	Kleberg
7	Knox
3	La Salle
6	Lamar
8	Lamb
5	Lampasas
4	Lavaca
4	Lee
5	Leon
4	Liberty
5	Limestone
9	Lipscomb
3	Live Oak
5	Llano
6	Loving
7	Lubbock
7	Lynn
4	Madison
6	Marion
6	Martin
5	Mason
3	Matagorda
3	Maverick
5	Mcculloch
5	Mclennan
3	Mcmullen
4	Medina
5	Menard
6	Midland
4	Milam
5	Mills
6	Mitchell
6	Montague
4	Montgomery
9	Moore
6	Morris
7	Motley
5	Nacogdoches
5	Navarro
4	Newton
6	Nolan
3	Nueces
9	Ochiltree
9	Oldham
4	Orange
6	Palo Pinto
5	Panola
6	Parker
9	Parmer
5	Pecos
4	Polk
9	Potter
4	Presidio
6	Rains
9	Randall
5	Reagan
4	Real
6	Red River
6	Reeves
3	Refugio
9	Roberts
4	Robertson
6	Rockwall
5	Runnels
5	Rusk
5	Sabine
5	San Augustine
4	San Jacinto
3	San Patricio
5	San Saba
5	Schleicher
7	Scurry
6	Shackelford
5	Shelby
9	Sherman
5	Smith
5	Somervell
3	Starr
6	Stephens
6	Sterling
7	Stonewall
5	Sutton
9	Swisher
5	Tarrant
6	Taylor
5	Terrell
7	Terry
6	Throckmorton
6	Titus
5	Tom Green
4	Travis
4	Trinity
4	Tyler
6	Upshur
5	Upton
4	Uvalde
4	Val Verde
6	Van Zandt
3	Victoria
4	Walker
4	Waller
6	Ward
4	Washington
3	Webb
3	Wharton
8	Wheeler
7	Wichita
7	Wilbarger
3	Willacy
5	Williamson
4	Wilson
6	Winkler
6	Wise
6	Wood
8	Yoakum
6	Young
3	Zapata
3	Zavala



Zone 3

1992 Model Energy Code Prescriptive Compliance Options for Detached One- and Two-Family Dwellings

Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]
1	R-19	R-13	12%	any	R-11	R-0	R-0
2	R-21	R-11	12%	any	R-13	R-0	R-0
3	R-13	R-11	15%	0.75	R-11	R-0	R-0
4	R-19	R-11	15%	0.75	R-13	R-0	R-0
5	R-30	R-19	15%	any	R-11	R-0	R-0
6	R-38	R-15	15%	any	R-19	R-4	R-2
7	R-19	R-11	18%	0.70	R-11	R-0	R-0
8	R-19	R-13	18%	0.75	R-13	R-0	R-0
9	R-30	R-11	18%	0.75	R-11	R-0	R-0
10	R-19	R-13	any	0.55	R-11	R-5	R-0
11	R-21	R-13	any	0.65	R-19	R-4	R-3
12	R-30	R-13	any	0.60	R-13	R-0	R-0
13	R-19	R-13	any	0.55	R-19	R-0	R-0
14	R-30	R-13	any	0.60	R-19	R-0	R-0

Zone 4

1992 Model Energy Code Prescriptive Compliance Options for Detached One- and Two-Family Dwellings

Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-13	R-11	12%	0.75	R-11	R-6	R-0	Normal
2	R-19	R-13	12%	any	R-19	R-10	R-4	Normal
3	R-30	R-15	12%	any	R-19	R-6	R-0	Normal
4	R-38	R-13	12%	any	R-13	R-7	R-0	Normal
5	R-38	R-20	12%	0.40	R-11	R-0	R-0	Normal
6	R-19	R-11	15%	0.70	R-11	R-5	R-0	Normal
7	R-30	R-11	15%	0.75	R-11	R-5	R-0	Normal
8	R-30	R-19	15%	0.30	R-11	R-0	R-0	Normal
9	R-19	R-11	18%	0.60	R-11	R-5	R-0	Normal
10	R-19	R-11	18%	0.70	R-19	R-9	R-2	Normal
11	R-30	R-13	18%	0.70	R-13	R-5	R-0	Normal
12	R-38	R-11	18%	0.70	R-13	R-6	R-0	Normal
13	R-19	R-11	any	0.45	R-11	R-5	R-0	Normal
14	R-30	R-11	any	0.50	R-11	R-5	R-0	Normal
15	R-38	R-13	any	0.60	R-19	R-9	R-2	Normal
16	R-30	R-14	12%	0.45	R-11	R-0	R-0	High
17	R-30	R-13	15%	any	R-19	R-8	R-2	High
18	R-30	R-19	15%	0.40	R-11	R-0	R-0	High
19	R-19	R-13	18%	0.75	R-13	R-5	R-0	High
20	R-38	R-19	18%	0.40	R-11	R-0	R-0	High
21	R-19	R-11	any	0.55	R-13	R-5	R-0	High
22	R-38	R-19	any	0.30	R-11	R-0	R-0	High

Zone 5

1992 Model Energy Code Prescriptive Compliance Options for Detached One- and Two-Family Dwellings
Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-19	R-14	12%	0.75	R-11	R-5	R-0	Normal
2	R-30	R-11	12%	0.75	R-13	R-5	R-0	Normal
3	R-19	R-13	15%	0.60	R-11	R-5	R-0	Normal
4	R-30	R-13	15%	0.70	R-13	R-6	R-0	Normal
5	R-38	R-13	15%	0.75	R-13	R-7	R-2	Normal
6	R-19	R-13	18%	0.50	R-11	R-5	R-0	Normal
7	R-30	R-13	18%	0.60	R-13	R-6	R-0	Normal
8	R-30	R-13	any	0.45	R-13	R-6	R-2	Normal
9	R-38	R-19	any	0.55	R-19	R-8	R-2	Normal
10	R-13	R-11	12%	0.70	R-11	R-4	R-0	High
11	R-38	R-19	12%	0.40	R-11	R-0	R-0	High
12	R-19	R-13	15%	0.70	R-13	R-4	R-2	High
13	R-38	R-16	15%	0.30	R-11	R-0	R-0	High
14	R-19	R-13	18%	0.65	R-13	R-5	R-2	High
15	R-30	R-13	18%	0.70	R-13	R-5	R-0	High
16	R-38	R-13	18%	0.75	R-13	R-6	R-0	High
17	R-19	R-13	any	0.50	R-13	R-6	R-0	High
18	R-30	R-13	any	0.50	R-13	R-4	R-0	High

Zone 6

1992 Model Energy Code Prescriptive Compliance Options for Detached One- and Two-Family Dwellings
Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-19	R-13	12%	0.60	R-13	R-5	R-2	Normal
2	R-30	R-13	12%	0.70	R-13	R-5	R-2	Normal
3	R-30	R-13	12%	0.60	R-11	R-4	R-0	Normal
4	R-19	R-13	15%	0.55	R-19	R-6	R-3	Normal
5	R-30	R-13	15%	0.55	R-13	R-5	R-2	Normal
6	R-38	R-13	15%	0.55	R-11	R-4	R-0	Normal
7	R-19	R-13	18%	0.50	R-19	R-7	R-7	Normal
8	R-30	R-13	18%	0.55	R-19	R-7	R-6	Normal
9	R-38	R-13	18%	0.50	R-13	R-5	R-2	Normal
10	R-19	R-17	any	0.45	R-19	R-7	R-6	Normal
11	R-30	R-13	any	0.45	R-19	R-6	R-3	Normal
12	R-38	R-19	any	0.55	R-19	R-7	R-6	Normal
13	R-19	R-13	12%	0.75	R-13	R-4	R-2	High
14	R-38	R-19	12%	0.30	R-11	R-0	R-0	High
15	R-19	R-13	15%	0.60	R-13	R-4	R-0	High
16	R-30	R-13	15%	0.70	R-13	R-4	R-2	High
17	R-19	R-13	18%	0.60	R-19	R-6	R-3	High
18	R-30	R-13	18%	0.65	R-19	R-5	R-2	High
19	R-38	R-13	18%	0.60	R-13	R-4	R-2	High
20	R-30	R-13	any	0.55	R-19	R-5	R-2	High

Zone 7

1992 Model Energy Code Prescriptive Compliance Options
for Detached One- and Two-Family Dwellings
Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-19	R-13	12%	0.50	R-13	R-5	R-2	Normal
2	R-30	R-13	12%	0.60	R-13	R-5	R-2	Normal
3	R-30	R-13	12%	0.55	R-11	R-4	R-0	Normal
4	R-38	R-13	12%	0.65	R-13	R-5	R-2	Normal
5	R-19	R-13	15%	0.50	R-19	R-7	R-4	Normal
6	R-30	R-13	15%	0.50	R-13	R-5	R-2	Normal
7	R-30	R-13	15%	0.45	R-11	R-4	R-0	Normal
8	R-38	R-13	15%	0.60	R-19	R-7	R-3	Normal
9	R-19	R-13	18%	0.45	R-19	R-8	R-8	Normal
10	R-30	R-13	18%	0.50	R-19	R-8	R-4	Normal
11	R-38	R-13	18%	0.45	R-13	R-5	R-2	Normal
12	R-19	R-15	any	0.40	R-19	R-8	R-10	Normal
13	R-30	R-13	any	0.40	R-15	R-7	R-2	Normal
14	R-38	R-19	any	0.50	R-19	R-8	R-4	Normal
15	R-19	R-13	12%	0.70	R-13	R-5	R-2	High
16	R-30	R-13	12%	0.75	R-11	R-4	R-0	High
17	R-19	R-13	15%	0.60	R-15	R-5	R-2	High
18	R-30	R-13	15%	0.70	R-19	R-6	R-2	High
19	R-30	R-13	18%	0.60	R-19	R-6	R-2	High
20	R-38	R-13	18%	0.60	R-19	R-5	R-2	High
21	R-30	R-13	any	0.45	R-13	R-4	R-2	High
22	R-38	R-13	any	0.45	R-11	R-4	R-0	High

Zone 8

1992 Model Energy Code Prescriptive Compliance Options
for Detached One- and Two-Family Dwellings
Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-19	R-13	12%	0.45	R-13	R-6	R-2	Normal
2	R-30	R-13	12%	0.55	R-13	R-6	R-2	Normal
3	R-30	R-13	12%	0.45	R-11	R-4	R-0	Normal
4	R-38	R-13	12%	0.65	R-19	R-8	R-3	Normal
5	R-19	R-13	15%	0.40	R-15	R-7	R-2	Normal
6	R-30	R-13	15%	0.45	R-13	R-6	R-2	Normal
7	R-38	R-13	15%	0.55	R-19	R-8	R-4	Normal
8	R-30	R-13	15%	0.40	R-11	R-5	R-0	Normal
9	R-38	R-14	15%	0.45	R-11	R-5	R-0	Normal
10	R-30	R-13	18%	0.45	R-19	R-8	R-4	Normal
11	R-38	R-19	18%	0.55	R-19	R-8	R-4	Normal
12	R-38	R-13	19%	0.45	R-19	R-9	R-5	Normal
13	R-21	R-13	any	0.35	R-19	R-9	R-6	Normal
14	R-30	R-13	any	0.40	R-21	R-9	R-9	Normal
15	R-38	R-19	any	0.45	R-19	R-8	R-3	Normal
16	R-19	R-13	12%	0.55	R-11	R-4	R-0	High
17	R-30	R-13	12%	0.70	R-13	R-5	R-2	High
18	R-19	R-13	15%	0.50	R-13	R-5	R-2	High
19	R-30	R-13	15%	0.65	R-19	R-7	R-2	High
20	R-30	R-13	18%	0.55	R-19	R-7	R-2	High
21	R-38	R-14	18%	0.60	R-19	R-7	R-3	High
22	R-19	R-13	any	0.40	R-19	R-6	R-2	High
23	R-30	R-13	any	0.40	R-11	R-4	R-0	High

Zone 9

1992 Model Energy Code Prescriptive Compliance Options
for Detached One- and Two-Family Dwellings
Effective June 1, 1994

Option	Ceiling R-value[1]	Wall R-value[2]	Window Area[3]	Window U-value[4]	Floor R-value[5]	Basement R-value[6]	Slab R-value[7]	Heating Efficiency[8]
1	R-19	R-15	12%	0.40	R-13	R-6	R-2	Normal
2	R-30	R-15	12%	0.50	R-13	R-6	R-2	Normal
3	R-30	R-13	12%	0.40	R-11	R-5	R-0*	Normal
4	R-38	R-13	12%	0.60	R-19	R-9	R-4	Normal
5	R-19	R-13	15%	0.40	R-19	R-10	R-6	Normal
6	R-30	R-13	15%	0.45	R-19	R-9	R-3	Normal
7	R-30	R-13	15%	0.55	R-30	R-16	R-14*	Normal
8	R-38	R-13	15%	0.50	R-19	R-10	R-6	Normal
9	R-38	R-19	15%	0.45	R-11	R-5	R-0	Normal
10	R-30	R-13	18%	0.40	R-19	R-9	R-4	Normal
11	R-38	R-13	18%	0.40	R-19	R-8	R-3	Normal
12	R-38	R-19	18%	0.55	R-30	R-13	R-8*	Normal
13	R-19	R-13	any	0.30	R-19	R-10	R-6	Normal
14	R-30	R-13	any	0.35	R-19	R-10	R-10	Normal
15	R-38	R-13	any	0.35	R-19	R-9	R-3	Normal
16	R-38	R-19	any	0.45	R-30	R-12	R-6*	Normal
17	R-19	R-13	12%	0.55	R-11	R-5	R-0	High
18	R-19	R-13	12%	0.65	R-19	R-6	R-2	High
19	R-19	R-13	15%	0.45	R-11	R-4	R-0	High
20	R-30	R-13	15%	0.65	R-19	R-8	R-4	High
21	R-30	R-13	18%	0.55	R-19	R-7	R-3	High
22	R-19	R-13	any	0.40	R-19	R-7	R-2	High
23	R-30	R-13	any	0.45	R-19	R-7	R-2	High
24	R-38	R-13	any	0.50	R-21	R-8	R-6	High

Zone 3

FOOTNOTES:

1. The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

2. R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

3. Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

4. Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

5. This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

6. Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

7. The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. Ceiling and wall R-values must meet an R-11 minimum.

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values represent maximum acceptable levels. R-values represent minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

Zone 4

FOOTNOTES:

[1] The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

[2] R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

[3] Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

[4] Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

[5] This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

[6] Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

[7] The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

[8] High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

Zone 5

FOOTNOTES:

[1] The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

[2] R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

[3] Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

[4] Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

[5] This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

[6] Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

[7] The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

[8] High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

Zone 6

FOOTNOTES:

1 The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

2 R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

3 Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

4 Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

5 This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

6 Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

7 The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

8 High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

FOOTNOTES:

1 The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

2 R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

3 Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

4 Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

5 This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

6 Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

7 The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

8 High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

Zone 8

FOOTNOTES:

[1] The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

[2] R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

[3] Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

[4] Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

[5] This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

[6] Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

[7] The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches.

[8] High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.

Zone 9

FOOTNOTES:

1 The ceiling R-values do not assume a raised truss construction. If the insulation achieves the full insulation thickness at the eaves, R-30 insulation may be substituted for R-38 insulation (this credit must be noted on the plans or compliance documentation).

2 R-values represent the sum of the wall cavity insulation plus insulation sheathing (if used). For example, an R-19 requirement could be met *EITHER* by R-19 cavity insulation *OR* R-15 cavity insulation plus R-4 insulating sheathing.

3 Window area is the ratio of the total glazing area to the total conditioned floor area. The glazing area includes the rough opening area of all sliding glass doors, skylights, and basement windows. Up to 1% of the total glazing area may be exempted from the U-value requirement.

4 Windows U-values shall be certified by the National Fenestration Rating Council (NFRC). Alternatively, default window U-values may be used as listed in Table 5, Chapter 27, *Overall Coefficients of Heat Transmission of Various Fenestration Products*, ASHRAE Handbook of Fundamentals, 1993 (the glass only U-values listed in the first three columns do not apply).

5 This requirement applies to floors over unconditioned spaces, such as unheated crawlspaces, basements, and garages. Floors over outside air must meet the ceiling requirements.

6 Basement walls below uninsulated floors must be insulated to a depth of 10 feet below the outside finish ground level or to the level of the basement floor, whichever is less. If the average opaque area of basement walls is less than 50% below grade, the total opaque basement wall area (including the below-grade portions) should be included as part of the above-grade wall. Basement windows are always included as part of the window area.

7 The R-value requirements listed in the table above are for unheated slabs. For heated slabs, add an additional R-2 to the R-value requirement shown above. A heated slab is one in which the heating elements or hot air distribution system are in contact with or placed within the slab or the subgrade. The insulation shall extend downward from the top of the slab for a minimum of 24 inches or downward to the bottom of the slab and then horizontally for a minimum total distance of 24 inches. Requirements followed by an asterisk must extend a total of 48 inches.

8 High efficiency is defined as a furnace with an AFUE of at least 90% or a heat pump with an HSPF of at least 7.8.

NOTES:

- Ceiling, wall, floor, and foundation constructions with two or more insulation levels will comply if the area-weighted average R-value is greater than or equal to the R-value listed. Windows and doors will comply if the area-weighted U-value is less than or equal to the U-value listed. If assemblies are area-weighted, the area and R-value (U-value) for each assembly must be listed on the compliance documentation. The following minimum R-values must be maintained:

Ceilings	R-19
Walls	R-11
Floors	R-11

- Door U-values must be less than or equal to 0.35. Door U-values must be manufacturer tested and certified. Alternatively, door U-values may be used as listed in Table 6, Chapter 22, *Transmission Coefficients U for Wood and Steel Doors*, ASHRAE Handbook of Fundamentals, 1993. Entry doors are exempted from this requirement.

- Window areas and U-values are maximum acceptable levels. R-values are minimum acceptable levels.

- R-values used in this table are for cavity insulation only and do not include structural components.