Chapter 3 [CE]: General Requirements

General Comments

Chapter 3 [CE] specifies the climate zones that establish exterior design conditions and provides general requirements for interior design conditions, materials, systems and equipment. Refer to Figure C301.1 or Table C301.1 to verify the climate zone for a particular county. Section C302 provides the interior design conditions for heating and cooling load calculations. Section C303 provides requirements for fenestration and insulation materials.

Purpose

Climate has a major impact on building energy use. The *Energy Code* establishes many requirements such as minimum wall and roof insulation *R*-values, maximum window and door *U*-factors and mechanical system parameters, all of which vary based on the building's climate zone. Therefore, this chapter is an important reference.

SECTION C301
CLIMATE ZONES

C301.1 General. Climate zones from Figure C301.1 or Table C301.1 shall be used in determining the applicable requirements from Chapter 4 [CE].

Section C301 contains information to assign a building to its correct climate zone, which is the basis for establishing prescriptive requirements and exemptions.

Climate zones are classified according to New York State. New York State has three climate zone designations:

- Zone 4 (mixed-humid): New York City, Westchester and Long Island
- Zone 5 (cool-humid): Hudson Valley, Genesee Valley and west
- Zone 6 (cool-humid): Finger Lakes region, Catskills, Adirondacks and north

Climate zones are consistent for residential and commercial buildings.

SECTION C302
DESIGN CONDITIONS

C302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F for heating and minimum of 75°F for cooling.

This section provides the interior conditions used to size mechanical equipment and systems. While the *Energy Code* regulates equipment size, it is not enforceable without establishing the exact design parameters. This section does not affect the interior design temperatures required by other codes such as Section 1204 of the *International Building Code*® (IBC®) or Section 602.2 of the *International Property Maintenance Code*® (IPMC®).

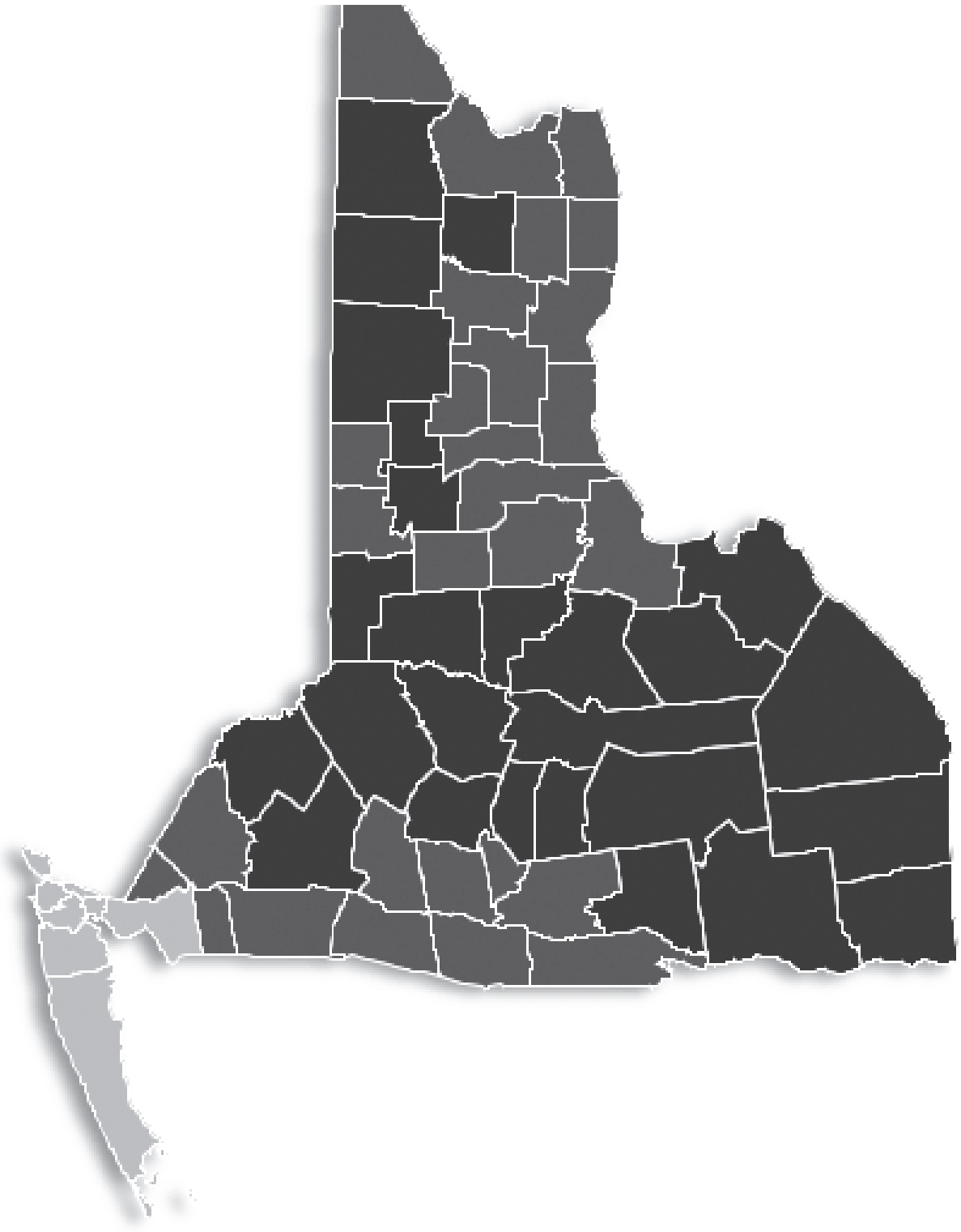


FIGURE C301.1
NEW YORK STATE CLIMATE ZONES

TABLE C301.1
CLIMATE ZONES BY COUNTY, ALL ZONES ARE CATEGORY A OR MOIST DESIGNATIONS

Climate Zone 4			
Bronx	Nassau	Queens	Suffolk
Kings	New York	Richmond	Westchester
Climate Zone 5			
Albany	Erie	Ontario	Saratoga
Cayuga	Genesee	Orange	Schenectady
Chautauqua	Greene	Orleans	Seneca
Chemung	Livingston	Oswego	Tioga
Columbia	Monroe	Putnam	Washington
Cortland	Niagara	Rensselaer	Wayne
Dutchess	Onondaga	Rockland	Yates
Climate Zone 6			
Allegany	Franklin	Montgomery	Sullivan
Broome	Fulton	Oneida	Tompkins
Cattaraugus	Hamilton	Otsego	Ulster
Chenango	Herkimer	Schoharie	Warren
Clinton	Jefferson	Schuyler	Wyoming
Delaware	Lewis	St. Lawrence	
Essex	Madison	Steuben	

SECTION C303
MATERIALS, SYSTEMS AND EQUIPMENT

C303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

This section requires that sufficient information is provided to enforce *Energy Code* compliance during plan review and field inspection. The permit applicant can submit required equipment and material information on the building plans, specification sheets or schedules or in any other way that allows the code official to clearly identify which specifications apply to which portions of the building (i.e., which parts of the building are insulated to the levels listed). Material information includes building thermal envelope component insulation *R*-values, fenestration assembly *U*-factors and duct and piping insulation levels. Equipment information includes heating and cooling equipment and appliance efficiencies.

Although manufacturers often mark their products (tag, stencil, label, stamp, sticker, bar code, etc.) (see Commentary Figure C303.1), if there is any uncertainty about the product, the mark is subject to code official approval.

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches or greater in width. 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 areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding, the *R*-value shall be labeled on the product's package and shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Insulation is rated by *R*-value—the higher the *R*-value, the better the insulation performs. For products lacking an *R*-value identification, the installer (or builder) must provide the insulation performance data. For example, materials such as foamed-in-place urethane and unfaced batt insulation are not labeled beyond their original packaging, if at all. However, the installer must certify for the code official the type, thickness and *R*-value of these materials.

The *R*-value of loose-fill insulation (blown or sprayed), for example, is dependent on both the installed thickness and the installed density (number of bags used). Therefore, loose-fill insulation cannot be directly labeled by the manufacturer. Many blown insulation products carry a manufacturer's *R*-value guarantee when installed to a designated thickness, "inches = *R*-value." Blown insulation products lacking this manufacturer's guarantee can be subjected to special inspection and testing, what is referred to as "cookie cutting." Cookie cutting involves extracting a column of insulation with a cylinder to determine its density. The insulation depth and density must yield the specified *R*-value according to the manufacturer's bag label specification.

The *Energy Code* and Federal Trade Commission (FTC) Rule 460 require that installers of insulation in homes, apartments and manufactured housing units report this information to the authority having jurisdiction in the form of a certification posted in a conspicuous location [see Commentary Figure C303.1.1(1)].

C303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches on markers that are installed at least one for every 300 square feet 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 in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

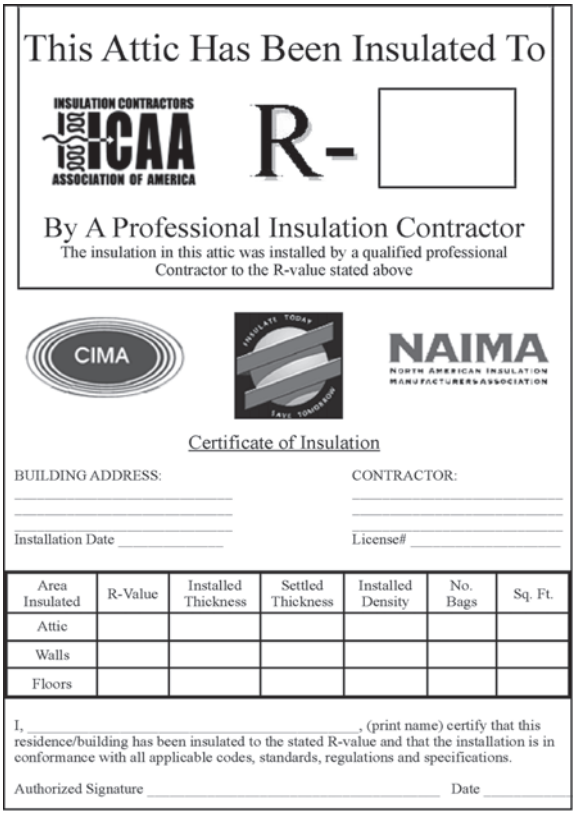
To help verify the installed *R*-value of blown-in or spray-applied insulation, the installer must certify the following information in a signed statement posted in a conspicuous place [see Section C303.1.1 and Commentary Figure C303.1.1(1)]:

- The type of insulation used and the manufacturer.
- The insulation's coverage per bag as stated by the manufacturer (the number of bags required to result in a given *R*-value for a given area), as well as the settled *R*-value.
- The initial and settled thickness [see Commentary Figure C303.1.1(2)].
- The number of bags installed.
- The total square footage of the attic space (roof/ceiling).

Under circumstances where the insulation *R*-value is guaranteed, only the initial thickness is required on the certification.

Loose-fill ceiling insulation also requires thickness markers that are attached to the framing and face the attic access. In a large space, markers placed evenly about every 17 feet (with some markers at the edge of the space) meet this requirement. These markers are ineffective with sprayed polyurethane and the *Energy Code* requires that the measured thickness and *R*-value be recorded on the certificate.

FIGURE C303.1
MARKED INSULATION PACKAGING



This Attic Has Been Insulated To

INSULATION CONTRACTORS ASSOCIATION OF AMERICA ICAA

R-

By A Professional Insulation Contractor

The insulation in this attic was installed by a qualified professional Contractor to the R-value stated above

CIMA

INSULATE TODAY SAVE TOMORROW

NAIMA NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

Certificate of Insulation

BUILDING ADDRESS:

CONTRACTOR:

Installation Date

License#

Area Insulated	R-Value	Installed Thickness	Settled Thickness	Installed Density	No. Bags	Sq. Ft.
Attic						
Walls						
Floors						

I, _____, (print name) certify that this residence/building has been insulated to the stated R-value and that the installation is in conformance with all applicable codes, standards, regulations and specifications.

Authorized Signature _____ Date _____

Figure C303.1.1(1)
SAMPLE CERTIFICATE OF INSULATION

(Logos courtesy of Cellulose Insulation Manufacturers Association, http:/cellulose.org, Insulation Contractors Association of America, www.insulate.org, and North American Insulation Manufacturers Association, www.NAIMA.org)

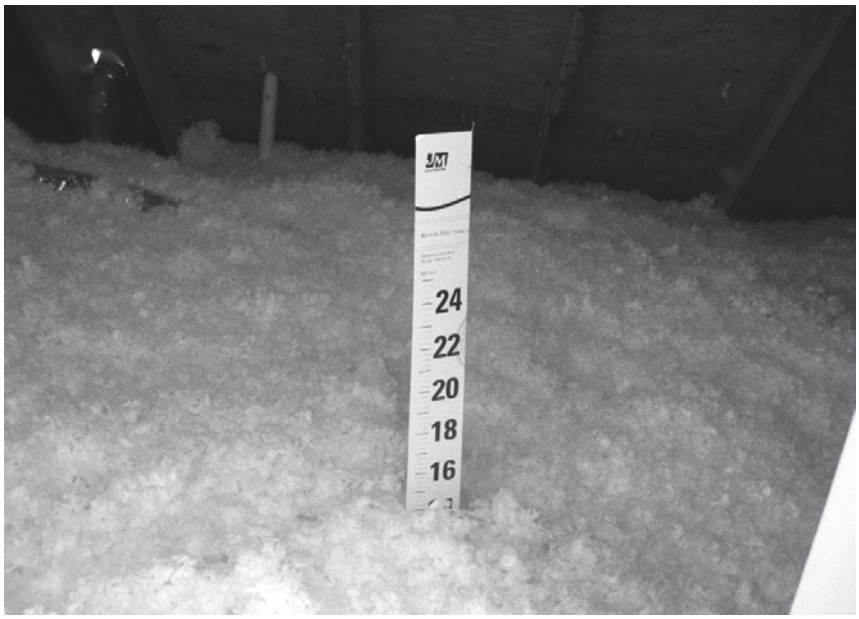


Figure C303.1.1(2)
LOOSE-FILL INSULATION DEPTH MARKER

C303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

For batt insulation, manufacturers' *R*-value designation is often printed directly on the insulation in applications where paper or foil faced products are used. Where possible, insulation should be installed so these designations are clearly visible. In cases where this is not possible, the *R*-value must be certified by the installer. See the commentary to Section C303.1.1 and Commentary Figure C303.1.1(2).

C303.1.3 Fenestration product rating. *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100.

Exception: Where required, garage door *U*-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

Products tested and certified by entities approved by the National Fenestration Rating Council (NFRC) and/or Door and Access Systems Manufacturers Association (DASMA) carry a label featuring the "NFRC-certified" or "DASMA-certified" mark. These labels [see Commentary Figure C303.1.3(1)] must be left in place until all building inspections are complete. Unlabeled products must use a default *U*-factor from Table C303.1.3(1) or C303.1.3(2).

The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) must be determined in accordance with NFRC 200 by an accredited, independent laboratory, and be *labeled* and certified by the manufacturer. Unlabeled products must be assigned a default SHGC or VT from Table C303.1.3(3).

Products certified according to NFRC procedures are listed in the Certified Products Directory. The directory is published annually and contains energy performance information for over 1.4 million fenestration product options listed by over 450 manufacturers. When using the directory or shopping for NFRC-certified products, it is important to note:

1. A product is considered NFRC certified only if it carries the NFRC label. Simply being listed in this directory is not enough.
2. The NFRC-certified mark does not signify that the product meets any energy-efficiency standards or criteria.
3. NFRC sets no minimum performance standards nor does it mandate specific performance levels. Rather, NFRC ratings can be used to determine whether a product meets a state or local code, or other performance requirement, and to compare the energy performance of different products during plan review. More information is available at www.nfrc.org.

Products that are not NFRC- or DASMA-certified and do not exactly match the specifications in Tables C303.1.3(1) and C303.1.3(2) must use the tabular specification for the products they most closely resemble. In the absence of certified *U*-factors, the default *U*-factor for doors containing glazing can be a combination of the glazing and door *U*-factor as described in the definition for "*U*-factor" (see commentary, Chapter 2 [CE], "*U*-factor").

When a fenestration assembly uses materials from multiple product types, the code official should be consulted on how it must be rated. Generally, the assembly must be assigned the higher *U*-factor, although an average may be acceptable in some cases. The assembly cannot receive credit for a feature that cannot be seen. Because performance features such as argon fill and low-emissivity (low-E) glass coatings are not visually verifiable, they do not receive credit in the default tables. Tested *U*-factors for these windows are often lower, so using tested *U*-factors is to the permit applicant's advantage. Commentary Figure C303.1.3(2) illustrates visually verifiable window characteristics, among other window performance, function and cost considerations.

A single-glazed window with an installed storm window is considered a double-glazed assembly and uses the corresponding *U*-factor from the default table. For example, the *U*-factor 0.80 in Table C303.1.3(1) applies to a double-glazed, metal window without a thermal break (but with an installed storm window). If the storm window was not installed, the *U*-factor would be 1.20.

TABLE C303.1.3(1)
DEFAULT GLAZED FENESTRATION *U*-FACTORS

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

This table prescribes default *U*-factor values based on visually verifiable characteristics of nonlabeled fenestration assemblies.

U-Factor

U-factor measures how well a product prevents heat from escaping. *U*-factor ratings generally fall between 0.20 and 1.20. The lower the *U*-factor, the better. *U*-factor is particularly important in northern climates.

Solar Heat Gain Coefficient

Solar heat gain coefficient (SHGC) measures how well a product blocks heat caused by sunlight. SHGC is expressed as a number between 0 and 1. A lower SHGC means less heat gain. SHGC is particularly important in southern climates.

Visible Transmittance

Visible transmittance (VT) measures how much light comes through a product. VT is expressed as a number between 0 and 1. Heavily tinted products have a relatively low VT.

Air Leakage

Air leakage (AL) heat loss and gain occur by infiltration through cracks in the window assembly. It is indicated by an air leakage rating (AL) expressed as the equivalent cubic feet of air passing through a square foot of window area. The lower the AL, the less air will pass through cracks in the window assembly. At this time, AL is optional but required by code only for manufactured windows and doors.

Figure C303.1.3(1)
SAMPLE NATIONAL FENESTRATION RATING COUNCIL (NFRC) LABEL

TABLE C303.1.3(2)
DEFAULT DOOR *U*-FACTORS

DOOR TYPE	*U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

Door *U*-factors in Table C303.1.3(2) should be used wherever NFRC-certified ratings are not available. There are a few other aspects to note about doors. Opaque door *U*-factors must include the effects of the door edge and the frame. Calculating *U*-factors based on a cross section through the insulated portion is not acceptable. To take credit for a thermal break, the door must have a thermal break in both the door slab and in the frame. The values in the table are founded on principles established in the 1997 ASHRAE *Handbook of Fundamentals*.

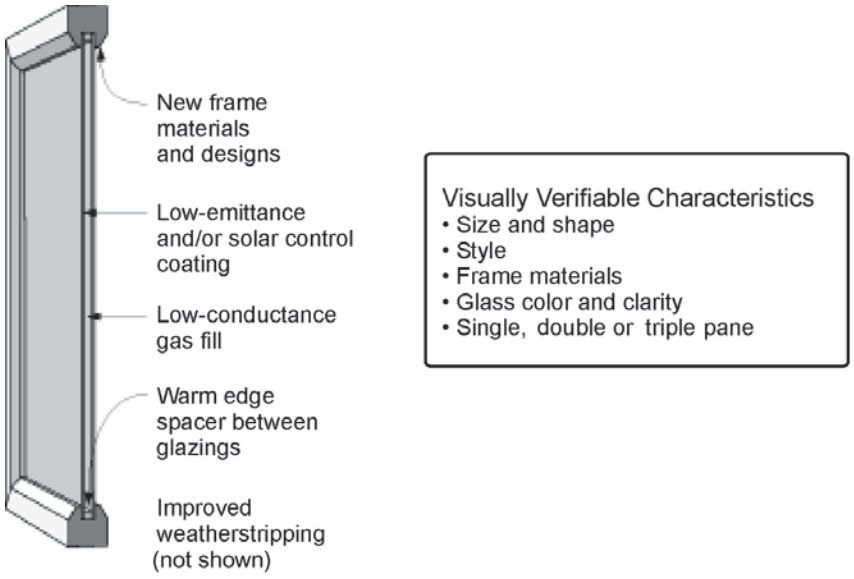


Figure C303.1.3(2)
VISUALLY VERIFIABLE WINDOW CHARACTERISTICS

TABLE C303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC AND VT

	SINGLE GLAZED		DOUBLE GLAZED		GLAZED BLOCK
	Clear	Tinted	Clear	Tinted	
SHGC	0.8	0.7	0.7	0.6	0.6
VT	0.6	0.3	0.6	0.3	0.6

This table prescribes default SHGC and VT values based on visually verifiable characteristics of nonlabeled fenestration assemblies. In heating-dominated climates, a high SHGC increases passive solar gain for the heating but reduces cooling-season performance. A low SHGC improves cooling-season performance but reduces passive solar gains for heating.