

Window and Frame Replacement - Code Compliance Brief

Overview:

The intent of this brief is to provide additional information to help assure the measure will be deemed in acceptance with the code. Providing notes for codes officials on how to plan review and field inspect can help the builder or remodeler with the proposed designs and provide the jurisdiction with information for acceptance. Providing the same information to all interested parties (i.e., code officials, builders, designers) is expected to result in increased compliance and fewer innovations being questioned at the time of plan review and/or field inspection.

When replacing existing windows and/or the framing around windows, the new installations are not always exempt from having to meet existing code requirements. (An example of when an exemption may be possible is if the window itself is being replaced within the existing framing or storm windows are installed over existing fenestration). The code requires submittal of compliance documents for permitting and inspection. Most window replacements throughout the country have been done without permits even though a permit is required by most national and state building codes. Obtaining a permit provides assurance to consumers that windows meet code and will be installed properly. Insurers may not cover windows that were installed without the benefit of a building permit if failure occurs from causes such as moisture intrusion, air leakage, or failure of the opening/closing mechanism if it is an operable window or slider.

Plan Review:

Per the **IECC/IRC, Section R103.3/R106.3, Examination of documents**. The code official/building official must examine or cause to be examined construction documents for code compliance.

This section lists the applicable code requirements and details helpful for plan review regarding the provisions to meet the requirements for "window and frame replacement."

- **Construction Documentation.** Review the construction documents for the details describing the windows and/or glass doors. International Energy Conservation Code (IECC) and International Residential Code (IRC) requirements are as follows:
 - 2015 IECC/IRC, Section R103.2/N1101.5 Information on construction documents.** Construction documents should include U-factor¹ and SHGC², values (Solar Heat Gain Coefficient).
 - 2012 IECC/IRC, Section R103.2/N1101.8 Information on construction documents.** Construction documents should include U-factor and SHGC values.
- **Fenestration..** Confirm that the products specified have been rated, certified, and labeled per National Fenestration Rating Council (NFRC³).
 - **Fenestration Product Rating..** CU-factors of fenestration products (i.e., windows and glass doors) to be determined in accordance with NFRC 100 and the SHGC with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. (Except for the actual section numbers in the codes, the requirements have not changed in the last three versions of the IECC/IRC.)
 - **2015 IECC/IRC, Section R303.1.3/N1101.10.3**
 - **2012 IECC/IRC, Section R303.1.3/N1101.12.3**
 - **2009 IECC/IRC, Section 303.1/N1101.5**
 - **Replacement Fenestration..** Where all or some of the existing fenestration units are replaced with new fenestration products, including sash and glazing, the replacement units must meet applicable requirements for U-factor and SHGC per the Insulation and Fenestration Table in the IECC, which is reproduced below. (Except for the values and section numbers in the codes, the requirements have not changed in the last three versions of the IECC/IRC.)
 - **2015 IECC/IRC, Section R503.1.1.1/N1109.1.1.1**
 - **2012 IECC/IRC, Section R402.3.6/N1102.3.6**
 - **2009 IECC/IRC, Section 402.3.6/N1102.3.6**

2015 IECC, Table R402.1.2/N1102.1.2 and 2012 IECC/IRC, Table R402.1.1/N1102.1.1 (U-factor and SHGC values are the same for both versions.)

Note: the cited Table R402.1.1/Except 1.3 and the 2015 IECC/IRC is an obvious typo that should refer to Table R402.1.2/N1102.1.2.

	Climate Zone 1	2	3	4 except Marine	5 and Marine 4	6	7, 8
U-factor	NR	0.40	0.35	0.35	0.32	0.32	0.32
SHGC	NR	0.25	0.25	0.40	NR	NR	NR
U-factor	1,20	0.65	0.50	0.35	0.35	0.35	0.35
SHGC	0.30/0.35	0.30/0.35	0.30/0.35	NR	NR	NR	NR

- **Flashing/Moisture Control**

- **2012 and 2015 IRC, Section R703.8/R703.4 (similar language) Flashing** Approved corrosion-resistant flashing to be applied shingle-fashion to prevent water from entering into wall cavities or from penetrating into building structural framing components. Self-adhered flashing must comply with AAMA 711. Fluid-applied membranes must comply with AAMA 714. Flashing at exterior window and door openings must extend to the surface of the exterior wall finish or to the water-resistive barrier. Flashing must be installed in accordance with one or more of the following:
 - In accordance with fenestration manufacturer’s installation and flashing instructions or in accordance with the flashing manufacturer’s instructions. Where instructions or details are not provided, pan flashing is to be installed at the sill of exterior window and door openings and must be sealed or sloped to direct water to the surface of the exterior wall finish or water-resistive barrier. Openings using pan flashing must also incorporate flashing or protection at the head and sides.
 - Per the flashing design or method of a registered design professional.
 - In accordance with other approved methods.
 - **2009 IRC, Section R703.8 Flashing.** Approved corrosion-resistant flashing to be applied shingle-fashion to prevent water from entering into wall cavities or from penetrating into building structural framing components. Self-adhered flashing must comply with AAMA 711. Flashing at exterior window and door openings must extend to the surface of the exterior wall finish or to the water-resistive barrier.
- **Air Sealing/Air Leakage Control**
 - Seal space between window/door jambs and framing. (Except for the actual section numbers in the codes, the requirements have not changed in the last three versions of the IECC/IRC.)
 - **2015 IECC/IRC, Table R402.4.1.1/N1102.4.1.1**
 - **2012 IECC/IRC, Table R402.4.1.1/N1102.4.1.1**
 - **2009 IECC/IRC, Table 402.4.2/N1102.4.2**

¹U-factor is defined in the 2015 IECC/IRC as thermal transmittance, the coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h•ft²•F).

²SHGC is defined in the 2015 IECC/IRC as the ratio of solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation which is then reradiated, conducted or convected into the space.

³NFRC is the leader in energy performance information, education, and certified ratings for fenestration products at <http://www.nfrc.org> [1].

Field Inspection:

Per the **2015 IECC, Section R104, Inspections**, construction or work for which a permit is required is subject to inspection. Construction or work is to remain accessible and exposed for inspection purposes until approved. Required inspections include: footing and foundation, framing and rough-in, plumbing rough-in, mechanical rough-in, and final inspection.

Per the **IRC, Section R109, Inspections**, the wording is somewhat different in that for on-site construction, from time to time the building official, upon notification from the permit holder or his agent, can make or cause to be made any necessary inspections. Further details are provided for inspections regarding foundation, plumbing, mechanical, gas and electrical, floodplain, frame and masonry, and final inspection. Any additional inspections are at the discretion of the building official.

This section provides details for inspecting to the specific provisions for “window and frame replacement” where one or more specific type of inspection per the IECC or IRC may be necessary to confirm compliance.

- *Confirm windows meet the ratings approved on the construction documents.* If the labels have been removed from the products, ask the contractor or homeowner if they saved a label for use in confirming that the ratings meet compliance.
- *Confirm the windows have been flashed and sealed properly.* The following websites provide information on flashing/sealing windows.

—Guide with pictures on how to properly flash the window: <https://basc.pnnl.gov/resource-guides/slab-edge-insulation#block-views-guide-static-blocks-block-1> [2]

—Guide with pictures on how to properly seal the window: <https://basc.pnnl.gov/resource-guides/window-and-door-rough-openings#block-views-guide-static-blocks-block-1> [3]

Technical Validation(s):

- [Guide to Energy Star Windows](#) [4]

- [Guide for Window and Door Rough Openings](#) [5]
- [Guide for Minimal Framing at Windows/Doors](#) [6]
- [Guide for Insert Window Replacement](#) [7]
- [Guide for Low-e Exterior Storm Windows](#) [8]
- [Guide for Low-e Permanent Interior Storm Windows](#) [9]
- [Guide for Removable Interior Storm Windows](#) [10]
- [Guide for Window Rehabilitation](#) [11]
- [Guide for Sash Replacement](#) [12]
- [Guide for Sash Retrofit](#) [13]
- [NFRC 100A-2014 Procedure for Determining Fenestration Attachment Product U-factors](#) [14]
 Author(s): National Fenestration Rating Council
 Organization(s): National Fenestration Rating Council
 Publication Date: January 2014
 Standard providing a procedure for determining fenestration attachment product U-factors.
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