

The Application of ISO 15099 to NFRC 100 and 200

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Software utilized in computing NFRC U-factors (NFRC 100-02) and SHGCs (NFRC 200-02) will be based on the recently completed ISO 15099 document (FDIS, September 21, 2001). In several cases, ISO 15099 suggests that individual national standards will need to be more specific and in other cases the ISO document gives users the choice of two options. This document clarifies these specific issues as they are to be implemented in NFRC approved software/algorithms:

- 1) Section 4.1: For calculating the overall U-factor, ISO 15099 offers a choice between the linear thermal transmittance (4.1.2) and the area weighted method (4.1.3). The area weighted method (4.1.3) shall be used.
- 2) Frame and divider SHGC's shall be calculated in accordance with Section 4.2.2. The alternate approach in section 8.6 shall not be used. [Note: current research is aimed at assessing which method is more accurate; at some point in the future, this recommendation may be revised.]
- 3) Section 6.4 refers the issue of material properties to national standards. Material conductivities and emissivities shall be determined in accordance with the NFRC Simulation Manual or more currently adopted NFRC standard on this topic.
- 4) Section 7 on Shading Systems is currently excluded from NFRC procedures.
- 5) Section 8.2 addresses environmental conditions. The following are defined by NFRC:

For U-factor calculations:

$$T_{in} = 21 \text{ }^{\circ}\text{C}$$

$$T_{out} = -18 \text{ }^{\circ}\text{C}$$

$$V = 5.5 \text{ m/s}$$

$$T_{rm,out} = T_{out}$$

$$T_{rm,in} = T_{in}$$

$$I_s = 0 \text{ W/m}^2$$

For SHGC calculations:

$$T_{in} = 24 \text{ }^{\circ}\text{C}$$

$$T_{out} = 32 \text{ }^{\circ}\text{C}$$

$$V = 2.75 \text{ m/s}$$

$$T_{rm,out} = T_{out}$$

$$T_{rm,in} = T_{in}$$

$$I_s = 783 \text{ W/m}^2$$

- 6) Section 8.3 addresses convective film coefficients on the interior and exterior of the window product. In section 8.3.1, NFRC simulations shall use the heat transfer coefficient based on the center of glass temperature and the entire window height; this film coefficient shall be used on

all indoor surfaces, including frame sections. In section 8.3.2, the formula from this section shall be applied to all outdoor exposed surfaces.

7) Section 8.4.2 presents two possible approaches for incorporating the impacts of self-viewing surfaces on interior radiative heat transfer calculations. NFRC shall use the method in section 8.4.2.1 (Two-Dimensional Element To Element View Factor Based Radiation Heat Transfer Calculation). This is also the method referenced in NFRC 500 for CI calculations. This method is used for projecting products (e.g., skylights, green house windows) and site built products.

8) Section 8.4.3: For simplified radiation calculations, used for fenestration products other than projecting and site built products, use the emissivity and temperature of each segment on the boundary, so that each exposed material on the boundary is represented by its appropriate emissivity and temperature.