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 °C
T_{out} = -18 °C
V = 5.5 m/s
$T_{rm,out}=T_{out}$
$T_{rm,in}=T_{in}$
I_s=0 W/m^2

For SHGC calculations:

T_{in} = 24 °C
T_{out} = 32 °C
V = 2.75 m/s
$T_{rm,out}=T_{out}$
$T_{rm,in}=T_{in}$
I_s=783 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 convective heat transfer coefficient based on the center of glass temperature and the entire window height; this film coefficient shall be used on all glass and edge of glass indoor surfaces. Frame section indoor convective film

coefficients shall be constants which depend on frame material type; these shall be determined using the algorithms in this document and using representative frame surface temperatures for each frame material type (to be included in the Simulation Manual). 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. Furthermore, in the interests of consistency and accuracy, this method shall be used for all products, including planar products, for U-factor calculations as well as CI calculations. The use of this method makes the use of Slightly or Partially Ventilated cavities (see section 6.7.1) on the interior of frame surfaces redundant. The standard frame convective film coefficients (hc) referenced in 6) above will thus be applied to all interior frame surfaces.