

ISO Standards, WINDOW5 and THERM5: Expected Changes to NFRC U-factor and SHGC calculations

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- Overview
- Program Demos
- Detailed Discussion of Program Changes and Actions required by NFRC

Acceptance of New Standards by ISO and ASHRAE

- Historically, WINDOW, THERM, FRAME, VISION, etc. calculations were based on “best science” as defined by developer
- ISO has finalized a standard (15099) on window heat transfer properties which define “best science” (as we know it today); ASHRAE expected to adopt this as well
- These committees represent almost all international scientists working in this field

ISO 15099 and SPC142

- International Consistency
- Technical Improvements to WINDOW & THERM
 - gas properties and gas mixes
 - gap heat transfer algorithms
 - interior surface heat transfer coefficient
 - radiation model in frame cavities
 - Use of actual frame cavity temperatures and heat flow directions
 - Improved modeling of frame solar heat gain

WINDOW 5

- WINDOW 5 is consistent with ISO 15099
- W5 U-factor results will be slightly different
 - Single glazing lower
 - Most multiple glazings minimally lower
 - Some IGs may be minimally higher
- W5 SHGC:
 - COG: No real change (NFRC continues to use “Direct” solar spectral irradiance function)

THERM 5

- THERM5 will be consistent with ISO 15099
- THERM5 U-factor results expected to be slightly different
- THERM5 SHGC:
 - Frame: changes based on surface length; small changes (lower) for Al sliders

Simulation Process Changes

- Height Dependent film coefficient, gap heat transfer
- Exterior film coefficient correlation changes
- New definitions for “open” frame cavities
- Frame cavities depend on direction of gravity
- Rectangularization of frame cavities changes
- Temperatures and heat flow directions of frame cavities iterated
- Specification of exterior frame BCs changes

Center of Glass U-values

preliminary

Description	W4.1	W5?????
Single 1/8" clear glass	1.111	1.037
Double 1/4" air	0.567	0.549
Double 1/2" air	0.492	0.480
Double 1/4" argon	0.524	0.506
Double 1/2" argon	0.466	0.454
Double 1/2" air 0.05 on 3	0.300	0.298
Double 3/4" air 0.05 on 3	0.311	0.314
Double 1/2" argon 0.05 on 3	0.254	0.251
Double 3/4" argon 0.05 on 3	0.265	0.266
Triple 1/4" argon 0.05 on 2+4	0.206	0.200
Triple 1/2" argon 0.05 on 2+4	0.128	0.127
Triple 3/8" krypton 0.05 on 2+4	0.105	0.104
Quadruple 1/2" argon 0.05 on 2+5	0.111	0.110

All values based on 3mm glass, conductivity=0.9 W/mK, 90% gas fill (expect for 100% krypton). W5 version from 9/5/2000, ASHRAE winter U-value conditions

W4 - W5 COG U-value
preliminary

