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THERMOS Rive-Nord inc.

Thermos 3mm

Make-up Name	Make-up Icon	Transmittance		Reflectance			U-Value		R-Value	Relative Heat Gain (RHG)	Shading Coefficient (sc)	Solar Heat Gain Coefficient (SHGC)
		Visible (τ_v %)	Solar (τ_e %)	Visible		Solar	Winter Night	Summer Day				
				ρ_v % out	ρ_v % in	ρ_e % out						
Thermos 3mm Clair		82	74	15	15	14	0.48	0.51	2.08	189	0.91	0.78
Thermos 3mm Clair + Argon		82	74	15	15	14	0.45	0.48	2.20	188	0.91	0.79
Thermos 3mm HER 80/70		81	62	13	13	21	0.27	0.25	3.69	165	0.81	0.70
Thermos 3mm HER 80/70 x2		80	57	11	11	22	0.25	0.23	3.94	150	0.73	0.64
Thermos Triple 3mm Clair		75	65	21	21	18	0.32	0.36	3.12	169	0.82	0.71
Thermos Triple 3mm Her 80/70		74	55	20	19	24	0.19	0.20	5.26	148	0.73	0.63
Thermos Triple 3mm Her 80/70 x 2		73	50	17	17	26	0.14	0.15	7.09	141	0.70	0.61

Calculation Standard: NFRC 2010

Thermos 3mm Clair

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----
GAP	100% Air, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ----- #4 -----

Total Unit = 0.734 in / 18.644 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos 3mm Clair + Argon

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----	
GAP		10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ----- #4 -----	

Total Unit = 0.734 in / 18.644 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos 3mm HER 80/70

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----	
GAP		10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ClimaGuard® 80/70 #4 -----	

Total Unit = 0.734 in / 18.644 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos 3mm HER 80/70 x2

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 ClimaGuard® 80/70	
GAP		10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ClimaGuard® 80/70 #4 -----	

Total Unit = 0.734 in / 18.644 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos Triple 3mm Clair

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----
GAP	100% Air, 7/16" = 11.1 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ----- #4 -----
GAP	100% Air, 7/16" = 11.1 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#5 ----- #6 -----

Total Unit = 1.226 in / 31.14 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos Triple 3mm Her 80/70

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----
GAP	10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ----- #4 -----
GAP	10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#5 ClimaGuard® 80/70 #6 -----

Total Unit = 1.351 in / 34.315 mm | Slope = 90° | Window Height = 1 meter

Indoors

Thermos Triple 3mm Her 80/70 x 2

Outdoors

LITE	Clear (North America) Thickness = 1/8" = 3mm	#1 ----- #2 -----
GAP	10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#3 ClimaGuard® 80/70 #4 -----
GAP	10% Air, 90% Argon, 1/2" = 12.7 mm	
LITE	Clear (North America) Thickness = 1/8" = 3mm	#5 ClimaGuard® 80/70 #6 -----

Total Unit = 1.351 in / 34.315 mm | Slope = 90° | Window Height = 1 meter

Indoors

Important Notes

The performance values shown above represent NOMINAL VALUES for the center of glass with no spacer system or framing. Slight variations may occur due to manufacturing tolerances, point of manufacture, and type of instrumentation used to measure the optical properties. For configurations which include ceramic frit coating, the actual values may vary significantly based upon the thickness and composition of the frit. For configurations with coatings laminated facing the PVB, there may be a noticeable color change. Guardian recommends a full size mock-up be approved. Calculations and terms in this report are based on NFRC 2010.

Please note that the THERMAL STRESS GUIDELINE is only a rough reference to the thermal safety of a glazing. Other factors such as the size of glass areas, shapes and patterns, glass thickness, glass damaged during shipping, handling or installation, orientation of the building, exterior shading, overhangs/fins that reduce wind speed, and areas with high daily temperature fluctuations can all increase the probability of thermal breakage. The results shown are not for any specific glazing installation and do not constitute a warranty against glass breakage.

Explanation of Terms

% Transmittance Visible or Light Transmittance (τ_v %) is the percentage of visible light at normal incidence (90° to surface) that is transmitted by the glass.

% Ultraviolet (UV) Transmittance (τ_{uv} %) is the percentage of ultraviolet light at normal incidence directly transmitted by the glass. Ultraviolet Light is defined as radiant energy from the sun having a wavelength range of 300 nm to 380 nm.

% Solar Energy Direct Transmittance (τ_e %) is the percentage of solar energy at normal incidence directly transmitted by the glass. Solar Energy is the radiant energy from the sun having a wavelength range of 300 nm to 2500 nm.

% Reflectance Visible Outdoors or Light Reflectance Out (ρ_v % out) is the percentage of visible light at normal incidence directly reflected by the glass back outdoors.

% Reflectance Visible Indoors or Light Reflectance In (ρ_v % in) is the percentage of visible light at normal incidence directly reflected by the glass back indoors.

% Solar Energy Reflected Outdoors or Solar Direct Reflectance Out (ρ_e % out) is the percentage of solar energy at normal incidence directly reflected by the glass back outdoors.

% Solar Energy Reflected Indoors or Solar Direct Reflectance In (ρ_e % in) is the percentage of solar energy at normal incidence directly reflected by the glass back indoors.

Absorptance (α_e %) (Solar, Visible or UV) is defined as a process in which a range of radiation is retained by a substance and converted into heat energy. The creation of heat energy also causes the substance to emit its own radiation.

U-Factor or U-Value (U_G) is the air-to-air thermal conductance of 39" high glazing and associated air films. US Standard units are Btu/hr.ft².F. and SI / Metric units are W/m²K. Winter night values are 12.3 mph wind at -0.4°F outdoors and 69.8°F still indoor air. Summer values are 0 sun, 6.15 mph wind at 89.6°F outdoors and 75.2°F still indoor air.

Relative Heat Gain (RHG) is the total net heat gain to the indoors due to both the air-to-air thermal conductance and the solar heat gain. Imperial units are Btu/hr.ft². RHG = [(Summer U-Value)(89.6°F - 75.2°F) + (Shading Coefficient)(200 Btu/hr-ft²)]. Metric units are W/m². RHG = [(Summer U-Value)(32°C - 24°C) + (Shading Coef.)(631 W/m²)]

Shading Coefficient (SC) is the fraction of solar heat, direct (300 to 2500 nm) plus indirect (5 to 40 μm), transferred indoors through the glass. For reference, 1/8" (3.1 mm) clear glass has a value of 1.00 (SC is an older term being replaced by the SHGC).

Solar Heat Gain Coefficient (SHGC) is the fraction of solar energy incident on the glazing that is transferred indoors both directly and indirectly through the glazing. The direct gain portion equals the direct solar transmittance, while the indirect is the fraction of the solar energy absorbed to the energy reradiated and convected indoors. No heat gain from warmer outdoor air is included. SHGC = (Direct Solar Trans) + {[(Indirect Solar Heat Gain) - (Summer U-Value)(89.6°F - 75.2°F)] / (248.209 Btu/hr-ft²)}

Light-to-Solar Gain (LSG) is the ratio of visible light gain to solar gain. LSG = (Visible Transmittance) / (SHGC)

Color Rendering Index in transmission, D65 (R_a) is the change in color of an object as a result of the light being transmitted by the glass.

Weighted Sound Reduction Index (Rw) is a single-number quantity which characterizes the airborne sound insulation of a material or building element over a range of frequencies.

Sound Transmission Class (STC) is a single-number quantity which characterizes the airborne sound insulation of a material or building element over a range of frequencies.

Disclaimer

This performance analysis is provided for the limited purpose of assisting the user in evaluating the performance of the glass products identified on this report. Spectral data for products manufactured by Guardian reflect nominal values derived from typical production samples. Spectral data for products not manufactured by Guardian were derived from the LBNL International Glazing Database and have not been independently verified by Guardian. The values calculated by this tool are generated according to established engineering practices and applicable calculation standards. Many factors may affect glass performance, including glass size, building orientation, shading, wind speed, type of installation, and others. The applicability and results of the analysis are directly related to user inputs and any changes in actual conditions can have a significant effect on the results. It is possible to create many different glazing types and glass make-ups using this tool. Guardian makes no guarantee that any glazing modeled by the tool is available from Guardian or any other manufacturer. The user has the responsibility to check with the manufacturer regarding availability of any glass type or make-up. While Guardian has made a good faith effort to verify the reliability of this tool, it may contain unknown programming errors that could result in incorrect results. The user assumes all risk relating to the results provided by the tool and is solely responsible for selection of appropriate products for the user's application. GUARDIAN MAKES NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND WITH RESPECT TO THE PERFORMANCE CALCULATOR. THERE ARE NO WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PERFORMANCE CALCULATOR AND NO WARRANTY SHALL BE IMPLIED BY OPERATION OF LAW OR OTHERWISE. IN NO EVENT SHALL GUARDIAN BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND RELATING TO OR RESULTING FROM USE OF THE PERFORMANCE CALCULATOR.

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