

## 12 mm HD Blue

Make-up Name	Glass 1 & Coating	Glass 2 & Coating	Transmittance		Reflectance				U-Value Summer Day (W/m <sup>2</sup> ·K)	Shading Coefficient (sc)	Solar Heat Gain Coefficient (SHGC)	Color Rendering Index (R <sub>a</sub> )
			Visible (τ <sub>v</sub> %)	Solar (τ <sub>e</sub> %)	Visible		Solar					
					ρ <sub>v</sub> % out	ρ <sub>v</sub> % in	ρ <sub>e</sub> % out	ρ <sub>e</sub> % in				
Default Make-up 02	Guardian HD Blue (Middle East) on Clear (Middle East)	N/A	25	21	20	28	14	36	4.43	0.47	0.40	98.1

Calculation Standard: NFRC 2010

### Default Make-up 02

		Thermal Stress Guidance (COG) (°C)
<b>Outdoors</b>		
<b>GLASS 1</b>	Clear (Middle East) Thickness = 1/2" = 12mm	#1 ----- Go 59.9
	#2 Guardian HD Blue (Middle East)	
Total Unit (Nominal) = 12 mm		
Slope = 90°		
Estimated Nominal Glazing Weight: 29.9 kg/m <sup>2</sup>		
<b>Indoors</b>		

### Important Notes

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#### Laminated products:

It is not guaranteed that modeled laminated configurations will be compliant with relevant laminated safety regulations unless specifically declared for Guardian products. It is the user's sole responsibility to assess if the final laminated product should be certified according to relevant standards and ensure compliance with laminated safety regulations.

Additional consequences for laminated glass with coating facing interlayer (due to contact between coating and interlayer) may include (not limited to): significant decrease of safety performance for some coating and interlayer combinations; loss of thermal insulation performance of surface facing the PVB; noticeable color change; other performance deterioration.

#### Non-specular products (translucent or diffuse):

The performance measurement for non-specular (translucent or diffuse) materials such as translucent interlayers or acid etched glass surface, or surface with ceramic frit is limited by the current experimental technologies. Since measurements capture physically only a part of the resulting radiation, calculated performance results provided herein and based on such measurements are not compliant with any standard (including EN 410) and may only be used as a general reference. Actual values may vary significantly based upon exact fabrication process, as well as type, thickness and color of used non-specular material.

Please note that the Thermal Stress Guideline is only a general guide to the thermal safety of a glazing, and it is not a replacement for detailed thermal stress analysis.

### Explanation of Terms

**Visible Light Transmittance (T<sub>v</sub>, %)** is the percentage the incident lighting the wavelength range of 380 nm to 780 nm that is transmitted by the glass.

**Ultraviolet (UV) Transmittance (T<sub>uv</sub>, %)** is the percentage of the incident solar radiation transmitted by the glazing in the 300 nm to 380 nm range.

**Solar Energy Direct Transmittance (T<sub>e</sub>, %)** is the percentage of incident solar energy in the wavelength range of 300 nm to 2500

nm that is directly transmitted by the glass.

**Visible Light Reflectance Outdoors/Indoor ( $R_v$  out/in, %)** is the percentage of incident visible light directly reflected by the glass.

**Solar Direct Reflectance Outdoors/Indoors ( $R_e$  out/in, %)** is the percentage of incident solar energy directly reflected by the glass.

**Solar Energy Absorptance ( $A_e$ , %)** is the percentage of the sun's energy that is absorbed by glass.

**U-Value** is the glazing parameter that characterizes the heat transfer through the central part of the glazing, i.e. without edge effects, and expresses the steady-state density of heat transfer rate per temperature difference between the environmental temperatures on each side. US Standard units are Btu/hr-ft<sup>2</sup>-F and SI / Metric units are W/m<sup>2</sup> K.

**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. US Standard units are Btu/hr.ft<sup>2</sup> and SI / Metric units are W/m<sup>2</sup>.

**Shading Coefficient (sc)** is Solar Factor divided by 0.87. It is a measure of the solar heat gain referenced to 3 mm clear glass which has the designated value of 1.00.

**Solar Heat Gain Coefficient (SHGC)** is the sum of the solar direct transmittance and the secondary heat transfer factor of the glazing towards the inside, the latter resulting from heat transfer by convection and longwave IR-radiation of that part of the incident solar radiation which has been absorbed by the glazing.

**Light-to-Solar Gain (LSG)** is the ratio of visible light gain to solar gain.  $LSG = (\text{Visible Transmittance}) / (\text{SHGC})$

**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 ( $R_w$ )** 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.

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Program Version: 4.1.0.8099  
Database Version: 20190402

## 12 mm HD Bronze

Make-up Name	Glass 1 & Coating	Glass 2 & Coating	Transmittance		Reflectance				U-Value Summer Day (W/m²·K)	Shading Coefficient (sc)	Solar Heat Gain Coefficient (SHGC)	Color Rendering Index (Ra)
			Visible (τ <sub>v</sub> %)	Solar (τ <sub>e</sub> %)	Visible		Solar					
					ρ <sub>v</sub> % out	ρ <sub>v</sub> % in	ρ <sub>e</sub> % out	ρ <sub>e</sub> % in				
Default Make-up 02	Guardian HD Bronze (Middle East) on Clear (Middle East)	N/A	23	17	13	2	14	20	3.98	0.42	0.36	95.6

Calculation Standard: NFRC 2010

### Default Make-up 02

		Thermal Stress Guidance (COG) (°C)
<b>Outdoors</b>		
<b>GLASS 1</b>	Clear (Middle East) Thickness = 1/2" = 12mm	#1 ----- Go 63.1
	#2 Guardian HD Bronze (Middle East)	
Total Unit (Nominal) = 12 mm		Slope = 90°
Estimated Nominal Glazing Weight: 29.9 kg/m²		
<b>Indoors</b>		

### Important Notes

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Additional consequences for laminated glass with coating facing interlayer (due to contact between coating and interlayer) may include (not limited to): significant decrease of safety performance for some coating and interlayer combinations; loss of thermal insulation performance of surface facing the PVB; noticeable color change; other performance deterioration.

### Non-specular products (translucent or diffuse):

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### Explanation of Terms

**Visible Light Transmittance (Tv, %)** is the percentage the incident lighting the wavelength range of 380 nm to 780 nm that is transmitted by the glass.

**Ultraviolet (UV) Transmittance (Tuv, %)** is the percentage of the incident solar radiation transmitted by the glazing in the 300 nm to 380 nm range.

**Solar Energy Direct Transmittance ( $T_e$ , %)** is the percentage of incident solar energy in the wavelength range of 300 nm to 2500 nm that is directly transmitted by the glass.

**Visible Light Reflectance Outdoors/Indoor ( $R_v$  out/in, %)** is the percentage of incident visible light directly reflected by the glass.

**Solar Direct Reflectance Outdoors/Indoors ( $R_e$  out/in, %)** is the percentage of incident solar energy directly reflected by the glass.

**Solar Energy Absorptance ( $A_e$ , %)** is the percentage of the sun's energy that is absorbed by glass.

**U-Value** is the glazing parameter that characterizes the heat transfer through the central part of the glazing, i.e. without edge effects, and expresses the steady-state density of heat transfer rate per temperature difference between the environmental temperatures on each side. US Standard units are Btu/hr-ft<sup>2</sup>-F and SI / Metric units are W/m<sup>2</sup> K.

**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. US Standard units are Btu/hr-ft<sup>2</sup> and SI / Metric units are W/m<sup>2</sup>.

**Shading Coefficient (sc)** is Solar Factor divided by 0.87. It is a measure of the solar heat gain referenced to 3 mm clear glass which has the designated value of 1.00.

**Solar Heat Gain Coefficient (SHGC)** is the sum of the solar direct transmittance and the secondary heat transfer factor of the glazing towards the inside, the latter resulting from heat transfer by convection and longwave IR-radiation of that part of the incident solar radiation which has been absorbed by the glazing.

**Light-to-Solar Gain (LSG)** is the ratio of visible light gain to solar gain.  $LSG = (\text{Visible Transmittance}) / (\text{SHGC})$

**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 ( $R_w$ )** 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.

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Program Version: 4.1.0.8099  
Database Version: 20190402

## 12 mm HD Green

Make-up Name	Glass 1 & Coating	Glass 2 & Coating	Transmittance		Reflectance				U-Value Summer Day (W/m <sup>2</sup> ·K)	Shading Coefficient (sc)	Solar Heat Gain Coefficient (SHGC)	Color Rendering Index (R <sub>a</sub> )
			Visible (τ <sub>v</sub> %)	Solar (τ <sub>e</sub> %)	Visible		Solar					
					ρ <sub>v</sub> % out	ρ <sub>v</sub> % in	ρ <sub>e</sub> % out	ρ <sub>e</sub> % in				
Default Make-up 02	Guardian HD Green (Middle East) on Clear (Middle East)	N/A	32	28	26	16	14	25	4.62	0.53	0.46	94.4

Calculation Standard: NFRC 2010

### Default Make-up 02

		Thermal Stress Guidance (COG) (°C)
<b>Outdoors</b>		
<b>GLASS 1</b>	Clear (Middle East) Thickness = 1/2" = 12mm	#1 ----- Go
	Guardian HD Green (Middle East)	#2 57.1
Total Unit (Nominal) = 12 mm		Slope = 90°
Estimated Nominal Glazing Weight: 29.9 kg/m <sup>2</sup>		
<b>Indoors</b>		

### Important Notes

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### Non-specular products (translucent or diffuse):

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### Explanation of Terms

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**Ultraviolet (UV) Transmittance (T<sub>uv</sub>, %)** is the percentage of the incident solar radiation transmitted by the glazing in the 300 nm to 380 nm range.

**Solar Energy Direct Transmittance ( $T_e$ , %)** is the percentage of incident solar energy in the wavelength range of 300 nm to 2500 nm that is directly transmitted by the glass.

**Visible Light Reflectance Outdoors/Indoor ( $R_v$  out/in, %)** is the percentage of incident visible light directly reflected by the glass.

**Solar Direct Reflectance Outdoors/Indoors ( $R_e$  out/in, %)** is the percentage of incident solar energy directly reflected by the glass.

**Solar Energy Absorptance ( $A_e$ , %)** is the percentage of the sun's energy that is absorbed by glass.

**U-Value** is the glazing parameter that characterizes the heat transfer through the central part of the glazing, i.e. without edge effects, and expresses the steady-state density of heat transfer rate per temperature difference between the environmental temperatures on each side. US Standard units are Btu/hr-ft<sup>2</sup>-F and SI / Metric units are W/m<sup>2</sup> K.

**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. US Standard units are Btu/hr.ft<sup>2</sup> and SI / Metric units are W/m<sup>2</sup>.

**Shading Coefficient (sc)** is Solar Factor divided by 0.87. It is a measure of the solar heat gain referenced to 3 mm clear glass which has the designated value of 1.00.

**Solar Heat Gain Coefficient (SHGC)** is the sum of the solar direct transmittance and the secondary heat transfer factor of the glazing towards the inside, the latter resulting from heat transfer by convection and longwave IR-radiation of that part of the incident solar radiation which has been absorbed by the glazing.

**Light-to-Solar Gain (LSG)** is the ratio of visible light gain to solar gain.  $LSG = (\text{Visible Transmittance}) / (\text{SHGC})$

**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 ( $R_w$ )** is a single-number quantity which characterizes the airborne sound insulation of a material or building element over a range of frequencies.

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Database Version: 20190402

## 12 mm HD Grey

Make-up Name	Glass 1 & Coating	Glass 2 & Coating	Transmittance		Reflectance				U-Value Summer Day (W/m <sup>2</sup> ·K)	Shading Coefficient (sc)	Solar Heat Gain Coefficient (SHGC)	Color Rendering Index (R <sub>a</sub> )
			Visible (τ <sub>v</sub> %)	Solar (τ <sub>e</sub> %)	Visible		Solar					
					ρ <sub>v</sub> % out	ρ <sub>v</sub> % in	ρ <sub>e</sub> % out	ρ <sub>e</sub> % in				
Default Make-up 02	Guardian HD Grey (Middle East) on Clear (Middle East)	N/A	19	16	12	5	11	23	4.30	0.44	0.37	95.3

Calculation Standard: NFRC 2010

### Default Make-up 02

		Thermal Stress Guidance (COG) (°C)
<b>Outdoors</b>		
<b>GLASS 1</b>	Clear (Middle East) Thickness = 1/2" = 12mm	#1 ----- Go 62.9
	#2 Guardian HD Grey (Middle East)	
Total Unit (Nominal) = 12 mm		Slope = 90°
Estimated Nominal Glazing Weight: 29.9 kg/m <sup>2</sup>		
<b>Indoors</b>		

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