



One Flagler

Product
Solarban® R77 Acuity® Glass

Location
West Palm Beach, FL — USA

Architect
SOM (Skidmore Owings & Merrill)

Vitro Certified® Fabricator
Tecnoglass S.A.

Glazing Contractor
West Tampa Glass

General Contractor
Coastal Construction Co.

Photographer
Terry Wieckert

Monolithic Laminate Comparison Data Table

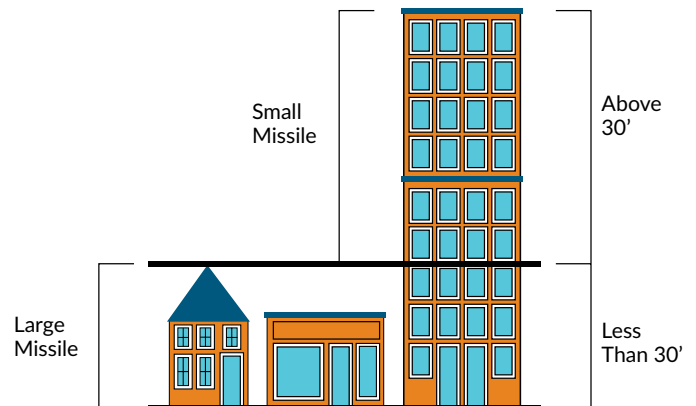
Understanding Hurricane Impact-resistant Glass

Missile Impact Resistance Diagram

There are two primary types of hurricane impact-resistant glass: large missile impact-resistant glass, designed for glazing within 30 feet above ground level, and small missile impact-resistant glass, used for glazing above 30 feet.

Small missile impact tests require the glazing system to withstand 2-gram solid steel balls traveling at 130 feet per second, while large missile impact speeds range from 40 to 80 feet per second. Typically, an interlayer thickness of at least 0.06 inches (1.52 mm) is specified for small missile resistance, whereas a minimum thickness of 0.09 inches (2.29 mm) is required for large missile resistance. Check with your local building codes for specific compliance.

The structural performance of impact-resistant glazing is not influenced by the type of glass, whether clear, low-iron or tinted.



Laminated glass has many architectural uses, including safety, security, acoustics, ultra-violet reduction and decorative applications.

For more information or for additional laminate configurations, contact your Vitro architectural rep.

Monolithic Laminate Comparison Data Table¹

Glass Type	Visible Light Transmittance (VLT) ² %	Visible Light Reflectance ²		U-Value NFRC (Btu/hr·ft ² ·°F) ³	Solar Heat Gain Coefficient (SHGC) ⁴	Color Rendering Index (CRI) ⁵	UV% Tdw-ISO ⁶
		Exterior %	Interior %				

SOLARBAN® 60 + 090PVB + GLASS

Solarban 60 (2) Clear + 090PVB + Clear	72	9	10	0.93	0.45	93	46
Solarban 60 (2) Acuity + 090PVB + Acuity	74	9	9	0.93	0.45	96	48
Solarban 60 (2) Starphire + 090PVB + Starphire	75	9	10	0.93	0.45	97	48
Solarban 60 (2) Azuria + 090PVB + Clear	55	7	8	0.93	0.45	76	38
Solarban 60 (2) Optiblue ¹¹ + 090PVB + Clear	52	7	8	0.93	0.42	90	36
Solarban 60 (2) Solarblue + 090PVB + Clear	45	6	8	0.93	0.43	83	33
Solarban 60 (2) Solexia + 090PVB + Clear	63	8	9	0.93	0.46	87	39
Solarban 60 (2) Optigray + 090PVB + Clear	51	7	8	0.93	0.44	92	33
Solarban 60 (2) Solargray + 090PVB + Clear	36	6	8	0.93	0.41	92	24
Solarban 60 (2) Solarbronze + 090PVB + Clear	43	6	8	0.93	0.42	94	26
Solarban 60 (2) Clear + 090PVB + Sungate ThermL (4) Clear	70	9	8	0.60	0.40	93	45
Solarban 60 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	73	9	9	0.60	0.40	96	46
Solarban 60 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	74	9	9	0.60	0.41	99	47
Solarban 60 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	54	7	8	0.60	0.35	76	37
Solarban 60 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	51	7	7	0.60	0.35	90	35
Solarban 60 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	44	6	7	0.60	0.34	83	32
Solarban 60 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	61	8	8	0.60	0.38	87	38
Solarban 60 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	50	6	7	0.60	0.35	91	32
Solarban 60 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	35	6	7	0.60	0.32	91	23
Solarban 60 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	42	6	7	0.60	0.33	94	25

SOLARBAN® 65 + 090PVB + GLASS

Solarban 65 (2) Clear + 090PVB + Clear	73	12	12	0.93	0.41	93	42
Solarban 65 (2) Acuity + 090PVB + Acuity	76	12	12	0.93	0.39	95	44
Solarban 65 (2) Starphire + 090PVB + Starphire	77	12	12	0.93	0.38	95	45
Solarban 65 (2) Clear + 090PVB + Sungate ThermL (4) Clear	71	11	11	0.60	0.36	93	41
Solarban 65 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	74	12	11	0.60	0.35	94	43
Solarban 65 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	75	12	11	0.60	0.35	95	43

SOLARBAN® 70¹ + 090PVB + GLASS

Solarban 70 (2) + 090PVB + Clear	64	16	17	0.93	0.35	94	39
Solarban 70 (2) Azuria + 090PVB + Clear	49	12	16	0.93	0.42	77	33
Solarban 70 (2) Optiblue + 090PVB + Clear	46	11	16	0.93	0.34	90	31
Solarban 70 (2) Solarblue + 090PVB + Clear	40	9	16	0.93	0.38	83	28
Solarban 70 (2) Solexia + 090PVB + Clear	56	14	17	0.93	0.41	88	34
Solarban 70 (2) Optigray + 090PVB + Clear	41	9	15	0.93	0.38	91	26

Monolithic Laminate Comparison Data Table¹

Glass Type	Visible Light Transmittance (VLT) ² %	Visible Light Reflectance ²		U-Value NFRC (Btu/hr·ft ² ·°F) ³	Solar Heat Gain Coefficient (SHGC) ⁴	Color Rendering Index (CRI) ⁵	UV% Tdw-ISO ⁶
		Exterior %	Interior %	Winter Nighttime			
SOLARBAN® 70i + 090PVB + GLASS (CONTINUED)							
Solarban 70 (2) Solargray + 090PVB + Clear	32	7	15	0.93	0.36	92	20
Solarban 70 (2) Solarbronze + 090PVB + Clear	38	9	16	0.93	0.36	95	22
Solarban 70 (2) Clear + 090PVB + Sungate ThermL (4) Clear	62	16	16	0.60	0.30	94	39
Solarban 70 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	48	11	15	0.60	0.32	77	32
Solarban 70 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	45	10	15	0.60	0.28	90	30
Solarban 70 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	39	9	15	0.60	0.29	83	28
Solarban 70 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	54	13	16	0.60	0.33	87	33
Solarban 70 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	44	10	15	0.60	0.30	92	27
Solarban 70 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	31	8	15	0.60	0.27	92	20
Solarban 70 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	37	9	15	0.60	0.27	95	22
SOLARBAN® 72 + 090PVB + GLASS							
Solarban 72 (2) Acuity + 090PVB + Acuity	67	15	17	0.93	0.34	96	42
Solarban 72 (2) Starphire + 090PVB + Starphire	67	17	18	0.93	0.31	97	42
Solarban 72 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	65	16	17	0.60	0.28	96	41
Solarban 72 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	65	16	17	0.60	0.28	97	41
SOLARBAN® 90 + 090PVB + GLASS							
Solarban 90 (2) Clear + 090PVB + Clear	45	14	25	0.93	0.31	93	28
Solarban 90 (2) Acuity + 090PVB + Acuity	47	15	26	0.93	0.28	96	30
Solarban 90 (2) Starphire + 090PVB + Starphire	48	15	26	0.93	0.26	97	30
Solarban 90 (2) Azuria + 090PVB + Clear	35	11	25	0.93	0.39	79	24
Solarban 90 (2) Optiblue + 090PVB + Clear	33	10	25	0.93	0.31	90	22
Solarban 90 (2) Solarblue + 090PVB + Clear	28	9	25	0.93	0.35	83	20
Solarban 90 (2) Solexia + 090PVB + Clear	39	13	25	0.93	0.38	87	25
Solarban 90 (2) Optigray + 090PVB + Clear	32	9	25	0.93	0.35	92	20
Solarban 90 (2) Solargray + 090PVB + Clear	23	7	25	0.93	0.34	91	15
Solarban 90 (2) Solarbronze + 090PVB + Clear	27	8	25	0.93	0.33	94	16
Solarban 90 (2) Clear + 090PVB + Sungate ThermL (4) Clear	44	15	24	0.60	0.25	93	28
Solarban 90 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	46	15	25	0.60	0.23	95	29
Solarban 90 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	46	15	25	0.60	0.22	96	29
Solarban 90 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	34	11	24	0.60	0.29	77	23
Solarban 90 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	32	10	23	0.60	0.24	90	22
Solarban 90 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	28	9	23	0.60	0.26	83	20
Solarban 90 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	38	12	24	0.60	0.29	87	24
Solarban 90 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	31	9	23	0.60	0.26	92	20
Solarban 90 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	22	7	23	0.60	0.24	91	14
Solarban 90 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	26	8	23	0.60	0.24	94	16
SOLARBAN® R67 + 090PVB + GLASS							
Solarban R67 (2) Clear + 090PVB + Clear	52	15	13	0.93	0.36	92	31
Solarban R67 (2) Acuity + 090PVB + Acuity	54	15	14	0.93	0.34	94	33
Solarban R67 (2) Starphire + 090PVB + Starphire	55	16	14	0.93	0.33	95	33
Solarban R67 (2) Azuria + 090PVB + Clear	40	11	13	0.93	0.40	76	26
Solarban R67 (2) Optiblue + 090PVB + Clear	38	10	13	0.93	0.35	89	24
Solarban R67 (2) Solarblue + 090PVB + Clear	33	9	13	0.93	0.37	82	22
Solarban R67 (2) Solexia + 090PVB + Clear	46	13	13	0.93	0.40	86	27
Solarban R67 (2) Optigray+ 090PVB + Clear	37	10	13	0.93	0.38	91	22
Solarban R67 (2) Solargray + 090PVB + Clear	26	7	13	0.93	0.36	90	16
Solarban R67 (2) Solarbronze + 090PVB + Clear	31	8	13	0.93	0.36	92	18
Solarban R67 (2) Clear + 090PVB + Sungate ThermL (4) Clear	51	15	13	0.60	0.30	92	31
Solarban R67 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	53	15	13	0.60	0.29	94	32
Solarban R67 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	54	15	13	0.60	0.29	95	32
Solarban R67 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	39	11	12	0.60	0.30	76	25
Solarban R67 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	37	10	12	0.60	0.28	89	24
Solarban R67 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	32	9	12	0.60	0.28	82	22
Solarban R67 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	45	13	12	0.60	0.31	86	26
Solarban R67 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	36	10	12	0.60	0.29	90	22
Solarban R67 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	26	7	12	0.60	0.27	90	16
Solarban R67 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	31	8	12	0.60	0.27	92	17
SOLARBAN® R77 + 090PVB + GLASS							
Solarban R77 (2) Clear + 090PVB + Clear	46	22	15	0.93	0.32	96	28
Solarban R77 (2) Acuity + 090PVB + Acuity	48	23	16	0.93	0.29	97	29
Solarban R77 (2) Starphire + 090PVB + Starphire	48	23	16	0.93	0.28	96	29
Solarban R77 (2) Azuria + 090PVB + Clear	35	16	15	0.93	0.38	80	23

Monolithic Laminate Comparison Data Table¹

Glass Type	Visible Light Transmittance (VLT) ² %	Visible Light Reflectance ²		U-Value NFRC (Btu/hr·ft ² ·°F) ³	Solar Heat Gain Coefficient (SHGC) ⁴	Color Rendering Index (CRI) ⁵	UV% Tdw-ISO ⁶
		Exterior %	Interior %				

SOLARBAN® R77 + 090PVB + GLASS (CONTINUED)

Solarban R77 (2) Optiblue + 090PVB + Clear	33	14	15	0.93	0.32	94	22
Solarban R77 (2) Solarblue + 090PVB + Clear	29	12	15	0.93	0.35	87	20
Solarban R77 (2) Solexia + 090PVB + Clear	40	18	15	0.93	0.38	91	24
Solarban R77 (2) Optigray + 090PVB + Clear	33	13	15	0.93	0.35	95	20
Solarban R77 (2) Solargray + 090PVB + Clear	23	9	15	0.93	0.35	94	14
Solarban R77 (2) Solarbronze + 090PVB + Clear	28	11	15	0.93	0.34	92	16
Solarban R77 (2) Clear + 090PVB + Sungate ThermL (4) Clear	45	22	15	0.60	0.27	96	27
Solarban R77 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	46	23	15	0.60	0.25	97	28
Solarban R77 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	47	23	15	0.60	0.25	96	28
Solarban R77 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	34	15	14	0.60	0.29	80	22
Solarban R77 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	32	14	14	0.60	0.25	94	21
Solarban R77 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	28	12	14	0.60	0.27	87	19
Solarban R77 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	39	18	14	0.60	0.29	91	23
Solarban R77 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	32	13	14	0.60	0.27	85	19
Solarban R77 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	22	9	14	0.60	0.25	94	14
Solarban R77 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	27	11	14	0.60	0.25	92	15

SOLARBAN® R100 + 090PVB + GLASS

Solarban R100 (2) Clear + 090PVB + Clear	42	28	11	0.93	0.31	90	27
Solarban R100 (2) Acuity + 090PVB + Acuity	44	28	11	0.93	0.28	92	28
Solarban R100 (2) Starphire + 090PVB + Starphire	44	29	11	0.93	0.27	94	28
Solarban R100 (2) Azuria + 090PVB + Clear	32	19	11	0.93	0.37	73	22
Solarban R100 (2) Optiblue + 090PVB + Clear	30	16	11	0.93	0.31	86	21
Solarban R100 (2) Solarblue + 090PVB + Clear	27	14	10	0.93	0.35	80	19
Solarban R100 (2) Solexia + 090PVB + Clear	37	22	11	0.93	0.37	84	23
Solarban R100 (2) Optigray + 090PVB + Clear	30	16	11	0.93	0.35	88	19
Solarban R100 (2) Solargray + 090PVB + Clear	21	10	10	0.93	0.34	88	14
Solarban R100 (2) Solarbronze + 090PVB + Clear	25	13	10	0.93	0.33	80	15
Solarban R100 (2) Clear + 090PVB + Sungate ThermL (4) Clear	41	28	10	0.60	0.25	90	26
Solarban R100 (2) Acuity + 090PVB + Sungate ThermL (4) Acuity	42	28	10	0.60	0.24	92	27
Solarban R100 (2) Starphire + 090PVB + Sungate ThermL (4) Starphire	43	29	10	0.60	0.23	93	27
Solarban R100 (2) Azuria + 090PVB + Sungate ThermL (4) Clear	32	19	10	0.60	0.28	73	22
Solarban R100 (2) Optiblue + 090PVB + Sungate ThermL (4) Clear	30	16	10	0.60	0.24	86	20
Solarban R100 (2) Solarblue + 090PVB + Sungate ThermL (4) Clear	26	14	10	0.60	0.26	80	18
Solarban R100 (2) Solexia + 090PVB + Sungate ThermL (4) Clear	36	22	10	0.60	0.28	84	22
Solarban R100 (2) Optigray + 090PVB + Sungate ThermL (4) Clear	29	16	10	0.60	0.26	88	18
Solarban R100 (2) Solargray + 090PVB + Sungate ThermL (4) Clear	20	10	9	0.60	0.25	88	13
Solarban R100 (2) Solarbronze + 090PVB + Sungate ThermL (4) Clear	25	13	10	0.60	0.25	92	14

SOLARCOOL® + 090PVB + GLASS

Solarcool (1) Azuria + 090PVB + Clear	25	36	18	0.93	0.30	86	16
Solarcool (1) Pacifica + 090PVB + Clear	15	36	10	0.93	0.30	81	11
Solarcool (1) Solarblue + 090PVB + Clear	21	36	14	0.93	0.35	93	13
Solarcool (1) Solarbronze + 090PVB + Clear	20	36	13	0.93	0.36	85	11
Solarcool (1) Solargray + 090PVB + Clear	16	36	10	0.93	0.34	92	10

SOLARCOOL® + 090PVB + SOLARBAN 65

Solarcool (1) Azuria + 090PVB + Solarban 65 (3) Clear	21	37	19	0.93	0.28	84	12
Solarcool (1) Pacifica + 090PVB + Solarban 65 (3) Clear	13	36	13	0.93	0.26	80	8
Solarcool (1) Solarblue + 090PVB + Solarban 65 (3) Clear	18	36	16	0.93	0.27	90	10
Solarcool (1) Solarbronze + 090PVB + Solarban 65 (3) Clear	17	36	15	0.93	0.27	84	8
Solarcool (1) Solargray + 090PVB + Solarban 65 (3) Clear	14	36	13	0.93	0.26	89	7

† Solarban® 70 (formerly Solarban® 70XL) glass for annealed applications is applied to low-iron glass; heat treated applications will require either clear or low-iron glass depending on manufacturing process.

†† Optiblue® is a unique substrate by Vitro Glass designed for use with several Solarban® coatings.

1. Data is based on center of glass performance of representative factory production samples. Actual values may vary due to the production process and manufacturing tolerances. All tabulated data is based on NFRC methodology using the LBNL Window 7.8 software.

2. Transmittance and Reflectance values based on spectrophotometric measurements and energy distribution of solar radiation.

3. U-Value - A measure of the insulating characteristics of the glass or how much heat gain or loss occurs through the glass due to the difference between indoor and outdoor temperatures and is measured Btu/hr·ft²·°F. The lower the number, the better the insulating performance. This number is the reciprocal of the R-value.

4. Solar Heat Gain Coefficient (SHGC) - Measures how well a window blocks (or shades) the heat from sunlight. SHGC is the fraction of solar radiation transmitted through a window or skylight, as well as the amount that is absorbed by the glass and reradiated to the interior. SHGC is expressed as a number between 0 and 1. The lower a window's SHGC, the less solar heat it transmits and the greater the shading ability. The SHGC is similar to the Shading Coefficient (SC), but also accounts for absorbed, converted and inwardly radiated solar energy.

5. Color Rendering Index (CRI) is a measurement from 0 to 100 of how accurately a color is reproduced under certain lighting conditions, relative to natural light. A value of 100 would indicate an unobstructed view. For glass, the color rendering index is calculated using the LBNL Optics 6 software following EN410 methodology, which is defined as the "change in color of an object as a result of the light being transmitted by the glass."

6. UV% Tdw-ISO or ISO Damage Weighted Transmittance is a comprehensive factor that assigns a specific damage weighted factor to each wavelength of UV or visible light (between 300 and 600nm) based on its contribution to fading. A lower Tdw-ISO translates into better fading protection.