



# LOW E TRIPLE GLAZING RANGE TECHNICAL SPECIFICATION DATA





# EVEN MORE OPTIONS. MORE PERFORMANCE


Metro Performance Glass in addition to its market leading Low E double glazing range also offers a range of triple glazing units. These units are only made in the South Island, incorporating the latest in Low Emissivity technology. Designs can be tailored to match the conditions, with the suitable combination of thermal insulation, solar control, anti-fading, clarity and sound reduction. Extra Double Low E triple glazing options are also available via consultation with our experts.

The Metro Glass Low E Triple Glazing range is Declare label certified.



Compliance in the H1/AS1 Schedule to a colder climate zone automatically ensures compliance to a warmer climate zone

## CLASSIC TRIPLE GLAZING

**Classic** Triple Glazing  Clear- Air - Clear- Air - Clear - Standard Spacer

EN 673					EN 410							
Building Code Acceptable Solution H1/AS1 Schedule					Heat Loss & Condensation	Visibility & Glare			Heat Gain			Fading
Window System Material Type by Climate Zone					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4					2.1	74%	21%	21%	69%	0.79	1.07	0.66
4-10-4-10-4					2.0	74%	21%	21%	69%	0.80	1.07	0.66
4-12-4-12-4					1.9	74%	21%	21%	69%	0.80	1.07	0.66
4-14-4-14-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.8	74%	21%	21%	69%	0.80	1.07	0.66
4-16-4-16-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.8	74%	21%	21%	69%	0.80	1.07	0.66
4-18-4-18-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.7	74%	21%	21%	69%	0.80	1.07	0.66

(Note thermal spacer needs to be requested for building code compliance)

Classic data is for comparative purposes based on aluminium spacer and air, Metro do not recommend the use of aluminium spacer with a thermally broken frame systems

## SINGLE LOW E TRIPLE GLAZING

**Low E** Triple Glazing  Low E Max - Argon - Clear - Argon - Clear - Thermal Break

EN 673					EN 410							
Building Code Acceptable Solution H1/AS1 Schedule					Heat Loss & Condensation	Visibility & Glare			Heat Gain			Fading
Window System Material Type by Climate Zone					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.5	62%	16%	19%	52%	0.60	1.20	0.57
4-10-4-10-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	62%	16%	19%	52%	0.60	1.20	0.57
4-12-4-12-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.2	62%	16%	19%	52%	0.60	1.20	0.57
4-14-4-14-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.2	62%	16%	19%	52%	0.60	1.20	0.57
4-16-4-16-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	62%	16%	19%	52%	0.60	1.20	0.57
4-18-4-18-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	62%	16%	19%	52%	0.60	1.20	0.57

# SINGLE LOW E TRIPLE GLAZING



Low E Xcel - Argon - Clear - Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN673					EN410						
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	73%	19%	19%	55%	0.63	1.33	0.62
4-10-4-10-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	73%	19%	19%	55%	0.63	1.33	0.62
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	73%	19%	19%	55%	0.63	1.32	0.62
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	73%	19%	19%	55%	0.63	1.32	0.62
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	73%	19%	19%	55%	0.63	1.32	0.62
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	73%	19%	19%	55%	0.63	1.32	0.62



Low E SunX™ Grey - Argon - Clear - Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN673					EN410						
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.4	39%	9%	18%	30%	0.34	1.30	0.40
4-10-4-10-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.2	39%	9%	18%	29%	0.34	1.34	0.40
4-12-4-12-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	39%	9%	18%	29%	0.34	1.34	0.40
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	39%	9%	18%	29%	0.33	1.34	0.40
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	39%	9%	18%	29%	0.33	1.34	0.40
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	39%	9%	18%	29%	0.33	1.34	0.40



Low E Xtreme - Argon - Clear - Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN673					EN410						
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 1-6 Stage One	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.3	68%	18%	20%	38%	0.43	1.82	0.44
4-10-4-10-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	68%	18%	20%	37%	0.43	1.82	0.44
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	68%	18%	20%	37%	0.43	1.82	0.44
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	68%	18%	20%	37%	0.43	1.82	0.44
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	68%	18%	20%	37%	0.43	1.82	0.44
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	68%	18%	20%	37%	0.43	1.82	0.44

# DOUBLE LOW E TRIPLE GLAZING



Low E Max - Argon- Low E Max- Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN 573				EN 410							
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				U (Cog) <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.2	52%	14%	15%	46%	0.52	1.15	0.32
4-10-4-10-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	52%	14%	15%	46%	0.52	1.15	0.30
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	52%	14%	15%	46%	0.52	1.15	0.32
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	52%	14%	15%	46%	0.52	1.15	0.32
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	52%	14%	15%	46%	0.52	1.15	0.32
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	52%	14%	15%	46%	0.52	1.15	0.32



Low E Max - Argon- Low E Xcel - Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN 573				EN 410							
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	61%	15%	16%	46%	0.52	1.34	0.31
4-10-4-10-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	61%	15%	16%	46%	0.52	1.34	0.31
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	61%	15%	16%	46%	0.52	1.34	0.31
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	61%	15%	16%	46%	0.52	1.34	0.31
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	61%	15%	16%	46%	0.52	1.34	0.31
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	61%	15%	16%	46%	0.52	1.34	0.31



Low E Xtreme - Argon - Low E Max - Argon - Clear - Thermal Break

Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	EN 573				EN 410							
	Building Code Acceptable Solution H1/AS1 Schedule				Heat Loss & Condensation	Visibility			Heat Gain			Fading
	Window System Material Type by Climate Zone				Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 3-4 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.1	57%	16%	16%	35%	0.40	1.63	0.16
4-10-4-10-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.9	57%	16%	16%	35%	0.40	1.63	0.16
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	57%	16%	16%	35%	0.40	1.63	0.16
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	57%	16%	16%	35%	0.40	1.63	0.16
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	57%	16%	16%	35%	0.40	1.63	0.16
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	57%	16%	16%	35%	0.41	1.63	0.16

## TERMINOLOGY

- R:** The higher the R value the better the triple glazing and correspondingly the window's thermal performance.
- U:** The lower the U Value the lower the heat transfer; the better the thermal insulation.
- Cog:** Both U and R values are Cog which = centre-of-glass measure designating glass performance only and not the whole window.
- VLT:** The higher the percentage the more daylight transmitted and the greater the glare.
- VLR-E:** The higher the percentage the more the light reflection looking into the building.
- VLR-I:** The higher the percentage the more the light reflection looking out of the building.
- SF:** The lower the solar factor or total energy transmittance coefficient the lesser the solar heat transmitted. SF is designated g value in Europe.
- SC:** The lower the shading coefficient the lesser the solar heat gain and the greater the shading provided by the glass.
- LSG:** If the LSG is greater than 1.0, then the glass transmits more light than solar heat, also termed as selectivity.
- Tdw-ISO:** The lower the Tdw-ISO the greater the reduction in fading damage through the glass.

### Building Code Schedule Notes:

The H1/AS1 schedule method is a good guide of what is compliant for consents from the 3rd of Nov 2022

- It can also be used for compliance when the glazing area is 30% or less of the total wall area

\* Calculation can be used for 0-40% or Modelling > 40% for these it may be possible to use a lower performing glass or frame on the margins

U Value is centre of glass (in W/m<sup>2</sup>.K) calculated for glass oriented vertically, with proprietary software using CEN boundary conditions.



#### Low E Xcel - Argon - Low E Xcel - Argon - Clear - Thermal Break

EN673					EN410							
Building Code Acceptable Solution H1/AS1 Schedule					Heat Loss & Condensation	Visibility			Heat Gain			Fading
Window System Material Type by Climate Zone					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	72%	17%	16%	50%	0.58	1.43	0.58
4-10-4-10-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	72%	17%	16%	50%	0.58	1.43	0.58
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	72%	17%	16%	50%	0.58	1.43	0.58
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	72%	17%	16%	50%	0.58	1.43	0.58
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	72%	17%	16%	50%	0.58	1.43	0.58
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.5	72%	17%	16%	50%	0.58	1.43	0.58



#### Low E Xtreme - Argon - Low E Xcel - Argon - Clear - Thermal Break

EN673					EN410							
Building Code Acceptable Solution H1/AS1 Schedule					Heat Loss & Condensation	Visibility			Heat Gain			Fading
Window System Material Type by Climate Zone					Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>3,4</sup>	Tdw-ISO <sup>3,5</sup>
Make-up (mm) <sup>1</sup> Thermal Spacer and Argon Gas	Standard Aluminium	Thermal Break Aluminium	uPVC	Timber	U Value	Visible Light Transmission	External Reflectance	Internal Reflectance	Solar Factor (g)	Shading co-efficient	Selectivity	Damage Weighted Transmission
4-8-4-8-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	1.0	67%	17%	17%	36%	0.42	1.85	0.42
4-10-4-10-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.8	67%	17%	17%	36%	0.42	1.85	0.42
4-12-4-12-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.7	67%	17%	17%	36%	0.41	1.85	0.42
4-14-4-14-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	67%	17%	17%	36%	0.41	1.85	0.42
4-16-4-16-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.6	67%	17%	17%	36%	0.41	1.85	0.42
4-18-4-18-4		Zones 5-6 Stage Two	Zones 5-6 Stage Two	Zones 5-6 Stage Two	0.5	67%	17%	17%	36%	0.41	1.85	0.42

# TRIPLE GLAZING

## Main Advantages

- + The ability to use two Low E coated panes of glass allow higher thermal performance, for example glass U values of 0.5 W/m<sup>2</sup>.K are possible with 4-18-4-18-4 (48mm Unit).
- + VLT can also be tuned to suit preferences, including glare and privacy, albeit the VLT will be lower relative to a comparable double glazed unit

## Considerations

- + Triple Glazing needs a wider glazing pocket. Which can in some cases be substantial to achieve a thermal performance that is comparable to that of high performance double glazing. For example, Low E Xtreme at 4-16-4 (24mm) achieves glass U Value 1.0 W/m<sup>2</sup>.K. In Triple Glazing, the same glass U value of 1.0 W/m<sup>2</sup>.K could be achieved using 4-12-4-12-4 (36mm Unit) Low E Xcel. So, essentially, unless selecting triple glazing with two Low E panes – say with Low E Xcel and/or Low E Xtreme – High Performance Double glazing can achieve similar glass U value performance.
- + Triple Glazing weight increases are generally around 30-50% over Double Glazing.

- + Triple Glazing lets less light through than the same comparative glass types i.e. classic double glazing has a VLT of 82% for triple glazing it would be 74%. With the addition of single or double Low E in the triple glaze unit the VLT would generally be in the 52%-73% range.
- + Dew (external condensation) on outer surface, is commonly seen for both high performance double glazing and triple glazing. Homes that have no eaves, are sheltered from prevailing breezes, and have high humidity/ cold conditions externally overnight, are likely to see dew form on the outside of the windows. (See notes)
- + Wind load and human impact rules still apply for Triple Glazing on the outer and innermost panes. There are also considerations around pressure differentials between the cavities in colder climates for Triple Glazing. Sometimes this necessitates wider spacers and/or thicker glass, please consult with Metro Glass for applications in cold climates.
- + Simulated sound reduction numbers for Triple Glazing are not demonstrably better (i.e. not very noticeable) than Double Glazing with similar outer pane glass makeups. If sound reduction is a key priority Metro recommend engaging an acoustics consultant.

## SOLAR CONTROL DATA: (SEE OPPOSITE)

Low E SunX™ Grey's colour tone is part of the Low E coating so you get a constant colour across different glass thicknesses. While also getting improved U Value and solar control from the Low E coating.

All other tints listed below are Body Tints generally used for increased privacy, reduce glare, direct heat gain and or fading. Body Tints do not improve the U value's. Body tinted double glazing should be of the same thickness, as thicker body tinted glass is darker. Tinted double glazed units are subject to greater heat buildup on building elevations that are exposed to direct sunlight. Heat buildup in glass can lead to thermal breakage. this risk can be reduced through heat treated glass.

Combining a laminate in double glazing is used to reduce UV transmission and reduce noise transfer.

## NOTES:

\*Metro Performance Glass triple glazed unit make ups are designed with the single Low E to surface 2 and for two Low E coated surfaces they will be to surface 2 and surface 4 as described above the tabulation for the make-up. If a Laminate is added this would be to surface 5-6 so the inside of the Triple glazed unit. The exception to this layup philosophy is in the case of a tint and Low E mix triple glazing unit, which will see the Tint positioned outermost to surface 1-2 and the Low E coating to surface 4, for two Low E coated surfaces it would be surface 3 and 5.

For the middle pane Metro recommend it should ideally be heat-treated to reduce the risk of thermal breakage not annealed, please discuss with Metro Glass your thermal risk assessment to confirm an appropriate makeup.

<sup>2</sup>Ug Value is centre of glass (in W/m<sup>2</sup>.K) calculated for glass oriented vertically, with proprietary software using CEN boundary conditions. Cavity infills based on air or argon = (90% argon, 10% air mix).

<sup>3</sup>SC, SF, VLT, VLR-E, VLR-I, Tdw-ISO calculated with proprietary software using CEN boundary conditions.

<sup>4</sup>LSG = VLT / SF (If the LSG is greater than 1.0, then the glass transmits more light than total solar heat).

<sup>5</sup>Tdw-ISO is a damage-weighted transmittance from the International Standards Organization (ISO) based on the contribution to fading at each wavelength from 300nm to 700nm that include the UV and Visible parts of the solar spectrum.

**Tolerances** – stated performance values can vary based on variations during production, use of float glass substrates on the basis of availability etc. Allowable variation is 3 basis points above or below (+/- 3) the specified values for VLT, VLR-E, VLR-I and SF and +/- 0.1 for U-Value.

**Thermal Risk** – Tinted and the middle glass pane's of triple glazed units are subject to greater heat build up. This heat build up is greater on building elevation's that are exposed to direct sunlight. Heat build up in glass can lead to thermal breakage.

This risk can be eliminated through heat treatment of the glass. Please discuss with Metro if you would like a thermal assessment carried out to determine the risk

**Condensation** – Low E double glazed units make the internal glass temperature warmer and reduce the likelihood of condensation on the inner glass surface.

**External Condensation (Dew)** – Low E double glazed units are so efficient they can, subject to external environmental conditions and factors, sometimes cause external condensation as the outer pane surface 1 can get colder due to less heat loss from the inside.

**Quality** – It should be noted that each pane of double glazing units is subject to the same quality standards as single glass. The applicable standard is AS/NZ4667:2000 standard and is applied in conjunction with the viewing criteria documented by the Window and Glass Association ([www.wganz.co.nz](http://www.wganz.co.nz) Guide to Visual Quality of Glass in Residential Buildings) and MBIE Guide ([www.building.govt.nz](http://www.building.govt.nz) Guide to tolerances, materials and workmanship in new residential construction)

# SOLAR CONTROL TINT & LAMINATE PERFORMANCE DATA<sup>2,7</sup>

<div> <div>Classic</div> <div>Classic</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Clear	4-12-4-12-4	1.9	74%	21%	21%	69%	0.80	1.07	0.66
Green Tint	4-12-4-12-4	1.9	66%	18%	20%	49%	0.56	1.35	0.54
Bronze Tint	4-12-4-12-4	1.9	50%	12%	19%	51%	0.59	0.98	0.40
Grey Tint	4-12-4-12-4	1.9	46%	11%	19%	49%	0.56	0.94	0.41

<div> <div>Laminate</div> <div>Laminate</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Clear	4-12-4-12-6.38	1.9	73%	21%	21%	68%	0.78	1.07	0.52
Green Tint	4-12-4-12-6.38	1.9	65%	18%	20%	48%	0.55	1.36	0.46
Bronze Tint	4-12-4-12-6.38	1.9	49%	12%	19%	51%	0.58	0.97	0.33
Grey Tint	4-12-4-12-6.38	1.9	46%	11%	19%	48%	0.56	0.95	0.34

<div> <div>Low E</div> <div>Max</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Laminated	4-12-4-12-6.38	1.2	61%	16%	18%	52%	0.59	1.19	0.45
Green Tint	4-12-4-12-4	1.2	55%	15%	16%	40%	0.46	1.40	0.47
Bronze Tint	4-12-4-12-4	1.2	42%	10%	15%	40%	0.46	1.04	0.34
Grey Tint	4-12-4-12-4	1.2	39%	10%	15%	39%	0.44	1.01	0.35

<div> <div>Low E</div> <div>Xcel</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Laminated	4-12-4-12-6.38	1.0	72%	18%	18%	55%	0.63	1.31	0.50
Green Tint	4-12-4-12-4	1.0	65%	16%	18%	41%	0.47	1.60	0.51
Bronze Tint	4-12-4-12-4	1.0	49%	11%	16%	40%	0.45	1.24	0.38
Grey Tint	4-12-4-12-4	1.0	46%	10%	16%	38%	0.44	1.20	0.38

<div> <div>Low E</div> <div>SunX Grey</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Laminated	4-12-4-12-6.38	1.9	38%	9%	18%	29%	0.33	1.31	0.31

<div> <div>Low E</div> <div>Xtreme</div> </div> <div>Triple Glazing</div>	Make-up (mm) <sup>5</sup>	Heat Loss & Condensation	Visibility			Heat Gain			Fading
		Ug <sup>2</sup>	VLT <sup>3</sup>	VLR-E <sup>3</sup>	VLR-I <sup>3</sup>	SF <sup>3</sup>	SC <sup>3</sup>	LSG <sup>4</sup>	Tdw-ISO <sup>5</sup>
		U Value	Visible Light Transmittance	External Reflectance	Internal Reflectance	Solar Factor	Shading co-efficient	Selectivity	Damage Weighted Transmission
Laminated	4-12-4-12-6.38	1.0	67%	18%	20%	37%	0.43	1.80	0.39
Green Tint	4-12-4-12-4	1.0	61%	16%	18%	32%	0.37	1.91	0.37
Bronze Tint	4-12-4-12-4	1.0	46%	11%	17%	29%	0.33	1.61	0.27
Grey Tint	4-12-4-12-4	1.0	43%	10%	17%	27%	0.31	1.56	0.27



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