Taiwan Energy Saving Film Co., Ltd.

Gglass

Suitable for Tropical Country

Architectural Glass

LOW-R

Low Solar Radiation

綠建材 Green Building Material

奈米標章 nano 051-01121

The Land Mark of Emperor mansion in Taipei.
installed "G"brand Laminated glass.

INDEX

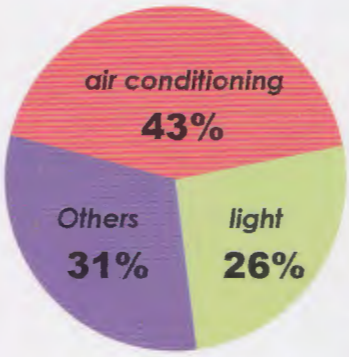
Mansion in PU LI using "G" brand glass

Building in Thailand using "G" brand glass

Choice reason	The reason that builder choose Low R glass
Global trend	Nowadays more country propose Green building.
Energy saving & Carbon Reduction	Due to fast growing internet information, consumer more aware that normal glass cannot give them comfortable with energy saving & reduce carbon Developer should upgrade their glass quality by usng "G" Brand.
budgets reduce	Insulated Low E glass is about 24mm in thickness. Change into "G" brand laminated glass, it can save cost 20-30% with materials and the labor cost.
Safety glass	Using safety glass for buildings is important. E.g. Strong Wind(Typhoon),earthquake and hailstone beside that. And also provide anti-theft after breaking the glasses.
good for soundproof	Normal transparent glass soundproof is 30 dB, "G" brand can increase the soundproof to 36 dB. Insulated laminated glasses can raise 4 more. (Each dB means: the sound strong add each 10 times, the loudness will add 10 dB), it means the real sound increase 10 times (means loudness add 10 dB).
Excellent architectural concept	In the era of easy access to information, it is recommended to build for a more excellent architectural concept,and gradually abandon the old style using wall more than glass,actually both are same important. Using "G" brand glass can enhance the quality of building.

Suggestion to the house builder

The window plays an important role to improve energy saving and comfort of building. According according to the statistics from Ministry of Economy, **43%** of power used at Air conditioning. Using clear glass the radiation transfer S.C.value is **84%**, however "G" Brand laminated glass B70, the S.C. Value is 58% and G70 lower to **43%**. It can lower down almost half of the radiation transfer.



general building electric power usage.

Building in Taichung.

TVietnam building project. (Laminated glass)

Low R glass is more suitable for Tropical climate

At Tropical country, building should choose glasses that can reduce direct solar radiation, which use Low-R Laminated Glass instead of Low-E Glass. For better heat insulate, should more focus on SC Value rather than U Value, which "G" Brand is the choice.

Remark: Low-E Glass received low secondary radiation, also mean that glass endothermic then re-radiation.

Tropical Zone vs. Boreal Zone : SC value and U value for glass which is important?

Tropical Zone	Boreal Zone
Room temperature too warm come from 80% of the heat go through indoor via transparent glass. If demand heat radiation does not penetrate in, choose glass with low C value, while indoor and outdoor temperature difference is small, there is no significant requirement for U value.	For winter and indoor able keep warm, current market trend to Low-E glass from high latitude Europe and United States, designed to allow heat radiation into the room. Hence, SC value higher for warmth effect. While Indoor and outdoor temperature difference is larger, the smaller U value is better.

Example:
The temperature difference from day time to night time is average 7.8 degree in Taiwan, SC value accounted for 90% of the total solar energy transmittance. Total solar energy transmittance = (SC value x 630) + (U value x 7.8)
So we should care more for SC value, not for U value.

(table 1)

"G" brand Low-R laminated glass and Low-R insulating laminated glass

Query	"G" brand Laminated glass	"G" brand Laminated Insulating glass	Description
First Heat Radiation	O	O	Bath insulate (directly solar radiation) are good.
Second heat radiation	X	O	Glass endothermic then re-radiation.
Soundproof	O	O	Soundproof effect: "G" brand Laminated Insulated Glass ((40 dB isolated) "G" brand Insulated Glass (isolated 36 dB) Normal insulated glass (isolated 30 dB) Glass composition: Normal transparent insulating glass = 5mm glass + 12mm air + 5mm glass, "G" brand Laminated Insulated Glass = 5mm glass + PVB + 5mm glass, dB definition: Ever sound increased 10 times, loudness whereby increased by 10 times
Safety	O	O	Injury reduce caused by impact or self explode.
Durability	O	O	Even more durable compare with tinted glass film.For "G" brand Limiated insulating glass using USA super spacer , it vacuum can even more then 20 years.
Cost	O	X	"G" brand laminatedinsulating glass more costly than "G" brand laminated glass. However it's advantage are: (1)No forst (Normal glass for indoor if outdoor temperature difference more than 6°C,will create frost.) (2)Reduce cold radiation. (3)Reduce U value,energy & power saving.
Anti conde -nsation and saving energy	X	O	Indoor and outdoor temperature difference is often more than 6 degrees in winter, if you don't use the insulating glass will make inside dew condensation, so it will become very moist inside.

"G" brand all kinds of energy saving glass optical performance data sheet

Glass Type	Structure	Color	Item Number	V.L.T.	V.L.T. reflection	SC (Summer)	U Value (W/m-K)
Foil glass MG	IR reflection 5mm+IR reflection glass	Clear	MG-H70	66%	10.55	0.44	5.58
			MG-H50	48%	25.75	0.38	5.56
Lamin-ated Glass DG	5mm+PVBuv +PVBir+5mm	Clear	DG-B70	65%	6.25	0.58	5.69
			DG-B60	59%	6.01	0.51	5.59
			DG-B40	42%	5.22	0.51	5.70
			DG-G81	48%	7.77	0.47	5.65
	6mm+PVBuv +PVBir+6mm	Clear	DG-G70	59%	7.33	0.43	3.60
			DG-G40	42%	6.21	0.37	3.53
			DG-G70-8	70%	8.2	0.54	3.56
		Gray	DG-G40-2	20%	4.71	0.28	3.58
		Low-reflective	DG-G40-5	30%	28.09	0.29	3.45
Lamin-ated Insula-ting glass AG	綠建材 6mm+PVBuv+PVBir +6mm+12A+6mm	Clear	AG-G70	51%	9.94	0.34	1.40
	5mm+PVBuv+PVBir +5mm+12A+5mm	Clear	AG-B70	56%	9.87	0.39	2.70
			AG-B40	40%	6.44	0.35	2.70

All the testing reports from our company are tested by the third party; if you need the original report please contact our sales.

(table 3)

Low-R GLASS(B70) VS. Single Silver Low-E Glass

project		Low-R GLASS(B70)	Single Silver Low-E Glass
description of glass construction		5+PVB38+PVB IR38+5	sle5+12A+5
optical characteristics	V.L.T	64.71 better	63
	V.L.T. reflection	6.25 better	15
	SC	0.578 better	0.65
	UV penetration	<1 better	65
effect of sound-proof		35 better	30
safety	use for roof	yes better	no
	explosionproof	yes better	no
cost	cost ofwindow frame	more economic better	need to use the thicker window frame
	volume of glass	smaller better	double than laminated glass
	freight	cheaper better	double
	cost of construction	cheaper better	more expensive
	risk of air crack	no need to consider better	need to consider

If use "G" brand B series, it's better than single silver Low-E glass, if use "G" brand G series, it's better than double silver Low-E glass, as attachment 8.

(table 4)

R.H.G (Relative Heat Gain)

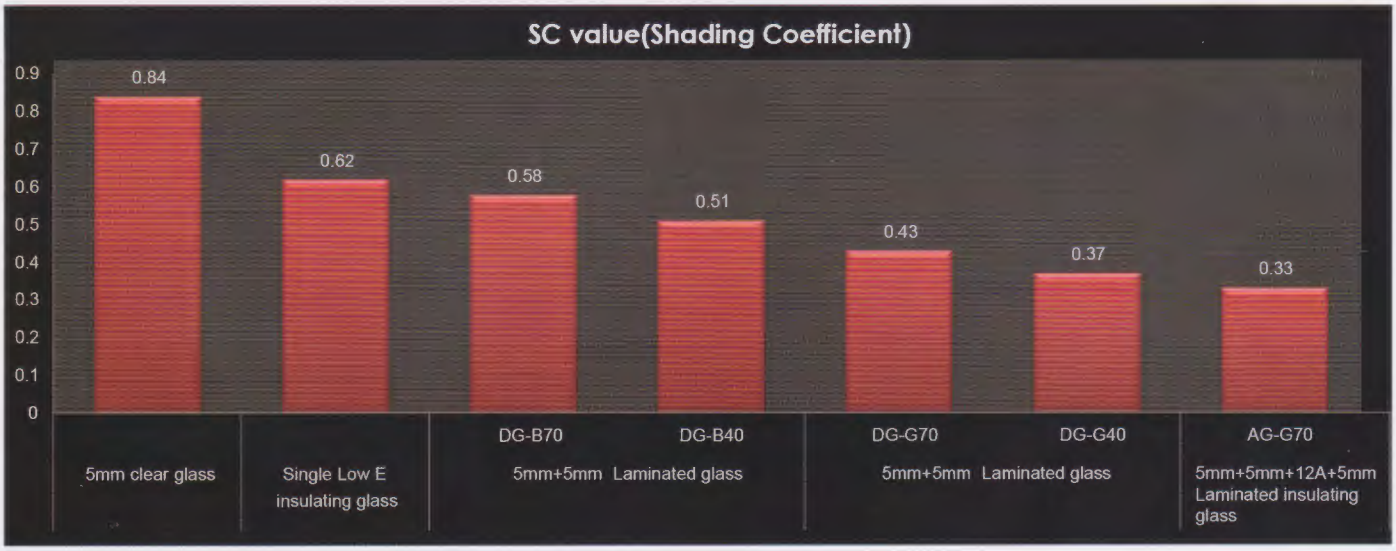
The total heat gain through glass for total heat transmittance (contain first heat radiation, second heat radiation, for all the heat radiation amount) from the RHG(Relative Heat Gain) reduce heat rate (chart 9) can find the data. For example: you can check the data from the total solar energy transmittance chart, for example: use G brand B series B70 energy saving laminated glass, can reduce 29% total solar energy transmittance, but if you use G brand G series, G70 energy saving laminated glass can reduce 46% total solar energy transmittance, but if you choose add insulating glass, it can reduce total solar energy transmittance to 52% or 62%. Using air conditioning is depend on building enter how much heat. We calculate you can get back this investment of energy saving glass within 3 years. How long a building you will use? 30 years? 50 years?You can save the electronic power charge for your grandson, do you think it is value to invest or not?

saving electronic power estimate

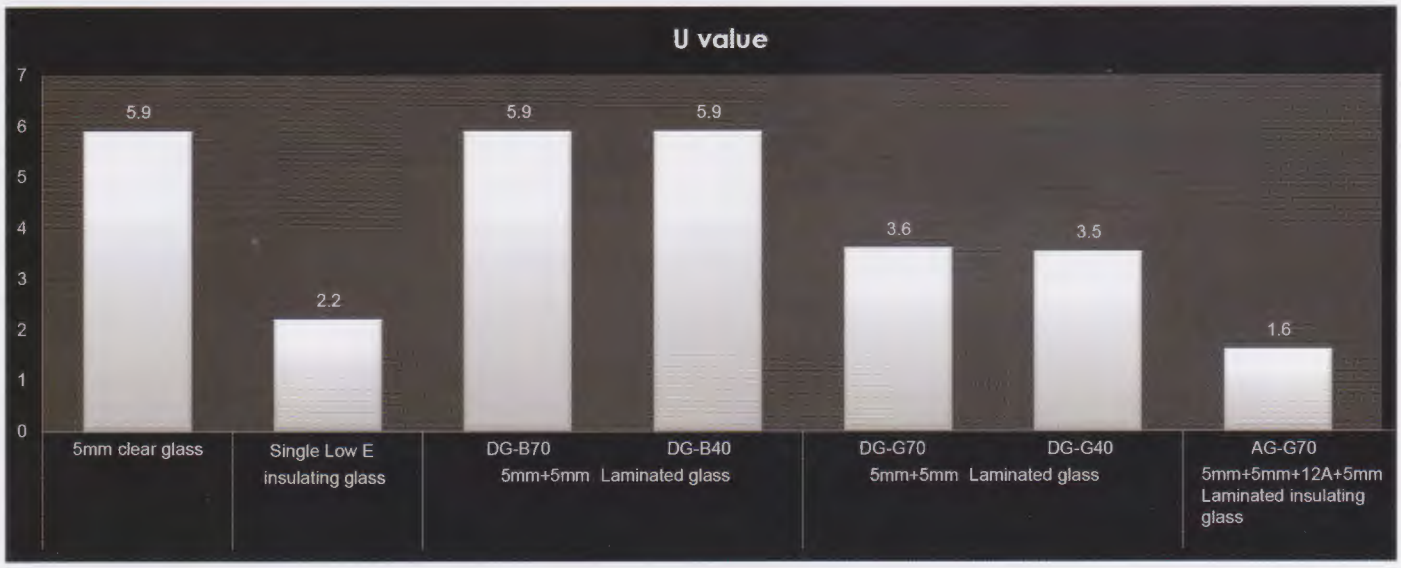
G LOW-R GLASS

It can saving **30%** electronic power charge
(Testing proved by Kun Shan University)

An apartment use glass average area is about 100 square feet, investment charge is NTD380 x 100 (square feet) = NTD38000, it can save electronic power charge NTD4000 every month, you can get back the investment in 2 years and 8 months. After this 2 years and 8 months, you can save NTD1200 every month.



(table 5)

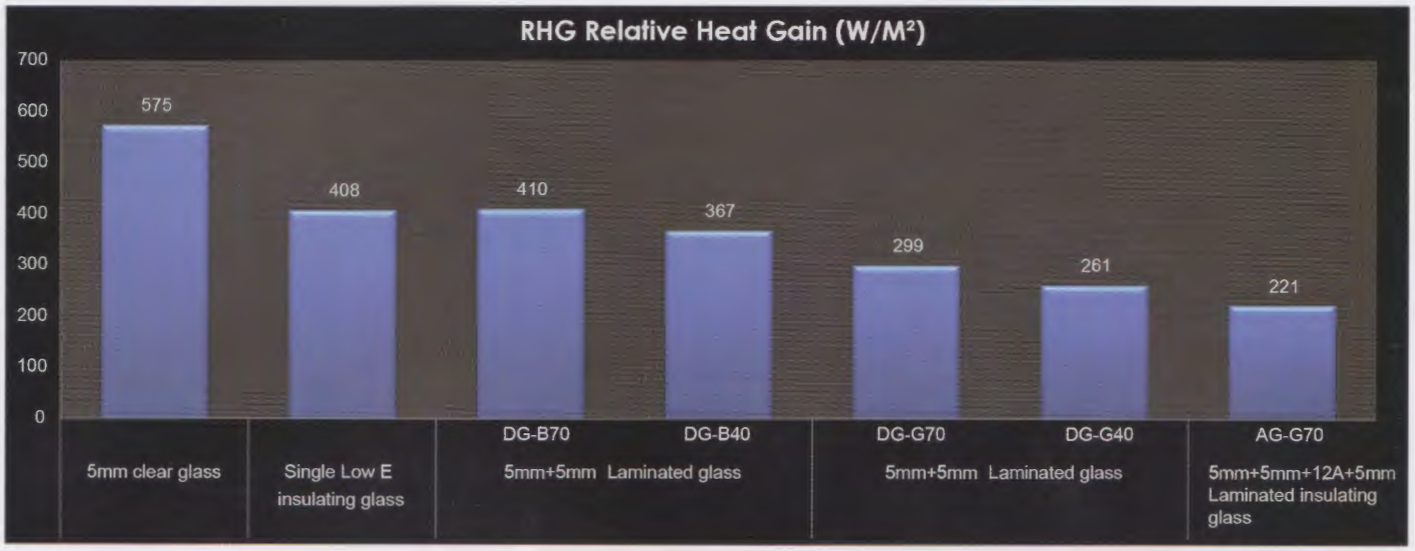


(table 6)

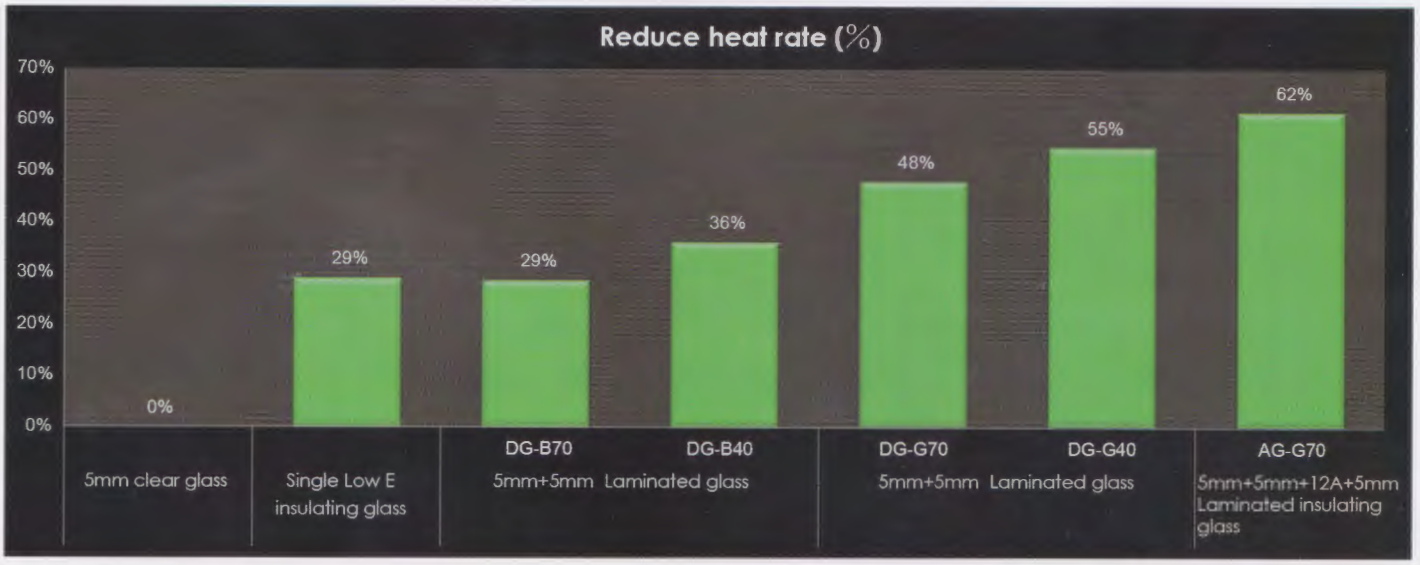
Optical performance comparison

Glass type	5mm clear glass	Single Low E insulating glass	6mm+6mm Laminated glass		6mm+6mm+12A+6mm Laminated insulating glass
			DG-G70	DG-G40	AG-G70
SC value (Shading Coefficient)	0.84	0.62	0.43	0.37	0.34
U value RHG Relative Heat Gain	5.9	2.2	3.6	3.5	1.4
Total solar energy transmittance(W/M²)	575	408	299	261	224
visible light transmittance Reduce heat rate(%)	84	63	59.4	41.8	50.5
Reduce the heat rate	0%	29%	48%	55%	62%

(table 7)

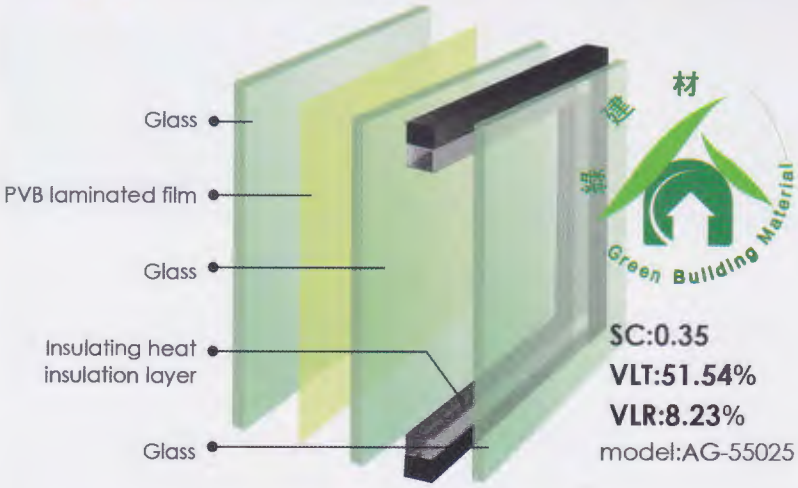


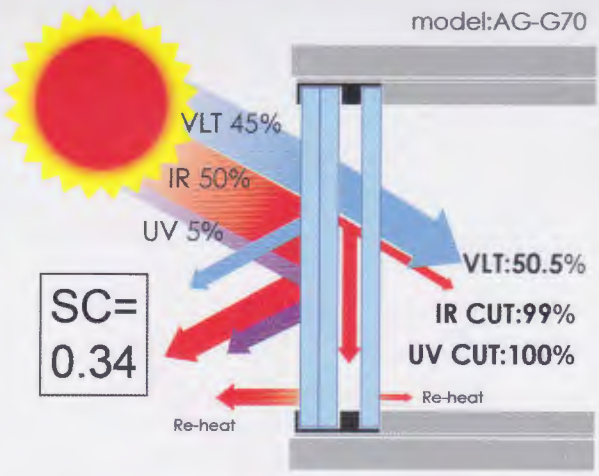
(table 8)



(table 9)

Insulating Energy Saving Glass





Nano ceramic laminated insulation glass:
Heat insulation theory

The benefits of insulation glass

As insulation glass with spacer : It can reduce the heat and cold air conduction through the glasses. The conduction will go on 24 hours for building like 7-11, hospital and Hotel which need air conditioning for 24 hours. It can save the a lot of money for air conditioning.

Prevent condensation : The temperature difference over 6 degree in and outside the house. It will have condensation on the glass and caused the high moisture inside the house. Installation the insulation glass with a spacer, the low U value can lower down the temperature difference without condensation.

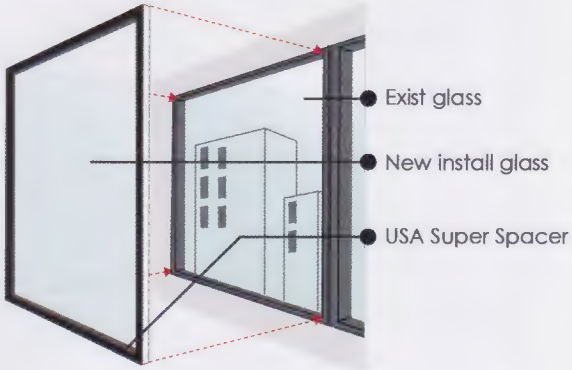
Improving cold radiation : May people install the air tightness window and most the windows are insulation glass without space. It is only hallow glass cannot lower down the radiation efficiently. The hollow glass is very hot in summer, but it can have better cold air insulation in winter. The cold radiation is stopped by the inner glass without conduction. This is the main reason why cold area uses the insulation glasses.

Sound proof : The sound insulation is better because of the increasing of the glass thickness.

Green building materials villa (glued hollow green building glass)

Many stores like 7-11, MCDonald,KFC in Taiwan all use laminated glass or laminated insulation glass.

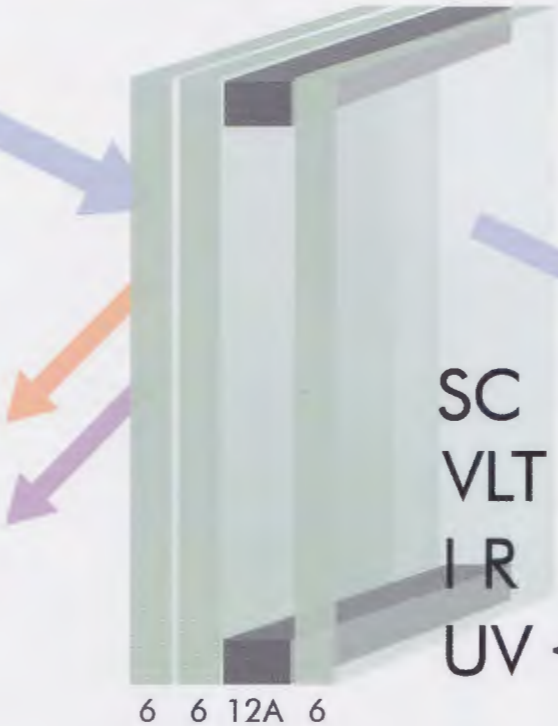
We can offer home service to improve your insulation glass.



We can offer home service for your existing insulation glass. Using USA super spacer to lower down the conduction of the outside glass. The Super Space is flexible and adjust by the temperature to avoid the explosion for 15 years.

ULTRA HIGH PERFORMANCE

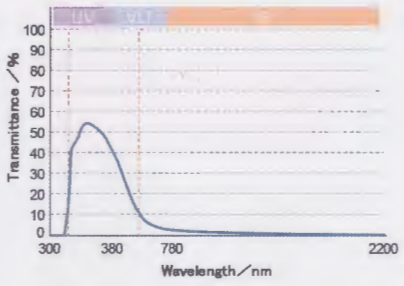
Insulating Energy Saving Glass AG-G70



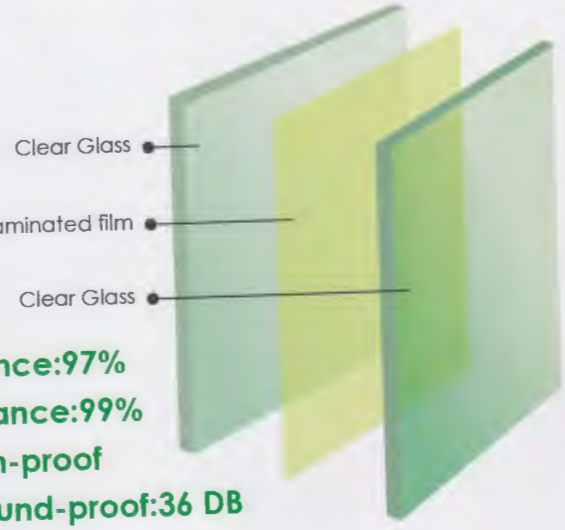
綠建材 Green Building Material

SC : 0.34
VLT : 51%
IR : 1%
UV < 1%

visible light transmittance : 51%
visible light reflectance : 9.9%
solar radiation transmittance : 22%
UV transmittance < 1%
SC : 0.34
LSG : 1.73



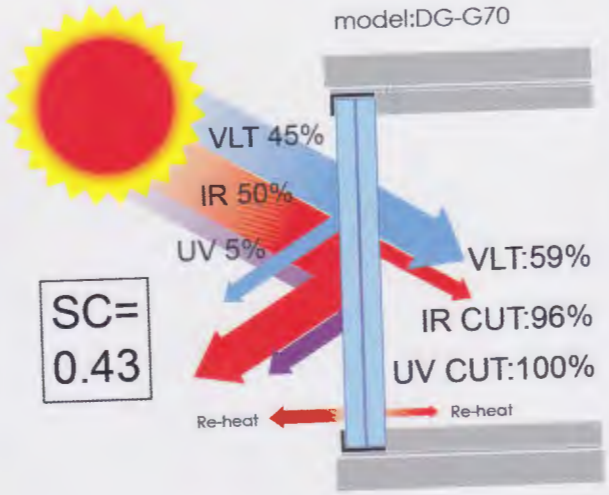
Nano Ceramic laminated glass



High VLT
IR resistance:97%
UV resistance:99%
Explosion-proof
Super sound-proof:36 DB

New building using TES laminated glass

Sunmatch using TES laminated glass



The theory of heat insulation of
Nano Ceramic laminated glass

High VLT, High Heat Insulation, Super explosion-proof.

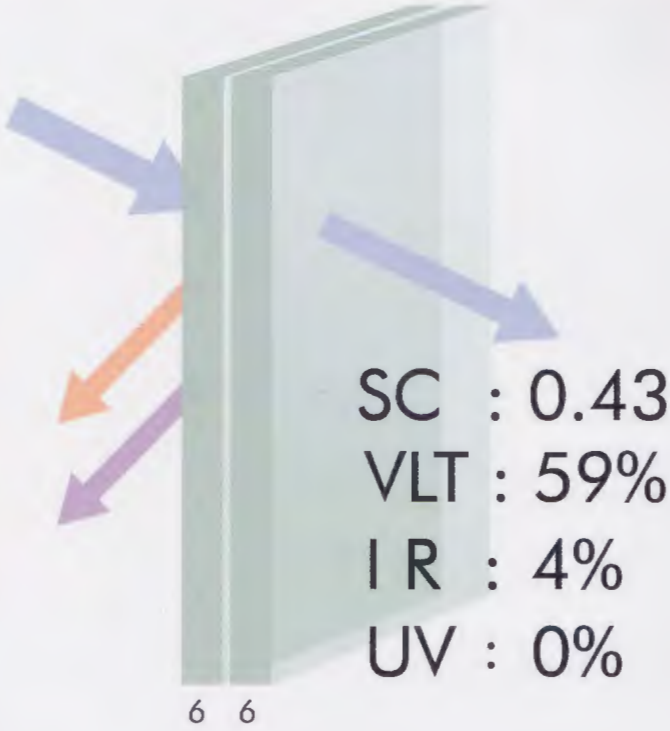
The PVB film added Nano materials blocks 99.9% of UV and 97% of IR. But the visible light still transferable. Therefore, no need to turn on the light at day time.(Lots of people install curtains to block the heat and turn on the light). The infrared ray cannot comes in, saving lots of air conditioning consumption. The earthquake and Typhoon happen very often in Taiwan, the breakage of glasses caused many damages. This is why more and more people choose safety laminated glass. Especially for the areas like stairs, fences that need to install glasses all adapt explosion-proof laminated glass.

Taipei Emperor mansion
landmark adapt
TES glass

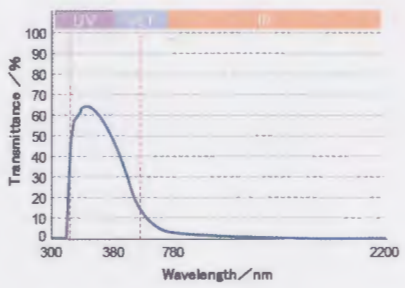
Mansion in Malaysia
adapt TES glass

HIGH EFFICIENCY

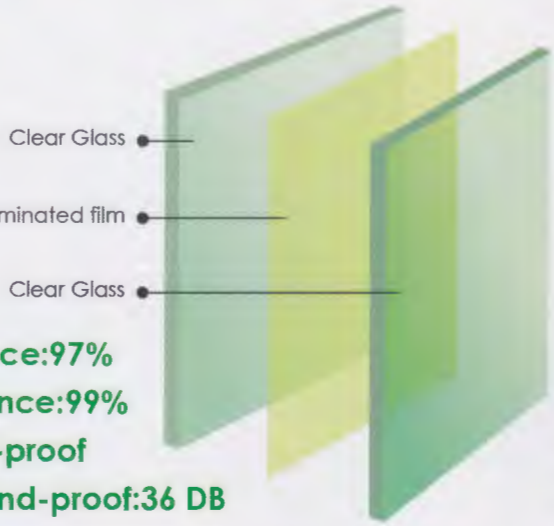
Laminated Energy Saving Glass DG-G70



visible light transmittance : **59%**
visible light reflectance : **7%**
solar radiation transmittance : **26%**
UV transmittance < **0%**
Infrared direct transmittance : **4%**
SC : **0.43**
LSG : **1.58**



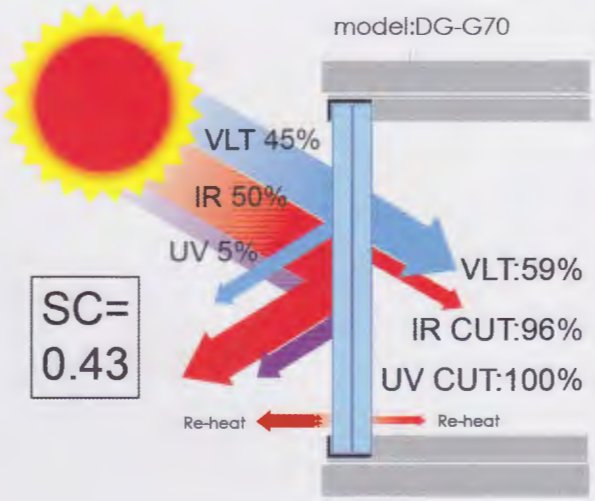
Nano Ceramic laminated glass



High VLT
IR resistance:97%
UV resistance:99%
Explosion-proof
Super sound-proof:36 DB

New building using TES laminated glass

Sunmatch using TES laminated glass



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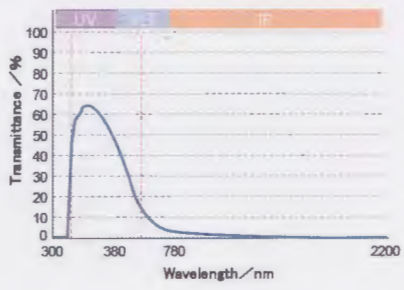
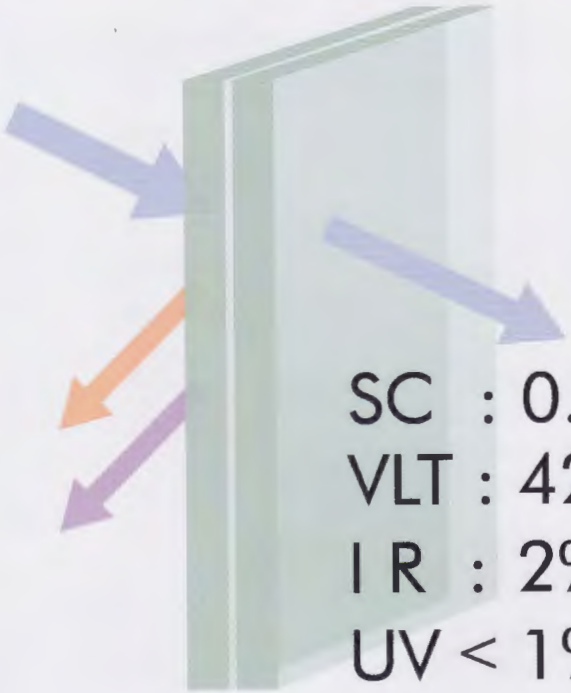
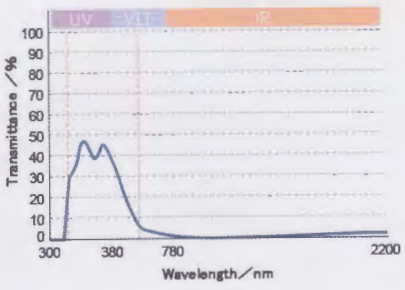


Laminated Energy Saving Glass DG-B40

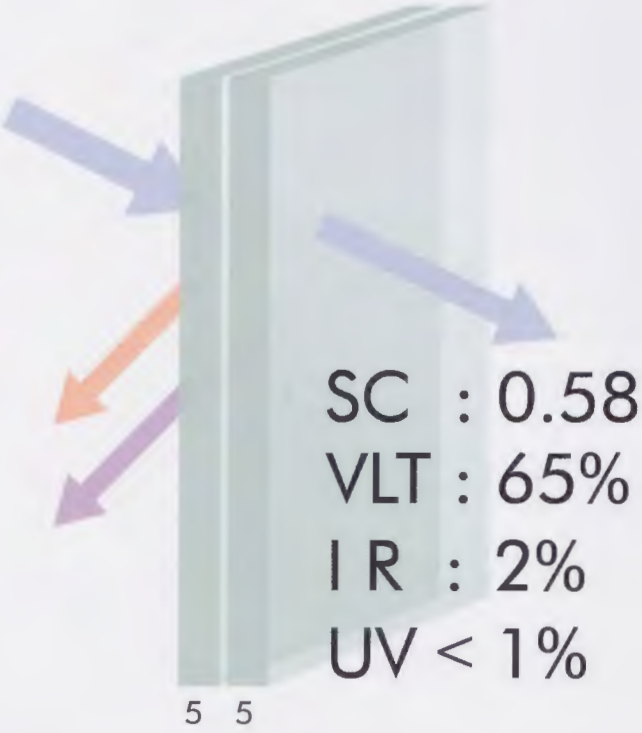


SC : 0.51
VLT : 42%
I R : 2%
UV < 1%

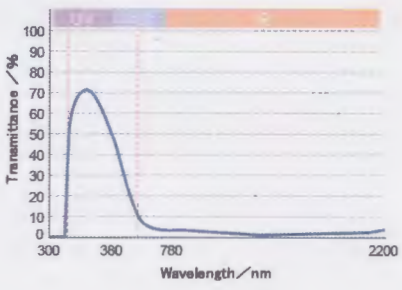
visible light transmittance : **42%**
visible light reflectance : **5%**
solar radiation transmittance : **18%**
UV transmittance < **1%**
Infrared direct transmittance : **2%**
SC : **0.51**
LSG : **0.94**



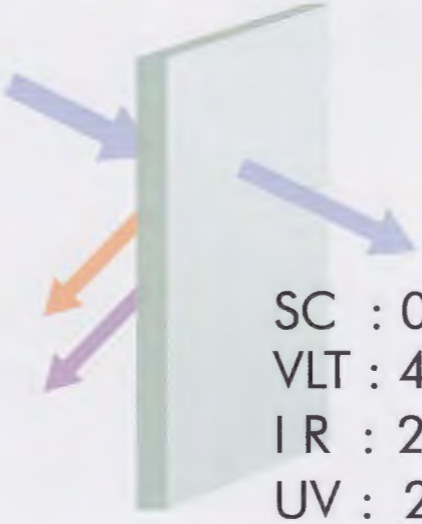
Laminated Energy Saving Glass DG-B70



visible light transmittance : **65%**
visible light reflectance : **6%**
solar radiation transmittance : **27%**
UV transmittance < **1%**
Infrared direct transmittance : **2%**
SC : **0.58**
LSG : **1.29**



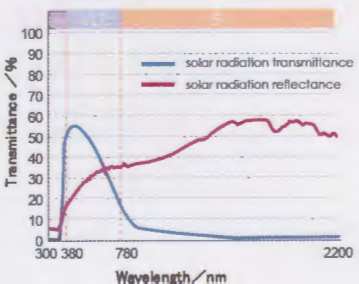
Infrared Reflective Glass MG-H50



SC : 0.38
VLT : 48%
I R : 26%
UV : 2%

visible light transmittance : 48%
visible light reflectance : 26%
solar radiation transmittance : 22%
UV transmittance < 02%
Infrared direct transmittance : 04%
SC : 0.38
LSG : 1.45

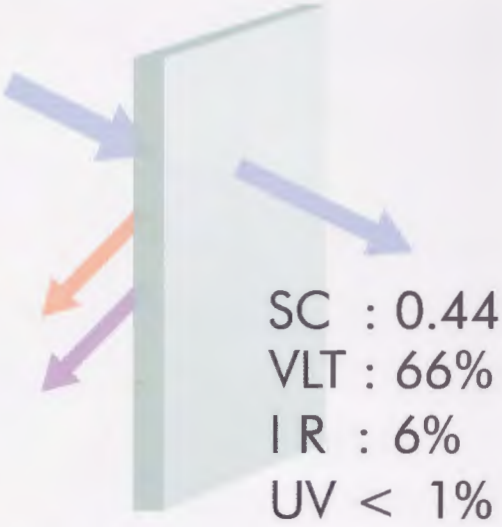
Daylight Penetration Spectrum



Infrared Reflective Film Insulation Principle:

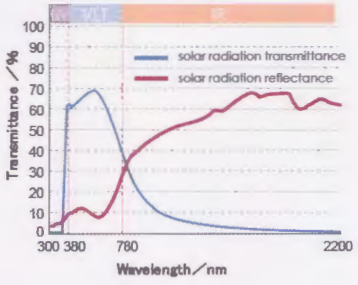
Infrared does not transmit, do not absorb, but reflect, only reflect can down the glass surface temperature to the lowest, as the glass surface temperature is not high, so the second heat radiation will

Infrared Reflective Glass MG-H70



visible light transmittance : 66%
visible light reflectance : 11%
solar radiation transmittance : 30%
UV transmittance < 0.3%
Infrared direct transmittance : 6%
SC : 0.44
LSG : 1.71

Daylight Penetration Spectrum



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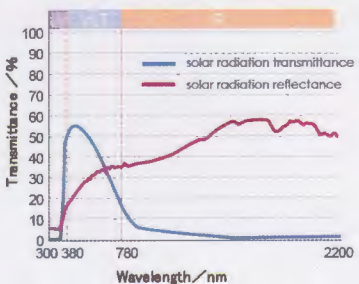

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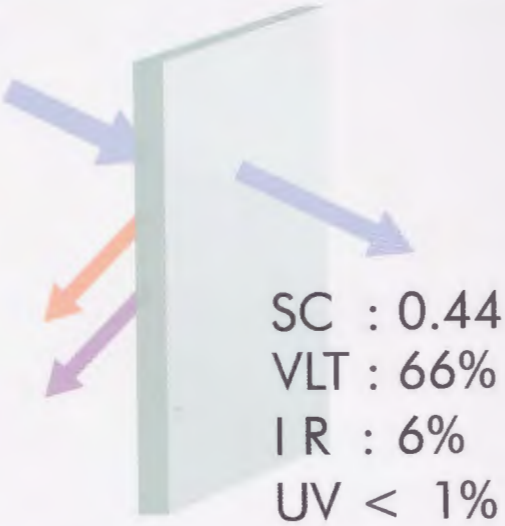

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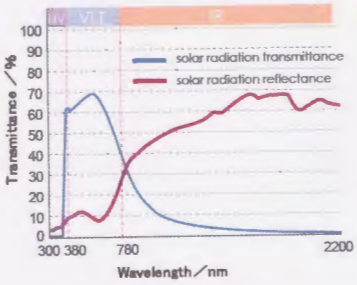

Infrared Reflective Film Insulation Principle:

Infrared does not transmit, do not absorb, but reflect, only reflect can down the glass surface temperature to the lowest, as the glass surface temperature is not high, so the second heat radiation will come down with it, the simplest date can show the information on