

High performance energy saving glass analysis

High performance energy saving glass emerged with the development of glass processing, glass coating technology, Materials technology.

- Glass coating: Lower and lower emissivity coated glass from single silver, double silver to now [triple silver](#).
- Spacer materials: From traditional aluminium spacer, stainless spacer, [warm edge spacer](#), composite warm edge spacer to TPS.
- Glass make up: From monolithic glass to insulated glass, triple glass units, and then [vacuum glass](#).

More and more new creative products were developed, for example heat mirror insulated glass, aerogel glass, smart glass etc.

But high performance glass account less than 10% of new buildings, and existing buildings over 50 billion square meters adopt traditional normal glass or laminated glass, which caused high energy waste. High performance glass need further promotion and application on new constructed buildings.

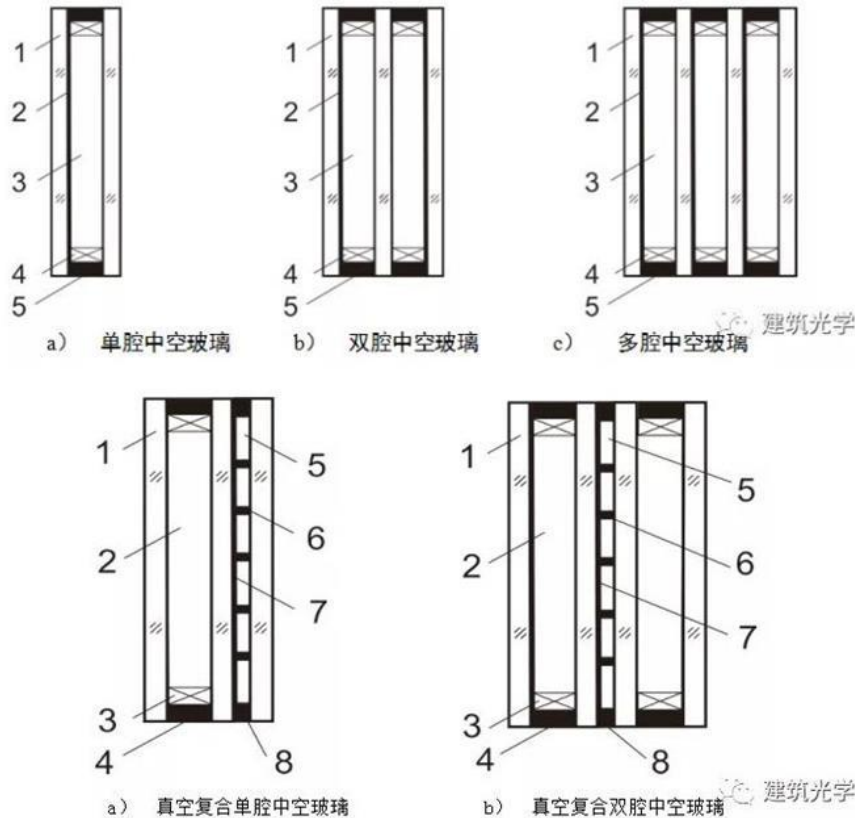


What's High Performance Glass?

High-performance energy-saving glass refers to architectural glass products that made with coating, insulating, and vacuum technology and have significant thermal insulation effects.

High Performance Glass Classifications.

The glass are mainly used in passive houses,mainly classified into below:Insulated glass,vacuum glass,vacuum insulated glass,heat mirror insulated glass.



The main characters are:

- The number of lowe coatings in each cavity of multi-cavity insulating glass should not exceed one.
- The position of the Low-E of the vacuum glass should be in the vacuum chamber.
- Warm-edge spacers should be used in severe cold, cold and hot summer and cold winter areas.
- The thickness of the insulating glass spacer should not be less than 9mm.
- Insulated glass should be filled with inert gas, and the initial gas content should be greater than 85%.
- The primary sealant should use butyl rubber or thermoplastic spacer sealant.
- The second sealant should be polysulfide sealant, and the water vapor permeability should be less than 15 g/(m²·d).



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- Organic materials should not be used as vacuum glass sealing materials.

High Performance Glass thermal property

Below table shows the insulated glass U value, light property and other thermal insulation performance.

Glass Combination	Low Types	Coating Emissivity	U value(w/m2.k)	SC	SHGC	LT %
Triple Glass Unit 6LE+12AR+6+12AR+6LE	Single +Single	0.072,0.072	0.78	0.587	0.511	0.725
	Triple +Single	0.021,0.072	0.74	0.345	0.300	0.61
Triple Glass Unit 6LE+16AR+6+16AR+6LE	Single +Single	0.072,0.072	0.76	0.587	0.511	0.725
	Triple +Single	0.021,0.072	0.72	0.344	0.299	0.61
Quadruple Glass Unit 6LE+12AR+6LE+12AR+6+12AR+6	Single +Single	0.072,0.072	0.69	0.533	0.464	0.659
	Triple +Single	0.021,0.072	0.639	0.315	0.274	0.555
Vacuum IGU 6+12AR+6LE+V+6	Single	0.103	0.64	0.520	0.452	0.593
	Double	0.055	0.52	0.400	0.348	0.557
	Triple	0.021	0.41	0.347	0.302	0.615
Vacuum IGU 6LE+12AR+6LE+V+6+12AR+6	Online +Online	0.18,0.18	0.58	0.523	0.455	0.517
	Single +Single	0.072,0.072	0.41	0.517	0.45	0.659
	Triple +Single	0.021,0.072	0.40	0.309	0.269	0.555

Above data are calculated based on WINDOW7.3, 90% argon content, as Window will calculate the glass center U value, increased glass edge performance result from warm edge spacers cannot be calculated here, but please check our previous post:

[Argon filled insulating glass VS warm edge spacer insulating glass](#)

- For most conventional window types, choosing to fill the [insulating glass with argon gas](#) and replacing the aluminum spacers with warm-edge spacers can reduce the entire window U value by about 0.1-0.2W/m2K”.
- For double glazed units with 12mm spacer, the influence argon is better than using warm edge. For the triple glazed units, whether it is 12mm or 15mm spacer, warm edge spacer has much better thermal insulation performance than argon filled glass units. Especially for the 15mm, the reduction of U value is almost twice that of argon filled units.
- After using the warm edge, the [thermal insulation performance](#) of whole window is more balanced, and there is no obvious weak parts in the window. While using argon filling, the balance of thermal insulation performance of each part of the window has been further broken.

High Performance Glass surface temperature and Anti-condensation performance



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In the severe winter, standing by the window, we will feel the chilly wind, and the body will feel uncomfortable. This is "cold radiation". But if high-performance glass is used, this chilly feeling will be significantly improved, mainly because the glass better isolate the heat transfer between indoor and outdoor, so the temperature of the indoor side glass surface Higher, the temperature difference with the indoor air is smaller, and the cold radiation phenomenon will be improved.

The following calculations for normal glass and high-performance glass at different temperatures, you can see the obvious difference in the indoor glass surface temperature.

Glass Combination	U value(W/M2.K)	Temperature	Indoor Surface Temperature	Temperature difference with Indoor air
Double Insulated Glass 6LE+12AR+6	1.52	Outdoor -20°C Indoor 20°C	12.6	7.4
	1.52	Outdoor -10°C Indoor 20°C	14.5	5.5
Triple Glass Unit 6LE+12AR+6+12AR+6LE	0.74	Outdoor -20°C Indoor 20°C	16.4	3.6
	0.74	Outdoor -10°C Indoor 20°C	17.3	2.7
Vacuum Insulated Glass 6+12AR+6LE+V+6	0.52	Outdoor -20°C Indoor 20°C	17.5	2.5
	0.52	Outdoor -10°C Indoor 20°C	18	2

In the severe winter, the higher indoor glass surface temperature, the better. Obviously, high performance energy saving glass temperature is closer to the indoor air temperature, which can effectively avoid condensation and improve comfort.

High Performance Glass Acoustic Performance

High-performance glass not only has excellent energy-saving properties, but also has good [sound insulation properties](#) to improve environmental comfort.

Glass Type	Thickness	Glass Combination	RW(DB)
Double Glass Unit	20	5+9A+6	33
	24	5+12A+6	34
Triple Glass Unit	42	5+12A+6+15A+5	38
Vacuum Glass	10	5+V+5	37
Vacuum insulated glass	38	5+9A+5+V+5+9A+5	40
Laminated Vacuum insulated glass	30.14	5+9A+5+V+5+1.14PVB+5	42

High-performance glass is generally used in low-energy passive buildings, China Hebei standard (DB13(J)/T177-2015) stipulates that the noise of the bedroom, living room and study room should be less than 30dB(A). Vacuum insulating glass and triple-glass insulating glass have better sound insulation performance. If you need to further improve the sound insulation performance of glass, laminated glass is a better choice. In addition, unequal thickness design can be used to reduce resonance and improve the sound insulation performance of the glass.



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Working with over 50 China glass processing factories, Morn now is able to manufacture and supply all kinds of high performance energy saving glass, including double and triple silver low-E coatings, warm edge space, triple glass units, etc. We sincerely hope the rapid development of ultra-low-energy buildings worldwide, so that people can live in good houses that are both energy-efficient and comfortable, and enjoy the comfortable experience brought by high-performance glass.

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