

# Vacuum Glass

## Innovative Vacuum Glass Technology

### Build a low carbon world



HaanGlass is international pioneer in vacuum glazing industry.

We research, develop vacuum insulated glass technology, manufacture and supply VIG worldwide.

With SGGC / IGCC certified long durable safety vacuum insulating

glass, our mission is to make vacuum insulating glass more

reliable, more affordable and more popular.



## What's Vacuum Insulating Glass?

Different from insulated glass, the vacuum glass panels are sealed and separated by 0.15mm vacuum space at  $10^{-4}$  Pa.

The vacuum space eliminates the transmittance medium of thermal and sound, making vacuum glass the ever best energy-efficient glass.



More Comfort



Low carbon emission



Thin and light



Sustainable development

## HaanGlas VIG PRO

HaanGlas Pro is our updated VIG solutions of VIG Basic.

The solution offers Tempered version only, with best  $0.45 \text{ W/m}^2 \cdot \text{K}$  thermal conductivity while keeping up to 70% high light transmittance.

Meanwhile minimum glass thickness achieved 6.3mm with both panels tempered, and weight only  $15 \text{ kg/sqm}$  to suit special application.

Ultra slim 10mm glass edge makes it more suitable for slimline windows frames and new constructions.

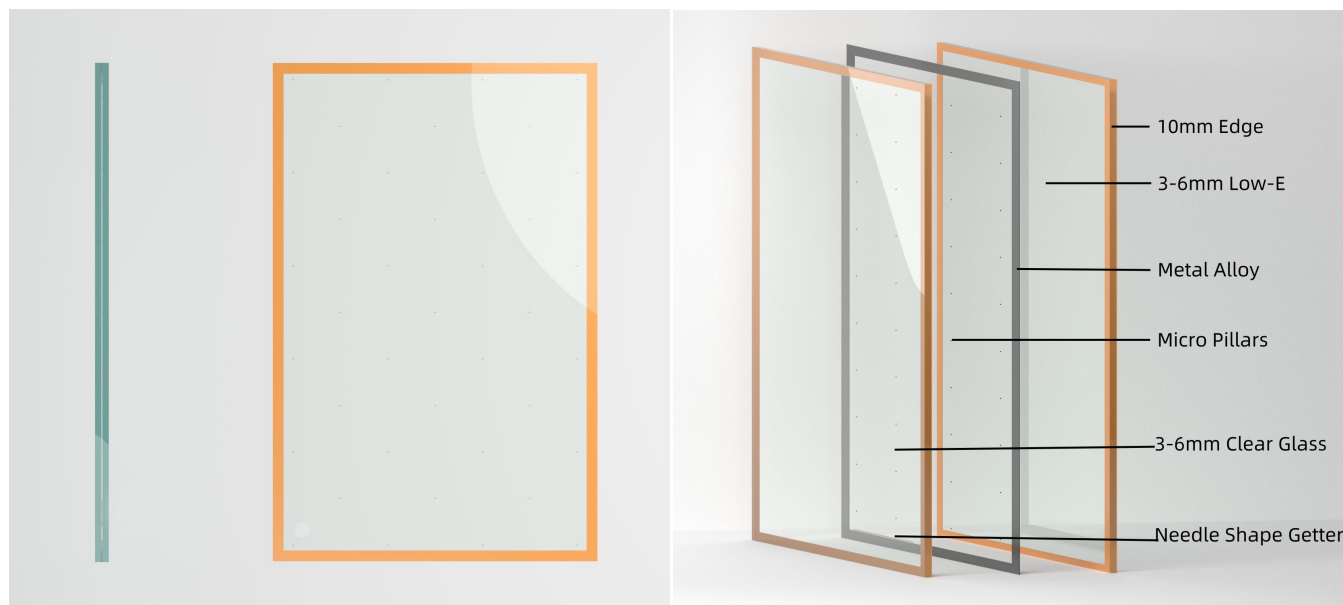
Beside single VIG glazing, laminated VIG and hybrid insulated VIG are available to have better safety and thermal performance.

Learn more about us, and our vacuum glazed windows:

[www.vacuum-glass.com](http://www.vacuum-glass.com)

[www.vigwindows.com](http://www.vigwindows.com)

## Vacuum Glass Structure



## Vacuum Glass Features

|                        |                                                                        |
|------------------------|------------------------------------------------------------------------|
| ● Thermal Insulation   | U value <0.5W/m <sup>2</sup> .K<br>Not affected by installation angles |
| ● Acoustic Performance | Weighted sound reduction >36DBs                                        |
| ● Thickness            | 6.3mm   8.3mm   10.3mm   12.3mm                                        |
| ● Weight               | Minimum 15kgs/M <sup>2</sup>                                           |
| ● Condensation         | No condensation under -60°C                                            |
| ● Flatness             | No expansion & contraction                                             |
| ● Environmental        | Lead free   Recyclable                                                 |
| ● Lifetime             | Lifetime >25 years, warranty = 15 years                                |

## Why HaanGlas is Different?

- 90 Fully tempered glass -High glass strength >90Mpa
- 180 No evacuation holes design, 180° flat appearance
- 6.3 Minimum thickness 3+0.3+3mm, perfect for renovation
- 250 <250°C low temperature metal edge sealing technology
- 2500 available size 1600\*3000mm, the biggest in the world
- 100 Over 100 different glass combination -substrate, coating, thickness
- 24000 Monthly output over 20,000 square meters, high production capability

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## Vacuum Glass Performance



| Glass            | Thickness | LT % | LR-Out | LR-In | U value | SHGC |
|------------------|-----------|------|--------|-------|---------|------|
| 3 MS1.1+0.15V+3  | 6.15MM    | 77   | 12     | 12    | 0.6     | 0.51 |
| 3 MS1.16+0.15V+3 | 6.15MM    | 80   | 13     | 13    | 0.65    | 0.57 |
| 4 MD80+0.15V+4   | 10.15MM   | 70   | 13     | 14    | 0.5     | 0.38 |
| 5 MD80+0.15V+3   | 8.15MM    | 69   | 13     | 14    | 0.45    | 0.38 |

Remark: Above data are calculated by LBNL Windows 7.5 based on NFRC 100-2010/EN673 ,actual performance may slightly vary.

## Production capability

- **Minimum Size:** 300\*300mm
- **Vacuum laminated glass:** Yes
- **Monthly output:** 4,000 sqm
- **Colors:** Clear, Blue, Grey etc
- **Maximum size:** Standard 1500\*2500mm, Max 1600\*3000mm
- **Vacuum insulated glass:** Yes
- **Product warranty:** 15 years.
- **LT:** Varies from 20% -80%
- **Shape:** Rectangle, Shaped Glass

## Vacuum Glass Test

| Performance          | Standard                   | Test Item                    | Glass            | Result            |
|----------------------|----------------------------|------------------------------|------------------|-------------------|
| ● Thermal Insulation | ASTM C18-21                | Steady - state U value       | 3S1.16+0.15V+3   | 0.5w/m2.k         |
|                      |                            |                              | 5D80+0.15V+5     | 0.49w/m2.k        |
| ● Impact Resistance  | ANSI Z97.1-2015            | Pendulum Impact test         | 8.15 VIG         | Pass              |
|                      |                            |                              | 10.15 VIG        | Pass              |
|                      |                            |                              | 4C FT            | Pass              |
|                      |                            |                              | 5C FT            | Pass              |
|                      | EN12600:2002               | Pendulum Impact test         | 10.15 VIG        | 1C3               |
| ● Soundproof         | ISO 10140-2:2021           | Airborne Sound Insulation    | 10.15 VIG        | 36(-1; -3) Dbs    |
| ● Weather Durability | ASTM E546 E2188 E2189      | Weather Acceleration         | 8.15VIG+12AR+4   | Pass              |
|                      |                            |                              | 8.15VIG          | Pass              |
| ● Structural         | NFRC 102-2020/AAMA 1503-09 | Fixed PVC Windows Structural | 12.15 VIG        | ±9097 Pa          |
|                      |                            |                              | 12.15 PRO+12AR+6 | ±6703 Pa          |
|                      |                            | Dual Windows Structural      | 12.15 VIG        | +3830Pa,-4390Pa   |
| ● Windows Thermal    | ASTM E330/E330M-14(2021)   | Fixed PVC Windows Thermal    | 10.15 VIG+12AR+5 | 0.15Btu/hr-ft2 ·F |
|                      |                            | Dual Windows Thermal         | 10.15 VIG        | 0.18Btu/hr-ft2 ·F |
|                      |                            |                              | 10.15 VIG+12AR+5 | 0.15Btu/hr-ft2 ·F |
| ● Environmental      | ROHS(EU) 2015/863          | Lead/Mercury/Cadmium etc     | 10.15VIG         | Pass              |

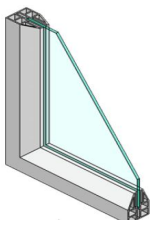
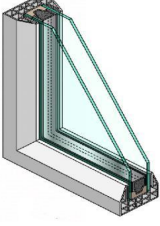
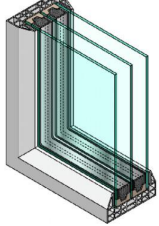
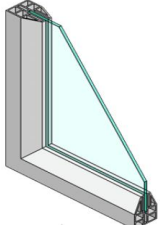


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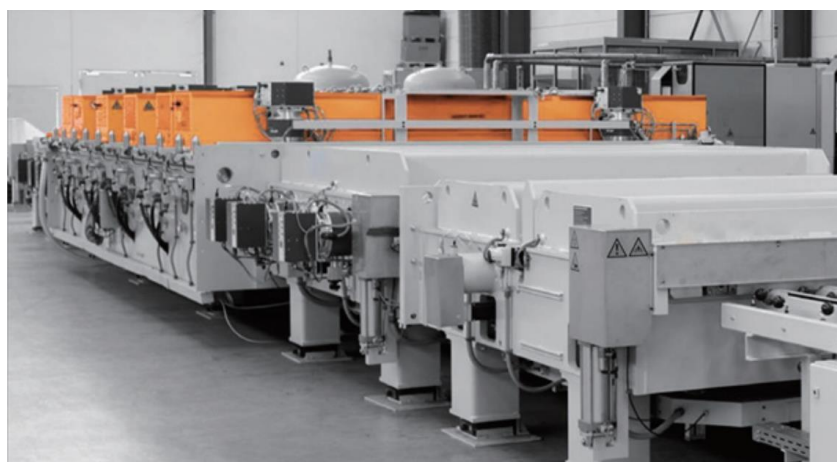
## Why VIG is Amazing?

| Glass Type           | 6 Clear                                                                           | 6LE +12A+6                                                                        | 6LE+12Ar+6+12Ar+6                                                                   | 4 LE+0.15V+4                                                                        |
|----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Glass Sealed windows |  |  |  |  |
| Thickness -mm        | 6mm                                                                               | 24mm                                                                              | 42mm                                                                                | 8.15 mm                                                                             |
| Weight- Kgs/m2       | 15                                                                                | 30                                                                                | 45                                                                                  | 20                                                                                  |
| LT %                 | 88                                                                                | 68                                                                                | 52                                                                                  | 70                                                                                  |
| U value-W/m2.k       | 5.82                                                                              | 1.65                                                                              | 0.71                                                                                | 0.47                                                                                |
| SHGC                 | 0.82                                                                              | 0.38                                                                              | 0.30                                                                                | 0.37                                                                                |
| STC/OITC -dBs        | 30/28                                                                             | 34/29                                                                             | 37/29                                                                               | 36/33                                                                               |

## How we make it possible?



Glaston TC Series dual chamber tempering furnace



Continuous VIG sealing line

- Min 3+0.15V+3 tempered VIG
- Fully tempered glass
- No evacuation holes
- Low temperature Metal edge sealing
- One Step successive Sealing
- Lead free materials
- No expansion & contraction
- 25 years lifetime
- 15 years warranty

## HaanGlas Basic VS HaanGlas Pro



| Criteria                           | HaanGlas Basic                                                                                              | HaanGlas PRO                                                                                               |
|------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Innovative Vacuum Insulating Glass |  <p>HaanGlas VIG Basic</p> |  <p>HaanGlas VIG Pro</p> |
| Glass Sealing Material             | Low Temperature Glass Solder                                                                                | Low Temperature Metal                                                                                      |
| Min Thickness                      | 6.15mm annealed                                                                                             | 6.15mm Tempered                                                                                            |
| Pillar Materials                   | Translucent Ceramic pillars                                                                                 | Black/translucent ceramic pillars                                                                          |
| Pillar Distance                    | 40*40mm                                                                                                     | 25*25/30*30/40*40mm                                                                                        |
| Getter Type                        | Stripe Shape                                                                                                | Round Getter/ Needle Shape                                                                                 |
| Evacuation Holes                   | No                                                                                                          | No                                                                                                         |
| Edge Width                         | 8-12mm                                                                                                      | 10mm                                                                                                       |
| Best U value-W/m2.k                | 0.45W/m2.k                                                                                                  | 0.45W/m2.k                                                                                                 |
| Toughen Status                     | 6.15   8.15 Heat Strengthened<br>10.15   12.15 Toughened                                                    | All Toughened                                                                                              |
| Supplying Capability               | 300,000sqm / Year                                                                                           | 50,000sqm / Year                                                                                           |

## Vacuum Glazed Aluminium Windows - Best U value 0.74W/(m2K)

- American MANI | NFRC certified Aluminium Frame Windows.
- VWS 70 | VWP 91 Aluminium windows Series
- Covering 10 different windows types.
- Best U value 0.74W/(m2K)
- AAMA -CW PG 40-60



## Contact Info



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