

**INTRODUCTIONS  
to  
LANDGLASS & LandVac**

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## I. Introduction to LandGlass :

### 1、 About us:



LandGlass Technology Co., Ltd. is a high-tech enterprise specializing in R&D, manufacture and sales of tempering furnaces and tempered vacuum insulated glass (VIG units).

There are more than 500 employees in LandGlass. Apart from the company headquarter which is located in the downtown of Luoyang, LandGlass has a Tempering Furnace Manufacturing Base in Luolong District with over 68,000 square meters, a Tempered Vacuum Insulated Glass Manufacturing Base in Yibin District with over 200,000 square meters and a New Products R&D Base in suburb with over 25,000 square meters.

Now, LandGlass has got more than 530 authorized patents for VIG, in which there are around 170 foreign patents in Europe, USA, Australia, Canada, Russia, Japan, Korea, etc.

## 2. Company's Honors

**2004** Provincial Enterprise Technology Center

**2008** High-tech Enterprises in Henan

**2012** Postdoctoral Research and Development Base in Henan

**2012-2013** Top Award in the industry and the Gold Medal of Chinese Patent in two consecutive years

**2015** Intellectual Property Advantage Enterprise, the only enterprise selected in Luoyang

**2017** Awarded as the "Leading Innovation Enterprise of Henan Province in 2017", the only enterprise in Luoyang which successfully passed the evaluation of Henan Provincial Department of Science and Technology.

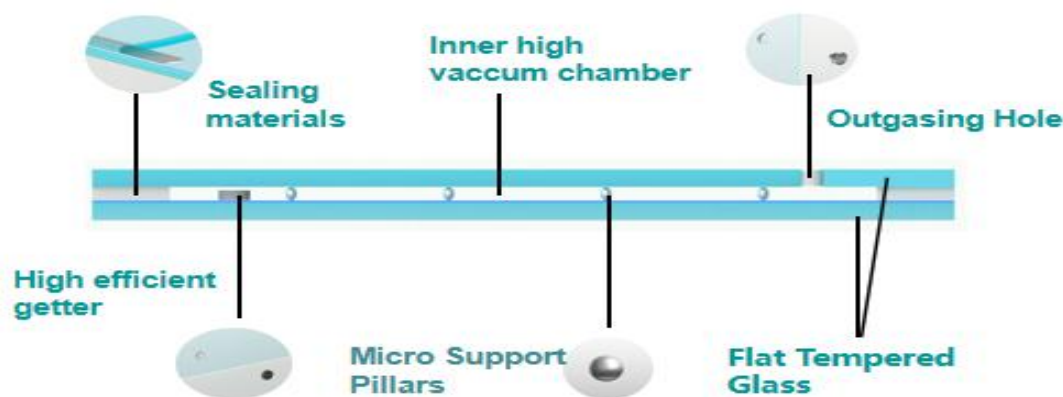
**2018** Selected in the list of "Technical Innovation Capability Top 1000 of China in 2018"



## II. About LandVac Unites

Fully Tempered Vacuum Insulated Glass of LandGlass ( LandVac )

### 1. Structure of LandVac



### 2. Specifications of LandVac Units

Items	Configurations	Main Parameters	Descriptions Thickness optional
Standard VIG	5TL+0.3V+5T	1. U Value < 0.5W/m <sup>2</sup> K. 2. Visible Light Transmittance is 75%.	4mm/5mm/6mm
VIG+IG	5T+9A+5TL+0.3V+5T	1. Max size : 1450*2480mm 2. Min size : 300*300mm Remarks: LandVac unit is a customized glass product. Its properties of U value, visible light transmittance and shading coefficient can be adjusted as per customers' requirements.	6mm/9mm /12mm/16mm
VIG+LG	5T+0.3V+5TL+0.76P+5T		0.76mm or 1.52mm
Remarks : 5T for 5mm clear glass. 0.3V for 0.3mm vacuum chamber, 5TL for 5mm Low-E glass . A for air space. P for PVB laminated layer			

## Tempered Vacuum Insulated Glass

### (1). Fully Tempered Glass



The stress at any points on the surface of LandVac exceeds 90 MPa, LandVac becomes small particles with obtuse angles after being broken. LandVac meets the national standard of toughened glass GB15763.2-2005, has passed the American Safety Glass Standard ANSI Z97.1 and obtained the Certification of American SGCC ( Safety Glass Certification Association ). The strength of wind resistance of LandVac reached up to +7200Pa ( ATI Laboratory Test Report of the United States ) and reached the top standard of wind pressure resistance grade 9 in China ( Grade 9 is more than 5000Pa ).



(2). Excellent Thermal Insulation Property:



TEST REPORT

Report No.: F7090.01-109-44

Rendered to:

LUOYANG LANDGLASS TECHNOLOGY CO., LTD.  
Luoyang  
CHINA

PRODUCT TYPE: Tempered Vacuum Insulated Glass  
SERIES/MODEL: LandVac SL4

Title	Summary of Results
Design Pressure	$\pm 7200 \text{ Pa} (\pm 150.38 \text{ psf})$

The thermal insulation performance of vacuum insulated glass is based on the theory of vacuum flask, the heat insulation effect of LandVac is more than 1.5 meters thick brick wall, it is 6 times than that of the normal insulating glass. U value is as low as  $0.4 \text{ W/m}^2\text{K}$  ( European IFT Laboratory Test Report ) .

(3). Outstanding Sound Insulation & Noise Reduction Properties

国家安全玻璃及石英玻璃质量监督检验中心  
检 验 报 告

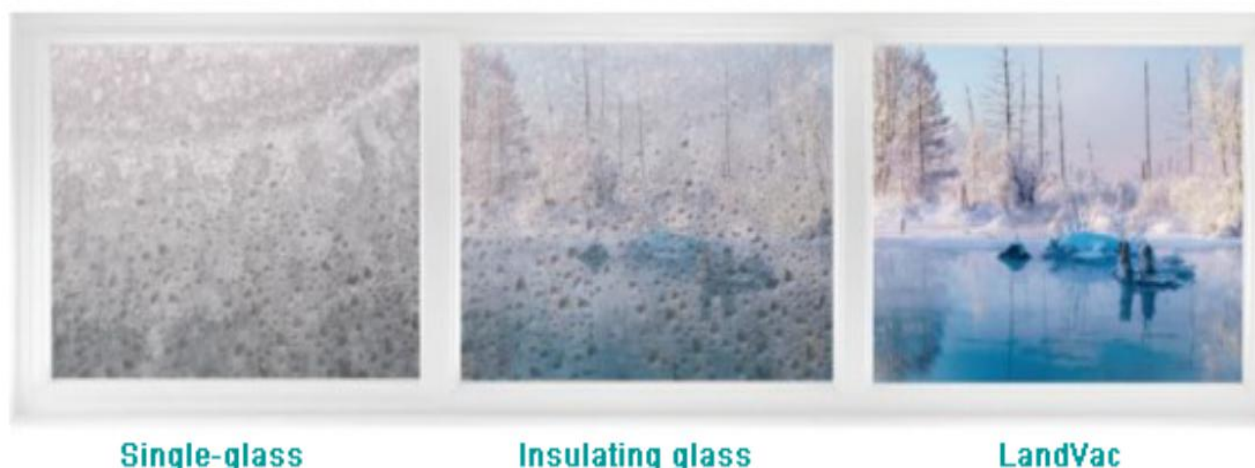
报告编号: WT2018E99A00046-1 第 2 页 共 8 页

样品规格: 1500mm × 1000mm × 10.3mm	仪器设备: BN-138 传声器单元; BN-139 传声器单元; BN-135 声级计器(美国 CASSELLA); BN-147 频响道分析仪		
环境温度: 23℃	环境相对湿度: 50%RH		
检验项目	隔声性能		
检验依据	GB/T 8485-2008《建筑门窗空气声隔声性能分级及检测方法》		
标准要求	JC/T 1079-2006要求: 隔声性能应 ≥ 30dB		
试验结果			
样品编号	$R_w$ /dB	$C$ /dB	$C_{tr}$ /dB
20	39	0	-4
单项判定	符合		
备 注			

审核: [Signature]

The sound insulation and noise reduction performance of vacuum insulated glass is based on the fact that sound does not propagate in vacuum chamber. The Weighted Sound Reduction Index at full frequency band can reach up to 39dB ( CTC National Inspection Group Report ), while the weighted sound reduction index of regular insulated glass is 28 dB.

(4). Free of Dew Condensation



**Notes:** Indoor temperature is 25 ℃, outdoor temperature is -40 ℃, and relative humidity is 70%

Thank to the vacuum chamber of LandVac unit, so there is no inner condensation, even the temperature is lower than -40°. What's more, its lead-free sealing material has passed the RoHS Certification. Therefore, LandVac can be used in global high-end home appliance industry.

(5) . Super Service / Application Lifespan:





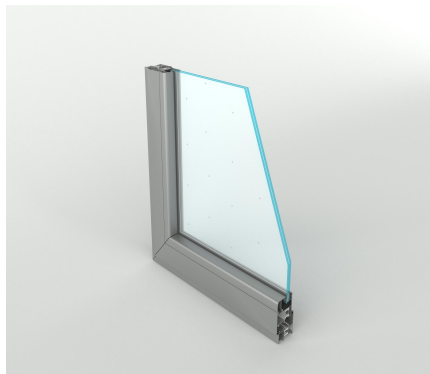
All kinds of materials consisting of LandVac units are inorganic. Even facing the high temperature, high moisture, high radiation and so on, LandVac units are not easy to get aged. Meanwhile, high vacuum chamber can protect the Low-E glass coatings from getting aged. In a word, the lifespan of LandVac can reach up to over 25 years.

#### (6) . Stable and Reliable Quality



The fully automated vacuum insulated glass production line at LandGlass has the annually capacity of 200,000 square meters. This production-line has passed ISO 9001:2015 Quality System Certification and the strict System Audit and Process Audit of BSH Household Appliances as well. All these will ensure every single piece of LandVac units has the reliable quality, which is insured by PICC Quality Assurance Insurance.

### 3. Comparisons with Insulated Glass



Items	Configurations	U Value ( W/m <sup>2</sup> K )	RW ( dB )	Thickness ( mm )	Weight ( kg/m <sup>2</sup> )
LandVac	5T+0.3V+5TL	0.45	39	10.3	25
Low-E IG	5T+12A+5TL	1.6	28	22	25
Triple Glazing with Low-E IG	5T+12A+5TL+12A+5T	1.2	32	39	37.5

### III. Some Application Cases



#### **Project 1 : Renovation Project for Beijing**

##### **Institute of Architectural R&D**

LandApplication Amount : 1500m<sup>2</sup>

Configuration : 6T+16Ar+5T+0.3V+5TL

Application : Window, Curtain wall

Profile : 105 Broken Bridge Aluminum

Notes: U value of whole windows unites <  
0.9 W/m<sup>2</sup>K



#### **Project 2 : Government Office Building**

##### **Project of Luoyang**

LandVac Application Amount : 2000m<sup>2</sup>

Configuration : 5TL+0.3V+5T

Steel frame concealed frame curtain wall

Application : Window, Curtain wall

Notes: U value of whole windows unites <  
0.9 W/m<sup>2</sup>K





### **Project 3 : Border Post**

LandVac Application Amount : 100m<sup>2</sup>

Configuration : 5TL+0.3V+5T

86 Aluminum-clad wood

Application : Windows & Doors glass

Notes : 40° difference of Internal and external without condensation



### **Project 4 : Erlitou Museum Project in Luoyang**

LandVac Application Amount : 100m<sup>2</sup>

Configuration : 4TL+0.3V+4T+1.52P+5T

Steel exposed frame

Application : Sunroof glass

Notes: High visible light transmittance & Low heat transfer

### **Project 5 : Villa Project of Country Garden in Guangdong**



LandVac Application Amount : 3000m<sup>2</sup>

Configuration : 5T+0.3V+5TL+14A

( warm edge ) +5T

75 Broken Bridge Aluminum

Application : Windows & Doors glass

Notes: U value of whole window unit < 1.0 W/m<sup>2</sup>K

### Project 6 : Villa Project in Weifang, Shangdong



LandVac Application Amount : 5000m<sup>2</sup>

Configuration : 5TL+0.3V+5T+9A+5T

88 Broken Bridge Aluminum

Application : Windows & Doors glass

Notes: U value of whole window unit < 1.0  
W/m<sup>2</sup>K

### Project 7 : Passive House Project in Xinjiang



LandVac Application Amount : 1000m<sup>2</sup>

Configuration : 5T+0.3V+5TL

80 High class Plastic steel

Application : Windows & Doors glass

Notes: U value of whole window unit < 1.0  
W/m<sup>2</sup>K

### Project 8 : Skylight System Project in Hebei



Usage amount LandVac : 1000m<sup>2</sup>

Configuration :

4T+9Ar+5T+0.3V+5TL+0.76P+4T

Aluminum-wood composite

Application : Skylight Glass

Notes: U value of whole windows unit < 0.9  
W/m<sup>2</sup>K



## IV、 Development Trend of the Future

In recent years, green building materials are being used in lots of public construction projects at the backdrop of the global advocacy of green building, especially in the low energy consumption and passive buildings, which has very strict requests for door and window glass. Vacuum insulated glass with its irreplaceable energy saving property wins the favor of passive and low energy consumption buildings. Undoubtedly, there will be a broad market prospect for VIG units. Meanwhile, vacuum insulated glass has a very broad developing prospect in green appliances, transportation, military development and other application fields.



### （七）新材料关键技术产业化

新材料产业是国民经济发展的重要基础。加快培育和发展新材料产业，对于促进产业转型升级，保障重大工程实施，提升制造业核心竞争力具有重要战略意义。产业化的重点任务是：

1、加快先进金属及非金属关键材料产业化。重点发展汽车用超高强度钢板及零部件用钢，高铁关键零部件用钢，高性能硅钢，发动机用高温合金材料，海洋工程及高技术船舶用钢，核电关键装备用钢，大型压铸模用热作模具钢，极地环境用钢，大型水电用高级别压力钢管及蜗壳用钢，高炉渣提钛产钛白粉，航空用轻合金材料，高端稀土功能材料，电子信息用关键材料，高端伺服电机用热压磁环及热压磁粉，核燃料贮存格架用钼基碳化硼中子吸收材料，新型稀有稀贵金属材料，石墨烯，8.5代 TFT-LCD 及以上玻璃基板，显示面板用高强盖板玻璃，钢化真空玻璃，高性能氮化硅陶瓷材料，

