



***NorthGlass***®

# CONTENTS



**01**

**NorthGlass  
Introduction**

**04**

**QA/QC Procedure**

**02**

**Jumbo Size Glass**

**05**

**Projects to visit**

**03**

**Single & 3D Curved**

**06**

**Anisotropy**

# NORTHGLASS

Founded in: 1995

Production base : Luoyang, Beijing, Shanghai, Tianjin,

with a factory area of 1.12 million square meters and 2200 employees

Main products: Glass machine builder & Glass processing

Product sales to: over 110 countries and regions



# CO-INNOVATION PUSH THE ENVELOPE TO NEW HEIGHTS

*Northglass has worked with many world-renowned and quality-demanding architects to create landmarks all over the world - the list includes:*

Architect	Projects
Foster+Partner	many many Apple Stores, Apple Head Quarter Mobility Pavilion for EXPO 2020, National Bank of Kuwait
Pelli Clarke Pelli Architects	Tokyo Azabudai Toranomom, Beijing Taking
Snøhetta & Blight Rayner	New Performing Arts Centre in Brisbane
Snøhetta	Beijing Library
SOM	Guangzhou Chamber or Commerce 22.5m glass
SLH	Shanghai Pudong East Library
KPF	Abu Dhabi International Airport
Gensler	Shanghai Center

# COLLABORATING WITH APPLE TO PUSH THE ENVELOPE

*Supplied glass to almost one hundred Apple Stores all over the world*

*As well as the Apple World Head Quarter in Cupertino, California - some hi-lighted:*

- 2008 Beijing Sanlitun, the first Apple Store in China with 8m flat glass
- 2009 Shanghai IFC, the first time to use curved tempered glass with 12.6m
- 2011 Hong Kong Causeway Bay, the biggest flat facade glass with 16.5m
- 2013 Apple World Head Quarter in Cupertino, California with 16m size
- 2015 Nanjing IST, the biggest curved facade glass with 14.5m height
- 2016 Dubai mall, 12m curved glass with TNG now single silver Low-E
- 2020 Changsha IFS, the first time to use mirror coating facade glass
- 2022 Beijing New Sanlitun Apple Store
- so far as of today...

# Beijing Sanlitun Apple Store (2008 ~ 2022)





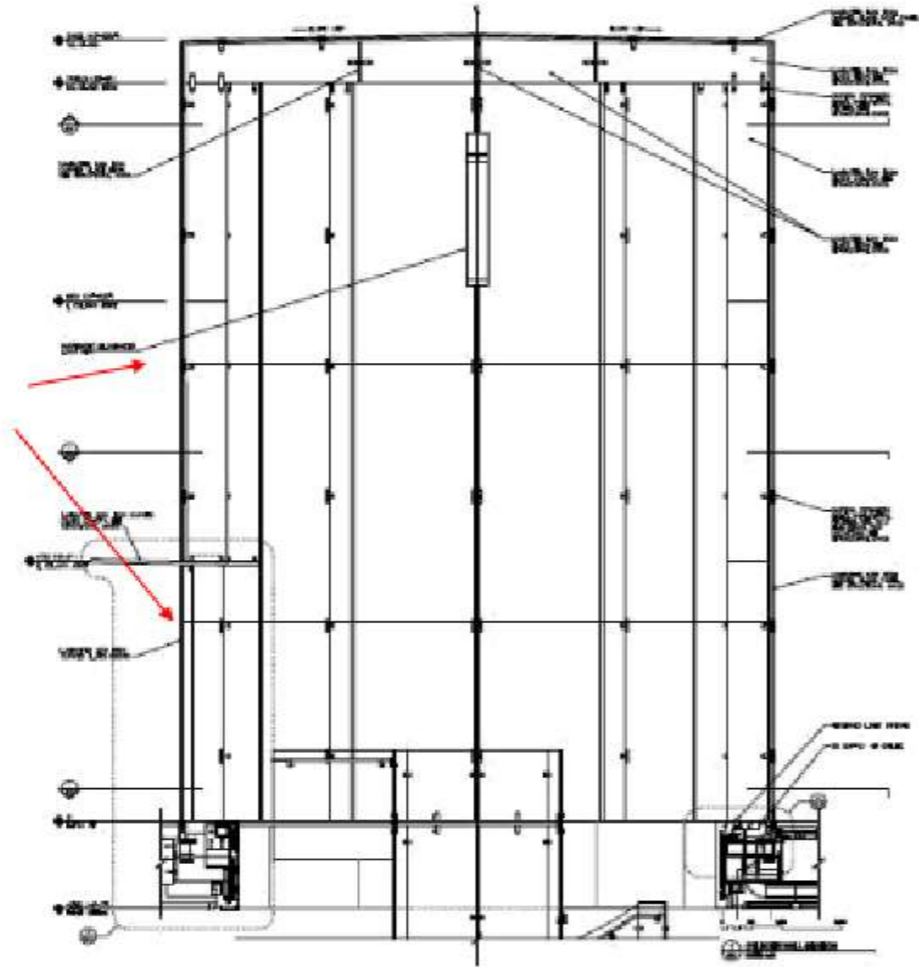
2010 Shanghai IFC

# Shanghai IFC Design Conception

Shanghai Pudong Apple Store

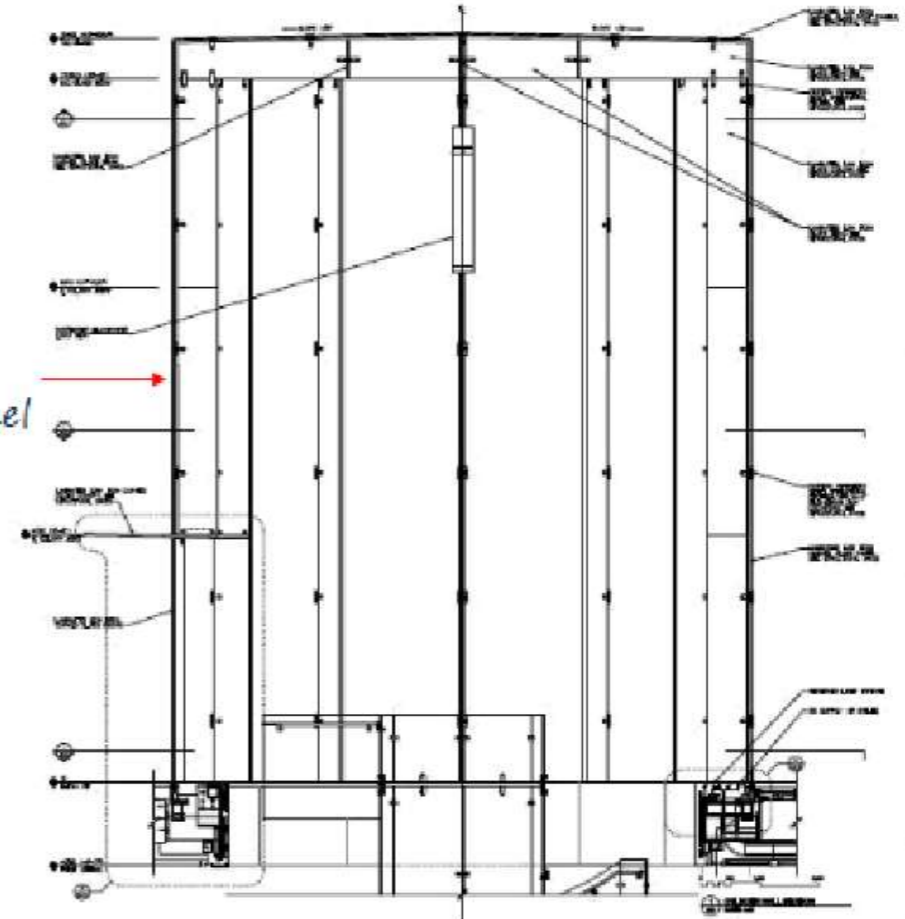
Shanghai Pudong Apple Store

Limited by size



Initial concept design

Seamless vertical panel



Innovative Design







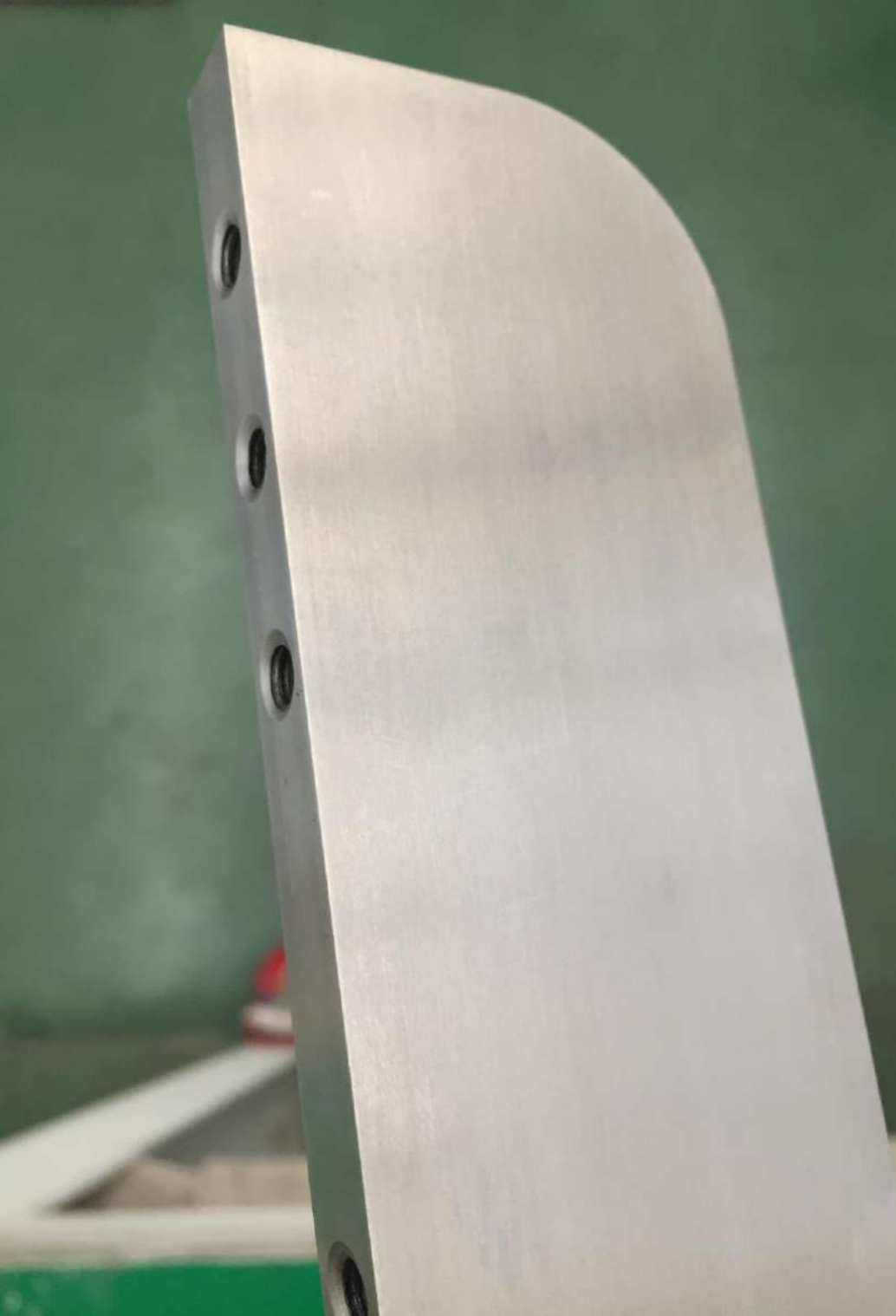
2011 Hong Kong Causeway Bay



# Kunming Apple Store



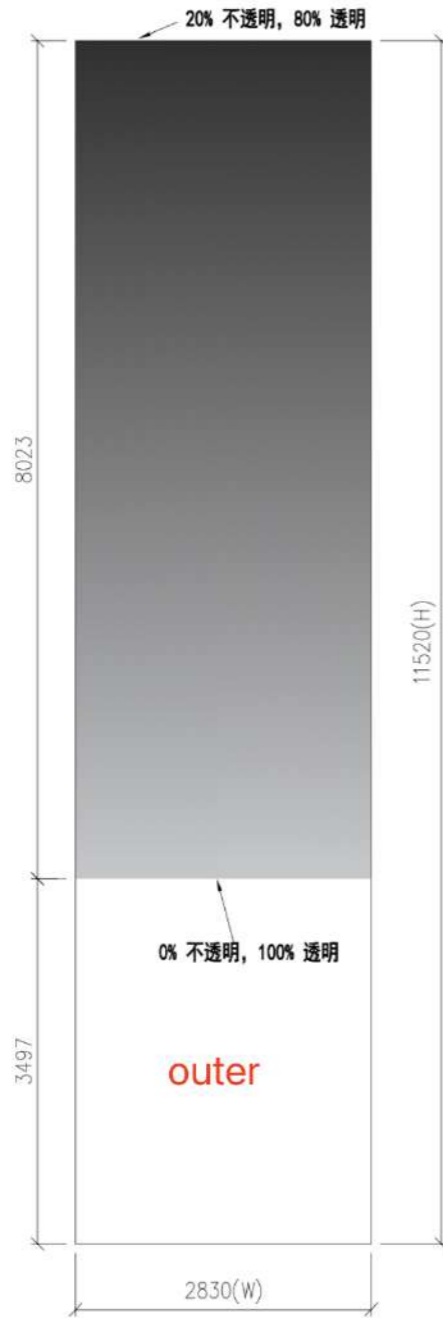




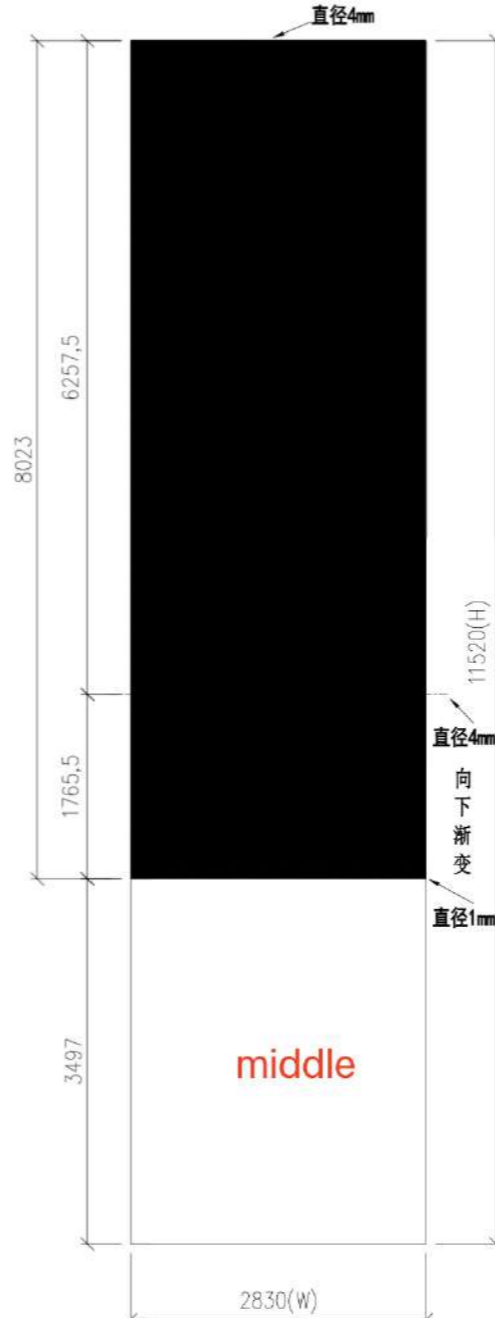


单片成品图，内视图，图1，面对图纸面为DIP和镜面膜面

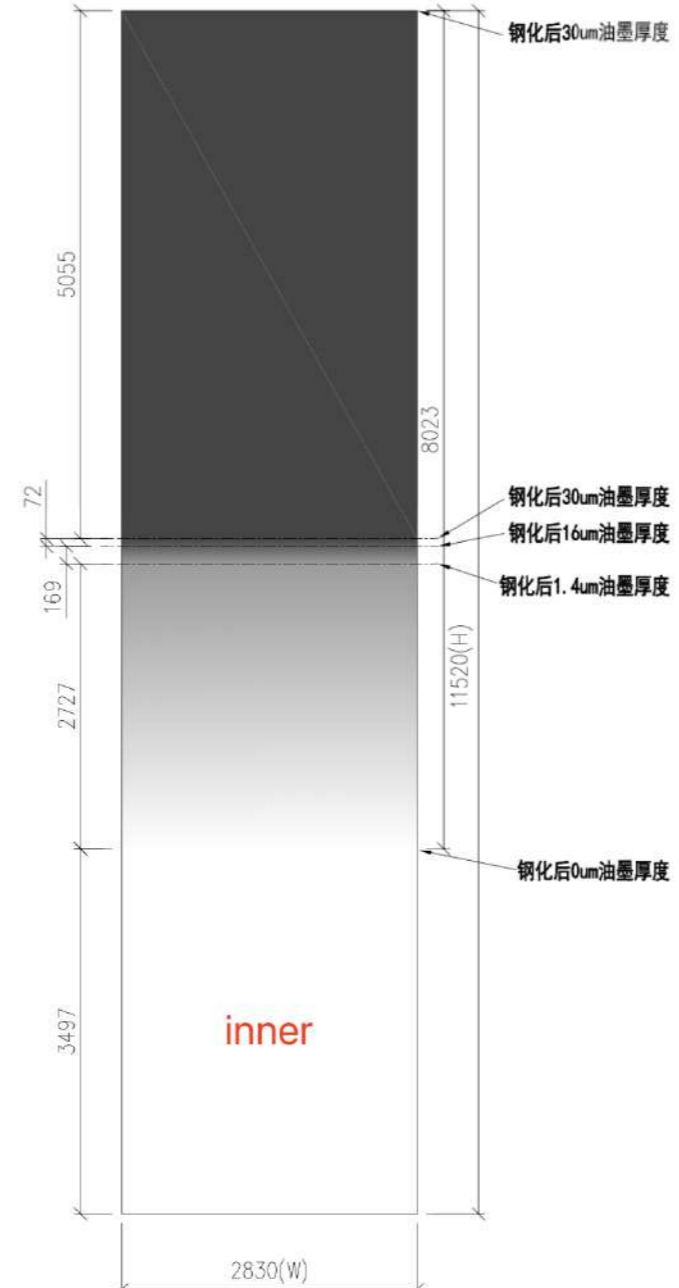
2#面、6#面DIP透明度油墨厚度详见文字描述



FG1-001-外片  
2#面-白色局部DIP



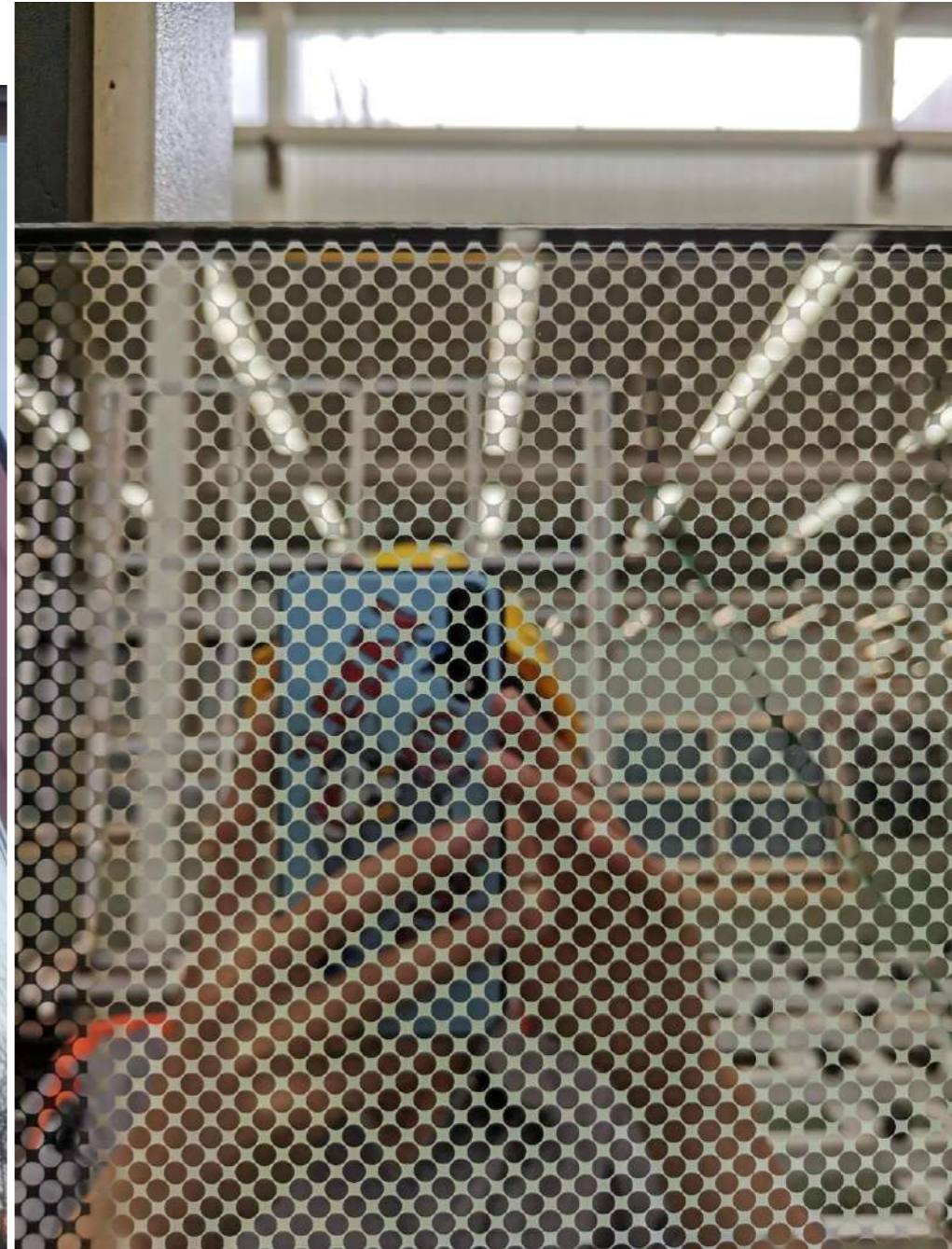
FG1-001-中片  
4#面-局部渐变圆点镜面膜



FG1-001-内片  
6#面-白色局部DIP



禁止拍照





2020/07/22 18:20

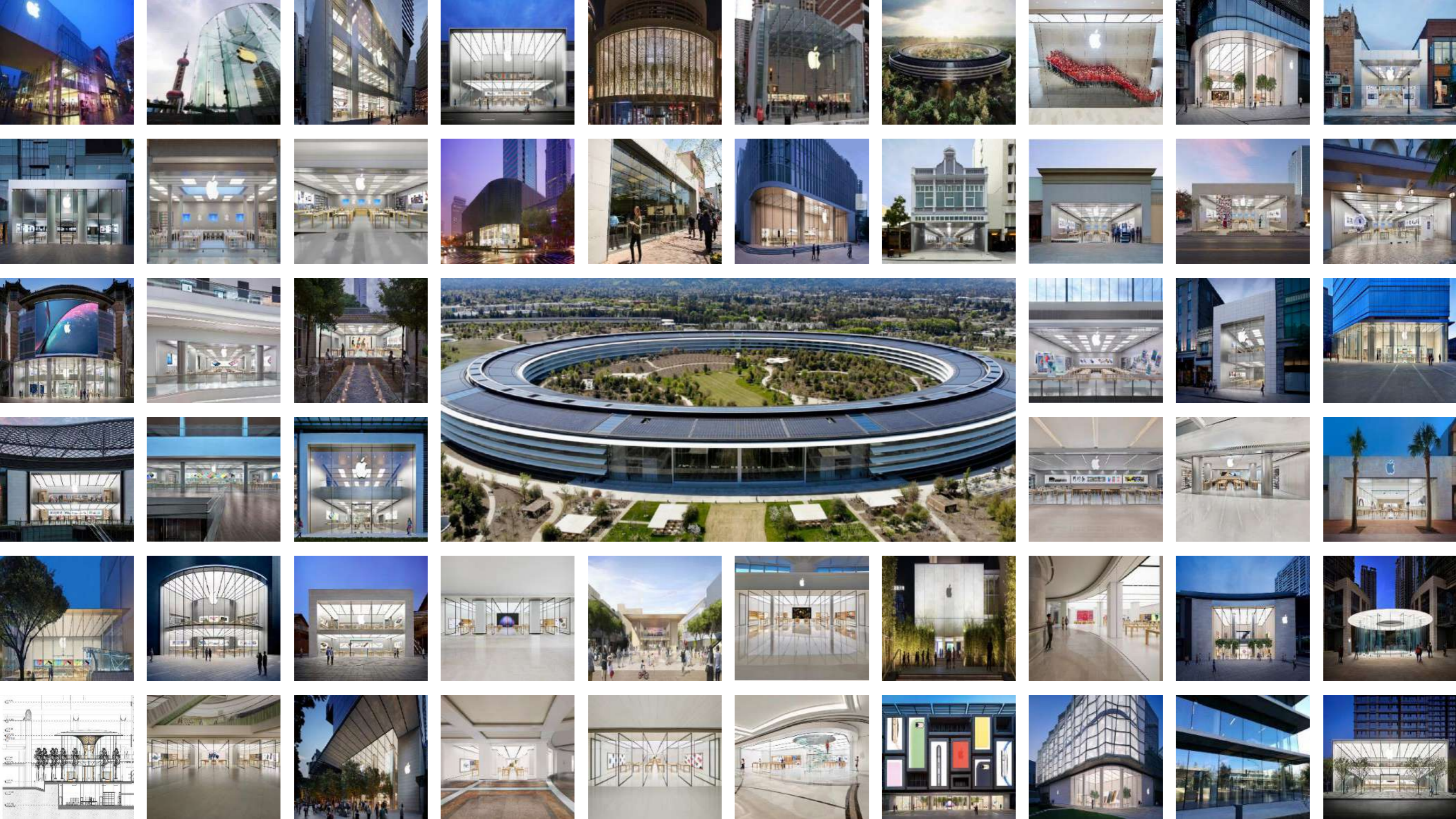


2020/10/31 10:43



2013 Apple World Head Quarter





# Tianjin NorthGlass Processing Capability



## - Coated glass (low iron and standard float glass)

Max. size: 3300x25000mm

## - Coated Glass (standard float glass)

Max. size: 4000x25000mm (in 2026 New Factory, triple Low E at the end of 2026, clear glass)

## - Flat tempering (low iron and standard float / uncoated glass)

Max. size: 3600x18000mm / 3300x25000mm

## - Flat tempering (coated glass)

Max. size: 3300x24000mm

## - Curved tempering (no solar or Low-E coating)

Max. size: 3600x18000mm

## - Curved tempering

Max. size: 3300x18000mm

## - Curved tempering (double Low-E)

Max. size: 3200x18000mm

## - Curved tempering (triple Low-E)

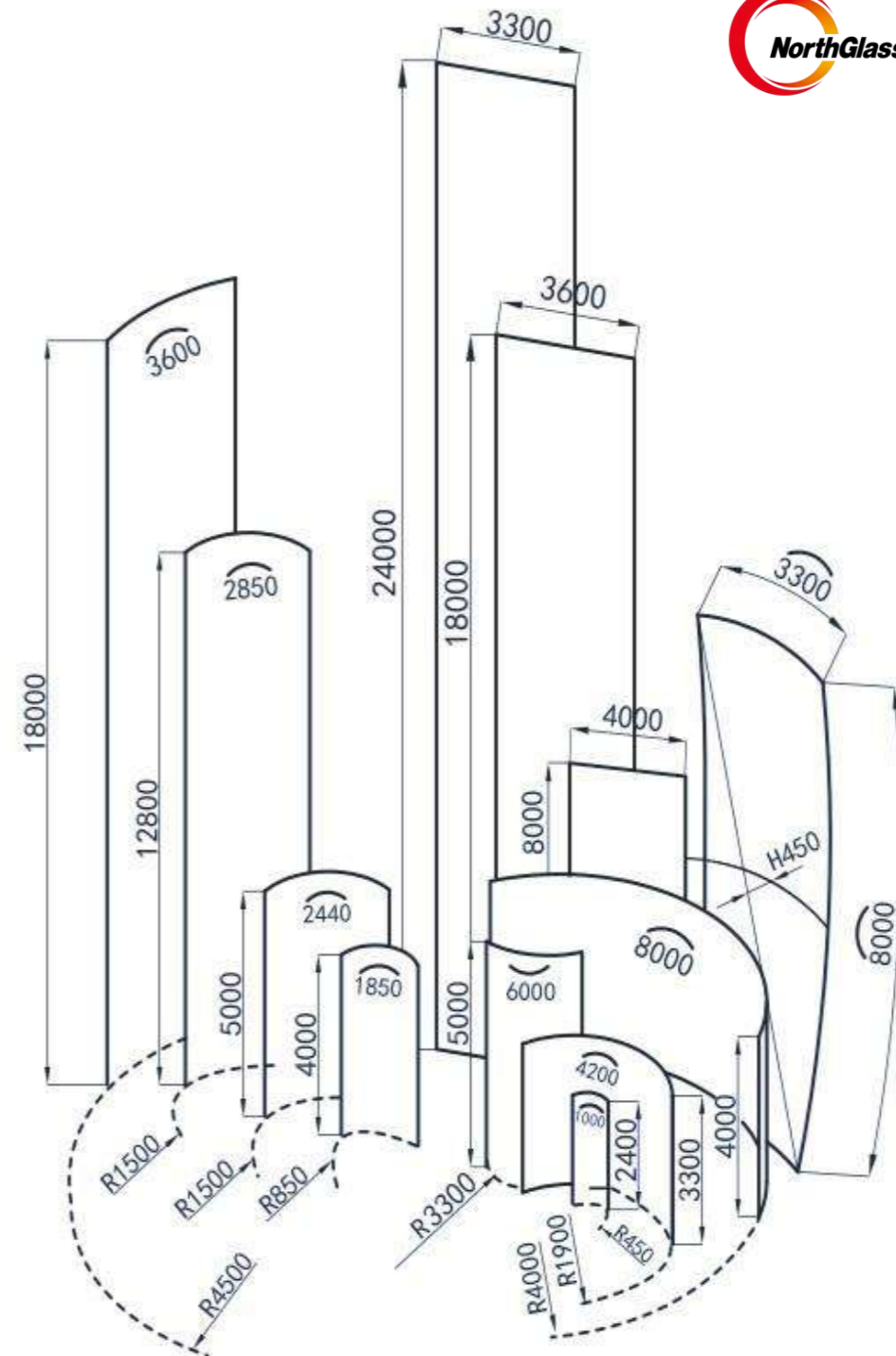
Max. size: 3200x18000mm

## - Digital printing

Max. size: 3300x18000mm

## - 4SG Spacer- Forever Saving Energy

Max. size: 3300x7000mm





**- Frit glass**

Laser Jet - Max. size: 3300x18000mm

**- Insulating, laminating, heat soak**

Max. size: 3600x18000mm

3300x25000mm

**- Min radius for curved glass**

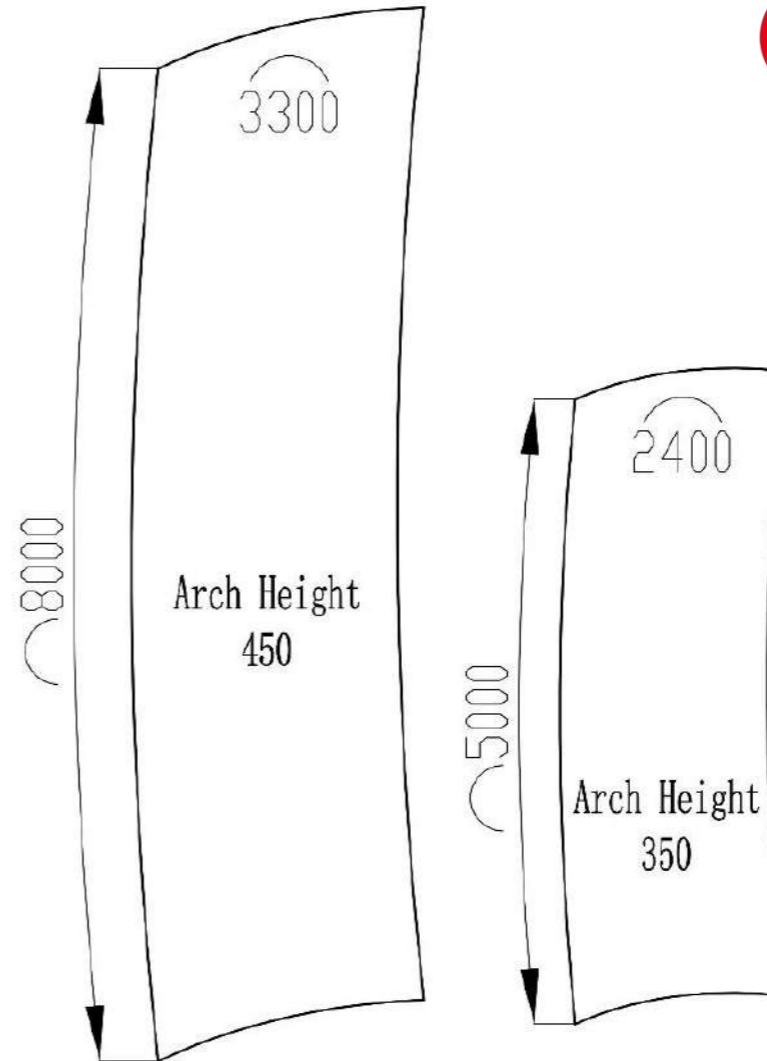
Min radius: 75mm

Max. size: 392mmx9000mm

Max. size: 392mmx12000mm

**- 3D curved glass**

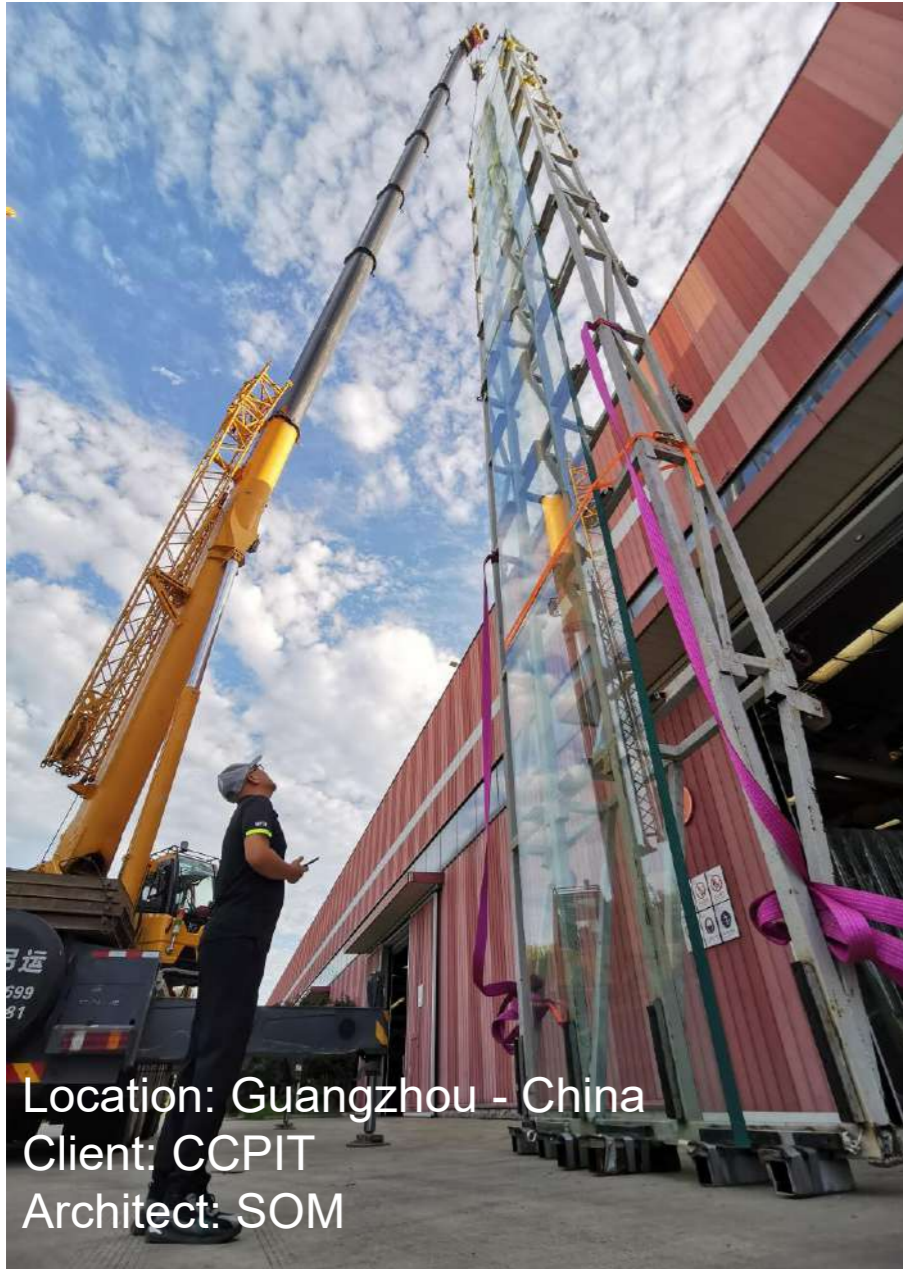
Max. size: 3300x12000mm (Max arc rise: 2500mm)



3D CURVED GLASS

# Jumbo Size Glass

# Guangzhou Commercial Center, 23m in Height



Location: Guangzhou - China  
Client: CCPIT  
Architect: SOM



# Qatar Lusail F1



# Taikang Tower

17meters  
Guinness World Record

Location: Beijing - China  
Client: Taikang  
Architect: Pelli Clarke & Partners / Arup







# Anji Cultural and Art Center, Zhejiang, China



Location: Zhejiang - China  
Client: Anji Construction Group  
Architect: MAD

19 Meters







# Single & 3D Curved Glass

# Dubai Apple Store



# Dubai Apple Store Main Build Up

- Facade: 12 low iron HS+1.52SGP+10 low iron Single Low-E TNG-E80 HS (#4) +18Ar+12low iron HS+1.52SGP+12 low iron HS (Curved)
- Fin: 5\*12 low iron FT&HST+4\*1.52SGP

名称 (Name)	可见光 Visible light			太阳能 Solar		SC EN	SHGC EN	U Value [W/(M <sup>2</sup> ·K)]EN
	透过 T <sub>vis</sub>	反射率R <sub>vis</sub>		透过T <sub>sol</sub>	反射R <sub>sol</sub>			
		Out	In					
12 low iron HS+1.52SGP+10 low iron TNG01-80E-DB HS (#4) +18Ar+12low iron HS+1.52SGP+12 low iron HS	68.0%	15.0%	13.0%	42.0%	16.0%	0.52	0.45	1.23
5*12 low iron FT&HST+4*1.52SGP	82.0%	7.0%	7.0%	57.0%	6.0%	0.66	0.57	4.17

# Palm Flower



Shanghai Jingan Apple Store 15m arc length curved tempered glass



# Washington M2050

Concave Curved Glass  
Radius = 2.9m



# Washington M2050

Concave Curved Glass  
Radius = 2.9m



# Washington M2050

Concave Curved Glass

Radius = 2.9m



# New Performing Arts Centre ,Australia

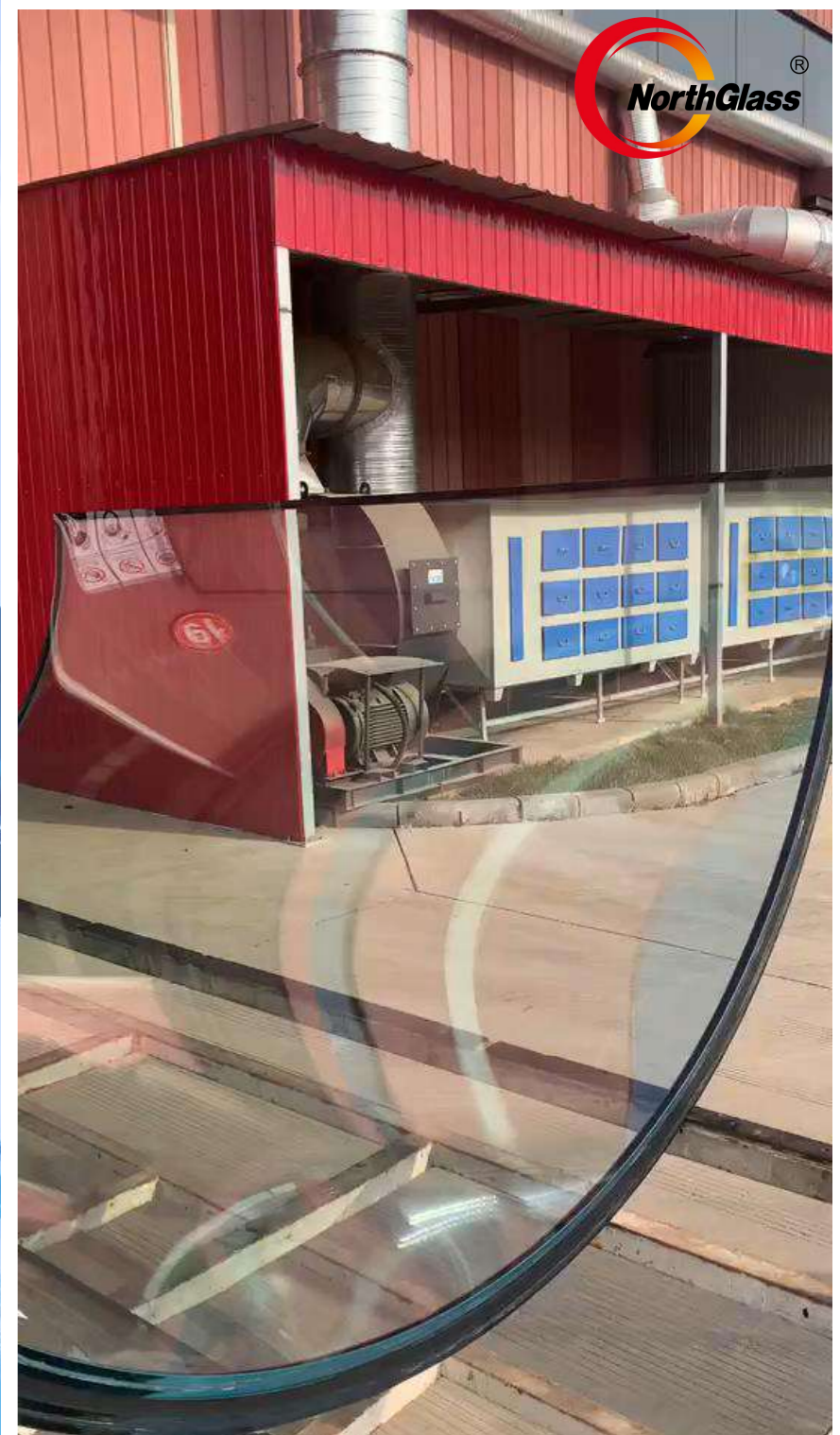
## 3D Curved Tempered Glass

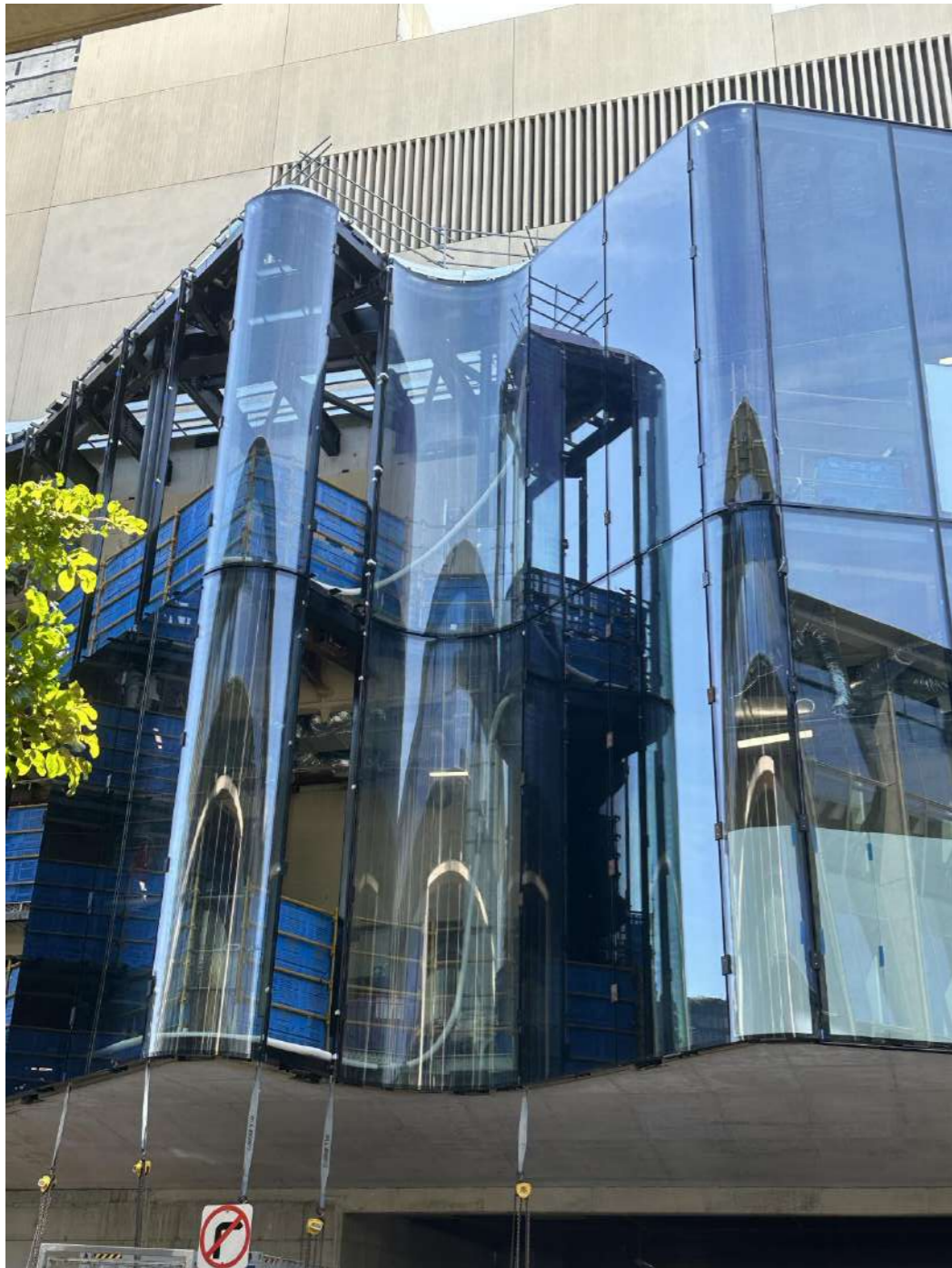
Height: 7.5m  
Arc length:3.3m  
Radius = 1m



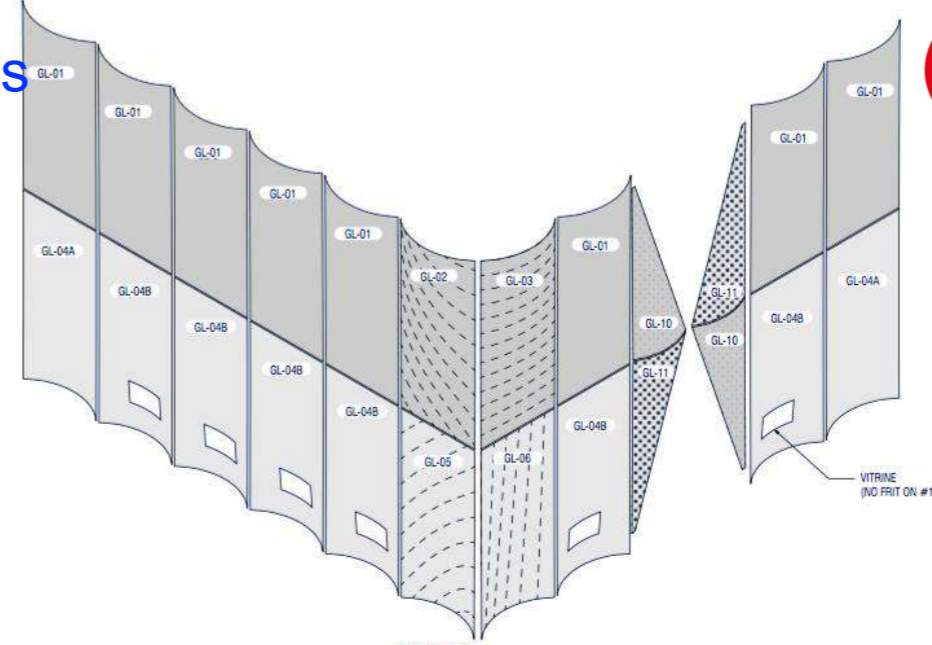
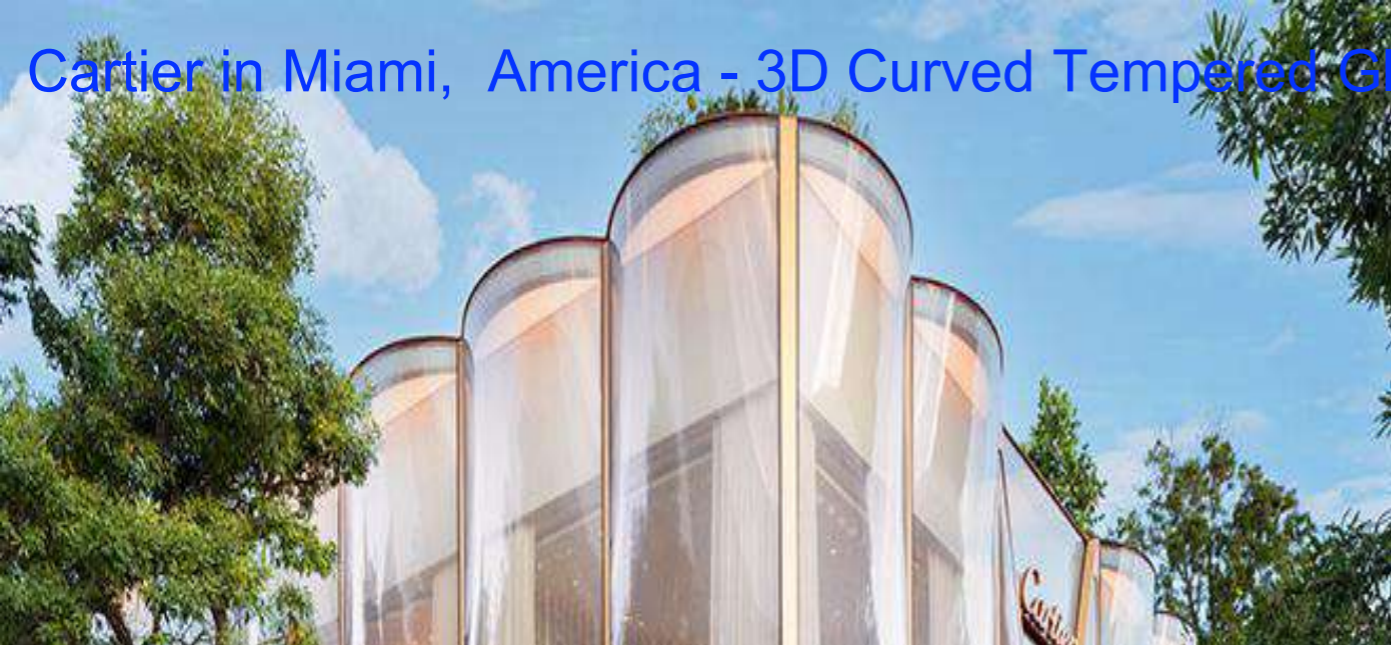
Location: Brisbane - Australia  
Client: QPAV  
Architect: Snohetta

Height: 7.5m  
Arc length: 3.3m  
Radius = 1m





# Cartier in Miami, America - 3D Curved Tempered Glass



Architect: Diller Scofidio + Renfro

Height: 7m

Arc length: 3.2m

Bottom Radius: 2.2m

Arc Rise: 533mm

#1 Digital Printing

#4 Low E



-19  
01-105

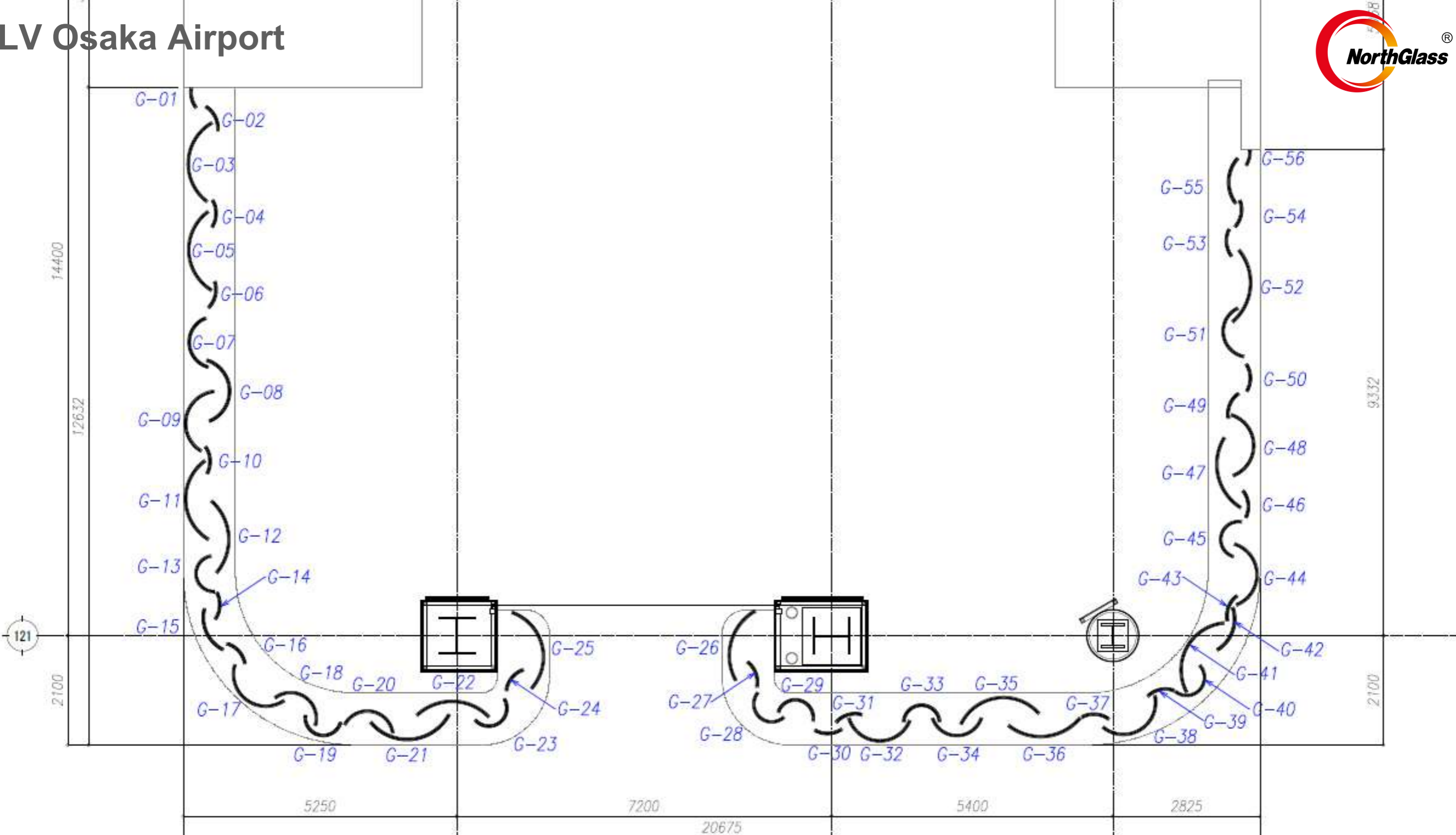
20 →

ラウンジ  
Lounge  
라운지 休息室

LOUIS VUITTON



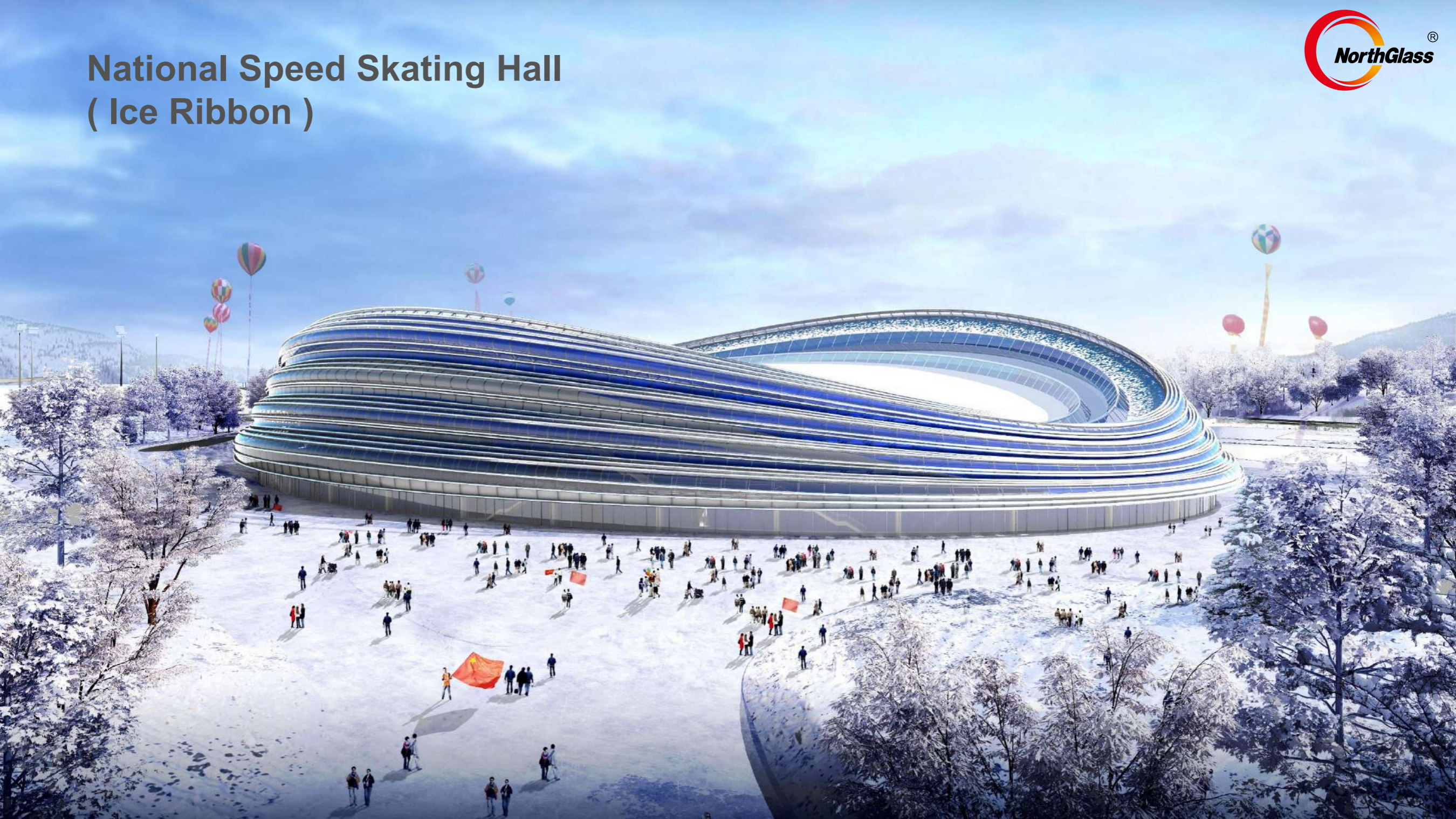
# LV Osaka Airport



# LV Osaka Airport

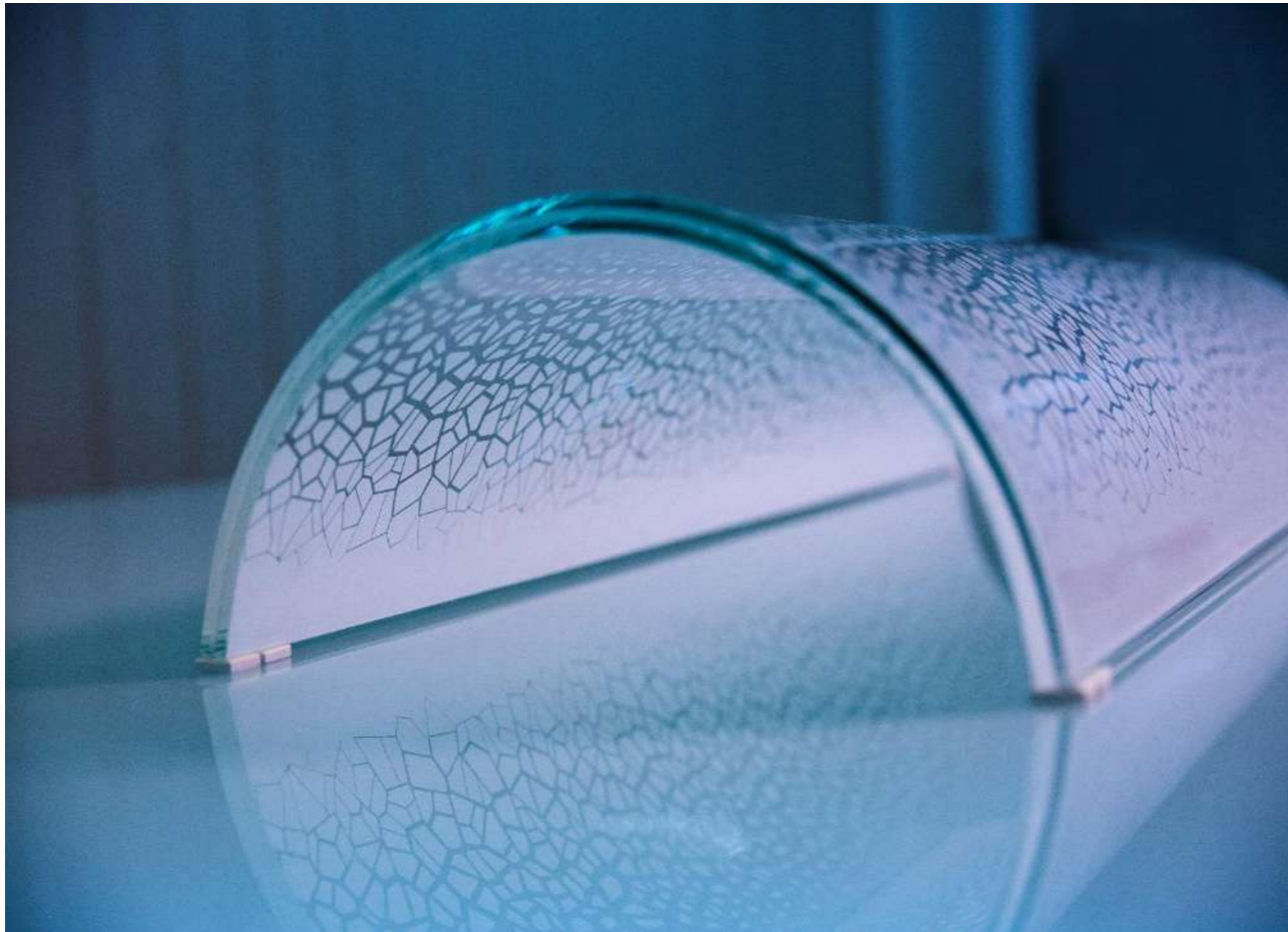


# National Speed Skating Hall ( Ice Ribbon )



# National Speed Skating Hall ( Ice Ribbon )

Heat Strengthened Laminated Glass  
Half Circle & R = 175mm



Shanghai Changfeng



Shanghai Changfeng



Shanghai Changfeng



Heat Strengthened Laminated Glass  
Half Circle & R = 125mm/175mm  
6mm +1.52SGP+6mm, low iron HS  
Height 4000mm



# Shenzhen Tengchuang Small Radius

30,000 glass tubes



Location: Shenzhen - China  
Client: Tencent  
Architect: Büro Ole Scheeren

# Huawei Red Bean



Location: Shanghai, China  
Client: Huawei



Amaala Yacht Club



# EXPO 2020 Mobility Pavilion

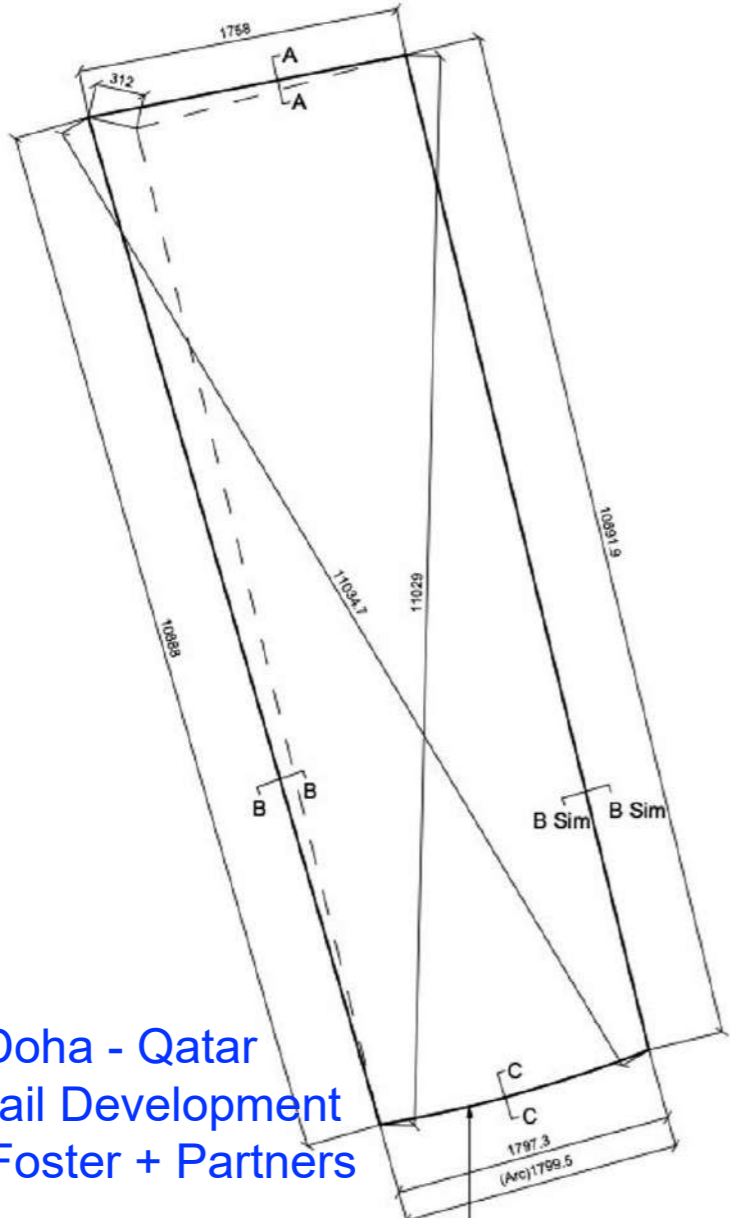


# EXPO 2020 Mobility Pavilion Performance Data

名称 (Name)	可见光 Visible light			太阳能 Solar		SC EN	SHGC EN	U Value [W/(M <sup>2</sup> ·K)]EN
	透过 T <sub>vis</sub>	反射率R <sub>vis</sub>		透过T <sub>sol</sub>	反射R <sub>sol</sub>			
		Out	In					
12mm HS extra clear SunGuard HP Neutral 50/32(#2)+20mm Air Space+6mm HS low iron+1.52mm PVB+6mm HS low iron	48.4	25.5	22.0	26.4	34.2	0.36	31.2	1.4
8mm HS extra clear with SunGuard HP Neutral 50/32(#2)+20mm Air Space+8mm HS low iron	49.7	26.1	22.5	29.9	38.4	0.37	32.4	1.4
8mm FT & HST low iron +1.52mm PVB+8mm FT & HST low iron	88.5	0.8	0.8	77.5	0.7	0.93	-	-
8mm HS low iron +1.52mm PVB+8mm HS extra clear with SunGuard HP Neutral 50/32(#4)+20mm Argon+8mm HS low iron	48.8	25.1	22.4	27.9	33.8	0.35	30.3	1.1
8mm HS low iron +1.52mm PVB+8mm HS extra clear with SunGuard HP Neutral 50/32(#4)+20mm Argon+5mm HS low iron +1.52mm PVB+5mm HS low iron	48.3	25.0	22.0	26.3	29.6	0.34	29.4	1.0
8mm HS low iron +1.52mm PVB+8mm HS extra clear with SunGuard HP Neutral 50/32(#4)+20mm Argon+5mm HS low iron with 100% black frit on surface 5+1.52mm PVB+5mm HS low iron	0.3	24.5	4.7	0.2	33.6	0.31	26.9	1.0

# Lusail Tower Podium glass, Qatar

- 3D Curved Tempered Glass
- one corner 400mm rise 11m height



Location: Doha - Qatar  
Client: Lusail Development  
Architect: Foster + Partners



# Lusail Tower Main Build Up

- 8mm low iron FT&HST+1.52PVB+8mm low iron TNG 03-51ND FT&HST (#4)+20AR+8mm low iron FT&HST+1.52PVB+8mm low iron FT&HST
- 8mm low iron FT&HST+1.52SGR+8mm low iron TNG 03-51ND FT&HST (#4)+20AR+8mm low iron FT&HST+1.52SGR+8mm low iron FT&HST (Curved)

名称 ( Name )	可见光 Visible light			太阳能 Solar		SC EN	SHGC EN	U Value [W/(M <sup>2</sup> ·K)]EN
	透过 T <sub>vis</sub>	反射率R <sub>vis</sub>		透过T <sub>sol</sub>	反射R <sub>sol</sub>			
		Out	In					
8low iron +1.52PVB+8low iron TNG03-51ND#4+20AR+8low iron+1.52PVB+8low iron	46.5%	16.6%	11.9%	21.1%	27.2%	0.25	0.22	1.1
8low iron +1.52SGR+8low iron TNG03-51ND#4+20AR+8low iron+1.52SGR+8low iron	45.7%	16.4%	11.8%	20.7%	25.5%	0.25	0.22	1.1

# SINGLE & 3D CURVED GLASS

Lusail Tower Podium glass, Qatar

3D curved with one corner 400mm rise 11m height



# FENIX Museum of Migration in Rotterdam, the Netherlands

## 3D Curved Tempered Glass



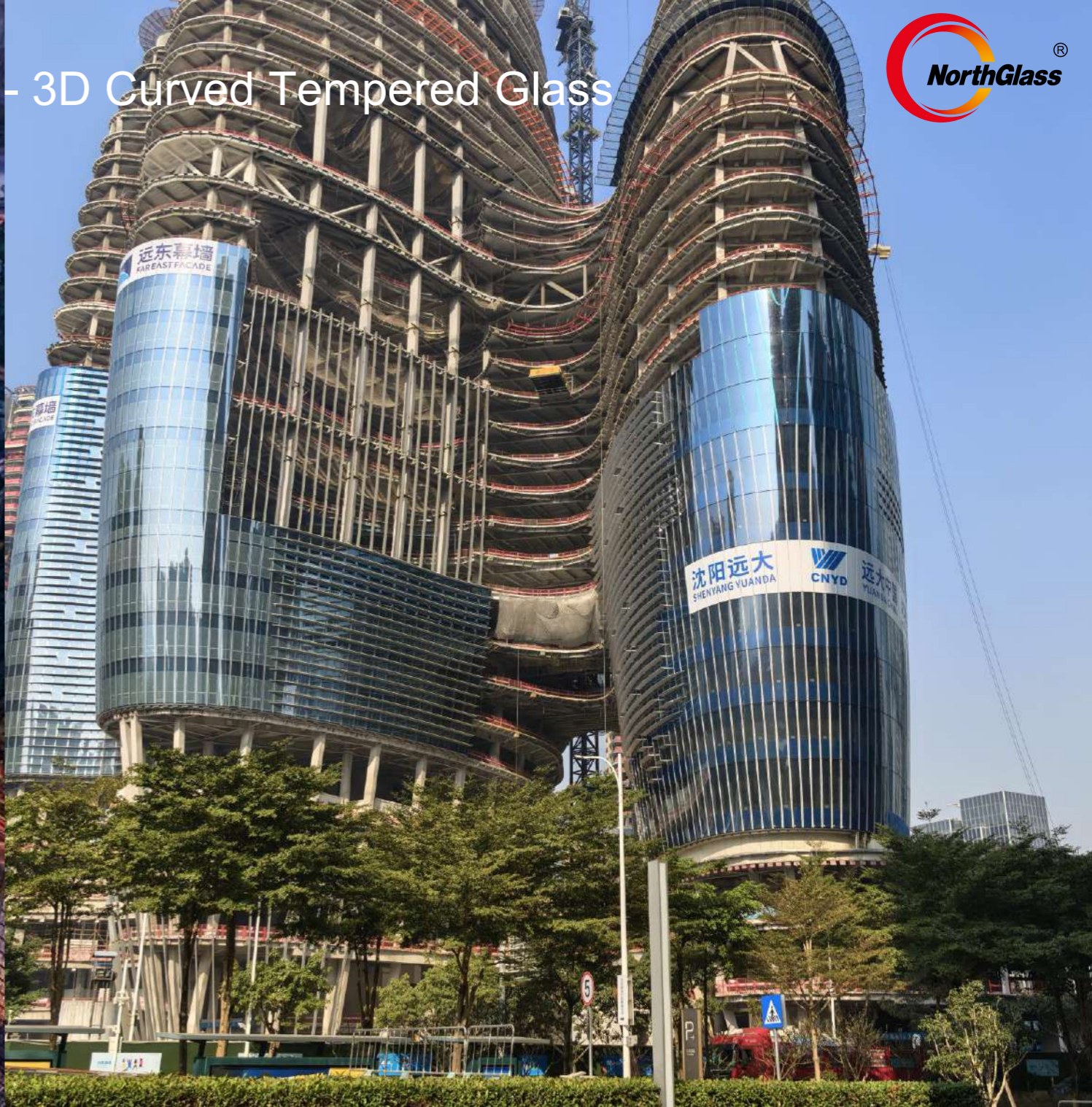
Location: Rotterdam - the Netherlands  
Architect: MAD



# Shenzhen OPPO headquarters, China - 3D Curved Tempered Glass



Location: Shenzhen - China  
Client: Oppo  
Architect: Zaha Hadid Architects



Middle East Project

- 3D Curved Tempered Glass



# Curved Tempered Glass

New technology  
for the visual reflection and anisotropy



# 4SG INSULATED GLASS

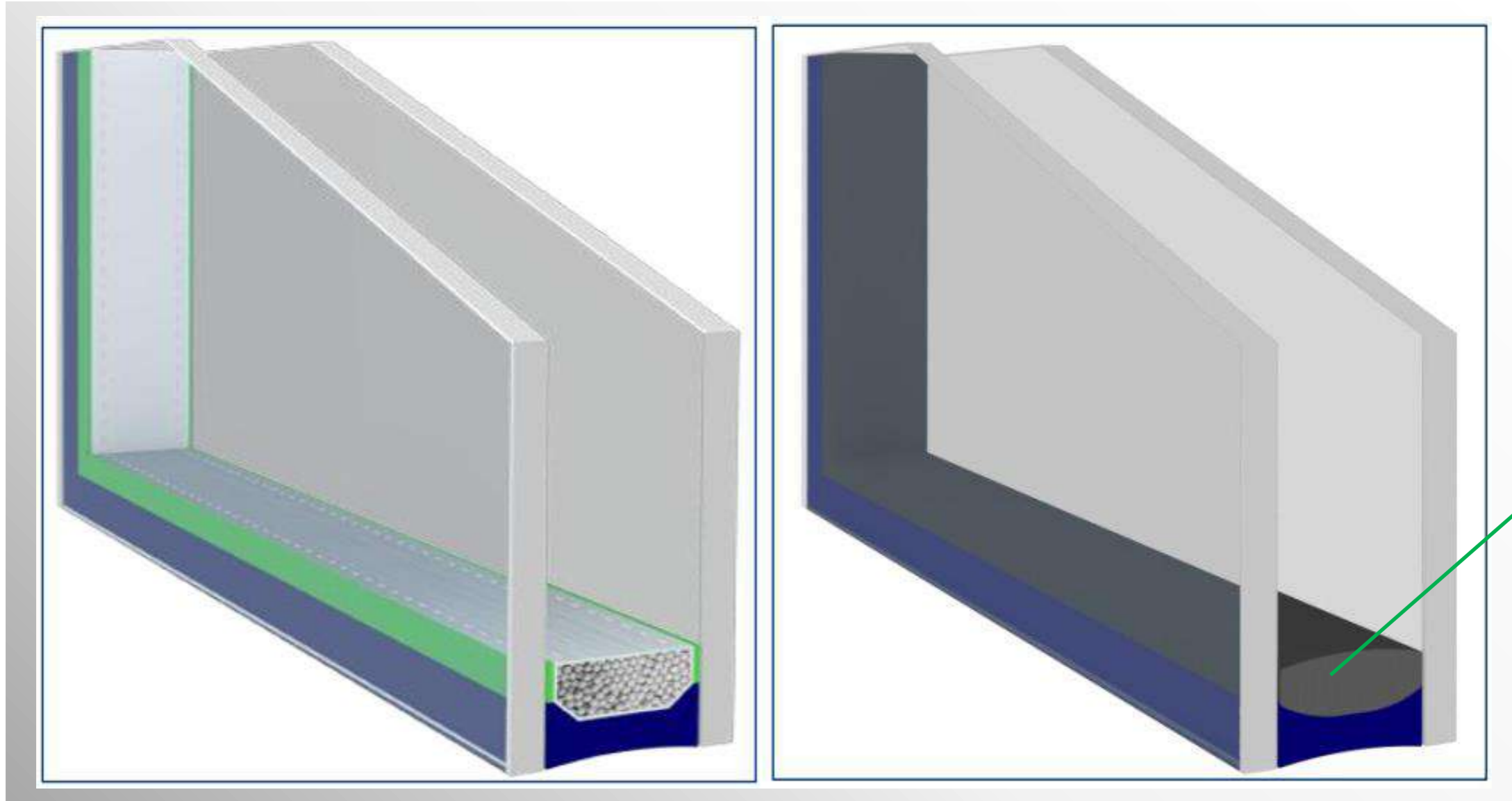


New Technology  
4SG Energy Saving IGU System

**TNG: Forever Saving Energy**

**Kommerling: For Structural Glazing**  
Max. size : 3300x7000mm

# Revolutionary Technology of Insulating Glass



4SG

# 4SG INSULATED GLASS

The Pumping Movement of Insulating Glass



隔条系统/*Box Spacer*



*Ködispace 4SG*



# Main advantage



0.1% vs 1%

## Gas loss

4SG **chemical bonding to glass and secondary silicone**. So it get the perfect and longtime sealing, the leakage rate for argon is less than 0.1% per year while the Traditional IGU is about 1% per year.

0.85 vs 1

## Performance

The performance can be increased about 15% compared with traditional warm edge IGU. Since the perfect seal of 4SG and the thermal conductivity of 4SG is only 0.25

25 vs 10

## Guarantee

The flexible edge seal withstands environmental loads during the entire lifetime of the insulating glass. so that the bonding between 4SG and glass surface always strong. The performance can keep longer. We can guarantee 25 years while Traditional only 10 years

1 vs 2

## Delivery time

Since fully automated application, No spacer bar bending, No PIB work. the speed of delivery time will be 2 times compared the traditional IGU.

# 4SG INSULATED GLASS

**LiSEC**



# Flat Glass Flatness & Anisotropy

# BEIJING LIBRARY

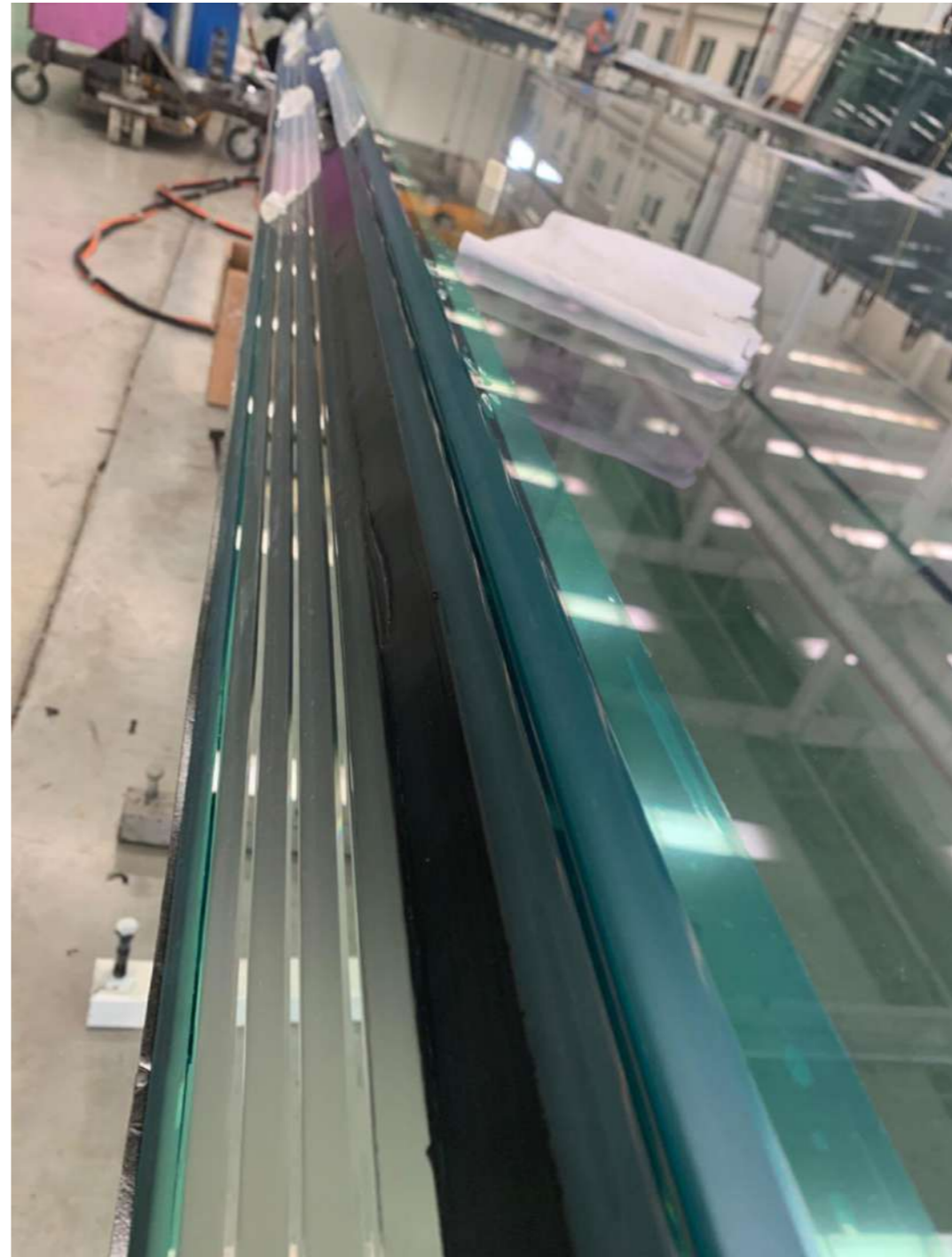
## The World Largest Structure Glass Project



16meters  
135mm thickness

Location: Beijing - China  
Client: Beijing Sub-Center  
Architect: Snohetta







TNG

# New Technology- tempered Flatness

TNG achieved excellent flatness by advanced advance T-Series furnace which NorthGlass independently developed and installed

Bow tolerance  $\leq 0.1\%$   
 Roller wave tolerance  $\leq 0.06/300\text{mm}$



Flatness -Tempered Glass		
Standard	Bow	Rollerwave
ASTM C1048-18	$\leq 0.3\% \sim 0.4\%$	$\leq 1.6\text{mm}/300\text{mm}$
GB 15763.2-2005	$\leq 0.3\%$	$\leq 0.6\text{mm}/300\text{mm}$
BS EN 12150 -15	$\leq 0.3\%$	$\leq 0.3\text{mm}/300\text{mm}$
T-Series Furnace	$\leq 0.1\%$	$\leq 0.06\text{mm}/300\text{mm}$





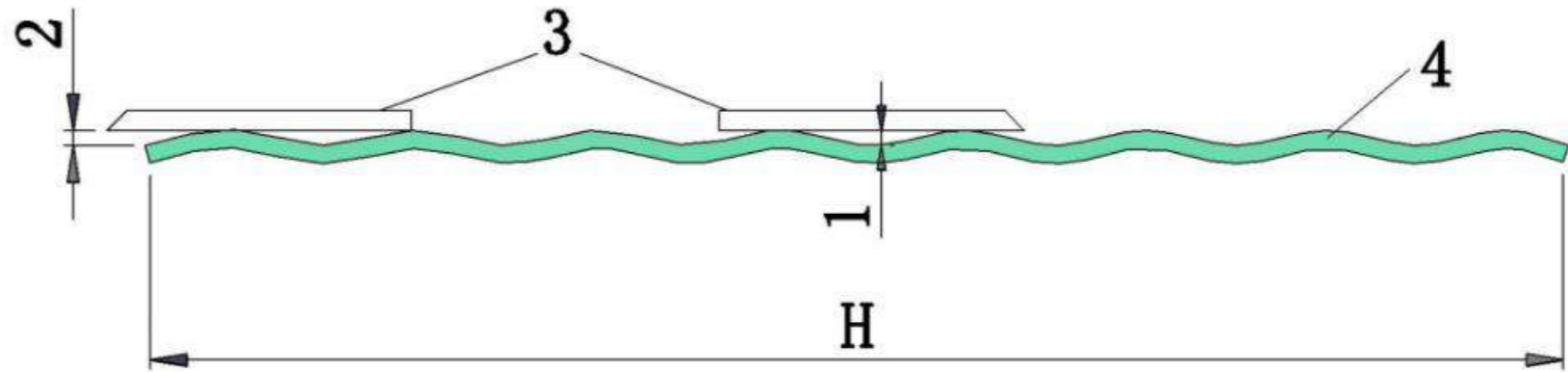
# Flatness request and visual distortion inspection for flat tempered glass

\* Roller wave

\* Edge lift

Distortion	欧标 EN	国标 GB	美标 ASTM	TNG
Roller wave	≤ 0.3 mm/300mm	≤ 0.6 mm/300mm	≤ 1.6 mm/300mm	≤ 0.06 mm/300mm
Edge lift	0.3mm	0.6mm	1.6mm	0.15mm

- 1 波形 Roller wave
- 2 边部翘曲 Edge lift
- 3 直尺 Straight edge
- 4 钢化玻璃 Tempered glass

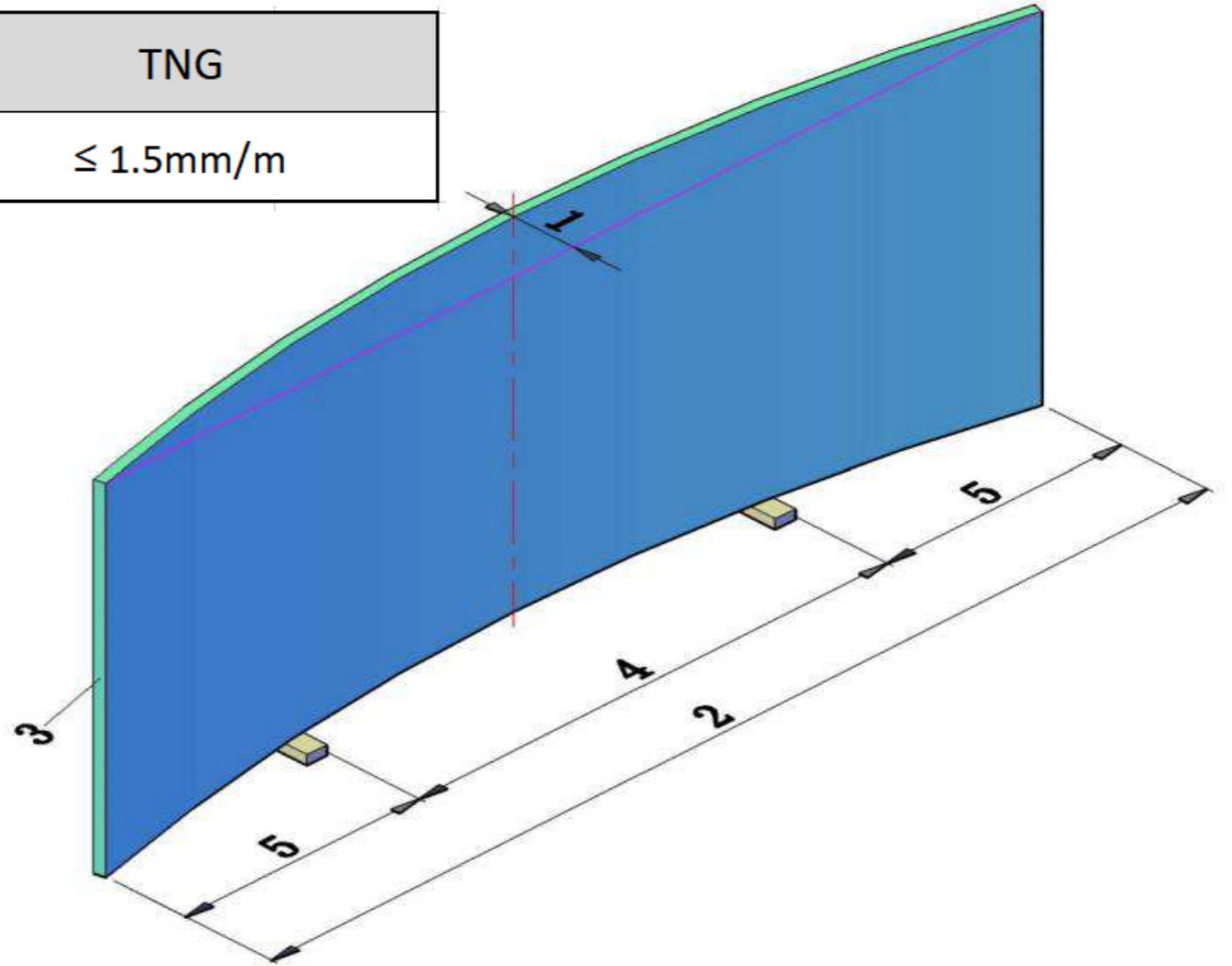


# Flatness request and visual distortion inspection for flat tempered glass

\* Overall bow

欧标 EN = 国标 GB	美标 ASTM	TNG
$\leq 3.0\text{mm/m}$	$\leq (2.0-5.0)\text{mm/m}$	$\leq 1.5\text{mm/m}$

- 1 弓形弯曲 Overall bow
- 2 W or H
- 3 钢化玻璃 Tempered glass
- 4  $(W \text{ or } H) / 2$
- 5  $(W \text{ or } H) / 4$



# Flatness request and visual distortion inspection for flat tempered glass

Visual distortion inspection - indoor



45° Zebra crossing



Cross grid inspection

# Flatness request and visual distortion inspection for flat tempered glass

Visual distortion inspection - outdoor



Bad visual distortion



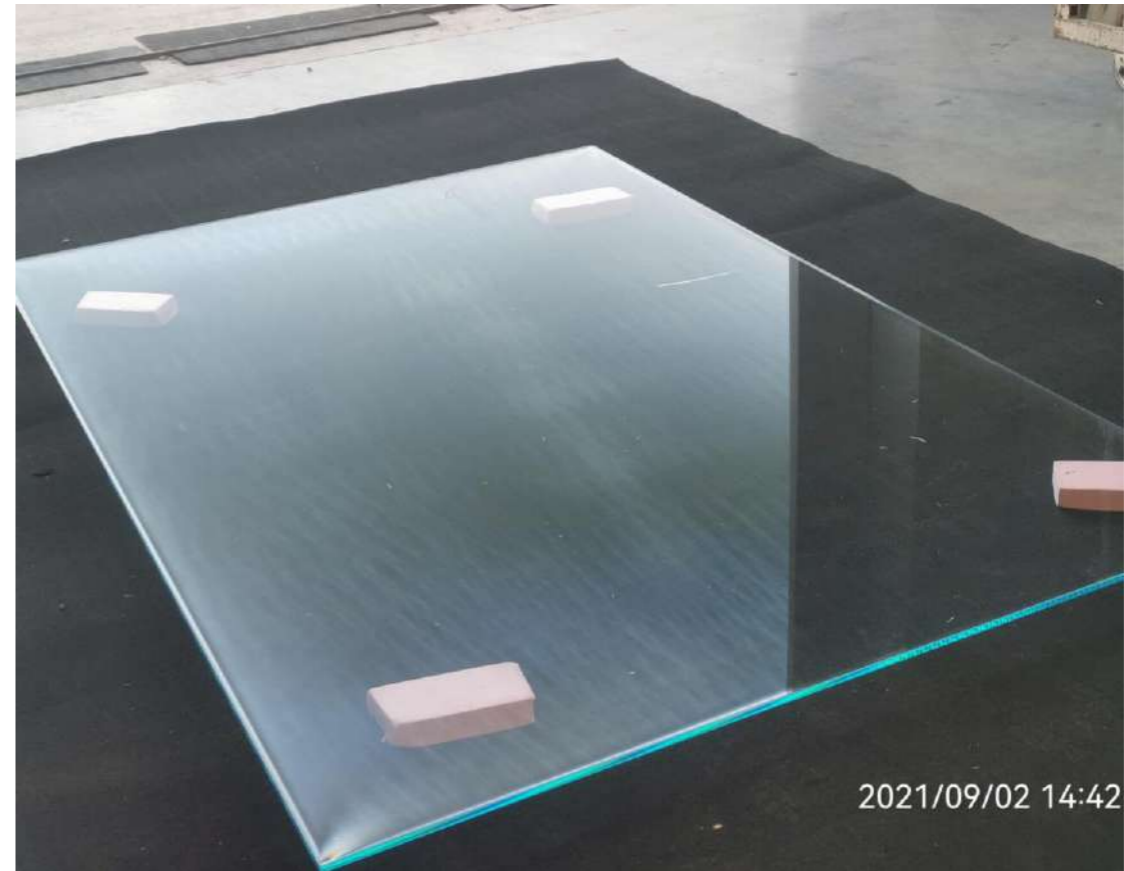
Good visual distortion (TNG quality)

# Flat tempered glass anisotropy control and inspection

Normal inspection method: inspect the tempered glass anisotropy by human eyes or polarized glasses under certain saturated light conditions.



Bad Anisotropy



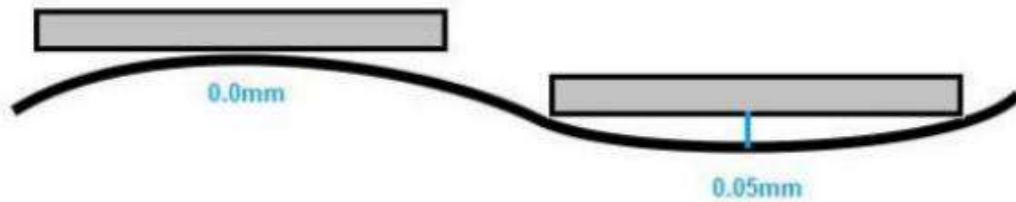
Good visual distortion (TNG quality)

# Distortion Scanner and Anisotropy Scanner

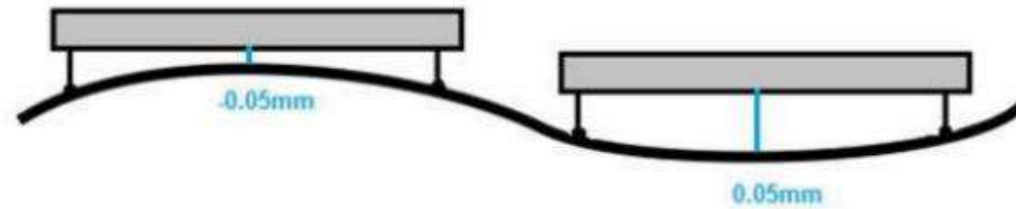


## The standard inspection method

Flat Bottom Gauge



3 Point Gauge



## Osprey provides Millidiopter (微曲光度)

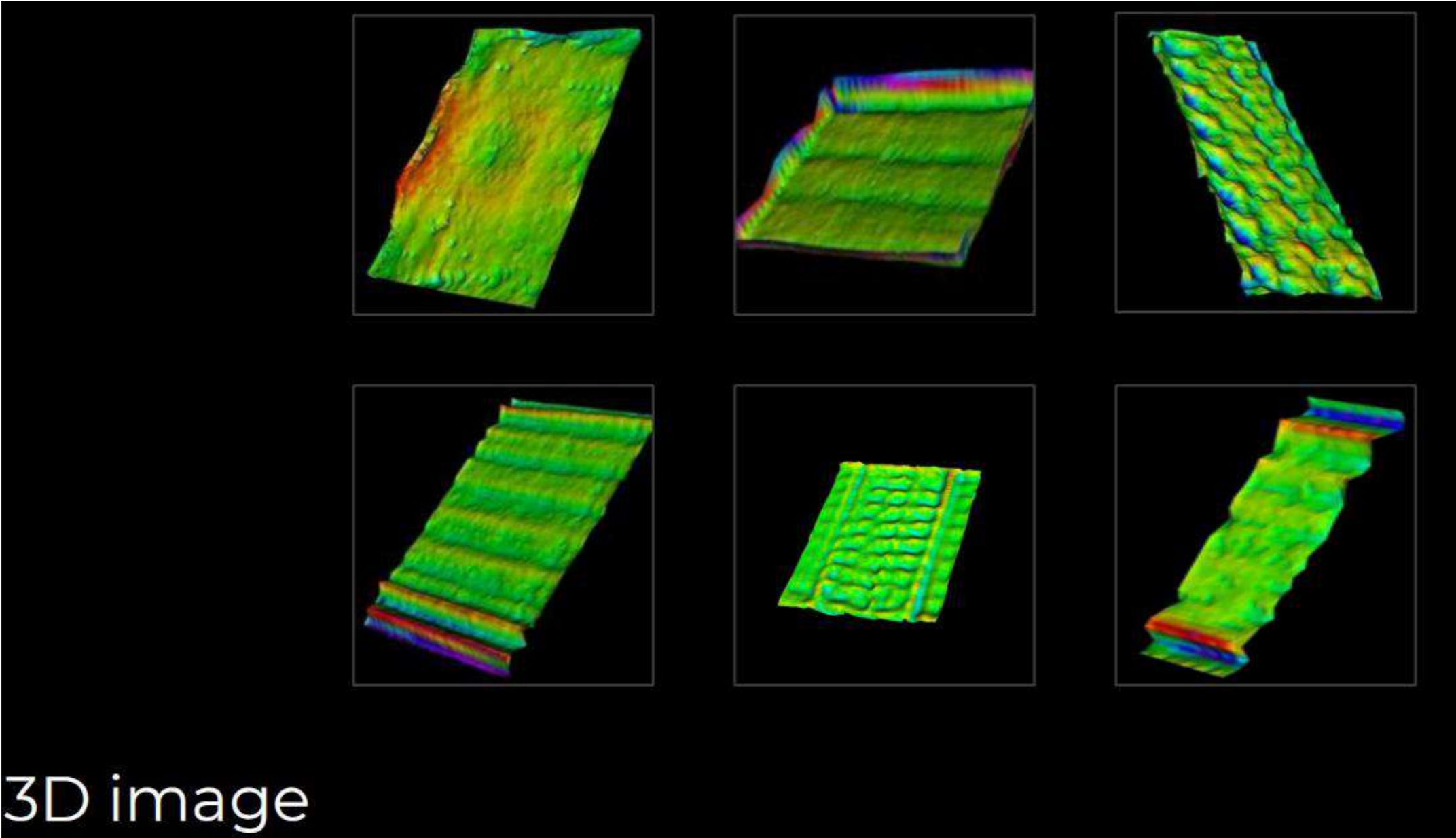
Millidiopter 微屈光度  
is a unit to measure lens power |  
inverse focus length | a  
measure of optical  
magnification  
用来测量镜头度数|反焦距|测量光学放大率



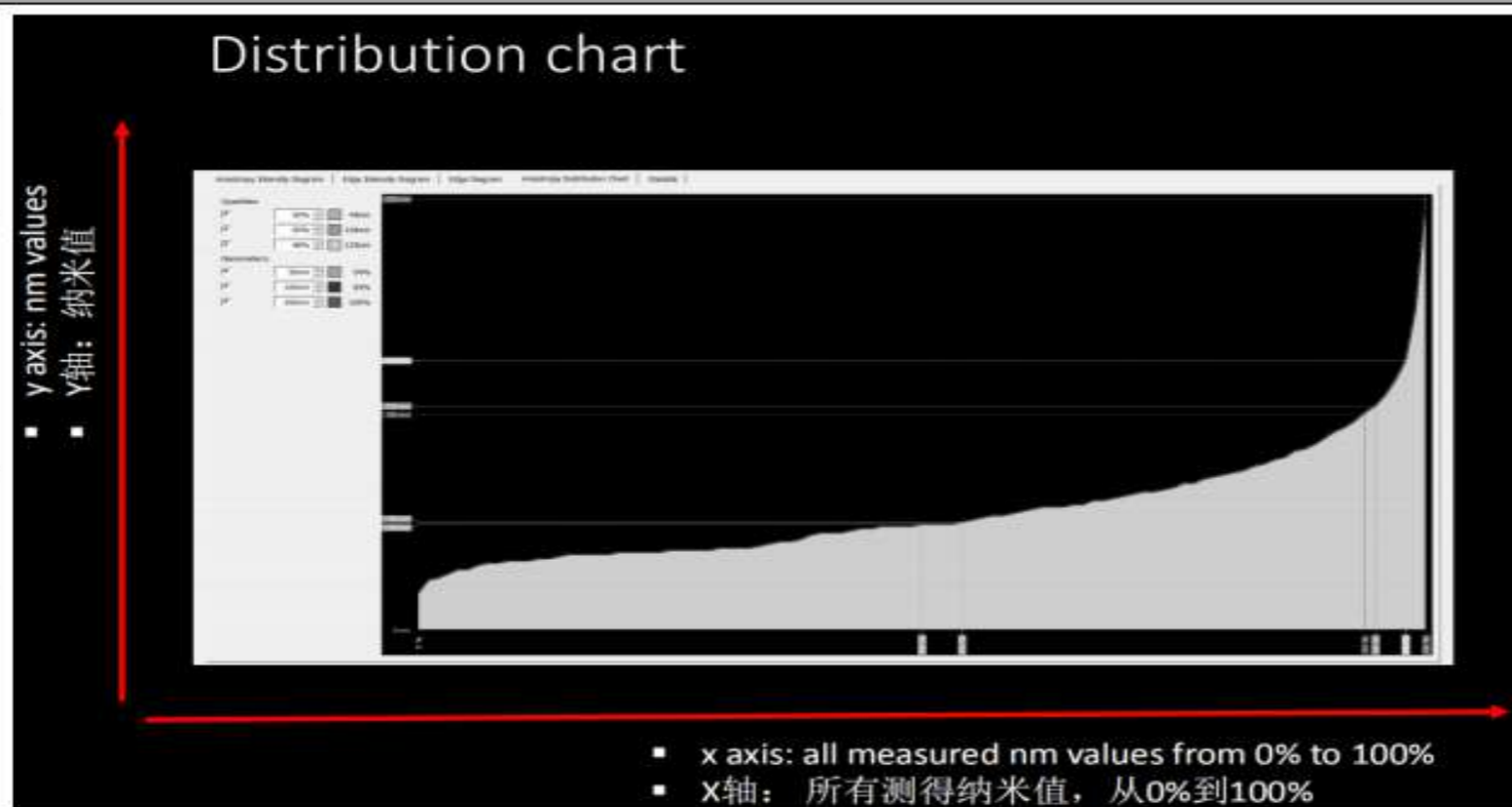
lens effect

Calculate the Peak Valley data to compliance with the standards





## 钢化应力斑数据检验记录



Wave length	Level
0~40nm	不可见
40~80nm	将在非常恶劣的环境下可见(意味着大量偏振光)
>80nm	可能看到

\*\*只适用于透明玻璃、低铁玻璃、镀膜玻璃的扫描。对于熔块、花纹熔块和高反射镀膜玻璃，数据仅供参考，需检查扫描图像。  
\*对于较小的或异形的玻璃，需要供应商与客户讨论。

Thickness	Criterion	Conclusion
	95% Area of panel	
5mm\6mm	≤50 nm	good
8mm\10mm	≤80 nm	good
12mm\15mm	≤100 nm	good

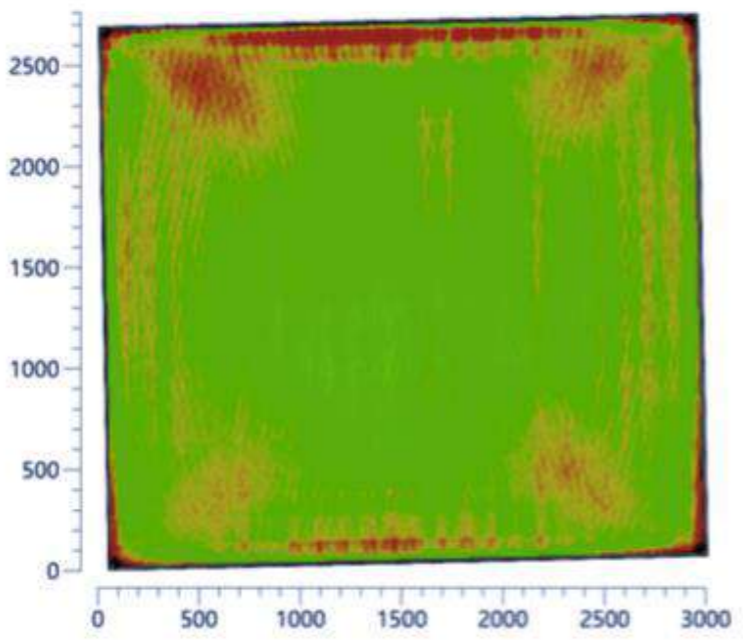
# Tempered glass anisotropy scanner -Soft solution



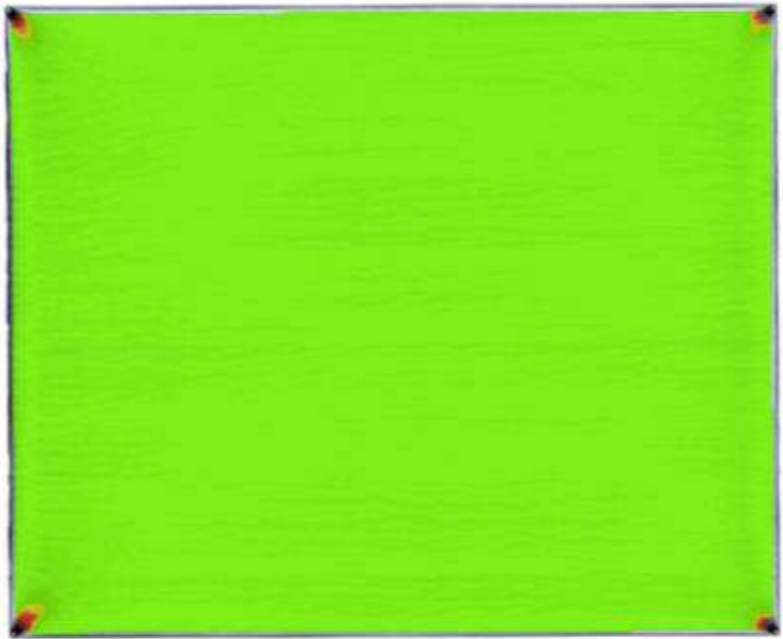
The anisotropy quality is shown through numerical values and scanned images. Each tempered glass has its own ID number to truly achieve the quality of the product traceability.

linescanner ID:	#/L1
batch number:	4179
date/time:	27.03.2022 03:55:32
operator:	
batch size:	85m <sup>2</sup>
glass sizes:	8m <sup>2</sup>
used capacity:	9.4%
glass number:	1

linescanner ID:	2022072104
batch number:	9273
date/time:	24.10.2023 10:25:44
operator:	
batch size:	
glass sizes:	7.6m <sup>2</sup>
used capacity:	
glass number:	1



Bad



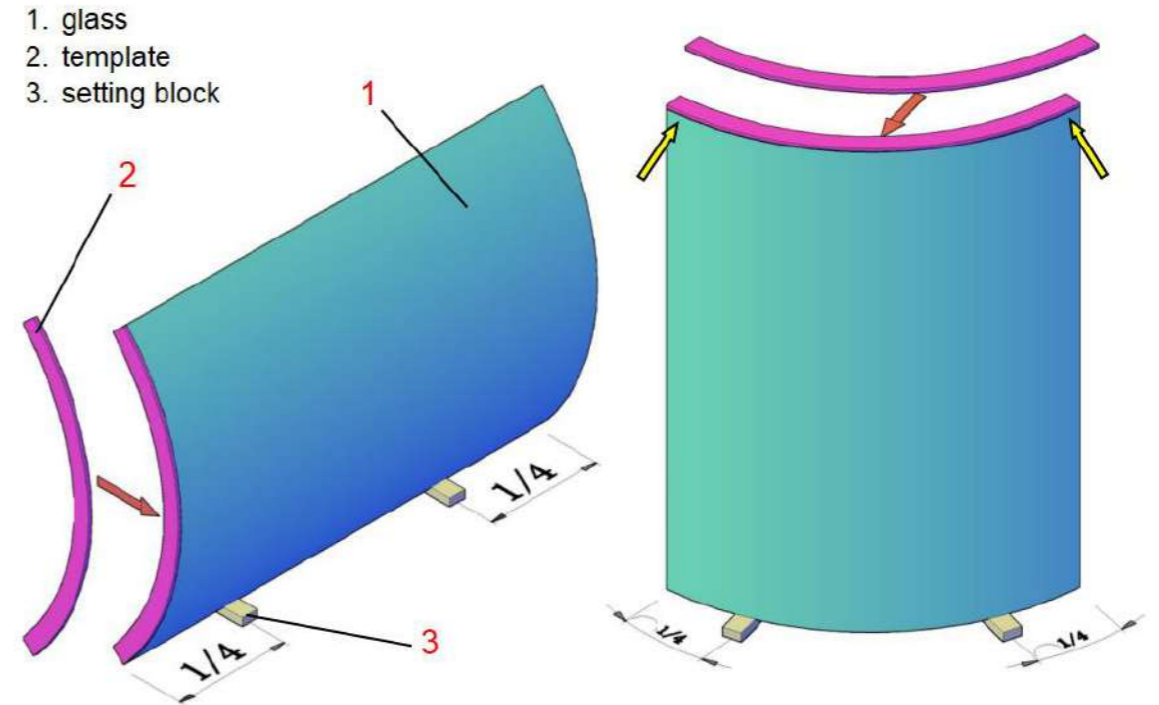
Good (TNG quality)

# Curved Glass Inspection

# Curved tempered glass arc accuracy, twist and height edge bending accuracy

\* Shape accuracy

欧标 EN		国标 GB	美标 ASTM			TNG
T < 10mm	2/3 T	—	X ≤ 2438	T ≤ 12mm	3.2mm	≤ 3mm
				T > 12mm	4.8mm	
T ≥ 10mm	1/2 T	—	2438 < X ≤ 3353	4.8mm		
			X > 3353	T ≤ 12mm	4.8mm	
				T > 12mm	6.4mm	
Thickness = T; X=Girth or Height						



Method A

Method B

Fig.1 Measurement of shape accuracy tolerance

# Curved tempered glass arc accuracy, twist and height edge bending accuracy

## \*Twist

欧标 EN		国标 GB	美标 ASTM		TNG		
$H \leq 1200$	$< 2.0\text{mm}$	—	$G \leq 2438$	$H \leq 1829$	$\leq 1.6\text{mm}$	同ASTM	
$H \leq 1500$	$< 2.5\text{mm}$			$H > 1829$	$\leq 2.4\text{mm}$		
$H \leq 2000$	$< 3.0\text{mm}$		$2438 < G \leq 3048$	$H \leq 3048$	$\leq 2.4\text{mm}$		
$H \leq 2400$	$< 3.5\text{mm}$			$H > 3048$	$\leq 3.2\text{mm}$		
$H > 2400$	$< 4.0\text{mm}$		$3048 < G \leq 3658$	$H \leq 2438$	$\leq 2.4\text{mm}$		—
—	—			$H > 2438$	$\leq 3.2\text{mm}$		
			$G > 3658$	$H \leq 1829$	$\leq 3.2\text{mm}$	$\leq 3.2\text{mm}$	
				$H \leq 3048$	$\leq 4.0\text{mm}$		
			$H > 3048$	$\leq 4.75\text{mm}$			
Thickness = T; Girth=G; Height=H (mm)							

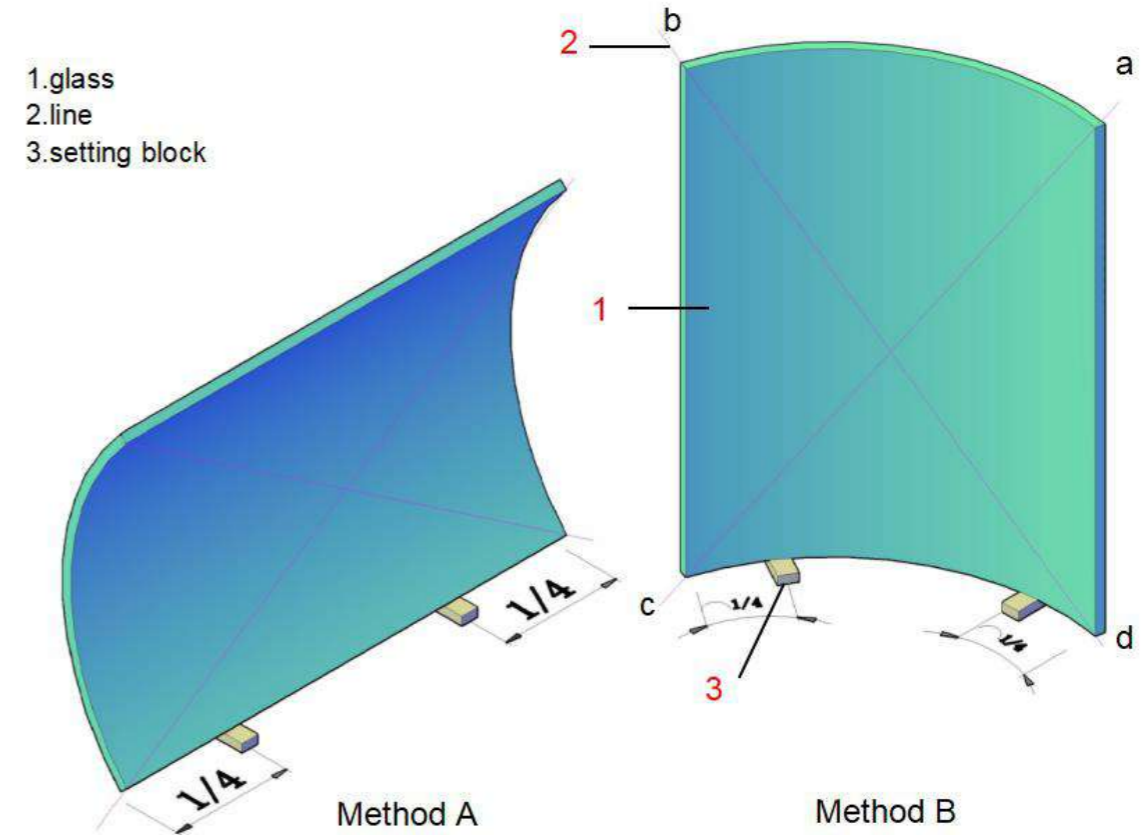


Fig.2 Measurement of maximum twist deviation

# Curved tempered glass arc accuracy, twist and height edge bending accuracy

\*Height edge bending accuracy

欧标 EN	国标 GB	美标 ASTM		TNG	
4mm/m	—	$H \leq 1219$	3.2mm		$\leq 2.0\text{mm/m}$
		$1219 < H \leq 2438$	$T \leq 8\text{mm}$	3.2mm	
	$T > 8\text{mm}$		4.8mm		
	—	$2438 < H \leq 3353$	4.8mm		
		$H > 3353$	$T \leq 12\text{mm}$	4.8mm	
$T > 12\text{mm}$			6.4mm		
Thickness = T; Height = H (mm)					

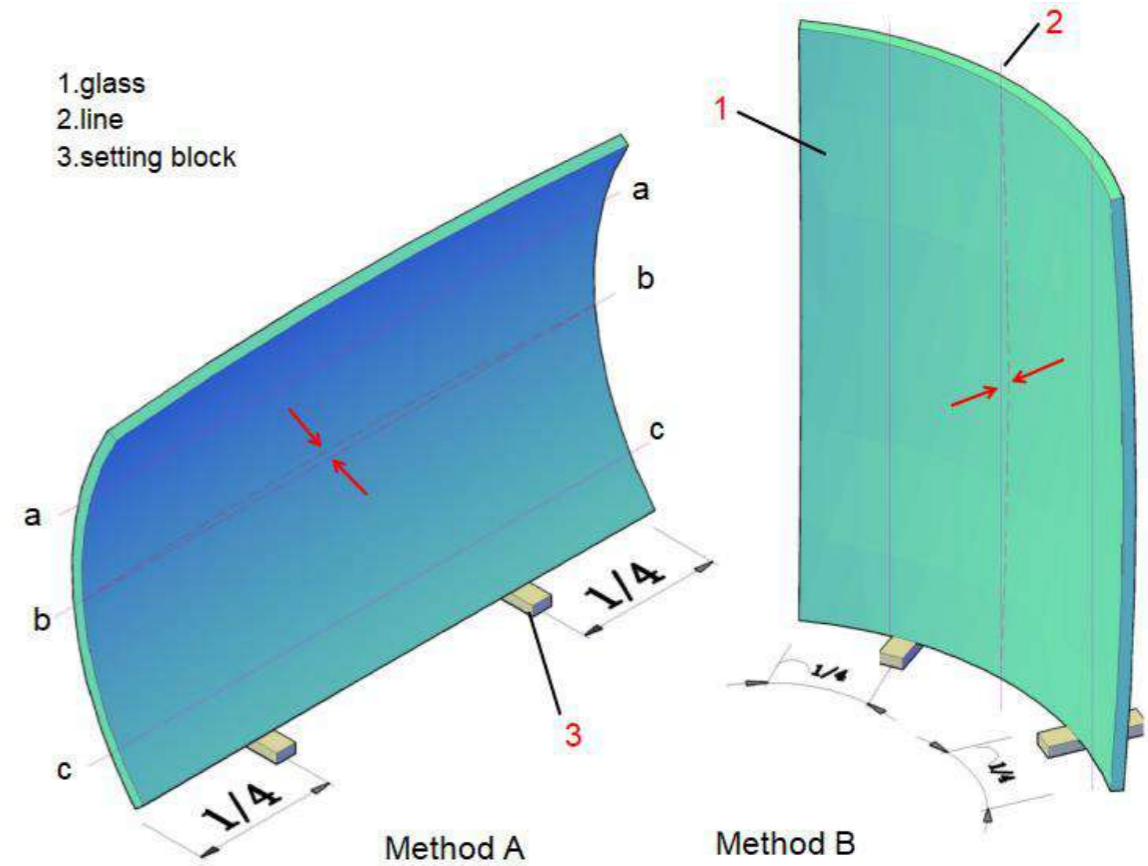


Fig.3 Measurement of maximum cross-curve deviation

\*Curved tempered arc reflection imaging

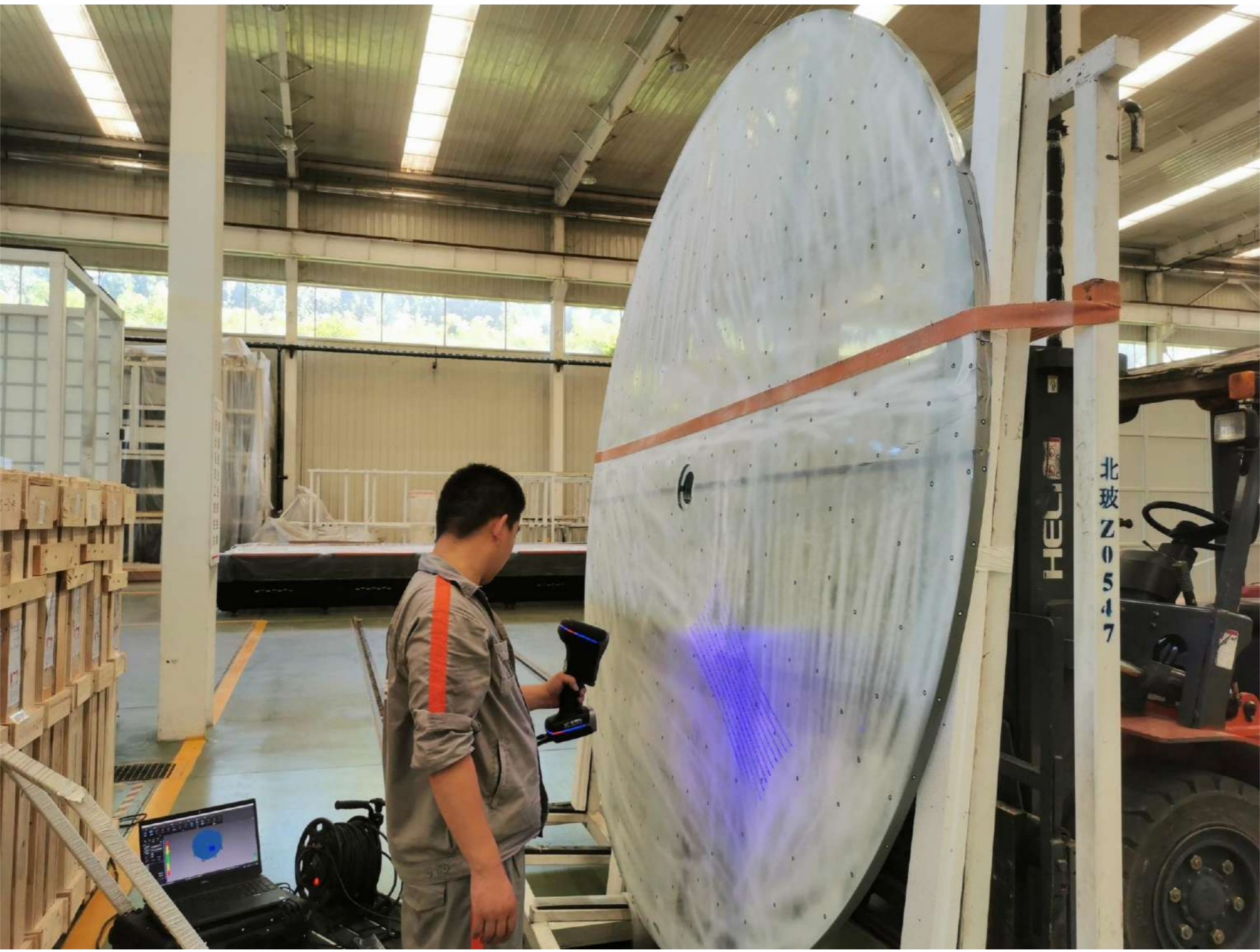


Bad



Good (TNG quality)

# 3D Scanner

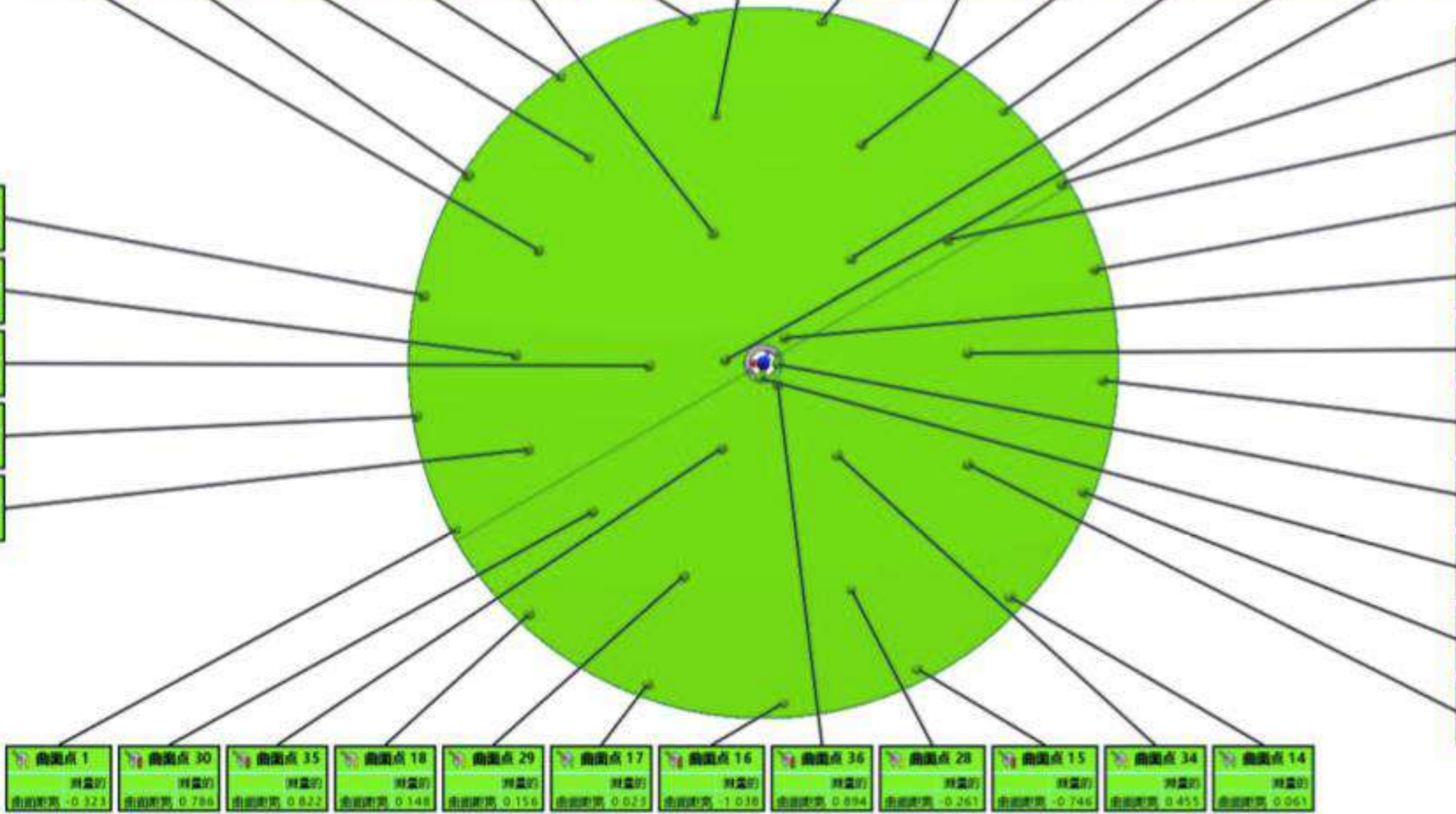




曲线点 21 测量的 曲面距离: 0.359	曲线点 4 测量的 曲面距离: 1.533	曲线点 22 测量的 曲面距离: -0.047	曲线点 5 测量的 曲面距离: -0.691	曲线点 32 测量的 曲面距离: 0.924	曲线点 6 测量的 曲面距离: -1.404	曲线点 23 测量的 曲面距离: -0.396	曲线点 7 测量的 曲面距离: -1.412	曲线点 8 测量的 曲面距离: -1.259	曲线点 24 测量的 曲面距离: 0.203	曲线点 9 测量的 曲面距离: -1.314	曲线点 33 测量的 曲面距离: 0.778	曲线点 38 测量的 曲面距离: 1.232
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曲线点 10 测量的 曲面距离: 0.217	曲线点 25 测量的 曲面距离: 0.602	曲线点 11 测量的 曲面距离: 0.758	曲线点 37 测量的 曲面距离: 1.106	曲线点 26 测量的 曲面距离: 1.723	曲线点 12 测量的 曲面距离: 1.263	曲线点 39 测量的 曲面距离: 1.199	曲线点 40 测量的 曲面距离: 1.303	曲线点 13 测量的 曲面距离: 1.307	曲线点 27 测量的 曲面距离: 1.137
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曲线点 3 测量的 曲面距离: 1.293	曲线点 20 测量的 曲面距离: 0.510	曲线点 31 测量的 曲面距离: 0.965	曲线点 2 测量的 曲面距离: 1.308	曲线点 19 测量的 曲面距离: 0.505
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曲线点 1 测量的 曲面距离: -0.323	曲线点 30 测量的 曲面距离: 0.796	曲线点 35 测量的 曲面距离: 0.822	曲线点 18 测量的 曲面距离: 0.148	曲线点 29 测量的 曲面距离: 0.156	曲线点 17 测量的 曲面距离: 0.023	曲线点 16 测量的 曲面距离: -1.038	曲线点 36 测量的 曲面距离: 0.894	曲线点 28 测量的 曲面距离: -0.261	曲线点 15 测量的 曲面距离: -0.746	曲线点 34 测量的 曲面距离: 0.455	曲线点 14 测量的 曲面距离: 0.061
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# Transportation









# Project Reference

# Abu Dhabi International Airport

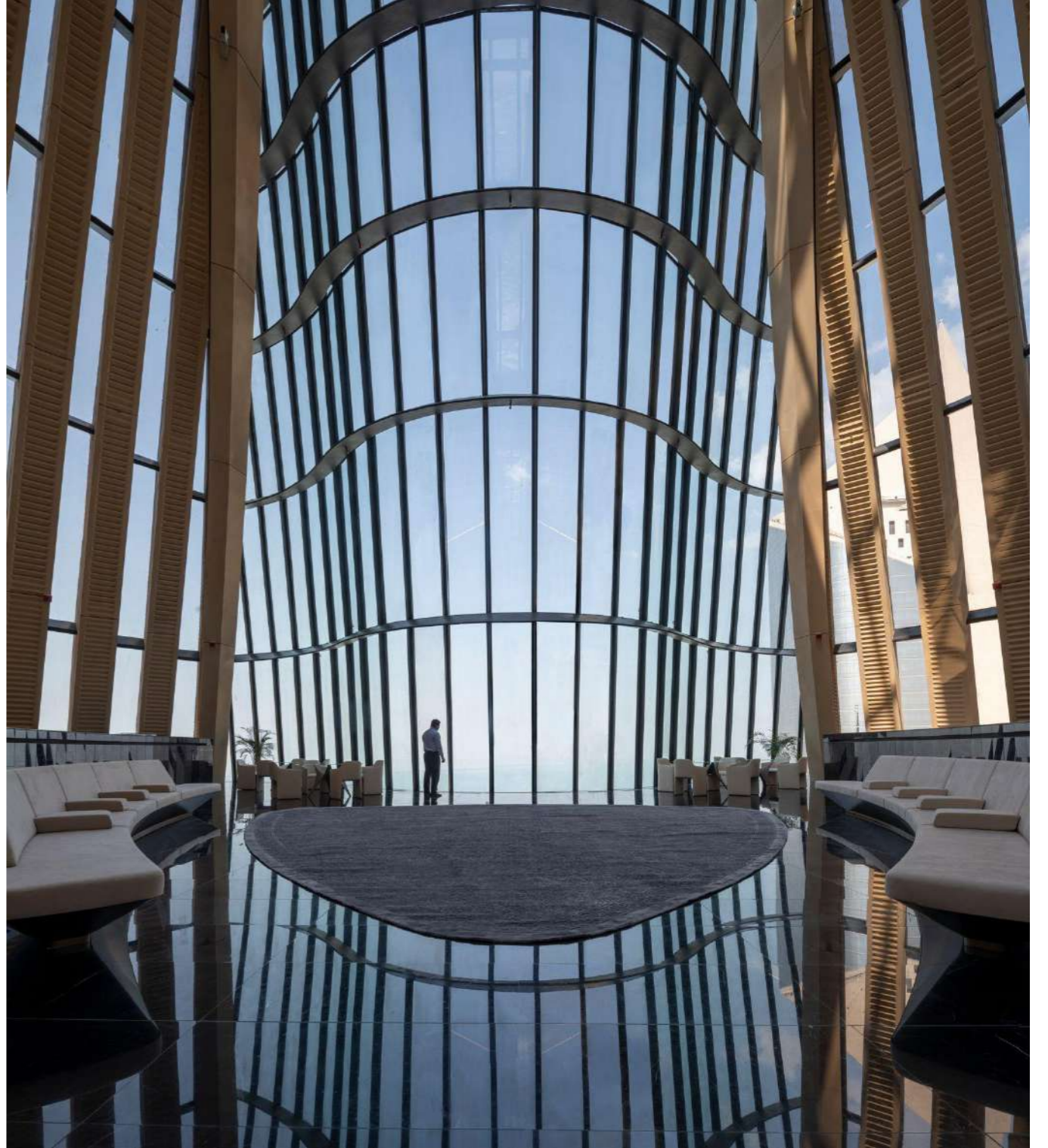
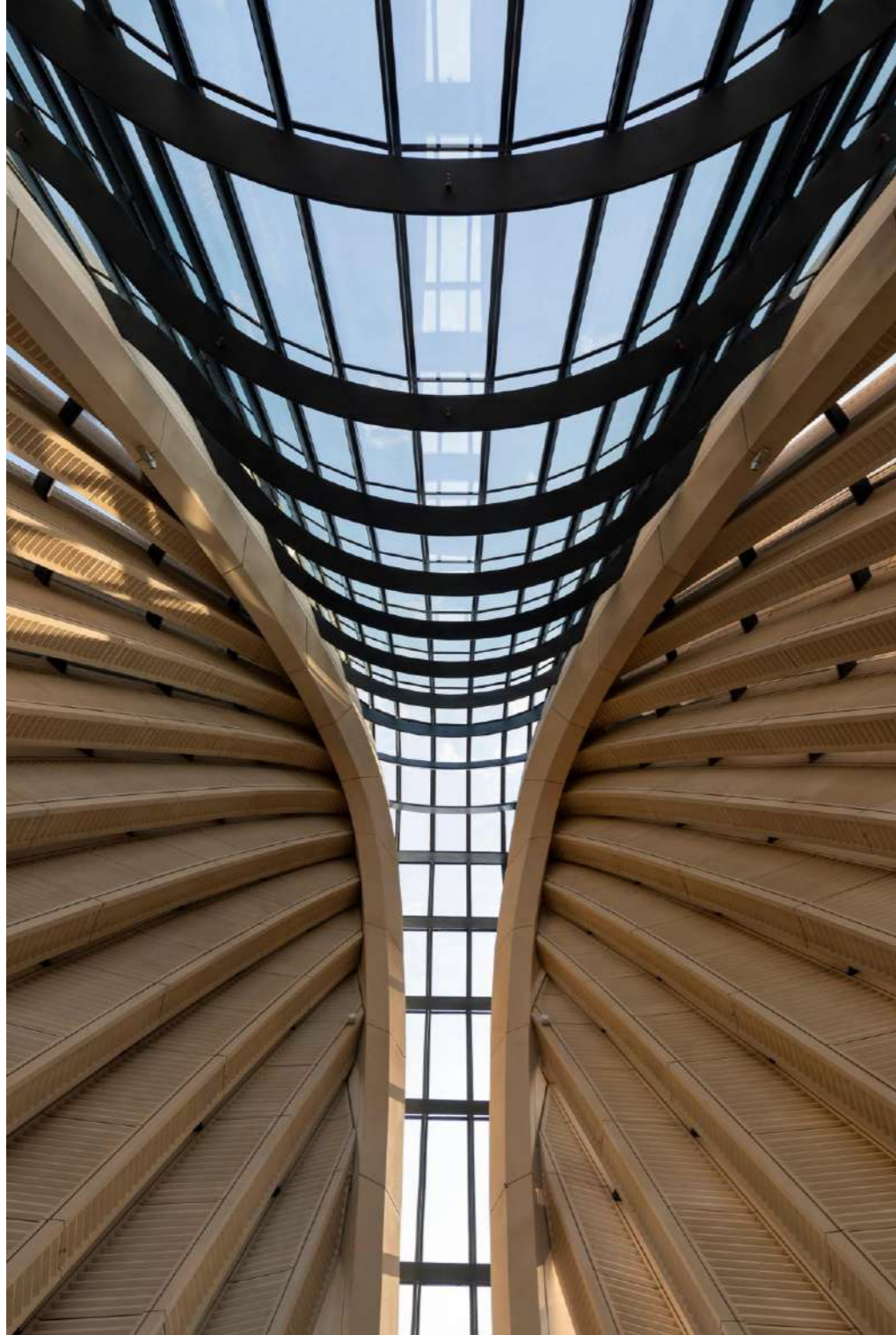


# Abu Dhabi International Airport Performance Data

名称 (Name)	可见光 Visible light			太阳能 Solar		SC EN	SHGC EN	U Value [W/(M <sup>2</sup> ·K)]EN
	透过 T <sub>vis</sub>	反射率R <sub>vis</sub>		透过T <sub>sol</sub>	反射R <sub>sol</sub>			
		Out	In					
6 clear light grey dot frit 30%HS (2#) +1.52PVB+6 SunGuard® SN 40T HS(#4)+12A+6 clear HS +1.52PVB+6 clear HS	26.9	15.6	14.4	12.0	19.3	0.20	17.3	1.5
6 clear light grey dot frit 40%HS (2#) +1.52PVB+6 SunGuard® SN 40T HS(#4)+12A+6 clear HS +1.52PVB+6 clear HS	23.3	15.7	14.8	10.4	18.3	0.18	15.7	1.5
6 clear light grey dot frit 50%HS (2#) +1.52PVB+6 SunGuard® SN 40T HS(#4)+12A+6 clear HS +1.52PVB+6 clear HS	23.3	15.7	14.8	10.4	18.3	0.18	15.7	1.5
5 clear light grey dot frit 30%HS (2#) +1.52PVB+5 SunGuard® SN 40T HS(#4)+16A+5 clear HS +1.52PVB+5 clear HS	27.4	15.7	14.6	12.3	20.6	0.19	16.9	1.3
5 clear light grey dot frit 40%HS (2#) +1.52PVB+5 SunGuard® SN 40T HS(#4)+16A+5 clear HS +1.52PVB+5 clear HS	23.7	15.8	15.0	10.7	19.5	0.18	15.3	1.3
5 clear light grey dot frit 50%HS (2#) +1.52PVB+5 SunGuard® SN 40T HS(#4)+16A+5 clear HS +1.52PVB+5 clear HS	20.0	16.1	15.4	9.1	18.6	0.16	13.6	1.3
5 clear light grey dot frit 60%HS (2#) +1.52PVB+5 SunGuard® SN 40T HS(#4)+16A+5 clear HS +1.52PVB+5 clear HS	16.2	16.6	15.9	7.4	18.1	0.14	11.9	1.3
5 clear light grey dot frit 75%HS (2#) +1.52PVB+5 SunGuard® SN 40T HS(#4)+16A+5 clear HS +1.52PVB+5 clear HS	16.2	16.6	15.9	7.4	18.1	0.14	11.9	1.3
6 clear HS+1.52PVB+6 SunGuard® SN 40T HS(#4)+12A+6 clear +1.52PVB+6 clear	37.6	16.7	13.3	16.7	23.8	0.25	21.9	1.5

National Bank of Kuwait





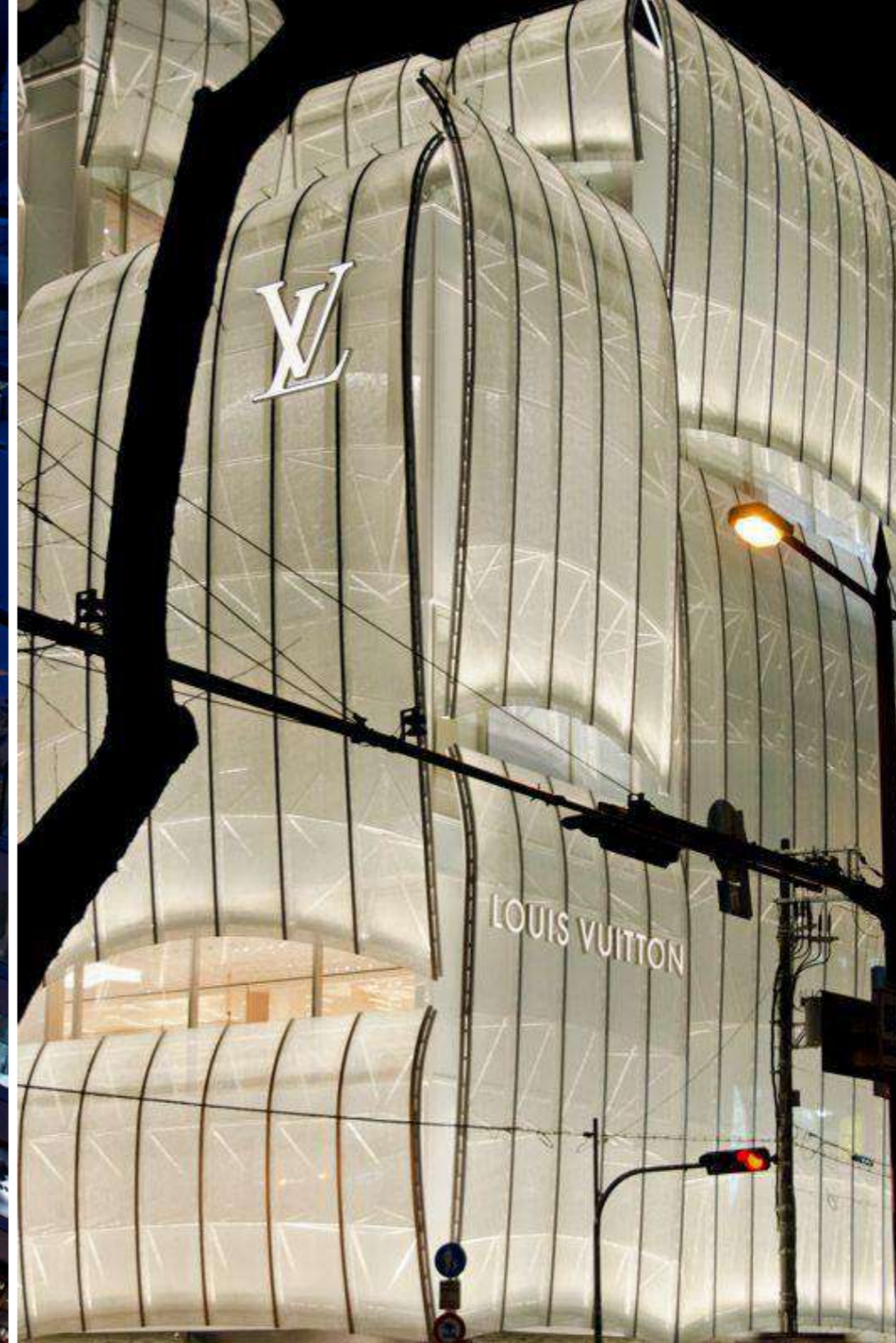
# National Bank of Kuwait Performance Data

名称 (Name)	可见光 Visible light			太阳能 Solar		SC EN	SHGC EN	U Value [W/(M <sup>2</sup> ·K)]EN
	透过 T <sub>vis</sub>	反射率R <sub>vis</sub>		透过T <sub>sol</sub>	反射R <sub>sol</sub>			
		Out	In					
8 low iron TNG12-32S HS (#2)+1.52PVB+8 clear TNG11-66D HS (#4)+16AR+6 clear HS+1.52PVB+6 clear HS	23.0%	25.0%	19.0%	11.0%	22.0%	0.14	0.12	1.10
8 low iron TNG12-32S HS (#2)+1.52PVB+8 clear TNG11-66D HS (#4)+12A+6 clear HS	24.0%	24.0%	20.0%	12.0%	22.0%	0.14	0.12	1.55

# Tokyo Azabudai Toranomon



Louis Vuitton Osaka





JOC-Japan Olympic office



Takamatsu Construction Group



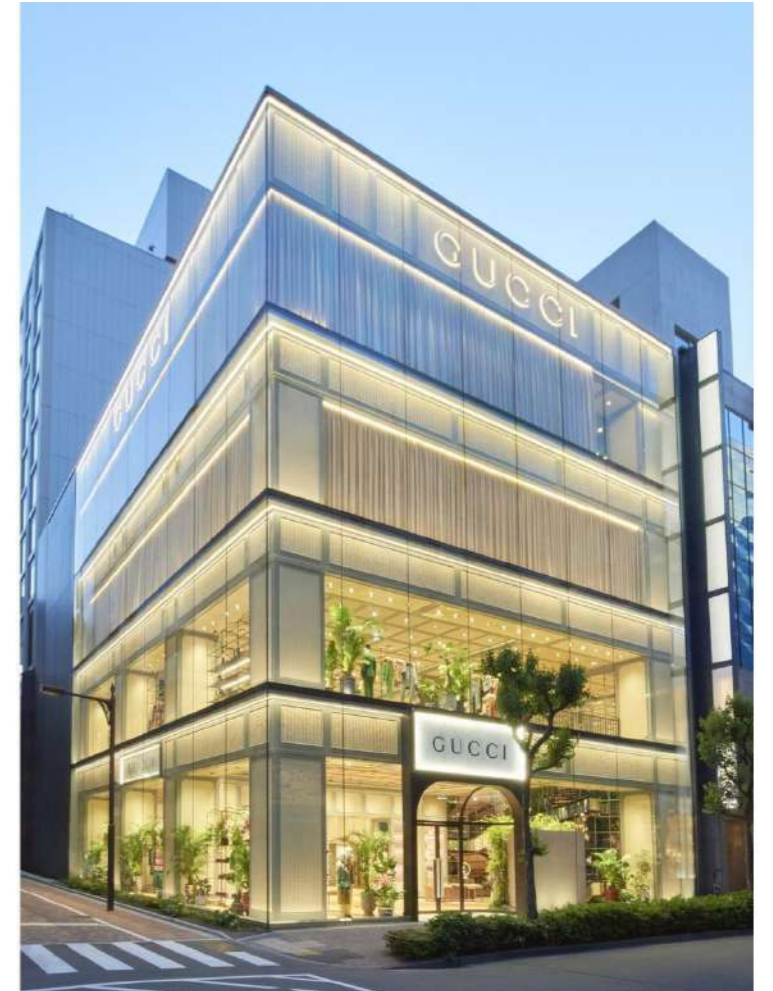
Toyokaiji in Tokyo



Channel



LV Osaka



Ginza Gucci

Shibaura in Tokyo Japan



Shibaura in Tokyo Japan



Shinagawa block 4



Shinagawa block 4





Manulife in Canada



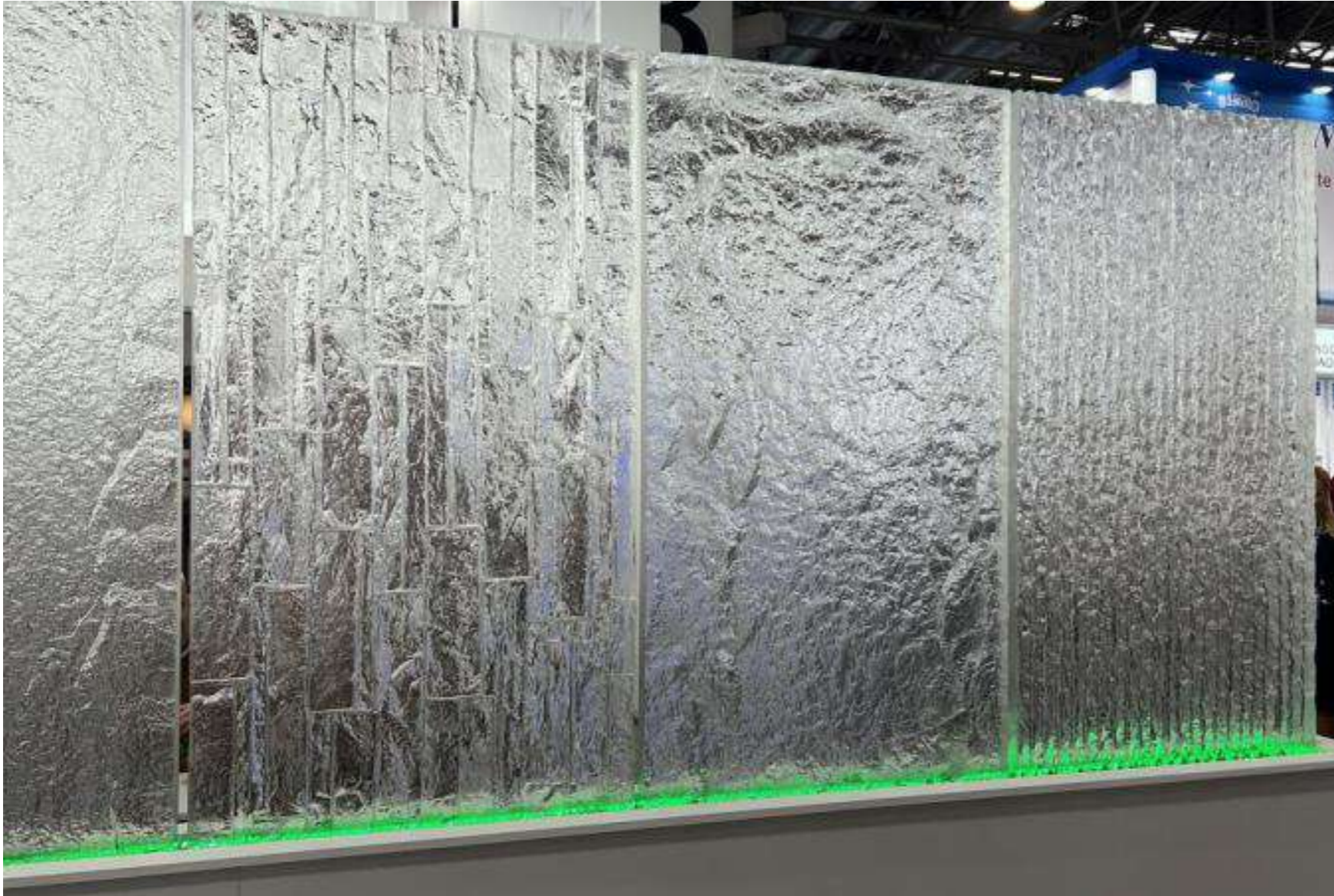
Hongkong Taikoo 2B





Borosilicate Cast Glass

# Cast Glass



Max. Size

3m × 6m

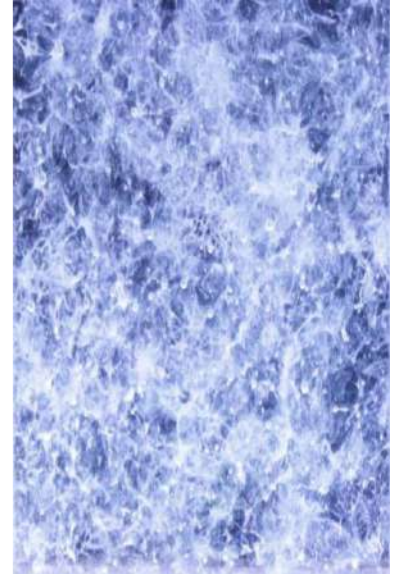
Thickness

(20 - 200 mm)

# Cast Glass



# Cast Glass



# Cast Glass



# NorthGlass Cast Glass Series Cast Glass Projects

雅诗兰黛喷泉水景

Estee Lauder Fountain Water Feature

Single Panel Size

1.3 m × 0.7m



# NorthGlass Cast Glass Series Cast Glass Projects

山东房产公司背景墙

Shandong property company background wall

Single Panel Size.

3.2m × 0.6m



# The Future of Glass Creation





**Thank you for your attention!**

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E-mail : [nancy@northglass.com](mailto:nancy@northglass.com)

