美 特 鋁 質 有 限 公 司
MIDI ALUMINIUM FABRICATOR LTD.

工程指示 / 要求簡箋(E.I.)

工程指示編號：EI / 3487 / 21　　修改版次：-
工程編號　：J - 852　　工程名稱 ：亞皆老街中電
工程項目　：磨沙玻璃 Bending Test (玻璃樣板+安排公証行測試)
收件人　：~~生統~~ Maggie　　發件人　：　Ant Yeung　日　期 ：04/06/2021

☐要求提供 / ☐確認 事項 ：

( ) 初步鋁料 B.M.　( ) 加工拆圖，然後生產　( ) 尺寸表
( ) 正式鋁料 B.M.　( ) 技術上資料 / 指示　( ) 報價
( ) 配件 B.M.　( ) 樣辦或貨品說明書　( ) 分判合約

內容 ：

因應入則要求，請安排三鑫提供玻璃樣板及安排公証行為 10mm 及 6mm 磨沙片做 Bending Test
玻璃樣板: 共 2 款
1) 10mm thk. low-iron tempered (acid etched) (按 D21041726 的 10mm 磨沙片)， 10 件
2) 6mm thk. low-iron tempered (acid etched) (按 D21041725 的 6mm 磨沙片)， 10 件
BENDING TEST 詳細資料已在後頁報告封面上提供
請留意，因應入則要求，玻璃名稱按以下:
1) 10mm THK. Fritted pattern tempered glass
2) 6mm THK. Fritted pattern tempered glass
謝謝

請在 2021.06.08 前完成上列要求。

附： 頁

以上項目為:

☐ 原合約工程包　☐ 原合約工程加 / 減賬　☐ 新工程報價

原因 :-

分發東莞各部門 ：

( )生產技術總監口連附件　( )技術部　口連附件　( )生產部　口連附件　( )機械設計部口連附件
( )採購部　口連附件　( )生產統籌部口連附件　( )小羅&清　口連附件
( )質檢部　口連附件　( )會計部　口連附件　( )報關組　口連附件　( )其他 _____口連附件

分發其他分判 ：

(v)水洪　口連附件

分發香港各部門 ：

( )行政部口連附件　( )會計部口連附件　( )統籌部口連附件　( )工程部地盤科文口連附件 祥哥
( )採購部口連附件　( )QS 部 口連附件　( )維修部口連附件　( )其他 _____口連附件

傳遞編號：　　發件人簽署：

HK / / 21　　項目經理簽署：

CW 入則 (4th amend)

ND WINDOW WALL SYSTEM.

)

IS IN HONG KONG 2004.

VERTICAL SURFACE
92.70m
2.82kPa
1.00
+1.0/−1.4
+2.82/−3.948kPa

PROTECTIVE BARRIERS (FOR DOMESTIC USE)

ALLY APPLIED HEIGHT OF ABOVE THE OR LEVEL	CONCENTRATED LOAD DISTRIBUTED LOAD TO BE APPLIED ON THE INFILL BETWEEN FLOOR AND TOP RAIL	TO BE APPLIED ON ANY PART OF THE INFILL BETWEEN FLOOR AND TOP RAIL
kN/m)	(kPa)	(kN)
0.75	1.0	0.5

WALL BE OF GRADE S275 J0 CLASS 1 WELDABLE STRUCTURAL STEEL AND OR HOLLOW SECTIONS AND BS EN 10025 FOR OTHER SECTIONS.
DIP GALVANIZED TO BS EN ISO 1461 WITH MIN 85 μm COATING THICKNESS.
ED STEEL TO BE MAKE GOOD BY AT LEAST TWO COATS OF ZINC RICH PRIMER TO BS 4652.
77kN/m³
205,000MPa
275MPa
430MPa
275MPa
265MPa

SION

GRADE 6063-T6/6061-T6/6063-T5 TO BS EN 755-2 AND BS EN 573-3.
27.2kN/m³
70,000MPa

6063-T6	6061-T6	6063-T5
170MPa	240MPa	130MPa
215MPa	260MPa	175MPa
160MPa	240MPa	110MPa
175MPa	260MPa	130MPa
95MPa	145MPa	65MPa

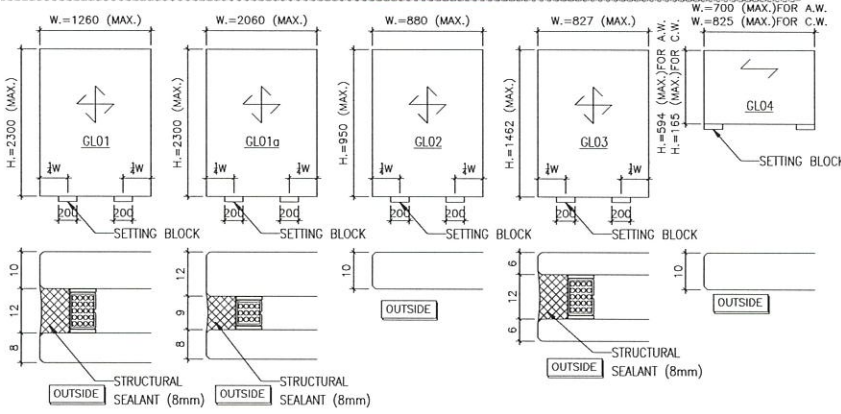
5-T6 UNLESS OTHERWISE STATED.

E 3003-H14 TO BS EN 485-2 AND BS EN 573-3.
27.2kN/m³
70,000MPa
3003-H14
125MPa

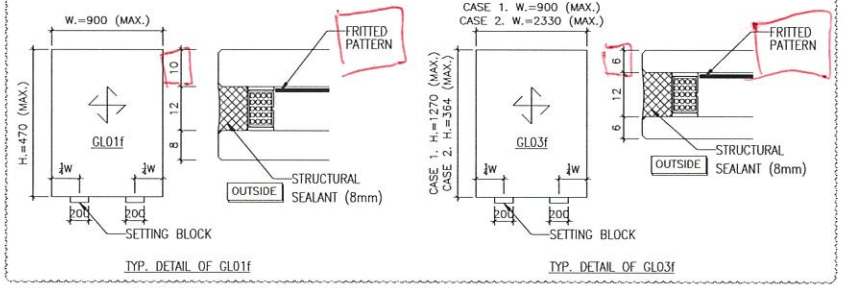
HEAT STRENGTHENED GLASS	40MPa
TEMPERED GLASS	80MPa

ALL TEMPERED GLASS TO BE HEAT-SOAK TESTED TO CODE OF PRACTICE FOR STRUCTURAL USE OF GLASS 2018 AND EN 14179-1:2016.

GL01 – 8mm THK. HEAT STRENGTHENED GLASS+12mm AIR GAP+10mm THK. TEMPERED GLASS	(DEFLECTION LIMIT: 1260/60 = 21.00)
GL01a – 8mm THK. HEAT STRENGTHENED GLASS+9mm AIR GAP+12mm THK. TEMPERED GLASS	(DEFLECTION LIMIT: 2060/60 = 34.33)
GL02 – 10mm THK. HEAT STRENGTHENED GLASS (SPANDREL GLASS)	(DEFLECTION LIMIT: 880/60 = 14.67)
GL03 – 6mm THK. HEAT STRENGTHENED GLASS+12mm AIR GAP+6mm THK. TEMPERED GLASS	(DEFLECTION LIMIT: 577/60 = 9.62)
GL04 – 10mm THK. TEMPERED GLASS (PROTECTIVE BARRIER)	(DEFLECTION LIMIT: 700/60 = 11.67)FOR A.W.
	(DEFLECTION LIMIT: 746/60 = 12.43)FOR C.W.
GL01f – 8mm THK. HEAT STRENGTHENED GLASS+9mm AIR GAP+10mm THK. FRITTED PATTERN TEMPERED GLASS	(DEFLECTION LIMIT: 470/60 = 7.83)
GL03f – 6mm THK. HEAT STRENGTHENED GLASS+12mm AIR GAP+6mm THK. FRITTED PATTERN TEMPERED GLASS	(DEFLECTION LIMIT: 900/60 = 15.00)
	(DEFLECTION LIMIT: 364/60 = 6.07)



TYP. DETAIL OF GL01 TYP. DETAIL OF GL01a TYP. DETAIL OF GL02 TYP. DETAIL OF GL03 TYP. DETAIL OF GL04



TYP. DETAIL OF GL01f TYP. DETAIL OF GL03f

SEALANT, GASKET AND SETTING BLOCK

ALL STRUCTURAL SEALANT TO BE 'DOW CORNING 983' (BD-SS-001), ALLOWABLE STRESS = 138kPa.
SECONDARY SEAL FOR IGU SHOULD BE "DOW CORNING 983" SILICON STRUCTURAL SEALANT (BD-SS-001) ALLOWABLE STRESS = 138kPa.

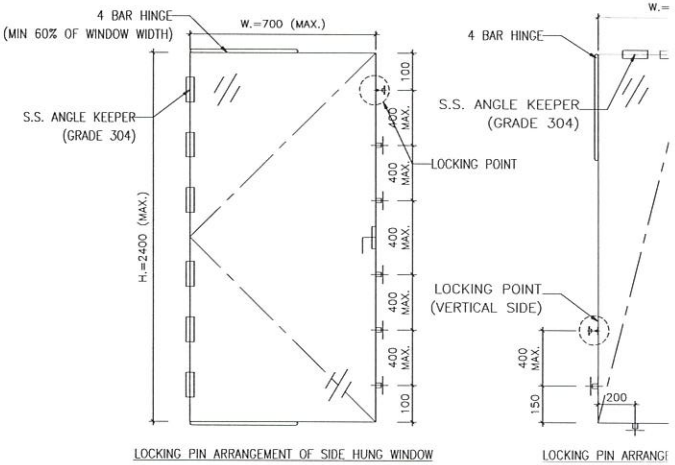
SAFETY TEST

SAFETY TEST TO CLAUSE 8.3.1 OF CODE OF PRACTICE FOR STRUCTURAL USE OF GLASS 2018 WILL BE CARRIED
HOKLAS ACCREDITED LABORATORY. (EXTENT REFER TO DRAWING CE101)

LEGEND :

– S.S. KEEPER & S.S. LOCKING PIN (GRADE 304)

– S.S. ANGLE KEEPER (GRADE 304)



LOCKING PIN ARRANGEMENT OF SIDE HUNG WINDOW

LOCKING PIN ARRANGE

美 特 鋁 質 有 限 公 司
MIDI ALUMINIUM FABRICATOR LTD.

Our ref. MC/40172/852

26th May 2021

Gammon Engineering & Construction Company Limited
139 - 147 Argyle Street,
Kowloon, Hong Kong

By Email & Hand

material submission letter

Attn.: Mr. Dick Yuen / Ms. Penny Chau

Dear Sir,

Re : Design, Supply & Installation of Aluminium Window & Cladding, Curtain Wall, Glass Wall, Lourves and Glass Balustrade Nominated Sub-Contract at K.I.L. 6038RP, K.I.L.6037RP, K.I.L. 6036RP, K.I.L. 6035RP & K.I.L. 6005, Nos. 139-147 Argyle Street, Kowloon.
Submission of Glass Samples for Bulk Order - Acid Etched Glass for Tower (MS083)

Further to the captioned project, we would like to submit acid etched glass samples for bulk order for your review and comment.

1) ~~8mm low-iron HS~~ (with low-e coating in light grey colour at surface #2) + 12mm Air Gap + 10mm low-iron HST (acid etched at surface #3)
Sample Code : D21041726 (8SEE0-83T (HS)+12A+10CBYP) 13.0 mm
Location: Fixed Windows - 1~23/F Bathroom, 22~23/F Master Ensuite

2) 6mm low-iron HS (with low-e coating in light grey colour at surface #2) + 12mm Air Gap + 6mm low-iron HST (acid etched at surface #3)
Sample Code : D21041725 (6SEE0-83T (HS)+12A+6CBYP) 7 6mm
Location: Openable Windows - 1~23/F Bathroom, 22~23/F Master Ensuite

We would deliver glass samples to site and each type of glass sample would be submitted in 2 sets. For details, please refer to the attached location plan, glass data and sample photos.

Thank you for your kind attention.

Yours faithfully,
MIDI ALUMINIUM FABRICATOR LTD.

Francis Mau
Managing Director

Encl

cc.	Gammon	- Mr. Chris Kwok / Ms. Myra Li /	(w/e)
		- Ms. Esther Chung / Mr. Sam Tang /	
		- Mr. Jackson Mok /	
	Sino	- Mr. Billy Tang / Mr. Jimmy Cheung /	(w/e) (Email Only)
		- Mr. Terry Wan / Mr. Jaja Wong	
	AGC	- Mr. Raymond Ho / Mr. Eliot Chan	(w/e) (Email Only)
	Arup	- Mr. Edwin Lui / Mr. Andrew Tai	(w/e) (Email Only)
	MFT	- Mr. Brian Leung / Mr. Nigel Lo	(w/e) (Email Only)
		- Ms. Eunice Yan / Ms. Cosimo Wong/ Mr. Neo Wong	

FM/MT/DW/AY/BL/KL/LKW/yl

九龍茶庫嶺道610號生利工業中心1樓6-8號
Units 6-8, 1st Floor, Sunray Industrial Centre, 610 Cha Kwo Ling Road, Kln.
TEL. (電話) : 2348 9211 FAX. (傳真) : 2772 7666 E-mail Address (電郵) : midi@midiltd.com.hk.

Facadetech

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New Territories, Hong Kong.

Tel : (852) 2659 - 2083
Fax : (852) 2402 - 9332

HKLAS 103 TEST

TEST REPORT

BENDING STRENGTH OF GLASS

Customer's Information

Customer and Address : ~~Teamfield Building Contractors Ltd. (Main Contractor)~~ / Midi Aluminium ~~Fabricator Ltd.~~
Units 6-8, 1/F., Sunray Industrial Centre, 610 Cha Kwo Ling Road, Yau Tong, Kowloon, Hong Kong

Project and Address : ~~Yiu Sha Road, Whitehead, Ma On Shan, S.T.T.L. 581.~~

Glass information :
- Glass type and name : ~~8 mm thick tempered glass with fritted pattern (grey)~~
- Nominal specimen size : 1100mm long x 360mm wide
- No. of test specimens : (i) 5 pieces (pattern surface on tensile side)
  (ii) 5 pieces (clear surface on tensile side)
- Supplier : AVIC Sanxin Co., Ltd.
- Pattern description : Fully fritted pattern ~~(grey)~~

Test information

Test Performed : Bending Strength of Glass to BS EN 1288-3:2000.

Test Procedure : As described in Technical Manual : TM15 of Facadetech Laboratory Limited that is complied with Glass in Building – Determination of the Bending Strength of Glass to BS EN 1288-3:2000.

Specimen Received on : December 12, 2017

Equipment I.D. : Loading Machine S/N – FTL/PT/162

Date of Test : December 13, 2017

Tested by : Mr. Pang Chi Kin

TESTED BY : Mr. Pang Chi Kin

APPROVED SIGNATORY : Dr. Chui Pui-Tak, Peter

Facadetech

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HOKLAS 103 TEST

TEST RESULTS

Test Condition

Temperature : 22 °C
Relative humidity : 60 %
Load rate : 38.4 N/s

Conditioning of specimen

Specimen (GAL1712-121/01 to GAL1712-121/05) : The test specimens were stored at 23 °C with the relative humidity between 40% and 70% for 4 hours before the bending test.

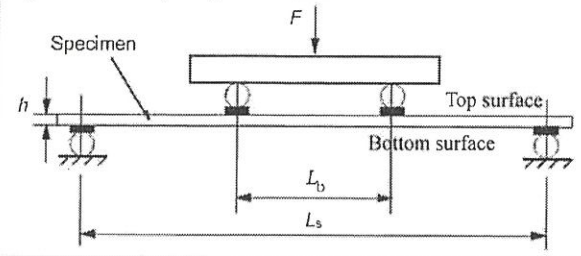
Test Results

Specimen Mark (GAL1712-121) (Frit pattern surface on tensile side)	/01	/02	/03	/04	/05
Specimen Size					
Length **L**, mm	1100	1100	1100	1100	1100
Width **B**, mm	358	360	360	360	360
Thickness **h**, mm	7.85	7.90	7.90	7.90	7.90
Support Span L_s, mm	1000				
Load Spacing L_b, mm	200				
Edge Finish	Ground Edge				
Maximum Failure Load F_{max}, kN	2.75	2.75	2.74	2.87	2.69
Dimensionless Factor, k	1.00	1.00	1.00	1.00	1.00
Bending Strength σ_{bB}, N/mm^2	152.0	149.3	148.7	155.7	146.0
Average Bending strength σ	**150.3**				
Time to Breakage **T**, sec	69	68	70	73	67
Bending Stress Rate **R**, N/mm^2/sec	2.2	2.2	2.1	2.1	2.2
Broken Location[Note (1)]	Ed	Ed	Ed	Ed	Ed

Note (1) - Breaking Location:
Ed represents the fracture origin lay between the two bending rollers and broke from the edge of the specimen.
Ce represents the fracture origin lay between the two bending rollers and broke from the central part (body) of the specimen.
Ob represents the fracture origin lay outside the two bending rollers.

Set-up :

L_s = 1000 mm, L_b = 200 mm



Surface	Finish	Tension / compression side in test
Top surface	Clear	Compression
Bottom surface	Fritted pattern	Tension

Remark:

i) The maximum expanded uncertainty of the measured bending strength is +/- 5.2 N/mm^2.
ii) The expanded uncertainty is based on a standard uncertainty by a coverage factor of K=2, providing a level of confidence of approximately 95%.
iii) The results given in this report only relate to the sample tested at the time of the test.

Facadetech

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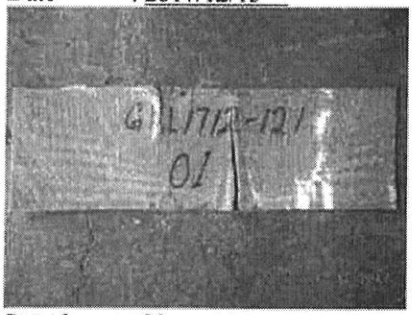
Fax : (852) 2402 - 9332

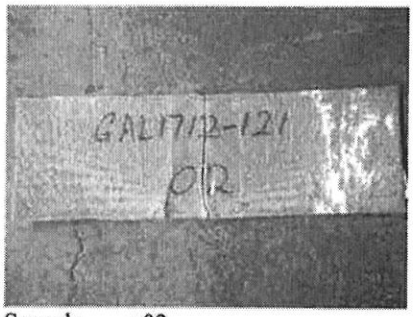
HOKLAS 103 TEST

PHOTO RECORD

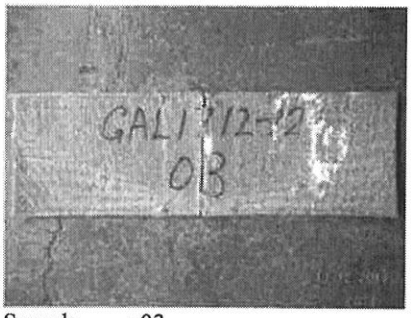
Title : Bending Strength of Glass - Sample after the bending test
Photo by : CK Pang
Date : 2017/12/13



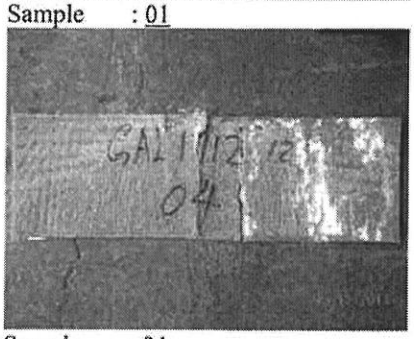
Sample : 01



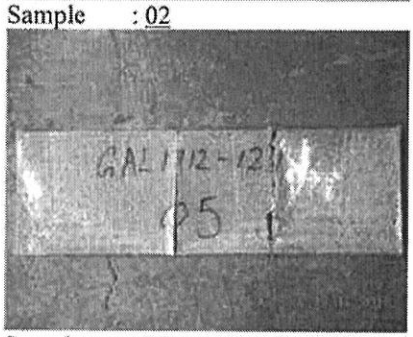
Sample : 02



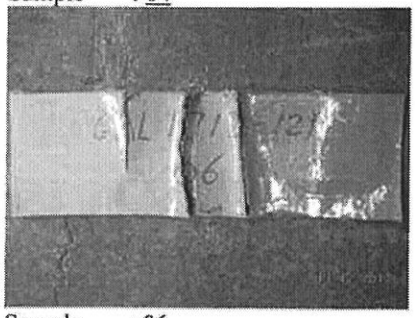
Sample : 03



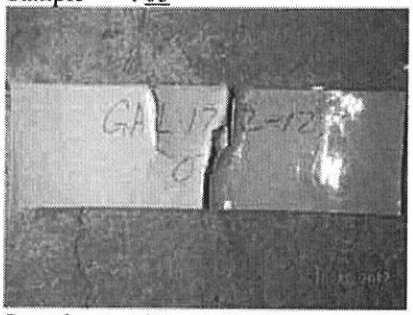
Sample : 04

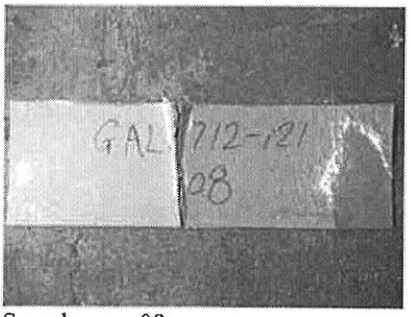


Sample : 05

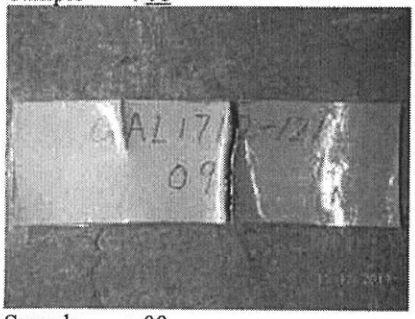


Sample : 06

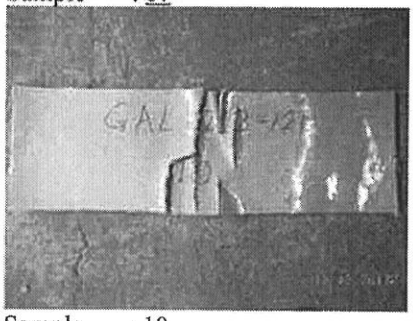

Sample : 07



Sample : 08



Sample : 09


Sample : 10

- The End -

Facadetech

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HOKLAS 103 TEST

TEST RESULTS

Test Condition

Temperature : 22 °C
Relative humidity : 60 %
Load rate : 38.4 N/s

Conditioning of specimen

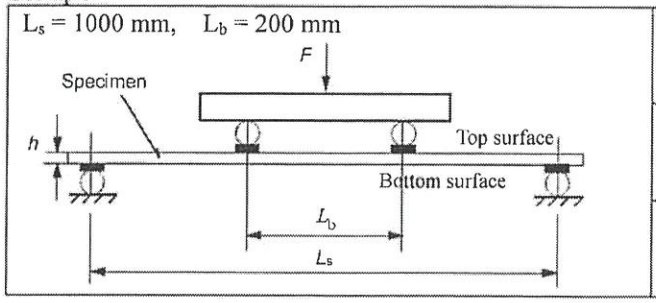
Specimen (GAL1712-121/06 to GAL1712-121/10) : The test specimens were stored at 23 °C with the relative humidity between 40% and 70% for 4 hours before the bending test.

Test Results

Specimen Mark (GAL1712-121) (Clear surface on tensile side)	/06	/07	/08	/09	/10
Specimen Size					
Length **L**, mm	1100	1100	1100	1100	1100
Width **B**, mm	360	360	360	359	360
Thickness **h**, mm	7.90	8.15	7.90	7.95	7.95
Support Span L_s, mm	1000				
Load Spacing L_b, mm	200				
Edge Finish	Ground Edge				
Maximum Failure Load F_{max}, kN	3.08	2.79	3.01	3.03	2.98
Dimensionless Factor, k	1.00	1.00	1.00	1.00	1.00
Bending Strength σ_{bB}, N/mm^2	166.9	142.3	163.1	162.6	159.5
Average Bending strength σ	**158.9**				
Time to Breakage **T**, sec	76	71	74	75	74
Bending Stress Rate **R**, N/mm^2/sec	2.2	2.0	2.2	2.2	2.2
Broken Location[Note (1)]	Ed	Ed	Ed	Ed	Ce

Note (1) - Breaking Location:
Ed represents the fracture origin lay between the two bending rollers and broke from the edge of the specimen.
Ce represents the fracture origin lay between the two bending rollers and broke from the central part (body) of the specimen.
Ob represents the fracture origin lay outside the two bending rollers.

Set-up :



Surface	Finish	Tension / compression side in test
Top surface	Fritted pattern	Compression
Bottom surface	Clear	Tension

Remark:

i) The maximum expanded uncertainty of the measured bending strength is +/- 5.6 N/mm^2.
ii) The expanded uncertainty is based on a standard uncertainty by a coverage factor of K=2, providing a level of confidence of approximately 95%.
iii) The results given in this report only relate to the sample tested at the time of the test.

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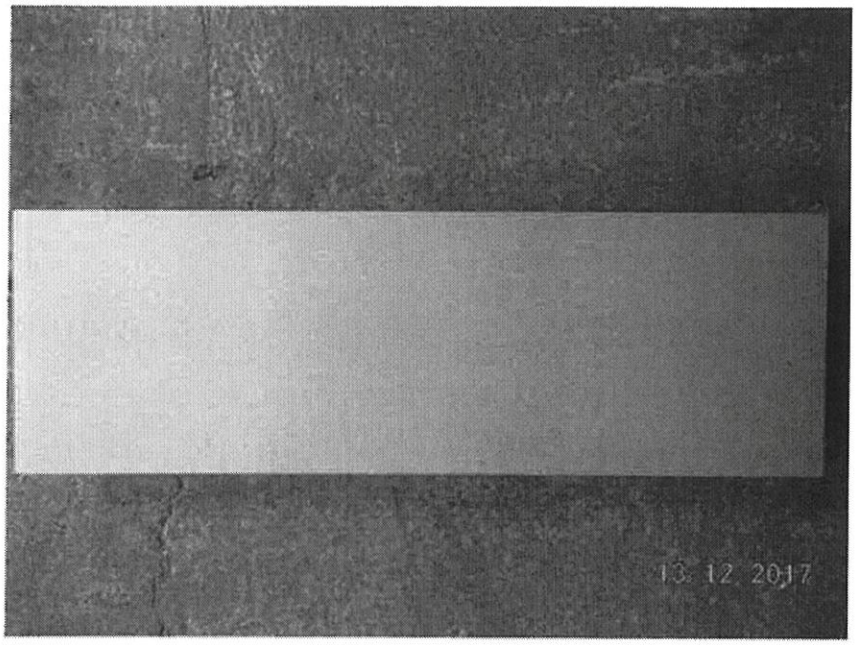
HOKLAS 103
TEST

PHOTO RECORD



Title : Bending Strength of Glass
Photo by : CK Pang
Date : 2017/12/13

Typical pattern surface

1 GENERAL

1.1 SCOPE

The Code of Practice for the Structural Use of Glass (the Code), provides guidelines on the design, construction, testing, and quality assurance of glass structures or elements in buildings.

1.2 DESIGN CONSIDERATIONS

1.2.1 Aim of glass design

In the Code, the limit state design principle is adopted for structures using structural glass with the aim to achieve the following:

a) Overall stability and buckling resistance against the design loads;

b) Strength against collapse under the design loads and the imposed deformations of supporting structures;

c) Integrity and robustness against progressive collapse under the design loads;

d) Serviceability under the design loads and the imposed deformations of supporting structures;

e) Water and air tightness;

f) Durability;

g) Quality; and

h) Maintainability during its design working life.

1.2.2 Design references

The Code has made references to various international standards in Annex A.

Where an alternative method or a performance-based approach is adopted, adequate information, including proposals on compliance testing, must be provided to demonstrate that the aim of glass design specified in clause 1.2.1 can be achieved.

1.3 GLOSSARY OF TERMS AND DEFINITIONS

bite width of structural sealant used to bond the glass to supporting members.

buckling resistance
limit of force or moment that a member can withstand without buckling failure.

curtain wall
non load-bearing enclosure fixed onto the load-bearing structure with its dead loads, imposed loads and wind loads transferred to the structure through fixings.

ultimate design strength
ultimate design strength obtained by applying partial material factor to the specified minimum yield strength or tensile strength of the material.

gasket plastic-like solid material used to separate glass and other brittle materials from contact with each other or supporting frames.

glass

annealed glass
ordinary float glass commonly manufactured by floating the molten glass on a bed of molten tin until it sets. It can be cut by scoring and snapping. It will break into large fragments with sharp edges.

decorative glass
clear or patterned glass processed by craftsmen for decorative effect. Sand-blasted, acid-etched, embossed, fritted and printed glass fall into this category. Decorative interlayers may also be incorporated in laminated glass.

4.3 STRENGTH OF GLASS

The strength of glass varies greatly depending on the particular heating and cooling cycle(s) (heat treatment) that are applied in its production resulting in different types of glass. The types of glass commonly used for construction are outlined in clauses 4.2.1 to 4.2.3.

Breakage of glass is due to the stress concentrated at the microcracks on its surface. The ultimate design strength of glass is defined as the strength at which not more than 8 out of 1000 glass panes would fail.

The ultimate design strength (p_y) of glass under short-term load duration is given in Table 4.3.

As the strength of glass depends on load duration, a strength reduction factor (γ_d) should be applied to p_y for medium and long-term load duration for different glass types as given in Table 4.4. Definition of load duration is given in clause 3.5.

Also, as the strength of glass depends on different glass surface treatment, a glass surface treatment reduction factor (γ_s) should be applied to p_y as given in Table 4.5. Design strength of glass with surface treatment should be verified by bending test.

Table 4.3 Ultimate design strength (p_y) for different glass types under short-term load duration

Type of glass	Ultimate design strength (p_y) under short-term load duration (MPa)
Annealed	20
Heat strengthened	40
Tempered	80

Table 4.4 Strength reduction factor (γ_d) applied to p_y for different load durations and glass types

Type of glass	Strength reduction factor (γ_d)		
	Short-term load duration	Medium-term load duration	Long-term load duration
Annealed	1.00	0.53	0.29
Heat strengthened	1.00	0.73	0.53
Tempered	1.00	0.81	0.66

Table 4.5 Glass surface treatment reduction factor (γ_s) for different glass types

Type of glass	Glass surface treatment reduction factor (γ_s)
Flat clear, tinted or coated glass	1.0
Ceramic fritted or enamelled painted glass	0.625
Patterned (embossed), sand blasted or acid etched glass	0.5

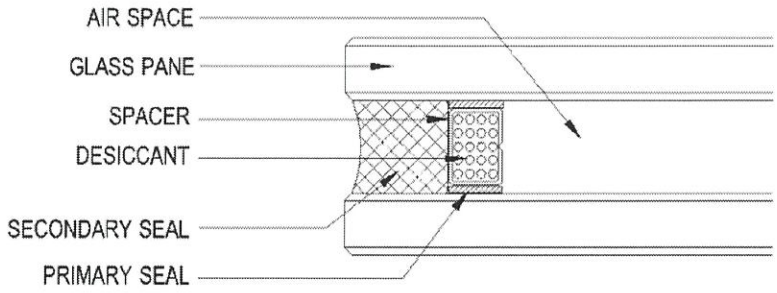


Figure 4.3 Edge of typical IGU

4.4.3 Low-E glass

Low-E glass has a coating or treatment applied that tunes the performance of glass to reduce energy consumption. The glass surface does not absorb radiation heat and reflects it so the thermal insulation properties can be improved. The effect of using low-E glass may not be on structural aspect, except that the surface temperature may have some effects on the surface thermal stress and it is in general insignificant for tempered glass.

4.4.4 Fire-rated glass

Glass is generally non-combustible. However, when exposed to the effects of heat, normal glass products shatter easily because of their low tensile bending strength in conjunction with their relatively high coefficient of thermal expansion.

Fire-rated glass commonly uses a clear intumescent interlayer "gel" in a laminated or multi-laminated glass assemblies. At elevated temperature, the intumescent interlayer turns into a rigid and opaque fire shield. The higher the fire resistance rating requirement, the thicker the glass assembly and the greater the number of interlayers. Durability tests for fire-rated glass such as high-temperature test, humidity test and radiation test should be carried out.

4.4.5 Decorative glass and fritted glass

A wide variety of techniques may be employed to apply decorative treatments to glass surface. The most common methods include coating, acid etching, sand blasting, fritting, screen printing, ink-jet printing, body tinting, embossing and abrading. Decorative interlayers may also be incorporated in laminated glass. The purpose of these treatments is to confer aesthetic benefits. It is possible that some of these treatments, such as fritting and engraving, may reduce the strength and durability of the glass, the effect of which on the ultimate design strength of glass pane is given in clause 5.4. For decorative treatments to glass, the effect of which on the ultimate design strength of glass should be examined by bending tests in accordance with BS EN 1288-3.