

**JAS (Inspection & Testing) Ltd**

**A**

**Surface Compression Measurement Report**

**To**

**ASTM C1279 & ASTM C1048**

**For**

**Tempered Glass**

**Manufactured by**

**Guangdong South Bright Glass Technology Co., Ltd.**

**Prepared By : JAS (Inspection & Testing) Limited**

**Date : 11<sup>th</sup> July 2019**

**Our Ref. : J19-101-R01-190711**



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## 1. TEST INFORMATION

Test Consultant	JAS (Inspection & Testing) Ltd.
Tester	Sam Lau
Glass Manufacturer	Guangdong South Bright Glass Technology Co., Ltd.
Address	Fu Wan Industrial Park, Gaoming District Fu Wan Industrial Park, Gaoming District, Foshan, China.
Date of Specimen manufactured	5 <sup>th</sup> July 2019
Identification of the specimen	Clear Tempered Glass
Selected Procedure	i. ASTM C 1279 Procedure A ii. ASTM C 1048
Glass Thickness (mm)	19 & 22
Room Temperature	23°C
Humidity	86%
Condition period	4 hours
Test Date	10 <sup>th</sup> July 2019
Apparatus	A Grazing Angle Surface Polarimeter.

## 2. PROCEDURE

### 2.1 ASTM C 1279 Procedure A

- Clean the surface of any trace of oil or other chemical deposits.
- Place a few drops of index liquid on the tin side surface of the specimen at the point of interest. The index of refraction of the liquid should be higher than the index of the examined glass and lower or equal to the index of the prism.
- Perform the adjustments of the optical path in accordance with manufacturer's specifications to obtain a clear image of an equally-spaced set of fringes in the compensator plane.
- Using the goniometer, measure the angle  $\theta$  (in degrees) of these fringes to the plane of symmetry.
- In all instances where the surface stress is uniform (independent of direction), measure the angle  $\theta$ , orienting the instrument's plane of symmetry to measure stress parallel to the nearest edge.
- In those instances where the direction of maximum and minimum stress is uncertain (as a result of irregular geometry, proximity of edges, or non-uniformity of heat-treating process), orient the instrument along direction  $\alpha_1$ ,  $\alpha_2$  &  $\alpha_3$ , and measure the fringe pattern angle  $\theta_1$ ,  $\theta_2$  &  $\theta_3$ , in degrees. For each direction . Select  $\alpha_1$ ,  $\alpha_2$  &  $\alpha_3$  as follows:
  - $\alpha_1$  - parallel to the nearest edge.
  - $\alpha_2$  -  $45^\circ$  to the nearest edge, and
  - $\alpha_3$  - perpendicular to the nearest edge.

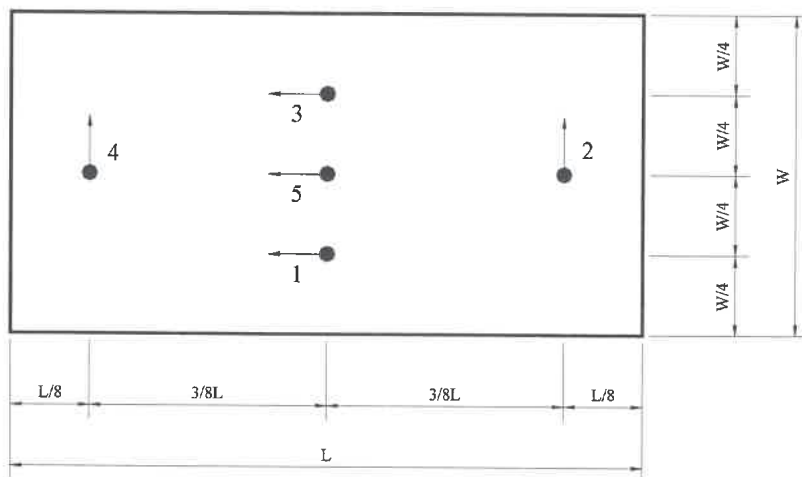


Fig.1a. Five Location Examined for ASTM C1279

## 2.2 ASTM C 1048

- a. Clean the surface of any trace of oil or other chemical deposits.
- b. Place a few drops of index liquid on the tin side surface of the specimen at the point of interest. The index of refraction of the liquid should be higher than the index of the examined glass and lower or equal to the index of the prism.
- c. Perform the adjustments of the optical path in accordance with manufacturer's specifications to obtain a clear image of an equally-spaced set of fringes in the compensator plane.
- d. Using the goniometer, measure the angle  $\theta$  (in degrees) of these fringes to the plane of symmetry.
- e. In all instances where the surface stress is uniform (independent of direction), two surface compression measurements shall be made in each of five locations, oriented in two direction at  $90^\circ$  to each other, for a total of ten readings on each specimen to be tested. Average the ten readings to determine the stress level of the test sample.
- f. In those instances where the direction of maximum and minimum stress is uncertain (as a result of irregular geometry, proximity of edges, or non-uniformity of heat-treating process), orient the instrument along direction  $\alpha_1$ ,  $\alpha_2$  &  $\alpha_3$ , and measure the fringe pattern angle  $\theta_1$ ,  $\theta_2$  &  $\theta_3$ , in degrees. For each direction . Select  $\alpha_1$ ,  $\alpha_2$  &  $\alpha_3$  as follows:
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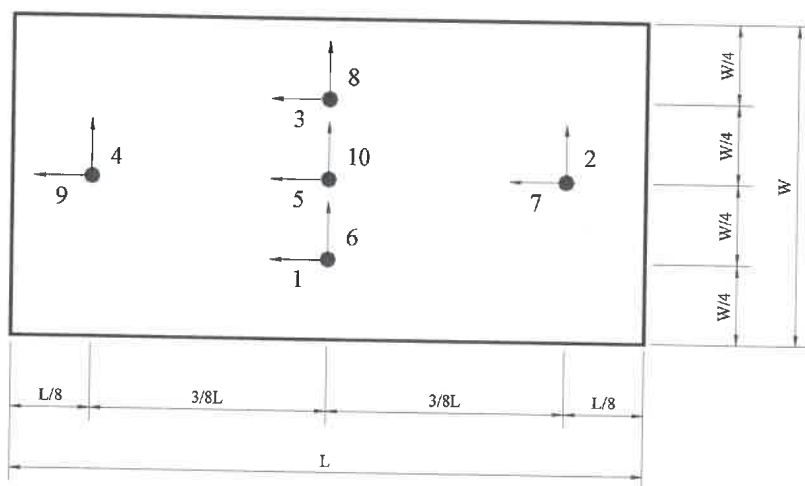


Fig.1b. Five Location Examined for ASTM C1048



## 4. RESULT

### 4.1 19mm Tempered Glass

Date of specimen manufactured	5 <sup>th</sup> July 2019				
Date of Test	10 <sup>th</sup> July 2019				
Identification of specimen	1,100mm x 360mm x 19mm				
Selected procedure	ASTM C 1279 / ASTM C1048				
Glass Thickness	18.42mm				
Direction of measurement	Refer to Fig. 1a & Fig.1b				
Location	1	2	3	4	5
Measured angle in degrees	58	57	57	58	59
Calculated stress (MPa)	96.48	92.84	92.84	96.48	100.34
Location	6	7	8	9	10
Measured angle in degrees	58	58	58	59	59
Calculated stress (MPa)	96.48	96.48	96.48	100.34	100.34
ASTM C1279 (Locations 1-5) Average Measured angle in degrees	57.8				
ASTM C1279 (Locations 1-5) Average Calculated stress (MPa)	95.80				
ASTM C1048 (Locations 1-10) Average Measured angle in degrees	58.1				
ASTM C1048 (Locations 1-10) Average Calculated stress (MPa)	96.91				

### 4.2 22mm Tempered Glass

Date of specimen manufactured	5 <sup>th</sup> July 2019				
Date of Test	10 <sup>th</sup> July 2019				
Identification of specimen	1,100mm x 360mm x 22mm				
Selected procedure	ASTM C 1279 / ASTM C1048				
Glass Thickness	21.99mm				
Direction of measurement	Refer to Fig. 1a & Fig.1b				
Location	1	2	3	4	5
Measured angle in degrees	58	58	59	58	59
Calculated stress (MPa)	96.48	96.48	100.34	96.48	100.34
Location	6	7	8	9	10
Measured angle in degrees	58	59	58	58	59
Calculated stress (MPa)	96.48	100.34	96.48	96.48	100.34
ASTM C1279 (Locations 1-5) Average Measured angle in degrees	58.4				
ASTM C1279 (Locations 1-5) Average Calculated stress (MPa)	98.02				
ASTM C1048 (Locations 1-10) Average Measured angle in degrees	58.4				
ASTM C1048 (Locations 1-10) Average Calculated stress (MPa)	98.02				



## 5. SUMMARY

The Surface Compression values measured according to ASTM C1279 Procedure A and ASTM C1048, are summarized as follow:

Tempered Glass Thickness	Average calculated Stress ASTM C1279 (MPa)	Average calculated Stress ASTM C1048 (MPa)
19mm	95.80	96.91
22mm	98.02	98.02

I certify this to be a true record of the test.

Tested by

Mr. Sam Lau

Certified by



Mr. Clifford A. Bury

## Appendix

- i. Unit-Stress Conversion Table**
- ii. Fig. 2**
- iii. Photos**

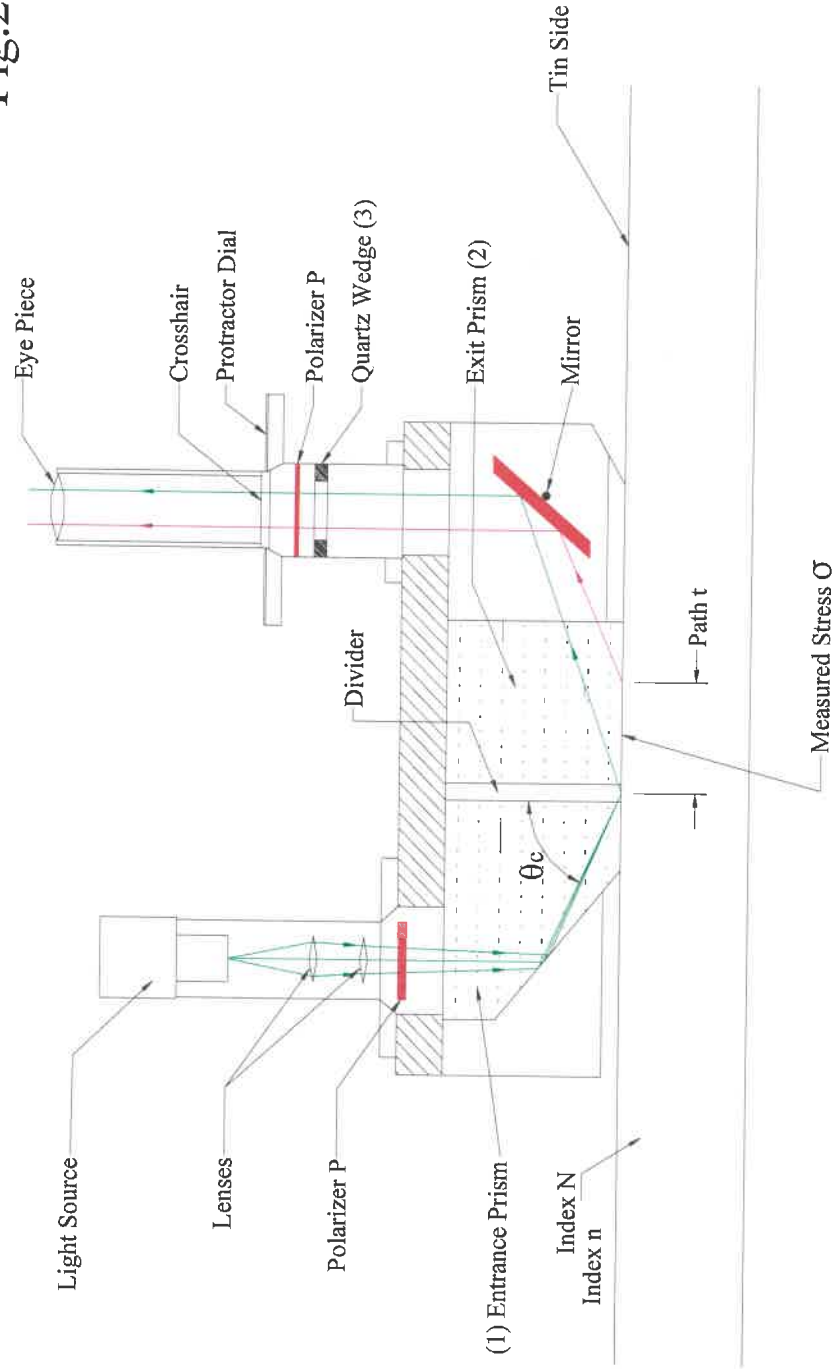


## Unit-Stress Conversion Table

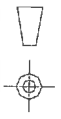
**STANDARD WEDGE USED IN GASP CS**  
**WEDGE FACTOR = 1.00**

Angle θ	Stress psi	Stress kgf/cm2	Stress Mpa		Angle θ	Stress psi	Stress kgf/cm2	Stress Mpa
1	153	11	1.05		39	7081	499	48.82
2	305	22	2.11		40	7337	517	50.59
3	458	32	3.16		41	7601	535	52.41
4	611	43	4.22		42	7873	554	54.29
5	765	54	5.27		43	8154	574	56.22
6	919	65	6.34		44	8444	595	58.22
7	1074	76	7.40		45	8744	616	60.29
8	1229	87	8.47		46	9055	638	62.43
9	1385	98	9.55		47	9377	660	64.65
10	1542	109	10.63		48	9711	684	66.96
11	1700	120	11.72		49	10059	708	69.36
12	1859	131	12.82		50	10421	734	71.85
13	2019	142	13.92		51	10798	760	74.45
14	2180	154	15.03		52	11192	788	77.17
15	2343	165	16.15		53	11604	817	80.01
16	2507	177	17.29		54	12035	848	82.98
17	2673	188	18.43		55	12488	879	86.10
18	2841	200	19.59		56	12964	913	89.38
19	3011	212	20.76		57	13465	948	92.84
20	3183	224	21.94		58	13993	985	96.48
21	3357	236	23.14		59	14552	1025	100.34
22	3533	249	24.36		60	15145	1067	104.43
23	3712	261	25.59		61	15775	1111	108.77
24	3893	274	26.84		62	16445	1158	113.39
25	4077	287	28.11		63	17161	1209	118.33
26	4265	300	29.41		64	17928	1263	123.61
27	4455	314	30.72		65	18752	1321	129.29
28	4649	327	32.06		66	19639	1383	135.41
29	4847	341	33.42		67	20600	1451	142.03
30	5048	356	34.81		68	21642	1524	149.22
31	5254	370	36.23		69	22779	1604	157.06
32	5464	385	37.67		70	24024	1692	165.65
33	5678	400	39.15		71	25394	1788	175.09
34	5898	415	40.67		72	26911	1895	185.55
35	6123	431	42.22		73	28600	2014	197.20
36	6353	447	43.80		74	30494	2147	210.26
37	6589	464	45.43		75	32633	2298	225.00
38	6832	481	47.10		76	35070	2470	241.81

Fig.2



UNITS : mm



DRAWING TITLE : Basic Principles of Operation

PROJECT : Surface Compression Measurement

DRAWN : JAS (Inspection & Testing) Ltd.

DATE : 10-10-2011 DWG NO : 2617

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# JAS (Inspection & Testing) Ltd.

## INSPECTION OF WORK - PHOTO RECORD



Photo 1

Size of the specimen was checked before test.



Photo 2

Thickness of the specimen was checked before test. (19mm)



Photo 3

Thickness of the specimen was checked before test. (22mm)



Photo 4

Place a few drops of index liquid on the tin side surface.



Photo 5

Tinted side of the specimen was confirmed for the test.



Photo 6

The Grazing Angle Surface Polarimeter.