

Gelivable AG Glass Optical Property Parameters Explained

1.0 Scope of Application

The optical properties detailed in this document apply to the clear sheet etched glass supplied by Gelivable®.

2.0 Purpose:

The purpose of this document is to clarify how the optical properties of etched glass are defined, classified and evaluated.

3.0 Optical Property Requirements

3.1 Gloss

3.1.1 Measurement

Gloss is measured with a BYK4563 gloss meter at an incident angle of 60 degrees, and the instrument must be used in accordance with the manufacturer's instructions.

3.1.2 In general, gloss varies by +/-10 units over the surface of a glass screen.

3.1.3 The relationship between gloss, roughness, haze and transmittance is illustrated in the table below.

	Single side					Double side					
Gloss	35±10	50±10	70±10	95±10	110±10	35±10	50±10	60±10	70±10	95±10	110±10
Roughness	0.18	0.15	0.12	0.09	0.07	0.16	0.13	0.11	0.09	0.07	0.05
Haze%	17	11	4.7	3	2	17	11	9	6	2.5	1.5
Transmittance	>89%	>89%	>89%	>89%	>89%	>89%	>89%	>89%	>89%	>89%	>89%
Reflectance	~8%	~8%	~8%	~8%	~8%	~8%	~8%	~8%	~8%	~8%	~8%
Resolution	2:1	3:1	3:1	3:1	3:1	2:1	2:3	2:3	3:1	3:1	3:1
Clarity	40	57	79	83	91	40	57	57	70	85	91

3.2 Resolution

3.2.1 Measurement

Resolution is measured by placing a 1951 USAF resolution test target on a light box.

3.2.1.1 The light box brightness and viewing conditions are set for a viewer with

maximum normal visual acuity or corrected visual acuity. The viewing conditions can

be confirmed by placing the resolution test target together with an un-etched glass

at a distance of 1.5 inches (38.1 mm); the observer should be able to resolve at least group 3:6 (equivalent to 14.3 line pairs/mm).

3.2.1.2 The etched glass under test is placed about 1.5 inches (38.1 mm) above the

USAF test target, and the resolution test target is then viewed through the etched

glass. The test target is placed on the surface of a light panel. The measured value

is the group number of the smallest resolvable line pairs on the resolution test target.

3.2.2 Using the 1951 USAF resolution test target, the resolution must meet or exceed

the following values, corresponding to the range of double-side AG gloss:

Gloss ≥ 110 -3:1 (8.00 line pairs/mm)

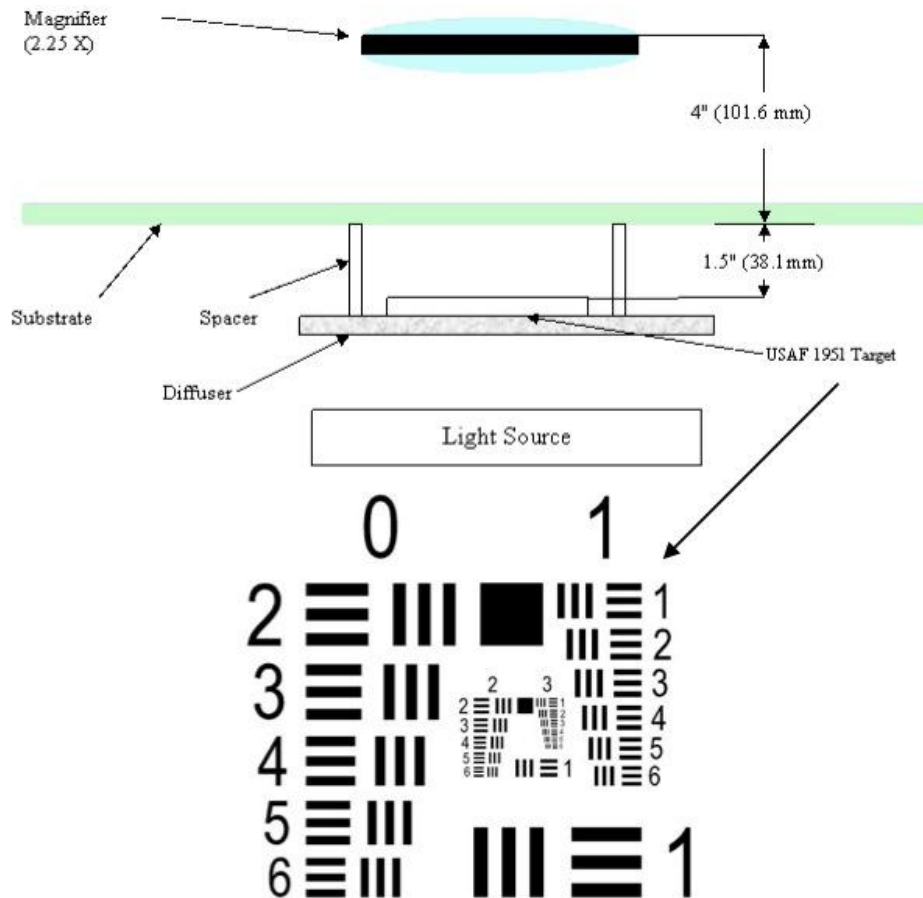
Gloss ≥ 95 -3:1 (8.00 line pairs/mm)

Gloss ≥ 70 -3:1 (8.00 line pairs/mm)

Gloss ≥ 50 -2:3 (5.04 line pairs/mm)

Gloss ≥ 35 -2:1 (4.00 line pairs/mm)

3.2.3 Resolution test equipment setup diagram:



3.3 Transmittance:

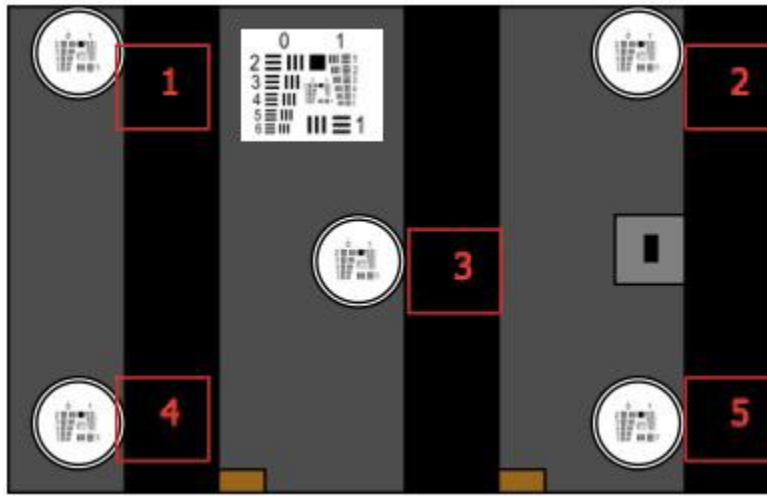
3.3.1 Transmittance is maintained at the production level of the raw glass supplier (transmittance of clear sheet glass > 89%); the etching process does not change the transmittance of the raw glass.

4.0 Inspection:

4.1 Gloss and Resolution

Gloss is evaluated on the basis of the readings taken at the measuring points shown in the figure below, together with statistical process control

(SPC) techniques, to assess the gloss of the glass sheet. The numbered positions in the figure below are the actual sampling points for the gloss/resolution values of the sheet.



5.0 Dimensional Property Requirements

5.1 Raw glass sheet thickness table

Thickness *	Raw Glass Tolerance		Single side Thickness		Double side Thickness	
	High	Low	High	Low	High	Low
0.7	0.75	0.65	0.71	0.59	0.67	0.53
1.1	1.15	1.05	1.11	0.99	1.07	0.93
1.6	1.68	1.52	1.64	1.46	1.6	1.4
1.9	2.08	1.91	2.04	1.85	2.00	1.79
2.2	2.26	2.16	2.22	2.1	2.18	2.04
3.1	3.15	3.05	3.11	2.99	3.07	2.93
3.9	3.94	3.78	3.9	3.72	3.86	3.66

5.2 By design, each chemical etching process reduces the thickness of the raw glass sheet by about 0.05+/-0.01 mm.

5.3 Single-side etched glass is etched on the air side only. Note: the tin side can also be etched if required by the customer.

5.4 Products of other thicknesses can be produced to actual requirements, provided that the thickness specification and tolerance are given.

6.0 Environmental Test



Gelivable (Dongguan) Co., Ltd

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6.1 Because Gelivable® AG glass is not a sprayed coating, the AG glass performs in environmental testing exactly like the raw glass sheet.

6.2 Test results are as follows:

High temperature (70°C, 240hrs) ---PASS

Low temperature (-30°C, 240hrs) ---PASS

Temperature & humidity (60°C, 80%RH, 240hrs) ---PASS

Thermal shock (-30/70°C, 50 cycles, one cycle every 60 min) ---PASS

Abrasion test: steel wool #0000, load 10N, 3500 back-and-forth strokes, 60 mins per cycle ---PASS