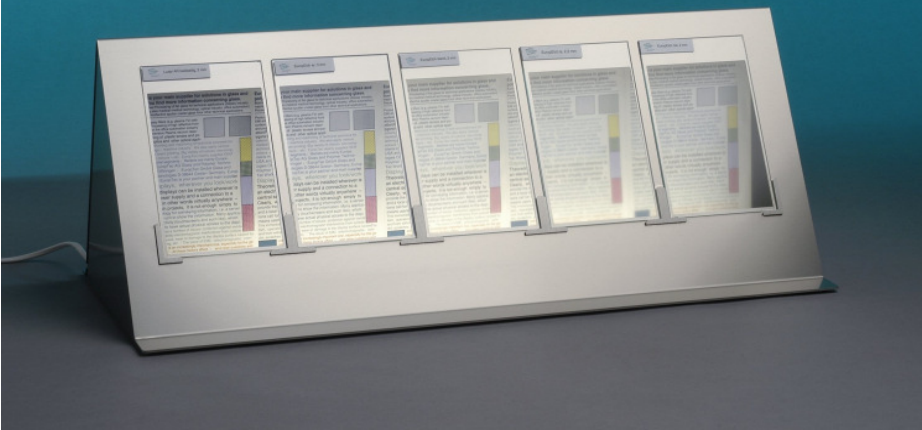


EagleEtch® EagleEtch Plus™

Various Etch Levels
High Resolution - Low Sparkle



The Anti-glare Glass for Technical Display Applications

EagleEtch® glass is designed and manufactured especially for the electronic display industry. The subtractive etching process makes our glass ideal for high resolution applications in adverse conditions which require the best in anti-glare properties, low sparkle, low haze, and improved clarity. Ideal applications include Touch Screens, Industrial and Commercial, Point of Sale, Kiosks, and Outdoor Displays.

What's new?

EuropTec offers standard anti-glare gloss levels as well as customized gloss levels based on application:

- **EagleEtch® (DS or SS antiglare)**
Top performing anti-glare panels that are unmatched for tight gloss control, ultra-high resolution, consistency of the etched surface, and sparkle control. Glare can cause undue eyestrain and fatigue. By utilizing an EagleEtch® anti-glare panel in your display, incident light is dispersed allowing the user to focus on the screen rather than the reflected images. Unlike coating or spray-on solutions, EagleEtch® offers durability in even the harshest environments.
- **EagleEtch Plus™ (AR coating over anti-glare)**
When only the best will do! All the benefits of EagleEtch® with an added anti-reflective coating to create our newest product.

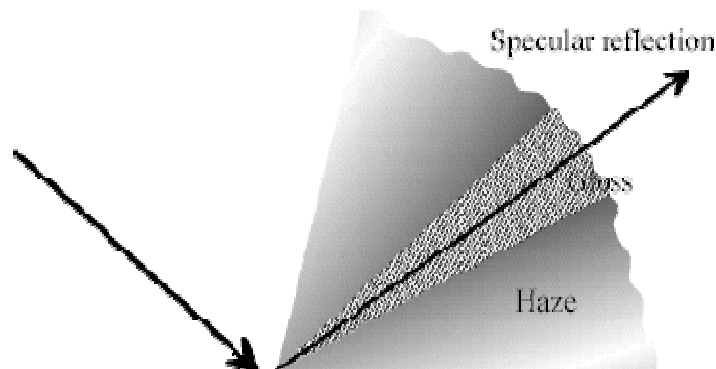
Applications:

- Touch Panels
- Military & Avionics
- Ruggedized displays
- Vehicle displays
- Equipment displays
- Medical Technology
- Computer displays
- Hand-held devices
- ATM's
- Kiosk's/POP's
- Information Displays
- Gaming Displays
- Outdoor Applications



EagleEtch®, EagleEtch Plus™:

- low haze
- homogenous gloss
- low sparkling effect
- high resolution



→ → → → → → → → **let's talk EagleEtch®!**

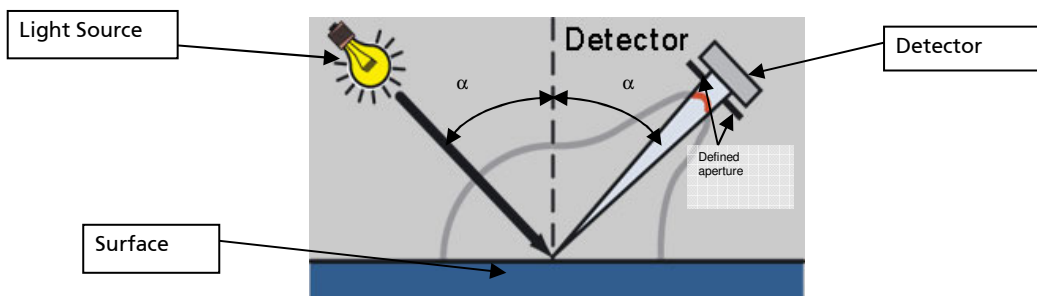
Gloss

Gloss measurement is great for defining a product from a supplier, but it is not a way to compare AG glass from different suppliers or technologies. In simple terms, a gloss 80 EagleEtch® has different diffusion characteristics and just "looks" different than a gloss 80 AG glass from an alternative supplier. Please note this and always evaluate samples of AG glass to decide what is best for your application.

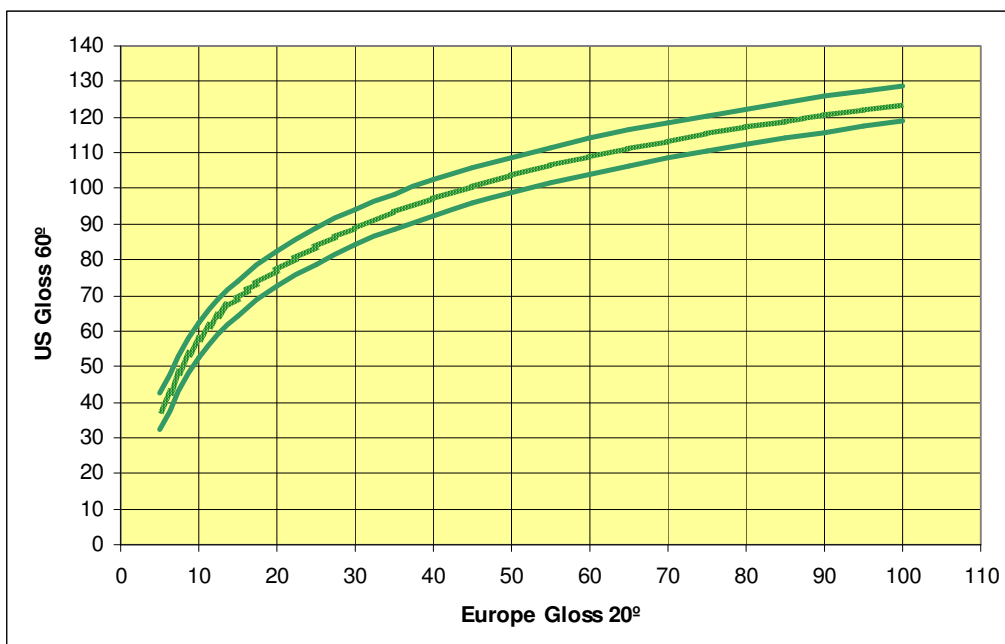
There are two different gloss measurements common in the industry:

US Gloss – which is measured using a BYK Gardner model 4460 and/or 4430 gloss meter at a 60-degree angle of incidence.

GW Gloss – Often used in Europe and is measured at a 20-degree angle of incidence.



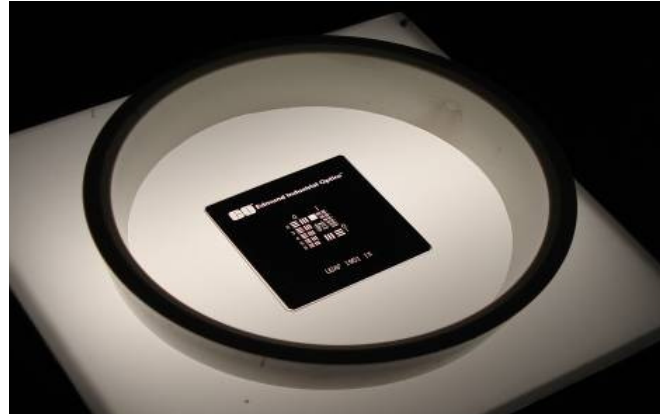
EagleEtch® – US Gloss vs. European (GW) Gloss Levels



Resolution

Resolution is measured by using a 1951 USAF resolving power test target positioned over an illuminated light box.

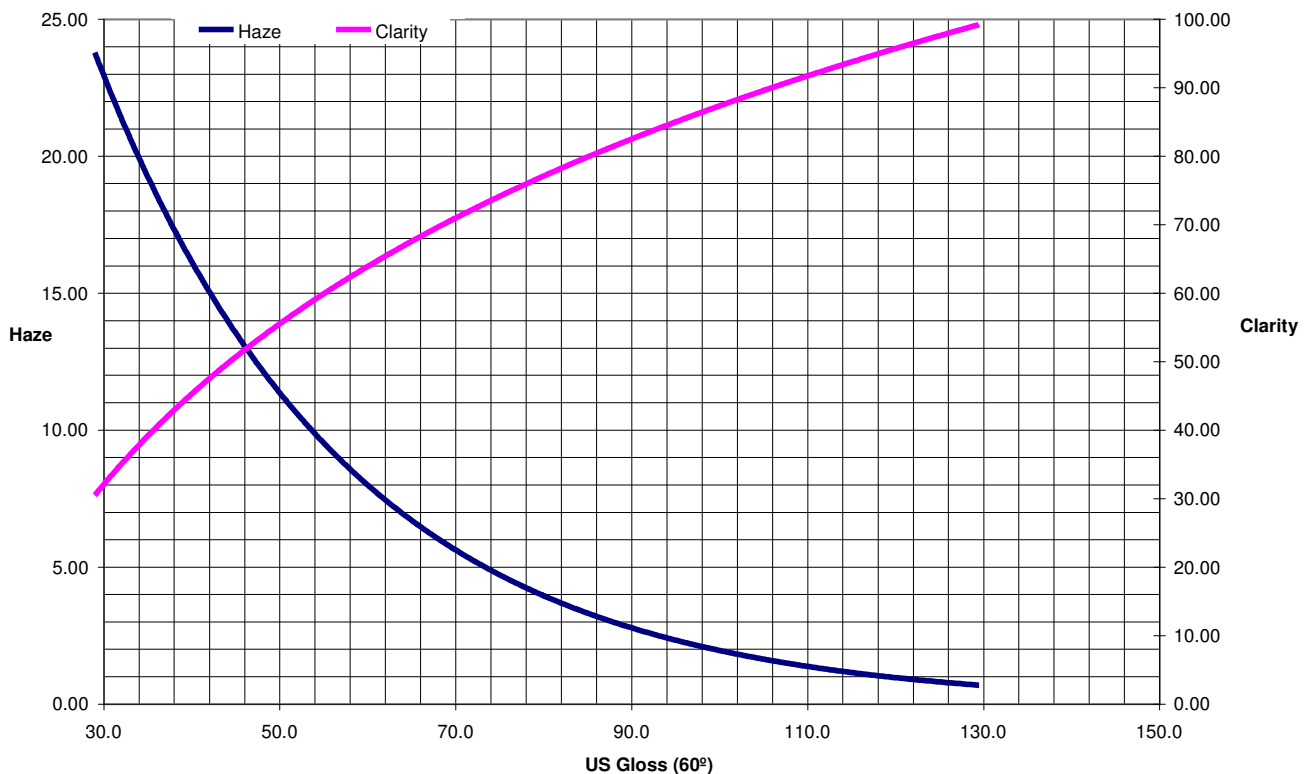
EagleEtch® meets extraordinary values in all gloss levels which is very important in connection with high resolution monitors and the effect of sparkle. This great resolution allows customers to use lower gloss/higher diffused EagleEtch® glass in front of displays.



Haze & Clarity

Haze is a wide angle scattering of light. Clarity is a narrow angle scattering of light. Both measurements are relative to gloss. Haze and Clarity are measured using the BYK Gardner haze-gard plus. See below chart for EagleEtch® double sided AG.

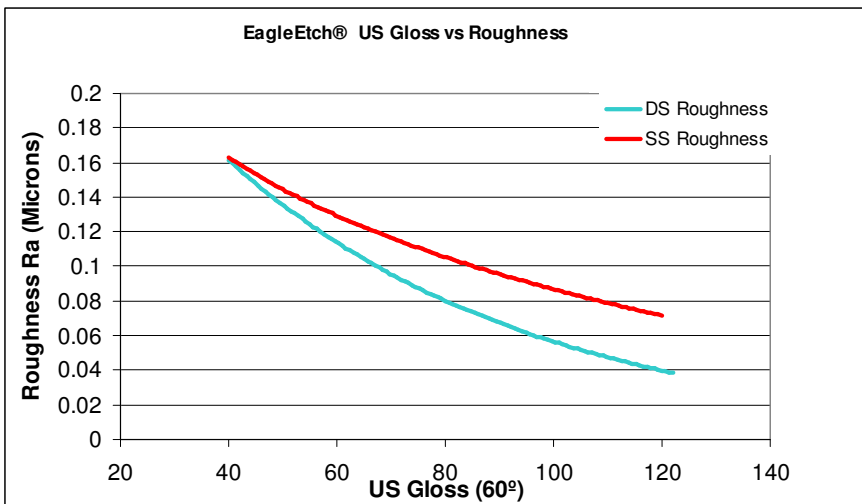
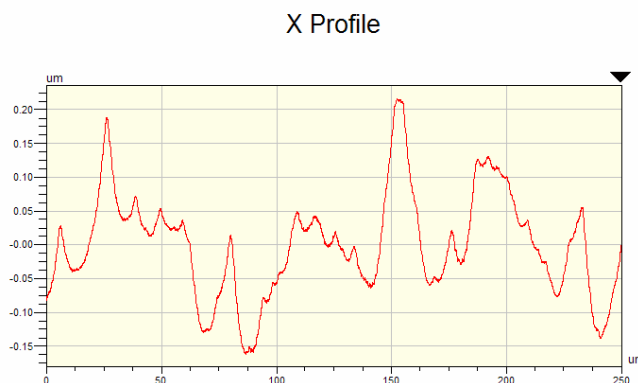
EagleEtch® US Gloss vs Haze - Clarity



Roughness

New high resolution displays are placing higher demands on these textured surfaces which can be produced in a wide variety of ways. AG glass can be produced by acid etching, sandblasting, spraying rough coatings, polymer web – coating, or dip coating to create a surface structure. Each method (and process) can yield very different surface geometries to achieve AG properties. Roughness is measured with a Dektak 150 stylus profilometer and reported as Ra (average Roughness).

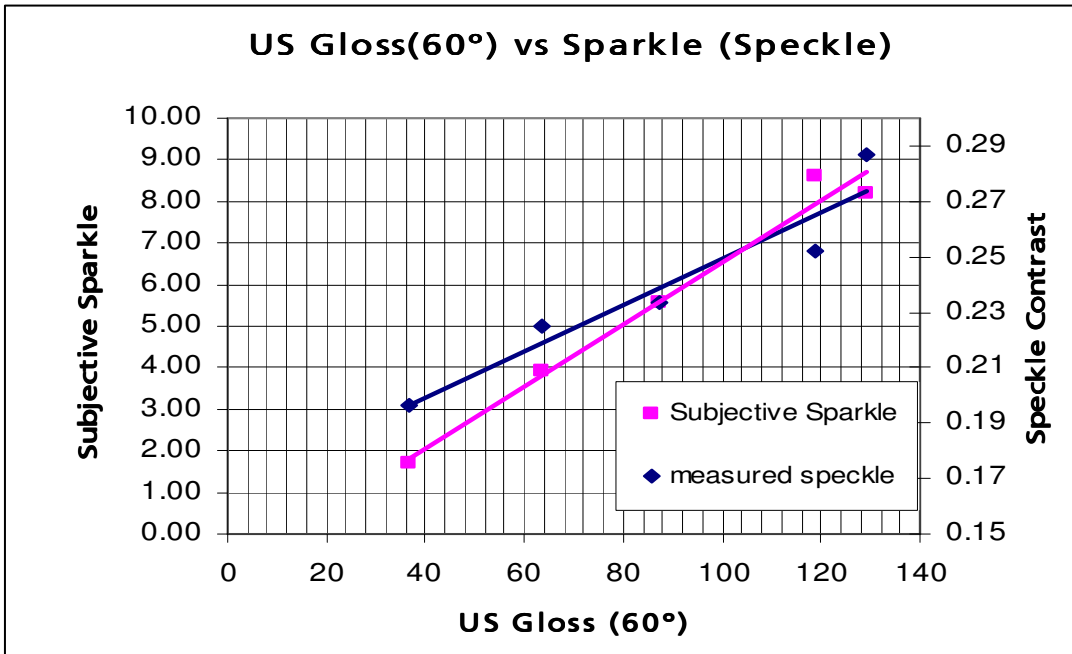
Surface structure/roughness EagleEtch® Gloss 80



The above graph shows that a lower gloss product has a rougher surface. A rougher surface increases light scattering, lowering the gloss (increasing the roughness) reduces sparkle within the EagleEtch® product line. This is not a measurement that can be compared between different etched products manufactured with different processes. Meaning that any etched glass does not sparkle less just because it has a rougher surface since there are many other factors affecting sparkle that should be taken into consideration.

Sparkle

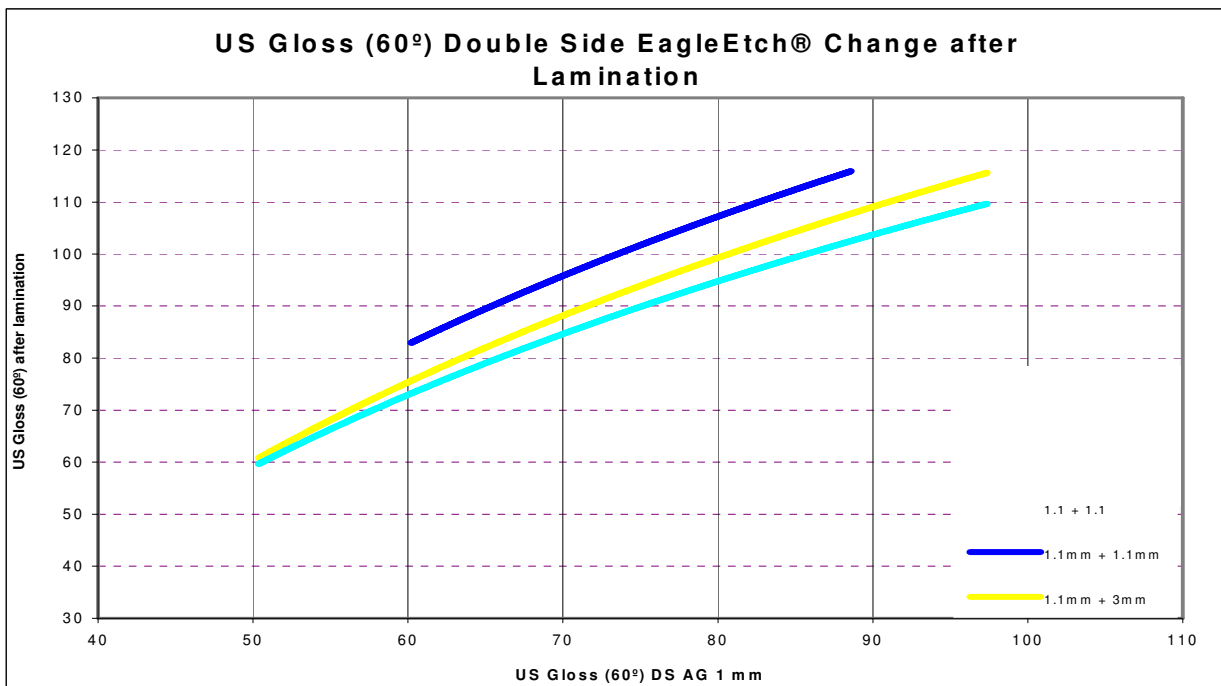
As the next generation of displays become higher resolution and backlights become brighter, sparkle is becoming a greater issue.



The above graph shows speckle contrast and subjective sparkle versus gloss for acid etched material. A lower gloss EagleEtch® product which also has a rougher surface will sparkle less than higher gloss/less rough product. EuropTec is working closely with the University of West Virginia to establish a measuring method and quantification of Sparkle on Anti-Glare surfaces (SID papers 2008 & 2009).

Lamination or Bonding of EagleEtch® Products

If a double side (DS) EagleEtch® glass is laminated, the gloss level changes as you can see from the graph by app. 15 to 20 gloss point. The second surface is eliminated and gloss increases. This makes it possible to easily integrate DS EagleEtch® into your application.



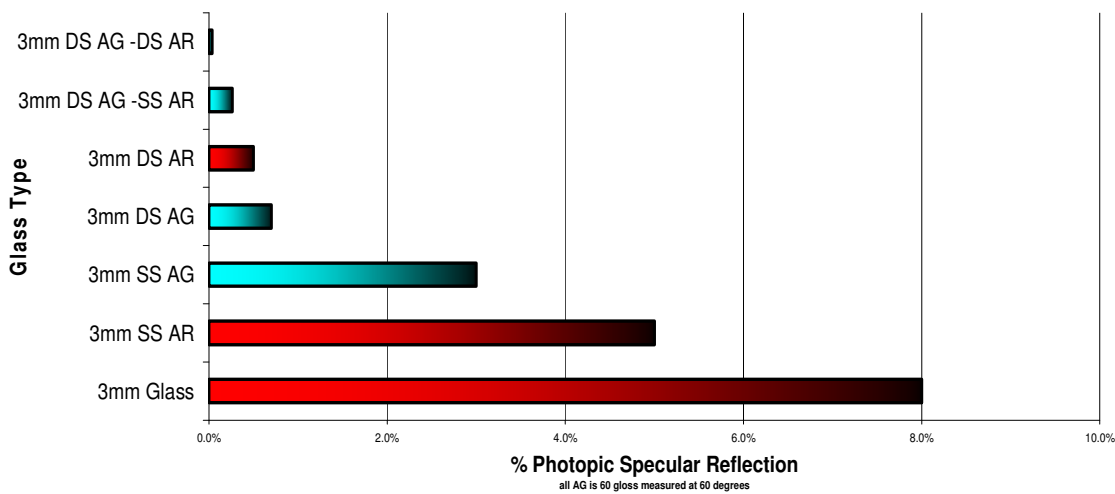
Chemical Strengthening and Heat Tempering of EagleEtch® Products

EagleEtch® products can be chemical strengthened and heat tempered. For heat tempering we follow ASTM C 1048 specification and for chemical strengthened glass ASTM C 1422.

EagleEtch Plus™

For military, avionics, and vehicle applications or any other sun-readable display EagleEtch Plus™ will give you the best possible display glass product. The graph below shows you the outstanding performance of our EagleEtch Plus™ product.

Photopic Specular Reflection vs Glass Treatments



DS AG = double side etched antiglare coating on EagleEtch®
 DS AR = double side antireflective coating on non treated float glass
 SS AG = single side etched antiglare coating on EagleEtch®
 SS AR = single side antireflective coating on non treated float glass

General Property Tables:

EagleEtch®

	Double Side AG					Single Side AG		
	Gloss 40	Gloss 60	Gloss 80	Gloss 100	Gloss 120	Gloss 40	Gloss 70	Gloss 90
Gloss Value	40	60	80	100	120	40	70	90
Transmission	>89%	>89%	>89%	>89%	>89%	>89%	>89%	>89%
Reflection Photopic	~ 8%	~ 8%	~ 8%	~ 8%	~ 8%	~ 8%	~ 8%	~ 8%
Roughness (microns)	0.16	0.12	0.08	0.06	0.04	0.155	0.12	0.1
Sparkle (Speckle Contrast)	0.194	0.209	0.228	0.2411	0.2591	0.1981	0.2241	0.2341
Sparkle (peaks/100microns)	> 4	> 4	> 4	> 4	> 4	> 4	> 4	> 4
Resolution	2:1	2:3	3:1	3:1	3:1	2:1	3:1	3:1
Resolution Lines/mm pair	4	5.04	8	8	8	4	8	8
Haze	16	8	4	2	1	13.5	4.7	3.6
Clarity	45	65	78	87	95	59	79	83

EagleEtch Plus™

	Double Side AG Single Side AR			Double Side AG Double Side AR		
	Gloss 40	Gloss 70	Gloss 90	Gloss 40	Gloss 70	Gloss 90
Reflection Specular Photopic	0.20%	0.36%	0.43%	< .1%	<.1%	<.1%
Resolution	2:1	3:1	3:1	2:1	3:1	3:1
Resolution Lines/mm pair	4	8	8	0:00	8	8
Haze	13	4.5	2.5	12.5	4.5	2.5
Clarity	60	78	88	60	78	88

- Gloss values indicated for coated glass are before coating
- Gloss measurements taken with BYK Gardner Gloss meters, models 4430 or 4460
- Haze and Clarity Measurements taken with BYK Gardner haze-gard plus
- Roughness Measurements taken with Dektak 150 Stylus Profilometer
- Spectrometer measurements taken with Ocean Optics USB 4000 Spectrometer
- Data is taken from Soda-Lime Glass
- Speckle Contrast is defined by the equation, Speckle Contrast = Stand. Dev. Intensity / Mean Intensity
- resolution according to 1951 USAF

Substrates:

Glass Type	Etchable
Soda Lime	Yes
Soda Lime Low Iron	Yes
Soda Lime Grey Glass	Yes
Corning: Eagle 2000	Yes
Corning: Eagle XG	Yes
Corning: Gorilla Glass	Yes

EagleEtch® Product Overview Sheet

Finished Thickness (mm)	1 Side Etch	2 Side Etch	Standard Width (inch)	Standard Length (inch)	Standard Width (mm)	Standard Length (mm)	Gloss Min/Max
0.6mm	N/A	yes	20	20	508	508	35~120
0.8mm	N/A	yes	20	20	508	508	35 - 120
1.0mm	yes	yes	32	50	812.8	1270	35~120
1.2mm	yes	yes	32	50	812.8	1270	35~120
1.5mm	yes	yes	32	50	812.8	1270	35~120
1.9mm	yes	yes	32	50	812.8	1270	35~120
2.1mm	yes	yes	32	50	812.8	1270	35~120
3.0mm	yes	yes	32	50	812.8	1270	35~120
3.8mm	yes	yes	32	50	812.8	1270	35~110
4.6mm	yes	yes	32	50	812.8	1270	35~110
5.6mm	yes	yes	32	50	812.8	1270	35~ 90

Standard QA specification for EagleEtch® glass products is QA7.2.3S002.