

GLOSS STANDARDS & MEASUREMENT

What is Gloss?

Gloss is defined as the degree to which a surface exhibits specular reflectance. This means that it is a measure of the image forming ability of a surface. In the case of glass or plastic sheets used for display enhancement, gloss is of interest because surface treatments known as antiglare treatments create a low gloss surface. In order to accurately specify and repeatably manufacture antiglare filters, it is necessary to understand how low gloss is obtained, how it is specified and controlled and how it is measured. This white paper will consider all of these aspects.

What Affects Gloss?

The perception of gloss is influenced by numerous factors, among them being: material being used, surface profile (structure and shape), transparency of the material. Polished glass and plastic, made by reliable manufacturers, will generally exhibit very high gloss numbers. Panels with additives designed to create a more or less milky appearance will exhibit low gloss values, as will those with surface etches. Gloss perception is also affected by details of the nature of the light source(s) and the observer's physical and emotional states. Gloss evaluation requires a direct source of illumination. A diffuse source causes a decreased gloss impression. Because the perception of gloss is not simply a physical measurement, it is often difficult to describe adequately. The paint and surface finish industries have developed several standards for defining gloss and how to measure it. The most important specifications include:

- ISO 2813
- ASTM D 523
- DIN 67530

Measuring Gloss

Several manufacturers produce gloss meters, such as BYK-Gardner, from whom most of this information has been derived. In order to assure reproducible data is obtained, it is necessary to standardize the instruments: Angle of illumination and regard are specified at angles of 20°, 60° and 85°. Dimensions of the source and receptor, light source (spectral characteristics) and sensitivity of the receptor are all specified and held constant within a given instrument. The theoretical standard for comparison is a highly polished black glass with a refractive index of 1.567, which is assigned a gloss value of 100 for each geometry. Several practical standards have been proposed and at least two versions are readily available. Measurement error should typically not exceed ± 1 unit. In gen-

eral, the gloss is first measured with the 60° geometry. The value obtained is reported if it is between 10 and 70 units. If the gloss reading is higher than 70, it is recommended that a measurement be taken at 20°, while the 85° geometry is used for readings below 10 (30 in the DIN standard). The use of different angles is needed because of the differences in measurement response at the different angles.

The Impact of Gloss on Displays

Low gloss will affect a display in two ways; first, a low gloss surface will reduce or eliminate the "white shirt" effect and second, the information content of the display will appear to have a blurry and perhaps speckled appearance. The "white shirt" effect is reduced because the light is diffusely reflected from the display surface, which minimizes the amount of specular reflections (see the *Reflections on Reflections* white paper for a more complete description). At the same time, however, the light from the display is also diffused by the low gloss surface. If the etching is relatively coarse, the light from the display will be focussed by the surface structure of the low gloss surface, resulting in an appearance in which the apparent brightness of a pixel will vary from point to point and over varying view angles. The degree of this diffusion and speckling is strongly influenced both by the distance between the emitting surface of the display and the diffusing surface and the degree of etch. It is the task of the display designer and manufacturer to arrive at the best compromise of reduced reflections and impaired appearance.

For More Information

Determining the best solution for your particular application can be a daunting task. We invite you to visit our web site, <http://www.GDOptiLabs.com>, for the latest information available on LCD, OLED and Plasma display optical enhancements. Or call 800.952.2535 to speak with a Sales Engineer.