

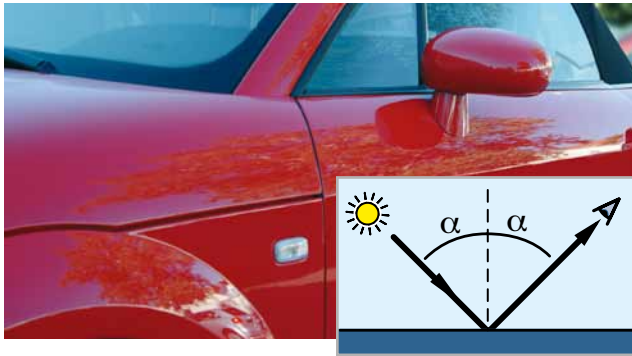
Introduction

Gloss Measurement

Gloss is a visual impression resulting from surface evaluation. The more direct light is reflected, the more obvious the impression of gloss will be.

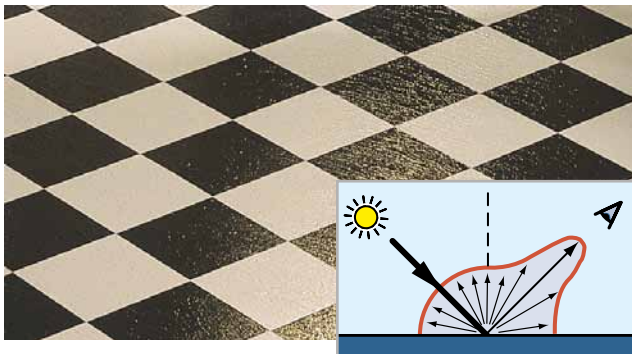
High Gloss

Smooth and highly polished surfaces reflect images distinctly. The incident light is directly reflected on the surface, i.e. only in the main direction of reflection. The angle of incidence is equal to the angle of reflection.



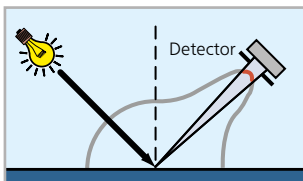
Matte to Semi Gloss

On rough surfaces the light is diffusely scattered in all directions. The image forming qualities are diminished: A reflected object no longer appears brilliant, but blurred. The more uniform the light is scattered, the less intense the reflection in the main direction and the surface will appear duller.



Glossmeter

A glossmeter measures the specular reflection. The light intensity is registered over a small range of the reflection angle.



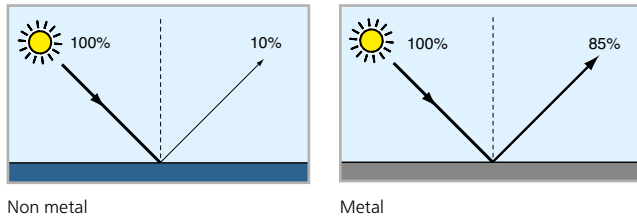
Measurement of specular reflection

GLOSS

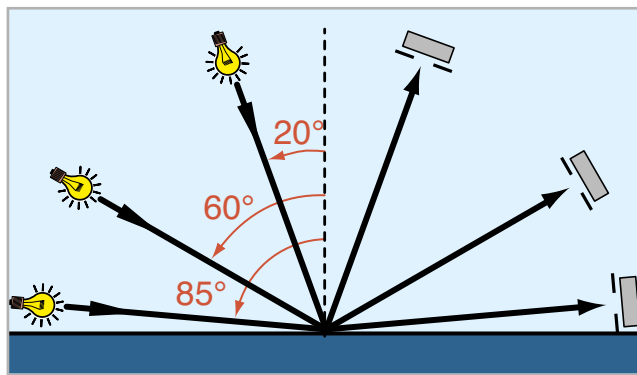


The intensity is dependent on the material and the angle of illumination. In case of non-metals (coatings, plastics) the amount of reflected light increases with the increase of the illumination angle. The remaining illuminated light penetrates the material and is absorbed or diffusely scattered dependent on the color. Metals have a much higher reflection and are less angle dependent than non metals.

Example:



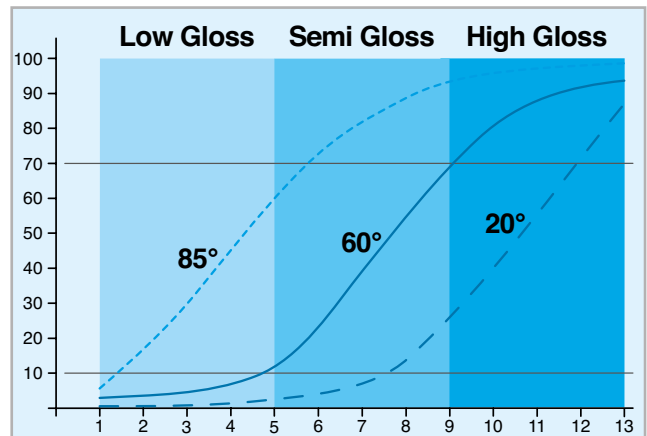
The measurement results of a glossmeter are related to the amount of reflected light from a black glass standard with a defined refractive index, and not to the amount of incident light. The measurement value for this defined standard is equal to 100 gloss units (calibration). Materials with a higher refractive index can have a measurement value above 100 gloss units (GU), e.g. films. In case of transparent materials, the measurement value can be increased due to multiple reflection in the bulk of the material. Due to the high reflection capabilities of metals, values of up to 2000 GU can be reached. For these applications it is common to document the measurement results in % reflection of the illuminated light.



Glossmeters and their handling procedures had to be internationally specified to allow comparison of measurement values. The angle of illumination is of high influence. In order to obtain a clear differentiation over the complete measurement range from high gloss to matte, 3 different geometries, i.e. 3 different ranges, were defined:

Gloss Range	60° value	To be measured with
Semi Gloss	10 to 70	60° geometry
High Gloss	>70	20° geometry
Low Gloss	< 10	85° geometry

In addition, there are industry specific applications for 45° and 75° measurement geometry.



In this case study 13 samples were visually ranked from matte to high gloss and measured with the 3 specified geometries. In the steep slopes of the curves, the differences between the samples can be clearly measured, while in the flat part, the measurement geometry no longer correlates with the visual.

Gloss measurement for any application – whether you are dealing with specific applications or need a universal solution for matte to high gloss samples, BYK-Gardner offers a complete line of glossmeters:

- Reference laboratory instrument – haze-gloss
- Portable micro-gloss family

Their unique features and benefits have made them the industry standard for gloss measurement.

Application	20° Coatings, plastic and related materials			45° Ceramic, Film		75° Paper, Vinyl	
	High Gloss	Semi Gloss	Low Gloss	Semi Gloss		Low Gloss	
DIN EN ISO 2813	■	■	■				
ASTM D 523	■	■	■				
ASTM D 2457	■	■		■		■	
DIN 67530	■	■	■				
JIS Z 8741	■	■	■	■		■	
ASTM C 346				■			
Tappi T 480						■	
	Brightened Metal						
EN ISO 7668	■	■	■	■			