RHOPOINT
INSTRUMENTS

**TECHNICAL
INFORMATION**

Trigloss + IQ
▼MENU ▲CURVE ▶STAT   n=53
                 60°   85°
20°   93.8   99.5
88.9   Haze   Rspec
RIQ   0.0   89.0
98.9   15/03/13 12:15
Batch:BATCH.002

RHOPOINT Q

20/60° • 20/60/85° GLOSSMETER
DOI METER
HAZE METER
GONIOPHOTOMETER

Why buy an IQ, not a glossmeter?

A high quality finish is important in a huge number of industries. "High gloss, deep finish, smooth and homogenous."

Orange peel and haze have a huge impact on finish quality.

Potential causes - coating formulation, substrate, application technique & conditions, drying/curing.

A glossmeter cannot measure these effects that reduce visual quality. *Rhopoint IQ- the ultimate glossmeter upgrade.*

Who needs these extra measurements?

Proven applications in:

- Paints & coatings
- Powder coatings
- Additives
- Inks
- Plastics
- Wood coatings
- Yacht manufacture

- Automotive
- Aerospace
- Polished stone and metals
- Glass manufacture
- Consumer electronics
- Anodised metals

Gloss
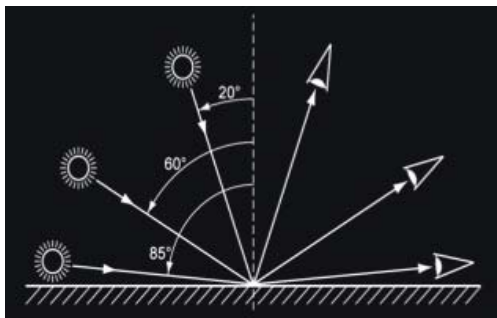
The Rhopoint IQ has standard glossmeter optics @ 60° & 85° and a high definition 512 element LDA @ 20°+/- 7.25°.
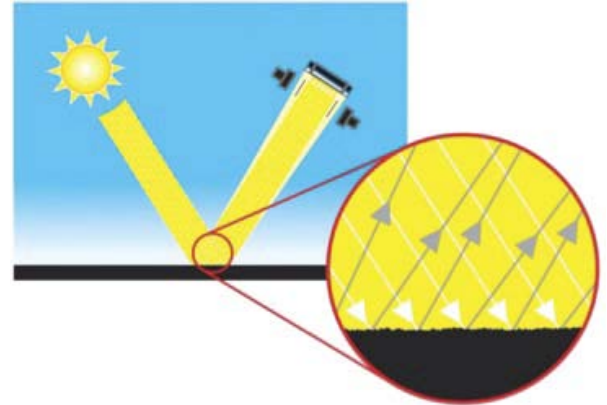
Which angle is best for my application?
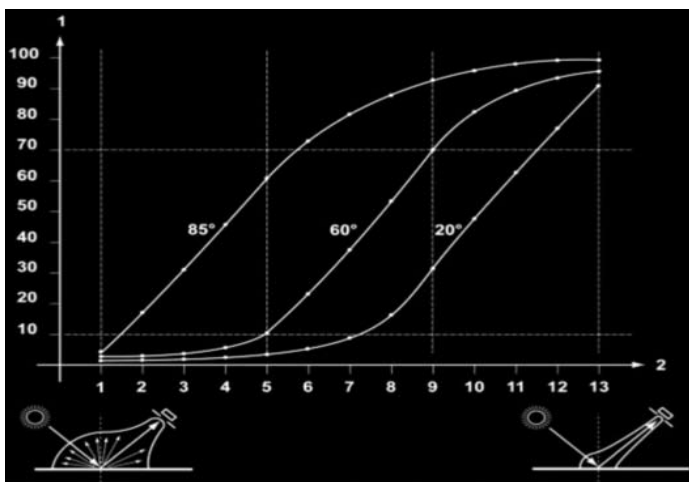
Surfaces with gloss < 10GU @ 60º should be measured with the 85º geometry.

Samples where gloss is > 70GU @ 60º measure with the 20º angle.

Haze

Haze is light that has been reflected by small surface structures adjacent to the main specular component.

$$Haze \propto \frac{Haze\ reflectance}{Incident}$$

Reflection Haze

Reflection haze is an optical phenomenon usually associated with high gloss surfaces, it is a common surface fault that reduces appearance quality. It is characterised by a surface in which reflections are visibly shallower with a milky finish, in addition halos are often visible around reflections of strong light sources.
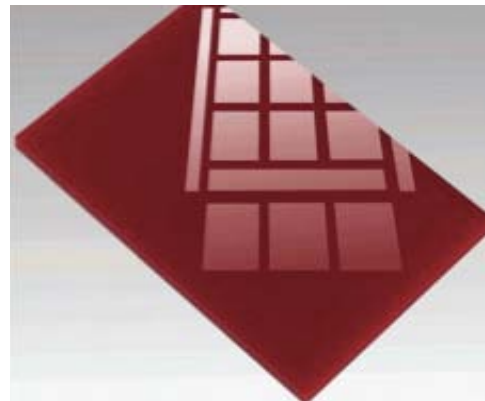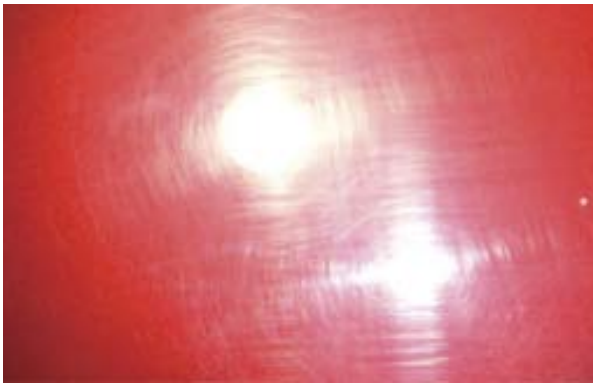

Sample 1- No Haze, deep reflection
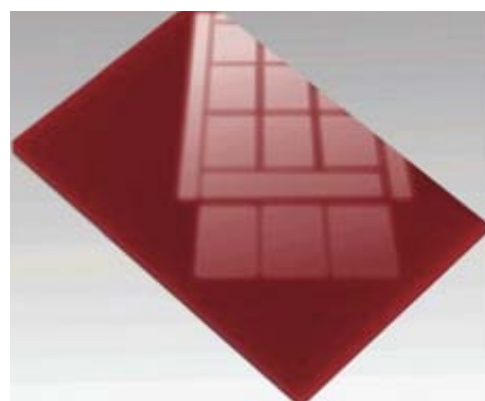
Sample 2- High Haze, 'shallow' finish

A high gloss finish with haze exhibits a milky finish with low reflective contrast- reflected highlights and lowlights are less pronounced.

Sample 3- Low Haze

Sample 4- Higher Haze

On surfaces with haze, halos are visible around the reflections of strong light sources.

Causes of Reflection Haze

Haze can be described as near specular reflection. It is caused by a microscopic surface structure which slightly changes the direction of a reflected light causing a bloom adjacent to the specular (gloss) angle. The surface has less reflective contrast and a shallow milky effect. In the coatings industry, this microscopic surface texture is often due to poorly dispersed raw materials, incompatible raw materials or oxidisation and weathering.

For polished metal surfaces haze is often associated with polishing marks or chemical residue.

Causes of Haze

Coating & Raw Materials
- Dispersion
- Pigment properties
- Particle size
- Binder compatibility
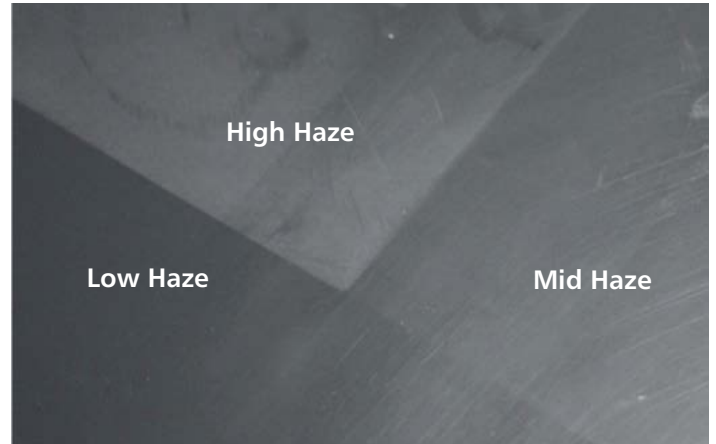- Influence and migration of additives
- Resin types and quality

Curing
- Drying conditions
- Cure temperature

Post Coating
- Polishing marks
- Cleanliness
- Ageing and oxidisation

Haze- Often visible as milky finish on high gloss surfaces

High Haze

Low Haze

Mid Haze

Gloss & Haze Measurement with IQ Array Technology

The Rhopoint IQ uses a 512 element linear diode array which profiles reflected light in a large arc from 14 to 27°. The IQ instrument processes this high resolution data, selecting individual elements within the array that equate to the angular tolerances outlined in international measurement standards.

In a single 20° measurement, the following calculations are made by:

$$Gloss = \frac{\sum \text{Pixels between } 20°\pm0.9° \text{ (sample)}}{\sum \text{Pixels between } 20°\pm0.9° \text{ (standard)}}$$

$$Haze = 100 * \frac{\sum \text{Pixels from } 17° \text{ to } 19° \text{ (sample)} + \sum \text{Pixels from } 21° \text{ to } 23° \text{ (sample)}}{\text{Specular Gloss (Standard)}}$$

$$logHaze = 1285(log10((Haze/20)+1)))$$

Auto adjustment on curved surfaces

A major advantage of the IQ is that it automatically compensates for curved or textured sample surfaces by virtually adjusting the measurement position. Conventional gloss-hazemeters have fixed optics which can make measurement unreliable as any sample curvature will reflect light away from the centre of the measurement sensor causing errors.

The IQ automatically adjusts the sensor position by detecting the peak of the reflected light. The laws of reflection state that the incident angle is equal to the reflection angle thus the peak equates exactly to the 20° gloss angle.
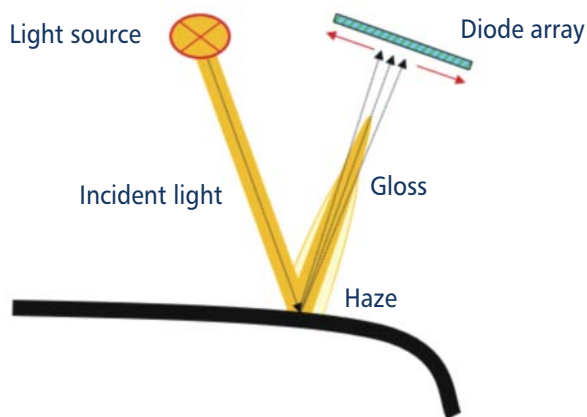

The IQ automatically adjusts for non-flat surfaces by sensing the reflected peak and virtually adjusting the position of the sensor.

Diffuse corrected haze measurement with IQ array technology

Reflection haze is caused by micro texture on a surface which causes a small amount of light to be reflected adjacent to the gloss angle. For white surfaces, bright colours and metallics, a certain amount of diffuse light, reflected from within the material, is also present in this region.

This diffuse light exaggerates the haze signal for these surfaces causing higher than expected readings.
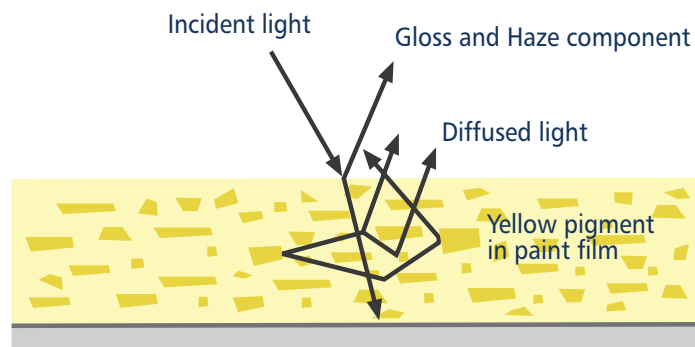
The Rhopoint IQ compensates for reflection from within the coating for highly reflective pigments, metallic coatings and speciality pigments, allowing the haze of any painted surface to be measured.
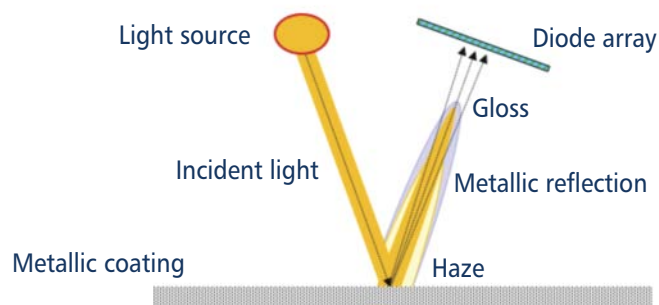
Corrected haze measurement on metallic coatings

For non metallic surfaces, the diffuse component is Lambertian: it is equal in amplitude at all angles in relation to the sample surface. Conventional gloss-hazemeters measure diffuse reflection using a luminosity sensor positioned away from the gloss angle. Luminosity is subtracted from the haze signal allowing non metallic surfaces to be measured independent of their colour.
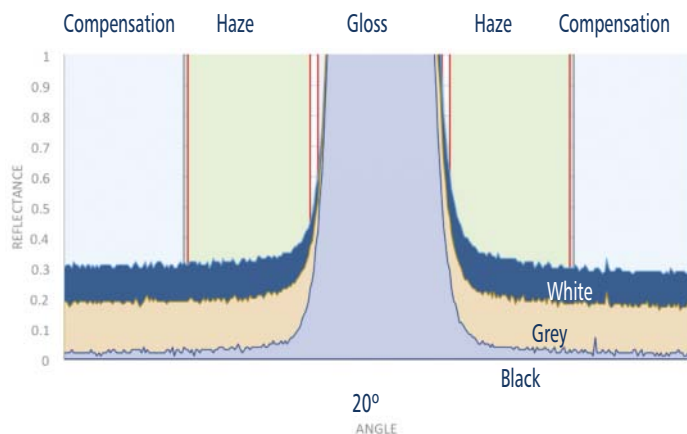
IQ goniophotometric information profiling the reflection from white, grey and black panels with an identical topcoat.

An advantage of the IQ is that unlike a conventional instrument, compensation is calculated using a region adjacent to the haze angle. This technique gives compatible readings on solid colours but also compensates for directional reflection from metallic coatings and speciality pigments.

The Rhopoint IQ captures compensation information from a region adjacent to the haze measurement angle. This means it can be used on metallic coatings which reflect light directionally.

Orange Peel

Orange peel is a surface texture which resembles the skin of an orange.

Causes of Orange Peel

Application

- Improper gun adjustment and technique
- Over-spray/dry spray
- Brush marks
- Improper flash or recoat time
- Substrate roughness/waviness
- Sag on vertical surfaces

Coating

- Incorrect coating, primer or clear coat film thickness
- Poor particle size distribution
- Incorrect viscosity leading to poor flow
- Flake alignment
- Resin types and quality
- Surface energy incompatibility
- Incorrect curing/environmental conditions

Distinctness of Image- DOI

Distinctness of image is the aspect of gloss characterized by the sharpness of images of objects produced by reflection at a surface.

$$Haze \: \alpha \: \frac{\Delta \: \text{Reflectance}}{\Delta \: \text{Angle}}$$

Low DOI is caused by large surface structures distorting the reflected light. The surface is visible: orange peel.
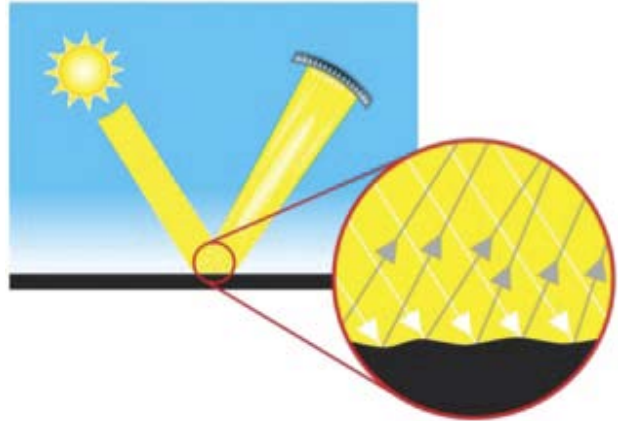

The Rhopoint IQ measures all aspects of reflective appearance.

Three high gloss coated panels measure identically using a standard glossmeter, but orange peel dramatically reduces the perceived quality of the surfaces with texture.
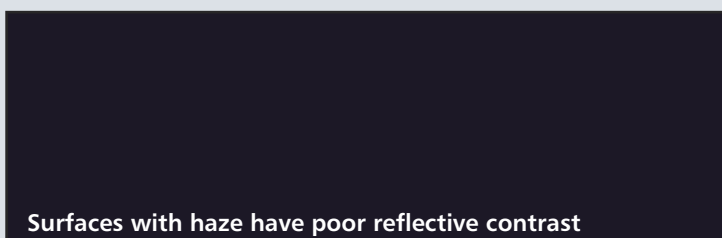
Gloss readings @ 20° approximately 85GU
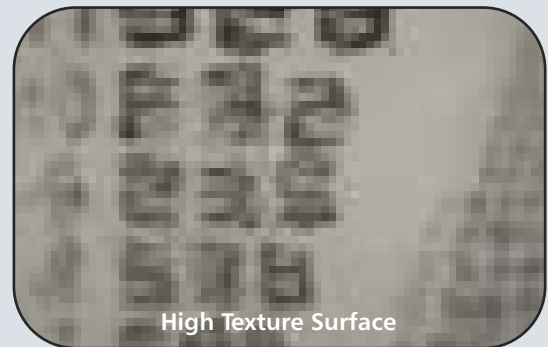Gloss readings @ 60° approximately 93GU

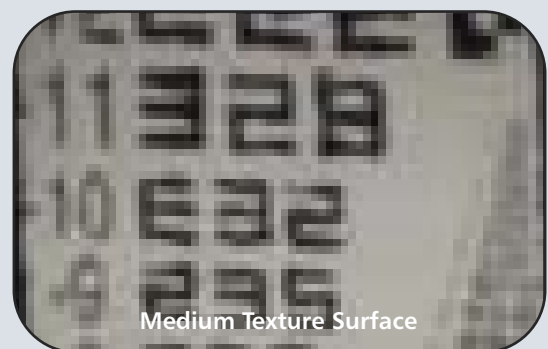Only by using additional parameters of DOI/RIQ can the visual quality be measured.

— Smooth Surface
— Medium Texture Surface
— High Texture Surface
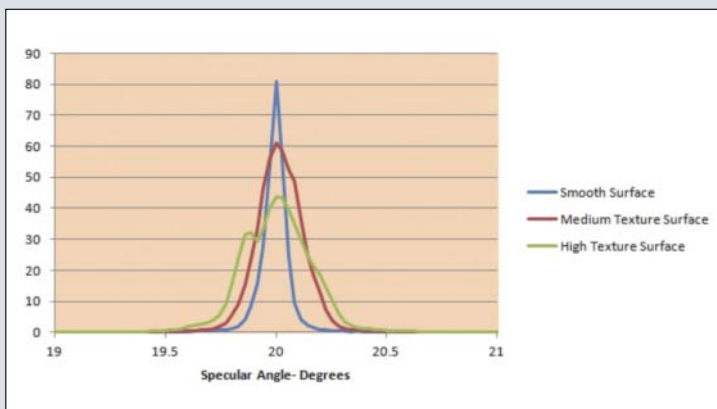
Goniophotometric curves clearly show the visual differences between the 3 panels.
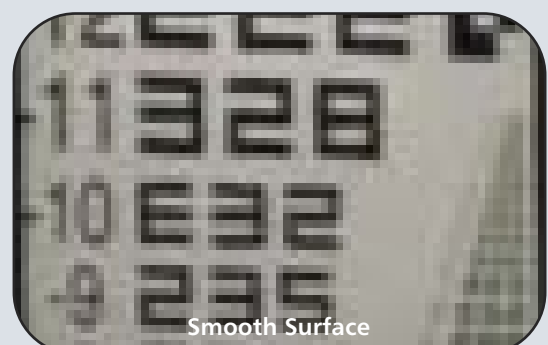

Surfaces with haze have poor reflective contrast

High Texture Surface

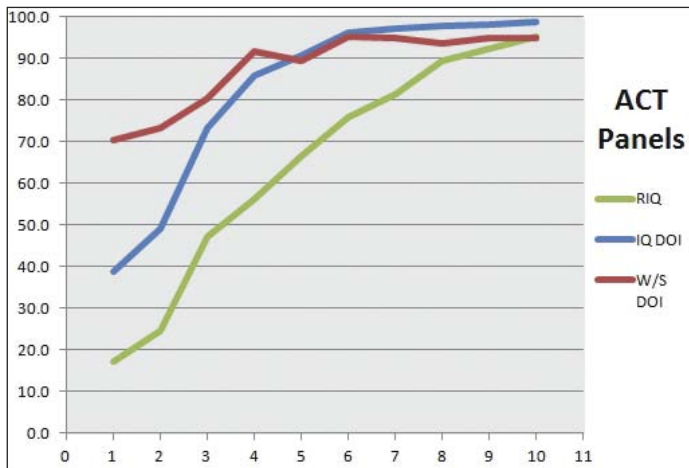**Medium Texture Surface**

Smooth Surface

RIQ- Reflected Image Quality

RIQ is a more sensitive, updated version of DOI.

A new high sensitivity/high resolution sensor allows improved measurement.
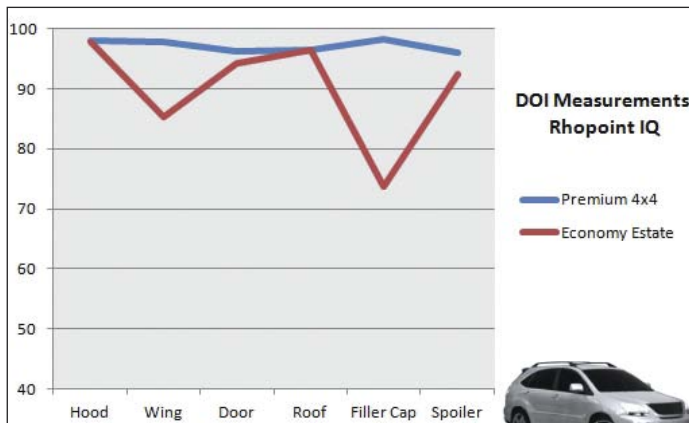

RIQ vs DOI

DOI is not sensitive to low amounts of orange peel on highest quality surfaces.

RIQ has a more proportionate response to orange peel on a wider range of surface finishes.

RIQ works well in differentiating low gloss surfaces with different specular/diffuse components.
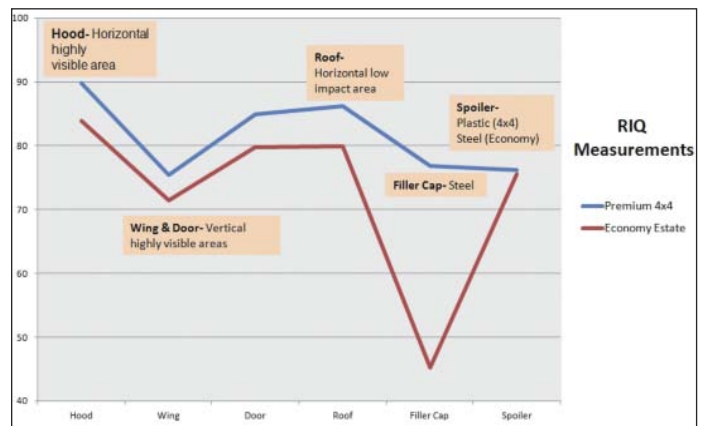

Rhopoint IQ– DOI

Quality differences between economy and premium are seen; poor orange peel on economy filler cap is shown, however horizontal and vertical surfaces are not differentiated.
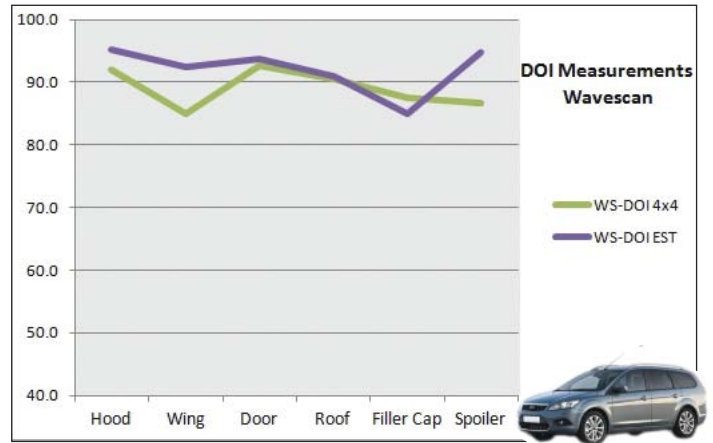
Wavescan– DOI

The DOI values do not reflect differences between horizontally and vertically sprayed panels; premium and economy models are not differentiated.
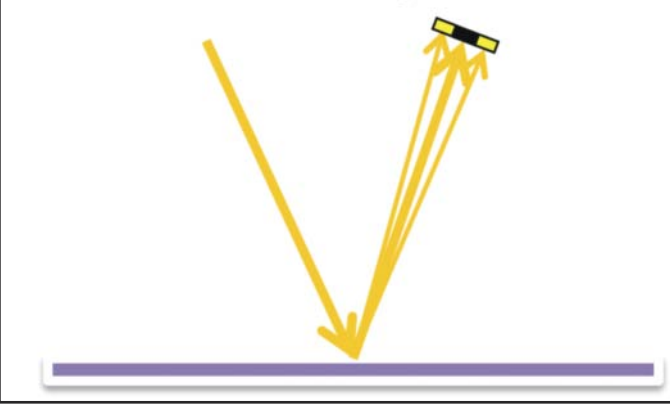

RIQ Measurements

RIQ measurement is sensitive enough to appearance differences due to-

• Substrate alignment (horizontal/vertical)

• Coating formulation
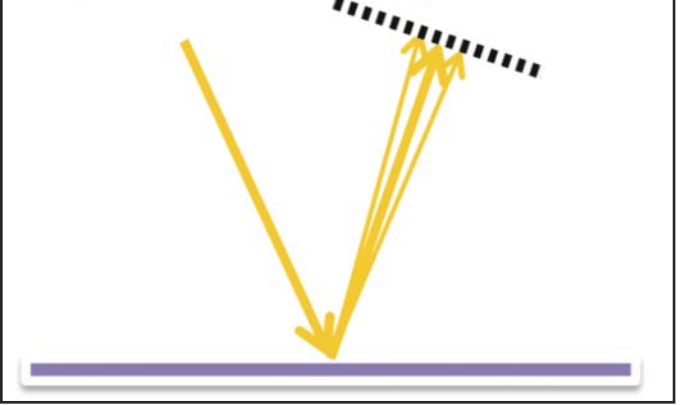
• Substrate

• Application technique

Sample Flatness Compensation
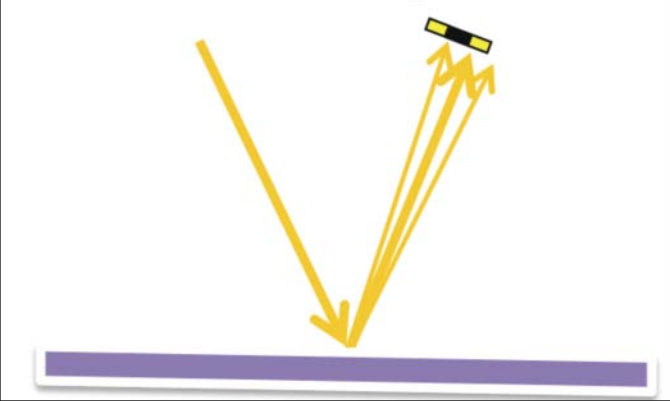
Glossmeter- Correct Reading

20° gloss & haze meters have fixed geometry. They require very flat surfaces to measure accurately.

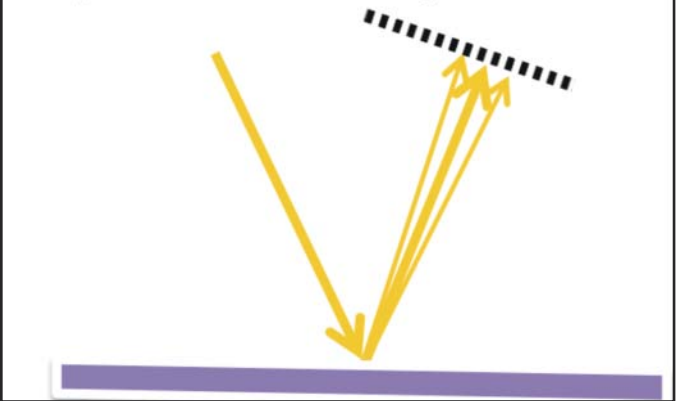### Rhopoint IQ- Correct Reading

The Rhopoint IQ uses a 512 element sensor that measures at 20° +/- 7.25°. It mathematically determines the gloss angle.
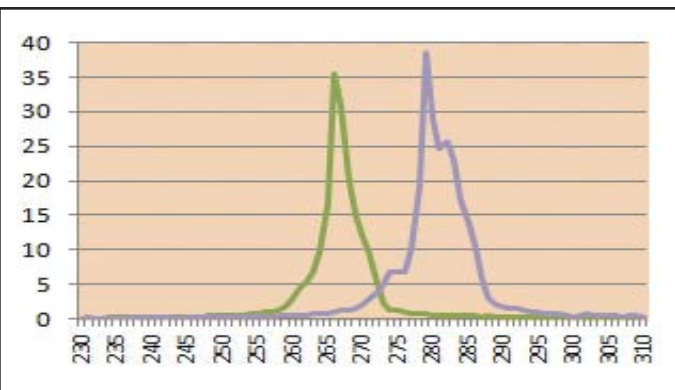
Glossmeter- Incorrect Reading

Non-flat surfaces cause light to reflect on an incorrect part of the sensor and give inaccurate gloss results.

Rhopoint IQ- Correct Reading

Light is reflected on different parts of the diode array. The instrument automatically compensates.

Two similar appearance surfaces, one is curved- the reflected light falls away from the centre of the array.
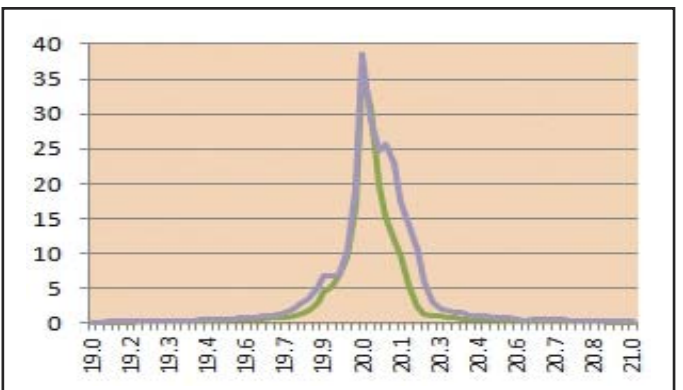
The instrument automatically compensates for non-flatness.

Law of Reflection
The direction of incoming light and the direction of outgoing light reflected make the same angle with respect to the surface.

www.rhopointinstruments.com

RHOPOINT Q

INSTRUMENT SPECIFICATIONS

Operation
▮ Full colour easy to read screen
▮ Adjustable brightness
▮ 6 button touch sensitive interface

Construction
▮ All aluminium construction – enclosure, optics, standard holder
▮ Integrated calibration holder with in position detector for error free calibration

Measurement
▮ Single button push to measure all parameters
▮ Fast measurement
▮ Results batching with user definable names

Statistical Analysis
▮ Max, min, mean, SD
▮ All measured parameters

Graphical Analysis
▮ On board trend analysis
▮ Gloss and IQ values

Power
▮ Rechargeable lithium ion
▮ 17+ hours operation
▮ 20,000+ readings per charge

Operate from
▮ Internal battery/USB/mains charger

Recharge Time
▮ USB: 4.5hrs
▮ Mains charger: 2.5hrs

Memory
▮ 8 MB = 999 readings
▮ User definable alphanumeric batching

Data Transfer
▮ Bluetooth
▮ PC compatible
▮ USB connection, no software installation required

Measurement Area
▮ 20°: 6mm x 6.4mm
▮ 60°: 6mm x 12mm
▮ 85°: 4mm x 45.9mm

▮ Operating temperature: 15 - 40° C (60 - 104° F)
▮ Humidity: up to 85%, non condensing

Dimensions & Weight
▮ 65mm x 140mm x 50mm (H x W x D)
▮ 790g
▮ Packed weight: 1.75kg
▮ Commodity code: 9031 8098

Languages

INCLUDED ACCESSORIES

▮ Calibration tile with ISO 17025 calibration certificate
▮ USB data cable
▮ Mini CD
  ▮ Instruction manual
  ▮ Bluetooth data app
  ▮ Example Excel spreadsheets
▮ Instructional videos

EXTRAS

FREE EXTENDED WARRANTY

FREE LIGHT SOURCE WARRANTY

Guaranteed for the life of the instrument

CALIBRATION AND SERVICE

Fast and economical service via our global network of accredited calibration and service centres. Please visit www.rhopointinstruments.com/support for detailed information.

Certificate no: FM 29741
ISO 9001:2008

LOCAL AGENT

00335/12/13

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