



QC Solutions for Consumer Electronics



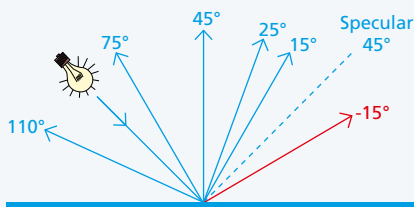
Consumer electronics such as smartphones, notebooks, tablets or PCs have become our permanent companions. Their look including design and color is most important and follows current fashion trends. From traditional black to a metallic appearance in a variety of colors, from matte to glossy surface finishes – anything is possible! Consistent color, gloss and surface finish are essential for a high quality product.

BYK-mac i Pro

Multi-angle color and effect control

Color Harmony Control

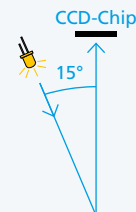
Lightness and Color Flop



Metallics show a lightness travel and pearl finishes can even change their color depending on the viewing angle. BYK-mac i Pro uses a directional illumination and measures color under 6 defined angles. The flop behavior can be judged by evaluating lightness difference between the near specular (15°) and the flop (110°) angle. The proven BYK LED technology guarantees an outstanding performance and allows use of digital standards among the global supply chain.

Anodizing Process Quality

Sparkle Amount and Sparkle Index ANO



The anodizing process influences the reflection behavior of the surface with more or less sparkling effects.

The BYK-mac i Pro illuminates the sample under 15° with a white super bright LED and a high-resolution CCD camera takes an image for data analysis.

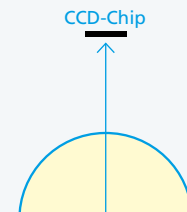
A new algorithm quantifies the quality of the anodizing process.

Sparkle amount ANO = Total amount of light flashes

Sparkle index ANO = Total area of light flashes

Sandblasting Process Quality

Graininess



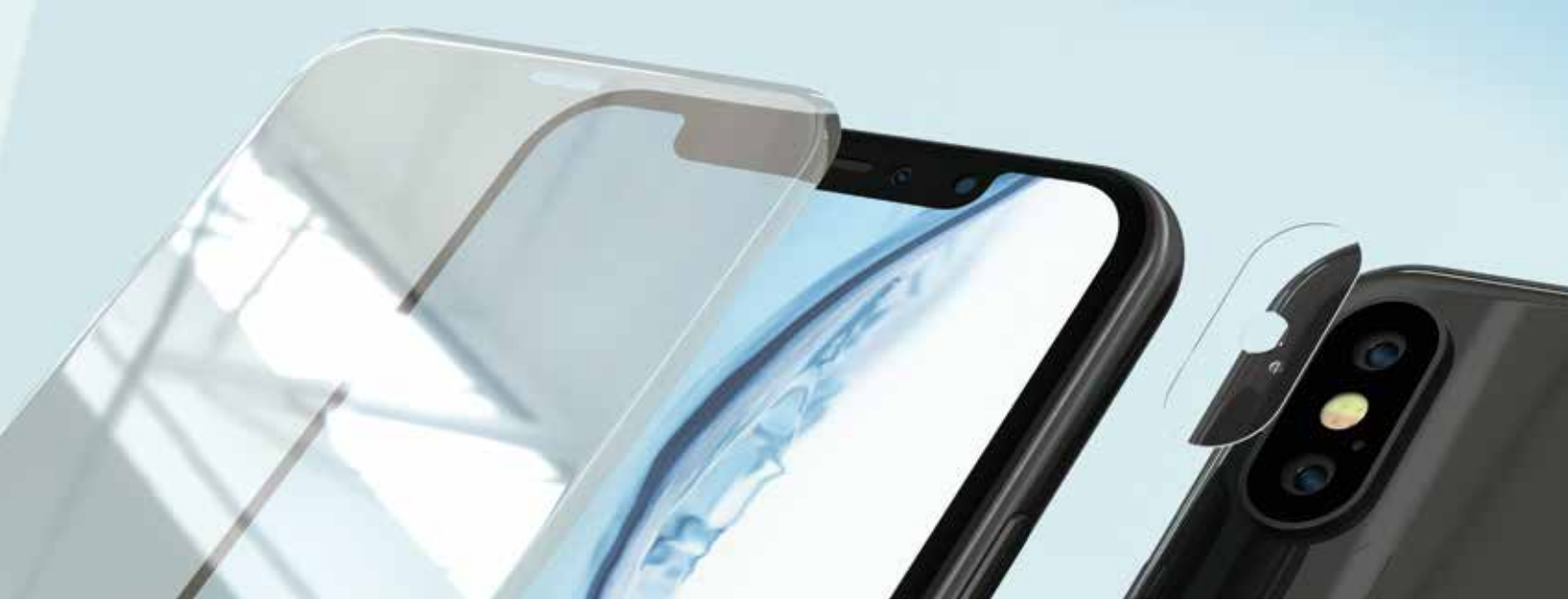
The initial sandblasting process of an anodized housing produces fine textures depending on the media size, pressure and "wear and tear" of the abrasive particles. A similar process is used to create a textured glass finish with high transmission and a matte look.

A high-resolution CCD camera takes an image under diffused illumination with two white LEDs integrated in a white coated hemisphere.

BYK-mac i Pro objectively measures texture variations:

Graininess = Uniformity of light and dark areas





haze-gard i Pro

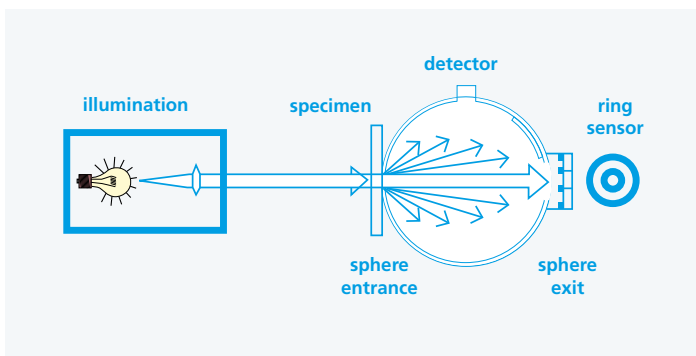
The objective standard for a clear view

The front cover glass of a smartphone needs to be tough enough to withstand a spill, but on the other hand also be as clear as possible to make photos and videos appear amazing. How much light passes through the glass and how distinct an image appears can be measured with Total Transmittance and Transmission Haze.

Advanced Performance for Toughest Limits

haze-gard i Pro is using high performance LED technology together with a reference beam and a self-diagnosis function.

In order to meet the toughest requirements for crystal clear glass the technical performance needs to be pushed to the utmost limit.



Haze < 0.3 %

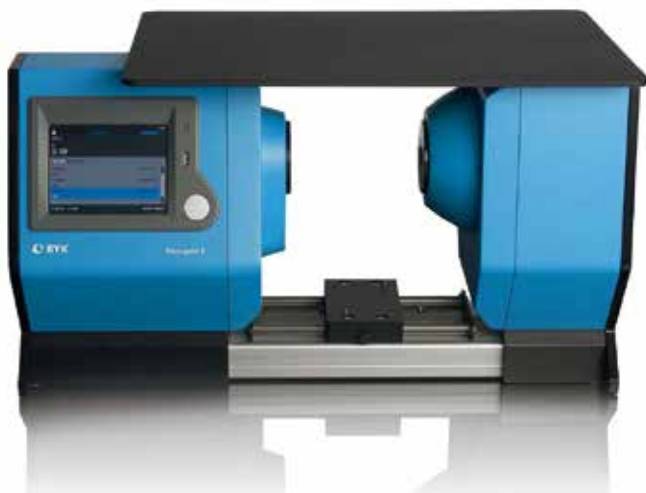
Repeatability & Reproducibility of +/- 0.01 %

At these low levels the influence of external conditions needs to be well controlled. For example the slightest flickering of fluorescent tubes can already disturb the results. Therefore, haze-gard i Pro comes with a black magnetic cover to ensure the sphere is always in the shade.

For measurement of a large amount of samples the haze-gard i Pro can be used in an online mode with smart-chart software:

Measure – Autosave – Pass/Fail with trend analysis

Even a barcode reader can be connected to scan the sample id.





micro-gloss S Smart gloss

A matte finish implies a higher value. Tight tolerances are needed to ensure a uniform matte surface finish. The micro-gloss S family offers improved performance for 60° gloss in the critical low gloss range (0-20 GU). This excellent accuracy can be guaranteed due a patented calibration procedure during the production of the gloss meters.



micro-gloss 60° S
Improved technical performance for low gloss finishes



micro-gloss XS-S
Small port for small parts



micro-gloss 60° S robotic
Automated online gloss

spectro2guide Color harmony and color stability

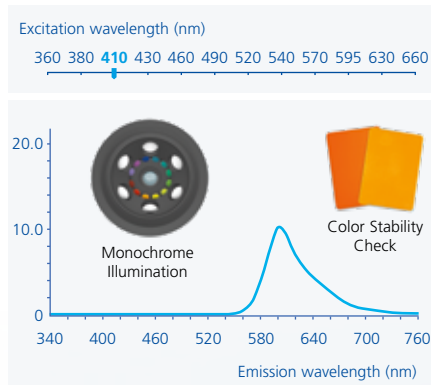
Consumer electronic products are exposed to varying lighting conditions. Natural daylight can cause color fading due to the potential impact of UV-light on sensitive raw materials. Thus, color stability is an important quality criteria – referred to as light fastness.

spectro2guide combines a spectrophotometer with a miniaturized fluorimeter. 12 monochrome LEDs (UV and visible range) excite the fluorescent ingredients and a spectrometer measures the emitted fluorescent light. Proprietary calculations predict the color change with total color difference ΔE as well as individual color component deltas $\Delta LabCH$.



BYK LED Technology

The spectro2guide uses innovative, high performance LED technology as light sources. Smart testing combined with our long-standing experience guarantees an outstanding technical performance. Superior accuracy and excellent inter-instrument agreement allow use of digital standards – the key for global color management.



smart-chart

Software for data analysis –
The smart way to
communicate



smart Standard Management

smart-chart includes a powerful standard management to set Pass/Fail tolerances for color, color stability, gloss, transmission haze and effect data – even “yellow” warning ranges to recognize a negative trend early. Master standards are shared digitally with all production sites and suppliers worldwide. Everybody is aiming the same target – a flexible supply chain becomes reality!

smart-process control to analyze BIG DATA

Powerful database management

The data of all BYK instruments can be saved in one SQL database for flexible analysis based on your specific criteria. Full network and server compatibility are a given.

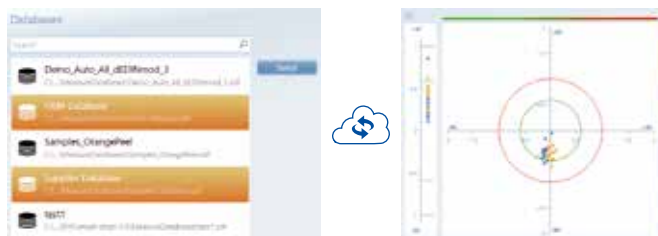
Data Sharing for seamless communication

Data can be easily shared within the supply chain by extracting mini databases that can be combined with other databases – see supplied parts before they even ship!

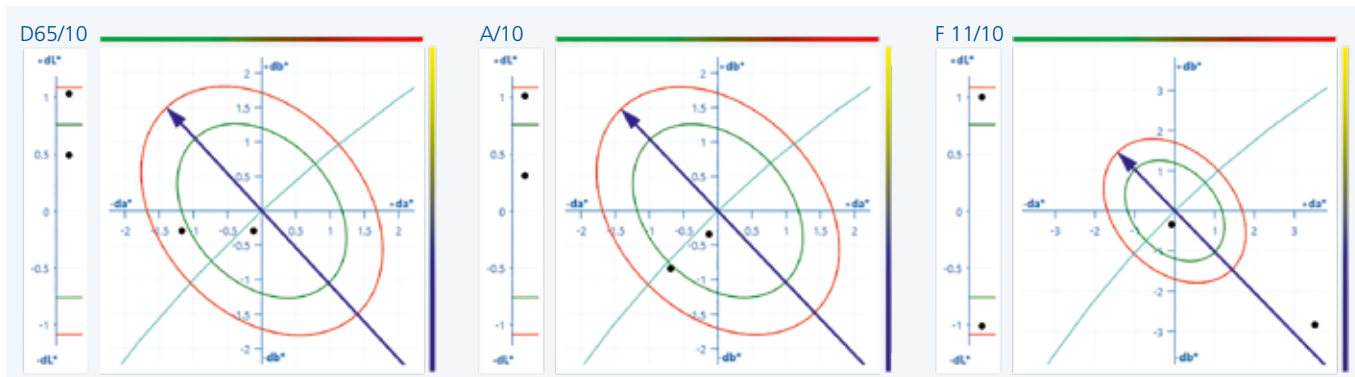
Global specifications and standardized QC procedures are the prerequisite for a seamless communication worldwide. BYK-Gardner's **smart-chart software** combines color and appearance data in one data analysis software – the same software for all instruments!

smart-lab for flexible data analysis

In order to define standardized color, gloss, haze and effect specifications it is necessary to experiment with different illuminants and color equations as well as the impact of tolerances on Pass/Fail results. To manage your lab work the data can be saved in projects for ease of handling.



Standard Green		D65/10 d:8° spin				A/10 d:8° spin				F11/10 d:8° spin			
D65/10		dE00	L*	a*	b*	dE00	L*	a*	b*	dE00	L*	a*	b*
Absolute Values			56.68	-13.92	14.99		56.12	-12.31	12.86		58.01	-17.47	17.83
		dE00	dL*	da*	db*	dE00	dL*	da*	db*	dE00	dL*	da*	db*
Match to Standard													
SAMPLE 001	20/05 18:22:03	0.98	1.03	-0.12	-0.29	0.97	1.01	-0.13	-0.34	0.93	1.00	-0.08	-0.34
SAMPLE 002	20/05 18:22:12	1.02	0.49	-1.17	-0.29	0.92	0.31	-0.69	-0.84	2.59	-1.01	3.51	-2.84





Technical data BYK-mac i Pro (Cat. No. 7049)

Color	
Measuring Geometry	45° illumination / -15°, 15°, 25°, 45°, 75°, 110° aspecular viewing
Aperture Size	23 mm diameter
Spectral Range Color	400–700 nm, 10 nm resolution
Measurement Range	0 to 600 % reflectance
Repeatability ¹	0.01 ΔE* (10 readings on white)
Reproducibility ¹	Grey BCRA tiles: avg. ΔE* < 0.10 Chromatic BCRA tiles: avg. ΔE* < 0.25
Color Systems	CIE Lab / Ch and weighted components
Color Differences	ΔE*, ΔECMC, ΔE94, ΔE2000, ΔE99, ΔEDIN6175-2019 and customer specific equations
Indices	Flop, Int-Em
Illuminants	A, C, D50, D65, F2, F7, F11, F12
Observer	2°; 10°
Effect	
Aperture Size	23 mm diameter
Measuring Geometry	15°/45°/75° and diffused illumination perpendicular viewing
Effect Parameters for Metallic Paint: ΔS, ΔS _a , ΔS _i , ΔG	
Repeatability ¹	S _a / S _i : 5 % or > 0.50 / G = ± 0.05
Reproducibility ¹	S _a / S _i : 10 % or > 1.00 / G = ± 0.15
Effect Parameters for Anodized Surfaces: Sparkle index ANO, Sparkle amount ANO	
Repeatability ¹	± 250 or 2.5 % (on anodized silver reference standard)
Reproducibility ¹	± 500 or 5 % (on anodized silver reference standard)
General Data	
Memory	1000 standards/samples
Interface	Proprietary plug; USB-B (docking station)
Battery	Rechargeable battery pack or 4 mignon AA batteries (alkaline or rechargeable)
Dimensions	21.8 × 8.1 × 14.7 cm (8.6 × 3.2 × 5.8 in)
Weight	1.3 kg (2.86 lbs)



Technical data spectro2guide (Cat. No. 7070, 7075)

Color	
Measuring Geometry	45°c:0°, d:8° (spin / spex)
Aperture Size	12 mm / 8 mm
Spectral Range Color	400–700 nm, 10 nm resolution
Spectral Range Fluorescence	340–760, 10 nm resolution
Measurement Range	0 to 170 % reflectance
Repeatability ¹	0.01 ΔE94 (10 readings on white)
Reproducibility ¹	0.1 ΔE94 (average of 12 BCRA tiles)
Color Systems	CIE Lab / Ch, Lab(h), XYZ, Yxy
Color Differences	ΔE*, ΔE(h), ΔECMC, ΔE94, ΔE99, ΔE2000 YIE313, YID1925, WIE313, CIE, Berger,
Indices	Color Strength, Opacity, Metamerism, Grayscale
Illuminants	A, C, D50, D55, D65, D75, F2, F6, F7, F8, F10, F11, UL30
Observer	2°, 10°
Gloss	
Aperture Size	5 × 10 mm
Measuring Geometry	60°
Measurement Range	0–20 GU 20–100 GU
Repeatability ¹	± 0.1 GU ± 0.2 GU
Reproducibility ¹	± 0.2 GU ± 1.0 GU
General Data	
Memory	4000 standards and 10 000 samples
Interface	USB-C (instrument), USB-B (docking station)
Battery	7.2 V, 2350 mAh, 16.92 Wh
Dimensions	87 × 110 × 188 mm (3.4 × 4.3 × 7.4 in)
Weight	700 g

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Technical data haze-gard i Pro (Cat. No. 4797)

Illuminants	CIE-C, CIE-A (ASTM D1003) CIE-D65 (ISO 13468, ISO 14782)
Spectral Sensitivity	CIE luminosity function y
Geometry	Geometry 0°/diffuse
Measurement Area	diameter 18 mm
Sample Port	diameter 25.4 mm
Measurement Range	0–100 %
Repeatability ¹	± 0.1 units
Reproducibility ¹	± 0.4 units Haze < 0.3 % R&R 10 % of measured value or > 0.01 %
Memory	5000 readings
Interface	LAN, USB 2.0, additional front USB-port for memory stick
Power Supply	115/230V self-adapting
Dimensions	62 × 33 × 22 cm (24 × 13 × 9 in)
Weight	18 kg (40 lbs)



Technical data micro-gloss S (Cat. No. 4565, 4570, 4576)

Spectral Sensitivity	CIE standard observer for illuminant CIE-C
Geometry	60°
Measurement Area	micro-gloss 60° S: 9 × 15 mm (0.35 × 0.6 in) micro-gloss 60° XS-S: 2 × 4 mm (0.08 × 0.16 in) micro-gloss 60° robotic: 9 × 15 mm (0.35 × 0.6 in)
Measurement Range	0–20 GU 20–100 GU 100–2000 GU
Repeatability ¹	± 0.1 GU ± 0.2 GU ± 0.2 %
Reproducibility ¹	± 0.2 GU ± 0.5 GU ± 0.5 %
Memory	999 readings with date and time
Interface	USB
Power Supply	one 1.5V AA Alkaline Battery 4000 readings
Dimensions	155 × 73 × 48 mm (6.1 × 2.9 × 1.9 in)
Weight	0.4 kg (0.9 lbs)

General

Operating Temperature	+10 to 40 °C (+50 to 104 °F)
Storage Temperature	0 to 50 °C (+32 to 122 °F)
Relative Humidity	Up to 85 %, non condensing

¹ Standard deviation