



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

BYK - Gardner
c/o BYK-Gardner USA
9104 Guilford Road
Columbia, MD 21046, USA
(and satellite locations as listed on the scope)

Fulfills the requirements of

ISO/IEC 17025:2017

In the fields of

CALIBRATION and TESTING

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R. Douglas Leonard Jr.', is positioned above a horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 28 April 2023

Certificate Number: AC-1534



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

BYK – Gardner

Dr. Ing Torsten Gruhn, 17025 Quality Manager
Torsten.Gruhn@altana.com
Phone: +49 (8171) 3493 341

This scope applies to the following locations:

Headquarter

c/o BYK – Gardner GmbH
Lausitzerstr.8, 82538 Geretsried, Germany

Headquarter USA

c/o BYK–Gardner USA
9104 Guilford Rd., Columbia, MD 21046, USA

BYK-Gardner Service Point Spain

c/o Actega Artística S.A
Calle Balmes 8, Suite: 3º 2ª, 08291 Ripollet, Spain

BYK–Gardner Service Point France

c/o Eckart France S.A.S.
31 Rue Amilcar Cipriani 93400, Saint Ouen, France

BYK-Gardner Service Point China

c/o BYK (Tongling) Co., Ltd. Shanghai Branch
Block 6A, Building A, No 88 Hong Cao Road,
Xuhui District, Shanghai 200233, P.R China

BYK-Gardner Service Point South Latin America

c/o MAST COMERCIAL E IMPORTADORA LTDA
Rua Itaporanga, 340-B, Bairro Paraíso, Santo André – SP, 09190-640, Brazil

BYK-Gardner Service Point Japan

c/o TETSUTANI CO., LTD
Chuo-ku, Osaka, Tokui cho 2-2-2, Japan

BYK-Gardner Service Point Austria, Hungary, Slovenia

c/o FRIEDRICH W. BLOCH GmbH
Wagramerstrasse 201, 1210 Vienna, Austria



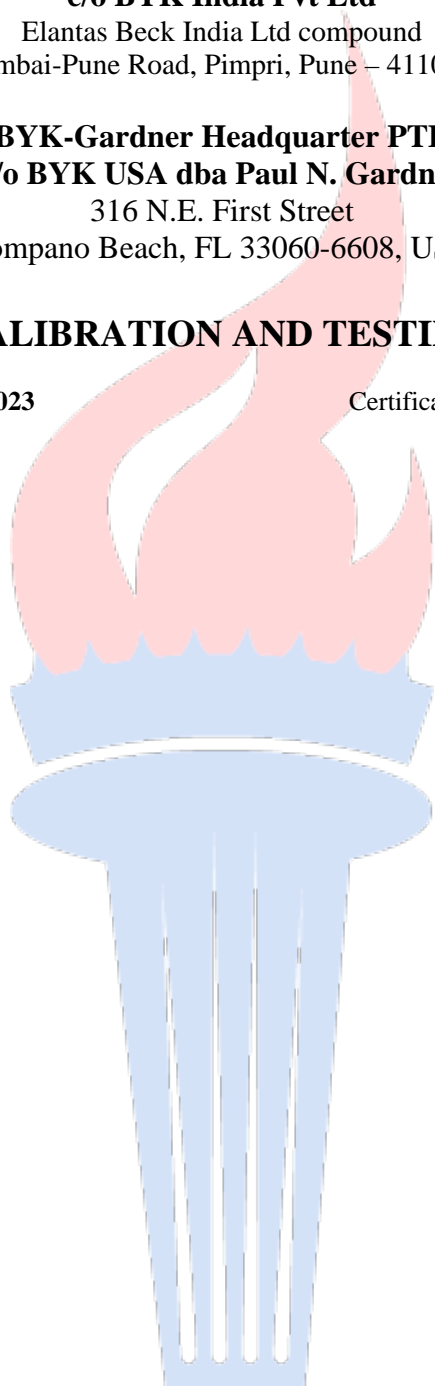
BYK-Gardner Service Point India
c/o BYK India Pvt Ltd
Elantas Beck India Ltd compound
147, Mumbai-Pune Road, Pimpri, Pune – 411018, India

BYK-Gardner Headquarter PTE
c/o BYK USA dba Paul N. Gardner
316 N.E. First Street
Pompano Beach, FL 33060-6608, USA

CALIBRATION AND TESTING

Valid to: **April 28, 2023**

Certificate Number: **AC-1534**



CALIBRATION

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Digital Film Thickness units ^{1,3}	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	2.9 μm 4.6 μm 11 μm	Certified Shims	All
Digital Film Thickness micro-Tri-gloss ^{1,3}	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	9.9 μm 11 μm 15 μm	Certified Shims	All
Film Thickness Shims	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	0.4 μm 0.6 μm 0.8 μm	Micrometer	Geretsried, Germany Pompano Beach, FL
Adhesion Tape Test Roller Length Weight Hardness, Shore A	(1 to 150) mm (1 to 3 000) gr (70 to 90) Duro	0.1 mm 1.2 gr 1.8 Duro	Vernier Caliper Scale Durometer	Geretsried, Germany Pompano Beach, FL

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Density Cups ³	(8 to 101) ml	0.1 % of reading	Scale, Timer, Thermometer	Columbia, MD Pompano Beach, FL Geretsried, Germany
Kinematic Viscosity ^{3,4} Ford Cups DIN Cups ISO Cups Zahn Cups	(10 to 100) sec	2.5 % of elapsed time 2 % of elapsed time 2 % of elapsed time 2 % of elapsed time	Thermometer, Timer, Certified Oil	Columbia, MD Pompano Beach, FL Geretsried, Germany
Rotational Viscosity ³	(1 to 106 000 000) cP (40 to 141) KU	0.14 cP 0.53 KU	Thermometer, Certified Oil	Columbia, MD Geretsried, Germany Santo André, Brazil



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Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Gloss ^{1,2}	(0 to 10) GU (>10 to 94) GU (>94 to 100) GU (158-168 GU at 20°) (148-158 GU at 45°) (128-138 GU at 60°) (108-118 GU at 75°) (100-110 GU at 85°)	0.21 GU 0.61 GU 0.41 GU 0.34 GU 0.34 GU 0.33 GU 0.31 GU 0.36 GU	Gloss Standards	All
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.25 a*: 0.10 b*: 0.10 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.21 L*: 0.30 a*: 0.10 b*: 0.10 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.29	White Standard	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.21 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.29 L*: 0.42 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.46 ΔE*(CIELCH): 0.46 ΔE*(CIE94): 0.46	Pale Grey Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.21 a*: 0.14 b*: 0.18 ΔE*(CIELab): 0.31 ΔE*(CIELCH): 0.31 ΔE*(CIE94): 0.31 L*: 0.35 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.40 ΔE*(CIELCH): 0.40 ΔE*(CIE94): 0.40	Mid/Diff Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.42 a*: 0.20 b*: 0.21 ΔE*(CIELab): 0.51 ΔE*(CIELCH): 0.51 ΔE*(CIE94): 0.51 L*: 0.71 a*: 0.14 b*: 0.20 ΔE*(CIELab): 0.75 ΔE*(CIELCH): 0.75 ΔE*(CIE94): 0.75	Deep Grey Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.26 b*: 0.21 ΔE*(CIELab): 0.44 ΔE*(CIELCH): 0.44 ΔE*(CIE94): 0.43 L*: 0.42 a*: 0.28 b*: 0.21 ΔE*(CIELab): 0.55 ΔE*(CIELCH): 0.55 ΔE*(CIE94): 0.55	Deep Pink Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.42 a*: 0.35 b*: 0.71 ΔE*(CIELab): 0.90 ΔE*(CIELCH): 0.90 ΔE*(CIE94): 0.88 L*: 0.57 a*: 0.42 b*: 1.28 ΔE*(CIELab): 1.46 ΔE*(CIELCH): 1.46 ΔE*(CIE94): 1.43	Red Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.28 b*: 0.52 ΔE*(CIELab): 0.65 ΔE*(CIELCH): 0.65 ΔE*(CIE94): 0.65 L*: 0.42 a*: 0.28 b*: 0.86 ΔE*(CIELab): 1.00 ΔE*(CIELCH): 1.00 ΔE*(CIE94): 0.98	Orange Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.35 a*: 0.21 b*: 0.44 ΔE*(CIELab): 0.60 ΔE*(CIELCH): 0.60 ΔE*(CIE94): 0.60 L*: 0.42 a*: 0.21 b*: 0.42 ΔE*(CIELab): 0.63 ΔE*(CIELCH): 0.63 ΔE*(CIE94): 0.63	Bright Yellow Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.30 a*: 0.24 b*: 0.30 ΔE*(CIELab): 0.49 ΔE*(CIELCH): 0.49 ΔE*(CIE94): 0.49 L*: 0.35 a*: 0.21 b*: 0.28 ΔE*(CIELab): 0.49 ΔE*(CIELCH): 0.49 ΔE*(CIE94): 0.49	Green/Diff Green Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.28 b*: 0.21 ΔE*(CIELab): 0.45 ΔE*(CIELCH): 0.45 ΔE*(CIE94): 0.45 L*: 0.42 a*: 0.28 b*: 0.28 ΔE*(CIELab): 0.58 ΔE*(CIELCH): 0.58 ΔE*(CIE94): 0.58	Cyan Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 1.20 a*: 1.84 b*: 1.42 ΔE*(CIELab): 2.62 ΔE*(CIELCH): 2.62 ΔE*(CIE94): 2.51 L*: 2.06 a*: 3.19 b*: 2.47 ΔE*(CIELab): 4.53 ΔE*(CIELCH): 4.53 ΔE*(CIE94): 4.23	Deep Blue Standard (BCRA)	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Clarity ^{1,2,6}	(0 to 100) %	0.2 %	Clarity Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Transmission ^{1,2,6}	(0 to 50) % (>50 to 100) %	0.37 % 0.07 %	Transmission Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C, ISO 13468	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Haze ^{1,2,6}	(0.1 to 1) % (>1 to 10) % (>10 to 100) %	0.1 % 0.1 % 0.2 %	Haze Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C, ISO 13468	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Wavescan / DOI ^{1,2}	(0 to 99) units	1.7 units	Orange Peel Standards	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Optical Radiation – Illuminance ^{1,3}	(50 to 200) fc (540 to 2 200) lx	10.9 fc 117 lx	Spectroradiometer	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France



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Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Optical Radiation - Color Temperature ^{1,3}	(2 250 to 3 500) K (3 800 to 4 350) K (6 300 to 6 700) K	55 K 74 K 82 K	Spectroradiometer	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France

Thermodynamic

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment	Locations ⁵
Thermocouple Simulation ³	Type K (0 to 500) °C	0.9 °C	Universal Calibrator	Columbia, MD Geretsried, Germany Vienna, Austria Shanghai, P.R China
Temperature	(5 to 50) °C	0.65 °C	Temperature Chamber	Geretsried, Germany Pompano Beach, FL
Humidity	(30 to 80) %RH	1.8 %RH	Temperature Chamber	Geretsried, Germany Pompano Beach, FL
Dewpoint	(10 to 30) °C	Calculated from temperature and humidity	Calculated from temperature and humidity	Geretsried, Germany Pompano Beach, FL

TESTING

Dimensional

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Digital Film Thickness units ^{1,3}	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	2.9 μm 4.6 μm 11 μm	Certified Shims BYK-Gardner working instructions Customer defined procedures	All
Digital Film Thickness micro-Tri-gloss ^{1,3}	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	9.9 μm 11 μm 15 μm	Certified Shims BYK-Gardner working instructions Customer defined procedures	All
Film Thickness Shims	(0 to 100) μm (>100 to 250) μm (>250 to 3 000) μm	0.4 μm 0.6 μm 0.8 μm	Micrometer BYK-Gardner working instructions Customer defined procedures	Geretsried, Germany Pompano Beach, FL
Adhesion Tape Test Roller Length Weight Hardness, Shore A	(1 to 150) mm (1 to 3 000) gr (70 to 90) Duro	0.1 mm 1.2 g 1.8 Duro	Vernier Caliper Scale Durometer BYK-Gardner working instructions Customer defined procedures	Geretsried, Germany Pompano Beach, FL

Mechanical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Density Cups ³	(8 to 101) ml	0.1 % of reading	Scale, Timer, Thermometer BYK-Gardner working instructions Customer defined procedures	Columbia, MD Pompano Beach, FL Geretsried, Germany



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Mechanical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Kinematic Viscosity ^{3,4} Ford Cups DIN Cups ISO Cups Zahn Cups	(10 to 100) sec	2.5 % of elapsed time 2 % of elapsed time 2 % of elapsed time 2 % of elapsed time	Thermometer, Timer, Certified Oil BYK-Gardner working instructions Customer defined procedures	Columbia, MD Pompano Beach, FL Geretsried, Germany
Rotational Viscosity ³	(1 to 106 000 000) cP (40 to 141) KU	0.14 cP 0.53 KU	Thermometer, Certified Oil BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Santo André, Brazil

Optical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Gloss ^{1,2}	(0 to 10) GU (>10 to 94) GU (>94 to 100) GU (158-168 GU at 20°) (148-158 GU at 45°) (128-138 GU at 60°) (108-118 GU at 75°) (100-110 GU at 85°)	0.21 GU 0.61 GU 0.41 GU 0.34 GU 0.34 GU 0.33 GU 0.31 GU 0.36 GU	Gloss Standards BYK-Gardner working instructions Customer defined procedures	All
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.25 a*: 0.10 b*: 0.10 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.21 L*: 0.30 a*: 0.10 b*: 0.10 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.29	White Standard BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Optical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.21 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.29 ΔE*(CIELCH): 0.29 ΔE*(CIE94): 0.29 L*: 0.42 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.46 ΔE*(CIELCH): 0.46 ΔE*(CIE94): 0.46	Pale Grey Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.21 a*: 0.14 b*: 0.18 ΔE*(CIELab): 0.31 ΔE*(CIELCH): 0.31 ΔE*(CIE94): 0.31 L*: 0.35 a*: 0.14 b*: 0.14 ΔE*(CIELab): 0.40 ΔE*(CIELCH): 0.40 ΔE*(CIE94): 0.40	Mid/Diff Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.42 a*: 0.20 b*: 0.21 ΔE*(CIELab): 0.51 ΔE*(CIELCH): 0.51 ΔE*(CIE94): 0.51 L*: 0.71 a*: 0.14 b*: 0.20 ΔE*(CIELab): 0.75 ΔE*(CIELCH): 0.75 ΔE*(CIE94): 0.75	Deep Grey Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Optical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.26 b*: 0.21 ΔE*(CIELab): 0.44 ΔE*(CIELCH): 0.44 ΔE*(CIE94): 0.43 L*: 0.42 a*: 0.28 b*: 0.21 ΔE*(CIELab): 0.55 ΔE*(CIELCH): 0.55 ΔE*(CIE94): 0.55	Deep Pink Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.42 a*: 0.35 b*: 0.71 ΔE*(CIELab): 0.90 ΔE*(CIELCH): 0.90 ΔE*(CIE94): 0.88 L*: 0.57 a*: 0.42 b*: 1.28 ΔE*(CIELab): 1.46 ΔE*(CIELCH): 1.46 ΔE*(CIE94): 1.43	Red Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.28 b*: 0.52 ΔE*(CIELab): 0.65 ΔE*(CIELCH): 0.65 ΔE*(CIE94): 0.65 L*: 0.42 a*: 0.28 b*: 0.86 ΔE*(CIELab): 1.00 ΔE*(CIELCH): 1.00 ΔE*(CIE94): 0.98	Orange Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Optical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.35 a*: 0.21 b*: 0.44 ΔE*(CIELab): 0.60 ΔE*(CIELCH): 0.60 ΔE*(CIE94): 0.60 L*: 0.42 a*: 0.21 b*: 0.42 ΔE*(CIELab): 0.63 ΔE*(CIELCH): 0.63 ΔE*(CIE94): 0.63	Bright Yellow Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.30 a*: 0.24 b*: 0.30 ΔE*(CIELab): 0.49 ΔE*(CIELCH): 0.49 ΔE*(CIE94): 0.49 L*: 0.35 a*: 0.21 b*: 0.28 ΔE*(CIELab): 0.49 ΔE*(CIELCH): 0.49 ΔE*(CIE94): 0.49	Green/Diff Green Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 0.28 a*: 0.28 b*: 0.21 ΔE*(CIELab): 0.45 ΔE*(CIELCH): 0.45 ΔE*(CIE94): 0.45 L*: 0.42 a*: 0.28 b*: 0.28 ΔE*(CIELab): 0.58 ΔE*(CIELCH): 0.58 ΔE*(CIE94): 0.58	Cyan Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India



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Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Color / Spectrophotometer ^{1,2}	8°:di / 8°:de: (380-780 nm) 0°:45°a (380-780 nm)	L*: 1.20 a*: 1.84 b*: 1.42 $\Delta E^*(CIE_{Lab})$: 2.62 $\Delta E^*(CIE_{LCH})$: 2.62 $\Delta E^*(CIE_{94})$: 2.51 L*: 2.06 a*: 3.19 b*: 2.47 $\Delta E^*(CIE_{Lab})$: 4.53 $\Delta E^*(CIE_{LCH})$: 4.53 $\Delta E^*(CIE_{94})$: 4.23	Deep Blue Standard (BCRA) BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Clarity ^{1,2,6}	(0 to 100) %	0.2 %	Clarity Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C, BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Transmission ^{1,2,6}	(0 to 50) % (>50 to 100) %	0.37 % 0.07 %	Transmission Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C, ISO 13468, BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India

Optical

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment	Locations ⁵
Haze ^{1,2,6}	(0.1 to 1) % (>1 to 10) % (>10 to 100) %	0.1 % 0.1 % 0.2 %	Haze Standards ASTM D1003 Illuminant A, ASTM D1003 Illuminant C, ISO 13468, BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Wavescan / DOI ^{1,2}	(0 to 99) units	1.7 units	Orange Peel Standards BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France Shanghai, P.R China Santo André, Brazil Osaka, Japan Vienna, Austria Pune, India
Optical Radiation – Illuminance ^{1,3}	(50 to 200) fc (540 to 2 200) lx	10.9 fc 117 lx	Spectroradiometer BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France
Optical Radiation - Color Temperature ^{1,3}	(2 250 to 3 500) K (3 800 to 4 350) K (6 300 to 6 700) K	55 K 74 K 82 K	Spectroradiometer BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Ripollet, Spain Saint Ouen, France

Thermal

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment	Locations ⁵
Thermocouple Simulation ³	Type K (0 to 500) °C	0.9 °C	Universal Calibrator BYK-Gardner working instructions Customer defined procedures	Columbia, MD Geretsried, Germany Vienna, Austria Shanghai, P.R China

Thermal

Parameter / Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method and/or Equipment	Locations ⁵
Temperature	(5 to 50) °C	0.65 °C	Temperature Chamber BYK-Gardner working instructions Customer defined procedures	Geretsried, Germany Pompano Beach, FL
Humidity	(30 to 80) %RH	1.8 %RH	Temperature Chamber BYK-Gardner working instructions Customer defined procedures	Geretsried, Germany Pompano Beach, FL
Dewpoint	(10 to 30) °C	Calculated from temperature and humidity	Calculated from temperature and humidity BYK-Gardner working instructions Customer defined procedures	Geretsried, Germany Pompano Beach, FL

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration/testing services are available for this parameter; based on strict protocols, the same uncertainties are achieved on-site.
2. Applies to both instruments and standards (standards can only be calibrated in-laboratory)
3. Applies to instruments only
4. Drain time of certified calibration oil
5. The capabilities of all sites are identical using same procedures and equipment, under the same environment conditions.
6. Unit-less measure expressed as a percentage.
7. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1534.



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