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# CERTIFICATE OF ACCREDITATION

*This is to attest that*

## **KIEL INSTITUTE**

DAEWOO TECHNOPARK A-403  
BUCHEON CITY GYEONGGIDO 14523, REPUBLIC OF KOREA

### **Testing Laboratory TL-448**

has met the requirements of AC89, *IAS Accreditation Criteria for Testing Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Expiry Date January 1, 2026

Effective Date November 22, 2024



*International Accreditation Service*

Issued under the authority of IAS management

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# SCOPE OF ACCREDITATION

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*Accredited to ISO/IEC 17025:2017*

*Effective Date November 22, 2024*

Lighting/ENERGY STAR	
AEC-Q102 – Rev A	Failure Mechanism Based Stress Test Qualification for Optoelectronic Semiconductors in Automotive Applications  A2a. Wet High Temperature Operating Life (WHTOL 1) A2b. Wet High Temperature Operating Life (WHTOL 2) A3a. Power Temperature Cycling (PTC) B1a. High Temperature Operating Life (HTOL 1) B1b. High Temperature Operating Life (HTOL 2) B2. Low Temperature Operating Life (LTOL) B3. Pulsed Life (PLT) C2. Physical Dimension (PD) E2. Parametric Verification (PV) E3. Electrostatic Discharge Human Body Model (HBM)
ANSI C78.50-2014	Electric Lamps – Assigned LED Lamp Codes
ANSI C78.50-2016	Electric Lamps – Assigned LED Lamp Codes
ANSI C78.79-2014	Electric Lamps – Nomenclature for Envelope Shapes Intended for Use with Electric Lamps
ANSI C78.79-2014 (R2020)	Electric Lamps – Nomenclature for Envelope Shapes Intended for Use with Electric Lamps
ANSI C78.377-2017	American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid State Lighting (SSL) Products
ANSI C79.1-2002	American national standard for electric lamps – nomenclature for glass bulbs intended for use with electric lamps
ANSI C81.61-2017	American national standard for electric lamp bases
ANSI C82.16-2020	Light Emitting Diode Drivers—Methods of Measurement
ANSI C82.77-10:2014	Harmonic emission limits-related power quality requirements for lighting equipment
ANSI C82.77-10:2020	Harmonic emission limits-related power quality requirements for lighting equipment
ANSI/ANSLG C82.16-2015 (anticipated)	Light Emitting Diode Drivers—Methods of Measurement

TL-448

KIEL INSTITUTE

Effective Date November 22, 2024

Page 2 of 6

IAS/TL/100-1



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ANSI/IES LM-75-19	Guide To Goniometer Measurements And Types, And Photometric Coordinate Systems
ANSI/IES RP-16-17	Nomenclature and Definitions for Illuminating Engineering
ANSI/IES RP-27-20	Recommended Practice: Photobiological Safety for Lighting Systems
ANSI/IES TM-21-19	Projecting long term lumen, photon, and radiant flux maintenance of LED light sources
ANSI/UL 153-2002	Standard for Safety of Portable Electric Luminaires (only sections 124-128A)
ANSI/UL 153-2014	Portable electric luminaires (only sections 124-128A)
ANSI/UL 1310-2019	Standard for Safety of Class 2 Power Units
ANSI/UL 1598C-2014	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
ANSI/UL 1993-2017	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters
ASA S12.55-2012/ISO 3745:2012	Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Methods Anechoic and Hemi-Anechoic Rooms
ASA S12.55-2012/ISO 3745:2012 (R2019)	Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Methods Anechoic and Hemi-Anechoic Rooms
ASSIST recommends Volume 11, Issue 3	Recommended Metric for Assessing the Direct Perception of Light Source Flicker
ASTM G154 – 16	Standard practice for operating fluorescent light apparatus for UV exposure of nonmetallic materials
CIE 13.3-1995	Method of measuring and specifying color rendering of light sources
CIE 15-2018	Colorimetry
CIE 84-1989	The measurement of luminous flux
CIE 127-2007	Measurement of LEDs
CIE S 025	Test Method for LED Lamps, LED Luminaires and LED Modules
CIE S 025-SP1/E:2019	Test Method for LED Lamps, LED Luminaires and LED Modules Supplement 1: Test Method for OLED Luminaires and OLED Light Sources
DOE 10 CFR Part 429	Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment
DOE 10 CFR Part 430	Energy Conservation Program for Consumer Products
DOE 10 CFR Part 430 Appendix W to Subpart B	Uniform Test Method for Measuring the Energy Consumption of Medium Base Compact Fluorescent Lamps
DOE 10 CFR Part 430 Appendix BB to Subpart B	Uniform Test Method for Measuring the Input Power, Lumen Output, Lamp Efficacy, Correlated Color Temperature (CCT), Color Rendering Index (CRI), Power Factor, Time to Failure, and Standby Mode Power of Integrated Light-Emitting Diode (LED) Lamps
ENERGY STAR	ENERGY STAR program requirements product specification for Downlights version 1.0



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ENERGY STAR program requirements for lamps and luminaires (including Downlights) Start time Test Method November 2023	
ENERGY STAR	ENERGY STAR Requirements for the Use of LM-80 Data
IEC 60061-1:1969/AMD61:2020	Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety – Part 1: Lamp Caps
IEC 60061-1 (2012)	Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety – Part 1: Lamp Caps
IEC 60810 ED.5.1 B:2019	Lamps, light sources and LED packages for road vehicles – Performance requirements 8. Requirements and test conditions for LED packages 8.6 Qualification test definition 8.6.1 Pre- and post- electrical and photometric test 8.6.2 Pre- and post- external visual (EV) test 8.6.3 High temperature operating life (HTOL) test 8.6.4 Temperature cycling (TMCL) test 8.6.5 Wet high temperature operating life (WHTOL) test 8.6.6 Power temperature cycling (PTMCL) test 8.6.10 Physical dimensions (PD) test 8.6.16 Thermal shock (TMSK) tes 8.6.18 Pulsed operating life (PLT) test
IEC 61347-2-3 ED. 2.1 B:2016	Amendment 2 - Lamp Control Gear - Part 2-3: Particular Requirements for A.C. Supplied Electronic Ballasts for Fluorescent Lamps
IEC 62301 Ed.2.0 B:2011	Household electrical appliances - Measurement of standby power
IEC 62301 Ed. 2.0 2011-01	Household electrical appliances - Measurement of standby power
IEC 62321 Ed. 1.0	Electrotechnical Products - Determination of Levels of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)
IEC 62321 Ed.1.0 B:2008	Electrotechnical Products – Determination of Levels of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)
IEC 62471 Ed.1.0b:2006	Photobiological safety of lamps and lamp systems
IEC TR 62778 Ed. 2.0	Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires
IEEE C62.41-1991	IEEE Recommended practice for surge voltage in low-voltage AC power circuits, category A, 7 strikes
IEEE C62.41.1-2002	IEEE guide on the surge environment in low-voltage (1000 V and Less) AC power circuits
IEEE C62.41.2-2002	IEEE recommended practice on characterization of surges in low-voltage (1000 V and Less) AC power circuits
IEEE PAR 1789-2015	Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers

TL-448

KIEL INSTITUTE

Effective Date November 22, 2024

Page 4 of 6

IAS/TL/100-1



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IES LM-15-03	Guide for reporting general lighting equipment engineering data for indoor luminaires
IES LM-16-93	Practical guide to colorimetry of light sources
IES LM-20-20	Photometric testing of reflector – type lamps
IES LM-54-20	IESNA guide to lamp seasoning
IES LM-58-20	Approved method of spectroradiometric measurement methods for light sources
IES LM-79-08	Approved method for electrical and photometric measurements of solid-state lighting products
IES LM-79-19	Optical and Electrical Measurements of Solid-State Lighting Products
IES LM-80-08 and its Addendum A	Measuring lumen maintenance of LED light sources
IES LM-80-15	IES approved method: measuring luminous flux and color maintenance of LED packages, arrays and modules
IES LM-80-20	Approved method: measuring luminous flux and color maintenance of LED packages, arrays and modules
IES LM-82-12	Method for the characterization of LED light engines and LED lamps for electrical and photometric properties as a function of temperature
IES LM-82-20	Method for the characterization of LED light engines and LED lamps for electrical and photometric properties as a function of temperature
IES LM-84-14	Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES LM-84-20	Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES LM-85-14	Electrical and Photometric Measurements of High-Powered LEDs
IES LM-85-20	Electrical and Photometric Measurements of High-Powered LEDs
IES LS-4-20	Lighting Science: Measurement of Light - The Science of Photometry
IES TM-15-11	Luminaire Classification System for Outdoor Luminaires
IES TM-15-20	Luminaire Classification System for Outdoor Luminaires
IES TM-21-11 and its Addendum B	Projecting long term lumen maintenance of LED sources
IES TM-27-14	Standard Format for the Electronic Transfer of Spectral Data
IES TM-27-20	Standard Format for the Electronic Transfer of Spectral Data
IES TM-28-14	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaries
IES TM-28-20	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaries



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IES TM-30-18	IES Method for Evaluating Light Source Color Rendition
IES TM-30-20	IES Method for Evaluating Light Source Color Rendition
ISO 7574-4:1985	Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment
NEMA 77-2017	Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria
NEMA LSD 45-2009	Recommendations for Solid State Lighting Sub-Assembly Interfaces for Luminaires
NEMA SSL 7A-2015	Phase Cut Dimming for Solid-State Lighting: Basic Compatibility
UL 1574-2004	Track lighting systems (only section 54)
UL 1598-2008	Safety luminaires (only sections 19.7 and 19.10-19.16)
UL 1598-2021	Safety luminaires (only sections 19.7 and 19.10-19.16)

*CIE: International Commission on Illumination*

*CSA: Canadian Standard Association*

*IEEE: Institute of Electrical and Electronics Engineers*

*IES: Illuminating Engineering Society*

*UL: Underwriters Laboratories*

