

CERTIFICATE OF ACCREDITATION

This is to attest that

DEKRA TESTING AND CERTIFICATION (SHANGHAI) LTD.

3F, #250, JIANGCHANGSAN ROAD, BUILDING 16, HEADQUARTER ECONOMY PARK SHIBEI HI-TECH PARK, JING'AN DISTRICT SHANGHAI, 200436, CHINA

Testing Laboratory TL-907

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.

Effective Date July 9, 2024



International Accreditation Service

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DEKRA TESTING AND CERTIFICATION (SHANGHAI) LTD.

Location	Address	Scope (page)
Main Lab	NO. 250, JIANGCHANGSAN ROAD, BUILDING 16,	2 - 6
	HEADQUATER ECONOMY PARK SHIBEI HI-TECH PARK,	
	JING'AN DISTRICT, SHANGHAI, 200436, CHINA	
Satellite Lab	NO.16, LANE 1288, LUONING ROAD, BAOSHAN DISTRICT,	6 - 11
	SHANGHAI, 200949, CHINA	

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Accredited to ISO/IEC 17025:2017

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Main Lab

Lighting Test	
ANSI C78.377	Electric Lamps — Specifications for the Chromaticity of Solid-State Lighting Products
ANSI C136.3	For Roadway and Area Lighting Equipment - Luminaire Attachments
ANSI C136.3-2005	For Roadway and Area Lighting Equipment - Luminaire Attachments
ANSI C136.31	Roadway and Area Lighting Equipment - Luminaire Vibration
ANSI C136.31-2001	Roadway and Area Lighting Equipment - Luminaire Vibration
ANSI_ANSLG C78.377- 2011	Electric Lamps — Specifications for the Chromaticity of Solid-State Lighting Products
ANSI/UL 153(ISTMT)	Standard for safety Portable Electric Luminaires
ANSI/UL 1574(ISTMT)	Standard for safety Track Lighting Systems
ANSI/UL 1598 (ISTMT)	Standard for safety Luminaires
ANSI/UL 1598C (ISTMT)	Standard for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
ASTM D3359-17	Standard Test Methods for Rating Adhesion by Tape Test
CIE 018:2019	The Basics of Physical Photometry
CIE 13.3	Method of Measuring and Specifying Colour Rendering Properties of Light Source
CIE 15	Colorimetry



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The Basics of Physical Photometry The Spectroradiometric Measurement of Light Sources The Measurement of Luminous Flux
The Measurement of Luminous Flux
Guide for the Lighting of Road Tunnels and Underpasses
Guide on the Maintenance of Indoor Electric Lighting Systems
Lighting of Roads for Motor and Pedestrian Traffic
The Maintenance of outdoor lighting systems
Photometry - The CIE System of physical photometry
Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 4: LED lamps, modules and luminaires
Measurement method of total input power of ballast-lamp circuits
Degrees of protection provided by enclosures (IP Code)
Luminaires - Part 1: General requirements and tests
Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
Non-Integraded LED Lamps – Part 2: Performance requirements
Double-capped fluorescent lamps - Performance specifications
Tungsten halogen lamps (non-vehicle) - Performance specifications
Luminaires - Part 2-3: Particular requirements - Luminaires for road and street lighting
High-pressure sodium vapour lamps – Performance specifications
Single-capped fluorescent lamps - Performance specifications
Ballasts for tubular fluorescent lamps – Performance requirements
Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions
Protection against electric shock - Common aspects for installation and equipment
Metal halide lamps



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IEC/EN 61547:2009	Equipment for general lighting purposes – EMC immunity requirements
IEC/EN 62035	Discharge lamps (excluding fluorescent lamps) - Safety specifications
IEC/EN 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
IEC/EN 62321-4	Determination of certain substances in electrotechnical products – Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS
IEC/EN 62384	DC or AC supplied electronic control gear for LED modules - Performance requirements
IEC/EN 62442-1	Energy performance of lamp controlgear – Part 1: Controlgear for fluorescent lamps – Method of measurement to determine the total input power of controlgear circuits and the efficiency of the controlgear
IEC/EN 62471	Photobiological safety of lamps and lamp systems
IEC/EN 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50 V-Performance requirements
IEC/EN 62717	LED modules for general lighting – Performance requirements
IEC/EN 62722-1	Luminaire performance – Part 1: General requirements
IEC/EN 62722-2-1	Luminaire performance – Part 2-1: Particular requirements for LED luminaires
IEC/TR 61341	Method of measurement of centre beam intensity and beam angle(s) of reflector lamps
IES LM-9	Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps
IES LM-10	IESNA Approved Method for Photometric Testing of outdoor fluorescent luminaires
IES LM-41	Approved method: Photometric testing of indoor fluorescent luminaires
IES LM-66	Approved Method: Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
IES LM-79	Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-79-08	Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
IES LM-80-08	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules



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IES LM-82	Approved Method: Characterization of LED light Engines and LED lamps for Electrical and Photometric Properties as a Function of Temperature
IES LM-82-12	Approved Method: Characterization of LED light Engines and LED lamps for Electrical and Photometric Properties as a Function of Temperature
IES LM-84	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES LM-84-14	Approved Method: Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES TM-21	Projecting Long Term Lumen Maintenance of LED light Sources
IES TM-21-11	Projecting Long Term Lumen Maintenance of LED light Sources
IES TM-28	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires
IES TM-28-14	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires
ISO 4628-2:2016	Paints and Varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 2: Assessment of degree of blistering
ISO 4628-3:2016	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 3: Assessment of degree of rusting
ISO 4628-4:2016	Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 4: Assessment of degree of cracking
ISO 9227:2017	Corrosion tests in artificial atmospheres - Salt spray tests
ISO 23539	Photometry - The CIE System of physical photometry
L2(AP)005	Cone luminous flux
SASO 2870:2018	Energy Efficiency, Functionality and Labelling Requirements for Lighting Products – Part 1
SASO 2870:2018/AMD1:2021	Energy Efficiency, Functionality and Labelling Requirements for Lighting Products – Part 1
SASO 2902:2018	Energy Efficiency, Functionality and Labelling Requirements for Lighting Products – Part 2
SASO 2902:2018/AMD1:2021	Energy Efficiency, Functionality and Labelling Requirements for Lighting Products – Part 2
SASO 2927:2019	Energy efficiency functionality and labelling requirements



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SASO 2927:2019/AMD1:2021	Energy efficiency functionality and labelling requirements for lighting products – Part 3: Street lighting
SASO EN 13032-4	Light and lighting - Light and lighting - Measurement and presentation of photometric data of lamps and luminaires - Part 4: LED lamps, modules and luminaires
SASO GSO IEC 60064	Tungsten filament lamps for domestic and similar general lighting purposes - Performance requirements
SASO GSO IEC 60901	Single-capped fluorescent lamps - Performance specifications
SASO GSO IEC 60969	Self-ballasted compact fluorescent lamps for general lighting services – Performance requirements
SASO IEC 60682	Standard method of measuring the pinch temperature of quartz-tungsten- halogen lamps
SASO IEC 62554	Sample preparation for measurement of mercury level in fluorescent lamps
SASO IEC/PAS 62707-1	LED-binning – Part 1: General requirements and white colour grid intended for automotive applications
SASO IEC/PAS 62717	LED modules for general lighting – Performance requirements
SASO IEC/TS 62504	General lighting - Light emitting diode (LED) products and related equipment - Terms and definitions

Satellite Lab

Photovoltaic Products	
ABNT NBR IEC 62116	Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters
AS 62040.1	Uninterruptible power supply systems (UPS) - Part 1: Safety requirements
AS/NZS 4777.2	Grid connection of energy systems via inverters Part 2: Inverter requirements
C10/11	Specific technical prescriptions regarding power-generating plants operating in parallel to the distribution network
CEI 0-16	Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution Company
CEI 0-21	Reference technical rules for the connection of active and passive users to the LV electrical Utilities
DIN VDE V 0124-100	Grid integration of generator plants – Low-voltage – Test requirements for generator units to be connected to and operated in parallel with low-voltage distribution networks



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Dubai Electricity & Water Authority (DEWA)	Standards for distributed renewable resources generators connected to the distribution network (DRRG) (Only applicable clauses, D3 & D4)
EIFS 2018:2	The Energy Market Inspectorate's Regulations on the determination of generally applicable requirements for network connection of generators
EIFS 2019:3	The Energy Market Inspectorate's regulations on establishing requirements for data exchange between electricity network companies and significant network users
EN 50549-1	Requirements for generating plants to be connected in parallel with distribution networks - Part 1: Connection to a LV distribution network - Generating plants up to and including Type B
EN 50549-2	Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B
EN 50549-10	Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units
EN 62109-1	Safety of power converters for photovoltaic power generation systems – Part 1: General requirements
EN 62109-2	Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters
EN IEC 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <=16 A per phase) (Exclusion clause, Annex B)
EN IEC 61000-3-3	Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection (Exclusion clause 4.2.4 and Annex A, B, and D)
EN IEC 62040-1	Uninterruptible power supply systems (UPS) - Part 1: Safety requirements
EN IEC 62477-1	Safety requirements for power electronic converter systems and equipment – Part 1: General (Exclusion clauses, 4.7.2, 4.7.3, 5.2.7)
G98	Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks
G98/NI	Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16A per phase) in parallel with public Low Voltage Distribution Networks in Northern Ireland – Applicable section, Annex A
G99	Requirements for the connection of generation equipment in parallel with public distribution networks



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G99/NI	Requirements for the connection of generation equipment in parallel with public distribution networks in Northern Ireland – Applicable sections, Annex A to D
G100	Technical Requirements for Customers' Export and Import Limitation Schemes
IEC 60068-2-1	Environmental testing –Part 2-1: Tests –Test A: Cold
IEC 60068-2-2	Environmental testing –Part 2-2: Tests – Test B: Dry heat
IEC 60068-2-14	Environmental testing –Part 2-14: Tests – Test N: Change of temperature
IEC 60068-2-27	Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock
IEC 60068-2-30	Environmental testing –Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IEC 60068-2-64	Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance
IEC 60891	Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics
IEC 60904-1	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics
IEC 61683	Photovoltaic systems - Power conditioners Procedure for measuring efficiency
IEC 61727	Photovoltaic (PV) systems - Characteristics of the utility interface
IEC 62040-1	Uninterruptible power supply systems (UPS) - Part 1: Safety requirements
IEC 62093	Balance-of-system components for photovoltaic systems - Design qualification natural environments
IEC 62109-1	Safety of power converters for photovoltaic power generation systems – Part 1: General requirements
IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters
IEC 62116	Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters
IEC 62477-1	Safety requirements for power electronic converter systems and equipment – Part 1: General (Exclusion clauses, 4.7.2, 4.7.3, 5.2.7)
IEC 62477-2	Safety requirements for power electronic converter systems and equipment - Part 2: Power electronic converters from 1000 V AC or 1500 V DC up to 36 kV AC or 54 kV DC
IEC 62788-1-2	Measurement procedures for materials used in photovoltaic modules - Part 1-2: Encapsulants - Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials





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IEC 62788-1-4	Measurement procedures for materials used in photovoltaic modules - Part 1-4: Encapsulants - Measurement of optical transmittance and calculation of the solar-weighted photon transmittance, yellowness index, and UV cut-off wavelength
IEC 62788-1-5	Measurement procedures for materials used in photovoltaic modules - Part 1-5: Encapsulants - Measurement of change in linear dimensions of sheet encapsulation material resulting from applied thermal conditions
IEC 62788-1-6	Measurement procedures for materials used in photovoltaic modules - Part 1-6: Encapsulants - Test methods for determining the degree of cure in Ethylene- Vinyl Acetate
IEC 62788-1-7	Measurement procedures for materials used in photovoltaic modules - Part 1-7: Encapsulants - Test procedure of optical durability
IEC 62788-2-1	Measurement procedures for materials used in photovoltaic modules - Part 2-1: Polymeric materials - Frontsheet and backsheet - Safety requirements
IEC 62788-5-1	Measurement procedures for materials used in photovoltaic modules - Part 5-1: Edge seals - Suggested test methods for use with edge seal materials
IEC 62788-5-2	Measurement procedures for materials used in photovoltaic modules - Part 5-2: Edge seals - Durability evaluation guideline
IEC 62788-6-2	Measurement procedures for materials used in photovoltaic modules - Part 6-2: General tests - Moisture permeation testing of polymeric materials
IEC 62788-7-3	Measurement procedures for materials used in photovoltaic modules - Part 7-3: Accelerated stress tests - Methods of abrasion of PV module external surfaces
IEC 62933-5-2	Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical-based systems
IEC 63027	Photovoltaic power systems – DC arc detection and interruption
IEC TS 62788-7-2	Measurement procedures for materials used in photovoltaic modules - Part 7-2: Environmental exposures - Accelerated weathering tests of polymeric materials
IEC TS 62933-5-1	Electrical energy storage (EES) systems - Part 5-1: Safety considerations for grid-integrated EES systems - General specification
INMETRO ORDINANCE No. 140	Approves the Technical Quality Regulation and the Conformity Assessment Requirements for Electric Energy Generation, Conditioning and Storage Equipment in Photovoltaic Systems – Consolidated
JETGR0002-1	General rules for testing methods for low-voltage grid-connected protection devices
JETGR0003-1	Individual test methods for grid-connected protection devices for solar power generation systems



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JETGR0003-4	Individual test method for grid-connected protection devices for multi-unit grid- connected solar power generation systems
JETGR0005-1	Test method for high voltage grid-connected protection devices
MEA	Metropolitan Electricity Authority's Grid-connected Inverter Regulation
NRS 097-2-1	Grid interconnection of embedded generation Part 2: Small-scale embedded generation Section 1: Utility interface
OVE E 8001-4-712	Erection of electrical installations with rated voltages up to AC 1000 V and DC 1500 V – Part 4-712: Photovoltaic power-systems – Erection and safety requirements systems
OVE-Richtlinie R 25	Test requirements for generator units to be connected to and operated in parallel with low-voltage distribution networks
PEA	Provincial Electricity Authority's Regulation on the Power Network System Interconnection Code (Only applicable clause, Attachment 6)
Philippine Distribution Code	Philippine Grid Code PV Inverter Test Requirements
Philippine Grid Code	Philippines grid code, applicable clauses 3 & 5
P.O.12.2	Generation and demand facilities: Minimum requirements for design, equipment, operation, commissioning and safety (Spanish grid code of the grid operator)
P.O.12.3	Requirements regarding wind power facility response to grid voltage dips
PPDS	Rules for the operation of distribution systems - rules for parallel operation of production and storage equipment with the network of the distribution system operator (Czech grid code)
PSE	Wymogi ogólnego stosowania wynikające z Rozporządzenia Komisji (UE) 2016/631 z dnia 14 kwietnia 2016 r. ustanawiającego kodeks sieci dotyczący wymogów w zakresie przyłączenia jednostek wytwórczych do sieci (NC RfG) /Requirements for general application arising from Commission Regulation (EU) 2016/631 of 14 April 2016 establishing the Code network regarding connection requirements generating units to the grid (NC RfG)
PTPiREE	Conditions and procedures for the use of certificates in the process of connecting power generating modules to power grids
RD244	Regulates the administrative, technical, and economic conditions for self- consumption of electrical energy (Spain) – Applicable clause I.3
RD413	Regulating the connection to the electrical grid of small-scale power generation facilities
RD647	Regulating the connection to the electrical grid of small-scale power generation facilities



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RD661	Regulating the connection to the electrical grid of small-scale power generation facilities
RD1699	Regulating the connection to the electrical grid of small-scale power generation facilities
TNB	TNB Technical Guidebook on Grid-interconnection of Photovoltaic Power Generation System to LV and MV Networks (Malaysia)
TOR Erzeuger Type A, B, C, D	TOR generators, Connection and parallel operation of Type A, B, C, D power generation systems
UL 1741	Inverters, Converters, Controllers and Interconnection System Equipment for use with Distributed Energy Resources (Exclusion clause, 46)
UNE 217001 IN	Tests for systems intended to avoid the energy transmission to the distribution network
UNE 217002	Grid connected inverters – Testing of requirements for DC grid injection, overvoltage generation and island operation detection system
UTE C15-712-1	Low-voltage electrical installations -Practical guide- Photovoltaic installations without storage and connected to the public distribution network
UTE C15-712-2	Stand alone photovoltaic installations not connected to the public distribution network with battery storage
VDE 0126-1-1	Automatic disconnection device between a generator and a public low voltage grid
VDE-AR-E 2510-2	Stationary electrical energy storage systems intended for connection to the low voltage grid
VDE-AR-E 2510-50	Stationary battery energy storage systems with lithium batteries – Safety requirements
VDE-AR-N 4105	Technical minimum requirements for the connection to and parallel operation with low-voltage distribution networks (TCR low voltage)
VDE-AR-N 4110	Technical requirements for the connection and operation of customer installations to the medium voltage network (TCR medium voltage)
VDE-AR-N 4120	Technical requirements for the connection and operation of customer installations to the high voltage network (TCR high voltage)
VDE-AR-N 4130	Technical requirements for the connection and operation of customer installations to the extra high voltage network (TCR extra high voltage)
XP C15-712-3	Photovoltaic installations with storage device and connected to a public distribution network

ANSI: American National Standards Institute



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- ANSLG: American National Standard Lighting Group ASTM: American Society for Testing and Materials CIE: International Commission on Illumination EN: European Standards GSO: GCC Standardization Organization IEC: International Electrotechnical Commission IES: Illuminating Engineering Society
- ISO: International Organization for Standardization
- SASO: Saudi Arabian Standards Organization
- UL: Underwriters Laboratories

