

TÜVNORD

Testing, Inspection and Certification of PV Products 光伏产品检测，检验及认证

TÜV NORD Renewable Energy
TÜV NORD 可再生能源



Company Profile

公司介绍



TÜV NORD was founded in Hanover, Germany in 1869. From the initial 'German Technical Inspection Associations for Boilers', TÜV NORD has gradually developed into a technical service company authorized by the German government and continuously expanded its service scope. Now, it has become one of the world's leading third-party inspection, testing and certification bodies. TÜV NORD GROUP has more than 15,000 employees worldwide, with businesses covering over 100 countries and 500 locations around the world, including energy, management system, industry, vehicle transportation, information security, environmental protection, natural resources, space, education and training, etc.

TÜV NORD 于 1869 年在德国汉诺威成立，从最初的“压力容器检验协会”，逐步发展成为德国官方授权的技术服务公司，并持续拓展服务范围，如今已跻身全球领先的第三方检验、检测、认证机构之列。TÜV NORD 集团在全世界拥有员工约 15000 人，业务遍及全球 100 多个国家和 500 多个地区，覆盖能源、管理体系、工业、车辆交通、信息安全、环境保护、自然资源、航空航天、教育培训等领域。

As a professional technical provider, TÜV NORD dedicates itself to offering manufactures, installers, suppliers and investors a comprehensive range of testing and certification services covering assessing safety, performance and quality of PV products and PV system in the field of solar energy. Its capability of testing and certification of PV products is embodied in a variety of PV modules, PV components and materials, balance of system components, energy storage equipment and system, PV power plant, etc. Testing and certification of PV modules ranges from BIPV module, smart modules, flexible modules, MBB/SMBB/OBB, modules with whole cells/half-cut cells/segmented cells, mono/poly silicon modules, concentrator PV modules, etc., involving n/p type, MWT, PERC, TOPCon, HJT, XBC, CdTe, CIGS, Perovskite/Tandem and other technologies.

作为一家专业的技术服务商，TÜV NORD 在太阳能领域致力于为制造商、安装商、服务供应商及投资者提供从太阳能光伏组件、零部件到光伏发电系统整个产品供应链的全方位测试和认证服务。光伏产品检测及认证能力涵盖各类型光伏组件、光伏辅材零部件、光伏系统平衡部件、储能设备及系统、光伏电站等领域。光伏产品测试认证范围已涵盖 BIPV、智能组件、轻质/柔性组件、MBB/SMBB/OBB 组件、整片/半片/叠瓦/叠片组件、单面/双面组件、聚光组件等，涉及 n 型/p 型、MWT、PERC、TOPCon、HJT、XBC、CdTe、CIGS、钙钛矿/叠层等新型电池技术。

Why Choose TÜV NORD? 为什么选择我们?



One-stop Service,
Multi-certification
一检多证、一站式服务

Satisfied
Service Quality
令您满意的服务质量

Customized
Training Courses
定制化培训

Customized Service
定制化服务

Carbon Footprint
Assessment and
Certification Services
碳足迹评估与认证服务

As a member of IECCE-CB scheme, our test report and certificate are widely recognized. We offer services from factory construction evaluation, building quality management systems to quality management and control, supplier management, defective products analysis and optimization, foreign market access analysis.

作为 IECCE-CB 互认体系成员, 我们签发的测试报告和证书被广泛认可。从前期的工厂建设评估、管理体系的建设、到生产过程中工艺质量管控、供应商管理、产品问题分析优化、国内外市场准入分析等服务, 提供一检多证, 一站式服务。

With rich experience of testing and project handling, our international team provides you with professional technical services. Our experts will always be your strong support and help you to reach business goals efficiently.

我们的国际团队拥有丰富的测试与项目管理经验, 向您提供专业技术服务。我们的专家一如既往地给予您强大的技术支持, 助您快速有效地达到业务目标。

Training of international standards, test methods, quality management and control on incoming material inspection, production process and warehouse, maintenance of solar simulator, power measurement, solar system, etc.

相关国际标准、测试方法、质量管理与控制(来料检验、生产工艺、仓库管理)、太阳能模拟器的维护保养、功率测量、光伏系统等培训。

For example 例如:

- Outdoor annual energy yield 户外实证
- Production surveillance 生产监督
- Pre-shipment inspection 出货检验
- Supplier rating 供应商评级
- Third-party assessment service 第三方评估服务
- Others 其他客户特殊需求

We adopt domestic/internationally recognized certification standards, providing professional carbon footprint assessment and certification services to enterprises. Helping customers accurately calculate and reduce carbon emissions, so as to achieve sustainable development goals.

我们采用国内/国际认可的认证标准, 长期致力于为企业提供专业的碳足迹评估与认证服务, 帮助客户准确核算和减少碳排放, 实现可持续发展目标。

PV Modules and Solar Cells

光伏组件与电池片

Basic Certification 基础认证

- IEC 61215 / IEC 61730 Design Qualification and Safety for c-Si PV Modules
晶硅光伏组件 IEC 基础认证
- IEC 61215 / IEC 61730 Design Qualification and Safety for Thin-film PV Modules
薄膜光伏组件 IEC 基础认证
- IEC 62108 / IEC 62688 Design Qualification and Safety to CPV Modules
光伏组件 IEC 基础认证
- Guidelines for Qualifying at High Temperatures IEC TS 63126 高温运行环境下光伏组件认证

Emerging Technology Certification 前沿技术认证

- High Efficient PV Modules
高效光伏组件 (MWT、PERC、TOPCon、HJT、XBC、Half-cut、Shingled、MBB/SMBB/OBB)
- IEC 63092 Building-integrated PV Modules
光伏建筑一体化 (BIPV)
- EN 50583 Photovoltaics in Buildings
光伏建筑一体化 (BIPV)
- Perovskite PV Modules
钙钛矿 / 叠层电池组件
- Smart PV Modules
智能光伏组件

Specified Testing for PV Modules and Solar Cells 光伏组件与电池片单项测试

- IEC 61701 Salt Mist Corrosion Testing
光伏组件盐雾测试 / 认证
- IEC 62716 Ammonia Corrosion Testing
光伏组件氨气测试 / 认证
- IEC 60068-2-68 Dust and Sand Test
光伏组件沙尘测试 / 认证
- IEC TS 62804-1 Test for the Detection of Potential-Induced Degradation
光伏组件电势差诱导衰减测试 / 认证 (PID)
- Energy Efficiency Rating of PV Modules
光伏组件户外发电能效评级
- IEC TS 63209 Accelerated Stress Test for PV Modules
光伏组件加速老化测试 / 认证
- Wind Tunnel Test
光伏组件风洞测试
- Anti-glare Test
光伏组件防眩光测试
- IEC 63202-1 Measurement of Light-induced Degradation of Crystalline Silicon Photovoltaic Cells
电池片 LID 测试
- IEC TS 63202-4 Measurement of Light and Elevated Temperature Induced Degradation of Crystalline Silicon Photovoltaic Cells
电池片 LETID 测试
- IEC TR 63279 Photovoltaic Modules Accelerated Stress Testing
光伏组件加严应力测试
- LID Test / LET ID Test
光伏组件光诱导衰减测试 / 热辅助光诱导衰减测试认证
- UL 790 / UNI 9177 Fire Test
光伏组件防火测试 / 认证 (北美 / 意大利)
- IEC TS 62782 (Low Temperature) Cyclic Dynamic Mechanical Load Testing
光伏组件 (低温) 动态机械载荷测试 / 认证
- IEC 62759-1 Transportation Testing
光伏组件模拟运输测试 / 认证
- IEC 62938 Non-uniform Snow Load Testing
光伏组件不均匀雪载测试 / 认证
- ISO 6988 SO2 Resistance Testing
光伏组件酸雾测试 / 认证
- PANFILE for PVsyst according to IEC 61853 Series Standards
光伏组件 PANFILE 测试
- Photovoltaic (PV) Module Safety Qualification for DC System Voltage up to 3000 V DC
2000V-3000V 超高压系统电压光伏组件认证
- Requirements of Photovoltaic (PV) Modules for Offshore Use
海上光伏组件认证
- Photovoltaic (PV) Modules and Solar Cells UVD Test
光伏组件及电池片紫外辐照诱导衰减测试
- Requirements of PV modules for hot desert use
沙漠光伏组件认证

Sustainability Services 可持续发展服务

- EPD Italy
意大利 EPD
- EPD Norway
挪威 EPD
- EPD International
国际 EPD (瑞典)
- ISO 14067 Carbon Footprint of Products
光伏组件 / 电池片产品碳足迹评估
- ISO 14064-1 Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals
光伏企业组织碳足迹评估
- Ecodesign and Energy Label
欧盟生态设计指令及能效标签条例
- Evaluation Specification of Zero-carbon Factory
零碳工厂评价
- Recyclability for PV Module
光伏组件可回收性评估
- Traceability and Segregation Audit
供应链可追溯审核

Others 其他服务

- Utilization of Customer's Testing Facilities (CTF)
实验室认可计划
- IEC 62941:2019 Quality System for PV Module Manufacturing
光伏组件制造过程的质量管理体系认证

Light and elevated Temperature Induced Degradation (LETID)

LETID 热辅助光致衰减



LETID, as known as Light and Elevated Temperature Induced Degradation. With the PV modules using high efficiency technology such as PERC/TOPCon/HJT dominating the market, the phenomenon of LETID has become a hot topic. Compared to the LID, LETID continues to occur for months or even years after installation and recovers more slowly, with a power degradation of even more than 10%. TÜV NORD provides testing and certification services for LETID in accordance with IEC TS 63342:2022, testing the LETID sensitivity of PV modules.

LETID, 又称为热辅助光致衰减。随着使用 PERC/TOPCon/HJT 等技术的高效太阳能组件已占据市场主导地位, 关于高效电池组件的 LETID 现象成为一个热议的话题。相比于熟知的 LID, LETID 会在安装后几个月甚至几年内持续发生且恢复速度更加缓慢, 其功率衰减甚至会超过 10%。TÜV NORD 根据 IEC TS 63342:2022 标准, 为客户提供 LETID 的相关测试认证服务。

Accelerated Stress Test for PV Modules

光伏组件加速老化测试

PV modules are intended to be used outdoors for 25 or 30 years. Its degradation will directly affect the power generation and revenue. Whether the module can be safe and reliable under the actual use of the external environment, and ensure its power performance to maintain above a certain level, especially the power degradation of the module under long-term use, has been widely concerned in the photovoltaic industry.

光伏组件在户外使用 25 或 30 年，其衰减率直接影响发电量和收益。组件能否在实际使用的环境条件下安全、可靠，并保证其发电性能保持在一定水平之上，尤其是组件长期使用下的发电功率衰减问题，受到广泛关注。

IEC 61215 and IEC 61730 series only can evaluate the basic performance and reliability requirements of the PV modules. Based on years of experience in outdoor / laboratory tests and IEC TS 63209 series standard, TÜV NORD provides extended stress test and certification services according to the climate characteristics of different module types and installation environment to those customers who crave for higher quality and reliability.

IEC 61215、IEC 61730 系列标准，只能评估光伏组件基本的性能和可靠性要求。TÜV NORD 根据多年户外与实验室检测经验和 IEC TS 63209 系列标准，参考不同组件类型与安装环境气候特征，为有着更高质量与更高可靠性要求的客户定制光伏组件加速老化测试认证服务。



Energy Efficiency Rating of PV Modules 光伏组件户外发电能效评级

Test Purpose 测试目的

TÜV NORD has proposed a new solution which is based on outdoor performance analysis. Integrating the outdoor performance data, lab testing results and software simulation of PV systems, we provide accurate and reliable Energy Yield Rating Certificate for investors. At the same time, it is easier to find some tough issues during outdoor degradation test compared with laboratory test, such as water penetration of PV module, seal failure, EVA yellowing, finger oxide, etc.

TÜV NORD 推出了以户外实证为基础的全新的解决方案。基于户外实证实测到的数据，结合实验室的检测结果，再通过光伏系统模拟软件，给客户提供准确可靠的光伏组件发电能效评级证书。同时户外测试可以发现实验室内比较难发现的一些组件问题，例如组件渗水、密封失效、EVA 黄变和栅线氧化等。

Example: PV Module Performance Comparison Test 实际案例：光伏组件性能对比测试



Building-integrated PV Modules (BIPV) 光伏建筑一体化

BIPV is a technology that integrates solar power generation products into buildings. PV Modules can be directly used as building materials such as factory roof and curtain wall. In addition to the power generation function, BIPV also need to be building materials, aesthetics and other functions. The building envelope functions shall be, depending on the application, one or more of following: mechanical rigidity or structural integrity, primary weather impact protection (rain, snow, wind, hail), shading, daylighting, thermal insulation, fire protection, noise protection, separation between indoor and outdoor environments, security, shelter or safety.

光伏建筑一体化是一种将太阳能发电（光伏）产品集成到建筑上的技术，也就是说可以将光伏组件直接用作厂房屋顶、幕墙等建筑材料的形式。除了发电的功能之外，BIPV 组件还需兼具建材、美观等功能于一身。作为建筑围护结构，必须满足以下一项或多项功能：机械刚性或结构完整性；主要天气影响防护（雨、雪、风、冰雹）；遮阳、采光、保温；消防、防火；噪音保护；室内外环境隔离；保密、保护或安全。

TÜV NORD uses our global resources to integrate IEC / ISO / EN / GB standards to provide reliability test and global access certification services for BIPV products and systems.

TÜV NORD 利用全球资源整合 IEC、ISO、欧洲及国内相关标准，提供 BIPV 产品和系统的可靠性测试、评估和世界各国准入认证服务。

PV Components and Materials

光伏辅材与零部件



TÜV NORD Type Tested[®] Mark
“零部件型式认证”标志

We assure that PV components with “TÜV NORD Type Tested” marked on the market also meet the requirements of related international standards or recognized engineering regulations. For the manufacturers of PV modules, it is also an optimal choice of using PV components with “TÜV NORD Baumuster geprüft” marked to assemble their PV modules.

我们确保市场上印有“TÜV NORD 型式认证”标志的光伏零部件同样符合相关的国际标准与规范。对于光伏组件的生产商而言，采用标识有“TÜV NORD 型式认证”标志的零部件来组装光伏组件是最佳选择。

PV Components 太阳能光伏零部件

- Junction boxes for PV modules
光伏接线盒 (IEC 62790)
- Smart-junction boxes for PV modules
光伏智能接线盒 (IEC 62109)
- Bypass Diode – Thermal runaway test
旁路二极管热逃逸测试 (IEC 62979)
- Extended-stress testing – Polymeric component materials
零部件材料加严测试 (IEC TS 63209-2)
- Connectors for DC-application in PV system
光伏连接器 (IEC 62852)
- PV cables
光伏电缆线 (IEC 62930 & EN 50618)
- Guidelines for qualifying PV modules, components and materials for operation at high temperatures
高温地区用光伏零部件辅材测试 (IEC TS 63126)
- Crystalline silicon photovoltaic (PV) cells
晶硅电池片认证 (P12.4-AA-17, P12.4-AA-18)

PV Materials 太阳能光伏材料

- PV glass
太阳能光伏用玻璃
- PV encapsulant material (EVA, POE, etc.)
太阳能光伏用封装材料 (IEC 62788-1-1)
- PV ribbon
太阳能光伏用焊带
- PV silicon gel, tape
太阳能光伏用硅胶、胶带
- New alloy/Composite frame
新型合金 / 聚合物复合边框
- Silver paste for solar cell
太阳能电池用正银 / 背银
- PV flexible front and backsheets
太阳能光伏用柔性前板和背板 (IEC 62788-2-1)

PV BOS Products 太阳能光伏平衡部件产品

- PV Systems- design qualification of solar trackers
太阳能光伏跟踪支架 (IEC 62817)
- Floating buoy used in floating PV plants
太阳能光伏用浮体 (P33.3-AA-02)
- Fixed new alloy/composite mounting bracket for photovoltaic(PV) modules
太阳能光伏用固定支架 (P33.3-AA-01)

Your Reliable Technical Advisor

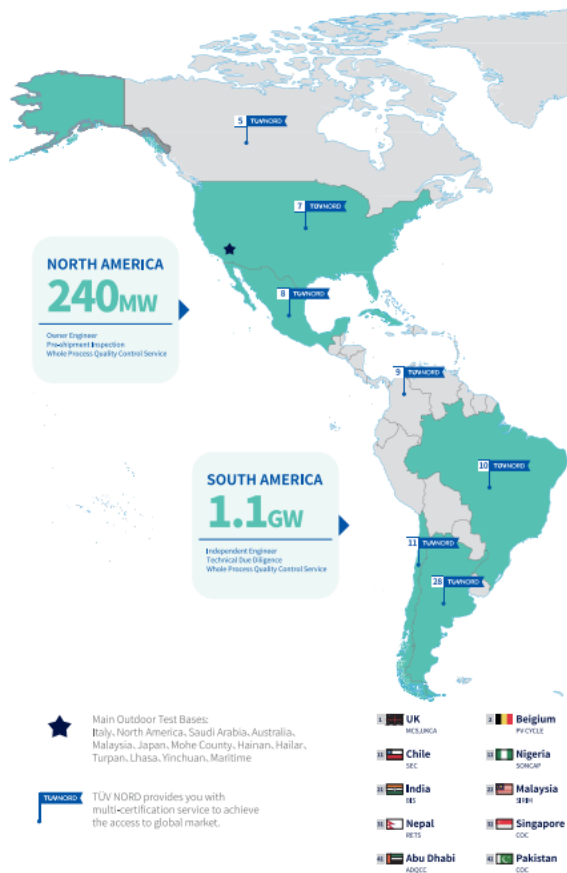
您的可靠技术顾问

Whole-process Quality Surveillance Program

全过程质量控制监督计划

The energy yield depends considerably on the quality of each equipment in a PV power plant, including PV modules, PV components, combiner boxes, inverters, mounting brackets, etc. Due to differences on capability of production process and quality assurance among different manufacturers, it requires rich experiences to identify the diversities. Since each buyer has its unique requirements on quality of products and details of techniques, introducing an expertized and independent third party for surveillance on production process quality control is critical to assure the usage of good raw materials, the utilization of fine production lines and the delivery of qualified products. Until the end of May, 2025, TÜV NORD has completed 112GW worldwide PV product and PV system performance evaluation, ensuring high quality products in the market.

光伏电站的每一个组成部件，无论是光伏组件、光伏零部件，还是汇流箱、光伏逆变器，甚至支架的质量优劣，都会影响到电站的发电性能，最终直接导致了电站的收益减少。由于各设备生产商的生产能力及质量保证体系存在差异，需要丰富的经验才能进行甄别。同时，各业主单位对产品质量要求及技术细节等方面各有不同，由专业且独立的第三方机构进行生产监督，可以保证生产商在原材料使用、生产过程及最终成品质量等各环节均符合业主单位的要求。截止到2025年5月底，TÜV NORD 已完成 112GW 全球光伏产品及光伏系统评估量，为您购买到高质量的光伏产品保驾护航。

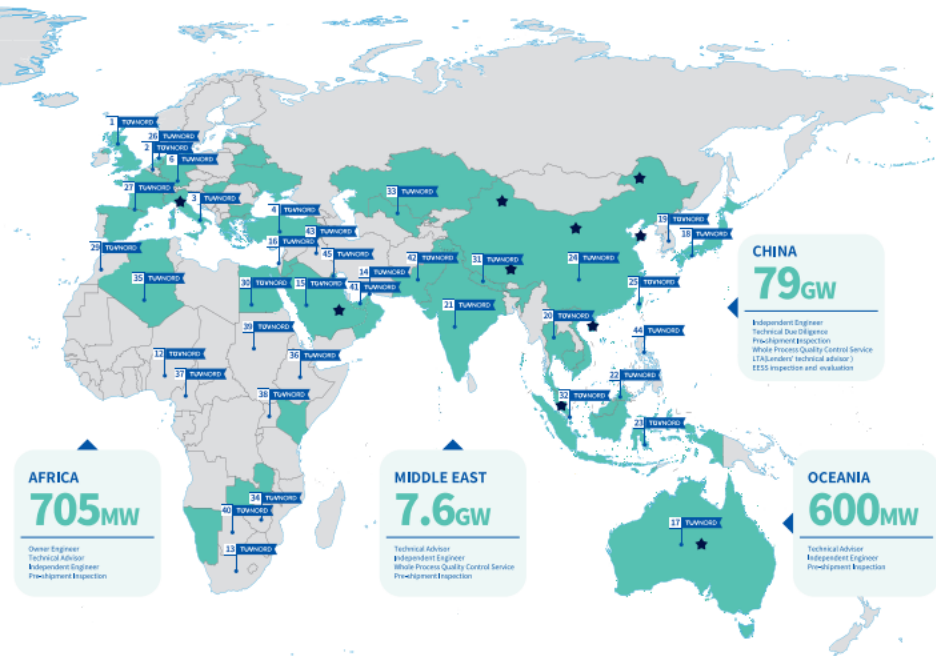


EUROPE
8.3 GW

Technical Advisor
Independent Engineer
Whole Process Quality Control Service

REST OF ASIA
14.5GW

Owner Engineer
Technical Advisor
Independent Engineer
Technical Due Diligence
Procurement Inspection
Third-party Laboratory Test
Whole Process Quality Control Service



AFRICA
705MW

Owner Engineer
Technical Advisor
Independent Engineer
Procurement Inspection

MIDDLE EAST
7.6GW

Technical Advisor
Independent Engineer
Whole Process Quality Control Service
Procurement Inspection

OCEANIA
600MW

Technical Advisor
Independent Engineer
Procurement Inspection

Italy EPC/PMC/Fin Test	Turkey Market Access	Canada CSA	Germany DIN	USA UL/CEC	Mexico FER	Columbia RETE	Brazil IBMETRO
South Africa SABS	Dubai GSOB	Saudi Arabia SABER	Israel TA	Australia COC	Japan JEL/JEPA	Korea KS	Thailand TISI
Indonesia SNI / NPT	China CQC/CQC	Chinese Taipei VFC	Netherlands NEN	WEEE	Argentina IRAM	Morocco COC	Egypt CEN
Uzbekistan GOST UZ	Zimbabwe CECA	Algeria COC	Ethiopia COC	Cameroon PSCAE	Uganda Pisc	Sudan Pisc	Botswana SCSR/COC
Iraq COC	Philippines UPR	Kuwait KIBKAC					

Pre-shipment Inspection
出货前检验

On-site Inspection
到货后验收

Inspection Documents Delivery
项目资料提交

End
项目结束

Your Reliable Technical Advisor

您的可靠技术顾问



Factory Inspection before Production

生产前工厂检查

Conduct factory inspection in designated workshop before production starts and eliminate all non-conformities.

在正式供货之前，对预定生产的工厂（车间）进行工厂检查，正式生产在所有缺陷消除之后才能进行。

Basis

依据

- Purchase Order, Technical Agreements, Quality Plan (QP)
采购协议、技术协议、质量保证计划 (QP)
- Related standards and requirements of IEC/ISO
IEC 和 ISO 对应的标准和要求
- Rich factory inspection experiences of TÜV NORD
TÜV NORD 丰富的工厂品质审核经验

PV Products
光伏产品

PV Module
光伏组件

PV Inverter & PCS
光伏逆变器 & PCS

Floating PV
漂浮式光伏

Mounting Bracket
边框支架

Battery & Energy Storage System
电池 & 储能系统

In-line Inspection 在线生产监督



Third-party Laboratory Testing 第三方实验室测试

In-line Verification 线上测试

Some processes can be verified in-line measurements such as pull strength of soldering ribbons, dimension, etc.

一些过程可以通过在线监督得到验证，比如电池片焊接拉力，组件尺寸测量，EL 测试等。

Third-party Laboratory Test 第三方实验室验证测试

Some process cannot be verified by in-line measurements such as LID/LETID, Potential Induced Degradation Test, Gel Content Test, Peel-off Test etc.

一些过程没有办法通过在线监督得到验证，比如 LID/LETID、PID 测试、封装材料交联度和剥离强度测试等。

Pre-shipment Inspection 出货前检验

Based on shipment plan, take certain amount of samples and conduct pre-shipment inspection.
根据出货量，抽取一定数量的样品，进行复检。



