

TÜVNORD

TÜV NORD
PV Science and Technology Co., Ltd.
戎得（苏州）光伏科技有限公司



Company Profile

公司简介

TÜV NORD PV Science and Technology Co, Ltd., whose mother company is TÜV NORD Group, is a third-party testing lab committed to PV testing and inspection, research and development as well as other PV technical services. In recent years, our team has accumulated abundant experiences in testing and certification of PV products and evaluation services of PV plant with immense market-oriented practice in offering the services. TÜV NORD PV lab is built to extending the lead in the market.

戎得（苏州）光伏科技有限公司是 TÜV NORD 集团旗下一家专注于光伏检测、研发及相关技术服务的第三方检测实验室。近年来，我们的团队通过大量面向市场的工作实践，在各类光伏产品测试、认证以及光伏电站的评估服务方面积累了丰富的经验，并在原有技术和运营团队的基础上，建立了戎得光伏实验室。





With a great support from TÜV NORD PV technical team, TÜV NORD PV lab has gathered a strong strength internationally and domestically in the field of testing and certification with advanced testing equipments, reliable inspection capability and broad industrial resources. TÜV NORD PV Lab will strengthen TÜV NORD's comprehensive service capability in all dimension based on the original technical advantages. Located in Wuzhong District, Suzhou and covering an area of 1800 m², TÜV NORD PV Lab has been established and operated according to the ISO/IEC 17025 testing lab quality control system, and it could offer high-end customized technical solutions to customers according to different market demands.

戎得光伏实验室集先进的检测设备、可靠的检测能力、强大的技术团队和资源网络于一身，在检测认证领域具备国际化和本土化两方面的优势。作为 TÜV NORD 旗下全资子公司，戎得光伏实验室将依托原有的技术优势，进一步扩大 TÜV NORD 的综合服务能力。戎得光伏实验室座落于苏州市吴中区，占地面积 1800 平方米。按照 ISO/IEC 17025 实验室管理体系要求建立及运营，能够根据不同的市场需求，为客户提供高端定制化技术解决方案。

Test Scope (PV Module)

测试范围 (光伏组件)



- IEC 61215: Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
 - IEC 61730-2 Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing
 - IEC 61853-1 Irradiance and temperature performance measurements and power rating
 - IEC TS 62804-1: Photovoltaic (PV) modules – Test methods for the detection of potential-induced degradation – Part 1: Crystalline silicon
 - IEC 61701 Salt mist corrosion testing
 - IEC62782 Cyclic (dynamic) mechanical load test
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- IEC 61215: 地面用晶体硅光伏组件 - 设计鉴定和定型
 - IEC 61730-2 光伏 (PV) 组件安全鉴定 - 第二部分: 试验要求
 - IEC 61853-1 辐照度和温度性能测量和功率评定
 - IEC TS 62804-1: 光伏 (PV) 组件—检测潜在衰减的试验方法 - 第一分部: 晶硅
 - IEC 61701 盐雾腐蚀试验
 - IEC 62782 动态载荷试验



Test Scope (Inverter)

测试范围 (逆变器)



- Energy efficiency test standards: IEC 61683, EN 50530
- Environmental test standards: IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-14, IEC 60068-2-30
- Safety test standards: IEC 62109-1, IEC 62109-2, IEC 62477-1
- Grid-connected test standards: IEC 61727, IEC 62116, VDE AR-N 4105, VDE 0124-100, VDE 0126-1-1, CEI 0-21, CEI 0-16, EN 50549-1, EN 50549-2, EN 50549-10, AS/NZS 4777.2, NRS 097-2-1, SAGC, ABNT NBR 16149, ABNT NBR 16150, DEWA, C10/11, OVE-RICHTLINIE R 25, TOR Erzeuger Typ A, TOR Erzeuger Typ B, PEA, MEA, NTS 631, UNE 217001, CEA, IEC TS 62910, NC RFG, Ordinance NO 140:2022
- 能效测试标准：IEC 61683、EN 50530
- 环境测试标准：IEC 60068-2-1、IEC 60068-2-2、IEC 60068-2-14、IEC 60068-2-30
- 安规测试标准：IEC 62109-1、IEC 62109-2、IEC 62477-1
- 并网测试标准：IEC 61727、IEC 62116、VDE AR-N 4105、VDE 0124-100、VDE 0126-1-1、CEI 0-21、CEI 0-16、EN 50549-1、EN 50549-2、EN 50549-10、AS/NZS 4777.2、NRS 097-2-1、SAGC、ABNT NBR 16149、ABNT NBR 16150、DEWA、C10/11、OVE-RICHTLINIE R 25、TOR Erzeuger Typ A、TOR Erzeuger Typ B、PEA、MEA、NTS 631、UNE 217001、CEA、IEC TS 62910、NC RFG、Ordinance NO 140:2022



Lab Qualification 实验室资质



Procedure

测试流程



Salt Mist Corrosion Testing of Photovoltaic (PV) Modules

光伏组件盐雾腐蚀测试

Test condition

Severity 1:

4 cycles with 7 days of each cycle Including 2 hours of salt mist spray followed by 7days of storage under high humidity condition

Severity 3 / 4 / 5 / 6:

1 / 2 / 4 / 8 cycles with 7 days of each cycle Including initial 4 days with 2 hours of salt mist spray and 22 hours of storage under high humidity condition every day, followed by 3 days of storage under a standard atmosphere

Pass criteria

- No evidence of major visual defects
- Pass insulation test
- Pass wet leakage current test
- Degradation of maximum power output < 5%

测试条件

等级 1:

4 个循环，每个循环 7 天。
包括 2 小时盐雾喷淋和 7 天的高湿度下储存

等级 3/4/5/6:

1 个 / 2 个 / 4 个 / 8 个循环，每个循环 7 天。
包括前 4 天，每天 2 小时盐雾喷淋及 22 小时湿度下储存，后 3 天室温下储存

判定要求

- 没有严重外观缺陷
- 通过绝缘测试
- 通过湿漏电流测试
- 最大功率衰减 < 5%



Photovoltaic (PV) Modules - Cyclic (Dynamic) Mechanical Load Testing

光伏组件-循环 (动态) 机载荷测试



Test condition

1000 cycles
Maximum pressure =1000Pa
3 - 7 cycles every minute

测试条件

1000 个循环
最大压强 1000Pa
每分钟 3-7 个循环

Pass criteria

- No evidence of major visual defects
- No interruption of current flow during the test
- Pass insulation test
- Pass wet leakage current test
- Degradation of maximum power output < 5%

判定要求

- 没有严重外观缺陷
- 测试期间监控电流无断路
- 通过绝缘测试
- 通过湿漏电流测试
- 最大功率衰减 < 5%

Potential-induced Degradation Test

PID 测试

Test condition

Temperature: $60 \pm 2^\circ\text{C}/85 \pm 2^\circ\text{C}$

Relative humidity: $85\% \pm 3\%$

Duration: 96/192/500/1000hrs

Voltage: $\pm 1000\text{V}/\pm 1500\text{V}$

测试条件

温度: $85 \pm 2^\circ\text{C}$

相对湿度: $85\% \pm 3\%$

测试时间: 96/192/500/1000hrs

测试电压: $\pm 1000\text{V}/\pm 1500\text{V}$

Requirements

- a) No evidence of major visual defects (include electroluminescence image)
- b) Pass the wet leakage current test
- c) Max power degradation less than 5%

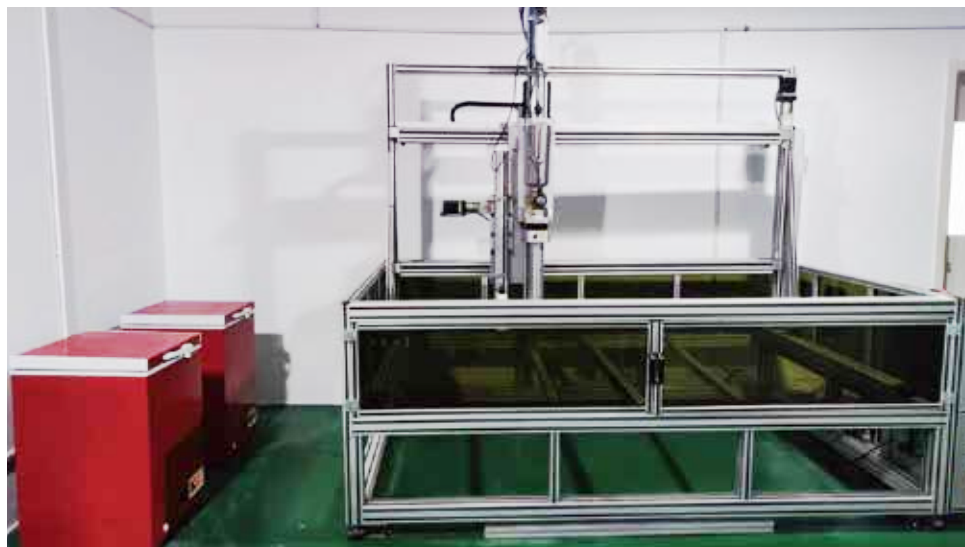
判定要求

- a) 没有严重外观缺陷 (包含 EL 图像)
- b) 通过湿漏电流测试
- d) 最大功率衰减 $< 5\%$



Hail Test

冰雹测试



Test condition

Ice-ball

Diameter:25/30/35/40/45/55mm

Freezer controlled: $-10\pm 5^{\circ}\text{C}$

Storage container: $-4\pm 2^{\circ}\text{C}$

Test velocity:23~33.9m/s

测试条件

冰球

直径：25/30/35/40/45/55mm

冰箱控制： $-10\pm 5^{\circ}\text{C}$

储存控制： $-4\pm 2^{\circ}\text{C}$

冰球速度：23~33.9m/s

Requirements

- a) No evidence of major visual defects
- b) Pass the wet leakage current test

判定要求

- a) 无严重外观缺陷
- b) 通过湿漏电测试

Low Voltage Ride Through and High Voltage Ride Through Test

LVRT、HVRT测试

Test conditions

Ambient temperature: 15°C-30°C

Ambient humidity: 30%RH-75%RH

Voltage: Set the fault voltage value according to national standards and customer claims

Power: full load, half load, light load, no load

测试条件

环境温度：15°C-30°C

环境湿度：30%RH-75%RH

电压：根据各国标准、客户宣称设定故障电压值

功率：满载、半载、轻载、空载

Pass criteria

- General requirements: During the fault traversal, there shall be no active, reactive, off-grid phenomenon.
- Additional requirements: According to national standards, increase the recovery time, crossing state and other requirements.

判定要求

- 常规要求：故障穿越期间不得产生有功、无功、脱网现象。
- 附加要求：根据各国标准，增加恢复时间、穿越状态等要求。



Island Test 孤岛测试



Test conditions

Ambient temperature: 15°C-30°C
Ambient humidity: 30%RH-75%RH
Voltage and frequency: The voltage and frequency of the power grid under various national standards
Power: 100%, 66%, 33% Pmax

Pass criteria

Protection time: After the grid signal is lost, the machine stops working within the specified time according to the standard requirements.

测试条件

环境温度：15°C-30°C
环境湿度：30%RH-75%RH
电压、频率：各国家标准下电网的电压、频率
功率：100%、66%、33%Pmax

判定要求

保护时间：在电网信号丢失后，机器根据标准要求，在规定时间内停止工作。



Run Environment Test

运行环境测试

Test conditions

Ambient temperature: set according to standard requirements: high temperature, low temperature, high and low temperature conversion, etc

Ambient humidity: set according to standard requirements

Voltage, frequency: voltage and frequency under the standard requirements

Power: full load, shutdown

Pass criteria

General requirements: in the standard requirement environment, the machine can run for the length of time required by the standard, and the temperature of each specified electronic component and machine component does not exceed the declared or standard value; Or after storage, it can be used normally.

测试条件

环境温度：根据标准要求进行设定：高温、低温、高低温转换等

环境湿度：根据标准要求进行设定

电压、频率：标准要求下的电压、频率

功率：满载、停机

判定要求

常规要求：在标准要求环境下，机器能够运行标准要求时长，各规定电子元件、机器元件的温度不超过宣称或者标准规定数值；或存储后能够正常开机使用。

Grounding Continuity Test

接地连续性测试

Test conditions

Ambient temperature: 15°C-30°C
Ambient humidity: 30%RH-75%RH
Machine status: Down

测试条件

环境温度：15°C-30°C
环境湿度：30%RH-75%RH
机器状态：停机

Pass criteria

General requirements: At the current and time required by the standard, the resulting resistance must not exceed the standard requirements.

判定要求

常规要求：在标准要求的电流和时间下，结果阻值不得超过标准要求。



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