White Paper for Coastal Application of PV Modules

光伏组件沿海应用白皮书

Foreword

前言

Along with the continuous development of PV applications, the power generation by PV modules is increasingly popularized in coastal and island regions. This White Paper aims to provide the matters to be noted during the usage of PV modules in coastal regions for the reference by the application clients of PV systems.

随着光伏应用的不断发展，沿海甚至海岛地区利用光伏组件发电越来越普及，本白皮书旨在说明光伏组件的在沿海地区使用时的注意事项供光伏系统应用端参考使用。

Contents 目录

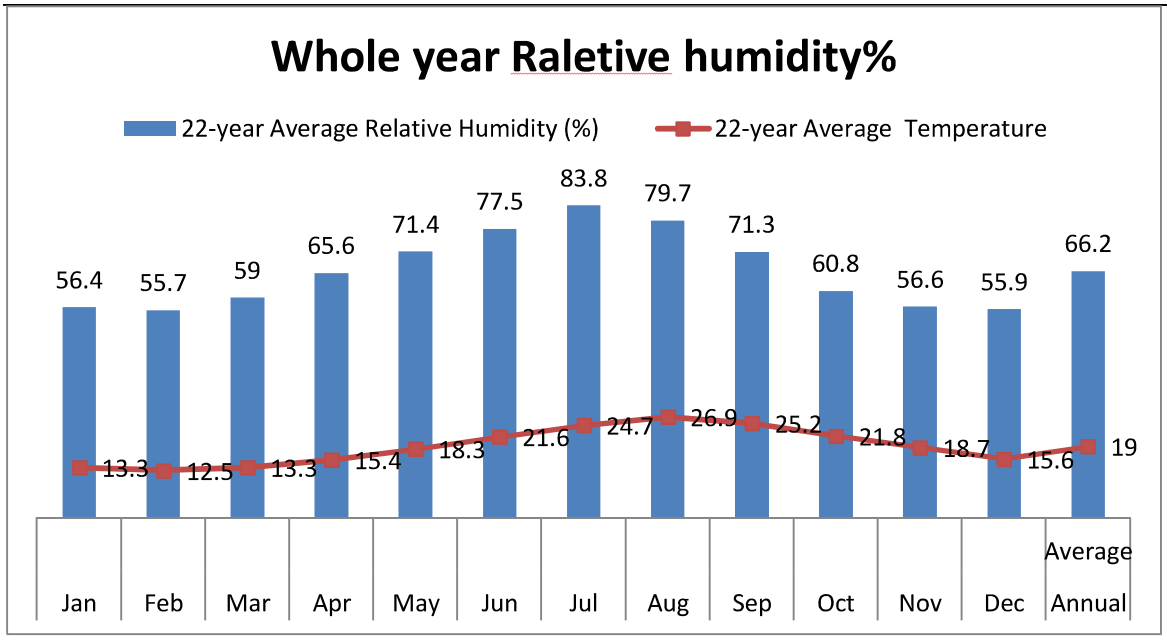
1. Background 背景

Generally, the salt concentration of seawater is about 5%, the air humidity is high in a coastal region and the seawater/salt fog may easily corrode the PV module and its racking installed in such a coastal region, and as a result, the PV module and its racking shall have some resistance to corrosion and meet the service life requirements. If part or all of such a module is immersed in seawater due to force majeure (like tsunami or typhoon), it shall not belong to the normal warranty range.

通常海水的含盐浓度约为 5%，而且沿海地区空气湿度大，海水或盐雾容易对安装在沿海地区的光伏组件和支架造成腐蚀，因此需要光伏组件和支架具有一定的抗腐蚀能力，满足使用寿命要求。如果因为不可抗力因素，组件部分或全部浸没在海水里，（比如海啸、台风），不在正常质保范围；

The island country—Japan is hereby taken for example so as to do statistics of the air humidity along the coast.

对于沿海应用，本文以日本岛国为例，统计沿海空气湿度。



The humidity in the marine environment, throughout the year, also changes from 50% to 90%, which is an alternating process.

海洋环境中一年四季的湿度也是从 50%~90%之间变化的，存在交替的过程。

2. Salt Fog Test on PV Modules 光伏组件盐雾测试

To simulate the application ability of a PV module to resist the corrosive environment along the coast, the relevant international certification authority adopts the IEC61701-2011&IEC 60068-2-52 standards for testing.

为模拟光伏组件耐受沿海腐蚀环境应用能力，国际认证机构采用 IEC61701-2011&IEC 60068-2-52 标准来测试。

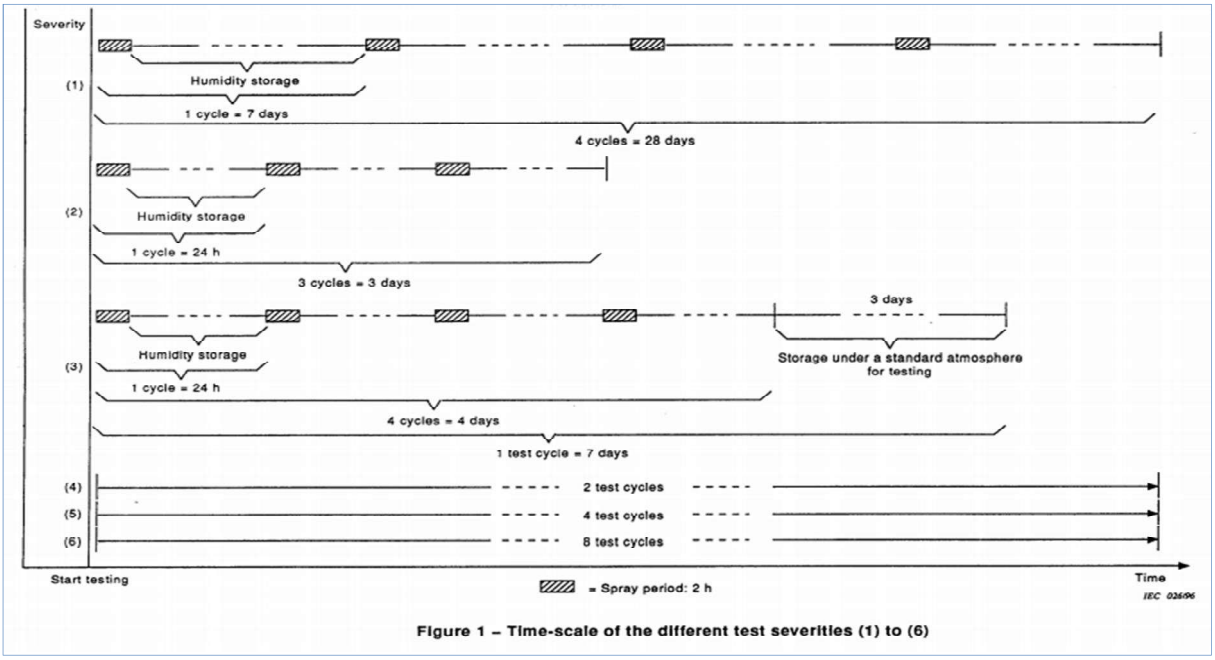
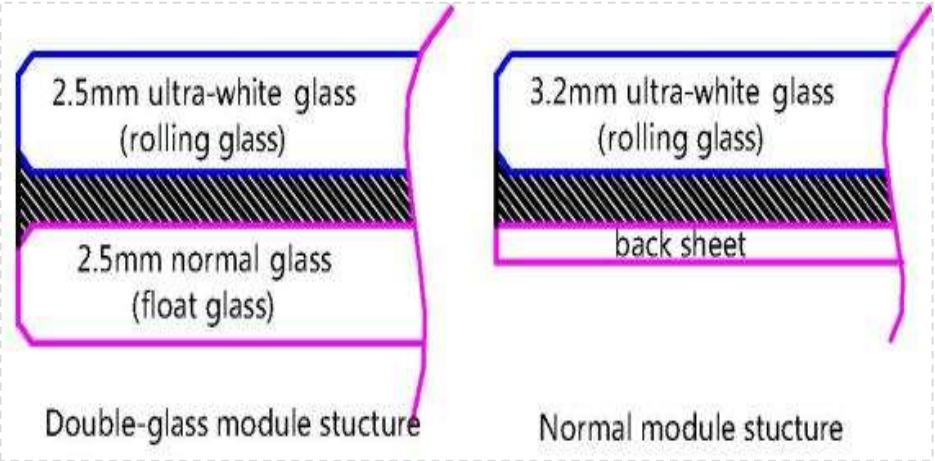


Figure 1 – Time-scale of the different test severities (1) to (6)

Severities (3)—(6) are closer to the actual application environment along the coast; the higher the severity is, the stricter the testing conditions will be. Trina's modules pass the requirements of severity (6) in the salt fog test.

等级 3~6 更加符合海边实际应用环境，等级越高，测试条件越苛刻。天合组件通过盐雾 6 级测试。

3. Structure of PV Module 光伏组件结构



4. Anti-corrosion Measures for Racks of PV Modules 光伏组件支架的耐腐蚀措施

Generally, there are carbon steel racks and aluminum alloy racks (a case study in Japan)

支架通常有碳钢支架和铝合金支架（以日本地区为例)

（1） Carbon steel racks 碳钢支架

1） In Japanese market, the galvanization for the steel racks is generally required to be over 70um or specially 80um. As it is close to the sea, the galvanizing coat can be thickened.

例如：日本市场对钢支架镀锌一般要求是 70um 以上，特殊点的会有 80um，所以海边很近，可以对镀锌层加厚；

2） New anti-corrosion materials are used. For example: In Japan, there is a kind of material from ZAM process (Zn-Al-Mg composite plated steel), whose performance is 10—20 times that of the carbon steel (but its price is higher than that of hot dipped zinc); or a spray plastics layer can be added onto the anti-corrosion layer.

采用新型的防腐蚀材料，如：在日本，有一款 ZAM 工艺的材料（Zn-Al-Mg 复合镀钢），性能是碳钢的 10-20 倍；（价格比热镀锌贵）；或防腐层外增加喷塑层；

（2） Aluminum alloy racks 铝合金支架

The surface should be anodized, with the oxide film thickness of over 10um

阳极氧化表面，氧化膜厚度不低于 10um；.

5. Recommendations for Coastal Applications of PV Modules 光伏组件在沿海中应用建议

Definition 定义	Coast Distance(m) 沿海距离 L	Module 组件	Rack Requirement 支架要求
General Location 普通位置	L ≥500	常规 Normal/双玻 Double glass	Standard 标准
Coast Location 近海位置	50 < L < 500	Normal 常规/Double glass 双玻	Anti-corrosive treatment 防腐
Severe Coast area 海边位置	30 < L < 50	Double glass 双玻	Anti-corrosive treatment 防腐

6. Conclusion 结语

The air humidity in a coastal region is high and the seawater/salt fog may easily corrode a PV module and its rack in such a coastal region, so such a PV module and its rack shall have a certain resistance to corrosion and extended life, improving reliability

沿海地区空气湿度大，海水或盐雾容易对安装在沿海地区的光伏组件和支架造成腐蚀，因此需要光伏组件和支架具有一定的抗腐蚀能力，延长使用寿命，提高可靠性。

The right to interpret this White Paper shall belong to Trina.

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