the standard in safety

第四届中美可再生能源产业论坛　　第五场讨论组B: 质量保证与标准
Fourth U.S. - China Renewable Energy Industries Forum
Session 5 Breakout B: Quality Assurance and Standards

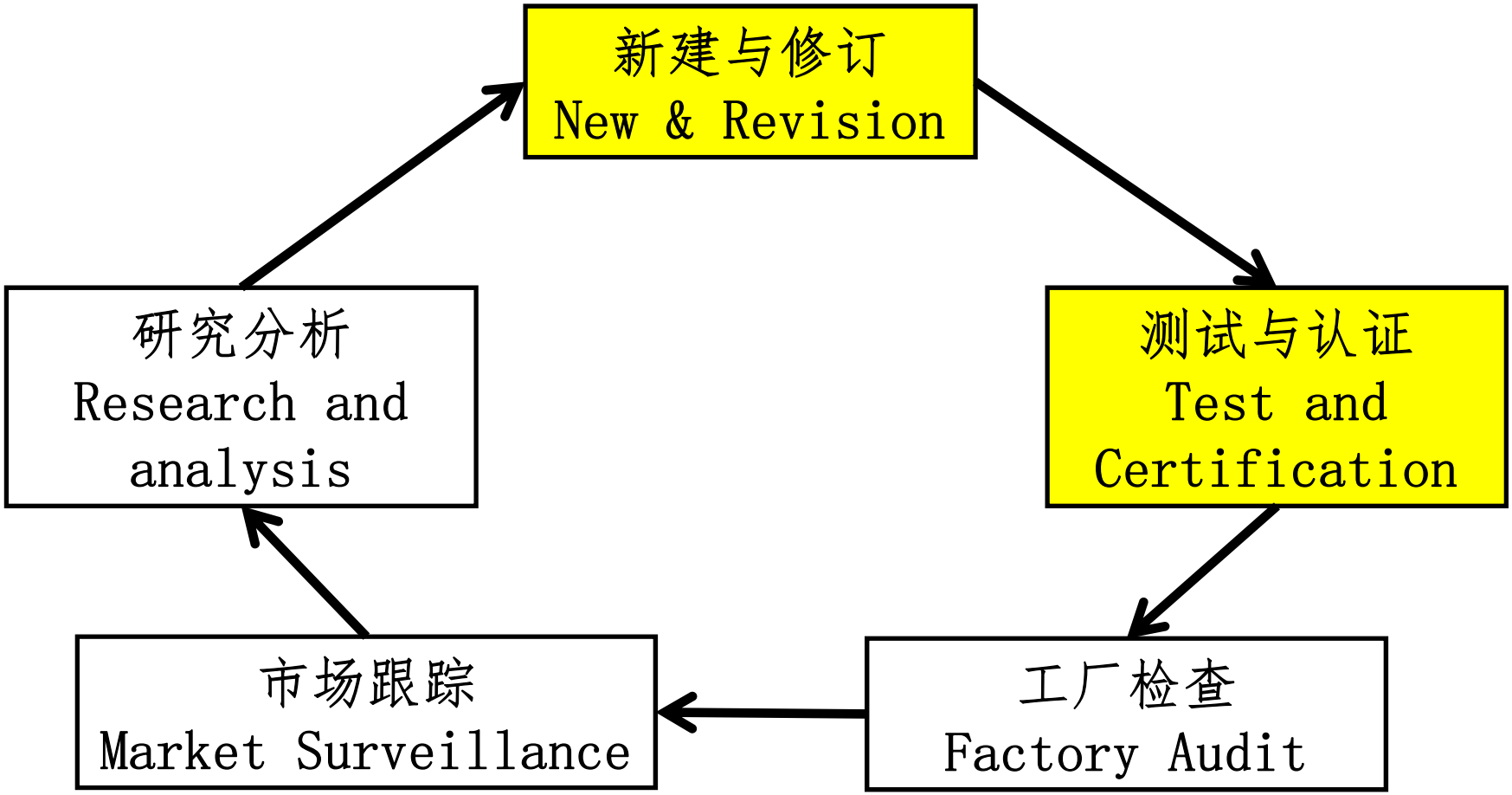
Standard Development and US/China Comparison

标准制定与中美标准体系比较

Liang Ji 季良俊
UL LLC
Washington DC, USA　美国 华盛顿
2015-06-03

Copyright© 1995-2007 Underwriters Laboratories Inc All rights reserved No portion of this material may be reprinted in any form without the express written permission of Underwriters Laboratories Inc or as otherwise provided in writing

Standard Development Steps 标准制定步骤



UL 具备以上所有步骤 UL has them all

Underwriters Laboratories

Some Highlights 几个强调点

Increase or decrease standard requirements?

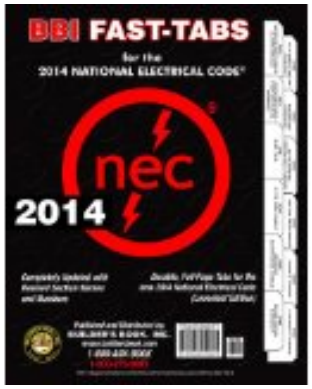
- **All test must be reflect system real on-site failure mode**
- **Performance – not pass or fail for all; need consensus for higher or lower;**
- **Safety – has minimum requirement, hard to lower**

标准要求的提高或降低？

- 所有测试必须反映系统现场运行的真实失效模式
- 性能标准 - 不能全部通过或全部不通过；提高或降低都需要达成共识
- 安全性标准 - 具有最低要求，很难降低要求

Underwriters Laboratories

US Standard for PV 美国光伏标准



ARTICLE 690
Solar Photovoltaic (PV) Systems

I. General

690.1 Scope

The provisions of this article apply to solar PV electrical energy systems, including the array circuit(s), inverter(s), and

690.4 General Requirements

(A) Photovoltaic Systems. Photovoltaic systems shall be permitted to supply a building or other structure in addition to any other electrical supply system(s).

•

(B) Equipment. Inverters, motor generators, PV modules, PV panels, ac PV modules, dc combiners, dc-to-dc converters, and charge controllers intended for use in PV power systems shall be listed for the PV application.

Shall be listed

- NEC (National Electric Code)
- Article 690 is for PV systems
- It is a mandatory requirement
- All equipment "shall be listed"
- Most Listings are based on UL standards

- NEC 美国国家电工规范
- 690章专门针对光伏系统
- NEC 是强制性规范
- 其中要求所有光伏设备必须取得"列名"认证
- 光伏设备 "列名"认证主要是根据UL标准

Underwriters Laboratories

US Adopted IEC Standard and National Differences
美国采标 IEC 标准与国家差异

JULY 18, 2014

1

ANSI/UL 62109-1-2014

UL 62109-1

Standard for Safety of power converters for use in photovoltaic power systems – Part 1: General requirements

IEC 62109-1
UL adoption 采标
UL 62109-1

UL standard to ANSI
ANSI/UL 62109-1
上升为美国国家标准
出版ANSI/UL 62109-1

National Differences For
UL 62109-1 Standard for Safety of power converters for use in photovoltaic power systems - Part 1: General requirements

National Differences
UL出版美国国家差异文件

Interest Category Balance of Standard Committee
标准委员会各类利益方代表的平衡

Standards covered by this STP: Standard Technical Penal
UL 6703, Connectors for Use in Photovoltaic Systems
UL 6703A, Multi-Pole Connectors for Use in Photovoltaic Systems
UL 9703, Distributed Generation Wiring Harnesses

STP Balance Summary

Total Number of Voting Members: 24

	利益方分类	委员人数	比例 (%)
	Interest Category	**Number of members**	**Percentage (%)**
监管部门	AHJ	4	17
工商用户	Commercial/Industrial User	2	8
消费者	Consumer	0	0
一般代表	General	4	17
政府部门	Government	0	0
国际代表	International Delegate	0	0
生产者	Producer	8	33
供应链	Supply Chain	3	13
测试与标准	Testing & Standards	3	13

实例一则：

UL 6703 技术委员会

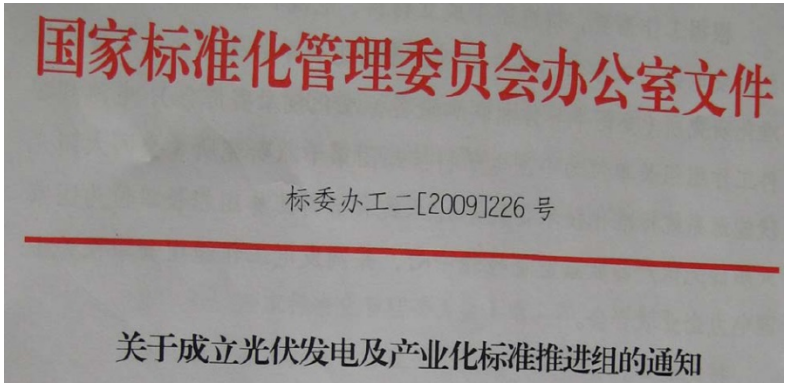
共负责3个标准：
6703 单脚接插头，
6703A 多脚接插头，
9703 分布式发电用线束.

UL 出任委员会主任和秘书，没有投票权；
UL出任一个技术代表，有投票权；
每个参加单位只有一票，包括UL.

任何一类利益方的代表数不允许超过总数的三分之一.

Underwriters Laboratories

China PV Standards 中国光伏标准


国家标准化管理委员会办公室文件

标委办工二[2009]226 号

关于成立光伏发电及产业化标准推进组的通知

国务院关于印发深化
标准化工作改革方案的通知

国发〔2015〕13 号

各省、自治区、直辖市人民政府，国务院各部委、各直属机构：

现将《深化标准化工作改革方案》印发给你们，请认真贯彻执行。

国务院

2015 年 3 月 11 日

（此件公开发布）

深化标准化工作改革方案

为落实《中共中央关于全面深化改革若干重大问题的决定》、《国务院机构改革和职能转变方案》和《国务院关于促进市场公平竞争维护市场正常秩序的若干意见》（国发〔2014〕20 号）关于深化标准化工作改革、加强技术标准体系建设的有关要求，制定本改革方案。

- China National Standard designation:
  GB (for mandatory), GB/T (for voluntary)
- 1987 June – SAC TC90 established
- 2009 Dec. – 4 promotion groups established for a) Materials, b) Cell and Module, c) System and BOS, d)Grid Connection
- 2015 March – New Guidelines for standard system reform. Noticeably, institutions and industry associations are encouraged to develop related standards.

- 中国国标 GB(强制性)， GB/T(推荐性)
- 1987年6月,国标光标委 TC90 成立
- 2009年12月,四个光标推荐组成立(材料， 电池和组件， 系统和部件， 并网)
- 2015年3月， 深化标准化工作改革方案. 值得注意的一条是 “培育发展团体标准”

Underwriters Laboratories

Thank You

Liang Ji (季良俊)

UL LLC

333 Pfingsten Road

Northbrook, IL60062, USA

Phone: +1 847 664 1200

Email: <liangji@ulcom>

Underwriters Laboratories

Shanghai Institute of Microsystem And Information Technology
Chinese Academy of Sciences

LIU Zhengxin 刘正新

<z.x.liu@mail.sim.ac.cn>

中国科学院上海微系统与信息技术研究所

SIMIT (Shanghai Institute of Microsystem and Information Technology)

CAS (Chinese Academy of Sciences)

Washington DC, USA 美国 华盛顿

2015-06-03

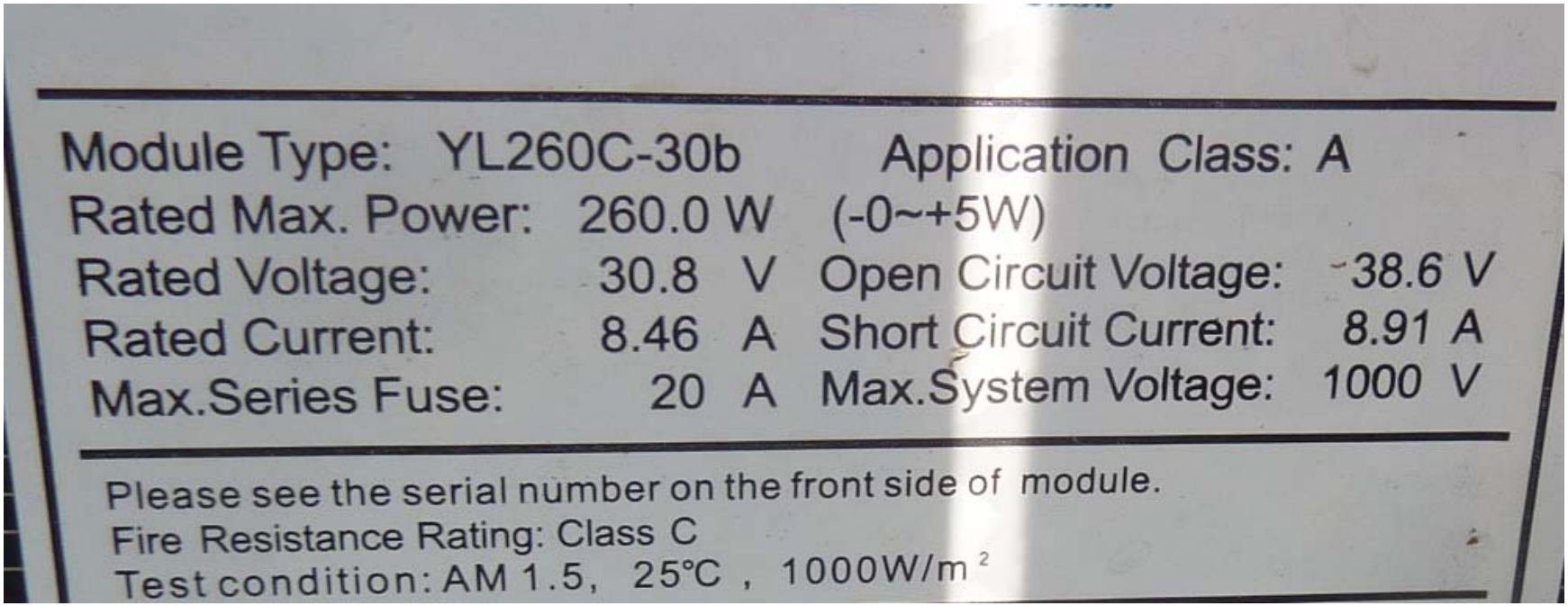
中国科学院 CHINESE ACADEMY OF SCIENCES

中国科学院 上海微系统与信息技术研究所

Market Demand: Accurate Measurement
市场要求: 测量的准确性

Rated Max Power 标称最大功率

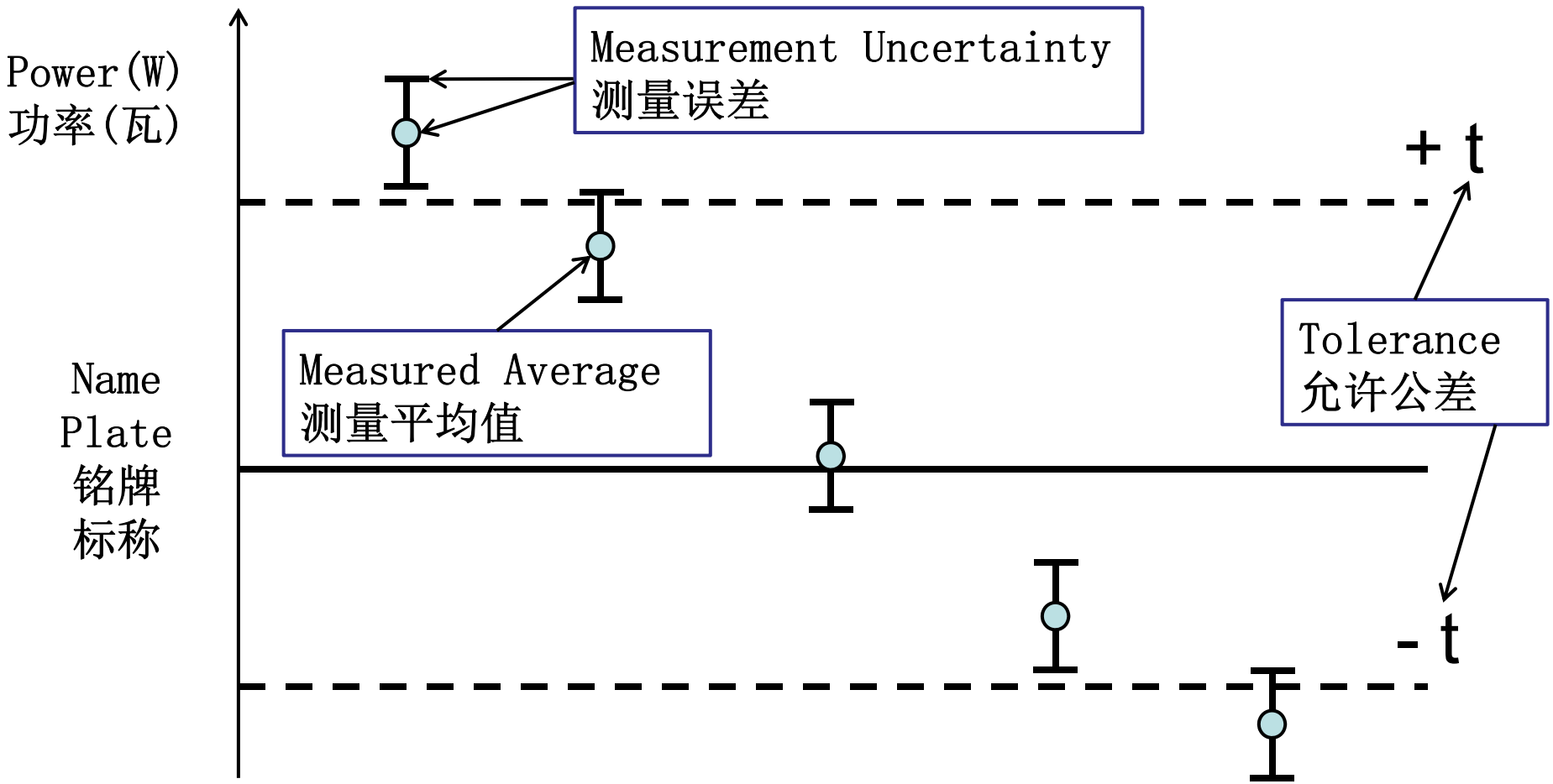
260.0 W(-0 ~ +5W), or (-0% ~ 1.92%)



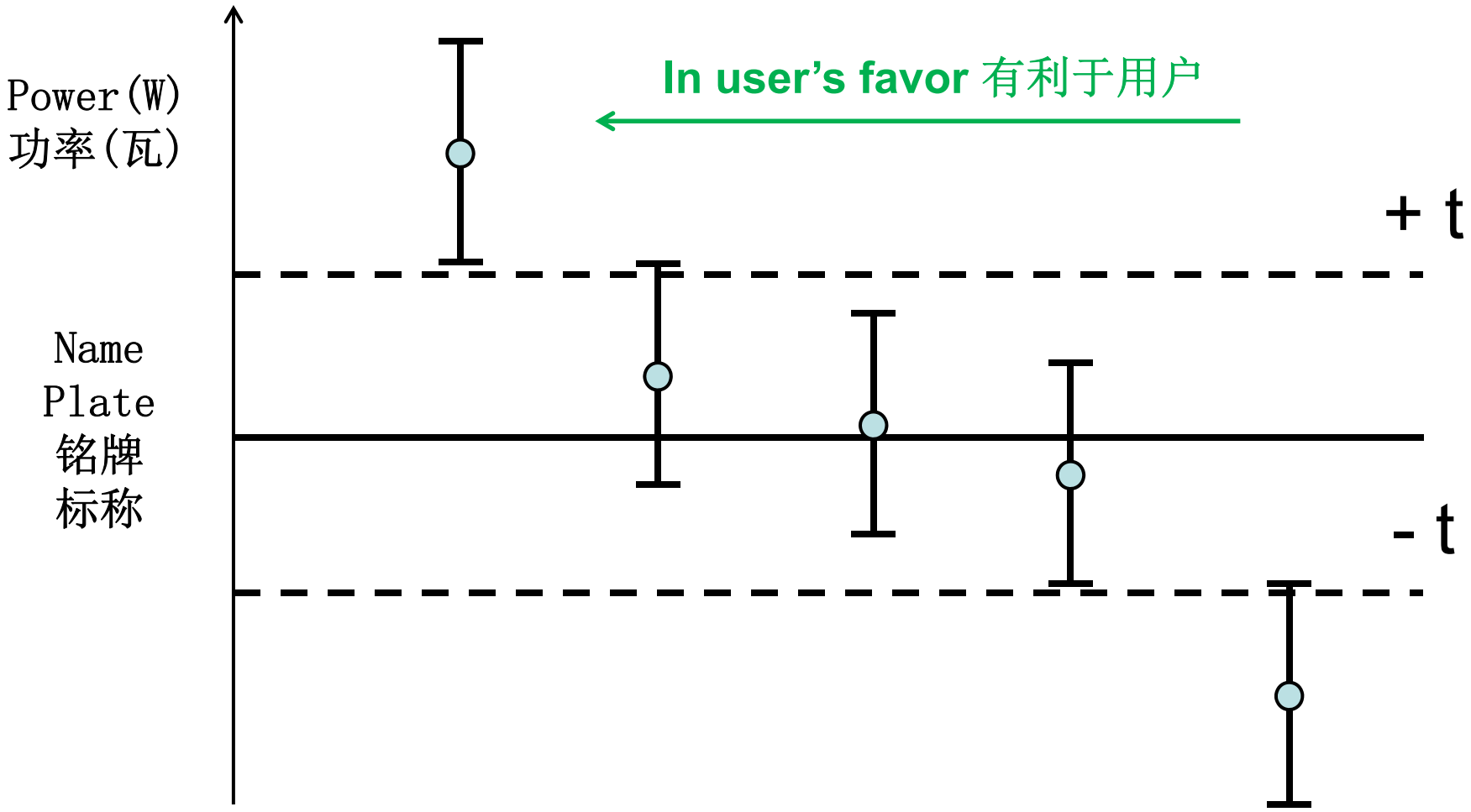
Module Type:	YL260C-30b	Application Class:	A
Rated Max. Power:	260.0 W	(-0~+5W)	
Rated Voltage:	30.8 V	Open Circuit Voltage:	38.6 V
Rated Current:	8.46 A	Short Circuit Current:	8.91 A
Max.Series Fuse:	20 A	Max.System Voltage:	1000 V

Please see the serial number on the front side of module.
Fire Resistance Rating: Class C
Test condition: AM 1.5, 25℃, 1000W/m²

Name Plate Value and Measurement Uncertainty
铭牌标称值与测量误差

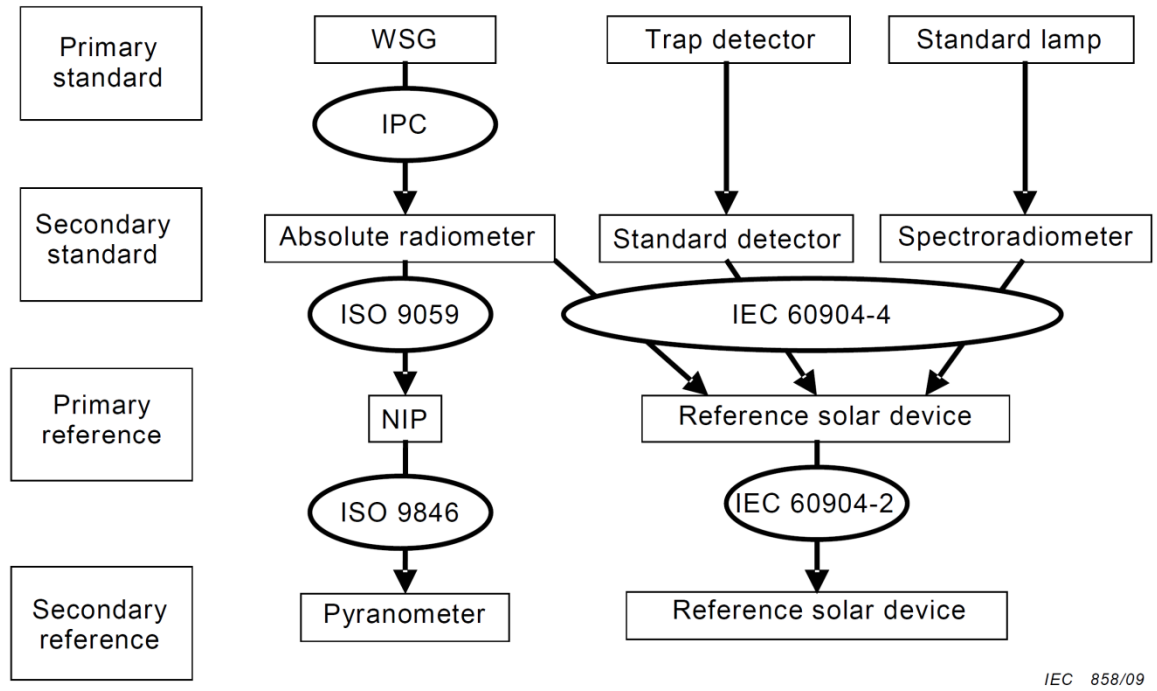


Effect of Measurement Uncertainty
测量误差的影响



IEC 60904-4 Calibration Traceability 标定溯源

- **So far, China don't have traceable standard**
- **All Chinese manufacturers calibrate their reference cells or reference modules abroad**
- **SIMIT is establishing a traceable standard**
- **NREL is providing great technical support under USCREP program**
- 中国至今没有溯源标准
- 所有中国厂商的参照电池片和参照组件都是送到国外标定
- 中科院上海微系统所正在建立光伏标定溯源
- 美国国家新能源实验室在中美新能源合作计划下给予了很大的技术支持



NOTE Direct traceability of absolute radiometers to SI radiometric scale may also be available.

Figure 1 – Schematic of most common reference instruments and transfer methods used in the traceability chains for solar irradiance detectors

中国科学院 CHINESE ACADEMY OF SCIENCES

中国科学院 SIMIT 上海微系统与信息技术研究所

Thank You

LIU Zhengxin
刘正新
<z.x.liu@mail.sim.ac.cn>

SIMIT CAS
中科院上海微系统与信息技术研究所

865 Changning Road, Shanghai
China 200050
中国上海市长宁路865号 200050

中国科学院 CHINESE ACADEMY OF SCIENCES
中国科学院 SIMIT 上海微系统与信息技术研究所