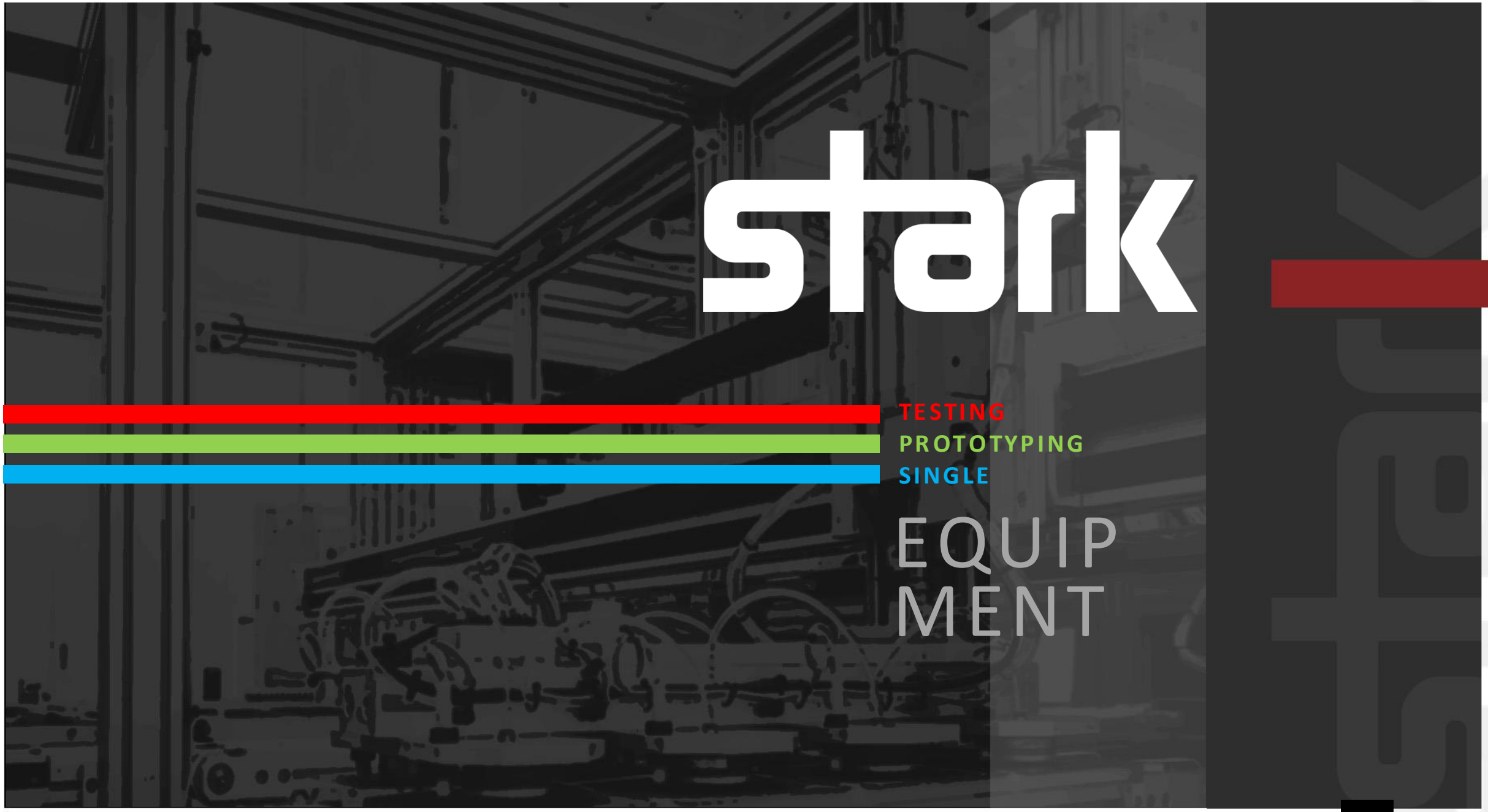
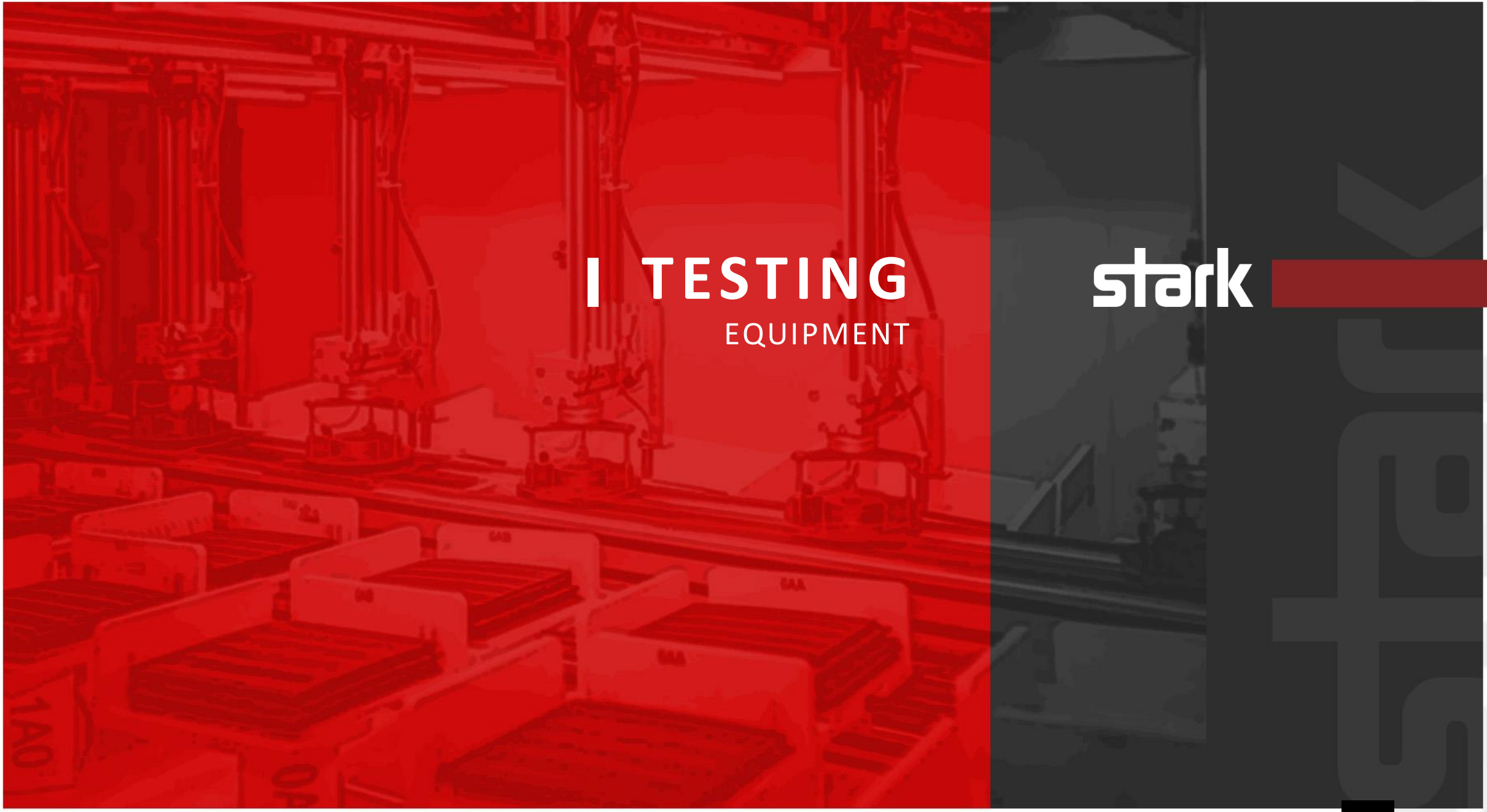

stark
TESTING
PROTOTYPING
SINGLE
EQUIP
MENT



TESTING

EQUIPMENT

stark

I TESTING EQUIPMENT

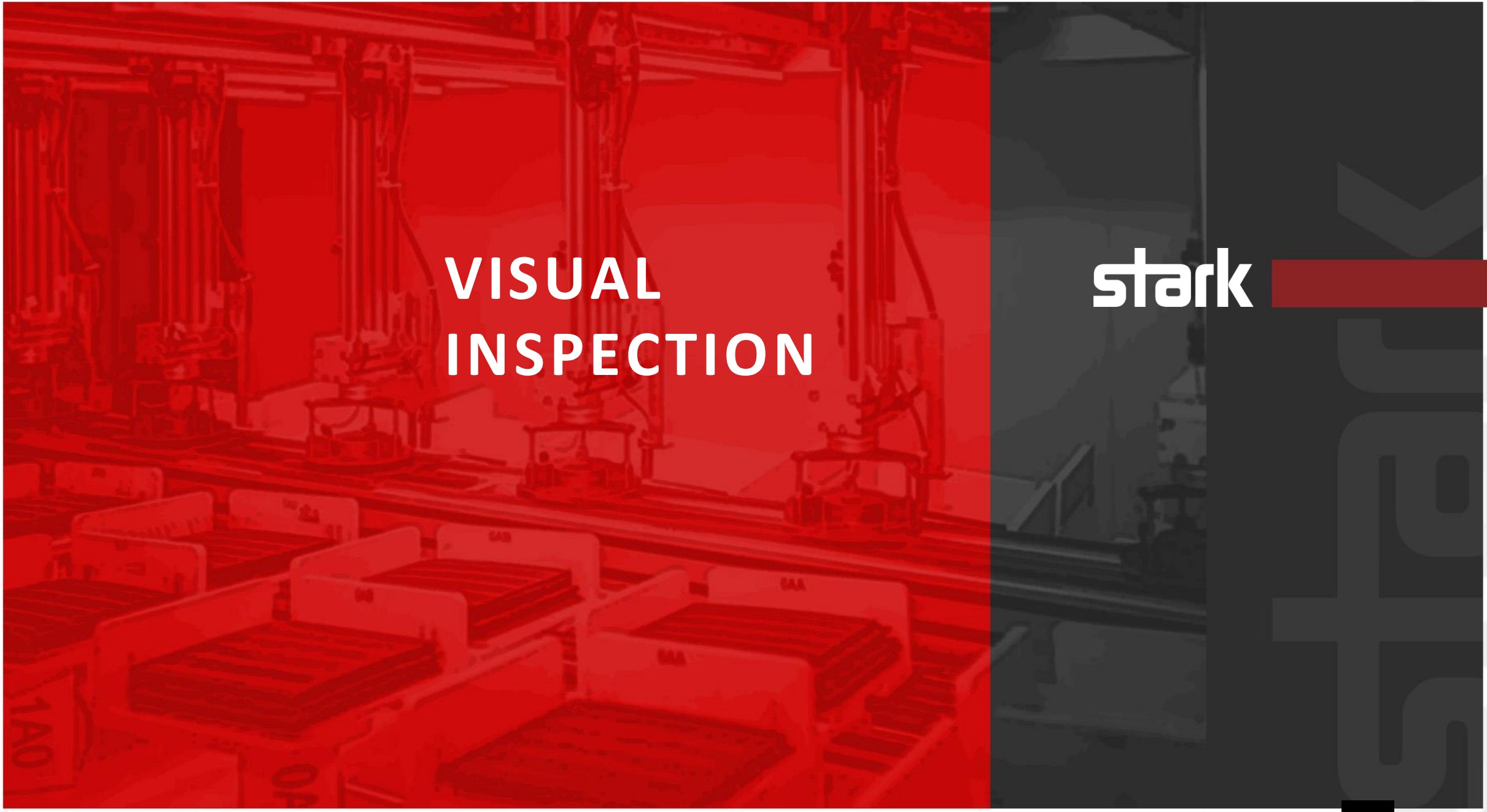
TABLE OF CONTENT

I TESTING EQUIPMENT

TABLE OF CONTENT

I TESTING EQUIPMENT

TABLE OF CONTENT



VISUAL INSPECTION

VISUAL INSPECTION MACHINE

ST-BR-VI+EL

TESTING STANDARD

Perform standards: IEC 61215-2:2021, IEC 61730-2:2021

PURPOSE

To detect any visual defects in the module

TECHNICAL SPECIFICATIONS

- Illumination of LED lamps >1000 Lux
- Table Size: > 2.4m×1.31m
- Table materials: Green non-slip mats
- Frame material: Aluminum alloy profile with drawers, for storing tools
- Illumination meter
- measurement range 0~20~200~2000~20000Lux (automatic range switching)
- Magnifying glass, digital camera, etc.

VISUAL INSPECTION MACHINE

TECHNICAL SPECIFICATIONS

- Illumination of LED lamps >1000 Lux
- Table Size: > 2.4m×1.31m
- Table materials: Green non-slip mats
- Frame material: Aluminum alloy profile with drawers, for storing tools
- Illumination meter
- measurement range 0~20~200~2000~20000Lux (automatic range switching)
- Magnifying glass, digital camera, etc.

VISUAL INSPECTION TABLE

ST-TA-VI

TESTING STANDARD

It's conform IEC61215 MQT 01 & IEC61730 MST 01 testing standard requirement.

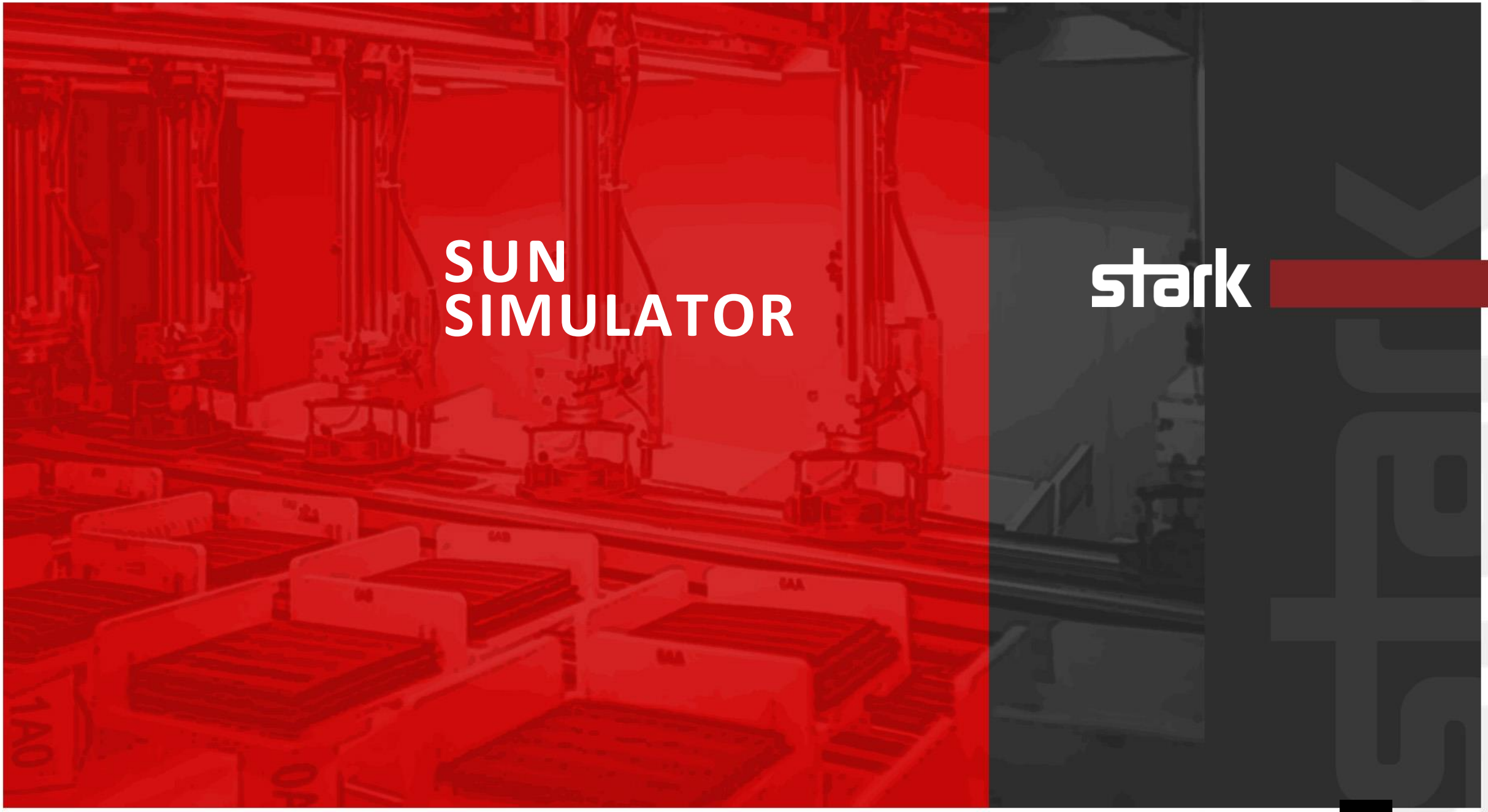
PURPOSE

To detect any visual defects in the module

TECHNICAL SPECIFICATIONS

- Worktable mass capacity : ≥200N
- Worktable material : solid material
- Frame material : Industry aluminum alloy
- Have drawer, used save for tools
- Automatic change range
- 1 Measurement range:0~20~200~2000~20000 Lux
- Include the magnifier
- Included the lumeter

SUN SIMULATOR



SUN SIMULATOR BBA STATE

ST-SUN-BBA

TESTING FUNCTION

IEC61215 MQT 07 Low irradiance testing.
IEC61215-2:2016 MQT 09, IEC61730-2:2016 MST IEC61215-2:2016 MQT 19 Stabilization testing.

INTRODUCTION

According to IEC 61215, IEC 61730 testing standard.
This machine will offer a near natural light source under the certain area, the light source class is BBA. It's main used for large area PV module aging testing.

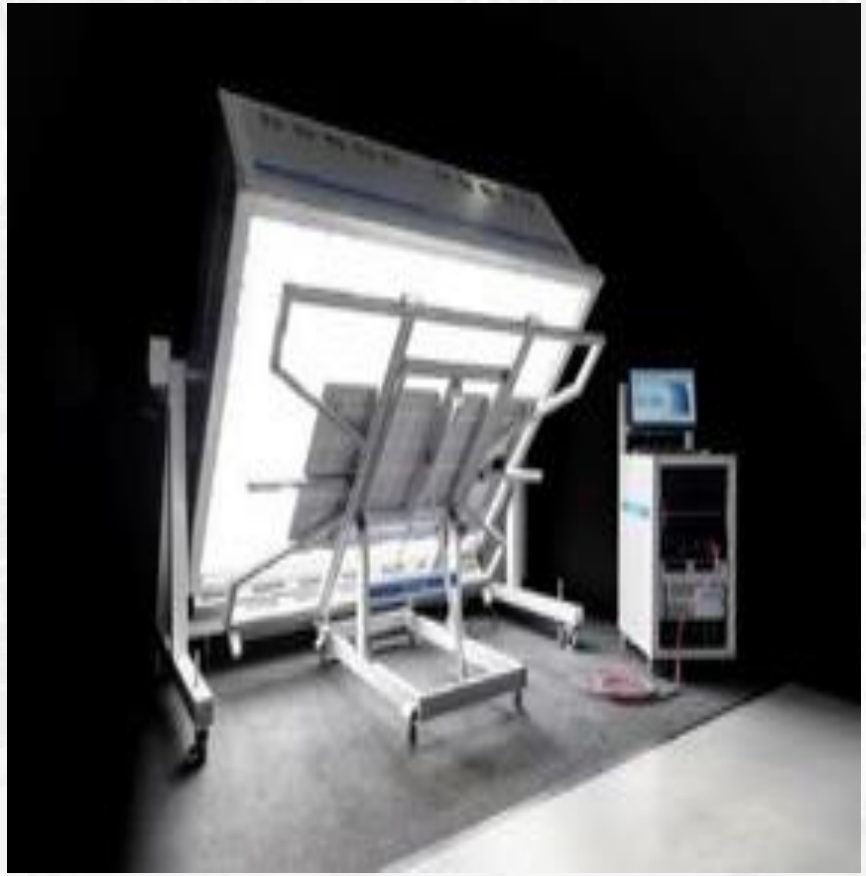
SUN SIMULATOR BBA STATE

TECHNICAL SPECIFICATIONS

- The chamber body: metal plate thickness : 1.2mm ; The warehouse board thickness : 100mm
- The chamber of testing machine : foam board, it's made of completely cut off sunlight and keep warm foam board materials assembly together.
- Testing sample placed frame : 40×40mm Industry aluminum pro□le, open structure is conducive to cold air circulation, rapid and constant temperature on the back of PV module.
- The Inner chamber structure: two layer, light source layer and testing layer, the height of testing layer approx 1900mm.
- Testing layer temperature control : fan cooling system, automatic constant temperature system.
- Light source : OSRAM brand
- The lamp quantity : according to the irradiance area to calculate, different irradiance area the lamp quantity is different.
- Radiation intensity : 500-1200W/m2
- Wave band : 400-1100mm
- Spectral matching level : class B , The irradiation inhomogeneity : class B , Instabilities : class A
- Air temperature control range : 0C°~60C° (As the air temperature control temperature)
- PV Module temperature control range: 20C° ~ 85C° (As the module temperature control temperature)

SUN SIMULATOR AAA STATE (LASS)

ST-SUN-3A LASS



TESTING FUNCTION

Continuous solar illumination solar simulator according to IEC 61215-2:2016, IEC 61853-1/2, IEC 61730-2:2016, IEC 61646, UL 1703-2015

INTRODUCTION

According to IEC 61215, IEC 61730 testing standard. This machine will offer a near natural light source under the certain area, the light source class is AAA. It's main used for large area PV module aging testing.

TECHNICAL SPECIFICATIONS

- Class AAA 1.5m x 2.5m
- High efficiency plasma light (lifetime up to 40'000 hours)
- Irradiance level: from 500W/m2 (possibility to go down to 200W/m2) to 1100W/m2
- Warm up time for stabilization of irradiance: ~150 s
- Warm up time for stabilization of I-V measurements: ~150 s
- Thermalized sample holder with recirculating chiller in order to cool down the PV module at 25 degrees
- Standard ReRa Reference cell
- I-V Measurement system
- Electronic load piloted by I-V Tracer software
- Pt100 temperature sensor

SUN SIMULATOR A+A+A+ STATE

ST-SUN-3A+

TESTING FUNCTION

Xenon module flasher dedicated to laboratory applications with dark tunnel according to IEC60904-9:2016, IEC 60891, IEC 61215-2:2016, IEC 61853
Class: A+A+A+ (according IEC60904-9 Ed2 & Ed3

TECHNICAL SPECIFICATIONS

- Spectral match: 0.875 - 1.125 (A+)
- Non-uniformity <1% (A+)
- Long term instability <1% (A+)
- Type: Xenon
- Xenon lifetime: 60'000 flashes guaranteed, 80'000 typical
- Illuminated area: 2200*2200 [mm]
- A+A+A+ area: 2100*2100 [mm]
- Light intensity: 700-1200W/m2
- Light pulse length: 10 ms
- Cycle time: 25 s
- Electronic load: Active 4 quadrant E-load. Voltage range: -15 V to 420 V, Current range: -50 A to 50 A. Load mode (1st and 3rd quadrant): up to 15 kW peak. Source mode (2nd and 4th quadrant): up to 1.2 kW peak
- Voltage ranges: 1.5 / 5 / 15 / 50 / 150 / 420 V
- Current ranges: 0.15 / 0.5 / 1.5 / 5 / 15 / 50 A
- Irrad. Ranges: 0.015 / 0.05 / 0.15 / 0.5 / 1.5 / 5 V (4 irradiance measurement channels)

SUN SIMULATOR
A+A+A+ STATE TOP GLASS

ST-SUN-3A+ G

TESTING FUNCTION

A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency solar module IV Testing, such as PERC, HJT, N type, IBC, Topcon..... all high efficiency and high capacitance solar module testing with high transparency EVA

TECHNICAL SPECIFICATIONS

- Max. illuminated area：2600mm×1500mm
- Type of lamp: Xenon lamp
- Lamp lifetime (average no. of flashes): over 600000 flashes at 10ms flash time, over 300000 flashes at 100ms 2.4 Module sunny side: down
- Range of light intensity：200-1200W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.875-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜0.5%（A+）
- Non-uniformity of irradiance: ＜1%(A+ class at 1000W/m2)

SUN SIMULATOR
A+A+A+ STATE TOP GLASS

TECHNICAL SPECIFICATIONS

- Repeatability error：＜0.2% under 40 continuous test
- Cycle Time （s）: 10 S
- Measurement range voltage： 1V， 10V， 50V， 100V， 200V
- Measurement range current：0.25A， 1A， 5A， 12.5A， 20A
- Measurement resolution：voltage：0.003%， current：0.003%
- Pulse duration: 10ms – 100ms in step of 10ms
- Type of measurement single flash
- Testing Mode: Linear Sweep & Non-Linear Sweep GSN
- Dimension：3100mm×1900mm×850mm
- Power：220V±10%， 10A， 50HZ
- Configuration: tester + IR temperature sensor + PC+ Display Screen + software + Keyboard + Mouse
- Effective Testing area : 2600*1500mm

SUN SIMULATOR
A+A+A+ MASS PRODUCTION

ST-SUN-3A+ MS

TESTING FUNCTION

A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency solar module IV Testing, such as PERC, HJT, N type, IBC, Topcon..... all high efficiency and high capacitance solar module testing with high transparency EVA

TECHNICAL SPECIFICATIONS

- Max. illuminated area：2600*1600
- Type of lamp: Xenon lamp
- Lamp QTY/Life time :Single Lamp GSN_E01 solution, using 30ms measure HJT with high precision lamp lifetime over 150K flashes
- Range of light intensity：200-1400W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.875-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜0.5%（A+）
- Non-uniformity of irradiance: ＜1%(A+ class at 1000W/m2)

SUN SIMULATOR
A+A+A+ MASS PRODUCTION

TECHNICAL SPECIFICATIONS

- Repeatability error : ＜0.15% (STC , 100 times)
- Measurement range voltage : 1V, 10V, 50V, 100V, 200V
- Measurement range current : 0.25A, 1A, 5A, 12.5A, 20A
- Measurement resolution : voltage : 0.003%, current : 0.003%
- Pulse duration: 10ms – 100ms in step of 10ms
- Testing Mode :Linear Sweep & Non-Linear Sweep GSN,/GEM/ GMC
- Configuration: tester + IR temperature sensor + PC+ Display Screen + software + Keyboard + Mouse
- Effective Testing area : 2600*1600mm

SUN SIMULATOR A+A+A+ FOR LAB

ST-SUN-3A+ LAB

TESTING FUNCTION

A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency solar module IV Testing, such as PERC, HJT, N type, IBC, Topcon..... all high efficiency and high capacitance solar module testing with high transparency EVA

TECHNICAL SPECIFICATIONS

- Max. illuminated area：2600*1600
- Type of lamp: Xenon lamp
- Lamp QTY/Life time :Single Lamp GSN_E01 solution, using 30ms measure HJT with high precision lamp lifetime over 150K flashes
- Range of light intensity：200-1400W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.875-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜0.5%（A+）
- Non-uniformity of irradiance: ＜1%(A+ class at 1000W/m2)

SUN SIMULATOR A+A+A+ FOR LAB

TECHNICAL SPECIFICATIONS

- Repeatability error : ＜0.15% (STC , 100 times)
- Measurement range voltage : 1V, 10V, 50V, 100V, 200V
- Measurement range current : 0.25A, 1A, 5A, 12.5A, 20A
- Measurement resolution : voltage : 0.003%, current : 0.003%
- Pulse duration: 10ms – 100ms in step of 10ms
- Testing Mode :Linear Sweep & Non-Linear Sweep GSN,/GEM/ GMC
- Configuration: tester + IR temperature sensor + PC+ Display Screen + software + Keyboard + Mouse
- Effective Testing area : 2600*1600mm

SUN SIMULATOR A+A+A+ FOR LAB

(integrated with temperature Co-efficient Test)

ST-SUN-3A+ LTC

TESTING FUNCTION

A+A+A+ Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency solar module IV Testing, such as PERC, HJT, N type, IBC, Topcon..... all high efficiency and high capacitance solar module testing with high transparency EVA

TECHNICAL SPECIFICATIONS

- Max. illuminated area：2600*1600
- Type of lamp: Xenon lamp
- Lamp QTY/Life time :Single Lamp GSN_E01 solution, using 30ms measure HJT with high precision lamp lifetime over 150K flashes
- Range of light intensity：200-1400W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.875-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜0.5%（A+）
- Non-uniformity of irradiance: ＜1%(A+ class at 1000W/m2)

SUN SIMULATOR A+A+A+ FOR LAB

(integrated with temperature Co-efficient Test)

TECHNICAL SPECIFICATIONS

- Repeatability error : ＜0.15% (STC , 100 times)
- Measurement range voltage : 1V, 10V, 50V, 100V, 200V
- Measurement range current : 0.25A, 1A, 5A, 12.5A, 20A
- Measurement resolution : voltage : 0.003%, current : 0.003%
- Pulse duration: 10ms – 100ms in step of 10ms
- Testing Mode :Linear Sweep & Non-Linear Sweep GSN,/GEM/ GMC
- Temperature Range: 25-75 degree
- Temperature Uniformity: ±1°C (50 minutes)
- Temperature Up rate: 1°C/min

SUN SIMULATOR
A+A+A+ for Perovskite Technology

ST-SUN-3A+P

TESTING FUNCTION

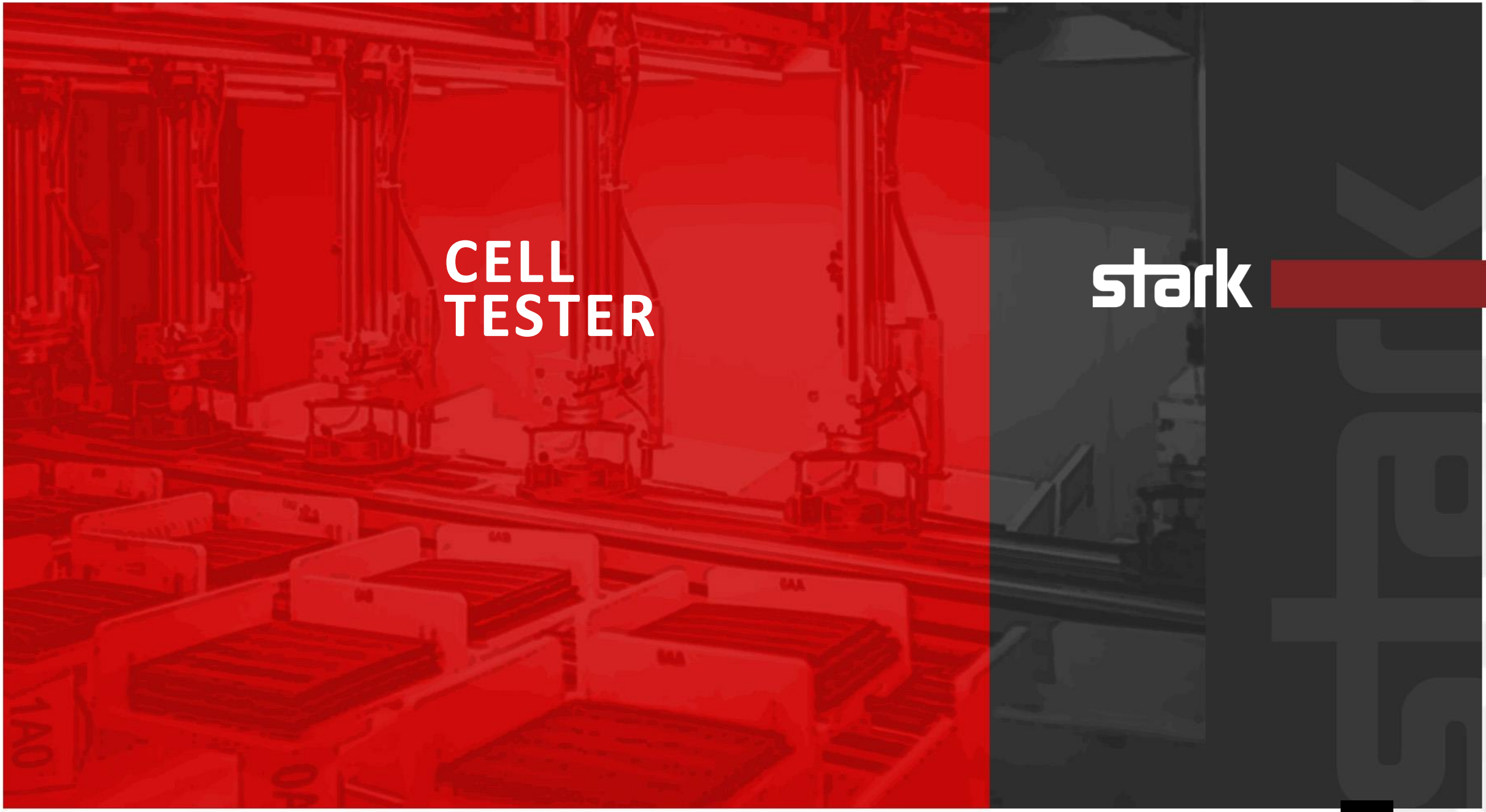
A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency **Perovskite, tandem**、 Topcon..... silicon and thin film solar cell module IV Testing

TECHNICAL SPECIFICATIONS

- Classification: A+A+A+
- Module Technology: Perovskite module
- illuminated area ： 10mm*10mm - 1800mm*2800mm
- Testing Mode: Steady State, Pulsed, Pre-Illumination, Pmax Trace, single wavelength control
- Pulse Duration: 10ms-100s
- Repeatability: 0.1%
- Lamp Lifetime: ≥40000h
- Range of light intensity ： 200-1200W/㎡
- Measurement Range: Voltage: -1-380V Current : 0.25-20A


CELL
TESTER
stark

SOLAR CELL TESTER

A+A+A+ (Xenon lamp Basis)

ST-CELL-3A+ X

TESTING FUNCTION

A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency Cell IV Testing, such as PERC, HJT, Thin film , Topcon..... all high efficiency and high capacitance solar cell

TECHNICAL SPECIFICATIONS

- Max. illuminated area：230*230
- Type of lamp: Xenon lamp
- Lamp Life time : 2000 K flashes
- Range of light intensity：200-1200W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.875-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜1%（A+）
- Non-uniformity of irradiance: ＜1%(A+ class at 1000W/m2)

SOLAR CELL TESTER

A+A+A+ (Xenon lamp Basis)

TECHNICAL SPECIFICATIONS

- Repeatability error： ＜0.10% (STC , 100 times)
- Measurement range::voltage 0- 10 Current 0-25A
- Measurement resolution：voltage：0.003%， current：0.003%
- Testing Mode :Linear Sweep & Non-Linear Sweep

SOLAR CELL TESTER

A+A+A+(LED Basis)

ST-CELL-3A+ L

TESTING FUNCTION

A+A+A+ , Top Class as per IEC 60904-9:2020, the latest international standards

INTRODUCTION

According to IEC 60904-9:2020 testing standard.
Especially designed for high Efficiency Cell IV Testing, such as PERC, HJT, Thin film , Topcon..... all high efficiency and high capacitance solar cell

TECHNICAL SPECIFICATIONS

- Max. illuminated area：240*240
- Type of lamp: LED
- Lamp Life time : 2YEARS
- Range of light intensity：200-1200W/㎡
- Spectrum wavelength: 300-1200nm
- Spectrum match: 0.95-1.125(A+ class at 1000W/m2)
- Irradiance Long term Instability （LTI）：＜0.5%（A+）
- Non-uniformity of irradiance: ＜2%(A+ class at 1000W/m2)

stark

ELECTRO LUMINESCENCE EL TESTER

ELECTRO LUMINESCENCE TESTER EL

ST -EL-01

TESTING FUNCTION

EL Tester according to IEC/TS 60904-13-2018

INTRODUCTION

An Electro-Luminescence (EL) tester for photovoltaic (PV) modules is used to evaluate the performance and detect defects in solar panels. It works by applying a reverse bias voltage to the PV cells, causing them to emit light. This light is then captured by a camera to create an image that reveals issues such as microcracks, cell degradation, ...

TECHNICAL SPECIFICATIONS

- Cycle time: 28S (C/V speed: 60CM/S; synchronizing)
- Cycle time for EL image capturing: single exposure + capture <-1.5s
- Cycle time for Cosmetic image capturing: single exposure + capture <=0.5s;
- Dimensions : L(1.80m) ×W(2.80m) × H(1.9m)
- Module format: mono/poly crystalline G-B/G-G module;
- Module format: cell: 156 – 160mm; Pattern: 6*10/6*12;
- Conveying orientation: long edge leading; Pass line height: 900mm;
- Image capturing: sunny-side down;
- Power: Peak 1.5KW; Rated: 0.8KW; 220V 50HZ;
- Air supply: 0.5 – 0.8MPA CDA; flow: 1.6L/MIN; Hose: Φ10mm;
- Working temperature: 20 – 30 degree Celsius;

ENVIRONMENTAL TESTERS

stark

UV PRECONDITIONING TEST

ST- UVP-15

TESTING STANDARD

It's according to IEC61215-2:2016 MQT 10 & IEC61730-2:2016 MST54 testing standard requirement .

INTRODUCTION

It's to precondition the PV module with ultra-violet (UV) radiation before the thermal cycle /humidity freeze tests to identify those materials and adhesive bonds that are susceptible to UV degradation

UV PRECONDITIONING TEST

TECHNICAL SPECIFICATIONS

- The Professional UVA, UVB optical fiber probe makes data acquisition more accurate
- Industrial touch screen operate and real-time monitor display UVA, UVB, when arrived the set value, it's will automatic stop.
- Fan cooling temperature control system, temperature sensor precise control testing sample surfacetemperature during the testing procedure, and real time display on the touch screen, promise thetesting temperature stable at 60C°±5C°
- Industrial Touch Screen + PLC Programmable Controller for Automatic Control of Temperature, Irradiation and Test Time

THERMAL CYCLING TEST / HUMIDITY FREEZE TEST

ST-TC-17

TESTING STANDARD

It's according to IEC61215-2:2016 MQT11, MQT12& IEC61730-2:2016 MST51, MST52 testing standardrequirement.

TECHNICAL SPECIFICATIONS

- It's according to IEC61215-2:2016 MQT11, MQT12& IEC61730-2:2016 MST51, MST52 testing standard requirement.
- Outer chamber material : Antirust steel plate + baking paint treatment.
- Insulation Material : High density hard PU foaming and glass insulation cotton, on the door withthe view window, the view window welding in the middle of the door, prevent moisture seepingin to the insulation.
- The chamber inner size : according to pv module size and quantity to decided
- Refrigerant : use the newest HFC environmental protection refrigerant.
- Refrigerant valve : automatic switch regulating refrigerant valve.
- The Temperature range: - 50 –100C°, and the temperature fluctuation ≤±1C°, the deviation ≤±1C°and the uniformity: ≤±1C°.
- Humidity range : 30 to 98%RH, the relative humidity deviation :±3%FS,deviation 85±2%RH; 90±2%RH, Humidity fluctuation :±2%RH, Humidity uniformity: ≤2%RH
- Load Capacity : 1000kg.
- Communicate interface: Ethernet_TCP/IP communicate interface and RS485
- Maximal speed rate of temperature: 100C°/h
- Testing cycle times: 200 (Can be freely set according customer needs)

DAMP HEAT TEST

ST-DH-18

TESTING STANDARD

It's according to IEC61215-2:2016 MQT13 & IEC61730-2:2016 MST53 testing standard requirement.

TECHNICAL SPECIFICATIONS

- Inner chamber material : SUS #304 high temperature resistant stainless steel plate
- Outer chamber material : Antirust steel plate + baking paint treatment
- Insulation Material : High density hard PU foaming and glass insulation cotton, on the door withthe view window, the view window welding in the middle of the door, prevent moisture seepingin to the insulation.
- The chamber inner size : according to pv module size and quantity to be decided
- The Temperature range : 20 –120C°, and the temperature fluctuation ≤±1C°, the deviation ≤±1C°and the uniformity : ≤±1C° ;
- Humidity range : 30 to 98%RH, the relative humidity deviation : ±3%FS, deviation 85±2%RH ; 90±2%RH, Humidity fluctuation : ±2%RH, humidity uniformity : ≤2%RH
- Load Capacity : 1000kg
- Communicate interface: Ethernet_TCP / IP communicate interface and RS485
- Damp heat testing: common moisture point : 85C°/85%RH, the sustainable time ≥1000H / 90C°/90%RH, the sustainable time ≥1000H
- The Electricity: 380V 50 HZ

CLIMATIC CHAMBER

ST-CH-01

TESTING STANDARD

It's according to IEC 61215-2:2016, IEC 61646 and UL 1703-2015

.

TECHNICAL SPECIFICATIONS

- Climatic chamber according to IEC 61215-2:2016, IEC 61646 and UL 1703-2015
- Temp Range: -50°C ~ +130°C
- Humidity Range: 10% ~ 95% RH
- Temp/humidity Constancy (On the heading of controller): ±0.3°C; ±2.5%RH
- Indication Resolution: ±0.01°C; ±0.01%RH
- Temperature Uniformity (at center): ±2.0°C
- Internal Dimensions (WHD): 120 x 236 x 170 cm
- Heat-up Time: from -40°C to 0°C - 200°C / H under ramp linear. From 0°C to +90°C - 100°C / H under ramp linear
- Pull-down Time: from 90°C to 0°C - 100°C / H under ramp linear. From 0°C to -40°C - 200°C / H under ramp linear
- Possibility to make it compliant for Salt Mist and Corrosion test as per IEC61701-2 and IEC 60068-2-52

SAND STORM CHAMBER

ST-SSC-01

TESTING STANDARD

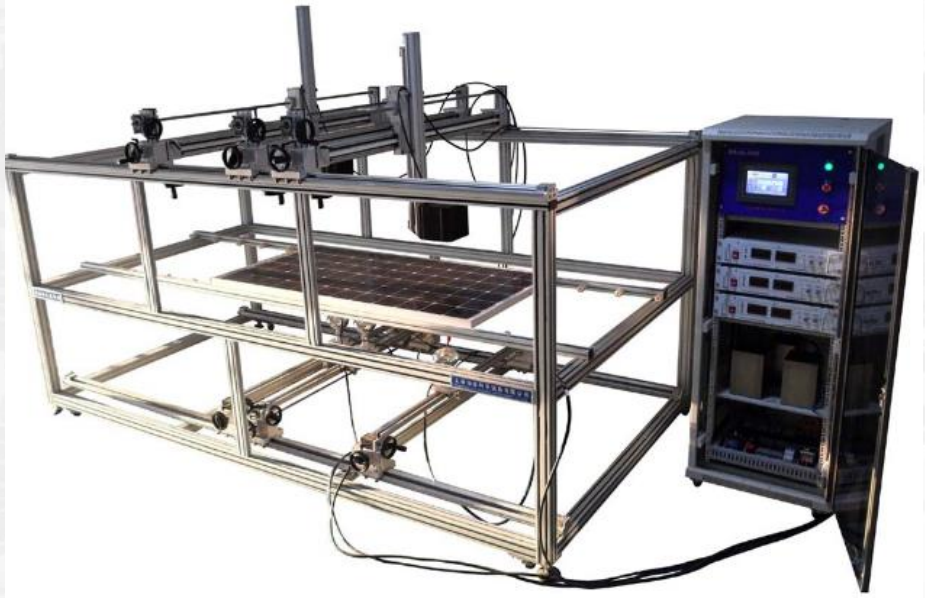
It's according EN 60068-2-68:1996-04 and MIL-STD-810G
.

TECHNICAL SPECIFICATIONS

- Sample dimensions: up to 2,5m x 1,2m or bigger
- Underground basement for the sand collection
- Adjustable rotation speed of the sample
- Adjustable sand flow and duration of the sand storm application

Hot Spot Endurance Tester

ST-HPE-01



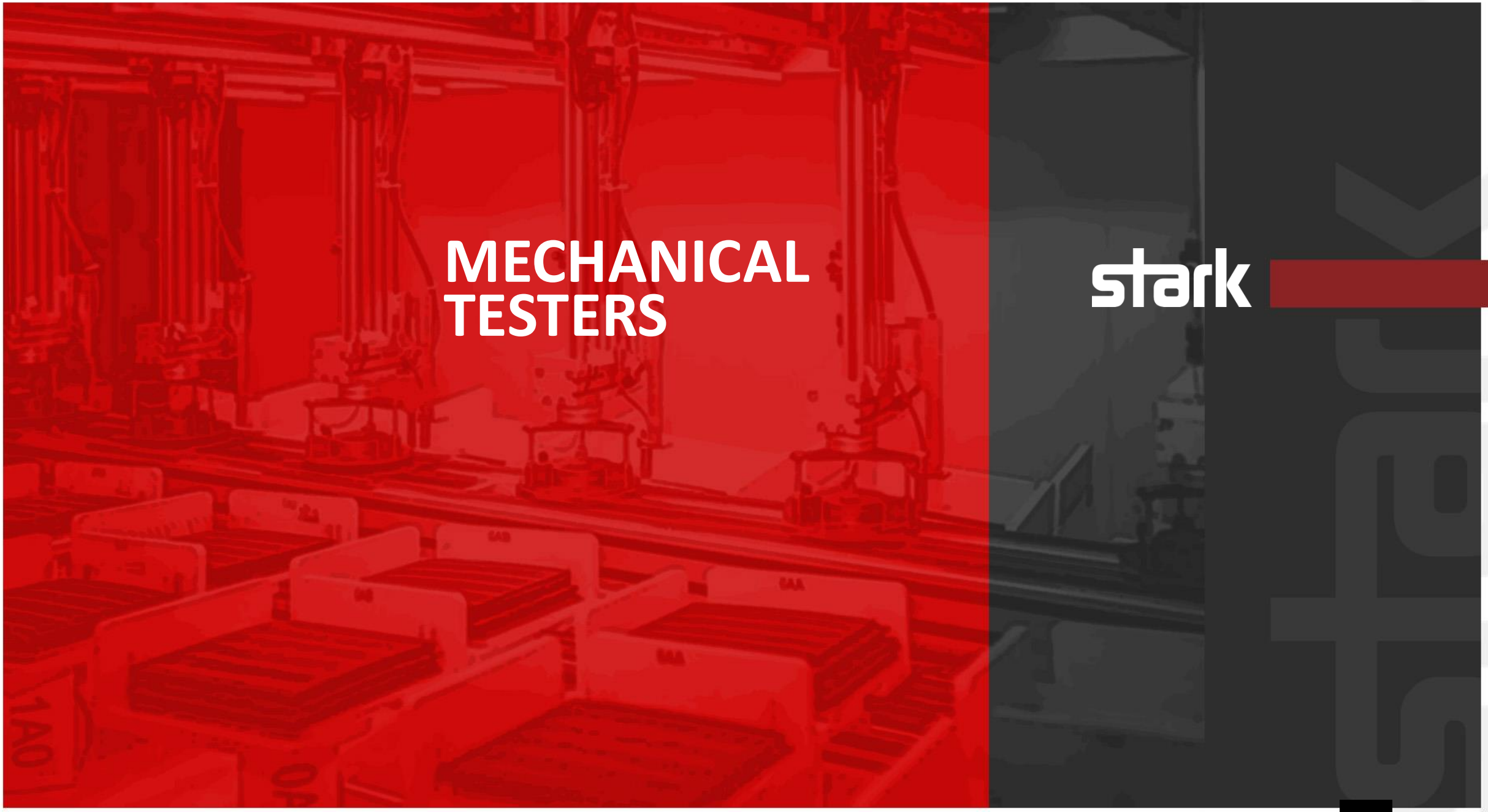
TESTING STANDARD

Implementation of standards: UL 1703-2008

FEATURES

- Light source: LED lamps, small calorific value, to avoid the cell temperature exceeds NOCT.
- 3 or 4 sets LED lamp, solved a technical problems of measuring cells in the same column.
- Transmission system: Light source horizontal and vertical displacement
- Radiation intensity: Electric lifting LED lamps, let Itest is the short-circuit current of anaverage cell at 100mW/cm2 and NOCT.
- Cell heating source: Infrared
- Program control: automatic completion 100 cycles

MECHANICAL TESTERS



ROBUSTNESS OF TERMINATIONS

ST-RT-13

TESTING STANDARD

It's according to IEC61215-2:2016 MQT 14 & IEC61730-2:2016 MST 42 etc testing standard requirement .

TESTING FUNCTION

- Cord anchorage pull testing
- Cord anchorage torsion testing
- Retention of junction box on mounting surface

TECHNICAL SPECIFICATIONS

- The material: Industrial aluminum profiles and metal plate baking finish
- The Machine table load capacity : 500kg
- The mass of the weight: 30N, 40N, 42N, 55N, 70N, 80N, 90N, 100N, 115N
- Timer : 1~100Sec
- Control ways : 7 inch color touch screen to control and display the testing value.
- The electric: 220 V 50HZ

STATIC & DYNAMIC MECHANICAL LOAD TEST

ST-SDM-08

TESTING STANDARD

According to IEC61215 MQT15 & IEC61730 MST17 testing standard requirement

PURPOSE

This test is to determine the ability of the module to withstand wind, snow, static or ice loads.

ADVANTAGES

- Dynamic & static integration, It's can satisfy the Dynamic load testing, and also satisfy the Static load testing
- The Static load mode : The positive load can realize +10000 Pa The reverse load can realize -10000 Pa
- Dynamic load mode: Dynamic load:2000 Pa, 2000 times, the dynamic load frequency: 3-10 cycle/min
- Cycle times : Free Setting by customer required
- Pressure control accurate : 5%

STATIC & DYNAMIC
MECHANICAL LOAD TEST

TECHNICAL SPECIFICATIONS

- The Testing machine's raw material : Aluminum profile structure metal plate+ baking finish (firm and Antirust)
- Can satisfy customer the maximum pv module size, (It's can adjustable, and suit for different solar panel's size testing)
- Pneumatic and force value feedback ways: low friction force cylinder, tensile pressure sensor (the accurate:0.1N)
- The cylinder quantity : according to customer's pv module size to rank
- The Cylinder telescopic stroke:≥300mm
- Sucker quantity : according to the customer's pv module size to rank
- The sucker diameter:120mm, Between the sucker center to sucker center distance ≤200mm sucker with the rotation function, the rotation angle≥15
- DC power supply : Can monitor and record the electric continuity and voltage of module during testing
- Temperature sensor : During testing, can monitoring the temperature of the pv module, the sensor accuracy: ±2,0 °C and repeatability of ±0,5 °C
- Infrared displacement sensor: Non-Contact Displacement Sensor For Module deflection Measurement should be up to 1000 mm
- Dynamic Load Frequency : 3 and 10 Cycle per minuets
- Testing cycle time setting : Can free setting
- Control ways : Computer control
- The testing data can automatic save and report export
- Real-time display the pv module's deformation, and drawing the force curve and pressure curve
- During testing, real-time monitor the current & voltage of Pv Modules
- When the deformation value exceeds setting value, the machine will automatic protection and stop

HAIL TEST

ST-HT-09

TESTING STANDARD

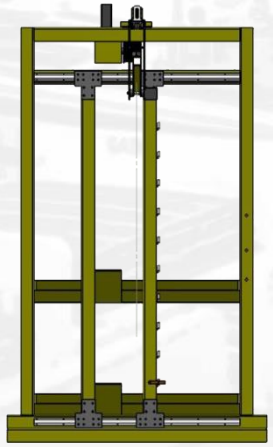
According to the sharp edge tester requirements specified in MST06 of the IEC 61730-2:2023 standard

TECHNICAL SPECIFICATIONS

- Testing module Size : according to customer pv module size requirement customized
- Module Mounting : Horizontal
- Type of Hail Tester : Vertically Launched
- Launcher Movement : Semi automatically (Traveling in X-Y direction automatically and can be adjusted manually with control unit).
- Between Velocity Sensor and PV Module distance : Maximum 1000mm
- X axis moving distance : according to customer pv module's size customized.
- Y axis moving distance : according to customer pv module's size customized.
- Launcher Velocity : 0m/s to 50 m/s (Adjustable)
- Barrel size : 25mm, 35mm, 45mm, 55mm, 65mm, 75mm
- Ice ball mould size : 25mm,35mm, 45mm, 55mm, 65mm, 75mm
- Guiding method : Use high precision Linear Bearing
- High precision Infrared speed sensor, the accurate : ±5%
- Control ways : Computer control
- The testing data can automatic save and report export.

MODULE BREAKAGE TEST

ST-MB-03



TESTING STANDARD

According to IEC61730 MST 32 testing standard requirement.

PURPOSE

This test is to provide confidence that risk of physical injuries can be minimized if the module is broken in its specified installation.

TESTING FRAME

- The structure frame raw materials: Steel channel (approx the width ≥100mm)
- The frame used welded or securely bolted at the cone to minimize twisting during impact
- It's use the bolted to the floor to prevent movement during impact testing
- The inner dimension of test frame:according to customer the maximum pv module size customize (It's adjustable, suit for different dimension of pv modules testing)
- The sample frame with the rubber bar and the thickness is 3mm, wide 15mm, hardness shore A50°, the steel channel size:360*100mm
- The sample frame with the rubber bar and the thickness is 3mm, wide 15mm, hardness shore A50°, the steel channel size:360*100mm

MODULE BREAKAGE TEST

IMPACTOR

- The exterior of the bag according to the standard use the wrapped with tape
- The inner filling diameter 2.5-3.0mm (the material is pellets or steel ball)
- The mass of impactor : 45.5 ± 0.5kg
- The ratio of widest diameter to height is between 1:1,5 to 1:1,4
  - Distance between the module surface and the bag : ≤13mm
  - Distance between the module center and the bag : ≤50mm

SAFETY FUNCTION

- With the safety protection frame
- Anti-secondary impact function

TESTING PARAMETERS

- Impact height : 300mm , 450mm, 600mm, 750mm, 900mm, 1200mm
- Impact height display accurate : 0.1mm
- Impactor rise ways : Automatic rise / Jog rise
- Release ways : arriving predetermined height, the cylinder automatic release
- Real-time display rise height
- The Remote control distance : ≤10m
- Touch screen control and display

PEEL TEST FOR PV MODULE EVA & BACKPLANE

ST-PEB-PV

TESTING STANDARD

According to IEC61730 MST35, MST36 Testing standard requirement

PURPOSE

It’s used for pv module’s backplane peel strength testing

ADVANTAGES

With 2 function : Peel test and lap shear tester , just only change the testing fixture.

PEEL TEST FOR PV MODULE EVA & BACKPLANE

TECHNICAL SPECIFICATIONS

- Type : three-dimensional peeling tester
- Accurate : 1 level (±1%)
- Forward and backward translation velocity : 50mm/min, can be set in the software
- Left and right translation velocity : 50mm/min, can be set in the software
- Clamp vertical tension speed : 50mm/min, can be set in the software
- Three-dimensional displacement : Horizontal(X axis) + Longitudinal (Y axis)+ Vertical (Z axis) (Cover module area)
  (X axis move distance : according to the customer pv module size customized, Y axis moving distance: according to the customer pv module size customized, Z axis move distance:0-150mm)
- X axis moving speed : 0-100mm/min, Y axis moving speed : 0-100mm/min, Z axis moving speed : 0-100mm/min
- Peeling testing angle : 90°±10° (0~90° , adjustable)
- Tension sensor range : 500N
  - Accuracy : +/-(0.2% FS+1 digit)
  - Overload capacity : 120% FS
  - Movement speed: 50±5mm/min, which can be Set in the operating software
  - Motor type : Servo motor
  - Analytic number of motor : 17-bit(160000p/rve)
  - Motor control signal : Pulse signal
- Included a set of computer
- Software with Chinese and English language, it can switch
- Connect to the printer, can print the testing report, report support World, Excel, PDF, JPG etc format
- Testing the maximum pv module dimension :according to the customer's pv module size customized (adjustable, suit for different testing module's
- dimension)
- Electricity: 220V 50HZ

Solar panel cell peel strength testing machine 12bb

ST-CPT-6201DAW

TECHNICAL SPECIFICATIONS

- 5kg the maximum testing force;
- tester Precision level: greater than 0.5;
- the range of testing force 0.2%—100%FS;
- relative force indication deviation ±1% within indication;
- test force resolution : 1 / ± 500000 maximum test force unchanged (resolution) ;
- relative deviation of displacement ±0.5% within indication;
- displacement resolution 0.001mm;
- the regulation range of force control rate:0.1-5%FS/S;
- the relative deviation of force control speed: within ±1% of set value;
- crossbeam speed adjusting range 0.05—3000mm/min;
- relative deviation of crossbeam speed: 1% within set value;
- constant force, constant deformation and constant displacement control range 0.5%--100%FS;

Solar panel cell peel strength testing machine 12bb

TECHNICAL SPECIFICATIONS

- constant force, constant deformation, constant displacement control precision: when set value <10%FS,it is within ±1% of the set value; when set value ≥10%FS, it is within ±0.1% of the set value;
- the maximum stretch stroke: 380mm;
- effective testing width:230*230mm;
- The battery clip clamp is applicable to 1-12bb batteries with various main grids, and can be applied to batteries of various sizes within 230mm * 230mm;
- console dimension：1000*550*950mm；
- power：220V 50Hz 0.4kW；
- console weight: about 140kg.

solar cell testing equipment 16bb

ST-C-6201DAWS

TECHNICAL SPECIFICATIONS of vertical photovoltaic modules:

- Maximum test force: 1000N;
- Accuracy grade of testing machine: 0.5;
- Test force measurement range: 2% - 100% FS;
- Relative error of test force indication: within ± 0.5% of indication;
- Test power resolution: 1 / ± 500000 of the maximum test power (the whole process resolution remains unchanged);
- Relative error of displacement indication: within ± 0.5% of the indication;
- Displacement resolution: 0.0005mm;
- Force control rate adjustment range: 0.01-2% FS / S;
- Relative error of force control rate: within ± 0.5% of the set value;
- Adjustment range of beam speed: 0.05-500mm/min;
- Relative error of beam speed: within 0.5% of the set value;
- Control range of constant force, constant deformation and constant displacement: 0.5% - 100% FS;
- Control accuracy of constant force, constant deformation and constant displacement: when the set value is less than 10% FS, it is within ± 1% of the set value; When the set value is ≥ 10% FS, it is within ± 0.1% of the set value;
- Maximum stretching stroke (excluding fixture): 680mm;
- Effective stretching space (clear space): 550mm;
- Effective test width: 150 * 150mm;
- Overall dimension of main engine (length) × wide × Height): about 1600 × six hundred and fifty × 1750mm ;
- Power supply: 220V 50Hz 0.4KW;
- Host weight: About 150kg.

Bench-top Servo PV cell tension testing machine16bb

ST-C-6201DMX

TECHNICAL SPECIFICATIONS

- 50N and 2kN the maximum testing force;
- tester Precision level: greater than 0.5;
- the range of testing force 0.2%—100%FS;
- elative force indication deviation ±1% within indication;
- test force resolution ： 1 /± 500000 maximum test force unchanged (resolution) ;
- relative deviation of displacement ±0.5% within indication
- displacement resolution 0.003mm;
- the regulation range of force control rate:0.1-5%FS/S;
- the relative deviation of force control speed: within ±1% of set value;
- crossbeam speed adjusting range 0.05—500mm/min;
- relative deviation of crossbeam speed: 1% within set value;
- constant force, constant deformation and constant displacement control range 0.5%--100%FS;
- constant force, constant deformation, constant displacement control precision: when set value <10%FS,it is within ±1% of the set value; when set value ≥10%FS, it is within ±0.1% of the set value;
- the maximum stretch stroke: 1100mm;
- effective stretching space (net space):650mm;
- effective testing width:420*420mm
- console dimension ： 840*500*1650mm ;
- power ： 220V 50Hz 0.4kW ;
- console weight: about 180kg

CUT SUSCEPTIBILITY TEST

ST-CST-01

TESTING STANDARD

According to IEC61730 MST 12 testing standard requirement

PURPOSE

To determine whether any front and rear surfaces of the PV module made of polymeric materials are capable of withstanding routine handling during installation and maintenance without exposing personnel to the danger of elec- tric shock.

CUT SUSCEPTIBILITY TEST

TEST STAND FRAME

- The raw materials: Industry Aluminum profile (Firm and Antirust)
- The testing standard dimension : According to the customer the maximum pv module's size to customized (adjustable, suit for different pv modules dimension)
- Included the Tracking pulley wheel

TESTING FIXTURE

- The blade raw material : Use adopt carbon steel blade
- The steel blade thickness : 0.64mm±0.05mm (It's suffficiently rigid as not to be bend sideways during the test)
- The top angle of steel blade : 90±2° ,the blade horizontal angel:140°and with rounded with radius 0.115mm±0.025mm
- The blade supply the force : 8.9N±0.5N
- The testing fixture figure as below :

TESTING PARAMETERS

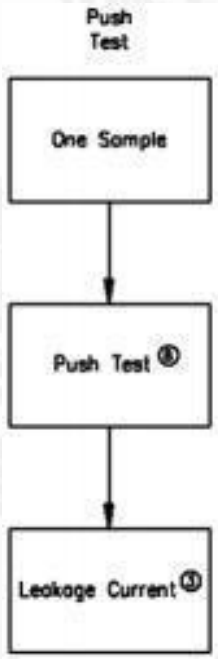
- Use motor constant speed tracking, speed can be set, tracking directing be can adjustable
- The test fixture speed:150±30mm/s
- Control ways and display ways : Touch screen
- Electricity: 1 Phase 220V 50HZ

Push Tester

ST-PH-01

TESTING STANDARD

Perform standards: UL 1703-2018, UL 746C-2004



Push Tester

Test procedure and pass criteria:

- A module back and front shall be capable of withstanding for 1 min. without creating a risk offire, electric shock, or injury to persons.
- A risk of fire is considered to exist, if, as a result of the application of either probe, parts ofthe module are displaced to the extent that arcing between parts of available current and voltage in the “Arc test” zone, Figure 40.1, is likely.
- A risk of electric shock is considered to exist if:
- A part involving a risk of electric shock is contacted by the applied probe;
- A part involving a risk of electric shock is rendered accessible (transitory or permanent) as a result of the application of either probe; or
- There is a reduction in resistance between a part involving a risk of electric shock and an accessible part such that the module or panel would not comply with the leakage current test, section 21.
- A risk of injury to persons is considered to exist, if, as a result of the application of either probe, parts are displaced or broken so as to expose edges which would not complywith the requirements for sharp edges in 6.9.

SHARP EDGE TEST

ST-SE-M002

TESTING STANDARD

According to the sharp edge tester requirements specified in MST06 of the IEC 61730-2:2023 standard

ADVANTAGES

- Adjustable angle with portable device
- Working pressure and tension can be displayed
- Mandrel can rotate 360°
- The pressure applied to the mandrel remains constant and stable

TECHNICAL SPECIFICATIONS

- Mandrel surface roughness:Ra≤0.40μm
- Rockwell hardness of mandrel surface: >40
- Mandrel diameter : 12.7±0.12mm
- Mandrel rotation speed : 23±4mm/s
- Mandrel pressure : 6.672±0.133 N
- Mandrel rotation scope : 360°
- Indicating tape : vinyl foam tape, single-adhesive coated, black in color, 19.1 (± 0.2) mm, Thickness h,14 to 2,03mm, Density 400 to 433kg/m3
- Sensing tape No. 2 : vinyl foam tape, double-adhesive coated, white in color, 19.1 (± 0.2) mm, Thickness 0.64 to 1.02mm, Density 224 to 321kg/m3
- Sensing tape No. 1 : PTFE (Polytetrafluoroethylene) tape, Total with adhesive backing : 0.114mm, Backing only: 0.064mm-0.089mm
- Dimension : 265*121*190mm
- Weight : 2.8kg

BENDING TESTER

ST-BT-01

TESTING STANDARD

Meets the bending test requirements specified in clause 4.22 (MQT22) of the IEC 61215-2:2021 standard.

ADVANTAGES

- Using a touch screen device, it is to control the device and record data.
- Rotation speed can be set.
- Cycle time can be set.

TECHNICAL SPECIFICATIONS

- Module size: According to the customer requirement.
- The machine dimension : according to the customer pv module size customize.
- Material : Aluminum profile
- Motor: ≤1°/min.
- Voltage range: 0-100V
- Voltage resolution: 0.1V
- Voltage accuracy: ±1.5%
- Current range: 0-1A
- Current resolution: 0.001A
- Current accuracy: ±1.5%
- Temperature sensor :
  - Temperature range: 0-100°C
  - Temperature accuracy: ≤±2°C
  - Temperature repeatability: ≤±0.5°C
  - Temperature Resolution: 0.1°C

DURABILITY OF MARKINGS TESTER

ST-DMT-01

TESTING STANDARD

It's conform the durability of markings tester requirements specified in MST05 clause of the IEC61730-2:2022 standard.

PURPOSE

This tester is suitable for the surface and printing surface friction-reistance life test of all products, it has the speed and stroke adjusted function during the test for easier adjustment, it can display the test speed and set the test frequencies.

TECHNICAL SPECIFICATIONS

- The max.load : 5kgf
- Moving range : 10-100mm
- Test load: 80~1000gf
- Test material : Rubber eraser
- Rubbing station : 2
- Rubbing distance : 10-100mm
- Rubbing cycle : 1-10000
- The mass of load weight : ≤1025g (25g(±0.5g), 50g(±0.5g), 100g(±0.5g), 200g(±0.5g), 500g(±1g))
- Rubbing frequency : 1-120cycle/min
- The exterior dimension approx : 640×400×320mm
- Weight : 40kg
- Electricity: AC 220V 50HZ

SCREW CONNECTIONS TESTER

ST-STGS

TESTING STANDARD

the screw connections tester requirements specified in MST33 of the IEC 61730- 2:2023 standard.

TECHNICAL SPECIFICATIONS

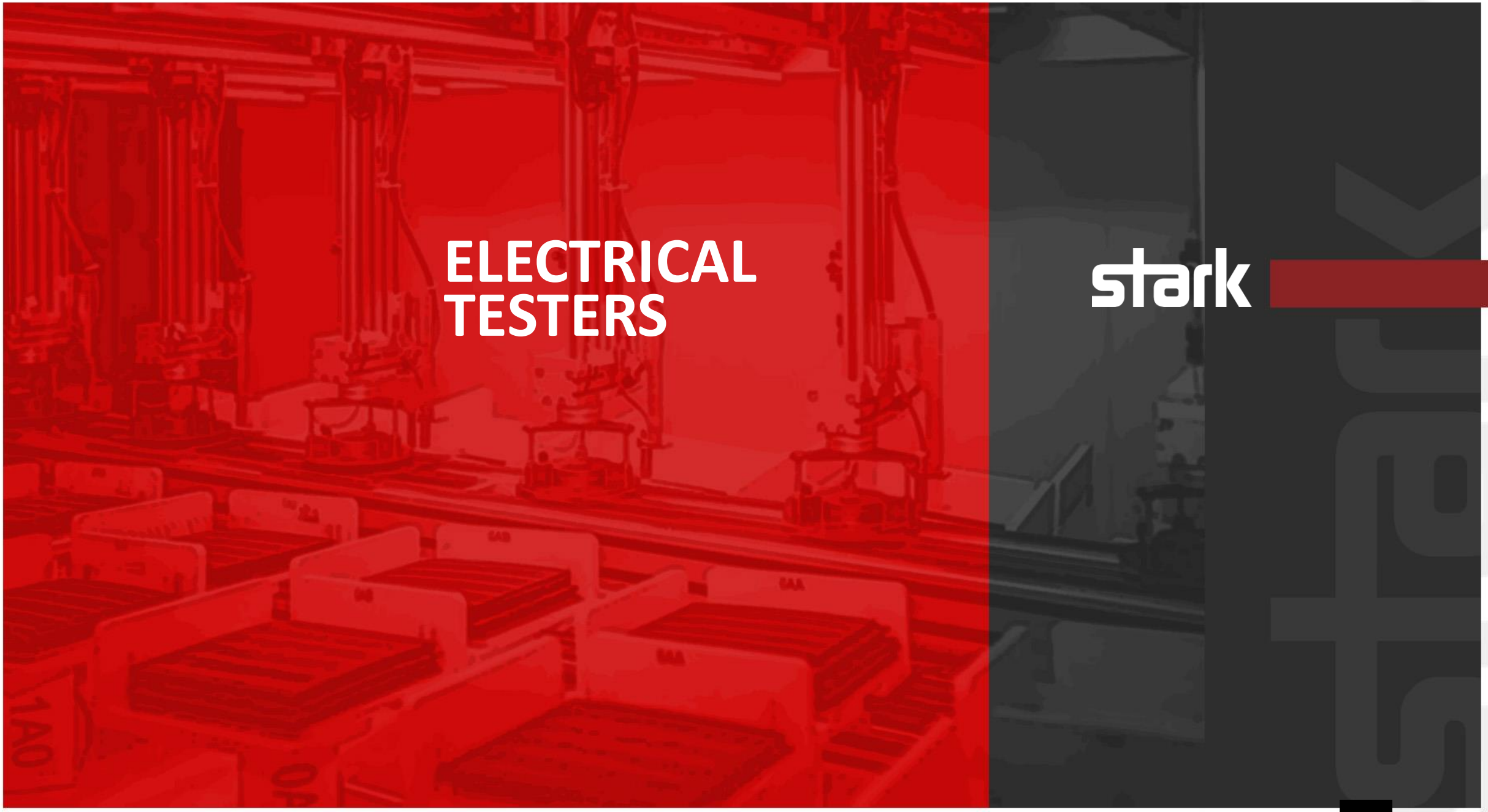
- Available for various screw structures and materials.
- Can be used clockwise or counter clockwise.
- Keep hold and follow mode, setting value controllable, 50 data storage

- **Torque meter 1**
  - Torque range: 0.3 to 6 N m
  - Resolution: 0.001 N m
  - CW Accuracy: ±3%
  - CW Accuracy: ±4%

- **Torque meter 2**
  - Torque range: 1.5~30N m
  - Resolution : 0.01 N m
  - CW Accuracy: ±3%
  - CW Accuracy: ±4%

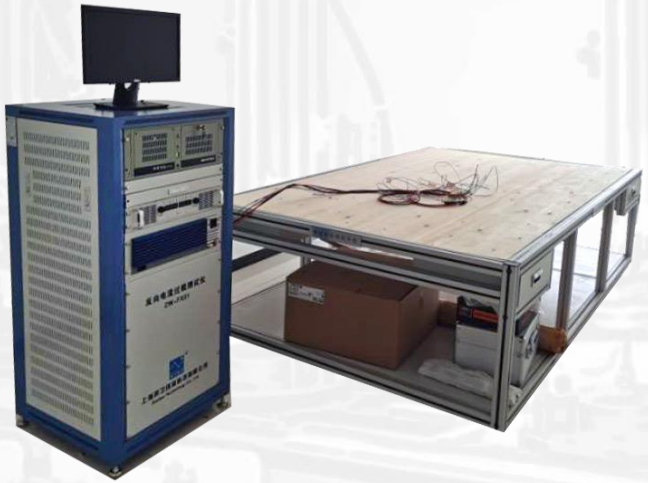
- **Torque meter 3**
  - Torque range: 6.8 to 135 N m
  - Resolution: 0.1 N m
  - CW Accuracy: ±3%
  - CW Accuracy: ±4%

ELECTRICAL TESTERS



REVERSE CURRENT OVERLOAD TESTER

ST-RCO-27



TESTING STANDARD

The equipment is designed to test the reverse current overload according to MST26 in the IEC61730

TECHNICAL PARAMETERS

Power supply :

- Voltage range: 0-100V;
- Resolution: 0.1V
- Accuracy: 1%;
- Current range: 0-60A;
- Resolution 0.1A
- Accuracy: 1%;

Wooden panel :

- Thickness : 9mm;
- Thermal conductivity : ≤0.5 W/(m·K)
- Size : According to the customer's pv module size customized;

Tissue paper :

- Density: 12 g/m2 to 30 g/m2
- Color: White

PID TESTER

ST-PID-01

TESTING STANDARD

According to IEC 61215 MQT21, IEC62804

FUNCTION FEATURES

- Module frames all along connect ground, and simulate actual situation, in order to prevent during the testing because of frame high voltage to cause potential danger
- Multi-modules meanwhile test, voltage can be adjusted continuously, voltage parameter real-time display, alarm: parameters are independent set
- Multi-current meanwhile display, alarm parameters are set separately
- Arc free conversion of positive power supply and negative power supply, simulate system's positive or negative grounding
- Voltage range:-2000V ~0V/0~+2000V
- Rated current : 1mA
- Source effect : ≦0.2%
- time error : ≦0.3%/h
- Temperature error : ≦0.5%/°C
- Ripple wave : ≦0.5%
- Alarm setting time : 1~1000uA/-1000~-1uA
- Test time : 0~168h
- Insulation resistance : 1~1000MΩ
- Testing module quantity : According to customer requirement customized
- Electric : 220V 50HZ
- Power approx : 1000W
- Weight : 12kg

CURRENT CONTINUITY MONITORING TESTER

ST-CCM-PD09

TESTING STANDARD

It's according to the IEC61215 testing standard requirement.

INTRODUCTION

Through temperature control DC power start, regarding the multi channel current, multi channel temperature long time real time monitor, with the high and low temperature combined use , Can monitor the internal circuit continuity of multiple modules, to determine fatigue resistance, rationality of lamination process, and stability of welding quality of solar pv modules under the high temperature and low temperature alternating environments.

ADDITIONAL ILLUSTRATE

- For internal circuit conductivity, above 25C° apply Imp current, through temperature control current's On/Off situation
- Can apply 1% Isc current for pv modules, through temperature control current On/Off;
- Between -40~80°C rise temperature stage, the module internal apply Imp current, at others stage, the module internal less than 1%Isc power.

TECHNICAL SPECIFICATIONS

- The voltage range:0-100V
- Voltage Precision:±1%
- Source voltage regulation rate: ≦0.2%
- Time error : ≦0.3%/h
- Load regulation rate : voltage stabilization ≤1%; current stabilization ≤2%
- Working environment : 10~45°C
- Current range:0-15A
- Current Precision : ±1%

Impulse Generator

ST-IG-20-100

TESTING STANDARD

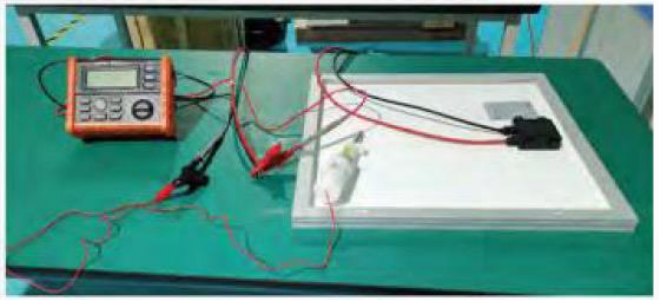
HV-Pulse Generator for iimpulse voltage tests of Solar Modules according to IEC 61730-2:2016

FEATURES

Voltage: 0.8 – 20 kV or more
Waveform: 1.2 / 50 µs
Range of EUT capacitances: 10 nF – 183 nF
Maximum stored energy Cs: 100J
Charging time for max. charging voltage: approx. 10s
Interior load capacitance Cp: 10 nF (± 10%)

ACCESSIBILITY TESTER

ST-AF-01



TESTING STANDARD

Meets accessibility test requirements specified in clause 10.9 MST 11 of the IEC 61730-2:2023 standard and IEC 61032:1997 type 11 figure 7.

TECHNICAL SPECIFICATIONS

- Test the strength of junction boxes through pressure testing
- Measure the resistance value to check if the current flows normally through the wire
- Pressure and resistance values are recorded by data logger
- Voltage of the ohmmeter : 50V
- Resistance range: 0.01MΩ~50MΩ
- Resistance accuracy : 1%
- Test finger: Type 11 of IEC61032
- Pressure : 10N
- Press resolution : 0.1N

BYPASS DIODE TEST/ BYPASS DIODE FUNCTIONALITY TEST

ST-BDF-26

TESTING STANDARD

It's according to IEC61215 MQT18 testing standard requirement

PURPOSE

It's simulate under the STC situation current, monitor junction box surface temperature , monitor diode current and the both end of diode voltage drop, linear fitting diode voltage drop and relative curve of temperature, automatic calculation diode's junction temperature.

FUNCTION & FEATURES

- Modular design can realize automatic and manual testing, support multichannel diode and temperature collection
- Real time monitor testing time, junction box surface temperature (1 channel), diode current, diode voltage etc data;
- Can display all data curve : 30C°, 50C°, 70C°, 90C° temperature curve display under the same coordinate system, corresponding under 30C°, 50C°,70C°, 90C° temperature impulse power trigger time section and current curve show the same coordinate system;
- Based on the testing data use the minimum two multiplicative fitting curve to get the VD against TJ feature, software show this curve, in the curve can display every temperature collection corresponding voltage value, automatic calculation diode junction temperature , and will fitting equation show on the interface;
- For the program control power working time interval's temperature curve show the same coordinate system, corresponding current and voltage display under the same coordinate system
- All the data can export as Excel, curve of figure formal export, convenient data handle and analysis.

BYPASS DIODE TEST/ BYPASS DIODE FUNCTIONALITY TEST

TECHNICAL SPECIFICATIONS

Impulse power (RS-485)
- Testing range : 0-20V
- Testing accurate : 2%
- Resolution : 0.01V
- Impulse width≤1ms
- Testing accurate : 1%
- Resolution : 0.01A

Program control power (RS-485)
- Testing range : 0-20V
- Testing accurate : 2%
- Resolution : 0.1V
- Testing range : 0-25A
- Testing accurate : 2%
- Resolution : 0.01A

Themocouple (Temperature collection)
- Testing range : 0-300C°
- K type temperature collection (4CH)
- Testing accurate : ±1C°
- Resolution : 0.1C°

Temperature collection
- • Support RS 485 communicated, support J, K, T,E, R, S and B type thermocouple input
- 16 bit resolution
- 8 channel different input
- T/C software configuration , low voltage current input
- Insulation voltage : 3000Vdc
- Support modus/TRU control
- Support 4-20mA

Data acquisition card
- Support 32 bot 5 V PCI total line
- 12 bit A/D resolution
- Channel automatic scan function select
- 16 channel single terminal simulate input
- Sampling rate the highest 1MS/s
- Board loading 1K sampling point A/D FIFO
- Bipolar simulate input range:+/-10V, +/-5V, +/-2.5V, +/-1.25V, +/-0.65V

High temperature chamber
- Inner chamber size (L*W*H) : 500*450*500mm;
- Temperature range : 10~100C°
- Temperature uniformity : ≤2.0C°
- Temperature fluctuation : ≤1.0C°
- Temperature deviation : ≤2.0C°
- Calibration reference point : 30C°, 50C°, 80C°, 100C°, 120C°, 150C° (deviation ±2C° repeat testing accurate: ±0.5C°)

SAFTY TESTERS

stark

WET LEAKAGE CURRENT TEST

ST-WLC-07

TESTING STANDARD

According to IEC61215 MQT15 & IEC61730 MST17 testing standard requirement

PURPOSE

It's to evaluate the insulation of the module under wet operating conditions and verify that moisture from rain ,fog, dew or melted snow does not enter the active parts of the module circuitry, where it might cause corrosion, a ground fault or a safety hazard.

WET LEAKAGE CURRENT TEST

TECHNICAL SPECIFICATIONS

- The water tank size : according to the customer the maximum pv module size to customized, the water tank thickness : 15mm, material : resistance insulation and corrosion PP
- Temperature control : temperature keep : 22±3C°
- Liquid resistivity : less than 3500Ω·cm
- DC withstand voltage testing
- Output voltage range : 500-10KV
- Output voltage accurate : +/-(3% set value+5V)
- Output voltage resolution : 10V
- Output the maximum rated power:36VA (6000V 6mA)
- Output voltage stability : +/-(1% set value+5V)
- Voltage display(DC)
- Measure range : 0.01mA-5.000mA
- Display resolution : 0.001mA
- Measure accurate : +/-(1% set value+2 word)
- Insulation voltage range:500-200V (Uncertainty : 3%)

Voltage Insulation Tester

ST-VIT-01

IEC 61215-2:2019 © IEC 2019 – 15 –

Table 1 – Voltage Stress Levels

Module Class	Are Cemented Joints Present?	One-Minute Preconditioning V_{Test1} (Volts)	Two-Minute Stress for Measuring Insulation Resistance, V_{Test2} (Volts)
0	No	1000 + 2 x V_{sys}	Greater of 500 or V_{sys}
II	No	2000 + 4 x V_{sys}	Greater of 500 or V_{sys}
III	No	500	500
0	Yes	1,35 x (1000 + 2 x V_{sys})	Greater of 500 or V_{sys}
II	Yes	1,35 x (2000 + 4 x V_{sys})	Greater of 500 or V_{sys}
III	Yes	1,35 x (500)	500

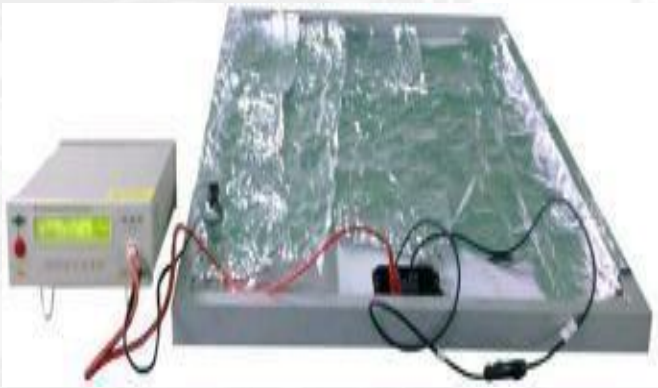
TESTING STANDARD

IEC 61215-2:2021, IEC 61730-2:2021(draft), UL 1703-2018...

PURPOSE

- PV voltage insulation tests are crucial for ensuring the safety, reliability, and performance of photovoltaic (PV) systems.

Voltage Insulation Test



- **Voltage Test**
  DC: 0.00~12.000KV, AC: 0.00~6.000KV
  Stability: ±(1%+5V) Resolution: 1Volts/Step
  Precision: ±(1%+5V)@voltage≥1.000KV
  ±(2%+5V)@voltage<1.000KV
- **Leakage Current Test**
  DC: 0.000~5.00mA AC: 0.000~12.00mA
  Set range: DC:0.001~5.000mA AC:0.01~12.00mA
  Resolution: DC:0.001mA/step AC:0.01mA/Setp
- **Insulation Resistance Output Voltage**
  Voltage: 250V~2500V Accuracy: ±(2%+5V)
- **Insulation Resistance Set**
  5MΩ~49999MΩ Resolution: 1MΩ/Step
- **Insulation Resistance**
  Measure Range: 5MΩ~99GΩ
  Accuracy: ±5%@1MΩ~1000MΩ, ±10%@1000MΩ~50GΩ
- **Other**
  Timer: 0.1~999.9s, 0=continuous Resolution: 0.1s Precision: ±1% Memory: 20 group
  Test Step: 8 steps
  Test failure mode: Buzzer (opening / closing can be set), indicating lamp, display Input characteristics: Single phase, 50Hz, 220V/AC±10%

FIRE TESTER

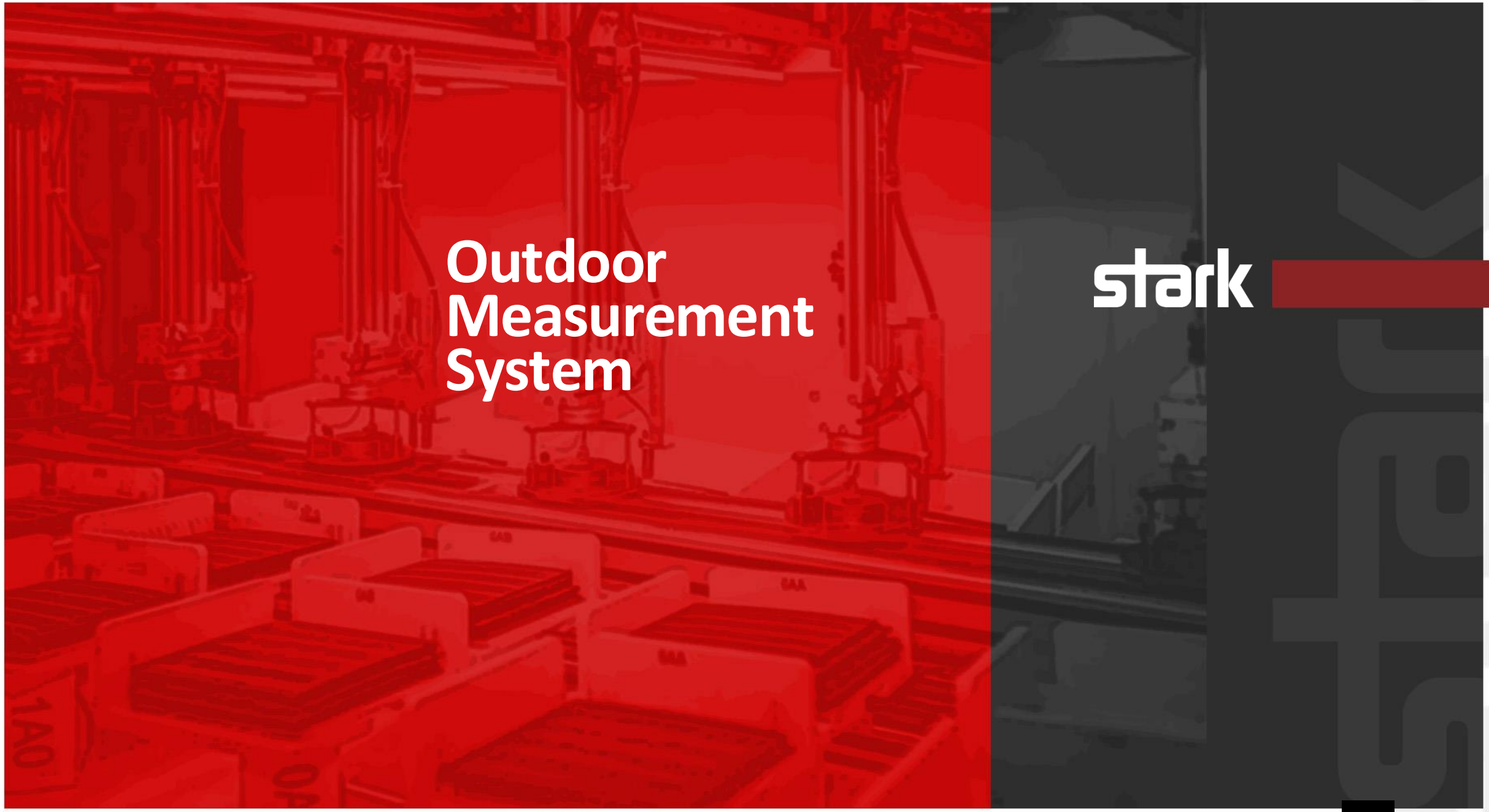
ST-FT-01

TESTING STANDARD

Spread of flame test and burning brand test according to IEC 61730-2:2016, UL 1703-2015, UL 790-2004, ENV 1187:2006, EN 13501-5:2006, ISO 9705-1993, ISO 834-1:1999, ISO 834-3:1994, ISO 5657:1997

TEST

Burner 330 kW with capacity to heat at (704 ± 28) ·C
Wind tunnel adjustable and maintain at 316.8 ± 13.2 m/min.
Temperature measuring point
Velocity measuring point



Outdoor Measurement System

stark

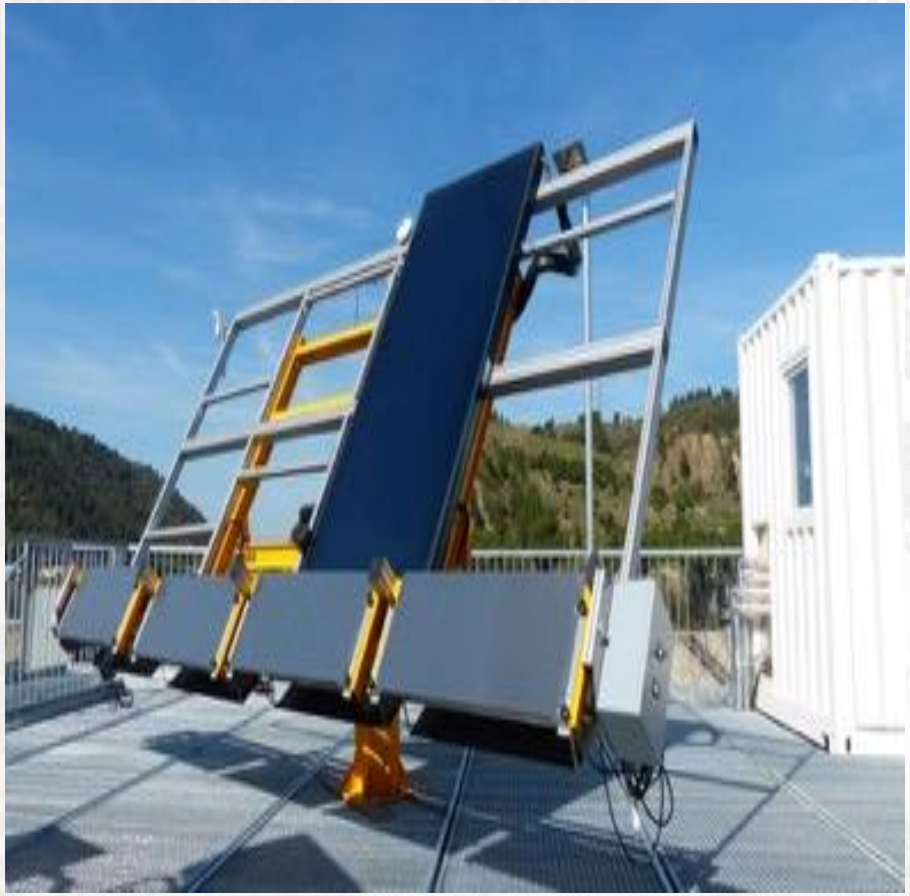
Outdoor Angle Incidence tester

ST-OAI-PV

TESTING STANDARD

Dual automatic sun tracker set for IEC 61853-2 (10 square meter dual-axis automatic sun tracking bracket system, including GPS + time control + light control controller;

Outdoor Angle Incidence tester



TECHNICAL SPECIFICATIONS

- 10 square meter dual-axis automatic sun tracking bracket system, including GPS + time control + light control controller; each tracking bracket system is designed to carry 4 pieces of crystal silicon components with a size of 1960mm*990mm*50mm, Range from − 90° to + 90°)
- Pyranometer (Accuracy : 5%, Sensitivity: 7~14μV/W·m2; Time response: ≤8s (99%), Stability: ±2%; Cosine: ≤±5%, Spectrum range: 0.27~3.0μm; Test range: 0~2000W/m2)
- UV radiometer IR-UV (Sensitivity: <100μV/W·m2; Time response: ≤8s; Stability: ±2%; Cosine: ≤10%; Spectrum Range: 280~400nm)
- Mmechanical Anemometer (Test range: 0~60m/s; Accuracy: ±0.2m/s; Resolution: 0.01m/s, Wind direction (0-359°) Resolution, +/- 1°sensitivity:1°)
- Panel temperature sensor (Test accuracy:±0.5°C, Responsetime:0.5s)
- Pitch angle sensor (50Hz refresh rate, 10Hz frequency response; ±0.07°accuracy @-15~50°C; ±0.2% horizontal exis error Range :− 90° to + 90°) Sun incidence angle tracker (using microcomputer control technology, automatic tracking of 2D angle; tracking accuracy: 4 hours less than ±0.5°; horizontal running angle (sun azimuth): 0~270°; Accuracy : ±1°sensitivity:1° vertical adjustment angle (sun declination): -45°~+45°, Accuracy : ±1°sensitivity:1°)
- Pyranometer
- Pyrheliometer (Accuracy : 3% Spectrum range : 300-3000nm Sensitivity: 7~14μV/W·m2; Time response: ≤15s (99%); Accuracy: < ±1%; Stability: ±1%)
- Mechanical anemometer
- Reference cell
- Data acquisition software control, analog data acquisition (16-bit)
- Thermocouple temperature acquisition
- Tracker manual control (pitch angle control)
- 6 Channels panel Isc test (Accuracy of ±0.2 %, Operating temperature :-25°C~ +70°C)

Incidence angle automatic positioning

ST-AOAI-PV

...

- **Incidence angle automatic positioning device** (IEC 61853- 2) For IEC 61853-2:2016 energy rating – Incidence angle and module operating temperature measurements
  Deflection angle: -80 ~+80°(software control)
  Deflection accuracy: + 1°

- **Micro-inverter for maximum power point tracking (MPPT)**
  Voltage and power: 22~60V, 60~130V, 130~250V, 600W*1/300W*2
  For stabilization, outdoor exposure, NMOT, temperature test...

- **Initial Stabilization (Pre-exposure test /LID)**
  - Irradiance cumulative dose: 5/10/60KW ·h/m²or software setting
    Valid data collection(1h): 800~1000W·m-2@50±10°C (module temperature)
  - Software just tells users if test is complete...

- **Measurement of temperature coefficients**
  Automatic calculation component 3 or 4 points average temperature (IEC 61853 and IEC 60891) Temperature rising process, automatic fitting curve, automatic calculation of relative and absolute temperature coefficient.

- **Hot-spot endurance test**
  - Valid data collection (1h): 900~1100W·m-2@50±10°C (module temperature)
  - Current measurement in different shadowing area.
  - Current measurement integrated in the system, automatic identification and screening effective Isc (Crystalline silicon cell for Imp and thin-film cell 99% Imp)
  - Cells shaded plates can satisfy the 0~100% within 5% increasing or decreasing.

NMOT Measurement

ST-NMOT-01

TESTING STANDARD

Perform standards:
IEC 61215-2:2021, IEC 61730-2:2021(draft), IEC 61853-1/-2/-3/-4, UL 1703-2018 ...
Preconditioning, Maximum power determination, Measurement of temperature coefficients, NMOT, Outdoor exposure test, Hot-spot endurance test, Light-soaking, Temperature test...

- **NMOT**

  NMOT test modules shall be positioned so that they are tilted at 37°±5°to the horizontal with the front side pointed toward the equator. The bottom edge of the test modules shall be 0.6 m or more above the local horizontal plane or ground level.
  Wind speed and wind direction Instrument installed approximately 0.7 m above the top of the modules and 1.2 m to the east or west.

- **NMOT Measurement**

  Mechanical Wind/ Direction Sensor: Alternate

  Software features: automated data collection and storage, not counting the invalid data, automatic calculation of junction temperature.
  Automatic fitting temperature (TJTamb) - irradiance curve, based on standard deviation selected out of 10 effective data, and optimize the curve.
  Irradiance, temperature, wind speed and direction automatic data collection, without invalid data, automatic calculation cell initial and final NOCT temperature.

Temperature Measurement

ST-TM-01

TESTING STANDARD

Perform standards:
IEC 61215-2:2021, IEC 61730-2:2021(draft), IEC 61853-1/-2/-3/-4, UL 1703-2018 ...
Preconditioning, Maximum power determination, Measurement of temperature coefficients, NMOT, Outdoor exposure test, Hot-spot endurance test, Light-soaking, Temperature test...

- **Temperature test** for IEC 61730 & UL 1703 also in here carry out. We provide 19mm thick wood (current standard) or a thermal insulation with a k factor ≤0.24W/m2K (IEC 61730 Ed.2) black painted wooden platform, the platform is to extend at least 0.6m beyond the module on all sides, can fast loading.

16-channel temperature sensor: Uncertainty 1°C or better
Automated calculation 40°C and 1000W·m-2 normalized temperature.

Testing the temperature of different position in a module, and then judging the module Ok or False.
Wood 19mm±5% thick
Automated calculation 40°C and 1000W·m-2 normalised temperature.

Testing the temperature of different position in a module, and then judging the module Ok or False.

main test Point:

Front glass above center cell, Backsheet behind center cell, Ambient air within J-box, J-box inside surface, Back face sheet beneath J-box, Module output leads, sealing compound around lamination (on the corner), Sealing compound inside junction box, Diode #1~6 case, Frame, Ambient (Absolute)

Electronic load and I-V measurement system

ST-IVM-01

...

- **Electronic load and I-V measurement system**
- Speed I-V sweep:10ms~1000ms (arbitrary setting) Constant speed sweep: 10~20ms
- Multi-sections variable speed sweep: 10~100~1000s or software settings
- Voltage measure accuracy: ±(0.025+0.05%F.S.)
- Current measure accuracy: ±(0.05+0.05%F.S.)
- Power measure accuracy: ±(0.2+0.2%F.S.)
- Rated power: 750W (500V/30A or 120V/60A)
- Irradiance measurement:
  - by standard cell (I-V sweep) and total radiation meter (exposure)
- Three modes of I-V measurement:
  - Single channel single measurement for maximum power determination
  - Single channel repeat measurement for temperature coefficients
  - Multichannel cycle measurement for outdoor array
- Automatically generating and storing I-V-P curve
- Temperature measurement precision: ±0.5°C
- Irradiance measurement precision: ±2% at 1000W/m2
- Wind speed measurement range: over 0.25m/s
  - (can according to the demand for expansion system)

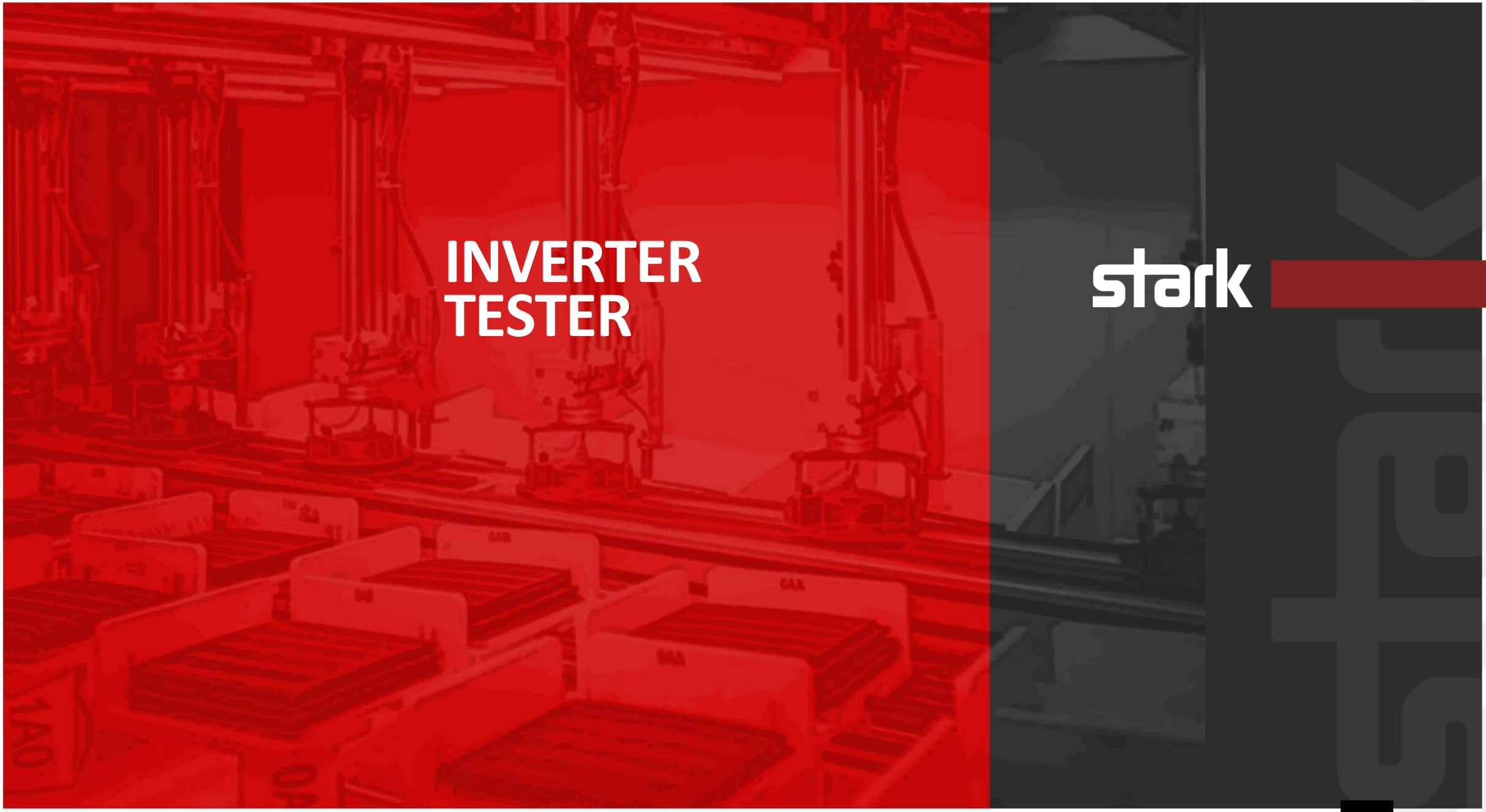
OET – Outdoor exposure tester

ST-OET-01

A comprehensive analysis of PV modules includes many different parameters. Determining the normal module operating temperature (NMOT), incidence angle effects and comparing soiling effects on different modules up to the initial degradation of PV modules are all parameters that can be analyzed with our outdoor exposure tester. The tester comes with up to twelve electronic loads installed in a 19" rack. The loads have two main functions: maximum power point tracking (MPPT) and IV curve tracing. For the advanced analysis, it is possible to change between these two modes within one test. In the normal operation mode, the electronic load keeps the module under MPP and each predefined interval an IV curve is traced. The entire tester comes with all necessary sensors such as temperature sensor, which can be attached to the module to determine the NMOT temperature like defined in IEC 61215 (MQT 05) and IEC 61853-2. The irradiation sensor is also included. In combination with our tracking system P2, it is also possible to determine incident angle effects of the PV module. It is also possible to connect other irradiation sensors for diffuse and direct irradiation, which helps to understand the behavior of the module in different irradiation conditions. An optional albedo meter is a powerful tool for the analysis of bifacial modules. The entire graphical user interface is web based and offers the possibility to access the system from the all computers in the network.

Software features

- Web-based intuitive graphical user interface for full remote control of the test stand
- Different user levels integrated
- Irradiation sum counter for stabilization tests
- Periodical IV curve tracing possible
- Automated correction to STC conditions
- Implementation of all required calibration parameters
- Advanced data analysis available


INVERTER
TESTER
stark

INVERTER TESTER

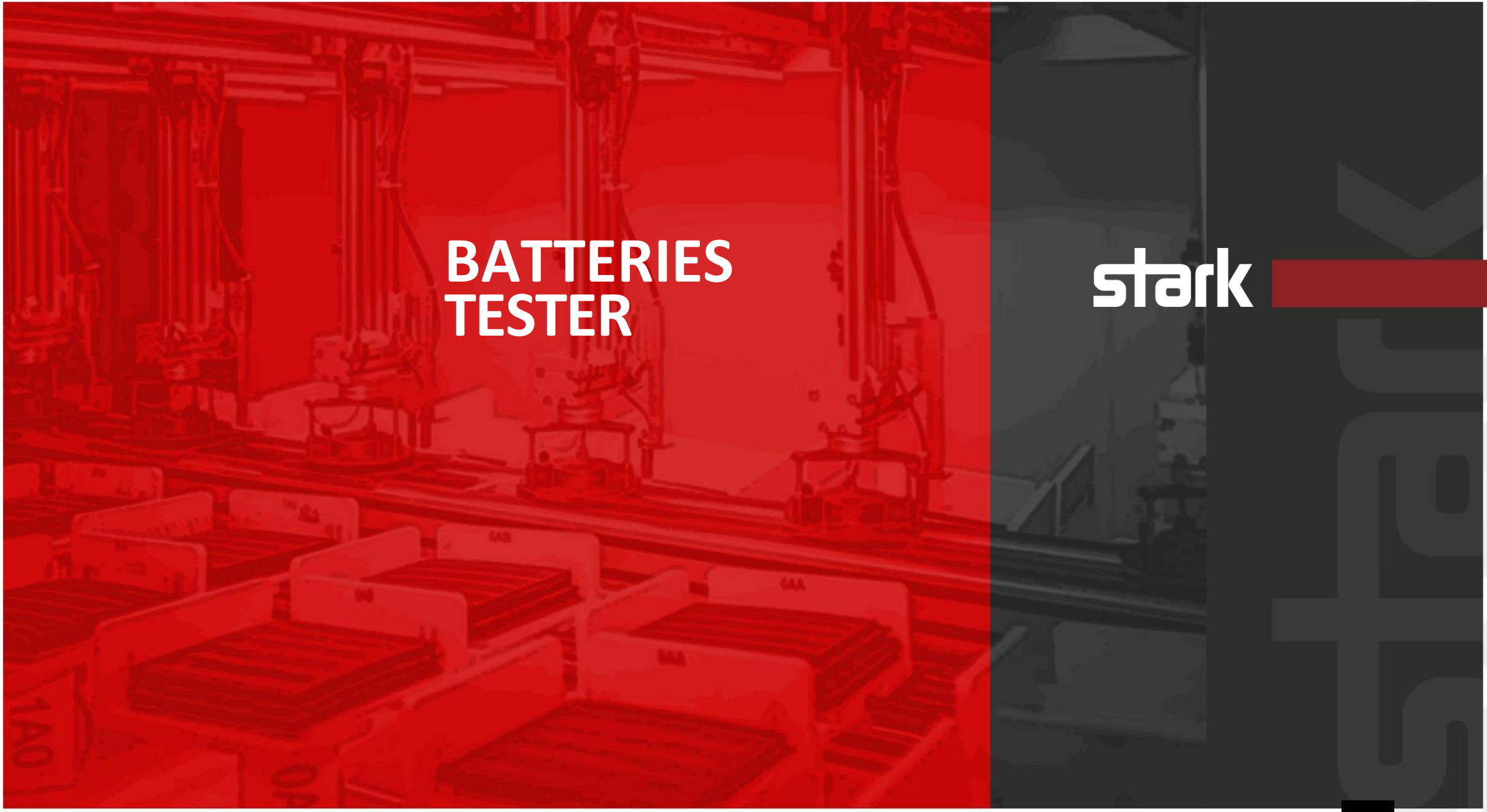
ST-INV-01

TESTING STANDARD

This equipment is designed to test grid inverter Grid simulator according to IEEE 1547 / IEC 61000 / IEC 62116

FEATURES

Output Power 30kVA /45KVA/60KVA
Output Voltage: 0-300V
Output Frequency: DC, 30Hz-100Hz
Single phase or three phase output
Full 4 quadrant, fully regenerative up to 100% of output current rating
Specifically designed for PV inverter, Smart Grid and EV related test applications
Turn on, turn off phase angle control
Harmonics, inter-harmonics waveform synthesizer



BATTERIES TESTER

stark

Batteries tester

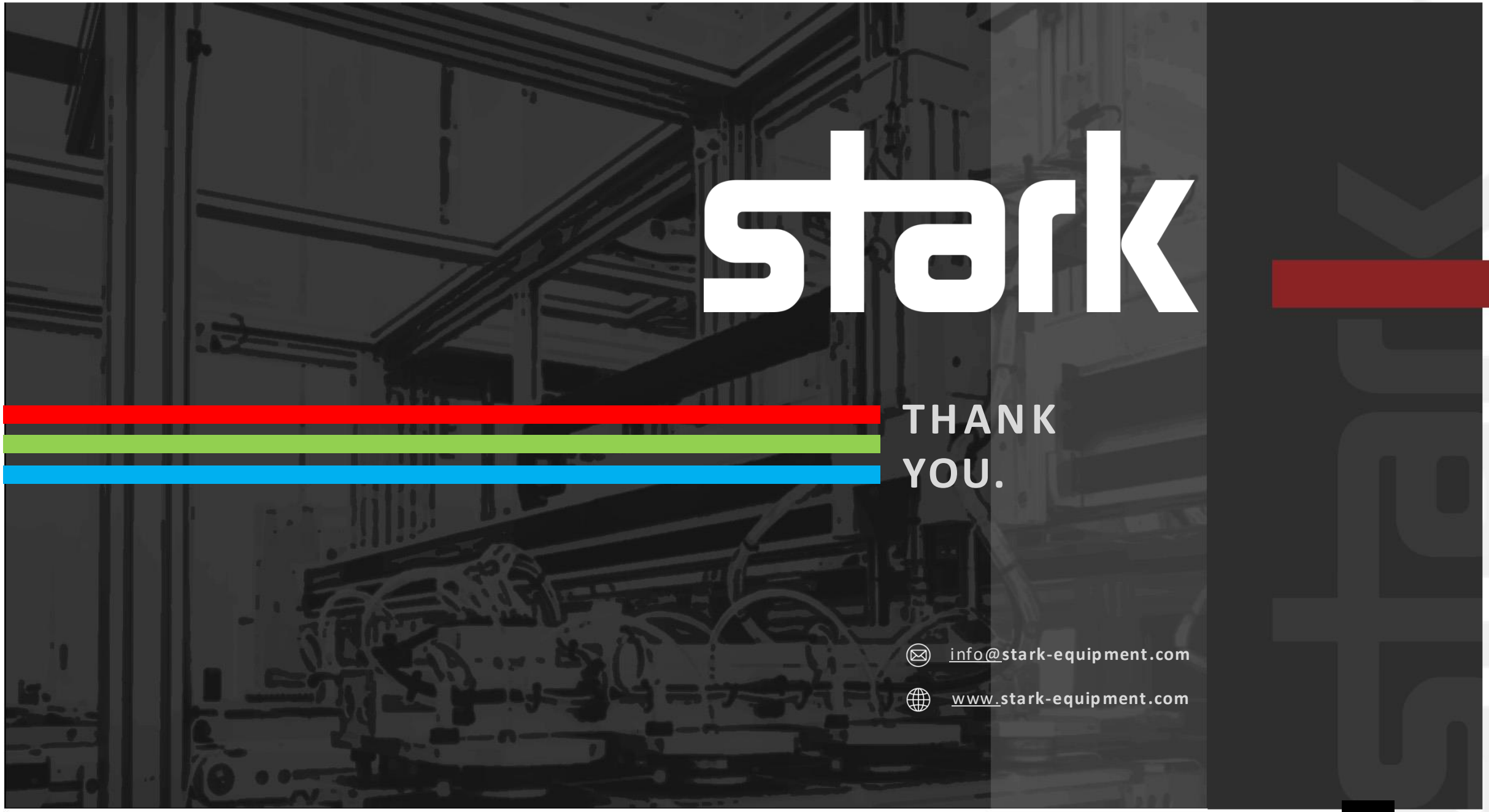
ST-BATT-120-200

TESTING STANDARD

Test System according to IEC 62660-1, IEC 61960, IEC 62391

FEATURES

Charge/discharge controller
Output voltage 0 to 120V
Output current 0 to 200A
Ttemperature chamber with a range of -40°C to +100°C
High precision output and measurement up to 0.02%F.S.
High sampling rate up to 10ms
Dynamic working condition simulation (current/power)
Flexible sampling recording (t, V, I, Q, W)
Low ripple current
Real time external circuit resistance monitoring function
Integrating ACIR test fixture, temperature/data logger and humidity chamber


stark
THANK
YOU.
info@stark-equipment.com
www.stark-equipment.com