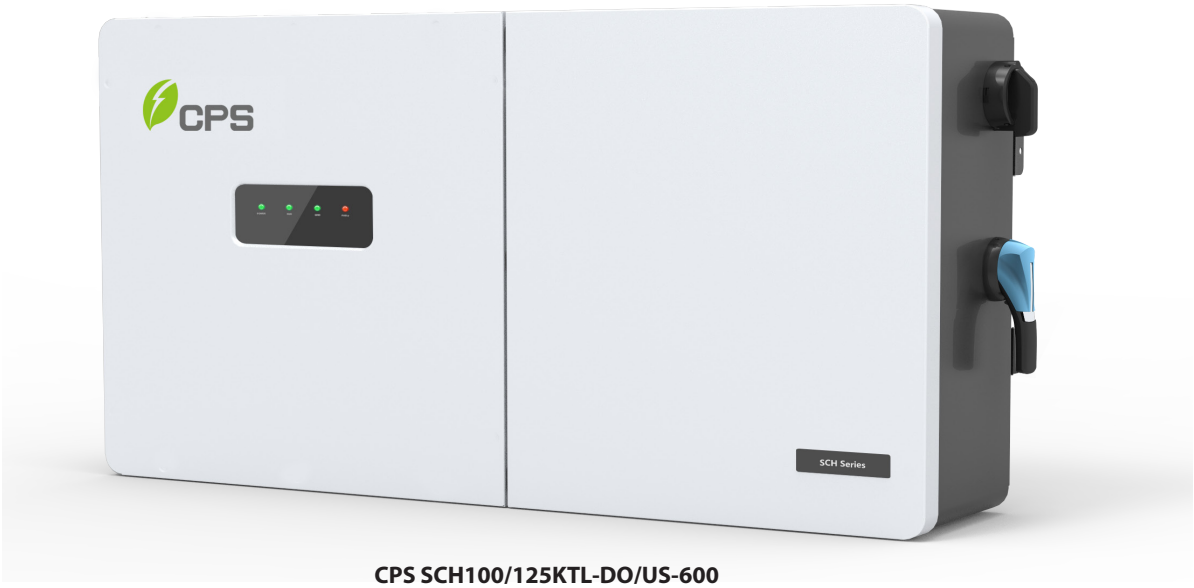
# Appendix A – Equipment Specifications, TCLP Report

# 100/125 kW, 1500 Vdc String Inverters for North America




**CPS SCH100/125KTL-DO/US-600**

The 100 and 125 kW high power CPS three-phase string inverters are designed for ground mount applications. The units are high performance, advanced and reliable inverters designed specifically for the North American environment and grid. High efficiency at 99.1% peak and 98.5% CEC, wide operating voltages, broad temperature ranges and a NEMA Type 4X enclosure enable this inverter platform to operate at high performance across many applications. The CPS 100/125 kW products ship with the Standard or Centralized Wire-box, each fully integrated and separable with AC and DC disconnect switches. The Standard Wire-box includes touch-safe fusing for up to 20 strings. The CPS FlexOM Gateway enables communication, controls and remote product upgrades.

## Key Features

- NFPA 70 and NEC compliant
- Touch-safe DC Fuse holders add convenience and safety
- CPS FlexOM Gateway enables remote firmware upgrades
- Integrated AC and DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper- and Aluminum-compatible AC connections
- NEMA Type 4X outdoor rated enclosure
- Advanced Smart-Grid features (CA Rule 21 certified)
- kVA headroom yields 100 kW @ 0.9 PF and 125 kW @ 0.95 PF
- Generous 1.87 (100 kW) and 1.5 (125 kW) DC/AC inverter load ratios
- Separable wire-box design for fast service
- Standard 5-year warranty with extensions to 20 years

100/125KTL Standard Wire-box

100/125KTL Centralized Wire-box

C SP US

FC This device complies with part 15 of the FCC Rules

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Chint Power Systems America
1380 Presidential Drive, Suite 100, Richardson, TX 75081
Tel: 855-584-7168 Mail: AmericaSales@chintpower.com Web: www.chintpowersystems.com

| Model Name | CPS SCH100KTL-DO/US-600 | CPS SCH125KTL-DO/US-600 |
|---|---|---|
| **DC Input** | | |
| Max. PV power | 187.5 kW | |
| Max. DC input voltage | 1500 V | |
| Operating DC input voltage range | 860-1450 Vdc | |
| Start-up DC input voltage / power | 900 V / 250 W | |
| Number of MPP trackers | 1 | |
| MPPT voltage range[1] | 870-1300 Vdc | |
| Max. PV input current (Isc x 1.25) | 275 A | |
| Number of DC inputs | Standard Wire-box: 20 PV source circuits, pos. and neg. fused<br>Centralized Wire-box: 1 input circuit, 1-2 terminations per pole, non-fused | |
| DC disconnection type | Load-rated DC switch | |
| DC surge protection | Type II MOV (with indicator/remote signaling) | |
| **AC Output** | | |
| Rated AC output power | 100 kW | 125 kW |
| Max. AC output power[2] | 100 kVA (111 kVA @ PF>0.9) | 125 kVA (132 kVA @ PF>0.95) |
| Rated output voltage | 600 Vac | |
| Output voltage range[3] | 528-660 Vac | |
| Grid connection type[4] | 3Φ / PE / N (neutral optional) | |
| Max. AC output current @ 600 Vac | 96.2 / 106.8 A | 120.3 / 127.0 A |
| Rated output frequency | 60 Hz | |
| Output frequency range[3] | 57-63 Hz | |
| Power factor | >0.99 (±0.8 adjustable) | >0.99 (±0.8 adjustable) |
| Current THD | <3% | |
| Max. fault current contribution (1-cycle RMS) | 41.47 A | |
| Max. OCPD rating | 200 A | |
| AC disconnection type | Load-rated AC switch | |
| AC surge protection | Type II MOV (with indicator/remote signaling) | |
| **System** | | |
| Topology | Transformerless | |
| Max. efficiency | 99.1% | |
| CEC efficiency | 98.5% | |
| Stand-by / night consumption | <4 W | |
| **Environment** | | |
| Enclosure protection degree | NEMA Type 4X | |
| Cooling method | Variable speed cooling fans | |
| Operating temperature range | -22°F to +140°F / -30°C to +60°C (derating from +108°F / +42°C) | |
| Non-operating temperature range[5] | -40°F to +158°F / -40°C to +70°C maximum | |
| Operating humidity | 0-100% | |
| Operating altitude | 8202 ft / 2500 m (no derating) | |
| Audible noise | <65 dBA @ 1 m and 25°C | |
| **Display and Communication** | | |
| User interface and display | LED indicators, WiFi + APP | |
| Inverter monitoring | Modbus RS485 | |
| Site-level monitoring | CPS FlexOM Gateway (1 per 32 inverters) | |
| Modbus data mapping | SunSpec / CPS | |
| Remote diagnostics / firmware upgrade functions | Standard / (with FlexOM Gateway) | |
| **Mechanical** | | |
| Dimensions (W x H x D) | Standard Wire-box: 45.28 x 24.25 x 9.84 in (1150 x 616 x 250 mm)<br>Centralized Wire-box: 39.37 x 24.25 x 9.84 in (1000 x 616 x 250 mm) | |
| Weight | Inverter: 121 lbs (55 kg)<br>Standard Wire-box: 55 lbs (25 kg)<br>Centralized Wire-box: 33 lbs (15 kg) | |
| Mounting / installation angle | 15 - 90 degrees from horizontal (vertical or angled) | |
| AC termination | M10 stud type terminal [3Φ] (wire range: 1/0 AWG - 500 kcmil CU/AL; lugs not supplied)<br>Screw clamp terminal block [N] (#12 - 1/0 AWG CU/AL) | |
| DC termination | Standard Wire-box: Screw clamp fuse holder (wire range: #12 - #6 AWG CU)<br>Centralized Wire-box: Busbar, M10 bolts (wire range: #1AWG - 500kcmil CU/AL [1 termination per pole],<br>#1 AWG - 300 kcmil CU/AL [2 terminations per pole]; lugs not supplied) | |
| Fused string inputs | 20 A fuses provided (fuse values up to 30 A acceptable) | |
| **Safety** | | |
| Certifications and standards | UL 1741-SA/SB Ed. 3, CSA-C22.2 NO.107.1-01, IEEE 1547-2018, FCC PART15 | |
| Selectable grid standard | IEEE 1547a-2014, IEEE 1547-2018[6], CA Rule 21, ISO-NE | |
| Smart-grid features | Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt | |
| **Warranty** | | |
| Standard[7] | 5 years | |
| Extended terms | 10, 15 and 20 years | |

1) See user manual for further information regarding MPPT voltage range when operating at non-unity PF.
2) "Max AC apparent power" rating valid within MPPT voltage range and temperature range of -30°C to +40°C (-22°F to +104°F) for 100 kW PF≥0.9, and 125 kW PF≥0.95.
3) The "output voltage range" and "output frequency range" may differ according to the specific grid standard.
4) Wye neutral-grounded; delta may not be corner-grounded.
5) See user manual for further requirements regarding non-operating conditions.
6) Firmware version 12.0 or later required.
7) 5-year warranty effective for units purchased after October 1, 2019.

# PARK

# SWITCHGEAR

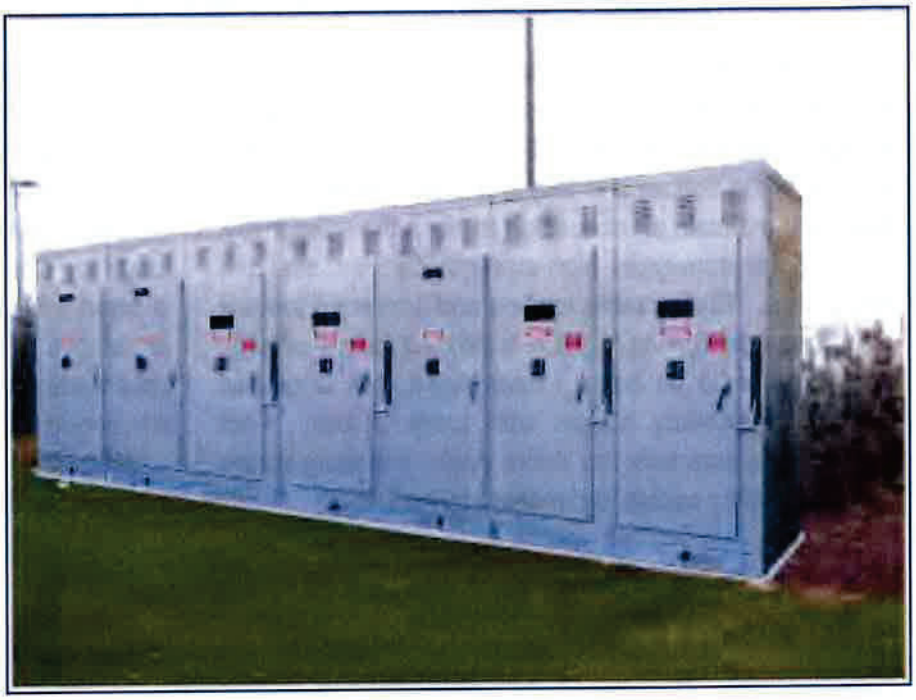
*Engineered Solutions for Power Distribution*

# Switchgear

In this brochure, we present a complete range of advanced, problem-solving switchgear products that have established Park as an industry leader in power distribution systems. Shown and described are medium voltage switchgear units for many diverse applications, all featuring the Park hallmarks of modern design and cutting-edge technology. With some of the industry's finest electrical engineers on staff, Park is ideally equipped to handle difficult custom jobs that many other companies may not have the capability to undertake.

Special projects are one of our particular strengths at Park, evidenced by our outstanding record for delivering these systems on tight schedules, and often under demanding circumstances.

Whatever your switchgear requirements, you can always rely on Park to provide you with the finest, state-of-the-art products and support services.



## FEATURES & ADVANTAGES

- Interrupter switches are completely factory adjusted.
- No taping of bus connections
- Built-in access control eliminates expensive fencing
- Wide-view windows allow inspection of switches from outside
- Louvers and space heaters reduce moisture
- Spare fuses store in built-in racks
- Generous access and ample work space
- Hot dipped galvanized base
- Sturdy, lockable latches
- Welded construction for security and strength
- Heavy duty hinges
- Manufactured to applicable utility standards

# Metal Enclosed

Metal Enclosed Load Interrupter Switchgear

## *Park Switchgear configurations are limited only by your imagination.*

Each unit features welded steel construction with wideview windows that allow checking switchgear without opening doors. Corrosionproof, rainproof louvers at the bottom and top, and space heaters inside each unit maintain air circulation to keep the interior dry. Three point cam-type, high-strength latches seal the doors shut. The lockable latches and screened louvers discourage tampering. Wide bulkhead doors provide easy access to all bays. Each full-length door has durable heavy-duty hinges with brass pivots. Foot operated holders lock the doors open, providing ample room for pulling cables and making terminations.

All interrupter switches are maintence-free and are available in 200, 600, and 1200 amp ratings. S&C® Power Fuses provide full-fault-spectrum protection. The switches are manually operated by nonremovable switch handles. Bus connections are silverplated copper for long life. Continuous ground bus in multibay lineups has a short-circuit rating equal to that of the integrated assembly. The HV meter bays are built to utility specifications and multibay lineups are assembled with a minimum of interbay bolting.

Call today and discuss your requirements with a Park sales representative.

UL® Listed up tp 15KV

## SPECIFICATIONS

### Ratings of S&C Mini-Ruptor Switches

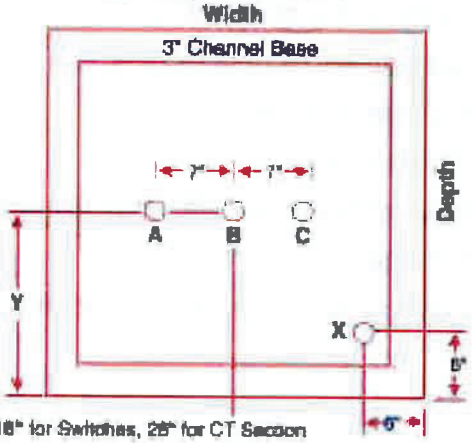
| KV | | | Amperes, RMS | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Interrupting | | | Mom. & |
| Nom. | Max. Des. | BIL | Cont. | Load | Cap. | Mag. | Fault Close (ASYM KA) |
| 5 | 5.5 | 60 | 600 | 600 | 35 | 21 | 40 |
| 5 | 5.5 | 60 | 1200 | 1200 | 35 | 21 | 61 |
| 15 | 17 | 95 | 600 | 600 | 35 | 21 | 40 |
| 15 | 17 | 95 | 1200 | 1200 | 35 | 21 | 61 |
| 25 | 29 | 125 | 600 | 400 | 35 | 21 | 40 |
| 34.5 | 38 | 150 | 600 | 600 | 35 | 21 | 28 |

### Physical Sizes & Park Numbers

| Park No. | Voltage KV | Height | Depth | Width |
|---|---|---|---|---|
| PM 315-4.8 | 4.8 | 104" | 44" | 42" |
| PM 315-15 | 15 | 104" | 44" | 42" |
| PM 315-25 | 25 | 120" | 44" | 42" |
| PM 315-35 | 34.5 | 130" | 70" | 60" |
| PM 315-CT | PT/CT Bay | to match | to match | to match |
| PM 315-WM | Meter Bay | to match | to match | 60" |

To order specify current rating & fuse size.

### Cabling Locations




Y=18" for Switches, 28" for CT Secoon

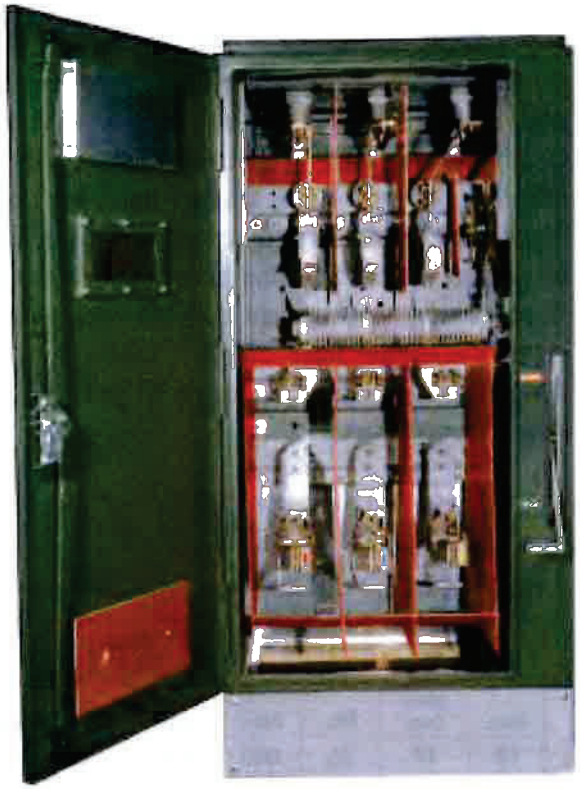
A,B,C,- Approximate Cable Termination Points

X - Approximate Heating Cable Termination (for Sw only)

# Switchgear

## FEATURES & ADVANTAGES

- Interrupter switches are completely factory adjusted
- Built-in access control eliminates expensive fencing
- Standard drilling and tapping for mounting various size and manufacturers' current and potential transformers
- No taping of bus connections
- Front operator standard
- Side operator available as an option
- Louvers and space heaters reduce moisture
- Spare fuses store in built in racks
- Sturdy 3 point door latch
- Heavy duty hinges
- Sturdy, lockable latches
- Welded construction for security and strength
- Hot dipped galvanized base
- Manufactured to applicable utility standards
- Finished with one prime and two enamel coats for corrosion resistance



# PM 123

Pad-mounted 15KV Primary Switch and Metering Cubicle

Each unit features welded steel construction. Corrosionproof, rainproof louvers at the bottom and top, and space heaters inside each unit maintain air circulation to keep the interior dry. Three point cam-type, high-strength latches seal the doors shut. The lockable latches and screened louvers discourage tampering. Wide bulkhead doors provide easy access. Each full-length door has durable heavy-duty hinges with brass pivots. Foot operated holders lock the doors open and provides ample room for pulling cables and making terminations.

Interruptor switches are maintenance-free and are 600 amp rated. S&C® Power Fuses provide full-fault-spectrum protection. The switches are manually operated by removable switch handles. Bus connections are silverplated copper for long life. The HV meter bays are built to utility specifications.

Call today and discuss your requirements with a Park sales representative.

UL® Listed up tp 15KV

## SPECIFICATIONS

### Ratings of S&C Mini-Ruptor Switches

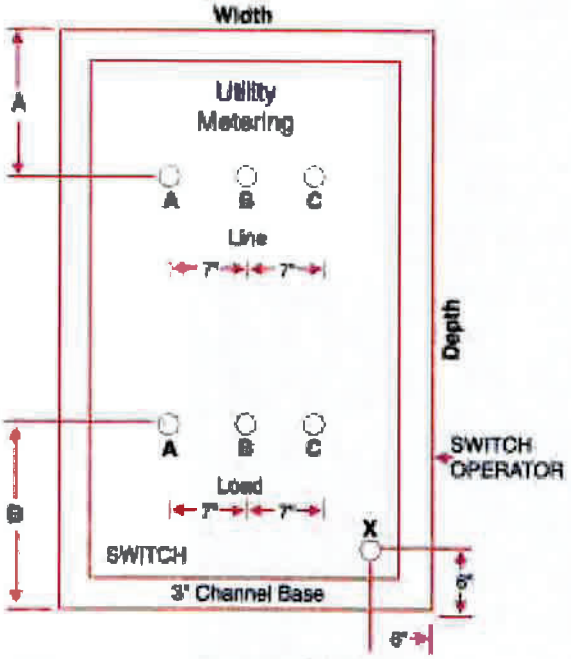
| KV | | | Amperes, RMS | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Interrupting | | | Mom. & |
| Nom. | Max. Des. | BIL | Cont. | Load | Cap. | Mag. | Fault Close (ASYM KA) |
| 15 | 17 | 95 | 600 | 600 | 35 | 21 | 40 |
| 25 | 29 | 125 | 600 | 400 | 35 | 21 | 40 |

### Physical Sizes & Park Numbers

| Park No. | Voltage KV | Height | Depth | Width | A | B |
|---|---|---|---|---|---|---|
| PM 123-4.8 | 4.8 | 82" | 60" | 40" | 19" | 12" |
| PM 123-15 | 15 | 82" | 60" | 40" | 19" | 12" |
| PM 123-25 | 25 | 94" | 60" | 54" | 19" | 14" |

To order specify current rating & fuse size.

### Cabling Locations




A,B,C.– Approximate Cable Termination Points

X – Approximate Heating Cable Termination

NOTE: Front and rear clearance of 4' required—2' on right for handle operations

# Switchgear

## FEATURES & ADVANTAGES

- Welded steel construction for security and strength.
- Various combinations of switch and fuse arrangements available.
- Interrupter switches are factory adjusted.
- Built-in access control eliminates expensive fencing.
- No taping of bus connections.
- Folding switch handle stores in padlockable compartment on enclosure side.
- Sturdy 3 point lockable door latches.
- Heavy duty hinges.
- Louvers help reduce moisture.
- Manufactured to applicable utility standards.
- Hot dipped galvanized base.
- Finished with one prime and two enamel coats for corrosion resistance.


PM-255


PM-155

# PM 155 & 255

## Pad-mounted 15 & 25KV Switch & Fuse

All 155 and 255 units feature welded steel construction. Louvers at the top and bottom of each unit are rainproof and corrosion proof, maintain air circulation to keep interior dry. Three point cam-type, high-strength latches seal the doors shut. Lockable latches and screened louvers discourage tampering. Wide bulkhead doors provide easy access. Each full-length door has durable heavy-duty hinges with brass pivots. Foot operated holders lock the doors open, and provide ample room for pulling cables and making terminations.

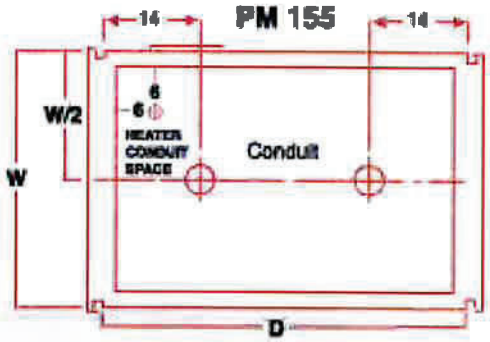
Interruptor switches are maintenance-free and rated at 600 amp. S&C® Power Fuses provide full-fault-spectrum protection. Switches are manually operated by removable switch handles. Bus connections are silverplated copper for long life.

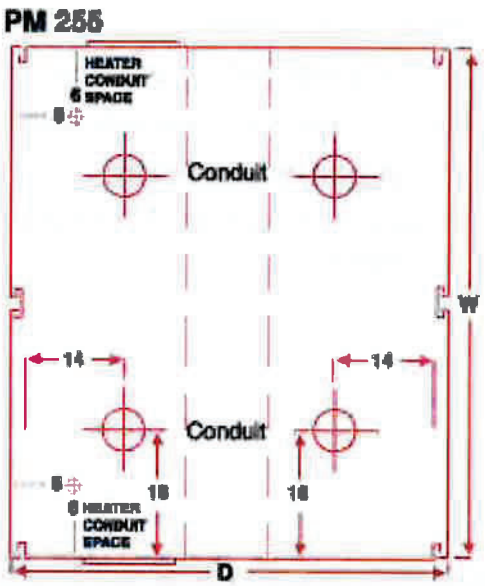
Call today and discuss your requirements with a Park sales representative.

## SPECIFICATIONS

| Park # | Volts | Height* | Width | Depth |
|---|---|---|---|---|
| 155 | 15 kv | 60 | 36 | 52 |
| 155 | 25 kv | 66 | 40 | 62 |
| 255 | 15 kv | 60 | 72 | 62 |
| 255 | 25 kv | 65 | 82 | 72 |

*Height includes 10" base.

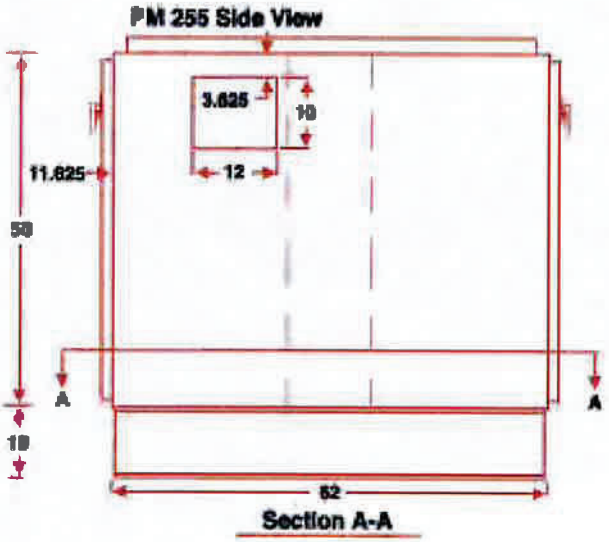




PM-155 front view ▲

rear view ▲



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## THREE PHASE PADMOUNT TRANSFORMERS

Short for "Tamper-proof, compartmentalized, liquid-filled, pad mounted transformer", all padmount designs feature fully enclosed tamper-proof terminal compartments and can be supplied with dead-front or live-front configuration, for loop or radial feed applications, with Type II mineral oil, or environmentally friendly and high flash-point Envirotemp™ FR3™.

All new Maddox padmount transformers are constructed of the highest quality materials and built in the US to heavy duty industrial standards, making them ideal for commercial and industrial applications such as data centers, solar step-up, manufacturing facilities, shopping centers, etc. Our padmounts are designed to the latest department of energy efficiency standards built and tested in accordance with industry standards including NEMA, ANSI C.57, DOE, and IEEE as applicable.

With thousands of new units in stock and ready-to-ship, and the manufacturing ability to produce almost any custom design, Maddox stands ready to meet your transformer need(s). Maddox stocks all standard configurations to match most common applications and deliver on short notice.

## Design

**HV Bushing Config.:**
- Dead front or live front
- Loop feed or radial feed

**Fluid Options:**
- Type II Mineral Oil
- Envirotemp™ FR3™

**Standard Gauge/Accessory Package:**
- Pressure relief valve
- Pressure vacuum gauge
- Liquid temp & level gauges
- Drain & sample valve
- Adjustment taps

**Switch Options:**
- 2 Position LBOR Switch
- 4 Position LBOR Switch (V-blade or T-blade)
- (3) 2 Position LBOR Switches

**Fusing Options:**
- Bayonets w/ isolation links or CLFs

**Construction:**
- 5-legged core
- Rectangular wound copper or aluminum windings
- Carbon rienforced or stainless steel tank
- Steel divider between HV and LV cabinets
- Penta-head captive bolt

**Optional Design Features & Accessories:**
- Gauges w/ Contacts
- External drain and sample valve
- Electrostatic Shielding
- Step-up Design
- Surge-Arresters

## Available Ratings

**Table 1. Typical Transformer Ratings**

| | |
|---|---|
| **Sizes (kVA)** | 45, 75, 112.5, 150, 225, 300, 500, 750, 1000, 1500, 2000, 2500, 3000, 3750, 5000 |
| **Frequency** | 60 Hz or 50 Hz |
| **Cooling Class** | ONAN or KNAN |
| **Temp Rise** | 55°C, 65°C, 55/65°C, 75°C |
| **Voltages** | *Available in Δ or Y configuration* |
| 600V | 208 |
| | 240 |
| | 416 |
| | 480 |
| | 600 |
| 2.5kv – 5kv | 2400 |
| | 4160 |
| | 4800 |
| 15kV | 12000 |
| | 12470 |
| | 13200 |
| | 13800 |
| | 14400 |
| 25kV | 20780 |
| | 21600 |
| | 22900 |
| | 24940 |
| | 26400 |
| 35kV | 33000 |
| | 34500 |

**Fig 1. Padmount Transformer Outline**

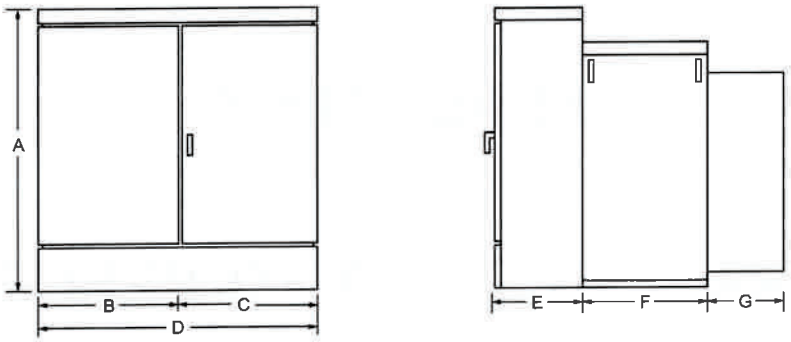



**Table 2. Approximate Transformer Dimensions**

| kVA | A | B | C | D | E | F | G | Gallons | Weight (Lbs) |
|---|---|---|---|---|---|---|---|---|---|
| 300 | 59" | 29.5" | 22" | 51.5" | 20.5" | 24" | 10" | 196 | 4,056 |
| 500 | 59" | 33" | 26.5" | 59.5" | 24" | 26.5" | 10" | 210 | 5,023 |
| 750 | 73" | 36" | 29" | 65" | 24" | 26.5" | 10" | 358 | 7,664 |
| 1000 | 73" | 36" | 29" | 65" | 24" | 27" | 10" | 354 | 8,530 |
| 1500 | 73" | 36" | 35.5" | 71.5 | 24" | 33.5" | 10" | 410 | 10,782 |
| 2000 | 75" | 39.5" | 28" | 67.5 | 24" | 35" | 27" | 433 | 12,490 |
| 2500 | 78" | 39.5" | 35.5" | 75.5" | 24" | 37.5" | 22.5" | 545 | 14,246 |
| 3000 | 84" | 30.5" | 32" | 62.5" | 24" | 37.5" | 38" | 550 | 14,014 |
| 3750 | 75" | 50.5" | 30" | 80.5" | 25.5" | 42" | 38" | 730 | 17,785 |

**Fig 2. Three Phase Maddox Padmount Transformer**

**Table 3. Common Accessories**

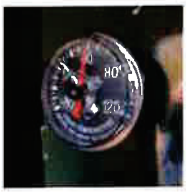
1. Bayonet Fuses

2. Loadbreak Switch

3. Tap-changer

4. Bushings

5. Parking Stand

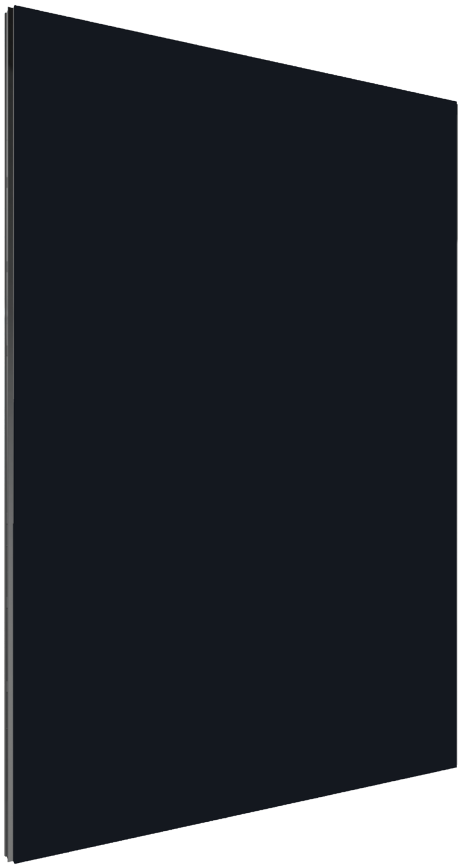


6: Gauges

First Solar

# Series 6 *Plus* Bifacial.

## 455-480 Watt Thin Film Solar Module



First Solar is once again setting the industry benchmark for reliable energy production, optimized design and environmental performance with Series 6 *Plus* Bifacial - the world's first bifacial thin film CdTe module. The advanced design signficantly reduces balance of system, shipping, and operating costs while delivering more energy per nameplate watt.

### More Lifetime Energy per Nameplate Watt

- Industry's best (0.3%) warranted degradation rate
- Superior temperature coefficient, spectral response and shading behavior
- Unlike crystalline silicon modules, First Solar's thin film technology does not experience losses from LID or LeTID
- Anti-reflective coated glass enhances energy production
- Added bifacial energy yield

### Innovative Module Design

- Under-mount frame provides the cleaning and snowshedding benefits of a frameless module while protecting edges against breakage
- Innovative SpeedSlots combine the robustness of bottom mounting with the speed of top clamping while utilizing fewer fasteners to achieve the industry's fastest installation times and lowest mounting hardware costs
- Dual junction box design reduces wire management complexity and cost

### Best In-Class Reliability & Durability

- Manufactured under one roof with 100% traceable QA/QC
- Independently tested and certified for reliable performance that exceeds IEC standards in high temperature, high humidity, extreme desert and coastal applications
- Inherently immune to and warranted against power loss from cell cracking
- Durable glass/glass construction

### Best Environmental Profile

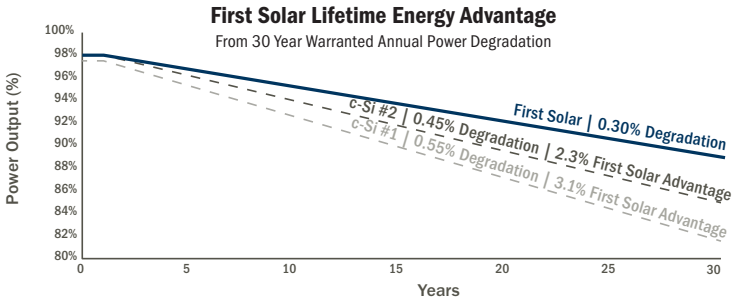
- Fastest energy payback time in the industry
- Carbon footprint that is 2.5X lower and a water footprint that is 3X lower than mono crystalline silicon panels on a life cycle basis
- Global PV module recycling services available through First Solar or customer-selected third-party

**19.0%**
HIGH BIN EFFICIENCY

**30YR**
LINEAR PERFORMANCE WARRANTY

**98%**
WARRANTY START POINT

**0.3%**
WARRANTED ANNUAL DEGRADATION RATE[1]




Learn more about First Solar and Series 6 *Plus* Bifacial at firstsolar.com/S6

# Series 6 *Plus* Bifacial.

## Electrical Specifications

**RATINGS AT STANDARD TEST CONDITIONS** (1000W/m², AM 1.5, 25°C)[2]

**SERIES 6 PLUS BIFACIAL MODEL TYPES: FS-6XXX-P-B / FS-6XXXA-P-B** (XXX = NOMINAL POWER)

| Nominal Power[3] (-0/+5%) | $P_{MAX}$ (W) | 455 | | 460 | | 465 | | 470 | | 475 | | 480 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STC[4] | BNPI[5] | STC | BNPI | STC | BNPI | STC | BNPI | STC | BNPI | STC | BNPI |
| Nominal Power | $P_{MAX}$ (W) | 455 | 464 | 460 | 469 | 465 | 474 | 470 | 479 | 475 | 485 | 480 | 490 |
| Voltage at $P_{MAX}$ | $V_{MAX}$ (V) | 187.8 | 187.8 | 188.8 | 188.8 | 189.8 | 189.8 | 191.1 | 191.1 | 191.5 | 191.5 | 192.8 | 192.8 |
| Current at $P_{MAX}$ | $I_{MAX}$ (A) | 2.42 | 2.47 | 2.44 | 2.49 | 2.45 | 2.50 | 2.46 | 2.50 | 2.48 | 2.53 | 2.49 | 2.54 |
| Open Circuit Voltage | $V_{OC}$ (V) | 222.0 | 222.0 | 222.9 | 222.9 | 223.8 | 223.8 | 224.3 | 224.3 | 224.8 | 224.8 | 225.4 | 225.4 |
| Short Circuit Current | $I_{SC}$ (A) | 2.58 | 2.63 | 2.59 | 2.64 | 2.60 | 2.65 | 2.61 | 2.66 | 2.61 | 2.66 | 2.62 | 2.67 |
| Efficiency (%) | % | 18.1 | | 18.3 | | 18.5 | | 18.7 | | 18.9 | | 19.0 | |
| Maximum System Voltage | $V_{SYS}$ (V) | 1500[6] | | | | | | | | | | | |
| Limiting Reverse Current | $I_R$ (A) | 5.0 | | | | | | | | | | | |
| Maximum Series Fuse | $I_{CF}$ (A) | 5.0 | | | | | | | | | | | |

### TEMPERATURE CHARACTERISTICS

| | | |
|---|---|---|
| Module Operating Temperature Range | °C | -40 to +85 |
| Temperature Coefficient of $P_{MAX}$ | $T_K(P_{MAX})$ | -0.32%/°C [Temperature Range: 25°C to 75°C] |
| Temperature Coefficient of $V_{OC}$ | $T_K(V_{OC})$ | -0.28%/°C |
| Temperature Coefficient of $I_{SC}$ | $T_K(I_{SC})$ | +0.04%/°C |
| Nominal Operating Cell Temperature | °C | 43 |
| Bifaciality Factor | % | 15±5 |

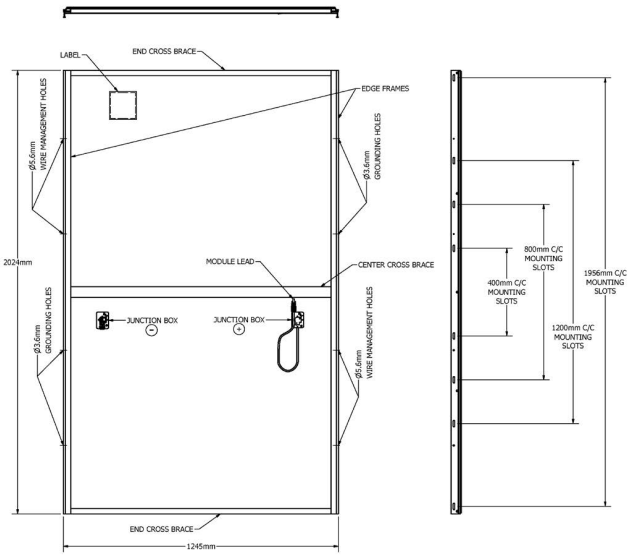
### PACKAGING INFORMATION

| Model Type | Modules Per Pack | Packs per 40' Container |
|---|---|---|
| FS-6XXX-P-B / FS-6XXXA-P-B | 27 | 18 |

### MECHANICAL DESCRIPTION

| | |
|---|---|
| Module/Glass Length | 2024mm/2016mm |
| Module/Glass Width | 1245mm/1216mm |
| Module/Glass Area | 2.52m²/2.45m² |
| Module Weight | 34.0kg |
| Leadwire[7] | 2.5mm², 733mm (+) & Bulkhead (-) |
| Connectors | TE Connectivity PV4-S, or alternate |
| Junction Box | IP68 Rated |
| Bypass Diode | N/A |
| Cell Type | Thin film CdTe semiconductor, up to 268 cells |
| Frame Material | Anodized Aluminum |
| Front Glass | Heat strengthened |
| Back Glass | Heat strengthened |
| Encapsulation | Laminate material with edge seal |
| Frame to Glass Adhesive | Silicone |
| Load Rating[8] | +/-2400Pa |

## Mechanical Specifications




Install in portrait only

## Certifications & Tests[9]

| CERTIFICATIONS AND LISTINGS | EXTENDED DURABILITY TESTS | QUALITY & EHS |
|---|---|---|
| IEC 61215:2021 & 61730-1:2016[6], CE | IEC TS 63209-1 Extended Stress Test | ISO 9001:2015 |
| IEC 61701 Salt Mist Corrosion | Long-Term Sequential | ISO 14001:2015 |
| IEC 60068-2-68 Dust and Sand Resistance | Thresher Test | ISO 45001:2018 |
| UL 61730 | PID Resistant | ISO 14064-3:2006 |
| | | EPEAT Silver Registered |

1 Limited power output and product warranties subject to warranty terms and conditions
2 All ratings ±10%, unless specified otherwise. Specifications are subject to change
3 Measurement uncertainty applies
4 Frontside electrical ratings
5 Bifacial Name Plate Irradiance, as per IEC 61215:2021
6 IEC 61730-1: 2016 Class II
7 Leadwire length from junction box exit to connector mating surface
8 1500Pa tentative load rating for 1956mm mounting slots. Higher loads may be acceptable,subject to testing
9 Testing Certifications/Listings pending

**Disclaimer**
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# Series 6 Plus TCLP Report

March 21, 2022

## 1 INTRODUCTION

The purpose of this report is to provide waste characterization of First Solar Series 6 Plus photovoltaic (PV) modules using USEPA Method 1311 Toxicity Characteristic Leaching Procedure (TCLP).

## 2 METHODS

In February, 2022, First Solar provided three Series 6 Plus modules to Eurofins Calscience laboratory for TCLP testing.

## 3 RESULTS

TCLP test results are documented in the enclosed laboratory test report and are below the hazardous waste thresholds in Table 1 of 40 CFR 261.24[1].

[1] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-261/subpart-C/section-261.24

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eurofins | Environment Testing America

# ANALYTICAL REPORT

Eurofins Calscience
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Tel: (714)895-5494

Laboratory Job ID: 570-85215-1
Client Project/Site: Photovoltaic (PV) Modules - TCLP Metals

For:
First Solar, Inc
28101 Cedar Park Blvd
Perrysburg, Ohio 43551

Attn: Adam Squire

*Authorized for release by:*
*3/17/2022 2:23:03 PM*

Rossina Tomova, Project Manager I
(657)210-6367
Rossina.Tomova@Eurofinset.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at:
www.eurofinsus.com/Env

*The test results in this report meet all 2003 NELAC, 2009 TNI, and 2016 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

# Table of Contents

# Definitions/Glossary

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

## Qualifiers

### Metals

| Qualifier | Qualifier Description |
|---|---|
| F1 | MS and/or MSD recovery exceeds control limits. |

## Glossary

| Abbreviation | These commonly used abbreviations may or may not be present in this report. |
|---|---|
| ¤ | Listed under the "D" column to designate that the result is reported on a dry weight basis |
| %R | Percent Recovery |
| CFL | Contains Free Liquid |
| CFU | Colony Forming Unit |
| CNF | Contains No Free Liquid |
| DER | Duplicate Error Ratio (normalized absolute difference) |
| Dil Fac | Dilution Factor |
| DL | Detection Limit (DoD/DOE) |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC | Decision Level Concentration (Radiochemistry) |
| EDL | Estimated Detection Limit (Dioxin) |
| LOD | Limit of Detection (DoD/DOE) |
| LOQ | Limit of Quantitation (DoD/DOE) |
| MCL | EPA recommended "Maximum Contaminant Level" |
| MDA | Minimum Detectable Activity (Radiochemistry) |
| MDC | Minimum Detectable Concentration (Radiochemistry) |
| MDL | Method Detection Limit |
| ML | Minimum Level (Dioxin) |
| MPN | Most Probable Number |
| MQL | Method Quantitation Limit |
| NC | Not Calculated |
| ND | Not Detected at the reporting limit (or MDL or EDL if shown) |
| NEG | Negative / Absent |
| POS | Positive / Present |
| PQL | Practical Quantitation Limit |
| PRES | Presumptive |
| QC | Quality Control |
| RER | Relative Error Ratio (Radiochemistry) |
| RL | Reporting Limit or Requested Limit (Radiochemistry) |
| RPD | Relative Percent Difference, a measure of the relative difference between two points |
| TEF | Toxicity Equivalent Factor (Dioxin) |
| TEQ | Toxicity Equivalent Quotient (Dioxin) |
| TNTC | Too Numerous To Count |

## Job ID: 570-85215-1

### Laboratory: Eurofins Calscience

**Narrative**

**Job Narrative**
**570-85215-1**

**Comments**
No additional comments.

**Receipt**
The samples were received on 2/17/2022 1:30 PM. Unless otherwise noted below, the samples arrived in good condition. The temperature of the cooler at receipt was 23.0º C.

**Receipt Exceptions**
The samples were received at the laboratory outside the required temperature criteria for Mercury. There was no cooling media present in the cooler.

**Metals**
Method 6010B: The matrix spike / matrix spike duplicate (MS/MSD) recoveries of Barium for preparation batch 440-667641 and 440-667772 and analytical batch 440-667873 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.(440-294036-A-22-F MSD)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Organic Prep**
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

# Detection Summary

Client: First Solar, Inc
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

Job ID: 570-85215-1

## Client Sample ID: OD0-0026-01 — Lab Sample ID: 570-85215-1

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Barium | 0.24 | | 0.10 | | mg/L | 1 | | 6010B | TCLP |
| Cadmium | 0.085 | | 0.050 | | mg/L | 1 | | 6010B | TCLP |

## Client Sample ID: OD0-0026-02 — Lab Sample ID: 570-85215-2

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Barium | 0.19 | | 0.10 | | mg/L | 1 | | 6010B | TCLP |

## Client Sample ID: OD0-0026-03 — Lab Sample ID: 570-85215-3

| Analyte | Result | Qualifier | RL | MDL | Unit | Dil Fac | D | Method | Prep Type |
|---|---|---|---|---|---|---|---|---|---|
| Barium | 0.14 | | 0.10 | | mg/L | 1 | | 6010B | TCLP |

This Detection Summary does not include radiochemical test results.

# Client Sample Results

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

**Client Sample ID: OD0-0026-01**
**Lab Sample ID: 570-85215-1**
**Date Collected: 02/09/22 15:00**
**Matrix: Solid**
**Date Received: 02/17/22 13:30**

## Method: 6010B - Metals (ICP) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| **Barium** | **0.24** | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| **Cadmium** | **0.085** | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| Chromium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| Lead | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| Selenium | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |
| Silver | ND | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:36 | 1 |

## Method: 7470A - Mercury (CVAA) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0025 | | mg/L | | 03/15/22 19:30 | 03/16/22 13:38 | 1 |

# Client Sample Results

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

**Client Sample ID: OD0-0026-02**
**Lab Sample ID: 570-85215-2**
**Date Collected: 02/09/22 15:00**
**Matrix: Solid**
**Date Received: 02/17/22 13:30**

## Method: 6010B - Metals (ICP) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| **Barium** | **0.19** | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| Cadmium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| Chromium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| Lead | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| Selenium | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |
| Silver | ND | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:39 | 1 |

## Method: 7470A - Mercury (CVAA) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0025 | | mg/L | | 03/15/22 19:30 | 03/16/22 13:43 | 1 |

# Client Sample Results

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

**Client Sample ID: OD0-0026-03**
**Lab Sample ID: 570-85215-3**
**Date Collected: 02/09/22 15:00**
**Matrix: Solid**
**Date Received: 02/17/22 13:30**

## Method: 6010B - Metals (ICP) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| **Barium** | **0.14** | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| Cadmium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| Chromium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| Lead | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| Selenium | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |
| Silver | ND | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:34 | 1 |

## Method: 7470A - Mercury (CVAA) - TCLP

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0025 | | mg/L | | 03/15/22 19:30 | 03/16/22 13:45 | 1 |

## Method: 6010B - Metals (ICP)

**Lab Sample ID: MB 440-667641/1-B**
**Matrix: Solid**
**Analysis Batch: 667873**

**Client Sample ID: Method Blank**
**Prep Type: TCLP**
**Prep Batch: 667772**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Barium | ND | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Cadmium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Chromium | ND | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Lead | 0.0710 | | 0.050 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Selenium | ND | | 0.20 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |
| Silver | ND | | 0.10 | | mg/L | | 02/23/22 17:20 | 02/24/22 19:05 | 1 |

**Lab Sample ID: LCS 440-667641/2-B**
**Matrix: Solid**
**Analysis Batch: 667873**

**Client Sample ID: Lab Control Sample**
**Prep Type: TCLP**
**Prep Batch: 667772**

| Analyte | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|
| Arsenic | 2.00 | 2.12 | | mg/L | | 106 | 80 - 120 |
| Barium | 2.00 | 2.12 | | mg/L | | 106 | 80 - 120 |
| Cadmium | 2.00 | 2.03 | | mg/L | | 101 | 80 - 120 |
| Chromium | 2.00 | 2.16 | | mg/L | | 108 | 80 - 120 |
| Lead | 2.00 | 2.09 | | mg/L | | 104 | 80 - 120 |
| Selenium | 2.00 | 1.89 | | mg/L | | 95 | 80 - 120 |
| Silver | 1.00 | 1.06 | | mg/L | | 106 | 80 - 120 |

**Lab Sample ID: 440-294036-A-22-E MS**
**Matrix: Solid**
**Analysis Batch: 667873**

**Client Sample ID: Matrix Spike**
**Prep Type: TCLP**
**Prep Batch: 667772**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.00 | 2.19 | | mg/L | | 103 | 75 - 125 |
| Barium | 5.4 | F1 | 2.00 | 7.85 | | mg/L | | 121 | 75 - 125 |
| Cadmium | 0.055 | | 2.00 | 2.09 | | mg/L | | 102 | 75 - 125 |
| Chromium | 0.36 | | 2.00 | 2.53 | | mg/L | | 109 | 75 - 125 |
| Lead | 2.1 | B | 2.00 | 4.19 | | mg/L | | 104 | 75 - 125 |
| Selenium | ND | | 2.00 | 1.85 | | mg/L | | 93 | 75 - 125 |
| Silver | ND | | 1.00 | 1.04 | | mg/L | | 104 | 75 - 125 |

**Lab Sample ID: 440-294036-A-22-F MSD**
**Matrix: Solid**
**Analysis Batch: 667873**

**Client Sample ID: Matrix Spike Duplicate**
**Prep Type: TCLP**
**Prep Batch: 667772**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | ND | | 2.00 | 2.21 | | mg/L | | 103 | 75 - 125 | 1 | 20 |
| Barium | 5.4 | F1 | 2.00 | 8.23 | F1 | mg/L | | 140 | 75 - 125 | 5 | 20 |
| Cadmium | 0.055 | | 2.00 | 2.08 | | mg/L | | 101 | 75 - 125 | 1 | 20 |
| Chromium | 0.36 | | 2.00 | 2.58 | | mg/L | | 111 | 75 - 125 | 2 | 20 |
| Lead | 2.1 | B | 2.00 | 4.36 | | mg/L | | 113 | 75 - 125 | 4 | 20 |
| Selenium | ND | | 2.00 | 1.91 | | mg/L | | 95 | 75 - 125 | 3 | 20 |
| Silver | ND | | 1.00 | 1.05 | | mg/L | | 105 | 75 - 125 | 1 | 20 |

## Method: 7470A - Mercury (CVAA)

**Lab Sample ID: MB 570-219655/1-B**
**Matrix: Solid**
**Analysis Batch: 220034**

**Client Sample ID: Method Blank**
**Prep Type: TCLP**
**Prep Batch: 219783**

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0025 | | mg/L | | 03/15/22 19:30 | 03/16/22 13:32 | 1 |

**Lab Sample ID: LCS 570-219655/2-B**
**Matrix: Solid**
**Analysis Batch: 220034**

**Client Sample ID: Lab Control Sample**
**Prep Type: TCLP**
**Prep Batch: 219783**

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | | | 0.0500 | 0.0529 | | mg/L | | 106 | 80 - 120 | | |

**Lab Sample ID: LCSD 570-219655/6-B**
**Matrix: Solid**
**Analysis Batch: 220034**

**Client Sample ID: Lab Control Sample Dup**
**Prep Type: TCLP**
**Prep Batch: 219783**

| Analyte | | | Spike Added | LCSD Result | LCSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | | | 0.0500 | 0.0530 | | mg/L | | 106 | 80 - 120 | 0 | 20 |

**Lab Sample ID: 570-85215-1 MS**
**Matrix: Solid**
**Analysis Batch: 220034**

**Client Sample ID: OD0-0026-01**
**Prep Type: TCLP**
**Prep Batch: 219783**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MS Result | MS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0500 | 0.0503 | | mg/L | | 101 | 55 - 133 | | |

**Lab Sample ID: 570-85215-1 MSD**
**Matrix: Solid**
**Analysis Batch: 220034**

**Client Sample ID: OD0-0026-01**
**Prep Type: TCLP**
**Prep Batch: 219783**

| Analyte | Sample Result | Sample Qualifier | Spike Added | MSD Result | MSD Qualifier | Unit | D | %Rec | %Rec. Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mercury | ND | | 0.0500 | 0.0504 | | mg/L | | 101 | 55 - 133 | 0 | 20 |

## Metals

### Leach Batch: 219655

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 1311 | |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 1311 | |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 1311 | |
| MB 570-219655/1-B | Method Blank | TCLP | Solid | 1311 | |
| LCS 570-219655/2-B | Lab Control Sample | TCLP | Solid | 1311 | |
| LCSD 570-219655/6-B | Lab Control Sample Dup | TCLP | Solid | 1311 | |
| 570-85215-1 MS | OD0-0026-01 | TCLP | Solid | 1311 | |
| 570-85215-1 MSD | OD0-0026-01 | TCLP | Solid | 1311 | |

### Prep Batch: 219783

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 7470A | 219655 |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 7470A | 219655 |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 7470A | 219655 |
| MB 570-219655/1-B | Method Blank | TCLP | Solid | 7470A | 219655 |
| LCS 570-219655/2-B | Lab Control Sample | TCLP | Solid | 7470A | 219655 |
| LCSD 570-219655/6-B | Lab Control Sample Dup | TCLP | Solid | 7470A | 219655 |
| 570-85215-1 MS | OD0-0026-01 | TCLP | Solid | 7470A | 219655 |
| 570-85215-1 MSD | OD0-0026-01 | TCLP | Solid | 7470A | 219655 |

### Analysis Batch: 220034

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 7470A | 219783 |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 7470A | 219783 |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 7470A | 219783 |
| MB 570-219655/1-B | Method Blank | TCLP | Solid | 7470A | 219783 |
| LCS 570-219655/2-B | Lab Control Sample | TCLP | Solid | 7470A | 219783 |
| LCSD 570-219655/6-B | Lab Control Sample Dup | TCLP | Solid | 7470A | 219783 |
| 570-85215-1 MS | OD0-0026-01 | TCLP | Solid | 7470A | 219783 |
| 570-85215-1 MSD | OD0-0026-01 | TCLP | Solid | 7470A | 219783 |

### Leach Batch: 667641

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 1311 | |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 1311 | |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 1311 | |
| MB 440-667641/1-B | Method Blank | TCLP | Solid | 1311 | |
| LCS 440-667641/2-B | Lab Control Sample | TCLP | Solid | 1311 | |
| 440-294036-A-22-E MS | Matrix Spike | TCLP | Solid | 1311 | |
| 440-294036-A-22-F MSD | Matrix Spike Duplicate | TCLP | Solid | 1311 | |

### Prep Batch: 667772

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 3010A | 667641 |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 3010A | 667641 |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 3010A | 667641 |
| MB 440-667641/1-B | Method Blank | TCLP | Solid | 3010A | 667641 |
| LCS 440-667641/2-B | Lab Control Sample | TCLP | Solid | 3010A | 667641 |
| 440-294036-A-22-E MS | Matrix Spike | TCLP | Solid | 3010A | 667641 |
| 440-294036-A-22-F MSD | Matrix Spike Duplicate | TCLP | Solid | 3010A | 667641 |

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

## Metals

### Analysis Batch: 667873

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | TCLP | Solid | 6010B | 667772 |
| 570-85215-2 | OD0-0026-02 | TCLP | Solid | 6010B | 667772 |
| 570-85215-3 | OD0-0026-03 | TCLP | Solid | 6010B | 667772 |
| MB 440-667641/1-B | Method Blank | TCLP | Solid | 6010B | 667772 |
| LCS 440-667641/2-B | Lab Control Sample | TCLP | Solid | 6010B | 667772 |
| 440-294036-A-22-E MS | Matrix Spike | TCLP | Solid | 6010B | 667772 |
| 440-294036-A-22-F MSD | Matrix Spike Duplicate | TCLP | Solid | 6010B | 667772 |

# Lab Chronicle

Client: First Solar, Inc
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

Job ID: 570-85215-1

## Client Sample ID: OD0-0026-01

**Date Collected: 02/09/22 15:00**
**Date Received: 02/17/22 13:30**

## Lab Sample ID: 570-85215-1

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| TCLP | Leach | 1311 | | | 100.20 g | 2000 mL | 667641 | 02/22/22 20:17 | | IRV 2 |
| TCLP | Prep | 3010A | | | 5 mL | 50 mL | 667772 | 02/23/22 17:20 | | IRV 2 |
| TCLP | Analysis | 6010B | | 1 | | | 667873 | 02/24/22 19:36 | P1R | IRV 2 |
| | Instrument ID: ICP8 | | | | | | | | | |
| TCLP | Leach | 1311 | | | 100.20 g | 2000 mL | 219655 | 02/22/22 20:17 | | ECL 3 |
| TCLP | Prep | 7470A | | | 10 mL | 100 mL | 219783 | 03/15/22 19:30 | VWJ7 | ECL 4 |
| TCLP | Analysis | 7470A | | 1 | | | 220034 | 03/16/22 13:38 | VWJ7 | ECL 4 |
| | Instrument ID: HG7 | | | | | | | | | |

## Client Sample ID: OD0-0026-02

**Date Collected: 02/09/22 15:00**
**Date Received: 02/17/22 13:30**

## Lab Sample ID: 570-85215-2

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| TCLP | Leach | 1311 | | | 101.30 g | 2000 mL | 667641 | 02/22/22 20:17 | | IRV 2 |
| TCLP | Prep | 3010A | | | 5 mL | 50 mL | 667772 | 02/23/22 17:20 | | IRV 2 |
| TCLP | Analysis | 6010B | | 1 | | | 667873 | 02/24/22 19:39 | P1R | IRV 2 |
| | Instrument ID: ICP8 | | | | | | | | | |
| TCLP | Leach | 1311 | | | 101.30 g | 2000 mL | 219655 | 02/22/22 20:17 | | ECL 3 |
| TCLP | Prep | 7470A | | | 10 mL | 100 mL | 219783 | 03/15/22 19:30 | VWJ7 | ECL 4 |
| TCLP | Analysis | 7470A | | 1 | | | 220034 | 03/16/22 13:43 | VWJ7 | ECL 4 |
| | Instrument ID: HG7 | | | | | | | | | |

## Client Sample ID: OD0-0026-03

**Date Collected: 02/09/22 15:00**
**Date Received: 02/17/22 13:30**

## Lab Sample ID: 570-85215-3

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dil Factor | Initial Amount | Final Amount | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|---|---|
| TCLP | Leach | 1311 | | | 100.42 g | 2000 mL | 667641 | 02/22/22 20:17 | | IRV 2 |
| TCLP | Prep | 3010A | | | 5 mL | 50 mL | 667772 | 02/23/22 17:20 | | IRV 2 |
| TCLP | Analysis | 6010B | | 1 | | | 667873 | 02/24/22 19:34 | P1R | IRV 2 |
| | Instrument ID: ICP8 | | | | | | | | | |
| TCLP | Leach | 1311 | | | 100.42 g | 2000 mL | 219655 | 02/22/22 20:17 | | ECL 3 |
| TCLP | Prep | 7470A | | | 10 mL | 100 mL | 219783 | 03/15/22 19:30 | VWJ7 | ECL 4 |
| TCLP | Analysis | 7470A | | 1 | | | 220034 | 03/16/22 13:45 | VWJ7 | ECL 4 |
| | Instrument ID: HG7 | | | | | | | | | |

**Laboratory References:**

ECL 3 = Eurofins Calscience Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494
ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494
IRV 2 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

# Accreditation/Certification Summary

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

## Laboratory: Eurofins Calscience

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority | Program | Identification Number | Expiration Date |
|---|---|---|---|
| California | Los Angeles County Sanitation Districts | 10109 | 09-30-22 |
| California | SCAQMD LAP | 17LA0919 | 11-30-21 * |
| California | State | 2944 | 09-30-22 |
| Guam | State | 21-003R | 06-22-22 |
| Nevada | State | CA00111 | 07-31-22 |
| Oregon | NELAP | CA300001 | 01-31-23 |
| USDA | US Federal Programs | P330-20-00034 | 02-10-23 |
| Washington | State | C916-18 | 10-12-22 |

## Laboratory: Eurofins Calscience

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority | Program | Identification Number | Expiration Date |
|---|---|---|---|
| California | Los Angeles County Sanitation Districts | 10256 | 06-30-22 |
| California | State | 2706 | 06-30-22 |
| Kansas | NELAP | E-10420 | 07-31-22 |
| Nevada | State | CA015312022-1 | 07-31-22 |
| Washington | State | C900 | 09-03-22 |

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

# Method Summary

Client: First Solar, Inc
Job ID: 570-85215-1
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 6010B | Metals (ICP) | SW846 | IRV 2 |
| 7470A | Mercury (CVAA) | SW846 | ECL 4 |
| 1311 | TCLP Extraction | SW846 | ECL 3 |
| 1311 | TCLP Extraction | SW846 | IRV 2 |
| 3010A | Preparation, Total Metals | SW846 | IRV 2 |
| 7470A | Preparation, Mercury | SW846 | ECL 4 |

**Protocol References:**

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

ECL 3 = Eurofins Calscience Knott, 11380 Knott Street, Garden Grove, CA 92841, TEL (714)895-5494

ECL 4 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

IRV 2 = Eurofins Calscience Tustin, 2841 Dow Avenue, Tustin, CA 92780, TEL (714)895-5494

# Sample Summary

Client: First Solar, Inc
Project/Site: Photovoltaic (PV) Modules - TCLP Metals

Job ID: 570-85215-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 570-85215-1 | OD0-0026-01 | Solid | 02/09/22 15:00 | 02/17/22 13:30 |
| 570-85215-2 | OD0-0026-02 | Solid | 02/09/22 15:00 | 02/17/22 13:30 |
| 570-85215-3 | OD0-0026-03 | Solid | 02/09/22 15:00 | 02/17/22 13:30 |

**Eurofins Calscience Irvine**
2841 Dow Avenue, Suite 100
Tustin, CA 92780
Phone (949) 261-1022 Fax (949) 260-3297

# Chain of Custody Record

eurofins Calsc

Loc: 570
85215

| Client Information | Sampler | Lab PM: Adam Squire | Carrier Tracking No(s): 12 430 69X03 93569815 | COC No: |
|---|---|---|---|---|
| Client Contact: Karissa Gordon | Phone: 419-764-3475 | E-Mail: karissa.gordon@firstsolar com | | Page: Page 1 of 1 |
| Company: First Solar Inc | | | | Job #: |
| Address: 28101 Cedar Park Blvd | Due Date Requested: | | | |
| City: Perrysburg | TAT Requested (days): | | | |
| State, Zip: OH 43551 | | | | |
| Phone: 419-662-8500 | PO #: | | | |
| Email: | WO #: | | | |
| Project Name: | Project #: | | | |
| Site: | SSOW#: | | | |

**Analysis Requested**

**Preservation Codes:**

| | |
|---|---|
| A - HCL | M - Hexane |
| B - NaOH | N - None |
| C - Zn Acetate | O - AsNaO2 |
| D - Nitric Acid | P - Na2O4S |
| E - NaHSO4 | Q - Na2SO3 |
| F - MeOH | R - Na2S2O3 |
| G - Amchlor | S - H2SO4 |
| H - Ascorbic Acid | T - TSP Dodecahydrate |
| I - Ice | U - Acetone |
| J - DI Water | V - MCAA |
| K - EDTA | W - pH 4-5 |
| L - EDA | Z - other (specify) |

Other:

| Sample Identification | Sample Date | Sample Time | Sample Type (C=comp, G=grab) | Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code: | | | | | |
| OD0-0026 -01 | 2/9/22 | 3:00 PM | COMP | SOLID | NO | | 3 | 200g (dispersed through 3 cases) |
| -02 | " | " | " | " | | | 3 | 200g |
| -03 | " | " | " | " | | | 3 | 200g |

570-85215 Chain of Custody

**Possible Hazard Identification**
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

**Sample Disposal ( A fee may be assessed if samples are retained longer than 1 month)**
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements

| Empty Kit Relinquished by: | Date: | Time: | Method of Shipment: |
|---|---|---|---|
| | | | |

| | Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |
|---|---|---|---|---|---|---|
| 1 | Karissa Gordon | 2/9/22 | First Solar | Olga Ornelas | 2/17/22 1330 | EDT |
| 2 | Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |
| 3 | Relinquished by: | Date/Time: | Company | Received by: | Date/Time: | Company |

Custody Seals Intact: Δ Yes Δ No | Custody Seal No

Cooler Temperature(s) °C and Other Remarks: IR-90 23.5/23.0

Ver: 01/16/2019

# Login Sample Receipt Checklist

Client: First Solar, Inc

Job Number: 570-85215-1

**Login Number: 85215**
**List Number: 1**
**Creator: Cruise, Noel**

**List Source: Eurofins Calscience**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| Sample custody seals, if present, are intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | False | Out of temperature for Mercury |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | False | Requested analyses are not listed on COC |
| Is the Field Sampler's name present on COC? | False | Refer to Job Narrative for details. |
| There are no discrepancies between the containers received and the COC. | True | |
| Samples are received within Holding Time (excluding tests with immediate HTs) | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| Sample Preservation Verified. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| Containers requiring zero headspace have no headspace or bubble is <6mm (1/4"). | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Residual Chlorine Checked. | N/A | |

# Surface Lot Canopy

**Offices, schools, attractions, and municipal buildings are all typically surrounded by parking lots that offer little real estate value. Adding solar canopies to these parking lots is a viable option for increasing the value of underutilized property and creating a visible commitment to sustainability goals. Canopies can be customized with a variety of architectural and stylish finishings to bring any conceptual idea to life.**

## Benefits

- Our teams will partner with you to create multiple conceptual designs, each aimed at achieving desired outcomes
- Experienced project management personnel to guide you through the whole project process from design to completed construction
- Licensed engineers provide signed and sealed drawings, as well as offer support needed during the permitting process
- With installation crews across the country, we can ensure each project is completed on time and within budget

## Make It Yours

- With several structural and geometric design options to choose from, every project can embody aesthetics and functionality
- Foundations can be designed to have minimal impact on existing parking stripe patterns
- Multiple finishing options and a catalog of additional accessories such as underdecking, snow guards, facia trim, and water management can turn any canopy into an architectural marvel
- Structures are engineered for various clearance heights and tilt angles to achieve any project goal desired