

# 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.

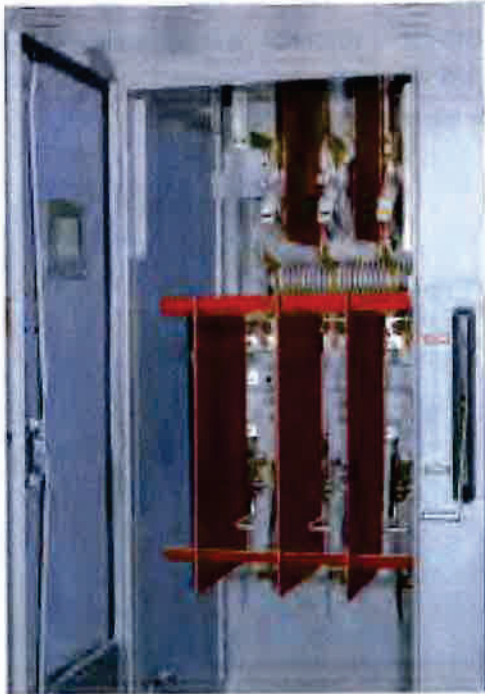
Special projects are one of our particular strengths at Park, evidenced by our outstanding record for delivering these systems on tight schedules, and often under demanding circumstances.

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 maintenance-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<sup>®</sup> Listed up to 15KV**

## SPECIFICATIONS

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

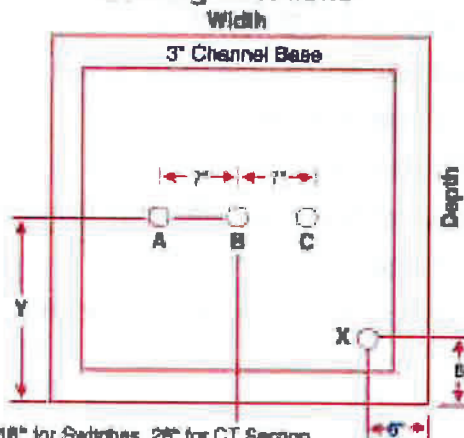
KV			Amperes, RMS					Mom. & Peak Close (ASYM KA)
Nom.	Max. Desc.	BIL	Interrupting			Mag.		
			Cont.	Load	Cap.			
5	5.5	60	600	600	35	21	40	
5	5.5	60	1200	1200	35	21	61	
15	17	95	600	600	35	21	40	
15	17	95	1200	1200	35	21	61	
25	29	125	600	400	35	21	40	
34.5	38	150	600	600	35	21	28	

**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**



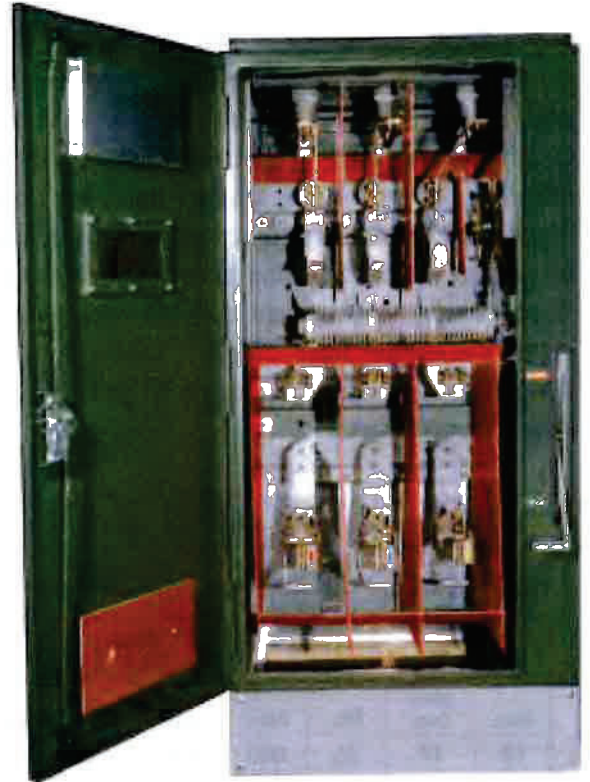
Y - 18" for Switches, 28" for CT Section  
 A, B, C - Approximate Cable Termination Points  
 X - Approximate Heating Cable Termination (for Sw only)



# 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 to 15KV

## SPECIFICATIONS

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

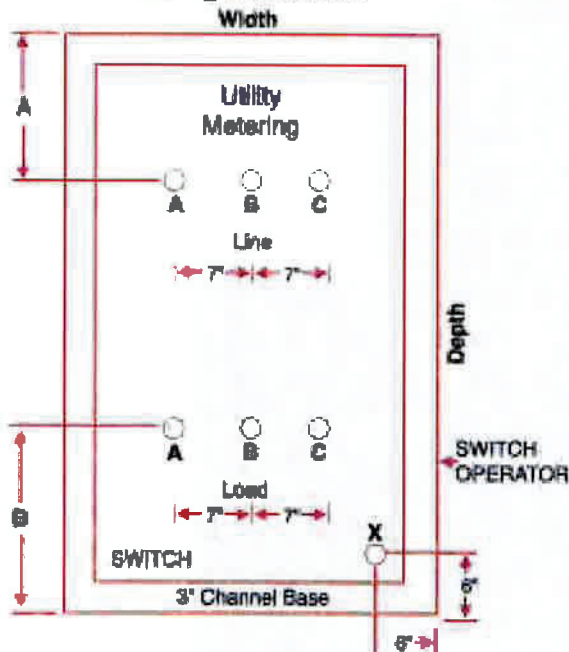
KV			Amperes, RMS					Mom. & Fault Close (ASYM KA)
Nom.	Max. Des.	BIL	Interrupting					
			Cont.	Load	Cap.	Meg.		
15	17	96	600	600	35	21	40	
25	29	125	600	400	35	21	40	

### 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-265



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.

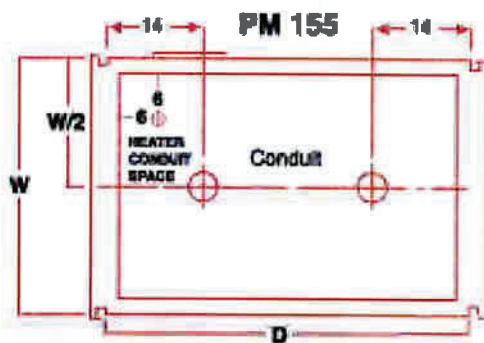
Interruptor switches are maintenance-free and rated at 600 amp. S&C® Power Fuses provide full-fault-spectrum protection. Switches are manually operated by removable switch handles. Bus connections are silverplated copper for long life.

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

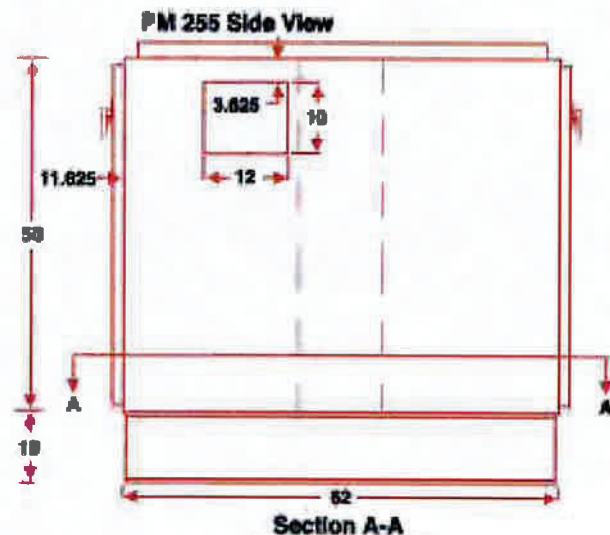
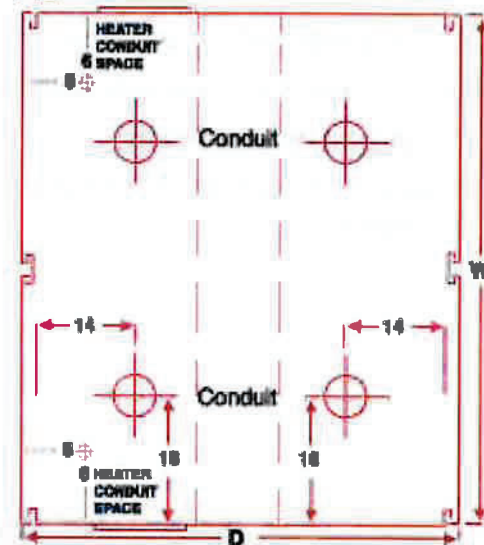
## SPECIFICATIONS

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

\*Height includes 10" base.



### PM 255





## **POWER DISTRIBUTION SYSTEMS**

### **RELIABLE POWER DISTRIBUTION SYSTEMS FOR EVERY REQUIREMENT**

- Busway
- Switchgear
- Switchboards
- Panelboards
- Transformer Enclosures
- Multiple Service Cabinets
- Standard & Custom Enclosures
- Control Panels

**WWW.PARKDETROIT.COM**  
**EMAIL: INFO@PARKDETROIT.COM**  
**1-800-796-PARK**



## 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 reinforced 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
Voltagess	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
35kV	26400
	33000
	34500

Fig 1. Padmount Transformer Outline

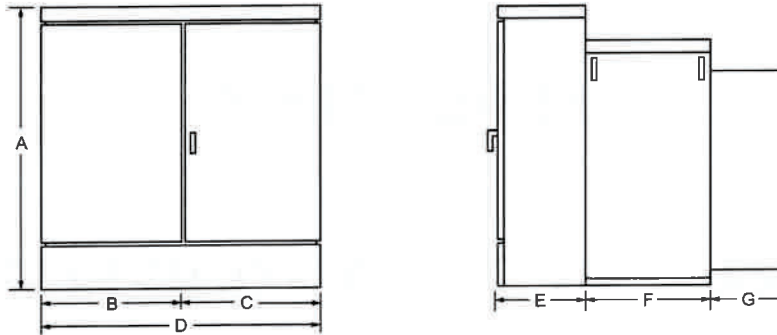


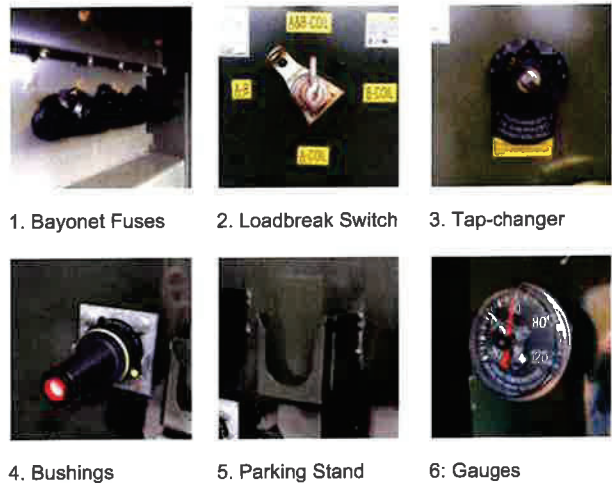
Table 2. Approximate Transformer Dimensions

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



# 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



Model Name	CPS SCH100KTL-DO/US-600	CPS SCH125KTL-DO/US-600
<b>DC Input</b>		
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 <sup>1</sup>	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 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)	
<b>AC Output</b>		
Rated AC output power	100 kW	125 kW
Max. AC output power <sup>2</sup>	100 kVA (111 kVA @ PF>0.9)	125 kVA (132 kVA @ PF>0.95)
Rated output voltage	600 Vac	
Output voltage range <sup>3</sup>	528-660 Vac	
Grid connection type <sup>4</sup>	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 <sup>3</sup>	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)	
<b>System</b>		
Topology	Transformerless	
Max. efficiency	99.1%	
CEC efficiency	98.5%	
Stand-by / night consumption	<4 W	
<b>Environment</b>		
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 <sup>5</sup>	-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	
<b>Display and Communication</b>		
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)	
<b>Mechanical</b>		
Dimensions (W x H x D)	Standard Wire-box: 45.28 x 24.25 x 9.84 in (1150 x 616 x 250 mm) Centralized Wire-box: 39.37 x 24.25 x 9.84 in (1000 x 616 x 250 mm)	
Weight	Inverter: 121 lbs (55 kg) Standard Wire-box: 55 lbs (25 kg) 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) 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) Centralized Wire-box: Busbar, M10 bolts (wire range: #1AWG - 500kcmil CU/AL [1 termination per pole], #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)	
<b>Safety</b>		
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 <sup>6</sup> , CA Rule 21, ISO-NE	
Smart-grid features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt	
<b>Warranty</b>		
Standard <sup>7</sup>	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.



# Series 7 TR1.

## 505-540 Watt Thin Film Solar Module

Series 7 TR1 thin film solar modules combine First Solar's thin film technology with an optimized structural design to deliver improved efficiency, enhanced installation velocity, and unmatched lifetime energy performance for large/utility-scale PV projects.



### More Lifetime Energy per Nameplate Watt

- Industry's best (0.3%/yr) warranted degradation rate (>89% power output after 30 years)
- Superior temperature coefficient, spectral and shading response



### Unmatched Quality and Reliability

- End-to-end manufacturing process for globally consistent quality
- Tested and certified to IEC standards and beyond
- Durable glass/glass construction
- Immune to and warranted against power loss from cell cracking
- 30-year Linear Performance Warranty
- 12-year Limited Product Warranty



### Optimized Module Design

- Optimized back rail mount design enhances installation velocity
- Frameless design improves soiling and snow shedding
- Dual junction box design reduces wire management complexity and cost



### Industry's Most Eco-efficient PV Solution

- Industry leading carbon footprint, water footprint and energy payback time
- Globally available PV module recycling services



### America's Solar Company

- Designed, responsibly sourced, and manufactured in the USA

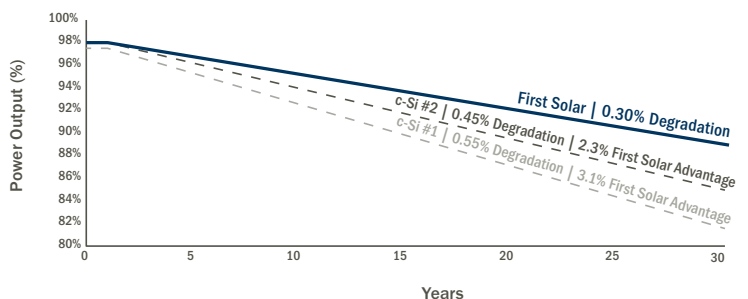
**19.3%**  
HIGH BIN EFFICIENCY

**30YR**  
LINEAR PERFORMANCE  
WARRANTY

**98%**  
WARRANTY START POINT

**0.3%**  
WARRANTED ANNUAL  
DEGRADATION RATE

**First Solar Lifetime Energy Advantage**  
From 30 Year Warranted Annual Power Degradation



Learn more about First Solar and Series 7 TR1 at [firstsolar.com/S7](https://firstsolar.com/S7)

# Series 7 TR1.

## Electrical Specifications

**MODEL TYPES: FS-7XXXA-TR1** (XXX = NOMINAL POWER)  
**RATINGS AT STANDARD TEST CONDITIONS** (1000W/m<sup>2</sup>, AM 1.5, 25°C)<sup>2</sup>

Nominal Power <sup>3</sup> (-0/+5%)	P <sub>MAX</sub> (W)	505	510	515	520	525	530	535	540
Efficiency (%)	%	18.1	18.3	18.4	18.6	18.8	19.0	19.1	19.3
Cell Efficiency (%)	%	18.9	19.1	19.3	19.5	19.7	19.9	20.1	20.3
Voltage at P <sub>MAX</sub>	V <sub>MAX</sub> (V)	182.5	183.4	184.3	185.2	186.0	186.9	187.8	188.7
Current at P <sub>MAX</sub>	I <sub>MAX</sub> (A)	2.77	2.78	2.80	2.81	2.82	2.84	2.85	2.86
Open Circuit Voltage	V <sub>OC</sub> (V)	223.9	224.5	225.0	225.6	226.1	226.7	227.2	227.7
Short Circuit Current	I <sub>SC</sub> (A)	3.01	3.02	3.03	3.04	3.04	3.05	3.06	3.06
Maximum System Voltage	V <sub>SYS</sub> (V)	1500 <sup>5</sup>							
Limiting Reverse Current	I <sub>R</sub> (A)	5.0							
Maximum Series Fuse	I <sub>CF</sub> (A)	5.0							

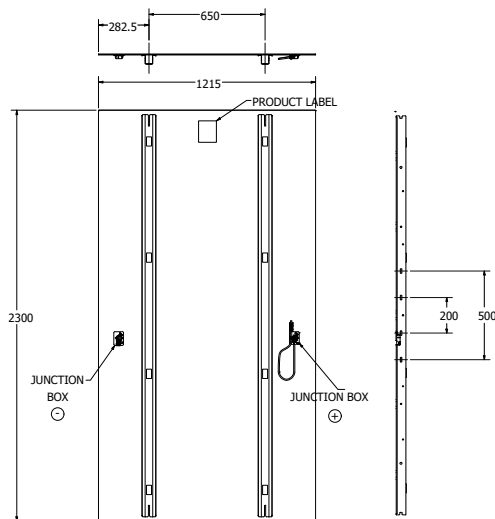
**RATINGS AT NOMINAL OPERATING CELL TEMPERATURE OF 45°C** (800W/m<sup>2</sup>, 20°C air temperature, AM 1.5, 1m/s wind speed)<sup>2</sup>

Nominal Power	P <sub>MAX</sub> (W)	378.1	381.8	385.6	389.4	393.2	396.8	400.6	404.4
Voltage at P <sub>MAX</sub>	V <sub>MAX</sub> (V)	168.8	169.7	170.6	170.8	171.7	172.5	173.4	174.3
Current at P <sub>MAX</sub>	I <sub>MAX</sub> (A)	2.24	2.25	2.26	2.28	2.29	2.30	2.31	2.32
Open Circuit Voltage	V <sub>OC</sub> (V)	211.9	212.4	212.9	213.5	214.0	214.5	215.0	215.5
Short Circuit Current	I <sub>SC</sub> (A)	2.44	2.44	2.45	2.45	2.46	2.47	2.47	2.48

### TEMPERATURE CHARACTERISTICS

Module Operating Temperature Range	(°C)	-40 to +85
Temperature Coefficient of P <sub>MAX</sub>	T <sub>K</sub> (P <sub>MAX</sub> )	-0.32%/°C [Temperature Range: 25°C to 75°C]
Temperature Coefficient of V <sub>OC</sub>	T <sub>K</sub> (V <sub>OC</sub> )	-0.28%/°C
Temperature Coefficient of I <sub>SC</sub>	T <sub>K</sub> (I <sub>SC</sub> )	+0.04%/°C

## Mechanical Specifications



### PACKAGING INFORMATION

Model Type	Modules Per Pack	Packs per 53' Container
FS-7XXXA-TR1	46	10



LEADING THE WORLD'S  
SUSTAINABLE ENERGY FUTURE

#### Disclaimer

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## Certifications & Tests<sup>4</sup>

### CERTIFICATIONS & LISTINGS

UL 61730 1500V Listed  
 IEC 61215:2021 & 61730-1:2016<sup>5</sup>  
 IEC 61701 Salt Mist Corrosion  
 IEC 60068-2-68 Dust and Sand Resistance  
 IEC 62716 Ammonia Corrosion

### EXTENDED DURABILITY TESTS

IEC 63209-1 Extended Stress Test  
 Long-Term Sequential  
 Thresher Test  
 PID Resistant

### QUALITY & EHS

ISO 9001:2015  
 ISO 14001:2015  
 ISO 45001:2018  
 ISO 14064-3:2006  
 EPEAT Silver Registered



### MECHANICAL DESCRIPTION

Length	2300mm
Width	1215mm
Area	2.79m <sup>2</sup>
Module Weight	39.7kg
Leadwire <sup>6</sup>	2.5mm <sup>2</sup> , 650mm (+) & 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
Back Rail Material	Galvanized steel
Front Glass	Heat strengthened
Back Glass	Heat strengthened
Encapsulation	Laminate material with edge seal
Frame to Glass Adhesive	Silicone
Load Rating	2400Pa

Install in portrait only

- Limited power output and product warranties subject to warranty terms and conditions
- All ratings ±10%, unless specified otherwise. Specifications are subject to change
- Measurement uncertainty applies
- Testing Certifications/Listings pending
- IEC 61730-1: 2016 Class II
- Leadwire length from junction box exit to connector mating surface



# Series 7 TCLP Report

March 3, 2023

## 1 INTRODUCTION

The purpose of this report is to provide waste characterization of First Solar Series 7 photovoltaic (PV) modules using USEPA Method 1311 Toxicity Characteristic Leaching Procedure (TCLP).

## 2 METHODS

In February, 2023, First Solar provided four Series 7 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<sup>1</sup>.

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

# ANALYTICAL REPORT

## PREPARED FOR

Attn: Adam Squire  
First Solar, Inc  
28101 Cedar Park Blvd  
Perrysburg, Ohio 43551  
Generated 2/27/2023 8:28:17 AM

## JOB DESCRIPTION

Photovoltaic (PV) Modules - TCLP Metals

## JOB NUMBER

570-128263-1



# Eurofins Calscience

## Job Notes

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The data in the report relate to the field sample(s) as received by the laboratory and associated QC. All results have been reviewed and have been found to be compliant with laboratory and accreditation requirements, with the exception of the noted deviation(s). For questions, please contact the Project Manager.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Calscience Project Manager.

## Authorization



Authorized for release by  
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# Definitions/Glossary

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

Job ID: 570-128263-1

## 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.
α	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

# Case Narrative

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

Job ID: 570-128263-1

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**Job ID: 570-128263-1**

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**Laboratory: Eurofins Calscience**

## Narrative

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**Job Narrative**  
**570-128263-1**

## Comments

No additional comments.

## Receipt

The samples were received on 2/17/2023 11:10 AM. Unless otherwise noted below, the samples arrived in good condition. The temperature of the cooler at receipt was 14.1° C.

## Metals

Method 7470A: The matrix spike (MS) recoveries for preparation batch 570-305425 and 570-306195 and analytical batch 570-306439 were outside control limits. Non-homogeneity is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

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

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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- 11
- 12
- 13
- 14

# Detection Summary

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

Job ID: 570-128263-1

**Client Sample ID: OD0-0040-01**

**Lab Sample ID: 570-128263-1**

No Detections.

**Client Sample ID: OD0-0040-02**

**Lab Sample ID: 570-128263-2**

No Detections.

**Client Sample ID: OD0-0040-03**

**Lab Sample ID: 570-128263-3**

No Detections.

**Client Sample ID: OD0-0040-04**

**Lab Sample ID: 570-128263-4**

No Detections.

- 1
- 2
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- 4
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- 11
- 12
- 13
- 14

This Detection Summary does not include radiochemical test results.

Eurofins Calscience

# Client Sample Results

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

Job ID: 570-128263-1

## Method: SW846 6010B - Metals (ICP) - TCLP

**Client Sample ID: OD0-0040-01**  
**Date Collected: 02/03/23 10:15**  
**Date Received: 02/17/23 11:10**

**Lab Sample ID: 570-128263-1**  
**Matrix: Solid**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:26	1
Arsenic	ND		1.0		mg/L		02/22/23 11:00	02/23/23 02:26	1
Barium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:26	1
Cadmium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:26	1
Chromium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:26	1
Lead	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:26	1
Selenium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:26	1

**Client Sample ID: OD0-0040-02**  
**Date Collected: 02/03/23 10:15**  
**Date Received: 02/17/23 11:10**

**Lab Sample ID: 570-128263-2**  
**Matrix: Solid**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:29	1
Arsenic	ND		1.0		mg/L		02/22/23 11:00	02/23/23 02:29	1
Barium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:29	1
Cadmium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:29	1
Chromium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:29	1
Lead	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:29	1
Selenium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:29	1

**Client Sample ID: OD0-0040-03**  
**Date Collected: 02/03/23 10:15**  
**Date Received: 02/17/23 11:10**

**Lab Sample ID: 570-128263-3**  
**Matrix: Solid**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:31	1
Arsenic	ND		1.0		mg/L		02/22/23 11:00	02/23/23 02:31	1
Barium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:31	1
Cadmium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:31	1
Chromium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:31	1
Lead	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:31	1
Selenium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:31	1

**Client Sample ID: OD0-0040-04**  
**Date Collected: 02/03/23 10:15**  
**Date Received: 02/17/23 11:10**

**Lab Sample ID: 570-128263-4**  
**Matrix: Solid**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:34	1
Arsenic	ND		1.0		mg/L		02/22/23 11:00	02/23/23 02:34	1
Barium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:34	1
Cadmium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 02:34	1
Chromium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:34	1
Lead	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:34	1
Selenium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 02:34	1

# Client Sample Results

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

Job ID: 570-128263-1

## Method: SW846 7470A - Mercury (CVAA) - TCLP

Client Sample ID: OD0-0040-01  
Date Collected: 02/03/23 10:15  
Date Received: 02/17/23 11:10

Lab Sample ID: 570-128263-1  
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0025		mg/L		02/22/23 20:48	02/23/23 12:59	1

Client Sample ID: OD0-0040-02  
Date Collected: 02/03/23 10:15  
Date Received: 02/17/23 11:10

Lab Sample ID: 570-128263-2  
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0025		mg/L		02/22/23 20:48	02/23/23 13:01	1

Client Sample ID: OD0-0040-03  
Date Collected: 02/03/23 10:15  
Date Received: 02/17/23 11:10

Lab Sample ID: 570-128263-3  
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0025		mg/L		02/22/23 20:48	02/23/23 13:03	1

Client Sample ID: OD0-0040-04  
Date Collected: 02/03/23 10:15  
Date Received: 02/17/23 11:10

Lab Sample ID: 570-128263-4  
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0025		mg/L		02/22/23 20:48	02/23/23 13:05	1

# QC Sample Results

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

Job ID: 570-128263-1

## Method: 6010B - Metals (ICP)

**Lab Sample ID: LB 570-305425/1-B**  
**Matrix: Solid**  
**Analysis Batch: 306250**

**Client Sample ID: Method Blank**  
**Prep Type: TCLP**  
**Prep Batch: 305993**

Analyte	LB LB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Silver	ND		0.10		mg/L		02/22/23 11:00	02/23/23 01:43	1
Arsenic	ND		1.0		mg/L		02/22/23 11:00	02/23/23 01:43	1
Barium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 01:43	1
Cadmium	ND		0.10		mg/L		02/22/23 11:00	02/23/23 01:43	1
Chromium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 01:43	1
Lead	ND		0.50		mg/L		02/22/23 11:00	02/23/23 01:43	1
Selenium	ND		0.50		mg/L		02/22/23 11:00	02/23/23 01:43	1

**Lab Sample ID: LCS 570-305425/2-B**  
**Matrix: Solid**  
**Analysis Batch: 306250**

**Client Sample ID: Lab Control Sample**  
**Prep Type: TCLP**  
**Prep Batch: 305993**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	2.00	1.86		mg/L		93	80 - 120
Barium	2.00	1.88		mg/L		94	80 - 120
Cadmium	2.00	1.86		mg/L		93	80 - 120
Chromium	2.00	1.90		mg/L		95	80 - 120
Lead	2.00	1.88		mg/L		94	80 - 120
Selenium	2.00	1.76		mg/L		88	80 - 120

**Lab Sample ID: LCSD 570-305425/3-B**  
**Matrix: Solid**  
**Analysis Batch: 306250**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: TCLP**  
**Prep Batch: 305993**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Arsenic	2.00	1.86		mg/L		93	80 - 120	0	20
Barium	2.00	1.88		mg/L		94	80 - 120	0	20
Cadmium	2.00	1.85		mg/L		92	80 - 120	1	20
Chromium	2.00	1.90		mg/L		95	80 - 120	0	20
Lead	2.00	1.86		mg/L		93	80 - 120	1	20
Selenium	2.00	1.67		mg/L		84	80 - 120	5	20

**Lab Sample ID: 570-128186-A-1-C MS**  
**Matrix: Solid**  
**Analysis Batch: 306250**

**Client Sample ID: Matrix Spike**  
**Prep Type: TCLP**  
**Prep Batch: 305993**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Arsenic	ND		2.00	1.83		mg/L		91	80 - 140
Barium	0.39		2.00	2.27		mg/L		94	87 - 123
Cadmium	ND		2.00	1.81		mg/L		91	82 - 124
Chromium	ND		2.00	1.91		mg/L		96	86 - 122
Lead	ND		2.00	1.87		mg/L		94	84 - 120
Selenium	ND		2.00	1.67		mg/L		83	79 - 127



# QC Sample Results

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

Job ID: 570-128263-1

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

Lab Sample ID: 570-128186-A-1-D MSD  
 Matrix: Solid  
 Analysis Batch: 306250

Client Sample ID: Matrix Spike Duplicate  
 Prep Type: TCLP  
 Prep Batch: 305993

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits	RPD	
Silver	ND		1.00	0.950		mg/L		95	86 - 128	1	7
Arsenic	ND		2.00	1.90		mg/L		95	80 - 140	4	11
Barium	0.39		2.00	2.25		mg/L		93	87 - 123	1	6
Cadmium	ND		2.00	1.83		mg/L		91	82 - 124	1	7
Chromium	ND		2.00	1.91		mg/L		96	86 - 122	0	8
Lead	ND		2.00	1.87		mg/L		94	84 - 120	0	7
Selenium	ND		2.00	1.80		mg/L		90	79 - 127	7	9

## Method: 7470A - Mercury (CVAA)

Lab Sample ID: LB 570-305425/1-C  
 Matrix: Solid  
 Analysis Batch: 306439

Client Sample ID: Method Blank  
 Prep Type: TCLP  
 Prep Batch: 306195

Analyte	LB	LB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Mercury	ND		0.0025		mg/L		02/22/23 20:48	02/23/23 12:37	1

Lab Sample ID: LCS 570-305425/2-C  
 Matrix: Solid  
 Analysis Batch: 306439

Client Sample ID: Lab Control Sample  
 Prep Type: TCLP  
 Prep Batch: 306195

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	%Rec
		Result	Qualifier				Limits
Mercury	0.0400	0.0358		mg/L		90	80 - 120

Lab Sample ID: LCSD 570-305425/3-C  
 Matrix: Solid  
 Analysis Batch: 306439

Client Sample ID: Lab Control Sample Dup  
 Prep Type: TCLP  
 Prep Batch: 306195

Analyte	Spike Added	LCSD	LCSD	Unit	D	%Rec	%Rec	RPD	Limit
		Result	Qualifier				Limits	RPD	
Mercury	0.0400	0.0361		mg/L		90	80 - 120	1	10

Lab Sample ID: 570-125329-A-51-H MS  
 Matrix: Solid  
 Analysis Batch: 306439

Client Sample ID: Matrix Spike  
 Prep Type: TCLP  
 Prep Batch: 306195

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec
	Result	Qualifier	Added	Result	Qualifier				Limits
Mercury	0.041	F1	0.0400	0.0722	F1	mg/L		79	80 - 120

Lab Sample ID: 570-125329-A-51-I MSD  
 Matrix: Solid  
 Analysis Batch: 306439

Client Sample ID: Matrix Spike Duplicate  
 Prep Type: TCLP  
 Prep Batch: 306195

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits	RPD	
Mercury	0.041	F1	0.0400	0.0727		mg/L		80	80 - 120	1	20

# QC Association Summary

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

Job ID: 570-128263-1

## Metals

### Leach Batch: 305425

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-128263-1	OD0-0040-01	TCLP	Solid	1311	
570-128263-2	OD0-0040-02	TCLP	Solid	1311	
570-128263-3	OD0-0040-03	TCLP	Solid	1311	
570-128263-4	OD0-0040-04	TCLP	Solid	1311	
LB 570-305425/1-B	Method Blank	TCLP	Solid	1311	
LB 570-305425/1-C	Method Blank	TCLP	Solid	1311	
LCS 570-305425/2-B	Lab Control Sample	TCLP	Solid	1311	
LCS 570-305425/2-C	Lab Control Sample	TCLP	Solid	1311	
LCSD 570-305425/3-B	Lab Control Sample Dup	TCLP	Solid	1311	
LCSD 570-305425/3-C	Lab Control Sample Dup	TCLP	Solid	1311	
570-125329-A-51-H MS	Matrix Spike	TCLP	Solid	1311	
570-125329-A-51-I MSD	Matrix Spike Duplicate	TCLP	Solid	1311	
570-128186-A-1-C MS	Matrix Spike	TCLP	Solid	1311	
570-128186-A-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

### Prep Batch: 305993

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-128263-1	OD0-0040-01	TCLP	Solid	3010A	305425
570-128263-2	OD0-0040-02	TCLP	Solid	3010A	305425
570-128263-3	OD0-0040-03	TCLP	Solid	3010A	305425
570-128263-4	OD0-0040-04	TCLP	Solid	3010A	305425
LB 570-305425/1-B	Method Blank	TCLP	Solid	3010A	305425
LCS 570-305425/2-B	Lab Control Sample	TCLP	Solid	3010A	305425
LCSD 570-305425/3-B	Lab Control Sample Dup	TCLP	Solid	3010A	305425
570-128186-A-1-C MS	Matrix Spike	TCLP	Solid	3010A	305425
570-128186-A-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	3010A	305425

### Prep Batch: 306195

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-128263-1	OD0-0040-01	TCLP	Solid	7470A	305425
570-128263-2	OD0-0040-02	TCLP	Solid	7470A	305425
570-128263-3	OD0-0040-03	TCLP	Solid	7470A	305425
570-128263-4	OD0-0040-04	TCLP	Solid	7470A	305425
LB 570-305425/1-C	Method Blank	TCLP	Solid	7470A	305425
LCS 570-305425/2-C	Lab Control Sample	TCLP	Solid	7470A	305425
LCSD 570-305425/3-C	Lab Control Sample Dup	TCLP	Solid	7470A	305425
570-125329-A-51-H MS	Matrix Spike	TCLP	Solid	7470A	305425
570-125329-A-51-I MSD	Matrix Spike Duplicate	TCLP	Solid	7470A	305425

### Analysis Batch: 306250

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-128263-1	OD0-0040-01	TCLP	Solid	6010B	305993
570-128263-2	OD0-0040-02	TCLP	Solid	6010B	305993
570-128263-3	OD0-0040-03	TCLP	Solid	6010B	305993
570-128263-4	OD0-0040-04	TCLP	Solid	6010B	305993
LB 570-305425/1-B	Method Blank	TCLP	Solid	6010B	305993
LCS 570-305425/2-B	Lab Control Sample	TCLP	Solid	6010B	305993
LCSD 570-305425/3-B	Lab Control Sample Dup	TCLP	Solid	6010B	305993
570-128186-A-1-C MS	Matrix Spike	TCLP	Solid	6010B	305993
570-128186-A-1-D MSD	Matrix Spike Duplicate	TCLP	Solid	6010B	305993

# QC Association Summary

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

Job ID: 570-128263-1

## Metals

### Analysis Batch: 306439

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-128263-1	OD0-0040-01	TCLP	Solid	7470A	306195
570-128263-2	OD0-0040-02	TCLP	Solid	7470A	306195
570-128263-3	OD0-0040-03	TCLP	Solid	7470A	306195
570-128263-4	OD0-0040-04	TCLP	Solid	7470A	306195
LB 570-305425/1-C	Method Blank	TCLP	Solid	7470A	306195
LCS 570-305425/2-C	Lab Control Sample	TCLP	Solid	7470A	306195
LCSD 570-305425/3-C	Lab Control Sample Dup	TCLP	Solid	7470A	306195
570-125329-A-51-H MS	Matrix Spike	TCLP	Solid	7470A	306195
570-125329-A-51-I MSD	Matrix Spike Duplicate	TCLP	Solid	7470A	306195



# Lab Chronicle

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

Job ID: 570-128263-1

**Client Sample ID: OD0-0040-01**

**Lab Sample ID: 570-128263-1**

**Date Collected: 02/03/23 10:15**

**Matrix: Solid**

**Date Received: 02/17/23 11:10**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.03 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	305993	02/22/23 11:00	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			306250	02/23/23 02:26	K1UV	EET CAL 4
Instrument ID: ICP11										
TCLP	Leach	1311			100.03 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	7470A			5 mL	50 mL	306195	02/22/23 20:48	CS5Z	EET CAL 4
TCLP	Analysis	7470A		1			306439	02/23/23 12:59	C0YH	EET CAL 4
Instrument ID: HG8										

**Client Sample ID: OD0-0040-02**

**Lab Sample ID: 570-128263-2**

**Date Collected: 02/03/23 10:15**

**Matrix: Solid**

**Date Received: 02/17/23 11:10**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.03 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	305993	02/22/23 11:00	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			306250	02/23/23 02:29	K1UV	EET CAL 4
Instrument ID: ICP11										
TCLP	Leach	1311			100.03 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	7470A			5 mL	50 mL	306195	02/22/23 20:48	CS5Z	EET CAL 4
TCLP	Analysis	7470A		1			306439	02/23/23 13:01	C0YH	EET CAL 4
Instrument ID: HG8										

**Client Sample ID: OD0-0040-03**

**Lab Sample ID: 570-128263-3**

**Date Collected: 02/03/23 10:15**

**Matrix: Solid**

**Date Received: 02/17/23 11:10**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.06 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	305993	02/22/23 11:00	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			306250	02/23/23 02:31	K1UV	EET CAL 4
Instrument ID: ICP11										
TCLP	Leach	1311			100.06 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	7470A			5 mL	50 mL	306195	02/22/23 20:48	CS5Z	EET CAL 4
TCLP	Analysis	7470A		1			306439	02/23/23 13:03	C0YH	EET CAL 4
Instrument ID: HG8										

**Client Sample ID: OD0-0040-04**

**Lab Sample ID: 570-128263-4**

**Date Collected: 02/03/23 10:15**

**Matrix: Solid**

**Date Received: 02/17/23 11:10**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	3010A			5 mL	50 mL	305993	02/22/23 11:00	ECX6	EET CAL 4
TCLP	Analysis	6010B		1			306250	02/23/23 02:34	K1UV	EET CAL 4
Instrument ID: ICP11										

# Lab Chronicle

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

Job ID: 570-128263-1

**Client Sample ID: OD0-0040-04**

**Lab Sample ID: 570-128263-4**

**Date Collected: 02/03/23 10:15**

**Matrix: Solid**

**Date Received: 02/17/23 11:10**

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			100.04 g	2000 mL	305425	02/20/23 19:00	XBO9	EET CAL 4
TCLP	Prep	7470A			5 mL	50 mL	306195	02/22/23 20:48	CS5Z	EET CAL 4
TCLP	Analysis	7470A		1			306439	02/23/23 13:05	COYH	EET CAL 4

Instrument ID: HG8

<sup>†</sup> Completion dates and times are reported or not reported per method requirements or individual lab discretion.

### Laboratory References:

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



# Accreditation/Certification Summary

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

Job ID: 570-128263-1

## 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
Arizona	State	AZ0830	11-16-23
California	Los Angeles County Sanitation Districts	10109	07-31-23
California	SCAQMD LAP	17LA0919	11-30-23
California	State	3082	07-31-24
Nevada	State	CA00111	08-01-23
Oregon	NELAP	4175	02-02-24
USDA	US Federal Programs	P330-22-00059	05-24-23
Washington	State	C916-18	10-11-23

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# Method Summary

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

Job ID: 570-128263-1

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	EET CAL 4
7470A	Mercury (CVAA)	SW846	EET CAL 4
1311	TCLP Extraction	SW846	EET CAL 4
3010A	Preparation, Total Metals	SW846	EET CAL 4
7470A	Preparation, Mercury	SW846	EET CAL 4

**Protocol References:**

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

**Laboratory References:**

EET CAL 4 = 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

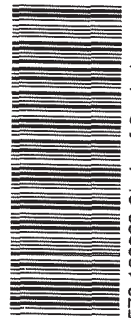
Job ID: 570-128263-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
570-128263-1	OD0-0040-01	Solid	02/03/23 10:15	02/17/23 11:10
570-128263-2	OD0-0040-02	Solid	02/03/23 10:15	02/17/23 11:10
570-128263-3	OD0-0040-03	Solid	02/03/23 10:15	02/17/23 11:10
570-128263-4	OD0-0040-04	Solid	02/03/23 10:15	02/17/23 11:10

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# Chain of Custody Record

<b>Client Information</b>		Sampler: Matt Wilson		Lab PIV: Adam Squire		Carrier Tracking No(s):		COC No:			
Client Contact: Pankhit Sinha		Phone: 480 619 3960		E-Mail: Pankhit.Sinha@FIRSTSOLAR.COM		Page: Page 1 of 1		Job #:			
Company: First Solar Inc.		Address: 28101 Cedar Park Blvd		City: Perrysburg		State Zip: OH 43551		Phone: (419) 322-2359			
Email: adam.squire@firstsolar.com		Quote Number: 57014388 - 0		Project #:		SSOW#:		Due Date Requested:			
TAT Requested (days): 10		PO #: pay w/ CC		WO #:		Project Name:		Site:			
<b>Sample Identification</b>		Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, G=gas, O=oil)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCLP RCRA 8 List-Metals (minus Hg)	TCLP Mercury	Total Number of Containers	Special Instructions/Note:
ODO-0040-01	2023-02-02	10 15 AM	G	S	N	N	Y	Y	1	150g provided	
ODO-0040-02	2023-02-03	10 15 AM	G	S	N	N	Y	Y	1	150g provided	
ODO-0040-03	2023-02-03	10 15 AM	G	S	N	N	Y	Y	1	150g provided	
ODO-0040-04	2023-02-03	10 15 AM	G	S	N	N	Y	Y	1	150g provided	
 570-128263 Chain of Custody											
<b>Possible Hazard Identification</b> <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested I, II, III, IV Other (specify)											
<b>Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)</b> <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months											
<b>Empty Kit Relinquished by:</b> _____ Date: _____ Time: _____ Method of Shipment: _____											
<b>Relinquished by:</b> <u>Matthew Wilson</u> Date/Time: <u>2-13-23 6:43:35 pm</u> Company: <u>First Solar</u>											
<b>Relinquished by:</b> _____ Date/Time: _____ Company: _____											
<b>Relinquished by:</b> _____ Date/Time: _____ Company: _____											
Custody Seals Intact: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Custody Seal No _____ Cooler Temperature(s) °C and Other Remarks: <u>no ice 14-1/14 J scu</u>											



# Login Sample Receipt Checklist

Client: First Solar, Inc

Job Number: 570-128263-1

**Login Number: 128263**

**List Number: 1**

**Creator: Yu, Tiffany**

**List Source: Eurofins Calscience**

Question	Answer	Comment
Radioactivity wasn't checked or is <math>\leq</math> 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.	True	
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.	True	
Is the Field Sampler's name present on COC?	True	
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 <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

