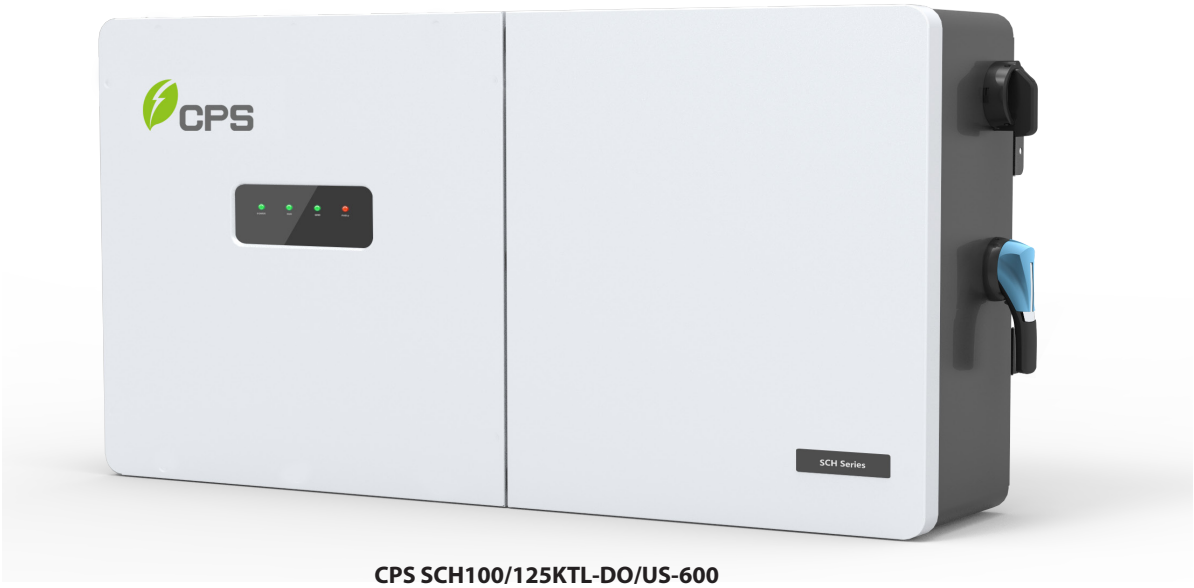
100/125kW, 1500Vdc String Inverters for North America



CPS SCH100/125KTL-DO/US-600

The 100 & 125kW 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 100/125kW 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, NEC 2014 and 2017 compliant
- Touch safe DC Fuse holders adds convenience and safety
- CPS FlexOM Gateway enables remote FW upgrades
- Integrated AC & DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper and Aluminum compatible AC connections
- NEMA Type 4X outdoor rated, tough tested enclosure
- Advanced Smart-Grid features (CA Rule 21 certified)
- kVA Headroom yields 100kW @ 0.9PF and 125kW @ 0.95PF
- Generous 1.87 and 1.5 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

Chint Power Systems America
6800 Koll Center Parkway, Suite 235 Pleasanton, CA 94566
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	187.5kW	
Max. DC Input Voltage	1500V	
Operating DC Input Voltage Range	860-1450Vdc	
Start-up DC Input Voltage / Power	900V / 250W	
Number of MPP Trackers	1	
MPPT Voltage Range[1]	870-1300Vdc	
Max. PV Input Current (Isc x1.25)	275A	
Number of DC Inputs	20 PV source circuits, pos. & neg. fused (Standard Wire-box) 1 PV output circuit, 1-2 terminations per pole, non-fused (Centralized Wire-box)	
DC Disconnection Type	Load-rated DC switch	
DC Surge Protection	Type II MOV (with indicator/remote signaling), Up=2.5kV, In=20kA (8/20uS)	
AC Output		
Rated AC Output Power	100kW	125kW
Max. AC Output Power[2]	100kVA (111KVA @ PF>0.9)	125kVA (132KVA @ PF>0.95)
Rated Output Voltage	600Vac	
Output Voltage Range[3]	528-660Vac	
Grid Connection Type[4]	3Φ / PE / N (Neutral optional)	
Max. AC Output Current @600Vac	96.2/106.8A	120.3/127.0A
Rated Output Frequency	60Hz	
Output Frequency Range[3]	57-63Hz	
Power Factor	>0.99 (±0.8 adjustable)	>0.99 (±0.8 adjustable)
Current THD	<3%	
Max. Fault Current Contribution (1-cycle RMS)	41.47A	
Max. OCPD Rating	200A	
AC Disconnection Type	Load-rated AC switch	
AC Surge Protection	Type II MOV (with indicator/remote signaling), Up=2.5kV, In=20kA (8/20uS)	
System		
Topology	Transformerless	
Max. Efficiency	99.1%	
CEC Efficiency	98.5%	
Stand-by / Night Consumption	<4W	
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	8202ft / 2500m (no derating)	
Audible Noise	<65dBA@1m 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 / FW Upgrade Functions	Standard / (with FlexOM Gateway)	
Mechanical		
Dimensions (WxHxD)	45.28x24.25x9.84in (1150x616x250mm) with Standard Wire-box 39.37x24.25x9.84in (1000x616x250mm) with Centralized Wire-box	
Weight	Inverter: 121lbs / 55kg; Wire-box: 55lbs / 25kg (Standard Wire-box); 33lbs / 15kg (Centralized Wire-box)	
Mounting / Installation Angle	15 - 90 degrees from horizontal (vertical or angled)	
AC Termination	M10 Stud Type Terminal [3Φ] (Wire range:1/0AWG - 500kcmil CU/AL, Lugs not supplied) Screw Clamp Terminal Block [N] (#12 - 1/0AWG CU/AL)	
DC Termination	Screw Clamp Fuse Holder (Wire range: #12 - #6AWG CU) - Standard Wire-box Busbar, M10 Bolts (Wire range: #1AWG - 500kcmil CU/AL [1 termination per pole], #1AWG - 300kcmil CU/AL [2 terminations per pole], Lugs not supplied) - Centralized Wire-box	
Fused String Inputs	20A fuses provided (Fuse values up to 30A acceptable)	
Safety		
Safety and EMC Standard	UL1741-SA-2016, CSA-C22.2 NO.107.1-01, IEEE1547a-2014; FCC PART15	
Selectable Grid Standard	IEEE 1547a-2014, CA Rule 21, ISO-NE	
Smart-Grid Features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAr, Freq-Watt, Volt-Watt	
Warranty		
Standard[6]	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 100KW PF $\geq$0.9 and 125KW PF $\geq$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) 5 year warranty effective for units purchased after October 1st, 2019.

HELIENE

144HC M10 SL Bifacial Module

144 Half-Cut Monocrystalline 520W – 540W

21%

Utilizes the latest M10 size super high efficiency Monocrystalline PERC cells. Half cut design further reduces cell to module (CTM) losses.

Stability & Looks

Rugged, double webbed frame design withstands wind, snow, and other mechanical stresses. Framed Glass–Backsheet aesthetic is ideal for high visibility installation.

Anti-Reflective

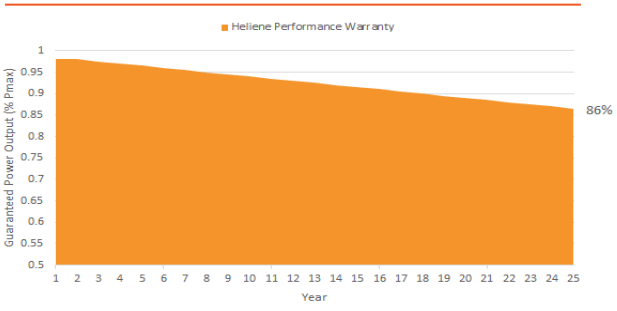
Premium solar glass with anti reflective coating delivers more energy throughout the day

High Reliability

Proven resistance to PID and reliable in high temperature and humidity environments.

No Compromise Guarantee

15 Year Workmanship Warranty
25 Year Linear Performance Guarantee



Manufactured Using International Quality System Standards: ISO9001

Half-Cut Design with Split Junction Box Technology

Bifacial Technology Enabling Additional Energy Harvest from Rear Side

1500V System Voltage Rating

World-class Quality

- Heliene's fully automated manufacturing facilities with state-of-the-art robotics and computer aided inspection systems ensure the highest level of product quality and consistency
- All manufacturing locations are compliant with international quality standards and are ISO 9001 certified
- Heliene modules have received Top Performer rankings in several categories from PV Evolution Labs (PV EL) independent quality evaluations

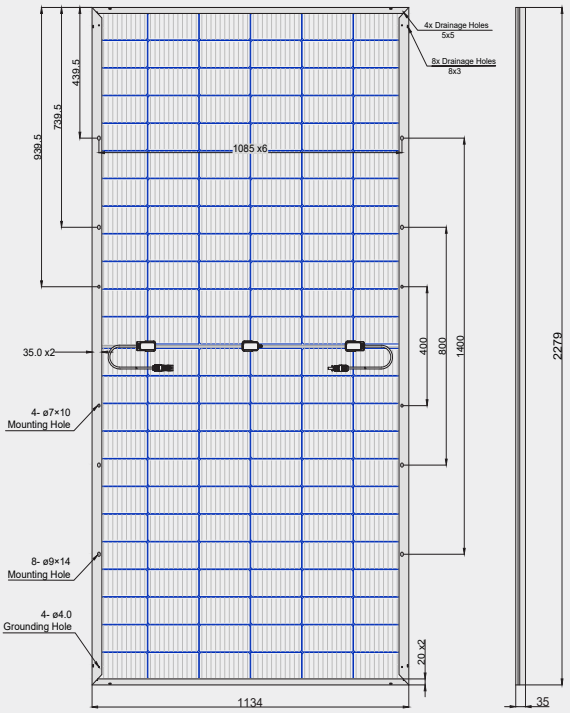
Bankable Reputation

- Established in 2010, Heliene is recognized by Bloomberg New Energy Finance (BNEF) as Tier 1 manufacturer of solar modules and has been approved for use by the U.S. Department of Defense, U.S. Army Corps of Engineers and from numerous top tier utility scale project debt providers
- By investing heavily in research and development, Heliene has been able to stay on the cutting edge of advances in module technology and manufacturing efficiency

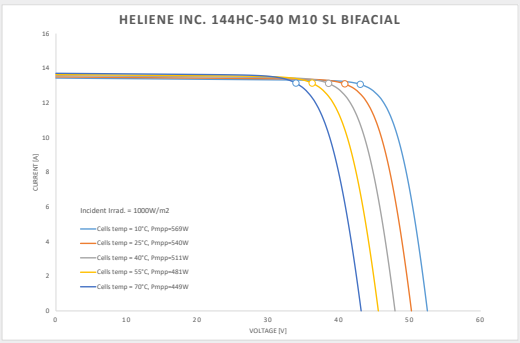
Local Sales, Service, and Support

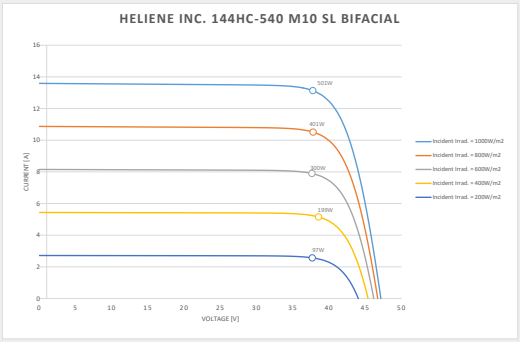
- With sales offices across the U.S. and Canada, Heliene prides itself on unsurpassed customer support for our clients. Heliene has become the brand of choice for many of the leading residential installers, developers and Independent Power Producers due to our innovative technology, product customization capability and just in time last-mile logistics support
- Local sales and customer support means answered phone calls and immediate answers to your technical and logistics questions. We understand your project schedules often change with little warning and endeavor to work with you to solve your project management challenges

Dimensions for 144HC M10 SL Bifacial Series Modules



I-V Curves for 144HC M10 SL Bifacial Series Modules





Certifications

Intertek

ISO 9001:2015 Certified
TRC
The Registrar Company

Electrical Data (STC)

Peak Rated Power	P_{mpp} (W)	540	535	530	525	520
Maximum Power Voltage	V_{mpp} (V)	42.32	42.13	41.94	41.75	41.56
Maximum Power Current	I_{mpp} (A)	12.77	12.70	12.64	12.58	12.52
Open Circuit Voltage	V_{oc} (V)	50.22	49.97	49.72	49.23	48.73
Short Circuit Current	Isc (A)	13.50	13.44	13.37	13.32	13.28
Module Efficiency *	Eff (%)	20.9	20.7	20.5	20.3	20.1
Maximum Series Fuse Rating	MF (A)	30	30	30	30	30
Power Output Tolerance			[- 0/+3%]			
Bifaciality Factor			70%			

STC - Standard Test Conditions: Irradiation 1000 W/m2 - Air mass AM 1.5 - Cell temperature 25 °C

Electrical Data (NMOT)

Maximum Power	P_{mpp} (W)	400	395	390	385	380
Maximum Power Voltage	V_{mpp} (V)	39.19	38.58	38.58	37.97	37.96
Maximum Power Current	I_{mpp} (A)	10.21	10.24	10.11	10.14	10.01
Open Circuit Voltage	V_{oc} (V)	47.13	46.89	46.66	46.20	45.73
Short Circuit Current	Isc (A)	10.87	10.82	10.77	10.72	10.70

NMOT - Nominal Module Operating Temperature:
Irradiance at 800W/m2, Ambient Temperature 20ºC, Wind speed 1m/s

Mechanical Data

Solar Cells	144 Half Cut, M10, 182mm, PERC Cells
Module Construction	Framed Glass–Backsheet
Dimensions (L x W x D)	2279 x 1134 x 35 mm (89.72 x 44.65 x 1.38 inch)
Weight	29.2 kg (64.3 lbs)
Frame	Double Webbed 15-Micron Anodized Aluminum Alloy
Glass	3.2mm Low-Iron Content, High-Transmission, PV Solar Glass with Anti Reflective Coating
Junction Box	IP-68 rated with 3 bypass diodes
Output Cables	0.3-meter Symmetrical Cables
Connectors	Multi-Contact/ Stäubli MC4

Certifications

UL Certification	UL61215, UL61730

Temperature Ratings

Nominal Operating Cell Temperature (NOCT)	+45°C (±2°C)
Temperature Coefficient of P_{max}	-0.36%/°C
Temperature Coefficient of V_{oc}	-0.28%/°C
Temperature Coefficient of I_{sc}	0.034%/°C

Maximum Ratings

Operational Temperature	-40°C to +85°C
Max System Voltage	1500V
Mech. Load Test (Front)	113 psf / 5400Pa
Mech. Load Test (Back)	50 psf / 2400 Pa
Fire Type	Type 1

Warranty

15 Year Workmanship Warranty

25 Year Linear Power Guarantee

Packaging Configuration

Modules per box:	31 pieces
Modules per 40' Container:	620 pieces
Modules per 53' Trailer:	806 pieces

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

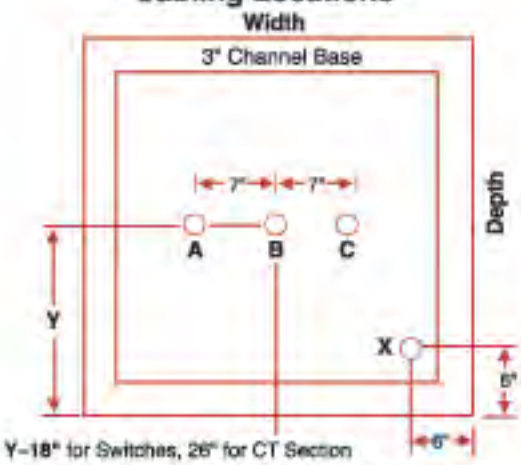
KV			Amperes, RMS				
				Interrupting			Mom. &
Nom.	Max. Des.	BIL	Cont.	Load	Cap.	Mag.	Fault Close (ASYM KA)
5	5.5	60	600	600	35	21	40
5	5.5	60	1200	1200	35	21	61
15	17	95	600	600	35	21	40
15	17	95	1200	1200	35	21	61
25	29	125	600	400	35	21	40
34.5	38	150	600	600	35	21	28

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	Motor Bay	to match	to match	60"

To order specify current rating & fuse size.

Cabling Locations



Y–18" for Switches, 26" 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 tp 15KV

SPECIFICATIONS

Ratings of S&C Mini-Ruptor Switches

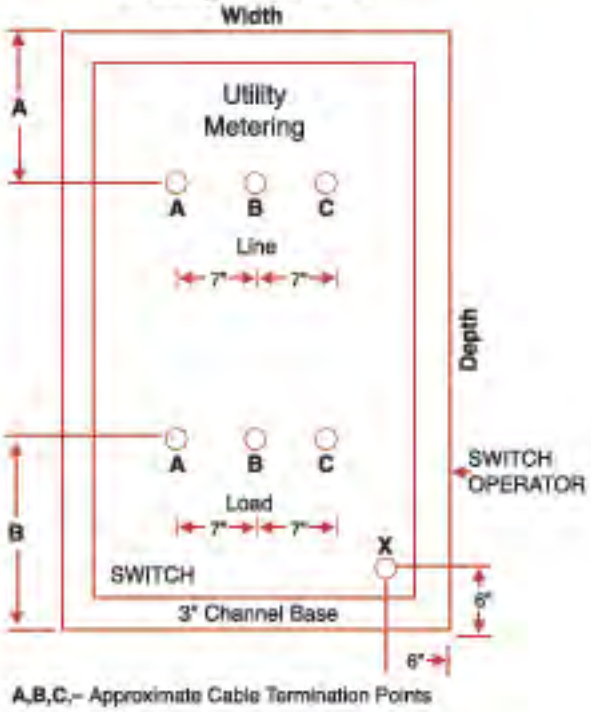
KV			Amperes, RMS				
				Interrupting			Mom. &
Nom.	Max. Des.	BIL	Cont.	Load	Cap.	Mag.	Fault Close (ASYM KA)
15	17	95	600	600	35	21	40
25	29	125	600	400	35	21	40

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"	80"	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.

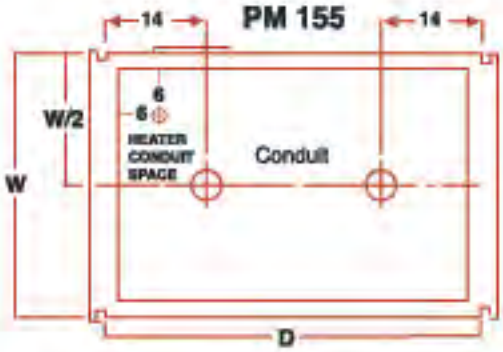
Interruptor switches are maintenance-free and rated at 600 amp. S&C® Power Fuses provide full-fault-spectrum protection. Switches are manually operated by removable switch handles. Bus connections are silverplated copper for long life.

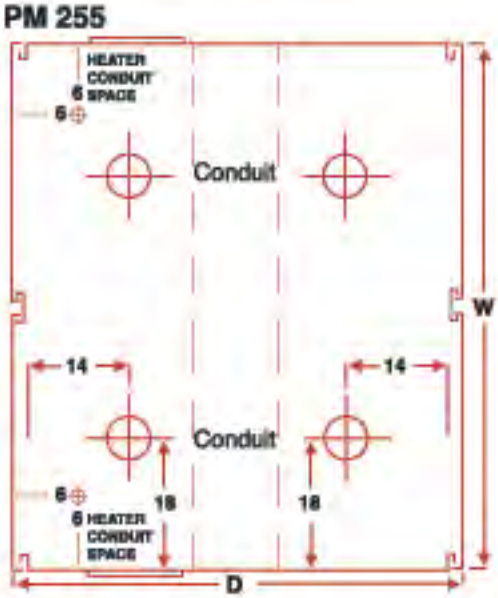
Call today and discuss your requirements with a Park sales representative.

SPECIFICATIONS

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

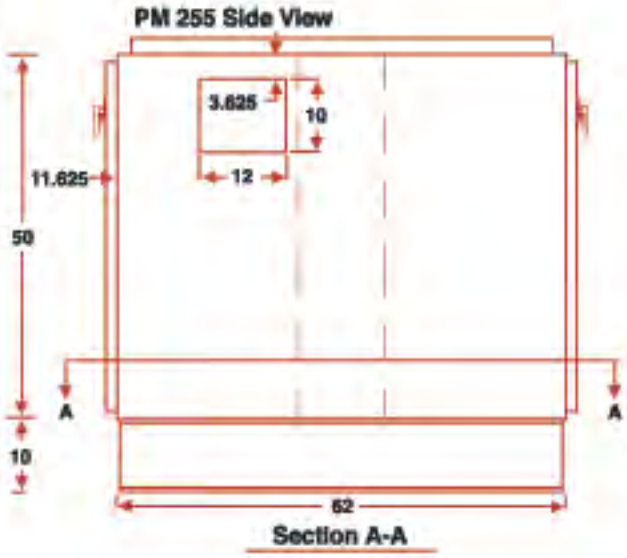
*Height includes 10" base.





PM-155 *front view* ▲

rear view ▲



PARK

Established 1945

POWER DISTRIBUTION SYSTEMS

RELIABLE POWER DISTRIBUTION SYSTEMS FOR EVERY REQUIREMENT

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General Offices: 19197 Sherwood Avenue • Detroit, Michigan 48234 • 313/366-2200 • Fax: 313/366-1540

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

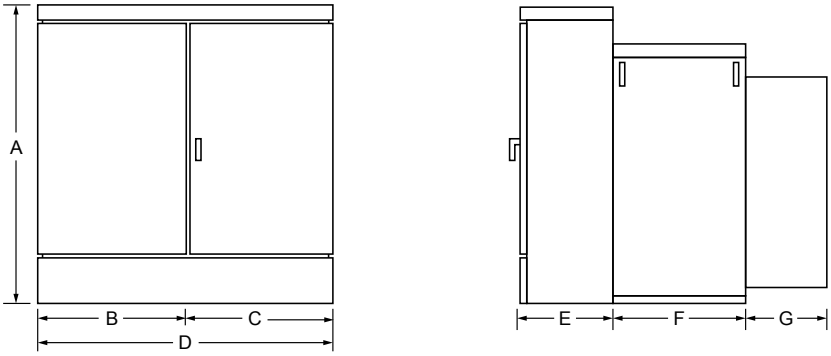


Table 2. Approximate Transformer Dimensions

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

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

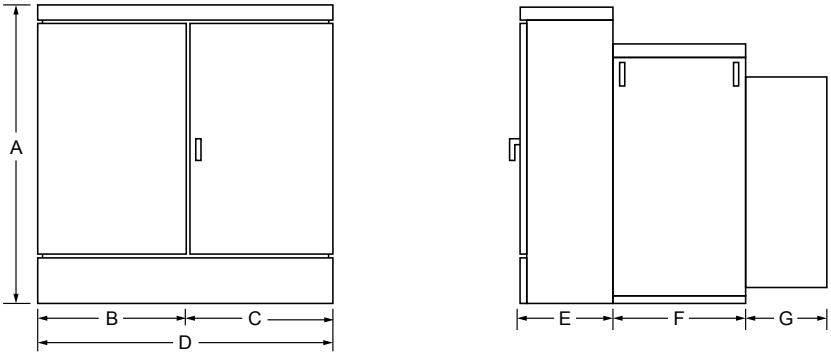


Table 2. Approximate Transformer Dimensions

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

September 21, 2020 **FINAL**

Heliene Inc.
520 Allens Side Road
Sault Ste. Marie, Ontario

E-mail: mpc@heliene.com

Attention: Manikantan Chandrasekharan
Property Manager

Re: TCLP Assessment Letter
520 Allens Side Road, Sault Ste. Marie, Ontario
Pinchin File: 276353

1.0 BACKGROUND

Pinchin Ltd. (Pinchin), requested by Heliene Inc. Inc. to complete a Toxicity Characteristic Leachate Procedure (TCLP) Assessment on a solar panel provided in order to classify the panel as hazardous or non-hazardous waste for end of life disposal.

2.0 SCOPE OF WORK

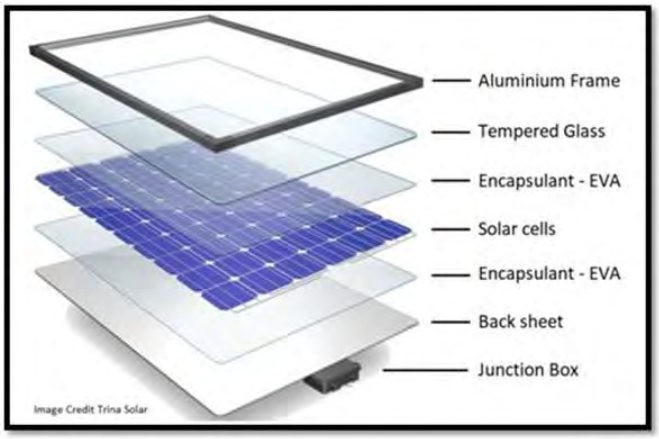
The scope of work completed by Pinchin, as outlined in the email entitled "*RE: Discussion on TCLP testing for Solar module*" between Christian Tenaglia of Pinchin and Gustavo Loureiro, Manikantan PC and Xinyan Bai submitted to the Client on May 29, 2020, included the following:

- Dismantle and cut panel, homogenize and prepare two composite samples >200 grams each, prep sample to <2 cm diameter.
- Submit composite panel samples to an accredited laboratory for analysis of leachate concentrations of metals, inorganics, and semi-volatile organic compounds (SVOCs) in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) as per Ontario Regulation 347 (as amended) to characterize the material for future off-site disposal. The TCLP procedure will also be completed in compliance with the United States Environmental Protection Agency (USEPA) SW846 method 1311.
- Compare the laboratory analytical results with the applicable standards stipulated in the Schedule 4 Leachate Quality Criteria, established by Ontario Regulation 558/00 (Ontario Regulation 347). In addition, Pinchin will review general USEPA hazardous waste definitions and select individual state law for waste characterization (California, South Carolina, Florida and Minnesota).

- Prepare a factual letter report for the results of the TCLP testing program summarizing the leachate characteristics of the panels and provide an opinion whether the material would be defined as hazardous or non-hazardous waste.

3.0 TOXICITY CHARACTERISTIC LEACHATE PROCEDURE – SAMPLING AND ANALYSIS

On June 17, 2020, Pinchin cut four randomly selected bulk sections of a solar panel provided by Heliene, and subsequently homogenized the bulk cuts into two composite samples. The cuts and composite samples included all parts of the solar panel, including the glass, encapsulant, solar cells which include electronic ribbons and bans, and back sheet (as shown in the photo below).



The two composite panel samples (TCLP1 and TCLP2) were processed (cut to <2 cm in diameter) for TCLP analysis and submitted to AGAT Laboratories (AGAT) in Mississauga, Ontario, which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) in accordance with the International Standards ISO/IEC 17025 – General Requirement for the Competence of Testing and Calibration Laboratories.

Pinchin submitted for analysis and compared the analytical results with the corresponding allowable regulatory limits for leachable metals, inorganics and SVOCs. The results of the composite sample analysis indicated that all parameters analyzed for were low and below the regulated limits for hazardous waste characterization, with the exception of lead. Leachate lead concentrations ranged from 6.69 to 8.36 milligrams per litres (mg/L) in comparison to the regulatory limit of 5 mg/L. The lead concentrations were observed to be elevated based on the presence of lead-containing bus bars and ribbons across the solar cell layer of the panel. The possibly high presence of lead-containing bus bars and ribbons in the composite samples likely elevated the overall percentage of lead in the leachate and may not have been representative of the entire composition of the solar panel. Below shows the overall composition of the solar panel by total weight (22 kilograms (kg)) versus the weight of the ribbons and bans (and subsequent lead).

Item	Quantity in Panel (kg)	Total Quantity of Lead (kg)	Percent of Lead in Panel (%)
RIB 2mm, Ribbon 0.9x 0.22mm (40% Pb)	0.22	0.088	0.40000
RIB 6mm, Ribbon 6 x 0.35mm Straight 149mm (40% Pb)	0.005	0.002	0.009091
RIB 6mm, Ribbon 6x.35mm Straight 307.5mm (40% Pb)	0.0103	0.00412	0.018727
RIB 6mm, Ribbon 6x.35mm Straight 290mm (40% Pb)	0.0145	0.0058	0.026364
Total	*0.2498*	*0.09992*	*0.454182*

As a result of elevated lead concentrations in the two composite TCLP samples, five additional composite samples were collected of the panel in areas where the lead-containing ribbon and bans were not present. The intent of the additional samples was to confirm if lead is present in other areas of the panel (not including ribbons and bans) and that the overall panel based on mass is not hazardous.

Four of the five additional composite samples (TCLP3 through TCLP6) were collected across the four quadrants of the panel and were collected using a carbide tipped core drill with an approximate diameter of 1.5 cm. The fifth sample (TCLP 7) was extracted and processed from the junction box and attached cable. All five samples were analyzed by AGAT via the TCLP procedure for lead.

The analytical results of the additional TCLP samples (TCLP3 through TCLP6) reported lead concentrations ranging from <0.01 to 0.582 mg/L and below the regulated limit. These results indicate that the previous TCLP sample analysis (TCLP1 and TCLP2) exhibited higher lead concentrations as a result of the inclusion of the ribbons and bans within the composite sample. As a result, Pinchin averaged the lead concentration of all seven samples to determine the overall compliance with the regulated limits. The average lead concentration of all seven TCLP samples was 2.27 mg/L, below the regulated limit of 5 mg/L, therefore would not be considered as hazardous waste.

A summary of the analytical data and calculations is provided in Table 1 in Appendix I. A copy of the laboratory certificates of analysis are provided in Appendix II.

4.0 REGULATED TOXICITY LIMITS FOR HAZARDOUS WASTE CHARACTERIZATION AND LEAD DISCUSSION

As part of the data evaluation, Pinchin compared the analytical results to both provincial (Ontario) and select state law (California, Florida, South Carolina and Minnesota). In Ontario, the province regulates hazardous waste characterization under Ontario Regulation 347/90 and establishes the regulated toxicity limits under Schedule 4 (Leachate Quality Criteria). In California, Florida, South Carolina and Minnesota, all four states have adopted Title 40 Code of Federal Regulations, Part 261, Subpart C, Section 261.24 (b) Toxicity Characteristic, Table 1 - Maximum Concentration of Contaminants for the Toxicity Characteristic into their regulatory regime for hazardous waste characterization (with respect to toxicity). The regulatory limit in all provincial and state jurisdictions reviewed for lead is 5 mg/L. Pinchin notes however that other provinces and states may have different hazardous waste characterization criteria and should be reviewed independently for waste disposal compliance purposes.

End of life disposal should consider each provincial/state requirement for hazardous waste characterization and electronics waste management and recycling programs. Pinchin recommends that given the lead content in certain components of the solar panel that those components be removed along with any other metals and be appropriately recycled at an approved receiving facility prior to disposal.

5.0 CLOSING

We trust that this letter meets your present requirements. If you have any questions, please feel free to contact the undersigned.

Should you have any questions or concerns regarding the contents of this letter, please contact the undersigned.

Yours truly,

Pinchin Ltd.

Prepared by:

Christian Tenaglia, M.E.S., P.Eng., QP_{ESA}
Director of Northeastern Ontario
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Reviewed by:

Tim McBride, B.Sc., P.Geo., QP_{ESA}
Director, Landfill & Municipal Services
705.690.5387
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Encl.: Table 1 – Toxicity Characteristic Leaching Procedure (TCLP) Analysis
Laboratory Certificates of Analysis

TABLE 1
TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) ANALYSIS
HELIENE INC.
520 Allens Side Road, Sault Ste. Marie, Ontario

Parameter	*Ontario Regulation 347**	*California Code of Regulations***	*South Carolina Regulation 61-79****	*Florida Admistrative Code Chapter 62-730*****	*Minnesota Administrative Rules 7045.0130******	*Sample Designation*							*AVERAGE CALCULATION*
						Sample Collection Date (dd/mm/yyyy)							
						TCLP 1	*TCLP 2*	*TCLP 3*	*TCLP 4*	*TCLP 5*	*TCLP 6*	*TCLP 7*	
						17/06/2020	*17/06/2020*	*07/20/2020*	*07/20/2020*	*07/20/2020*	*07/20/2020*	*07/20/2020*	
METALS													
Arsenic	2.5	5	5	5	5	<0.010	<0.010	-	-	-	-	-	-
Barium	100	100	100	100	100	<0.100	<0.100	-	-	-	-	-	-
Boron	500	-	-	-	-	<0.050	<0.050	-	-	-	-	-	-
Cadmium	0.5	1	1	1	1	<0.010	<0.010	-	-	-	-	-	-
Chromium	5	5	5	5	5	<0.010	<0.010	-	-	-	-	-	-
Lead	5	5	5	5	5	**6.69**	**8.36**	<0.010	0.255	<0.010	<0.010	0.582	2.27
Mercury	0.1	0.2	0.2	0.2	0.2	<0.01	<0.01	-	-	-	-	-	-
Selenium	1	1	1	1	1	<0.010	<0.010	-	-	-	-	-	-
Silver	5	5	5	5	5	<0.010	<0.010	-	-	-	-	-	-
Uranium	10	-	-	-	-	<0.050	<0.050	-	-	-	-	-	-
SEMI-VOLATILE ORGANIC COMPOUNDS													
Pyridine	5	5	5	5	5	<0.010	<0.010	-	-	-	-	-	-
Cresols	200	200	200	200	200	<0.012	<0.012	-	-	-	-	-	-
Ortho-Cresol	200	200	200	200	200	<0.004	<0.004	-	-	-	-	-	-
Meta & Para-Cresol	200	200	200	200	200	<0.008	<0.008	-	-	-	-	-	-
Hexachloroethane	3	3	3	3	3	<0.004	<0.004	-	-	-	-	-	-
Nitrobenzene	2	2	2	2	2	<0.004	<0.004	-	-	-	-	-	-
Hexachlorobutadiene	0.5	0.5	0.5	0.5	0.5	<0.004	<0.004	-	-	-	-	-	-
2,4,6-Trichlorophenol	0.5	2	2	2	2	<0.05	<0.05	-	-	-	-	-	-
2,4,5-Trichlorophenol	400	400	400	400	400	<0.004	<0.004	-	-	-	-	-	-
2,4-Dinitrotoluene	0.13	0.13	0.13	0.13	0.13	<0.004	<0.004	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	10	-	-	-	-	<0.004	<0.004	-	-	-	-	-	-
Hexachlorobenzene	0.13	0.13	0.13	0.13	0.13	<0.004	<0.004	-	-	-	-	-	-
Dinoseb	1	-	-	-	-	<0.004	<0.004	-	-	-	-	-	-
Benzo(a)pyrene	0.001	-	-	-	-	<0.001	<0.001	-	-	-	-	-	-
INORGANICS													
Fluoride	150	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Free Cyanide	20	-	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Nitrite and Nitrate	1000	-	-	-	-	<0.70	<0.70	-	-	-	-	-	-

Notes:

Ontario Regulation 347*	Schedule 4 - Leachate Quality Criteria
California Code of Regulations**	66261.24(a) Characteristic of Toxicity, California Code of Regulations, Table I - Maximum Concentration of Contaminants for the Toxicity Characteristic
South Carolina Regulation 61-79***	Regulation 61-79.261 South Carolina Harzardous Waste Managemetn Regulations, Identification and Listing of Hazardous Waste, Subpart C, Characteristics of Hazardous Waste 261.24 (b) Table I - Maximum Concentration of Contaminants for the Toxicity Characteristic.
Florida Administrative Code Chapter 62-730****	62.730.030 Identification of Hazardous Waste, reference and adoption of Title 40 Code of Federal Regulations, Part 261, Subpart C, Section 261.24 (b) Toxicity Characteristic, Table 1 - Maximum Concentration of Contaminants for the Toxicity Characteristic.
Minnesota Administrative Rules 7045.0130*****	7045.0130 Minnesota Administrative Rules, 7045.0131 Characterists of Hazardous Waste, Subpart 8 - Maximum Concentration of Contaminants for the Toxicity Characteristic
BOLD	Exceeds Regulatory Limit
Units	All Values Reported in Units of mg/L.

Pinchin File: 276353

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PINCHIN LTD
126 QUEEN STREET EAST, SUITE #3
SAULT STE. MARIE, ON P6A1Y5
(705) 575-9207
ATTENTION TO: Brandon Guzzo-Foliaro
PROJECT: 276353.00
AGAT WORK ORDER: 20T615469
SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer
TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist
DATE REPORTED: Jun 25, 2020
PAGES (INCLUDING COVER): 10
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.*
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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

CLIENT NAME: PINCHIN LTD

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2020-06-19

DATE REPORTED: 2020-06-25

		SAMPLE DESCRIPTION:		TCLP1	TCLP2
		SAMPLE TYPE:		Other	Other
		DATE SAMPLED:		2020-06-17	2020-06-17
Parameter	Unit	G / S	RDL	1211837	1211838
Arsenic Leachate	mg/L	2.5	0.010	<0.010	<0.010
Barium Leachate	mg/L	100	0.100	<0.100	<0.100
Boron Leachate	mg/L	500	0.050	<0.050	<0.050
Cadmium Leachate	mg/L	0.5	0.010	<0.010	<0.010
Chromium Leachate	mg/L	5	0.010	<0.010	<0.010
Lead Leachate	mg/L	5	0.010	**6.69**	**8.36**
Mercury Leachate	mg/L	0.1	0.01	<0.01	<0.01
Selenium Leachate	mg/L	1	0.010	<0.010	<0.010
Silver Leachate	mg/L	5	0.010	<0.010	<0.010
Uranium Leachate	mg/L	10	0.050	<0.050	<0.050
Fluoride Leachate	mg/L	150	0.05	<0.05	<0.05
Cyanide Leachate	mg/L	20	0.05	<0.05	<0.05
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70	<0.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Divine Basily

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
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TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

CLIENT NAME: PINCHIN LTD

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

O. Reg. 558 - SVOCs

DATE RECEIVED: 2020-06-19

DATE REPORTED: 2020-06-25

		SAMPLE DESCRIPTION:		TCLP1	TCLP2
		SAMPLE TYPE:		Other	Other
		DATE SAMPLED:		2020-06-17	2020-06-17
Parameter	Unit	G / S	RDL	1211837	1211838
Pyridine	mg/L	5.0	0.010	<0.010	<0.010
Cresols	mg/L	200	0.012	<0.012	<0.012
Ortho-Cresol	mg/L	200	0.004	<0.004	<0.004
Meta & Para-Cresol	mg/L	200	0.008	<0.008	<0.008
Hexachloroethane	mg/L	3	0.004	<0.004	<0.004
Nitrobenzene	mg/L	2.0	0.004	<0.004	<0.004
Hexachlorobutadiene	mg/L	0.5	0.004	<0.004	<0.004
2,4,6-Trichlorophenol	mg/L	0.5	0.05	<0.05	<0.05
2,4,5-Trichlorophenol	mg/L	400	0.004	<0.004	<0.004
2,4-Dinitrotoluene	mg/L	0.13	0.004	<0.004	<0.004
2,3,4,6-Tetrachlorophenol	mg/L	10	0.004	<0.004	<0.004
Hexachlorobenzene	mg/L	0.13	0.004	<0.004	<0.004
Dinoseb	mg/L	1	0.004	<0.004	<0.004
Benzo(a)pyrene	mg/L	0.001	0.001	<0.001	<0.001
BNA Extr	NA			Y	Y
Surrogate	**Unit**	**Acceptable Limits**			
2-Fluorophenol	%	30-130		74	74
Phenol-d6	%	30-130		72	71
2,4,6-Tribromophenol	%	50-140		84	76
Chrysene-d12	%	50-140		86	72

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

1211837-1211838 The sample was leached according to Regulation 558 protocol. Analysis was performed on the leachate.
Cresols total is a calculated parameter. The calculated value is the sum o-Cresol and m&p-Cresol.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: NPopowkolof

AGAT Laboratories

5835 COOPERS AVENUE
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TEL (905)712-5100
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http://www.agatlabs.com

Guideline Violation

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

CLIENT NAME: PINCHIN LTD

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
1211837	TCLP1	ON Reg 558	O. Reg. 558 Metals and Inorganics	Lead Leachate	mg/L	5	6.69
1211838	TCLP2	ON Reg 558	O. Reg. 558 Metals and Inorganics	Lead Leachate	mg/L	5	8.36

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PINCHIN LTD

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Jun 25, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 Metals and Inorganics															
Arsenic Leachate	1212960		<0.010	<0.010	NA	< 0.010	103%	70%	130%	110%	80%	120%	109%	70%	130%
Barium Leachate	1212960		0.408	0.402	NA	< 0.100	103%	70%	130%	110%	80%	120%	109%	70%	130%
Boron Leachate	1212960		<0.050	<0.050	NA	< 0.050	93%	70%	130%	90%	80%	120%	86%	70%	130%
Cadmium Leachate	1212960		<0.010	<0.010	NA	< 0.010	98%	70%	130%	99%	80%	120%	90%	70%	130%
Chromium Leachate	1212960		<0.010	<0.010	NA	< 0.010	98%	70%	130%	103%	80%	120%	88%	70%	130%
Lead Leachate	1212960		0.027	0.025	NA	< 0.010	100%	70%	130%	104%	80%	120%	88%	70%	130%
Mercury Leachate	1212960		<0.01	<0.01	NA	< 0.01	100%	70%	130%	98%	80%	120%	74%	70%	130%
Selenium Leachate	1212960		<0.010	<0.010	NA	< 0.010	100%	70%	130%	109%	80%	120%	110%	70%	130%
Silver Leachate	1212960		<0.010	<0.010	NA	< 0.010	100%	70%	130%	110%	80%	120%	81%	70%	130%
Uranium Leachate	1212960		<0.050	<0.050	NA	< 0.050	97%	70%	130%	97%	80%	120%	83%	70%	130%
Fluoride Leachate	1212960		0.28	0.29	3.5%	< 0.05	101%	90%	110%	102%	90%	110%	98%	70%	130%
Cyanide Leachate	1212960		<0.05	<0.05	NA	< 0.05	100%	70%	130%	105%	80%	120%	106%	70%	130%
(Nitrate + Nitrite) as N Leachate	1212960		<0.70	<0.70	NA	< 0.70	102%	80%	120%	100%	80%	120%	102%	70%	130%

Comments: If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated.

Certified By: Nivine Basily

AGAT Laboratories

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FAX (905)712-5122
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Quality Assurance

CLIENT NAME: PINCHIN LTD

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Jun 25, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 - SVOCs															
Pyridine	1211837	1211837	< 0.010	< 0.010	NA	< 0.010	78%	30%	140%	75%	30%	140%	75%	30%	140%
Ortho-Cresol	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	63%	50%	140%	77%	50%	140%	69%	50%	140%
Meta & Para-Cresol	1211837	1211837	< 0.008	< 0.008	NA	< 0.008	75%	50%	140%	68%	50%	140%	78%	50%	140%
Hexachloroethane	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	106%	50%	140%	86%	50%	140%	71%	50%	140%
Nitrobenzene	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	82%	50%	140%	93%	50%	140%	87%	50%	140%
Hexachlorobutadiene	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	94%	50%	140%	77%	50%	140%	86%	50%	140%
2,4,6-Trichlorophenol	1211837	1211837	< 0.05	< 0.05	NA	< 0.05	88%	50%	140%	67%	50%	140%	84%	50%	140%
2,4,5-Trichlorophenol	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	89%	50%	140%	69%	50%	140%	86%	50%	140%
2,4-Dinitrotoluene	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	106%	50%	140%	77%	50%	140%	86%	50%	140%
2,3,4,6-Tetrachlorophenol	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	92%	50%	140%	71%	50%	140%	71%	50%	140%
Hexachlorobenzene	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	99%	50%	140%	106%	50%	140%	74%	50%	140%
Dinoseb	1211837	1211837	< 0.004	< 0.004	NA	< 0.004	91%	50%	140%	69%	50%	140%	69%	50%	140%
Benzo(a)pyrene	1211837	1211837	< 0.001	< 0.001	NA	< 0.001	103%	50%	140%	99%	50%	140%	92%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popowkolof

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Method Summary

CLIENT NAME: PINCHIN LTD

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Arsenic Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Barium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Boron Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Cadmium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Chromium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Lead Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Mercury Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Selenium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Silver Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Uranium Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B	ICP-MS
Fluoride Leachate	INOR-93-6018	EPA 1311 & modified from SM4500-F-C	ION SELECTIVE ELECTRODE
Cyanide Leachate	INOR-93-6052	EPA 1311 & modified from MOE 3015 & SM 4500 CN-I	TECHNICON AUTO ANALYZER
(Nitrate + Nitrite) as N Leachate	INOR-93-6053	EPA 1311 & modified from SM 4500-NO3-I	LACHAT FIA

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Method Summary

CLIENT NAME: PINCHIN LTD

AGAT WORK ORDER: 20T615469

PROJECT: 276353.00

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Pyridine	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Cresols	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Ortho-Cresol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Meta & Para-Cresol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachloroethane	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Nitrobenzene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachlorobutadiene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,6-Trichlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,5-Trichlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4-Dinitrotoluene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,3,4,6-Tetrachlorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Hexachlorobenzene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Dinoseb	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Benzo(a)pyrene	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2-Fluorophenol	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
Phenol-d6	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
2,4,6-Tribromophenol	ORG-91-5114	modified from EPA 3510C, 8270E & ON MOECC E3265	GC/MS
Chrysene-d12	ORG-91-5114	modified from EPA SW846 3510C & 8270E	GC/MS
BNA Extr	ORG-91-5114	modified from EPA SW846 3510C & 8270E	N/A

AGAT Laboratories

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #:

Cooler Quantity:

Arrival Temperatures:

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes:

Report Information:

Company: Pinchin LTD
Contact: Brandon Guzzo
Address: 126 Queen St FCST SSM ONT
Phone: 705 575 9207 Fax:
Reports to be sent to:
1. Email: bguzzofoliaro@pinchin.com
2. Email: Send all email.

Regulatory Requirements: ☐ No Regulatory Requirement

(Please check all applicable boxes)

☑ Regulation 153/04
Table _____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region _____ *Indicate One*
☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☒ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

_____

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 2763533.000
Site Location: Solar Panel
Sampled By: Guzzo B & Christon T
AGAT Quote #: _____ PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:
Contact:
Address:
Email: gp@pinchin.com.

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides))	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use						Potentially Hazardous or High Concentration (Y/N)
TCLP 1	06/17/20	am	1	/																	TCLP Metals	TCLP Inorganics	TCLP Soil Volatiles			
TCLP 2	1	1	1	/																						
					See attached Parameter email																					

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	
Brandon Guzzo Foliaro.	06/17/2020	pm				
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	Page _____ of _____
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	Nº: T100551

AGAT Laboratories

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CANADA L4Z 1Y2
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CLIENT NAME: PINCHIN LTD
126 QUEEN STREET EAST, SUITE #3
SAULT STE. MARIE, ON P6A1Y5
(705) 575-9207
ATTENTION TO: Brandon Guzzo-Foliaro
PROJECT: 276353.000
AGAT WORK ORDER: 20T632194
SOIL ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician
DATE REPORTED: Aug 21, 2020
PAGES (INCLUDING COVER): 5
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

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Certificate of Analysis

AGAT WORK ORDER: 20T632194

PROJECT: 276353.000

CLIENT NAME: PINCHIN LTD

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:Solar Panel

SAMPLED BY:Guzzo B Christian T

O. Reg. 558 Lead

DATE RECEIVED: 2020-08-17

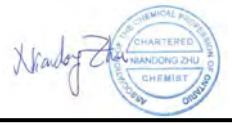
DATE REPORTED: 2020-08-21

				SAMPLE DESCRIPTION:	TCLP 3	TCLP 4	TCLP 5	TCLP 6	TCLP 7
				SAMPLE TYPE:	Other	Other	Other	Other	Other
				DATE SAMPLED:	2020-07-20	2020-07-20	2020-07-20	2020-07-20	2020-07-20
Parameter	Unit	G / S	RDL		1315295	1315297	1315298	1315299	1315300
Lead Leachate	mg/L	5	0.010		<0.010	0.255	<0.010	<0.010	0.582

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:



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Quality Assurance

CLIENT NAME: PINCHIN LTD
PROJECT: 276353.000
SAMPLING SITE:Solar Panel

AGAT WORK ORDER: 20T632194
ATTENTION TO: Brandon Guzzo-Foliaro
SAMPLED BY:Guzzo B Christian T

Soil Analysis

RPT Date: Aug 21, 2020			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 558 Lead															
Lead Leachate	1353169		<0.010	0.010	NA	< 0.010	97%	70%	130%	99%	80%	120%	88%	70%	130%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By:

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Method Summary

CLIENT NAME: PINCHIN LTD

AGAT WORK ORDER: 20T632194

PROJECT: 276353.000

ATTENTION TO: Brandon Guzzo-Foliaro

SAMPLING SITE:Solar Panel

SAMPLED BY:Guzzo B Christian T

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Lead Leachate	MET-93-6103	EPA 1311 & modified from EPA 6020B ICP-MS	

AGAT Laboratories

Red. Ben

5835 Coopers Avenue
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Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Pinchin LTD
Contact: Brandon Guzzo
Address: 126 Queen St. East SSM

Phone: 7055759907 Fax:

Reports to be sent to:
1. Email: bguzzofoliano@pinchin.com
2. Email: Fault all email

Project Information:

Project: 276353.000
Site Location: Solar Panel
Sampled By: Guzzo B CHAIN
AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company:
Contact:
Address:
Email: ap@pinchin.com

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 558

☒ Regulation 153/04
Table _____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Excess Soils R406
Table _____ *Indicate One*
Sample from APEC?
☐ Yes
☐ No
☐ Stockpile ☐ In-situ

☐ Sewer Use
☐ Sanitary ☐ Storm
_____ *Region*
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☒ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Laboratory Use Only

Work Order #: 20T632194

Cooler Quantity:
Arrival Temperatures: ~~11.8~~ 11.8 | 11.6 | NOICE
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics, inc. EC/SAR	O. Reg 153: Metals - ICPMS, ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs, Analyze F4G if required ☐ Yes ☐ No	PAHs	PCBs	VOC	Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	TCLP Lead	Potentially Hazardous or High Concentration (Y/N)
TCLP 3	July 30	AM PM	1														X	
TCLP 4	"	AM PM	"														X	
TCLP 5	"	AM PM	"														X	
TCLP 6	"	AM PM	"														X	
TCLP 7	"	AM PM	"														X	
		AM PM															X	
		AM PM																
		AM PM																
		AM PM																
		AM PM																
		AM PM																

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Brandon Guzzo BGF	July 30	am	Shawn de July 31/2020	9 AM	
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page _____ of _____

Nº: T 107087