# Energy Storage Solutions

for Renewable Energy and Backup Power


Trojan® BATTERY COMPANY

*Clean energy for life™*

***Made in the USA***


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# Imagine a World of Clean Energy for Everyone.

**In Kenya, a family gathers for dinner in a small house powered by an off-grid solar home system...**

**In India, an eco-resort generates reliable electricity from a micro-grid...**

**In Nicaragua, a rural telecom tower supplies communications to remote areas using renewable energy...**

Renewable energy installations are rapidly growing all around the world. Today, in the developing regions of the world where electricity is scarce, more than 1.6 billion people live without access to electric power; unable to meet their basic human needs due to lack of reliable lighting, communications, health care and clean water.

In these remote areas, renewable energy provides a resource that allows children to learn, families to prosper and businesses to grow. Industrial, commercial and residential applications that rely on clean energy are rapidly growing worldwide. Renewable energy sources from solar, wind, hydro, tidal, geothermal energy and others are transforming our dependence on fossil fuels and reducing our impact on the environment.

As the leading manufacturer of deep-cycle batteries, Trojan Battery Company believes it is possible to make a global shift to energy sources that are environmentally friendly and readily available worldwide. For more than 85 years, Trojan Battery has focused its experience and expertise in deep-cycle technology on manufacturing the highest quality, deep-cycle batteries available in the industry. If there is one thing we've learned over the years, it's that a truly outstanding battery must provide rugged durability, long life and reliable performance day in and day out.

We understand the importance of these performance features and that is why we offer the broadest portfolio of high-quality, deep-cycle flooded, AGM and gel products available for a wide range of renewable energy and backup power applications. With our broad portfolio of renewable energy products, you'll find a Trojan battery perfectly suited to your specific application.

*At Trojan we are committed to…Clean Energy for Life.*

*Energy Storage Solutions*

# Residential Markets


## Off-Grid Residential

Homes located in remote areas without access to grid power often depend on off-grid renewable energy systems to satisfy their power requirements. For these solar, wind and hybrid powered systems, energy storage plays a critical role in providing uninterrupted power when the sun does not shine or the wind does not blow.

Trojan's line of deep-cycle flooded, AGM and gel batteries are engineered for the long-life requirements of off-grid residential systems. With Trojan's deep-cycle batteries, homeowners can optimize their renewable energy systems and dramatically reduce operating costs when powering their homes in remote areas. Whether homeowners use solar panels, wind turbines, or a combination of different sources in a hybrid system, Trojan battery back-up power products provide reliable, cost-effective energy storage when living off the grid. Our Premium and Industrial lines are engineered specially for renewable energy applications.

## Backup Power

The increase in global energy consumption is placing an even greater strain on existing power grids. Many electrical grids are inefficient and unable to consistently meet the demands of growing urban populations. Power outages are becoming more common and the demand for battery backup systems to provide stable power is a valuable part of the overall energy mix.

Often referred to as the "inverter market", because these systems rely on the use of an inverter charger in conjunction with a battery bank, Trojan's deep-cycle technology is ideal for providing reliable backup power to residential and commercial buildings when the grid frequently goes down. Trojan's deep-cycle batteries are known for long cycle life, durable design, and consistent power output with low, life cycle system cost.

## *Rural Electrification*

Today more than 80 percent of the world's population lives in rural areas where access to electricity is unreliable or even nonexistent. Battery-based renewable energy technologies have made it possible to bring stable and reliable power to these remote areas effectively changing the way people live. In these remote locations, stand-alone systems require exceptionally reliable batteries. Trojan manufactures a wide range of deep-cycle flooded and maintenance-free, batteries that are reliable, durable and long lasting.

### Solar Home Systems (SHS)

The use of stand-alone solar and wind power home systems is rapidly growing around the world as renewable energy technologies become more affordable and available worldwide. Many families in the developing world that live without access to the electric grid are able to have lights at night and use basic electric appliances by purchasing a small off-grid system. Many families spend their savings on a small solar home system, so it is critical to ensure that the batteries they use for energy storage are reliable and designed for deep-cycle use. Trojan's deep-cycle flooded, AGM and gel batteries are known for having a long cycle life and delivering consistent performance even under the most challenging environmental conditions.

### Rural Community Buildings

Throughout the world, millions of people live in villages with schools, hospitals, and other community buildings that have no electricity. Off-grid, battery-based renewable energy systems are a great way for these villages to have access to lights and electric power so they can provide necessary services to residents. Trojan's flooded and maintenance-free, deep-cycle batteries are an ideal energy storage solution for solar, wind and hybrid systems that provide power to these communities.

### Micro-Grids

In many regions of the world, connecting remote villages to the national electric grid is costly so grid expansion is not a viable solution. Battery-based village micro-grid systems powered by solar, wind and hybrid renewable energy sources can provide reliable electricity where grid expansion is not an option. A reliable energy storage solution, using batteries designed for deep-cycle applications is a must for a micro-grid system due to the unpredictable nature of the wind or solar resource and the intermittent and unpredictable level of electricity usage by village residents.

*Energy Storage Solutions*

# Industrial Markets


## Lighting

Area, highway, traffic, parking and security lighting projects all depend on Trojan's proprietary deep-cycle battery technology for long battery life and consistent power output. Trojan Battery's line of deep-cycle AGM and gel batteries are ideal for battery-based lighting systems. These maintenance-free batteries provide rugged durability, optimum performance and dependable power.

Many AGM batteries on the market today are not designed for deep cycling, but off-grid street lighting applications require daily battery cycling since the sun goes down every day. However, the expected cycle life of Trojan AGM batteries is longer than most other cycling AGM batteries. Our AGM batteries are designed to self-discharge at a lower rate than other battery technologies at low temperatures, giving you more energy over the life of the battery. When you're considering a battery for an off-grid solar lighting option, Trojan deep-cycle AGM batteries are the perfect choice.

## Oil and Gas

The oil and gas industries have various critical small-load applications that depend on highly reliable power supplies in areas where utility power or genset power is not available, impractical or cost-prohibitive. Some examples of oil and gas applications that are ideal for Trojan's proven deep-cycle valve-regulated lead-acid (VRLA) batteries include well-site automation, monitoring and control, flow and pressure metering, instrumentation and measurement, process management systems, Supervisory Control & Data Acquisition (SCADA), safety & alarms and point-to-point radio communications.

## Communications

Small-load telemetry applications frequently require the positioning of the radio transmitter/receiver in a location where the utility infrastructure is prohibitive resulting in permitting delays. Standalone battery-based solar power systems can provide flexibility on where to position this equipment. Trojan's VRLA maintenance-free batteries are ideal for these applications because they are designed for deep-cycle operation and extended life in solar applications.

## Security

Security systems in remote locations must have a reliable power source in order to provide complete coverage. When access to grid power is not available, a battery-based solar energy solution is a low maintenance and cost-effective way for remote security systems to operate without interruption. Trojan's AGM and gel maintenance-free, deep-cycle batteries are known for their rugged design and long cycle life and are engineered to perform optimally under a wide range of environmental and operating conditions.

## Telecom Networks

Reliable wireless communication is something we all demand from our service providers, but many telecom networks are located in remote areas where no grid access is possible. When power is unavailable for telecom towers in rural areas, on mountaintops, in desert regions and in other isolated areas, battery-based renewable energy systems are an excellent choice to deliver reliable power. Solar, wind and hybrid systems with battery backup for energy storage are the most cost-effective and reliable solutions available for remote communication devices such as microwave, cellular base stations, repeaters, VSAT's and two-way radio networks. Trojan's broad line of deep-cycle batteries are an ideal choice for remote telecom networks, ensuring that data and voice communications connectivity is available 24/7.

# *Industrial batteries...*
## *designed for 1500 cycles at 80% DOD*

The Industrial line is engineered specifically to support renewable energy systems with large daily loads where the batteries are cycled regularly. These high amp-hour capacity batteries are ideal for use in large off-grid photovolataic (PV) systems, off-grid hybrid PV systems, grid-tied PV systems with battery backup, smart grid peak shifting systems and a variety of other applications. The Industrial line features advanced battery technologies that deliver reliable power and is housed in a dual container construction for enhanced battery protection. Trojan's Industrial line is the perfect combination of performance and function.

## *Intelligent Design*

### Dual Container Protection

Trojan's Industrial line of deep-cycle batteries is comprised of one, two or three single 2-volt cells, standalone or bundled together, secured in a secondary containment case to form single, high-capacity 2-volt, 4-volt or 6-volt battery solutions. Components of the individual cells are assembled in a rugged polypropylene housing designed to protect the internal plates from potential damage that may be caused during transport and installation. The 2-volt cells are enclosed in a larger polyethylene outer case that protects against damage caused by harsh environmental conditions such as moisture and dirt buildup, as well as safeguards against potential acid leaks. For added protection the thick-walled case features a lattice-design that reinforces the outer case's structural integrity.

### Stability Control

Trojan designed its Industrial line of batteries with stability in mind. Featuring a lower battery profile and wider stance design, weight is evenly distributed throughout the battery. By creating a wider center of gravity the battery profile enhances overall stability. Molded into the case design are dual handles that enable easy movement during transport and installation.




Trojan's battery testing procedures adhere to both BCI and IEC test standards.


# *Advanced Battery Technology*

## 1 Alpha Plus® Paste with T2 Technology™

Trojan's Alpha Plus Paste is a proprietary, high-density paste formulation precisely engineered to deliver outstanding battery performance. This high-density paste optimizes porosity development in the active material utilizing the active material more effectively resulting in sustained battery performance over a longer period of time. Trojan's T2 Technology features a patent-pending T2 metal agent which is incorporated into Trojan's Alpha Plus Paste further strengthening the electrochemical processing capabilities of the paste. Alpha Plus Paste with T2 Technology increases both sustained capacity and total overall ampere-hours resulting in more operating power. It's a key reason why Trojan batteries consistently outperform the competition.

## 2 DuraGrid™ Technology

Trojan's DuraGrid Technology is an innovative grid design specifically engineered for the longer life requirements of demanding renewable energy applications. DuraGrid features a thick grid structure which maintains greater corrosion resistance effectively increasing the life of the battery for up to 10 years. Exclusive to Trojan's Industrial line is a low-profile grid configuration that is optimized to enhance current flow throughout the grid network. This low-profile design maximizes the amount of electrolyte resulting in longer intervals between watering.

## 3 Reinforced Protection Wrap

Trojan's Industrial batteries are engineered with a robust positive plate construction that enhances overall performance. Trojan's DuraGrid technology combined with Alpha Plus paste securely locks the active materials to the grid creating an exceptionally strong positive plate. The Industrial line includes a five component wrapping and insulating system comprised of a stranded vertical slyver with a 20 mil backing mat and a secondary 20 mil horizontal compression mat. The entire mat is wrapped with edge-protecting Koroseal that is heat bonded as well as bonded to the plastic boot to protect the bottom of the plate and to keep the Koroseal in place. The advanced plate construction protects against shedding and assures the electrochemical performance of the battery's active materials.

## 4 Maxguard® XL Separator

Exclusively available in Trojan's Industrial and Premium batteries is the Maxguard XL separator. Featuring a wide-channel design, the Maxguard XL separator increases acid flow for optimum battery performance. Thirty percent thicker than Trojan's standard flooded battery separators, the Maxguard XL provides even greater resistance to stratification which is a typical mode of failure in batteries used in renewable energy systems.

## 5 Moss Shield

Trojan's Industrial line of deep-cycle batteries includes a full length moss shield to protect the separators from damage. The moss shield increases the battery life by protecting the top of the plates from shorting to the cell strap.

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| N/A | **IND9-6V** | 6 VOLT | 355 | 445 | 545 | 3.27 | 14 | 15-3/8 (390) | 10-1/4 (260) | 24 (610) | 220 (100) |
| N/A | **IND13-6V** | 6 VOLT | 533 | 673 | 820 | 4.92 | 14 | 22-3/8 (568) | 10-1/4 (260) | 24 (610) | 315 (143) |
| N/A | **IND17-6V** | 6 VOLT | 711 | 897 | 1090 | 6.54 | 14 | 26-11/16 (678) | 10-1/4 (260) | 24 (610) | 415 (188) |
| N/A | **IND23-4V** | 4 VOLT | 977 | 1233 | 1500 | 6.00 | 14 | 22-3/8 (568) | 10-1/4 (260) | 24 (610) | 370 (168) |
| N/A | **IND29-4V** | 4 VOLT | 1245 | 1570 | 1910 | 7.64 | 14 | 26-11/16 (678) | 10-1/4 (260) | 24 (610) | 465 (211) |
| N/A | **IND27-2V** | 2 VOLT | 1183 | 1457 | 1780 | 3.56 | 14 | 15-3/8(390) | 10-1/4(260) | 24(610) | 228(104) |
| N/A | **IND33-2V** | 2 VOLT | 1422 | 1794 | 2187 | 4.37 | 14 | 17-1/3 (440) | 10-1/4(260) | 24(610) | 278(125) |

A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

# *Deep-Cycle Flooded Batteries*
# Premium Line

## *Premium batteries...*
### *designed for 1600 cycles at 50% DOD*

Renewable energy applications operate under challenging conditions such as fluctuating or extreme temperatures, remote locations and the intermittent nature of solar and wind power generation. Designed with a 10-year battery life, Trojan Battery's Premium Line of flooded deep-cycle batteries is specifically engineered to withstand the rigorous conditions of renewable energy applications. The Premium Line incorporates advanced battery features such as Trojan's DuraGrid™, MaxGuard® XL separator and Alpha Plus® Paste technologies that provide superior performance, rugged durability and exceptionally long life. Our product strategy is focused on one simple objective – manufacture the highest quality battery available in the industry which is why our Premium Line is tested to IEC standards.




## 1 DuraGrid™ Technology

Trojan's DuraGrid Technology is a grid design specifically engineered for the longer life requirements of renewable energy applications. DuraGrid features a thicker grid structure maintaining even greater corrosion resistance effectively increasing the life of the battery for up to 10 years. Trojan's DuraGrid Technology combined with the Maxguard XL separator offers excellent charge efficiency allowing the batteries to charge quickly throughout the life of the battery.

## 2 Maxguard® XL Separator

In renewable energy applications batteries may go days without a charge and they frequently operate at partial states of charge. Recognizing the rigorous use of batteries in renewable energy systems, Trojan incorporated the Maxguard XL advanced separator into its battery design. Exclusively available in Trojan's Premium and Industrial lines of batteries, the Maxguard XL separator is 30 percent thicker than our T2 flooded battery separator. The Maxguard XL provides even greater resistance to stratification which is typically a mode of failure in batteries used in renewable energy systems.

## 3 Alpha Plus® Paste with T2 Technology™

Trojan's Alpha Plus Paste is a proprietary, high-density paste formulation precisely engineered to deliver outstanding battery performance. This high-density paste optimizes porosity development in the active material utilizing the active material more effectively resulting in sustained battery performance over a longer period of time. Trojan's T2 Technology features a patent-pending T2 metal agent which is incorporated into Trojan's Alpha Plus Paste further strengthening the electrochemical processing capabilities of Alpha Plus Paste. Alpha Plus Paste with T2 Technology increases both sustained capacity and total overall ampere-hours resulting in more operating power for your application. It's a key reason why Trojan batteries consistently outperform the competition.

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| GC2H | **T105-RE** | 6 VOLT | 185 | 225 | 250 | 1.50 | 5 | 10-3/8 (264) | 7-1/8 (181) | 11-3/4 (299) | 67 (30) |
| 903 | **L16RE-A*** | 6 VOLT | 267 | 325 | 360 | 2.16 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 115 (52) |
| 903 | **L16RE-B*** | 6 VOLT | 303 | 370 | 410 | 2.46 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 118 (54) |
| 903 | **L16RE-2V*** | 2 VOLT | 909 | 1110 | 1235 | 2.47 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 119 (54) |

* Polyon™ Case

A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) for the 20-Hour and 100-Hour rates and 86°F (30°C) for the 5-Hour rate and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

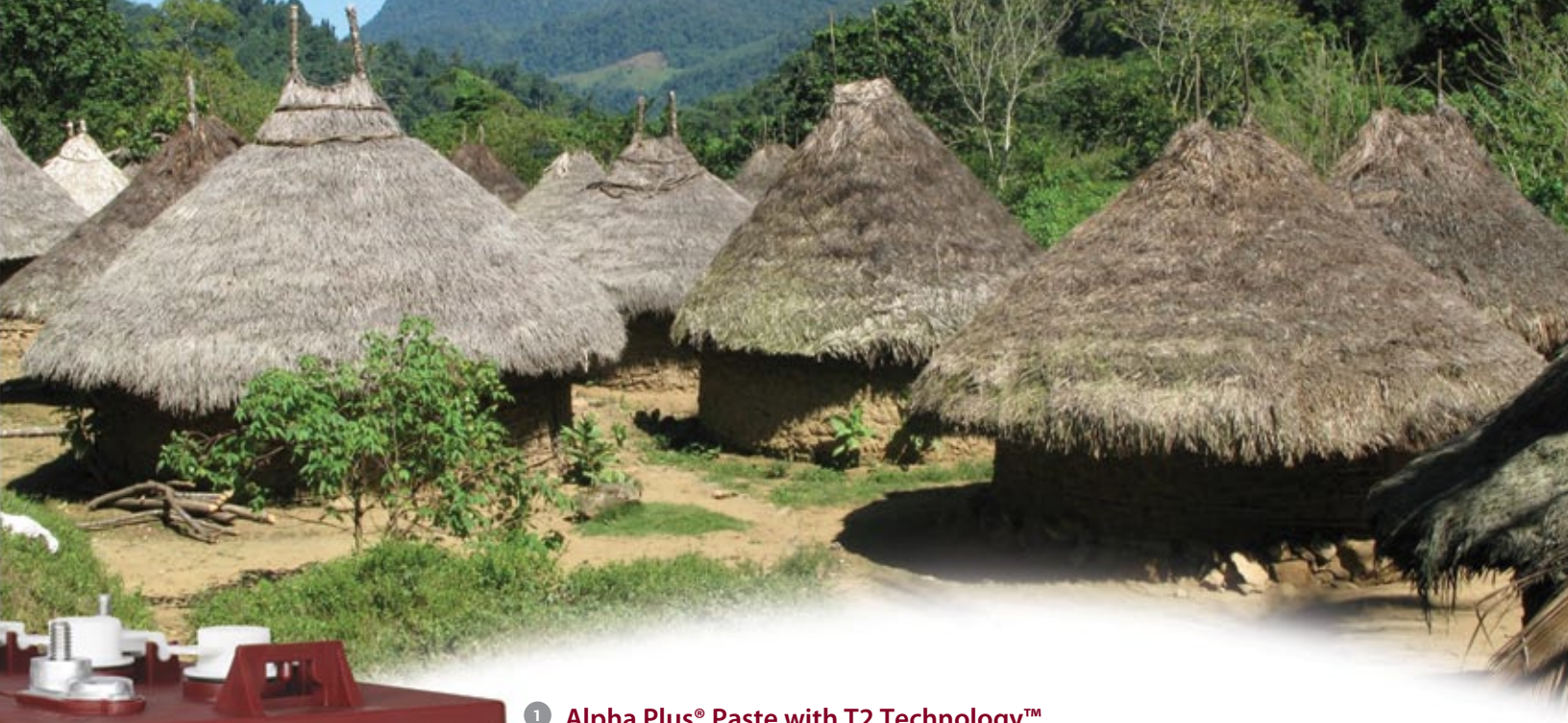
# *Deep-Cycle Flooded Batteries*
# Signature Line


## *Classic Trojan featuring...*
### *T2 Technology™*

The Signature Line of deep-cycle flooded batteries is the flagship of Trojan's product portfolio. Engineered to provide rugged durability and outstanding performance, Trojan's Signature Line is perfectly suited for use in renewable energy systems where lowest life-cycle cost is the key consideration. An all around power house, the Signature Line features Trojan's historically-proven engineering with T2 Technology, an advanced battery technology for maximum sustained performance, longer life and increased total energy.

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| **SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 1,200 CYCLES @ 50% DOD** | | | | | | | | | | | |
| N/A | **J150** | 12 VOLT | 120 | 150 | 166 | 1.99 | 2 | 13-13/16 (351) | 7-1/8 (181) | 11-1/8 (283) | 84 (38) |
| 921 | **J185P-AC*** | 12 VOLT | 168 | 205 | 226 | 2.71 | 6 | 15 (381) | 7 (178) | 14-5/8 (371) | 114 (52) |
| 921 | **J185H-AC*** | 12 VOLT | 185 | 225 | 249 | 2.99 | 6 | 15 (381) | 7 (178) | 14-5/8 (371) | 128 (58) |
| GC2 | **T-105** | 6 VOLT | 185 | 225 | 250 | 1.50 | 1 | 10-3/8 (264) | 7-1/8 (181) | 10-7/8 (276) | 62 (28) |
| GC2 | **T-125** | 6 VOLT | 195 | 240 | 266 | 1.60 | 1 | 10-3/8 (264) | 7-1/8 (181) | 10-7/8 (276) | 66 (30) |
| GC2H | **T-145** | 6 VOLT | 215 | 260 | 287 | 1.72 | 1 | 10-3/8 (264) | 7-1/8 (181) | 11-5/8 (295) | 72 (33) |
| 902 | **J305P-AC*** | 6 VOLT | 271 | 330 | 367 | 2.20 | 6 | 11-5/8 (295) | 7 (178) | 14-3/8 (365) | 96 (44) |
| 902 | **J305H-AC*** | 6 VOLT | 295 | 360 | 400 | 2.40 | 6 | 11-5/8 (295) | 7 (178) | 14-3/8 (365) | 98 (45) |
| 903 | **L16P** | 6 VOLT | 344 | 420 | 467 | 2.80 | 5 | 11-5/8 (295) | 7 (178) | 16-3/4 (424) | 114 (52) |
| 903 | **L16H** | 6 VOLT | 357 | 435 | 483 | 2.89 | 5 | 11-5/8 (295) | 7 (178) | 16-3/4 (424) | 125 (57) |

* Polyon™ Case




## 1 Alpha Plus® Paste with T2 Technology™

*Maximum Operating Performance*

Trojan's Alpha Plus Paste is a proprietary, high-density paste formulation engineered to deliver outstanding battery performance. It optimizes porosity development in the active material utilizing the active material more effectively resulting in sustained battery performance over a longer period of time. Trojan's T2 Technology introduces a patent-pending T2 metal agent into Alpha Plus Paste strengthening its electrochemical processing capabilities. Alpha Plus Paste with T2 Technology increase both sustained capacity and total overall ampere-hours resulting in more operating power. It's a key reason why Trojan batteries consistently outperform the competition.

## 2 Trojan Grid Technology

*Reduced Downtime*

Trojan's grid technology is a lead antimony alloy grid mixture formulated specifically for use with Trojan's Alpha Plus Paste with T2 Technology. The grid formulation provides exceptional structural adhesion between the Alpha Plus Paste and the grid frame. Thick grids reinforce the strength of the frame and reduce overall corrosion. The grid configuration is optimized to enhance current flow through the grid network providing exceptional battery performance, reducing downtime and lowering overall maintenance costs.

## 3 Maxguard® T2 Separator

*Longer Battery Life*

Exclusively available in Trojan batteries is our Maxguard T2 advanced separator. Its multi-rib geometry design keeps acid channels open longer enhancing electrochemical processing while reducing the risk of stratification. Maxguard's proprietary rubber-based material formulation inhibits antimony transfer between the positive grids and negative plates; a protection not available in many other competitor batteries. A newly fortified, thick back web provides even greater separator strength resulting in a more robust battery with increased protection against failures caused by separator degradation. Trojan's Maxguard T2 advanced separator sustains performance, provides longer battery life and significantly lowers operating costs.

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| **SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 600 CYCLES @ 50% DOD** | | | | | | | | | | | |
| 24 | **24TMX** | 12 VOLT | 70 | 85 | 94 | 1.13 | 9 | 11-1/4 (286) | 6-3/4 (171) | 9-3/4 (248) | 47 (21) |
| 27 | **27TMX** | 12 VOLT | 85 | 105 | 117 | 1.40 | 9 | 12-3/4 (324) | 6-3/4 (171) | 9-3/4 (248) | 55 (25) |
| 27 | **27TMH** | 12 VOLT | 95 | 115 | 128 | 1.54 | 9 | 12-3/4 (324) | 6-3/4 (171) | 9-3/4 (248) | 61 (28) |
| 30H | **30XHS** | 12 VOLT | 105 | 130 | 144 | 1.73 | 9 | 13-15/16 (355) | 6-3/4 (171) | 10-1/16 (256) | 66 (30) |

A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) for the 20-Hour and 100-Hour rates and 86°F (30°C) for the 5-Hour rate and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

# *Deep-Cycle VRLA Batteries*
# AGM Line


Trojan's deep-cycle absorbed glass mat (AGM) maintenance-free batteries for renewable energy applications feature a number of design elements to provide optimum performance. Robust plates extend the life-cycle of Trojan's deep-cycle AGM batteries. A separator of glass fibers serves to isolate the positive and negative plates while acting as a blotter to absorb the electrolyte. The separator is maintained under compression between plates to assure contact with plate surfaces. A computer-generated grid design is optimized for high-power density. Low calcium grid alloy reduces gas emissions and a flame arresting, one-way pressure relief vent prevents buildup of excessive pressure. Trojan's deep-cycle AGM batteries are low temperature tolerant, shock and vibration resistant and have a low internal resistance for higher discharge current and higher charging efficiency.

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| U1 | **U1-AGM** | 12 VOLT | 29 | 33 | 34 | 0.408 | 13 | 8-3/16 (207) | 5-3/16 (132) | 6-13/16 (174) | 27 (12) |
| 22 | **22-AGM** | 12 VOLT | 43 | 50 | 52 | 0.624 | 13 | 9 (229) | 5-8/16 (139) | 8-1/16 (205) | 40 (18) |
| 24 | **24-AGM** | 12 VOLT | 67 | 76 | 84 | 1.01 | 6 | 10-3/4 (274) | 6-13/16 (174) | 8-11/16 (220) | 54 (24) |
| 27 | **27-AGM** | 12 VOLT | 77 | 89 | 99 | 1.19 | 6 | 12-9/16 (318) | 6-13/16 (174) | 8-3/4 (221) | 64 (29) |
| 31 | **31-AGM** | 12 VOLT | 82 | 100 | 111 | 1.33 | 6 | 13-7/16 (341) | 6-13/16 (174) | 9-3/16 (233) | 69 (31) |
| GC12 | **12-AGM** | 12 VOLT | 112 | 140 | 144 | 1.72 | 13 | 13-9/16 (345) | 6-13/16 (173) | 10/15/16 (278) | 100 (45 |



A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) for the 20-Hour and 100-Hour rates and 86°F (30°C) for the 5-Hour rate and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

# Deep-Cycle VRLA Batteries
## Gel Line


Trojan's deep-cycle gel batteries are sealed, maintenance-free batteries that deliver superior power in demanding renewable energy applications. Engineered for rugged durability, outstanding performance and long battery life, Trojan's deep-cycle gel batteries feature a number of important design characteristics that provide significant advantages over competing gel products. The gelled electrolyte is a proprietary formulation containing sulfuric acid, fumed silica, pure demineralized, deionized water and a phosphoric acid additive. This exclusive formulation produces a homogenous gel that delivers consistent performance and dramatically long cycle life. The heavy-duty grids lock active material onto the grid network to efficiently deliver more concentrated energy to the terminals. Premium grade, double-insulated separators allow maximum charge flow between the plates for optimum performance.

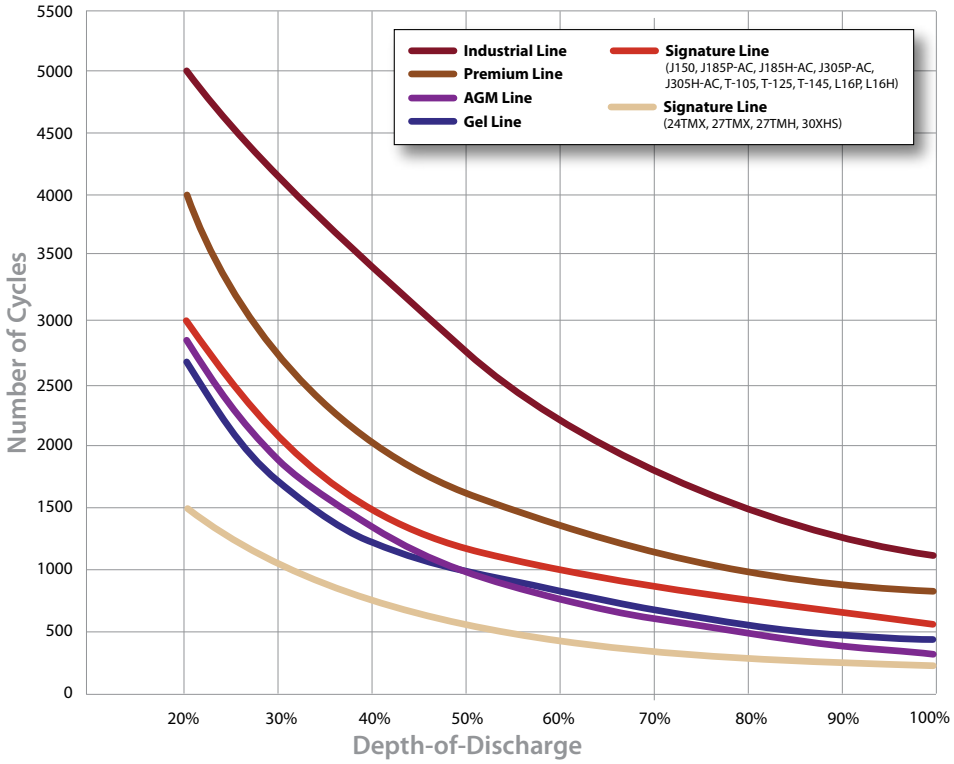
| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height | |
| 24 | **24-GEL** | 12 VOLT | 66 | 77 | 85 | 1.02 | 6 | 10-7/8 (276) | 6-3/4 (171) | 9-5/16 (236) | 52 (24) |
| 27 | **27-GEL** | 12 VOLT | 76 | 91 | 100 | 1.20 | 7 | 12-3/4 (324) | 6-3/4 (171) | 9-1/4 (234) | 63 (29) |
| 31 | **31-GEL** | 12 VOLT | 85 | 102 | 108 | 1.30 | 7 | 12-15/16 (329) | 6-3/4 (171) | 9-5/8 (245) | 70 (32) |
| DIN | **5SHP-GEL** | 12 VOLT | 110 | 125 | 137 | 1.64 | 8 | 13-9/16 (345) | 6-3/4 (171) | 11-1/8 (283) | 85 (39) |
| 8D | **8D-GEL** | 12 VOLT | 188 | 225 | 265 | 3.18 | 5 | 21-1/16 (534) | 11 (279) | 10-13/16 (233) | 157 (71) |
| GC2 | **6V-GEL** | 6 VOLT | 154 | 189 | 198 | 1.19 | 6 | 10-1/4 (260) | 7-1/8 (181) | 10-7/8 (276) | 68 (31) |
| DIN | **TE35-GEL** | 6 VOLT | 180 | 210 | 220 | 1.32 | 8 | 9-5/8 (244) | 7-1/2 (190) | 10-7/8 (276) | 69 (31) |

A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) for the 20-Hour and 100-Hour rates and 86°F (30°C) for the 5-Hour rate and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

# Enhance Battery Performance

## Cycle Life Chart

The single most important factor to consider when purchasing a deep-cycle battery for a renewable energy application is cycle life. The cycle life rating is the number of discharge/charge cycles the battery can provide over its lifetime. This will allow you to determine the true value of the battery over its life by understanding the total cost of ownership. This chart illustrates the cycle life ratings for the Trojan lines of deep-cycle batteries for renewable energy applications.




# Accessories

## Trojan Industrial Line Watering System

Proper maintenance and periodic watering are important factors in maximizing the performance and life of Trojan deep-cycle, flooded Industrial batteries. Battery maintenance can be a costly, time-consuming and messy job, but with Trojan's single-point watering system, precise watering of your flooded batteries is made easy, saving valuable time and money.

## Trojan Industrial Owner's Package

The Trojan Industrial Owner's Package is designed to assist customers with proper battery installation and maintenance. The package includes a hydrometer, a battery maintenance log and an Industrial battery User's Guide. The owner's package can be purchased through any Trojan Battery distributor or system integrator, and is suitable for Trojan's Industrial line of deep-cycle batteries.

# Product Specification Guide

| BCI GROUP SIZE | TYPE | VOLTAGE | CAPACITY [A] Amp-Hours (AH) | | | ENERGY (kWH) | Default TERMINAL | DIMENSIONS [B] Inches (mm) | | | WEIGHT lbs. (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5-Hr Rate | 20-Hr Rate | 100-Hr Rate | 100-Hr Rate | | Length | Width | Height [C] | |
| **INDUSTRIAL LINE - DEEP-CYCLE FLOODED BATTERIES - 2,800 CYCLES @ 50% DOD** | | | | | | | | | | | |
| N/A | **IND9-6V** | 6 VOLT | 355 | 445 | 545 | 3.27 | 14 | 15-3/8 (390) | 10-1/4 (260) | 24 (610) | 220 (100) |
| N/A | **IND13-6V** | 6 VOLT | 533 | 673 | 820 | 4.92 | 14 | 22-3/8 (568) | 10-1/4 (260) | 24 (610) | 315 (143) |
| N/A | **IND17-6V** | 6 VOLT | 711 | 897 | 1090 | 6.54 | 14 | 26-11/16 (678) | 10-1/4 (260) | 24 (610) | 415 (188) |
| N/A | **IND23-4V** | 4 VOLT | 977 | 1233 | 1500 | 6.00 | 14 | 22-3/8 (568) | 10-1/4 (260) | 24 (610) | 370 (168) |
| N/A | **IND29-4V** | 4 VOLT | 1245 | 1570 | 1910 | 7.64 | 14 | 26-11/16 (678) | 10-1/4 (260) | 24 (610) | 465 (211) |
| N/A | **IND27-2V** | 2 VOLT | 1183 | 1457 | 1780 | 3.56 | 14 | 15-3/8(390) | 10-1/4(260) | 24(610) | 228(104) |
| N/A | **IND33-2V** | 2 VOLT | 1422 | 1794 | 2187 | 4.37 | 14 | 17-1/3 (440) | 10-1/4(260) | 24(610) | 278(125) |
| **PREMIUM LINE - DEEP-CYCLE FLOODED BATTERIES - 1,600 CYCLES @ 50% DOD** | | | | | | | | | | | |
| GC2H | **T105-RE** | 6 VOLT | 185 | 225 | 250 | 1.50 | 5 | 10-3/8 (264) | 7-1/8 (181) | 11-3/4 (299) | 67 (30) |
| 903 | **L16RE-A*** | 6 VOLT | 267 | 325 | 360 | 2.16 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 115 (52) |
| 903 | **L16RE-B*** | 6 VOLT | 303 | 370 | 410 | 2.46 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 118 (54) |
| 903 | **L16RE-2V*** | 2 VOLT | 909 | 1110 | 1235 | 2.47 | 5 | 11-5/8 (295) | 7 (178) | 17-11/16 (450) | 119 (54) |
| **SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 1,200 CYCLES @ 50% DOD** | | | | | | | | | | | |
| N/A | **J150** | 12 VOLT | 120 | 150 | 166 | 1.99 | 2 | 13-13/16 (351) | 7-1/8 (181) | 11-1/8 (283) | 84 (38) |
| 921 | **J185P-AC*** | 12 VOLT | 168 | 205 | 226 | 2.71 | 6 | 15 (381) | 7 (178) | 14-5/8 (371) | 114 (52) |
| 921 | **J185H-AC*** | 12 VOLT | 185 | 225 | 249 | 2.99 | 6 | 15 (381) | 7 (178) | 14-5/8 (371) | 128 (58) |
| GC2 | **T-105** | 6 VOLT | 185 | 225 | 250 | 1.50 | 1 | 10-3/8 (264) | 7-1/8 (181) | 10-7/8 (276) | 62 (28) |
| GC2 | **T-125** | 6 VOLT | 195 | 240 | 266 | 1.60 | 1 | 10-3/8 (264) | 7-1/8 (181) | 10-7/8 (276) | 66 (30) |
| GC2H | **T-145** | 6 VOLT | 215 | 260 | 287 | 1.72 | 1 | 10-3/8 (264) | 7-1/8 (181) | 11-5/8 (295) | 72 (33) |
| 902 | **J305P-AC*** | 6 VOLT | 271 | 330 | 367 | 2.20 | 6 | 11-5/8 (295) | 7 (178) | 14-3/8 (365) | 96 (44) |
| 902 | **J305H-AC*** | 6 VOLT | 295 | 360 | 400 | 2.40 | 6 | 11-5/8 (295) | 7 (178) | 14-3/8 (365) | 98 (45) |
| 903 | **L16P** | 6 VOLT | 344 | 420 | 467 | 2.80 | 5 | 11-5/8 (295) | 7 (178) | 16-3/4 (424) | 114 (52) |
| 903 | **L16H** | 6 VOLT | 357 | 435 | 483 | 2.89 | 5 | 11-5/8 (295) | 7 (178) | 16-3/4 (424) | 125 (57) |
| **SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 600 CYCLES @ 50% DOD** | | | | | | | | | | | |
| 24 | **24TMX** | 12 VOLT | 70 | 85 | 94 | 1.13 | 9 | 11-1/4 (286) | 6-3/4 (171) | 9-3/4 (248) | 47 (21) |
| 27 | **27TMX** | 12 VOLT | 85 | 105 | 117 | 1.40 | 9 | 12-3/4 (324) | 6-3/4 (171) | 9-3/4 (248) | 55 (25) |
| 27 | **27TMH** | 12 VOLT | 95 | 115 | 128 | 1.54 | 9 | 12-3/4 (324) | 6-3/4 (171) | 9-3/4 (248) | 61 (28) |
| 30H | **30XHS** | 12 VOLT | 105 | 130 | 144 | 1.73 | 9 | 13-15/16 (355) | 6-3/4 (171) | 10-1/16 (256) | 66 (30) |
| **AGM LINE - VRLA DEEP-CYCLE BATTERIES - 1,000 CYCLES @ 50% DOD** | | | | | | | | | | | |
| U1 | **U1-AGM** | 12 VOLT | 29 | 33 | 34 | 0.408 | 13 | 8-3/16 (207) | 5-3/16 (132) | 6-13/16 (174) | 27 (12) |
| 22 | **22-AGM** | 12 VOLT | 43 | 50 | 52 | 0.624 | 13 | 9 (229) | 5-8/16 (139) | 8-1/16 (205) | 40 (18) |
| 24 | **24-AGM** | 12 VOLT | 67 | 76 | 84 | 1.01 | 6 | 10-3/4 (274) | 6-13/16 (174) | 8-11/16 (220) | 54 (24) |
| 27 | **27-AGM** | 12 VOLT | 77 | 89 | 99 | 1.19 | 6 | 12-9/16 (318) | 6-13/16 (174) | 8-3/4 (221) | 64 (29) |
| 31 | **31-AGM** | 12 VOLT | 82 | 100 | 111 | 1.33 | 6 | 13-7/16 (341) | 6-13/16 (174) | 9-3/16 (233) | 69 (31) |
| GC12 | **12-AGM** | 12 VOLT | 112 | 140 | 144 | 1.72 | 13 | 13-9/16 (345) | 6-13/16 (173) | 10/15/16 (278) | 100 (45 |
| **GEL LINE - VRLA DEEP-CYCLE BATTERIES - 1,000 CYCLES @ 50% DOD** | | | | | | | | | | | |
| 24 | **24-GEL** | 12 VOLT | 66 | 77 | 85 | 1.02 | 6 | 10-7/8 (276) | 6-3/4 (171) | 9-5/16 (236) | 52 (24) |
| 27 | **27-GEL** | 12 VOLT | 76 | 91 | 100 | 1.20 | 7 | 12-3/4 (324) | 6-3/4 (171) | 9-1/4 (234) | 63 (29) |
| 31 | **31-GEL** | 12 VOLT | 85 | 102 | 108 | 1.30 | 7 | 12-15/16 (329) | 6-3/4 (171) | 9-5/8 (245) | 70 (32) |
| DIN | **5SHP-GEL** | 12 VOLT | 110 | 125 | 137 | 1.64 | 8 | 13-9/16 (345) | 6-3/4 (171) | 11-1/8 (283) | 85 (39) |
| 8D | **8D-GEL** | 12 VOLT | 188 | 225 | 265 | 3.18 | 5 | 21-1/16 (534) | 11 (279) | 10-13/16 (233) | 157 (71) |
| GC2 | **6V-GEL** | 6 VOLT | 154 | 189 | 198 | 1.19 | 6 | 10-1/4 (260) | 7-1/8 (181) | 10-7/8 (276) | 68 (31) |
| DIN | **TE35-GEL** | 6 VOLT | 180 | 210 | 220 | 1.32 | 8 | 9-5/8 (244) | 7-1/2 (190) | 10-7/8 (276) | 69 (31) |

## Terminal Configurations

**1 - ELPT**
Embedded Low Profile Terminal

**2 - EHPT**
Embedded High Profile Terminal

**3 - EAPT**
Embedded Automotive Post Terminal

**4 - EUT**
Embedded Universal Terminal

**5 - LT**
L-Terminal

**6 - DT**
Automotive Post & Stud Terminal

**7 - UT**
Universal Terminal

**8 - AP**
Automotive Post Terminal

**9 - WNT**
Wingnut Terminal

**13 - IT**
Insert Terminal

**14 - IND**
Ind Terminal

* Polyon™ Case

A. The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 80°F (27°C) for the 20-Hour and 100-Hour rates and 86°F (30°C) for the 5-Hour rate and maintain a voltage above 1.75 V/cell. Capacities are based on peak performance.
B. Dimensions are based on nominal size. Dimensions may vary depending on type of handle or terminal. Batteries to be mounted with .5 inches (12.7 mm) spacing minimum.
C. Dimensions taken from bottom of the battery to the highest point on the battery. Heights may vary depending on type of terminal.

# Trojan Quality

## Research and Development

Quality and innovation are the cornerstones of Trojan's product development. As the leading manufacturer of deep-cycle flooded batteries, Trojan retains two state-of-the-art research and development centers dedicated exclusively to battery technology and innovation. Engineering teams, backed by more than 200 years of deep-cycle development expertise, work together to innovate and bring to market advanced battery technologies that exceed our customers' expectations for outstanding battery performance. To ensure the quality and superior performance of our batteries, Trojan applies the most rigorous testing procedures in the industry to test for cycle life, capacity, charger algorithms and both physical and mechanical integrity. Trojan's battery testing procedures adhere to both BCI and IEC test standards. Trojan's state-of-the-art research and development centers include charger characterization and analytical labs, battery prototype and evaluation labs and battery autopsy centers all dedicated to providing you with a superior battery that you can rely on.

## Technical Support and Training

At Trojan one of our core strengths is the dedication and support we provide to our customers. Trojan's expertise as the world's leading manufacturer of deep-cycle batteries provides us with a unique knowledge and understanding of battery technology in renewable energy applications. We apply this knowledge and expertise to the benefit of our customers by offering outstanding technical support provided by experienced engineers. To assist our customers with in-depth understanding of battery technologies and systems specifications, Trojan offers a range of training services that can be customized according to your application and market focus. These training services range from over-the-phone technical support to two-day training seminars and even on-site training sessions. Customers can earn North American Board of Certified Energy Practitioners (NABCEP) Continuing Education credit through our technical training sessions held at industry trade shows.

## Manufacturing Excellence Ensures Product Quality

Trojan's state-of-the-art manufacturing is just one of the ways we build industry-leading quality into our products. At Trojan we are investing at record levels in manufacturing and production improvement projects at our U.S. facilities. Our recent addition of advanced robotics, state-of-the-art cast-on-strap (COS) technology, automated acid fill stations, and heat seal and testing equipment ensures the overall quality of our products.

With ISO 9001:2008 certified manufacturing plants in California and Georgia, Trojan is dedicated to producing batteries that deliver superior performance, durability and reliability day in and day out.

# The Trojan Difference

## *Reputation Built on Quality, Leadership and Innovation*

Founded in 1925 by co-founders George Godber and Carl Speer, Trojan Battery Company is the world's leading manufacturer of deep-cycle batteries. From deep-cycle flooded batteries to deep-cycle AGM and gel batteries, Trojan has shaped the world of deep-cycle battery technology with more than 85 years of battery manufacturing experience. With the invention of the golf car battery for the Autoette vehicle in 1952, Trojan pioneered the development of deep-cycle battery technology for the golf industry; successfully introducing mobilization to the game of golf. For Trojan, this began a legacy of leadership and innovation that prevails today in the global, deep-cycle markets spanning applications for renewable energy, golf, transportation, floor machines, aerial work platforms, marine and recreational vehicles. Today, Trojan batteries are available worldwide.


Headquartered in Santa Fe Springs, Calif, Trojan's operations include ISO 9001:2008 certified manufacturing plants in the U.S. in California and Georgia and international offices located in Europe, UAE and Asia. Trojan is a proud member of the Alliance for Rural Electrification (ARE), the Solar Electric Power Association (SEPA), the American Solar Energy Society (ASES), the Battery Council International (BCI). We also are a technical research partner with the Bulgarian Academy of Sciences.

### Environmental Stewardship

At Trojan Battery, when we say, "Clean energy for life™," we mean every word. As proactive supporters of environmental sustainability, our environmental stewardship focuses on clean energy initiatives and recycling programs.

- Trojan batteries are 97% recyclable. The container plastic, battery lead and electrolyte from old deep-cycle batteries can be recycled to produce new deep-cycle batteries.
- Through its partnership with Southern California Edison (SCE) Trojan saves more than 8 million kilowatt hours and cuts CO2 emissions by over 12 million pounds significantly reducing our annual energy consumption and carbon foot print.


Trojan BATTERY COMPANY
*Clean energy for life*℠

Trojan batteries are available worldwide.
We offer outstanding technical support, provided by full-time application engineers.

**call 800.423.6569 or + 1.562.236.3000 or visit www.trojanbatteryRE.com**

12380 Clark Street, Santa Fe Springs, CA 90670 • USA or email re@trojanbattery.com



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