

Reserve Power SPA Batteries

Stand-By Applications



Reserve Power

As a member of a strong and developing business ecosystem, SUNLIGHT relies on its modern infrastructure, continuous innovation and its passion for excellence, to develop and supply reliable battery solutions.

At the core of the company's growth lies its state-of-the-art manufacturing plant in Northern Greece, covering an area of 142.000 m².

The company has consistently invested in developing one of the most advanced industrial plants in Europe, running highly specialized production and assembly lines. The plant is fully compliant with the strictest international standards and is certified for Quality, Occu-

pational Health & Safety and Environmental management systems.

The products are developed by SUNLIGHT's R&D team which constantly designs and evaluates new innovative solutions to better meet market needs based on the latest technological trends, industry developments and market feedback.

SUNLIGHT's products and services have gained international recognition by ensuring uninterrupted and reliable operations in a wide range of critical applications for a broad spectrum of industries, such as Telecom and Power networks.

The complete Reserve Power portfolio consists of:

| | | | | | |
|--------------|----------------------|------------------------|------------------------|--|-----|
| OPzS OPzV | RES OPzS RES OPzV | RES SOPzS RES SOPzV | RES SLT RES SLT GEL | SP SERIES ACCUFORCE SVT/ SVT GEL FRONT ACCESS | OGI |
|--------------|----------------------|------------------------|------------------------|--|-----|

SPA I Valve Regulated AGM Batteries

The SPA range of SUNLIGHT Valve Regulated Lead Acid batteries has been developed as general purpose batteries, designed to provide reliable performance in a wide field of applications. The SUNLIGHT SPA batteries respond to the needs of security and signalling systems market, low power UPS, telecommunications, information technology and emergency power supply.

The Valve Regulated Lead Acid (VRLA) battery is a rechargeable battery type with a safety valve, which allows the internal pressure to be released in case of overcharge. This battery type is maintenance free as there is no need for topping-up during the entire battery service life.

The SUNLIGHT SPA range of VRLA batteries features models with capacity up to 28Ah, offering a dense range of performances and dimensions also available with different types of terminals and flame retardant cases.



Security and fire alarm



UPS



Emergency lighting



Transportation signalling



| | |
|---------------------------------------|---|
| Security and fire alarm systems | Broadcasting systems |
| Low power UPS systems | Robots and factory automation control equipment |
| Emergency Lighting systems | Automation boards for elevators |
| Signalling systems | Electronic cash registers |
| Communications and electric equipment | |

SPA 6 - 4.5



SPA 6 - 8



SPA 12 - 7



SPA 12 - 9



SPA 12 - 18



SPA 12 - 26



The ideal energy solution for stand-by applications

High Performance

With low internal resistance and efficient discharge characteristics, the SUNLIGHT SPA batteries can be applied to many fields in stand-by applications.

Maintenance Free

During the battery service life, there is no need to check the level of the electrolyte or to add water. The gases produced during electrolysis are almost completely recombined to water (up to 99%) through an effective reaction between hydrogen and oxygen.

Safety Valve Design

Excessive gas produced by overcharge or an incorrect charging method is released through the safety valve, which detects rising internal pressure and allows gas to exit; then automatically reseals.

Separator Technology

The Absorbent Glass Mat (AGM) separator, used in the SUNLIGHT batteries, is a highly porous material, which achieves maximization of oxygen diffusion and facilitates the reaction of active materials in the plates. The separator also maintains a constant distance between the positive and the negative plates and immobilizes the electrolyte, so that the possibility of acid leakage is minimized.

Wide Temperature Range Performance

The SUNLIGHT SPA batteries operate within a wide range of temperature while the optimum temperature for the operation of the battery is 20°C - 25°C.

Low Self-discharge Rate

Using a lead / calcium grid alloy, the self-discharge is the minimum. The battery can be stored for 6 months under normal conditions (20°C - 25°C) with no permanent effect on the capacity or the expected service life.

Leak and Spill Proof Container

The construction of the SUNLIGHT battery guarantees that no electrolyte leakage can occur from the terminals or case. A highly resistant plastic material is used, available in either standard ABS (UL94 HB) or flame retardant type (UL94 V-0).

Float Service Life

The nominal service life is 10 years in float / stand-by applications (20°C).

Multi-position Placement

The sealed construction of the battery allows perfect operation in any position (vertical or horizontal but not in completely inverted position).



Features of SPA Range

- Capacity Range: 0,7Ah to 28Ah
- Design Life: 10 years at 20°C

- Classified as "Long Life", according to EUROBAT guide 2015
- Configurations: 4V, 6V, 8V and 12V blocks available



Certified Quality

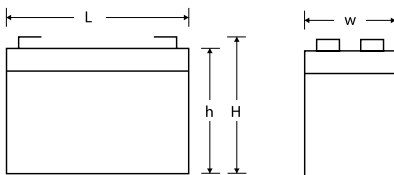
- The SUNLIGHT SPA batteries are recognized by **UL (File No MH18852)**.
- The SUNLIGHT Manufacturing Plant is certified according to **ISO 9001, ISO 14001** and **BS OHSAS 18001**
- As a member of **EUROBAT** organization SYSTEMS SUNLIGHT S.A. closely monitors the latest developments in the battery industry.
- Products are 100% tested and checked prior to shipment.
- The SUNLIGHT SPA batteries are completely recyclable.

| Battery Type | Nominal Voltage (V) | Nominal Capacity (Ah) at 1.75 Vpc (25°C) | | Length (mm) | Width (mm) | Height (h) (mm) | Total Height (H) (mm) | Typical Weight (kg) | Terminal Position | Terminal Type | Maximum Current (25°C) | | Internal Resistance (mOhm) | Short Circuit Current (A) |
|--------------|---------------------|--|------|-------------|------------|-----------------|-----------------------|---------------------|-------------------|---------------|------------------------|-----------------|----------------------------|---------------------------|
| | | 20 h | 10 h | | | | | | | | Charging (A) | Discharging (A) | | |
| SPA 4 - 9.5 | 4 | 9.6 | 8.8 | 102 | 44 | 95 | 101 | 1.05 | A | F1 | 3.00 | 150.0 | 8 | 400 |
| SPA 6 - 1.3 | 6 | 1.3 | 1.2 | 97 | 24 | 52 | 58 | 0.28 | A | F1 | 0.39 | 19.5 | 52 | 120 |
| SPA 6 - 2.8 | 6 | 2.8 | 2.6 | 66 | 33 | 97 | 104 | 0.49 | C | F1 | 0.84 | 42.0 | 32 | 190 |
| SPA 6 - 3.2 | 6 | 3.2 | 3.0 | 134 | 35 | 61 | 67 | 0.62 | A | F1 | 0.96 | 48.0 | 28 | 200 |
| SPA 6 - 4.5 | 6 | 4.0 | 3.6 | 70 | 47 | 101 | 107 | 0.65 | C | F1 | 1.20 | 60.0 | 30 | 210 |
| SPA 6 - 7 | 6 | 7.0 | 6.4 | 151 | 34 | 94 | 100 | 0.98 | A | F1 | 2.10 | 105.0 | 16 | 380 |
| SPA 6 - 8 | 6 | 8.0 | 7.4 | 98 | 56 | 117 | 119 | 1.20 | E | F1 | 2.40 | 120.0 | 10 | 450 |
| SPA 6 - 10 | 6 | 10.0 | 9.3 | 151 | 50 | 94 | 100 | 1.60 | A | F1 | 3.00 | 150.0 | 14 | 460 |
| SPA 6 - 12 | 6 | 12.0 | 11.2 | 151 | 50 | 94 | 100 | 1.70 | A | F1 | 3.60 | 180.0 | 10 | 500 |
| SPA 8 - 3.2 | 8 | 3.2 | 3.0 | 134 | 36 | 63 | 69 | 0.85 | D | F1 | 0.96 | 48.0 | 28 | 270 |
| SPA 12 - 0.7 | 12 | 0.8 | 0.7 | 96 | 25 | 62 | 62 | 0.33 | - | F6 | 0.24 | 5.0 | 200 | 60 |
| SPA 12 - 1.3 | 12 | 1.2 | 1.1 | 97 | 43 | 52 | 58 | 0.52 | D | F1 | 0.36 | 18.0 | 90 | 130 |
| SPA 12 - 1.9 | 12 | 2.0 | 1.9 | 178 | 35 | 61 | 67 | 0.65 | A | F1 | 0.60 | 30.0 | 65 | 180 |
| SPA 12 - 2C | 12 | 2.0 | 1.9 | 144 | 24 | 65 | 65 | 0.65 | G | F5 | 0.60 | 10.0 | 70 | 80 |
| SPA 12 - 2.3 | 12 | 2.3 | 2.1 | 178 | 35 | 61 | 67 | 0.80 | A | F1 | 0.69 | 34.5 | 60 | 200 |
| SPA 12 - 3.3 | 12 | 3.3 | 3.0 | 134 | 67 | 61 | 67 | 1.22 | D | F1 | 0.96 | 48.0 | 52 | 240 |
| SPA 12 - 5 | 12 | 5.0 | 4.7 | 90 | 70 | 101 | 107 | 1.45 | A | F1 | 1.58 | 75.0 | 26 | 450 |
| SPA 12 - 6 | 12 | 6.0 | 5.5 | 151 | 52 | 94 | 99 | 1.83 | F | F1 | 1.80 | 97.5 | 26 | 500 |
| SPA 12 - 7 | 12 | 7.0 | 6.2 | 151 | 65 | 94 | 100 | 1.95 | F | F1 | 2.10 | 105.0 | 26 | 400 |
| SPA 12 - 7.2 | 12 | 7.2 | 6.7 | 151 | 65 | 94 | 100 | 2.20 | F | F1 | 2.16 | 108.0 | 26 | 430 |
| SPA 12 - 9 | 12 | 9.0 | 8.4 | 151 | 65 | 94 | 100 | 2.35 | F | F1 | 2.70 | 135.0 | 19 | 640 |
| SPA 12 - 10 | 12 | 10.0 | 9.3 | 151 | 98 | 95 | 101 | 3.00 | F | F1 | 3.00 | 150.0 | 32 | 380 |
| SPA 12 - 12 | 12 | 12.0 | 11.3 | 151 | 98 | 95 | 101 | 3.40 | F | F1 | 3.60 | 180.0 | 19 | 640 |
| SPA 12 - 18 | 12 | 18.0 | 15.8 | 181 | 77 | 167 | 167 | 5.00 | B | F3 | 5.40 | 270.0 | 15 | 750 |
| SPA 12 - 26 | 12 | 26.0 | 24.4 | 165 | 176 | 127 | 127 | 7.60 | B | F3 | 7.80 | 390.0 | 12 | 1020 |
| SPA 12 - 28 | 12 | 28.0 | 26.0 | 165 | 125 | 175 | 182 | 8.60 | B | F4 | 8.40 | 420.0 | 11 | 1200 |

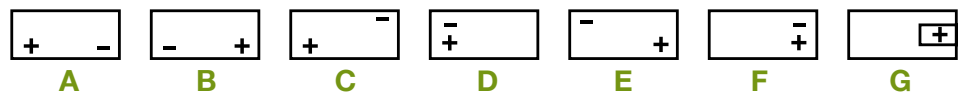
All dimensions and weights shown are subject to manufacturing tolerances

Drawings

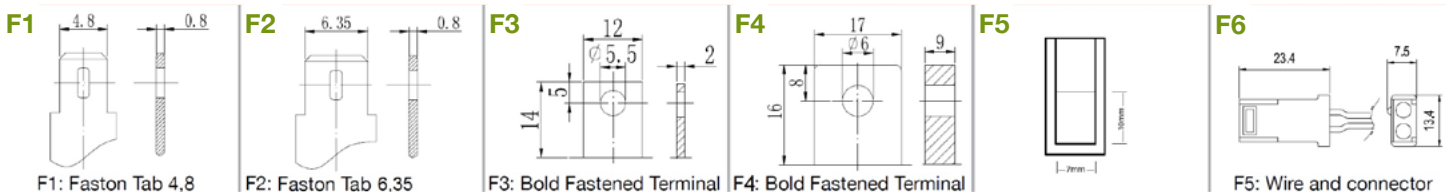
Case Dimensions



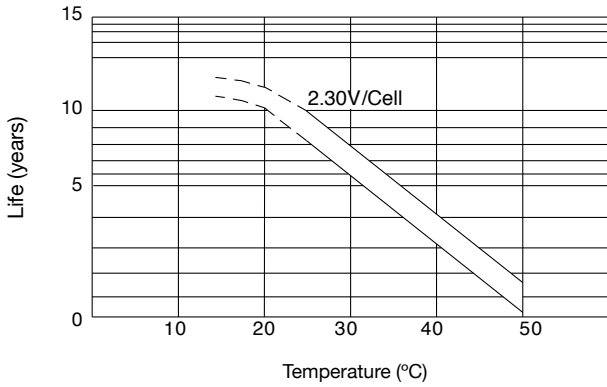
Terminal Positions



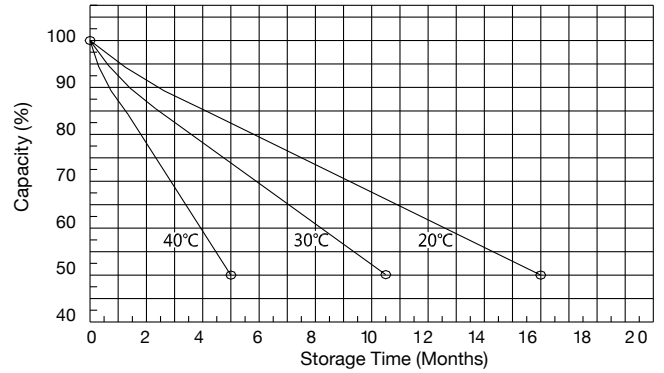
Terminals



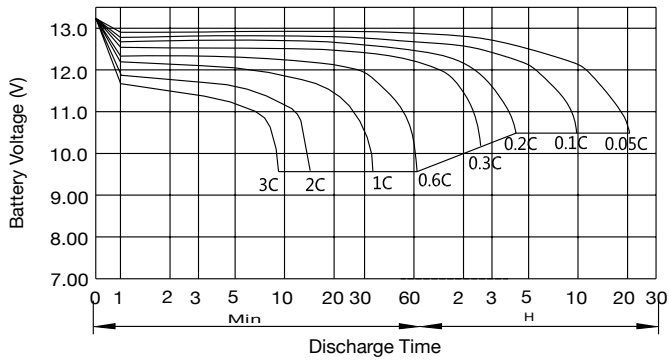
Temperature Effects on Float Life



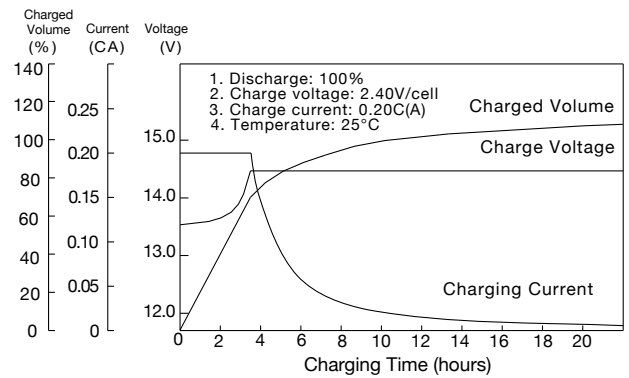
Self Discharge Characteristics



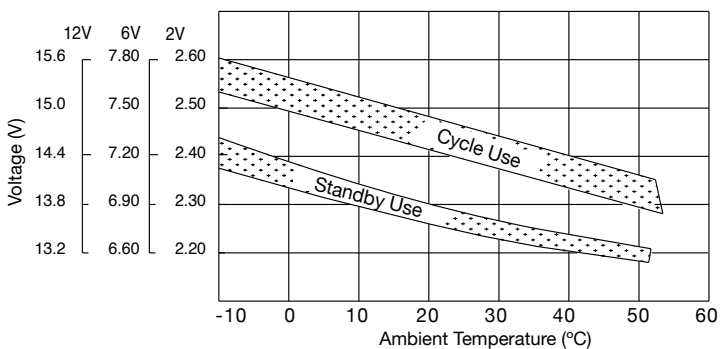
Discharge Characteristics (25°C)



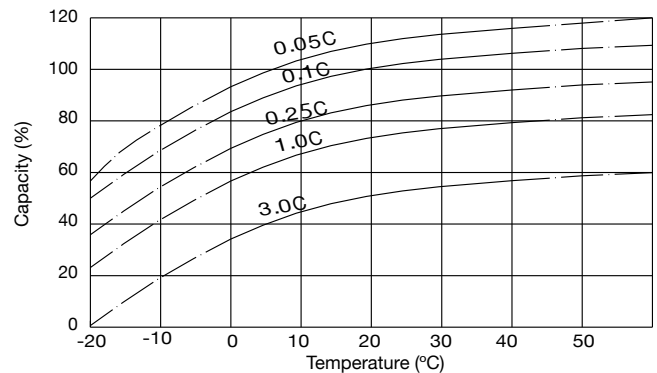
Charging Characteristics (25°C)



Relationship Between Charging Voltage and Temperature



Temperature Effects on Capacity



Discharge Constant Current at 25°C (Amperes)

| End Voltage 1.80 V/cell | | | | | | | | | | | | |
|-------------------------|-------|--------|--------|--------|-------|------|------|------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 30.14 | 19.20 | 15.50 | 9.00 | 5.63 | 3.19 | 2.31 | 1.84 | 1.57 | 1.02 | 0.86 | 0.47 |
| SPA 6 - 1.3 | 3.93 | 2.48 | 2.01 | 1.16 | 0.73 | 0.41 | 0.30 | 0.24 | 0.20 | 0.13 | 0.12 | 0.06 |
| SPA 6 - 2.8 | 8.94 | 5.64 | 4.58 | 2.65 | 1.66 | 0.94 | 0.68 | 0.54 | 0.46 | 0.29 | 0.26 | 0.14 |
| SPA 6 - 3.2 | 10.20 | 6.45 | 5.23 | 3.03 | 1.90 | 1.08 | 0.78 | 0.62 | 0.53 | 0.34 | 0.29 | 0.15 |
| SPA 6 - 4.5 | 12.10 | 7.66 | 6.21 | 3.60 | 2.25 | 1.28 | 0.92 | 0.74 | 0.63 | 0.40 | 0.35 | 0.19 |
| SPA 6 - 7 | 21.10 | 13.30 | 10.80 | 6.25 | 3.91 | 2.22 | 1.60 | 1.28 | 1.09 | 0.69 | 0.62 | 0.34 |
| SPA 6 - 8 | 25.70 | 16.20 | 13.10 | 7.62 | 4.78 | 2.71 | 1.95 | 1.57 | 1.33 | 0.85 | 0.73 | 0.40 |
| SPA 6 - 10 | 31.71 | 20.20 | 16.30 | 9.47 | 5.93 | 3.36 | 2.43 | 1.94 | 1.65 | 1.07 | 0.91 | 0.49 |
| SPA 6 - 12 | 37.99 | 24.20 | 19.60 | 11.40 | 7.11 | 4.03 | 2.91 | 2.33 | 1.98 | 1.28 | 1.09 | 0.59 |
| SPA 8 - 3.2 | 10.20 | 6.45 | 5.23 | 3.03 | 1.90 | 1.08 | 0.78 | 0.62 | 0.53 | 0.34 | 0.29 | 0.15 |
| SPA 12 - 0.7 | 2.54 | 1.61 | 1.31 | 0.76 | 0.47 | 0.27 | 0.19 | 0.16 | 0.13 | 0.09 | 0.07 | 0.04 |
| SPA 12 - 1.3 | 3.60 | 2.30 | 1.84 | 1.07 | 0.67 | 0.38 | 0.28 | 0.22 | 0.19 | 0.12 | 0.10 | 0.06 |
| SPA 12 - 1.9 | 6.38 | 4.03 | 3.27 | 1.89 | 1.19 | 0.67 | 0.49 | 0.39 | 0.33 | 0.21 | 0.18 | 0.10 |
| SPA 12 - 2C | 6.34 | 4.04 | 3.26 | 1.89 | 1.19 | 0.68 | 0.49 | 0.39 | 0.33 | 0.21 | 0.18 | 0.10 |
| SPA 12 - 2.3 | 7.34 | 4.64 | 3.76 | 2.18 | 1.36 | 0.77 | 0.56 | 0.45 | 0.38 | 0.24 | 0.21 | 0.11 |
| SPA 12 - 3.3 | 10.20 | 6.45 | 5.23 | 3.03 | 1.94 | 1.08 | 0.78 | 0.62 | 0.53 | 0.34 | 0.29 | 0.17 |
| SPA 12 - 5 | 15.70 | 9.80 | 8.13 | 4.69 | 2.92 | 1.68 | 1.21 | 0.97 | 0.82 | 0.52 | 0.46 | 0.25 |
| SPA 12 - 6 | 19.10 | 12.10 | 9.78 | 5.68 | 3.55 | 2.01 | 1.46 | 1.16 | 0.99 | 0.63 | 0.55 | 0.30 |
| SPA 12 - 7 | 21.10 | 13.30 | 10.80 | 6.25 | 3.91 | 2.22 | 1.60 | 1.28 | 1.09 | 0.70 | 0.61 | 0.34 |
| SPA 12 - 7.2 | 23.00 | 14.50 | 11.80 | 6.82 | 4.27 | 2.42 | 1.75 | 1.40 | 1.19 | 0.76 | 0.66 | 0.35 |
| SPA 12 - 9 | 28.70 | 18.10 | 14.70 | 8.52 | 5.34 | 3.02 | 2.18 | 1.75 | 1.48 | 0.95 | 0.82 | 0.44 |
| SPA 12 - 10 | 31.71 | 20.20 | 16.30 | 9.47 | 5.93 | 3.36 | 2.43 | 1.94 | 1.65 | 1.07 | 0.91 | 0.49 |
| SPA 12 - 12 | 35.64 | 22.70 | 18.40 | 10.70 | 6.71 | 3.84 | 2.76 | 2.15 | 1.86 | 1.22 | 1.11 | 0.56 |
| SPA 12 - 18 | 53.54 | 34.10 | 27.60 | 16.07 | 10.06 | 5.75 | 4.14 | 3.23 | 2.79 | 1.83 | 1.55 | 0.85 |
| SPA 12 - 26 | 76.77 | 48.90 | 39.80 | 23.10 | 14.40 | 8.31 | 5.98 | 4.67 | 4.04 | 2.65 | 2.40 | 1.22 |
| SPA 12 - 28 | 85.41 | 54.40 | 44.10 | 25.60 | 16.00 | 9.41 | 6.79 | 5.43 | 4.62 | 2.99 | 2.55 | 1.37 |

| End Voltage 1.75 V/cell | | | | | | | | | | | | |
|-------------------------|-------|--------|--------|--------|-------|------|------|------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 31.87 | 20.30 | 16.40 | 9.34 | 5.81 | 3.28 | 2.38 | 1.90 | 1.62 | 1.05 | 0.88 | 0.48 |
| SPA 6 - 1.3 | 4.16 | 2.63 | 2.12 | 1.21 | 0.75 | 0.42 | 0.31 | 0.25 | 0.21 | 0.13 | 0.12 | 0.07 |
| SPA 6 - 2.8 | 9.47 | 5.98 | 4.83 | 2.75 | 1.71 | 0.97 | 0.70 | 0.56 | 0.47 | 0.30 | 0.26 | 0.14 |
| SPA 6 - 3.2 | 10.80 | 6.84 | 5.52 | 3.14 | 1.96 | 1.10 | 0.80 | 0.64 | 0.54 | 0.35 | 0.30 | 0.16 |
| SPA 6 - 4.5 | 12.90 | 8.12 | 6.56 | 3.73 | 2.32 | 1.31 | 0.95 | 0.76 | 0.65 | 0.41 | 0.36 | 0.20 |
| SPA 6 - 7 | 22.30 | 14.10 | 11.40 | 6.49 | 4.04 | 2.28 | 1.65 | 1.32 | 1.12 | 0.71 | 0.64 | 0.35 |
| SPA 6 - 8 | 27.20 | 17.30 | 13.90 | 7.92 | 4.93 | 2.78 | 2.01 | 1.61 | 1.37 | 0.87 | 0.74 | 0.40 |
| SPA 6 - 10 | 33.60 | 21.40 | 17.30 | 9.83 | 6.12 | 3.45 | 2.50 | 2.00 | 1.70 | 1.10 | 0.93 | 0.50 |
| SPA 6 - 12 | 40.19 | 25.60 | 20.70 | 11.80 | 7.34 | 4.14 | 3.00 | 2.40 | 2.04 | 1.32 | 1.12 | 0.60 |
| SPA 8 - 3.2 | 10.80 | 6.80 | 5.52 | 3.14 | 1.96 | 1.10 | 0.80 | 0.64 | 0.54 | 0.35 | 0.30 | 0.16 |
| SPA 12 - 0.7 | 2.70 | 1.71 | 1.38 | 0.79 | 0.49 | 0.28 | 0.20 | 0.16 | 0.14 | 0.09 | 0.07 | 0.04 |
| SPA 12 - 1.3 | 3.80 | 2.40 | 1.94 | 1.11 | 0.69 | 0.39 | 0.28 | 0.22 | 0.19 | 0.12 | 0.11 | 0.06 |
| SPA 12 - 1.9 | 6.76 | 4.27 | 3.45 | 1.97 | 1.22 | 0.69 | 0.50 | 0.40 | 0.34 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2C | 6.72 | 4.28 | 3.45 | 1.96 | 1.23 | 0.69 | 0.50 | 0.40 | 0.34 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2.3 | 7.78 | 4.91 | 3.97 | 2.26 | 1.41 | 0.79 | 0.58 | 0.46 | 0.39 | 0.25 | 0.21 | 0.12 |
| SPA 12 - 3.3 | 10.80 | 6.84 | 5.52 | 3.14 | 2.00 | 1.10 | 0.80 | 0.64 | 0.54 | 0.35 | 0.30 | 0.17 |
| SPA 12 - 5 | 16.20 | 10.40 | 8.60 | 4.88 | 3.01 | 1.72 | 1.25 | 1.00 | 0.85 | 0.54 | 0.47 | 0.25 |
| SPA 12 - 6 | 20.30 | 12.80 | 10.30 | 5.90 | 3.67 | 2.07 | 1.50 | 1.20 | 1.02 | 0.65 | 0.55 | 0.30 |
| SPA 12 - 7 | 22.30 | 14.10 | 11.40 | 6.49 | 4.04 | 2.28 | 1.65 | 1.32 | 1.12 | 0.72 | 0.62 | 0.35 |
| SPA 12 - 7.2 | 24.40 | 15.40 | 12.40 | 7.07 | 4.40 | 2.48 | 1.80 | 1.44 | 1.22 | 0.78 | 0.67 | 0.36 |
| SPA 12 - 9 | 30.40 | 19.20 | 15.50 | 8.84 | 5.50 | 3.10 | 2.25 | 1.80 | 1.53 | 0.98 | 0.84 | 0.45 |
| SPA 12 - 10 | 33.60 | 21.40 | 17.30 | 9.83 | 6.12 | 3.45 | 2.50 | 2.00 | 1.70 | 1.10 | 0.93 | 0.50 |
| SPA 12 - 12 | 37.84 | 24.10 | 19.40 | 11.10 | 6.92 | 3.94 | 2.84 | 2.22 | 1.92 | 1.26 | 1.13 | 0.60 |
| SPA 12 - 18 | 56.68 | 36.10 | 29.14 | 16.69 | 10.38 | 5.90 | 4.27 | 3.33 | 2.88 | 1.89 | 1.58 | 0.90 |
| SPA 12 - 26 | 81.48 | 51.90 | 42.00 | 24.00 | 14.90 | 8.53 | 6.16 | 4.81 | 4.16 | 2.73 | 2.44 | 1.30 |
| SPA 12 - 28 | 90.59 | 57.70 | 46.60 | 26.50 | 16.50 | 9.65 | 7.00 | 5.60 | 4.76 | 3.08 | 2.60 | 1.40 |

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Current at 25°C (Amperes)

| End Voltage 1.70 V/cell | | | | | | | | | | | | |
|-------------------------|-------|--------|--------|--------|-------|------|------|------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 33.28 | 21.20 | 17.00 | 9.60 | 5.93 | 3.33 | 2.39 | 1.91 | 1.62 | 1.05 | 0.89 | 0.48 |
| SPA 6 - 1.3 | 4.35 | 2.75 | 2.20 | 1.24 | 0.77 | 0.43 | 0.31 | 0.25 | 0.21 | 0.13 | 0.12 | 0.07 |
| SPA 6 - 2.8 | 9.90 | 6.25 | 5.00 | 2.82 | 1.75 | 0.98 | 0.70 | 0.56 | 0.48 | 0.31 | 0.26 | 0.14 |
| SPA 6 - 3.2 | 11.30 | 7.14 | 5.72 | 3.22 | 2.00 | 1.12 | 0.81 | 0.64 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 6 - 4.5 | 13.40 | 8.48 | 6.79 | 3.83 | 2.37 | 1.33 | 0.96 | 0.77 | 0.65 | 0.41 | 0.36 | 0.20 |
| SPA 6 - 7 | 23.30 | 14.70 | 11.80 | 6.65 | 4.12 | 2.31 | 1.66 | 1.33 | 1.13 | 0.72 | 0.64 | 0.35 |
| SPA 6 - 8 | 28.50 | 17.90 | 14.40 | 8.11 | 5.03 | 2.82 | 2.02 | 1.62 | 1.38 | 0.88 | 0.75 | 0.40 |
| SPA 6 - 10 | 35.01 | 22.30 | 17.90 | 10.10 | 6.24 | 3.50 | 2.52 | 2.01 | 1.71 | 1.11 | 0.94 | 0.50 |
| SPA 6 - 12 | 42.08 | 26.80 | 21.40 | 12.10 | 7.49 | 4.20 | 3.02 | 2.42 | 2.05 | 1.33 | 1.12 | 0.60 |
| SPA 8 - 3.2 | 11.30 | 7.14 | 5.72 | 3.22 | 2.00 | 1.12 | 0.81 | 0.64 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 12 - 0.7 | 2.83 | 1.79 | 1.43 | 0.81 | 0.50 | 0.28 | 0.20 | 0.16 | 0.14 | 0.09 | 0.08 | 0.04 |
| SPA 12 - 1.3 | 4.00 | 2.50 | 2.01 | 1.14 | 0.71 | 0.40 | 0.29 | 0.22 | 0.19 | 0.12 | 0.11 | 0.06 |
| SPA 12 - 1.9 | 7.07 | 4.46 | 3.57 | 2.01 | 1.25 | 0.70 | 0.50 | 0.40 | 0.34 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2C | 7.00 | 4.46 | 3.58 | 2.01 | 1.25 | 0.70 | 0.50 | 0.40 | 0.34 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2.3 | 8.13 | 5.13 | 4.11 | 2.32 | 1.44 | 0.81 | 0.58 | 0.46 | 0.39 | 0.25 | 0.22 | 0.12 |
| SPA 12 - 3.3 | 11.30 | 7.14 | 5.72 | 3.22 | 2.05 | 1.12 | 0.81 | 0.64 | 0.55 | 0.35 | 0.30 | 0.17 |
| SPA 12 - 5 | 17.10 | 11.00 | 8.91 | 5.00 | 3.10 | 1.75 | 1.26 | 1.01 | 0.86 | 0.55 | 0.47 | 0.25 |
| SPA 12 - 6 | 21.20 | 13.40 | 10.70 | 6.05 | 3.75 | 2.10 | 1.51 | 1.21 | 1.02 | 0.65 | 0.56 | 0.30 |
| SPA 12 - 7 | 23.30 | 14.70 | 11.80 | 6.65 | 4.12 | 2.31 | 1.66 | 1.33 | 1.13 | 0.72 | 0.63 | 0.35 |
| SPA 12 - 7.2 | 25.40 | 16.10 | 12.90 | 7.25 | 4.49 | 2.52 | 1.81 | 1.45 | 1.23 | 0.79 | 0.67 | 0.36 |
| SPA 12 - 9 | 31.80 | 20.10 | 16.10 | 9.06 | 5.62 | 3.15 | 2.27 | 1.81 | 1.54 | 0.99 | 0.84 | 0.45 |
| SPA 12 - 10 | 35.01 | 22.30 | 17.90 | 10.10 | 6.24 | 3.50 | 2.52 | 2.01 | 1.71 | 1.11 | 0.94 | 0.50 |
| SPA 12 - 12 | 39.41 | 25.10 | 20.10 | 11.40 | 7.06 | 4.00 | 2.86 | 2.24 | 1.93 | 1.27 | 1.13 | 0.60 |
| SPA 12 - 18 | 59.19 | 37.70 | 30.17 | 17.10 | 10.59 | 5.99 | 4.30 | 3.35 | 2.90 | 1.90 | 1.59 | 0.90 |
| SPA 12 - 26 | 85.25 | 54.30 | 43.50 | 24.60 | 15.20 | 8.66 | 6.21 | 4.84 | 4.19 | 2.75 | 2.46 | 1.30 |
| SPA 12 - 28 | 94.67 | 60.30 | 48.20 | 27.20 | 16.80 | 9.80 | 7.05 | 5.64 | 4.79 | 3.10 | 2.62 | 1.41 |

| End Voltage 1.65 V/cell | | | | | | | | | | | | |
|-------------------------|-------|--------|--------|--------|-------|------|------|------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 34.70 | 22.10 | 17.60 | 9.88 | 6.08 | 3.35 | 2.41 | 1.93 | 1.63 | 1.06 | 0.89 | 0.48 |
| SPA 6 - 1.3 | 4.53 | 2.86 | 2.28 | 1.28 | 0.79 | 0.43 | 0.31 | 0.25 | 0.21 | 0.13 | 0.12 | 0.07 |
| SPA 6 - 2.8 | 10.30 | 6.52 | 5.19 | 2.91 | 1.79 | 0.99 | 0.71 | 0.57 | 0.48 | 0.31 | 0.26 | 0.14 |
| SPA 6 - 3.2 | 11.80 | 7.45 | 5.93 | 3.32 | 2.05 | 1.13 | 0.81 | 0.65 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 6 - 4.5 | 14.00 | 8.85 | 7.05 | 3.95 | 2.43 | 1.34 | 0.96 | 0.77 | 0.66 | 0.42 | 0.36 | 0.20 |
| SPA 6 - 7 | 24.30 | 15.40 | 12.20 | 6.86 | 4.23 | 2.33 | 1.67 | 1.34 | 1.14 | 0.73 | 0.64 | 0.35 |
| SPA 6 - 8 | 29.70 | 18.70 | 15.00 | 8.37 | 5.15 | 2.85 | 2.05 | 1.63 | 1.39 | 0.89 | 0.75 | 0.41 |
| SPA 6 - 10 | 36.58 | 23.30 | 18.50 | 10.40 | 6.40 | 3.53 | 2.54 | 2.03 | 1.72 | 1.12 | 0.94 | 0.51 |
| SPA 6 - 12 | 43.80 | 27.90 | 22.30 | 12.50 | 7.68 | 4.24 | 3.04 | 2.43 | 2.07 | 1.34 | 1.13 | 0.61 |
| SPA 8 - 3.2 | 11.80 | 7.45 | 5.93 | 3.32 | 2.05 | 1.13 | 0.81 | 0.65 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 12 - 0.7 | 2.94 | 1.86 | 1.48 | 0.83 | 0.51 | 0.28 | 0.20 | 0.16 | 0.14 | 0.09 | 0.08 | 0.04 |
| SPA 12 - 1.3 | 4.20 | 2.60 | 2.09 | 1.18 | 0.73 | 0.40 | 0.29 | 0.23 | 0.20 | 0.12 | 0.11 | 0.06 |
| SPA 12 - 1.9 | 7.37 | 4.66 | 3.71 | 2.08 | 1.28 | 0.71 | 0.51 | 0.41 | 0.34 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2C | 7.30 | 4.65 | 3.71 | 2.08 | 1.28 | 0.71 | 0.51 | 0.40 | 0.35 | 0.23 | 0.20 | 0.10 |
| SPA 12 - 2.3 | 8.48 | 5.35 | 4.27 | 2.39 | 1.47 | 0.81 | 0.58 | 0.47 | 0.40 | 0.26 | 0.22 | 0.12 |
| SPA 12 - 3.3 | 11.80 | 7.45 | 5.93 | 3.32 | 2.08 | 1.13 | 0.81 | 0.65 | 0.55 | 0.35 | 0.30 | 0.17 |
| SPA 12 - 5 | 18.10 | 11.10 | 9.22 | 5.12 | 3.18 | 1.77 | 1.27 | 1.01 | 0.86 | 0.55 | 0.47 | 0.25 |
| SPA 12 - 6 | 22.20 | 13.90 | 11.20 | 6.23 | 3.84 | 2.12 | 1.52 | 1.22 | 1.03 | 0.66 | 0.56 | 0.31 |
| SPA 12 - 7 | 24.30 | 15.40 | 12.20 | 6.86 | 4.23 | 2.33 | 1.67 | 1.34 | 1.14 | 0.73 | 0.63 | 0.35 |
| SPA 12 - 7.2 | 26.50 | 16.80 | 13.40 | 7.48 | 4.61 | 2.54 | 1.83 | 1.46 | 1.24 | 0.79 | 0.68 | 0.36 |
| SPA 12 - 9 | 33.20 | 21.00 | 16.70 | 9.35 | 5.76 | 3.18 | 2.28 | 1.83 | 1.55 | 0.99 | 0.85 | 0.45 |
| SPA 12 - 10 | 36.58 | 23.30 | 18.50 | 10.40 | 6.40 | 3.53 | 2.54 | 2.03 | 1.72 | 1.12 | 0.94 | 0.51 |
| SPA 12 - 12 | 41.13 | 26.20 | 20.90 | 11.80 | 7.25 | 4.03 | 2.88 | 2.25 | 1.95 | 1.28 | 1.14 | 0.60 |
| SPA 12 - 18 | 61.86 | 39.40 | 31.29 | 17.64 | 10.87 | 6.05 | 4.33 | 3.38 | 2.92 | 1.92 | 1.60 | 0.91 |
| SPA 12 - 26 | 88.23 | 56.20 | 45.10 | 25.40 | 15.60 | 8.74 | 6.25 | 4.88 | 4.22 | 2.77 | 2.47 | 1.31 |
| SPA 12 - 28 | 98.75 | 62.90 | 50.10 | 28.00 | 17.30 | 9.89 | 7.10 | 5.68 | 4.83 | 3.12 | 2.63 | 1.42 |

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Current at 25°C (Amperes)

| End Voltage 1.60 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|------|------|------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 35.80 | 22.80 | 18.10 | 10.10 | 6.18 | 3.37 | 2.42 | 1.94 | 1.64 | 1.06 | 0.89 | 0.48 |
| SPA 6 - 1.3 | 4.67 | 2.95 | 2.34 | 1.30 | 0.80 | 0.44 | 0.31 | 0.25 | 0.21 | 0.13 | 0.12 | 0.07 |
| SPA 6 - 2.8 | 10.60 | 6.72 | 5.32 | 2.97 | 1.82 | 0.99 | 0.71 | 0.57 | 0.49 | 0.31 | 0.26 | 0.14 |
| SPA 6 - 3.2 | 12.20 | 7.68 | 6.08 | 3.39 | 2.08 | 1.14 | 0.82 | 0.65 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 6 - 4.5 | 14.40 | 9.12 | 7.22 | 4.03 | 2.47 | 1.35 | 0.97 | 0.78 | 0.66 | 0.42 | 0.36 | 0.20 |
| SPA 6 - 7 | 25.10 | 15.80 | 12.50 | 7.05 | 4.29 | 2.34 | 1.68 | 1.35 | 1.14 | 0.73 | 0.64 | 0.35 |
| SPA 6 - 8 | 30.60 | 19.30 | 15.30 | 8.54 | 5.23 | 2.86 | 2.06 | 1.65 | 1.39 | 0.89 | 0.76 | 0.41 |
| SPA 6 - 10 | 37.68 | 24.00 | 19.00 | 10.60 | 6.50 | 3.55 | 2.55 | 2.04 | 1.73 | 1.12 | 0.94 | 0.51 |
| SPA 6 - 12 | 45.22 | 28.80 | 22.80 | 12.70 | 7.80 | 4.26 | 3.06 | 2.45 | 2.08 | 1.35 | 1.13 | 0.61 |
| SPA 8 - 3.2 | 12.20 | 7.68 | 6.08 | 3.39 | 2.08 | 1.14 | 0.82 | 0.65 | 0.55 | 0.35 | 0.30 | 0.16 |
| SPA 12 - 0.7 | 3.03 | 1.92 | 1.52 | 0.85 | 0.52 | 0.28 | 0.20 | 0.16 | 0.14 | 0.09 | 0.08 | 0.04 |
| SPA 12 - 1.3 | 4.30 | 2.70 | 2.14 | 1.20 | 0.74 | 0.41 | 0.29 | 0.23 | 0.20 | 0.13 | 0.11 | 0.06 |
| SPA 12 - 1.9 | 7.60 | 4.80 | 3.80 | 2.12 | 1.30 | 0.71 | 0.51 | 0.41 | 0.35 | 0.22 | 0.19 | 0.10 |
| SPA 12 - 2C | 7.53 | 4.80 | 3.80 | 2.13 | 1.30 | 0.71 | 0.51 | 0.41 | 0.35 | 0.23 | 0.20 | 0.10 |
| SPA 12 - 2.3 | 8.74 | 5.52 | 4.37 | 2.44 | 1.50 | 0.82 | 0.59 | 0.47 | 0.40 | 0.26 | 0.22 | 0.12 |
| SPA 12 - 3.3 | 12.20 | 7.68 | 6.08 | 3.39 | 2.10 | 1.14 | 0.82 | 0.65 | 0.55 | 0.35 | 0.30 | 0.17 |
| SPA 12 - 5 | 18.50 | 11.90 | 9.45 | 5.24 | 3.21 | 1.78 | 1.28 | 1.02 | 0.87 | 0.56 | 0.47 | 0.25 |
| SPA 12 - 6 | 22.80 | 14.40 | 11.40 | 6.36 | 3.90 | 2.13 | 1.53 | 1.23 | 1.04 | 0.67 | 0.56 | 0.31 |
| SPA 12 - 7 | 25.10 | 15.80 | 12.50 | 7.00 | 4.29 | 2.34 | 1.68 | 1.35 | 1.14 | 0.73 | 0.63 | 0.35 |
| SPA 12 - 7.2 | 27.40 | 17.30 | 13.70 | 7.63 | 4.68 | 2.56 | 1.84 | 1.47 | 1.25 | 0.80 | 0.68 | 0.37 |
| SPA 12 - 9 | 34.20 | 21.60 | 17.10 | 9.54 | 5.85 | 3.20 | 2.30 | 1.84 | 1.56 | 1.00 | 0.85 | 0.46 |
| SPA 12 - 10 | 37.68 | 24.00 | 19.00 | 10.60 | 6.50 | 3.55 | 2.55 | 2.04 | 1.73 | 1.12 | 0.94 | 0.51 |
| SPA 12 - 12 | 42.55 | 27.10 | 21.40 | 12.00 | 7.36 | 4.06 | 2.90 | 2.26 | 1.96 | 1.29 | 1.14 | 0.61 |
| SPA 12 - 18 | 63.74 | 40.60 | 32.13 | 18.00 | 11.03 | 6.08 | 4.35 | 3.40 | 2.94 | 1.93 | 1.61 | 0.91 |
| SPA 12 - 26 | 91.85 | 58.50 | 46.30 | 25.90 | 15.80 | 8.79 | 6.29 | 4.91 | 4.24 | 2.78 | 2.48 | 1.32 |
| SPA 12 - 28 | 101.74 | 64.80 | 51.30 | 28.60 | 17.60 | 9.95 | 7.14 | 5.71 | 4.86 | 3.14 | 2.64 | 1.42 |

Discharge Constant Power at 25°C (Watts/cell)

| End Voltage 1.80 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 56.00 | 36.00 | 29.50 | 17.20 | 10.40 | 6.20 | 4.56 | 3.66 | 3.12 | 2.03 | 1.74 | 0.93 |
| SPA 6 - 1.3 | 7.30 | 4.67 | 3.83 | 2.23 | 1.41 | 0.81 | 0.59 | 0.47 | 0.40 | 0.26 | 0.24 | 0.13 |
| SPA 6 - 2.8 | 16.63 | 10.60 | 8.70 | 5.07 | 3.20 | 1.83 | 1.34 | 1.08 | 0.92 | 0.60 | 0.51 | 0.27 |
| SPA 6 - 3.2 | 19.00 | 12.13 | 9.93 | 5.80 | 3.67 | 2.10 | 1.54 | 1.23 | 1.05 | 0.68 | 0.58 | 0.31 |
| SPA 6 - 4.5 | 22.57 | 14.40 | 11.80 | 6.87 | 4.33 | 2.49 | 1.82 | 1.46 | 1.25 | 0.81 | 0.69 | 0.37 |
| SPA 6 - 7 | 39.17 | 25.00 | 20.50 | 11.93 | 7.55 | 4.32 | 3.17 | 2.53 | 2.17 | 1.41 | 1.22 | 0.68 |
| SPA 6 - 8 | 47.83 | 30.50 | 25.00 | 14.57 | 9.22 | 5.28 | 3.87 | 3.10 | 2.65 | 1.72 | 1.47 | 0.79 |
| SPA 6 - 10 | 59.33 | 38.00 | 31.03 | 18.07 | 11.43 | 6.57 | 4.80 | 3.87 | 3.28 | 2.13 | 1.82 | 0.98 |
| SPA 6 - 12 | 71.00 | 45.33 | 37.33 | 21.70 | 13.73 | 7.87 | 5.77 | 4.63 | 3.93 | 2.56 | 2.19 | 1.18 |
| SPA 8 - 3.2 | 19.00 | 12.13 | 9.93 | 5.78 | 3.65 | 2.10 | 1.54 | 1.23 | 1.05 | 0.68 | 0.58 | 0.31 |
| SPA 12 - 0.7 | 4.75 | 3.03 | 2.48 | 1.45 | 0.92 | 0.52 | 0.38 | 0.31 | 0.26 | 0.17 | 0.15 | 0.08 |
| SPA 12 - 1.3 | 6.62 | 4.27 | 3.50 | 2.05 | 1.30 | 0.75 | 0.55 | 0.43 | 0.37 | 0.24 | 0.21 | 0.11 |
| SPA 12 - 1.9 | 11.87 | 7.58 | 6.22 | 3.62 | 2.28 | 1.31 | 0.96 | 0.77 | 0.66 | 0.43 | 0.37 | 0.20 |
| SPA 12 - 2C | 11.87 | 7.58 | 6.22 | 3.63 | 2.30 | 1.31 | 0.96 | 0.77 | 0.66 | 0.43 | 0.37 | 0.20 |
| SPA 12 - 2.3 | 13.65 | 8.72 | 7.13 | 4.15 | 2.63 | 1.51 | 1.11 | 0.89 | 0.76 | 0.49 | 0.42 | 0.23 |
| SPA 12 - 3.3 | 19.00 | 12.13 | 9.93 | 5.78 | 3.70 | 2.10 | 1.54 | 1.23 | 1.05 | 0.68 | 0.58 | 0.32 |
| SPA 12 - 5 | 28.33 | 18.17 | 15.25 | 8.92 | 5.52 | 3.28 | 2.40 | 1.93 | 1.64 | 1.07 | 0.91 | 0.49 |
| SPA 12 - 6 | 35.67 | 22.83 | 18.67 | 10.85 | 6.87 | 3.93 | 2.88 | 2.30 | 1.97 | 1.28 | 1.09 | 0.59 |
| SPA 12 - 7 | 39.17 | 25.00 | 20.50 | 11.93 | 7.55 | 4.32 | 3.17 | 2.53 | 2.17 | 1.41 | 1.22 | 0.68 |
| SPA 12 - 7.2 | 42.67 | 27.33 | 22.33 | 13.02 | 8.23 | 4.72 | 3.45 | 2.77 | 2.37 | 1.54 | 1.31 | 0.71 |
| SPA 12 - 9 | 53.50 | 34.17 | 28.00 | 16.27 | 10.30 | 5.90 | 4.32 | 3.47 | 2.95 | 1.92 | 1.64 | 0.88 |
| SPA 12 - 10 | 59.17 | 37.83 | 31.00 | 18.00 | 11.43 | 6.55 | 4.80 | 3.85 | 3.28 | 2.13 | 1.82 | 0.98 |
| SPA 12 - 12 | 66.67 | 42.67 | 35.00 | 20.50 | 12.95 | 7.48 | 5.47 | 4.27 | 3.70 | 2.45 | 2.22 | 1.13 |
| SPA 12 - 18 | 100.17 | 64.00 | 52.43 | 30.70 | 19.42 | 11.22 | 8.20 | 6.42 | 5.57 | 3.67 | 3.11 | 1.69 |
| SPA 12 - 26 | 143.67 | 91.83 | 75.50 | 44.17 | 27.83 | 16.20 | 11.83 | 9.27 | 8.03 | 5.30 | 4.78 | 2.45 |
| SPA 12 - 28 | 160.17 | 102.33 | 83.83 | 48.83 | 30.83 | 18.33 | 13.45 | 10.78 | 9.18 | 5.98 | 5.10 | 2.75 |

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Power at 25°C (Watts/cell)

| End Voltage 1.75 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 59.50 | 38.15 | 31.15 | 17.80 | 11.20 | 6.35 | 4.71 | 3.77 | 3.22 | 2.09 | 1.77 | 0.95 |
| SPA 6 - 1.3 | 7.73 | 4.93 | 4.03 | 2.30 | 1.45 | 0.83 | 0.61 | 0.49 | 0.42 | 0.27 | 0.24 | 0.13 |
| SPA 6 - 2.8 | 17.60 | 11.23 | 9.17 | 5.27 | 3.31 | 1.88 | 1.39 | 1.11 | 0.95 | 0.62 | 0.52 | 0.28 |
| SPA 6 - 3.2 | 20.13 | 12.87 | 10.50 | 6.00 | 3.77 | 2.15 | 1.58 | 1.27 | 1.08 | 0.70 | 0.60 | 0.32 |
| SPA 6 - 4.5 | 23.90 | 15.27 | 12.47 | 7.13 | 4.50 | 2.55 | 1.88 | 1.51 | 1.29 | 0.84 | 0.71 | 0.38 |
| SPA 6 - 7 | 41.50 | 26.50 | 21.67 | 12.38 | 7.78 | 4.43 | 3.27 | 2.62 | 2.23 | 1.45 | 1.25 | 0.69 |
| SPA 6 - 8 | 50.67 | 32.33 | 26.50 | 15.12 | 9.50 | 5.42 | 3.98 | 3.20 | 2.72 | 1.77 | 1.50 | 0.81 |
| SPA 6 - 10 | 62.67 | 40.00 | 32.77 | 18.77 | 11.80 | 6.73 | 4.97 | 3.97 | 3.37 | 2.20 | 1.86 | 1.00 |
| SPA 6 - 12 | 75.67 | 48.33 | 39.33 | 22.53 | 14.17 | 8.07 | 5.93 | 4.77 | 4.07 | 2.64 | 2.23 | 1.20 |
| SPA 8 - 3.2 | 20.13 | 12.85 | 10.50 | 6.00 | 3.78 | 2.15 | 1.59 | 1.27 | 1.08 | 0.70 | 0.60 | 0.32 |
| SPA 12 - 0.7 | 5.03 | 3.22 | 2.62 | 1.50 | 0.95 | 0.54 | 0.40 | 0.32 | 0.27 | 0.18 | 0.15 | 0.08 |
| SPA 12 - 1.3 | 7.10 | 4.53 | 3.68 | 2.12 | 1.34 | 0.77 | 0.56 | 0.44 | 0.38 | 0.25 | 0.21 | 0.12 |
| SPA 12 - 1.9 | 12.58 | 8.03 | 6.55 | 3.75 | 2.37 | 1.35 | 0.99 | 0.79 | 0.68 | 0.44 | 0.37 | 0.20 |
| SPA 12 - 2C | 12.60 | 8.05 | 6.57 | 3.75 | 2.35 | 1.34 | 0.99 | 0.79 | 0.68 | 0.44 | 0.37 | 0.20 |
| SPA 12 - 2.3 | 14.47 | 9.23 | 7.53 | 4.32 | 2.72 | 1.55 | 1.14 | 0.91 | 0.78 | 0.51 | 0.43 | 0.23 |
| SPA 12 - 3.3 | 20.17 | 12.85 | 10.48 | 6.00 | 3.82 | 2.15 | 1.58 | 1.27 | 1.08 | 0.70 | 0.60 | 0.33 |
| SPA 12 - 5 | 30.33 | 19.17 | 16.02 | 9.32 | 5.80 | 3.37 | 2.48 | 1.98 | 1.68 | 1.09 | 0.93 | 0.50 |
| SPA 12 - 6 | 37.67 | 24.17 | 19.67 | 11.27 | 7.08 | 4.03 | 2.97 | 2.38 | 2.03 | 1.32 | 1.12 | 0.60 |
| SPA 12 - 7 | 41.50 | 26.50 | 21.67 | 12.38 | 7.78 | 4.43 | 3.27 | 2.62 | 2.23 | 1.45 | 1.25 | 0.69 |
| SPA 12 - 7.2 | 45.33 | 28.83 | 23.67 | 13.52 | 8.50 | 4.83 | 3.57 | 2.87 | 2.43 | 1.58 | 1.34 | 0.72 |
| SPA 12 - 9 | 56.67 | 36.17 | 29.50 | 16.83 | 10.62 | 6.05 | 4.45 | 3.57 | 3.05 | 1.98 | 1.67 | 0.90 |
| SPA 12 - 10 | 62.83 | 40.17 | 32.83 | 18.83 | 11.80 | 6.72 | 4.95 | 3.97 | 3.38 | 2.20 | 1.87 | 1.00 |
| SPA 12 - 12 | 70.67 | 45.17 | 36.83 | 21.17 | 13.37 | 7.68 | 5.63 | 4.40 | 3.82 | 2.52 | 2.25 | 1.20 |
| SPA 12 - 18 | 106.00 | 67.83 | 55.33 | 31.87 | 20.03 | 11.52 | 8.45 | 6.62 | 5.73 | 3.78 | 3.17 | 1.80 |
| SPA 12 - 26 | 152.83 | 97.67 | 79.83 | 45.83 | 28.83 | 16.63 | 12.20 | 9.55 | 8.28 | 5.47 | 4.88 | 2.60 |
| SPA 12 - 28 | 169.83 | 108.50 | 88.50 | 50.67 | 31.83 | 18.83 | 13.87 | 11.12 | 9.47 | 6.17 | 5.20 | 2.80 |

| End Voltage 1.70 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 62.00 | 39.85 | 32.25 | 18.30 | 11.45 | 6.50 | 4.74 | 3.80 | 3.24 | 2.11 | 1.78 | 0.96 |
| SPA 6 - 1.3 | 8.10 | 5.17 | 4.17 | 2.37 | 1.48 | 0.84 | 0.61 | 0.49 | 0.42 | 0.27 | 0.24 | 0.13 |
| SPA 6 - 2.8 | 18.40 | 11.73 | 9.50 | 5.40 | 3.37 | 1.91 | 1.40 | 1.12 | 0.95 | 0.62 | 0.52 | 0.28 |
| SPA 6 - 3.2 | 21.03 | 13.43 | 10.87 | 6.17 | 3.87 | 2.18 | 1.60 | 1.28 | 1.09 | 0.71 | 0.60 | 0.32 |
| SPA 6 - 4.5 | 24.97 | 15.93 | 12.90 | 7.30 | 4.57 | 2.59 | 1.89 | 1.52 | 1.29 | 0.84 | 0.71 | 0.38 |
| SPA 6 - 7 | 43.33 | 27.67 | 22.33 | 12.70 | 7.95 | 4.50 | 3.28 | 2.63 | 2.25 | 1.46 | 1.25 | 0.69 |
| SPA 6 - 8 | 53.00 | 33.67 | 27.50 | 15.50 | 9.70 | 5.50 | 4.02 | 3.22 | 2.75 | 1.79 | 1.51 | 0.81 |
| SPA 6 - 10 | 65.67 | 42.00 | 34.00 | 19.23 | 12.03 | 6.83 | 5.00 | 4.00 | 3.40 | 2.22 | 1.87 | 1.01 |
| SPA 6 - 12 | 78.67 | 50.33 | 40.67 | 23.07 | 14.47 | 8.20 | 5.97 | 4.80 | 4.10 | 2.66 | 2.25 | 1.21 |
| SPA 8 - 3.2 | 21.03 | 13.43 | 10.85 | 6.15 | 3.85 | 2.19 | 1.60 | 1.28 | 1.09 | 0.71 | 0.60 | 0.32 |
| SPA 12 - 0.7 | 5.23 | 3.35 | 2.72 | 1.53 | 0.97 | 0.55 | 0.40 | 0.32 | 0.27 | 0.18 | 0.15 | 0.08 |
| SPA 12 - 1.3 | 7.42 | 4.73 | 3.82 | 2.18 | 1.36 | 0.78 | 0.57 | 0.44 | 0.39 | 0.25 | 0.21 | 0.12 |
| SPA 12 - 1.9 | 13.15 | 8.40 | 6.78 | 3.85 | 2.42 | 1.37 | 1.00 | 0.80 | 0.68 | 0.44 | 0.38 | 0.20 |
| SPA 12 - 2C | 13.13 | 8.40 | 6.80 | 3.85 | 2.42 | 1.37 | 1.00 | 0.80 | 0.68 | 0.44 | 0.38 | 0.20 |
| SPA 12 - 2.3 | 15.12 | 9.65 | 7.80 | 4.42 | 2.77 | 1.57 | 1.15 | 0.92 | 0.78 | 0.51 | 0.43 | 0.23 |
| SPA 12 - 3.3 | 21.00 | 13.43 | 10.87 | 6.15 | 3.95 | 2.18 | 1.60 | 1.28 | 1.09 | 0.71 | 0.60 | 0.33 |
| SPA 12 - 5 | 31.83 | 20.17 | 16.58 | 9.53 | 5.90 | 3.42 | 2.50 | 2.00 | 1.70 | 1.11 | 0.94 | 0.50 |
| SPA 12 - 6 | 39.33 | 25.17 | 20.33 | 11.53 | 7.23 | 4.10 | 2.98 | 2.40 | 2.05 | 1.33 | 1.12 | 0.60 |
| SPA 12 - 7 | 43.33 | 27.67 | 22.33 | 12.70 | 7.95 | 4.50 | 3.28 | 2.63 | 2.25 | 1.46 | 1.25 | 0.69 |
| SPA 12 - 7.2 | 47.33 | 30.17 | 24.50 | 13.85 | 8.67 | 4.92 | 3.58 | 2.88 | 2.45 | 1.59 | 1.35 | 0.73 |
| SPA 12 - 9 | 59.17 | 37.83 | 30.50 | 17.33 | 10.83 | 6.15 | 4.48 | 3.60 | 3.07 | 1.99 | 1.68 | 0.91 |
| SPA 12 - 10 | 65.67 | 42.00 | 34.00 | 19.17 | 12.05 | 6.83 | 4.98 | 4.00 | 3.40 | 2.22 | 1.87 | 1.01 |
| SPA 12 - 12 | 74.00 | 47.33 | 38.17 | 21.83 | 13.63 | 7.80 | 5.67 | 4.43 | 3.85 | 2.53 | 2.27 | 1.20 |
| SPA 12 - 18 | 111.00 | 71.00 | 57.33 | 32.67 | 20.45 | 11.68 | 8.50 | 6.65 | 5.77 | 3.81 | 3.19 | 1.80 |
| SPA 12 - 26 | 159.67 | 102.00 | 82.67 | 47.00 | 29.33 | 16.83 | 12.28 | 9.62 | 8.33 | 5.50 | 4.92 | 2.60 |
| SPA 12 - 28 | 177.33 | 113.33 | 91.67 | 52.00 | 32.50 | 19.17 | 13.95 | 11.20 | 9.53 | 6.20 | 5.23 | 2.82 |

The above characteristics data can be obtained within three charge/discharge cycles.

Discharge Constant Power at 25°C (Watts/cell)

| End Voltage 1.65 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 65.00 | 41.55 | 33.50 | 18.85 | 11.75 | 6.55 | 4.75 | 3.83 | 3.26 | 2.12 | 1.79 | 0.96 |
| SPA 6 - 1.3 | 8.43 | 5.37 | 4.33 | 2.43 | 1.52 | 0.85 | 0.62 | 0.50 | 0.42 | 0.28 | 0.24 | 0.13 |
| SPA 6 - 2.8 | 19.20 | 12.27 | 9.87 | 5.57 | 3.47 | 1.93 | 1.41 | 1.13 | 0.96 | 0.62 | 0.53 | 0.28 |
| SPA 6 - 3.2 | 21.93 | 14.00 | 11.27 | 6.33 | 3.97 | 2.20 | 1.61 | 1.29 | 1.10 | 0.71 | 0.60 | 0.32 |
| SPA 6 - 4.5 | 26.07 | 16.63 | 13.40 | 7.53 | 4.70 | 2.62 | 1.91 | 1.53 | 1.30 | 0.85 | 0.71 | 0.38 |
| SPA 6 - 7 | 45.17 | 28.83 | 23.33 | 13.10 | 8.15 | 4.55 | 3.32 | 2.65 | 2.27 | 1.47 | 1.26 | 0.70 |
| SPA 6 - 8 | 55.17 | 35.17 | 28.33 | 15.98 | 9.97 | 5.55 | 4.03 | 3.23 | 2.77 | 1.80 | 1.52 | 0.82 |
| SPA 6 - 10 | 68.33 | 43.67 | 35.33 | 19.83 | 12.37 | 6.90 | 5.03 | 4.03 | 3.43 | 2.23 | 1.88 | 1.01 |
| SPA 6 - 12 | 82.33 | 52.67 | 42.33 | 23.80 | 14.83 | 8.27 | 6.03 | 4.83 | 4.10 | 2.68 | 2.26 | 1.21 |
| SPA 8 - 3.2 | 21.95 | 14.00 | 11.28 | 6.35 | 3.95 | 2.20 | 1.61 | 1.29 | 1.10 | 0.71 | 0.60 | 0.32 |
| SPA 12 - 0.7 | 5.47 | 3.50 | 2.82 | 1.58 | 0.98 | 0.55 | 0.40 | 0.32 | 0.28 | 0.18 | 0.15 | 0.08 |
| SPA 12 - 1.3 | 7.73 | 4.93 | 3.97 | 2.25 | 1.40 | 0.79 | 0.57 | 0.45 | 0.39 | 0.25 | 0.21 | 0.12 |
| SPA 12 - 1.9 | 13.72 | 8.75 | 7.05 | 3.97 | 2.47 | 1.38 | 1.00 | 0.81 | 0.69 | 0.45 | 0.38 | 0.20 |
| SPA 12 - 2C | 13.70 | 8.75 | 7.05 | 3.97 | 2.48 | 1.38 | 1.01 | 0.81 | 0.69 | 0.45 | 0.38 | 0.20 |
| SPA 12 - 2.3 | 15.77 | 10.07 | 8.10 | 4.57 | 2.85 | 1.58 | 1.16 | 0.93 | 0.79 | 0.51 | 0.43 | 0.23 |
| SPA 12 - 3.3 | 22.00 | 14.00 | 11.27 | 6.35 | 4.02 | 2.20 | 1.61 | 1.29 | 1.10 | 0.71 | 0.60 | 0.33 |
| SPA 12 - 5 | 33.33 | 21.33 | 16.67 | 9.83 | 6.03 | 3.45 | 2.52 | 2.02 | 1.72 | 1.12 | 0.94 | 0.51 |
| SPA 12 - 6 | 41.00 | 26.33 | 21.00 | 11.90 | 7.42 | 4.13 | 3.02 | 2.42 | 2.07 | 1.34 | 1.13 | 0.61 |
| SPA 12 - 7 | 45.17 | 28.83 | 23.33 | 13.10 | 8.15 | 4.55 | 3.32 | 2.65 | 2.27 | 1.47 | 1.26 | 0.70 |
| SPA 12 - 7.2 | 49.33 | 31.50 | 25.33 | 14.28 | 8.90 | 4.95 | 3.62 | 2.90 | 2.47 | 1.60 | 1.35 | 0.73 |
| SPA 12 - 9 | 61.67 | 39.33 | 31.67 | 17.83 | 11.12 | 6.20 | 4.52 | 3.62 | 3.08 | 2.00 | 1.70 | 0.91 |
| SPA 12 - 10 | 68.50 | 43.83 | 35.17 | 19.83 | 12.35 | 6.88 | 5.02 | 4.03 | 3.43 | 2.23 | 1.88 | 1.01 |
| SPA 12 - 12 | 77.17 | 49.33 | 39.67 | 22.50 | 13.98 | 7.87 | 5.72 | 4.47 | 3.87 | 2.55 | 2.28 | 1.21 |
| SPA 12 - 18 | 116.00 | 74.17 | 59.50 | 33.70 | 20.98 | 11.80 | 8.57 | 6.70 | 5.82 | 3.83 | 3.20 | 1.82 |
| SPA 12 - 26 | 165.33 | 105.67 | 85.67 | 48.50 | 30.17 | 17.00 | 12.37 | 9.68 | 8.40 | 5.53 | 4.95 | 2.62 |
| SPA 12 - 28 | 184.83 | 118.17 | 95.17 | 53.50 | 33.33 | 19.33 | 14.05 | 11.27 | 9.60 | 6.25 | 5.27 | 2.83 |

| End Voltage 1.60 V/cell | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|------|------|------|------|
| | 5 min | 10 min | 15 min | 30 min | 1 h | 2 h | 3 h | 4 h | 5 h | 8 h | 10 h | 20 h |
| SPA 4 - 9.5 | 67.00 | 42.85 | 34.30 | 19.25 | 11.90 | 6.60 | 4.80 | 3.85 | 3.28 | 2.14 | 1.80 | 0.97 |
| SPA 6 - 1.3 | 8.70 | 5.53 | 4.43 | 2.50 | 1.54 | 0.85 | 0.62 | 0.50 | 0.42 | 0.28 | 0.25 | 0.13 |
| SPA 6 - 2.8 | 19.80 | 12.63 | 10.10 | 5.67 | 3.50 | 1.94 | 1.41 | 1.13 | 0.97 | 0.63 | 0.53 | 0.28 |
| SPA 6 - 3.2 | 22.63 | 14.43 | 11.57 | 6.47 | 4.00 | 2.22 | 1.62 | 1.30 | 1.10 | 0.72 | 0.60 | 0.32 |
| SPA 6 - 4.5 | 26.87 | 17.13 | 13.73 | 7.70 | 4.77 | 2.63 | 1.92 | 1.54 | 1.31 | 0.85 | 0.72 | 0.39 |
| SPA 6 - 7 | 46.67 | 29.83 | 23.83 | 13.37 | 8.28 | 4.57 | 3.33 | 2.67 | 2.28 | 1.48 | 1.27 | 0.70 |
| SPA 6 - 8 | 57.00 | 36.33 | 29.17 | 16.30 | 10.12 | 5.58 | 4.08 | 3.25 | 2.78 | 1.81 | 1.52 | 0.82 |
| SPA 6 - 10 | 70.33 | 45.00 | 36.00 | 20.23 | 12.53 | 6.93 | 5.03 | 4.03 | 3.47 | 2.24 | 1.89 | 1.02 |
| SPA 6 - 12 | 84.33 | 54.00 | 43.33 | 24.30 | 15.07 | 8.30 | 6.07 | 4.87 | 4.13 | 2.69 | 2.27 | 1.22 |
| SPA 8 - 3.2 | 22.63 | 14.45 | 11.55 | 6.48 | 4.03 | 2.22 | 1.62 | 1.30 | 1.11 | 0.72 | 0.61 | 0.33 |
| SPA 12 - 0.7 | 5.67 | 3.62 | 2.88 | 1.62 | 1.00 | 0.56 | 0.40 | 0.32 | 0.28 | 0.18 | 0.15 | 0.08 |
| SPA 12 - 1.3 | 8.00 | 5.10 | 4.07 | 2.30 | 1.42 | 0.79 | 0.58 | 0.45 | 0.39 | 0.25 | 0.22 | 0.12 |
| SPA 12 - 1.9 | 14.13 | 9.02 | 7.22 | 4.05 | 2.52 | 1.39 | 1.01 | 0.81 | 0.69 | 0.45 | 0.38 | 0.20 |
| SPA 12 - 2C | 14.10 | 9.02 | 7.23 | 4.05 | 2.50 | 1.39 | 1.01 | 0.81 | 0.69 | 0.45 | 0.38 | 0.20 |
| SPA 12 - 2.3 | 16.25 | 10.38 | 8.30 | 4.65 | 2.88 | 1.59 | 1.16 | 0.93 | 0.79 | 0.52 | 0.44 | 0.23 |
| SPA 12 - 3.3 | 22.67 | 14.43 | 11.55 | 6.48 | 4.08 | 2.22 | 1.62 | 1.30 | 1.11 | 0.72 | 0.60 | 0.33 |
| SPA 12 - 5 | 35.00 | 21.83 | 16.83 | 10.02 | 6.18 | 3.47 | 2.52 | 2.02 | 1.73 | 1.13 | 0.94 | 0.51 |
| SPA 12 - 6 | 42.50 | 27.00 | 21.67 | 12.15 | 7.52 | 4.15 | 3.03 | 2.43 | 2.08 | 1.35 | 1.13 | 0.61 |
| SPA 12 - 7 | 46.67 | 29.83 | 23.83 | 13.37 | 8.28 | 4.57 | 3.33 | 2.67 | 2.28 | 1.48 | 1.27 | 0.70 |
| SPA 12 - 7.2 | 50.83 | 32.50 | 26.00 | 14.58 | 9.03 | 4.98 | 3.63 | 2.92 | 2.48 | 1.61 | 1.36 | 0.73 |
| SPA 12 - 9 | 63.67 | 40.67 | 32.50 | 18.17 | 11.28 | 6.23 | 4.55 | 3.65 | 3.10 | 2.02 | 1.70 | 0.91 |
| SPA 12 - 10 | 70.67 | 45.17 | 36.17 | 20.17 | 12.55 | 6.93 | 5.05 | 4.05 | 3.45 | 2.25 | 1.88 | 1.02 |
| SPA 12 - 12 | 79.50 | 50.83 | 40.67 | 23.00 | 14.20 | 7.92 | 5.75 | 4.50 | 3.90 | 2.57 | 2.28 | 1.22 |
| SPA 12 - 18 | 119.33 | 76.33 | 61.00 | 34.38 | 21.30 | 11.87 | 8.62 | 6.75 | 5.85 | 3.86 | 3.22 | 1.82 |
| SPA 12 - 26 | 172.17 | 110.00 | 88.00 | 49.50 | 30.50 | 17.17 | 12.45 | 9.73 | 8.45 | 5.57 | 4.97 | 2.63 |
| SPA 12 - 28 | 190.67 | 121.83 | 97.50 | 54.67 | 33.83 | 19.33 | 14.13 | 11.33 | 9.67 | 6.28 | 5.28 | 2.85 |

The above characteristics data can be obtained within three charge/discharge cycles.



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