

# bosfa spiral lead acid battery



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**Bosfa Industrial Battery Co., Ltd.**

## bosfa spiral lead acid battery



product introduction:



### Brief Introduction about Spiral Battery

The bosfa application of the alloy that can effectively reduce the release of hydrogen, the special technique in manufacturing grid, and the appropriate match of active materials of both negative plates and positive plates, all these enable spiral valve-regulated sealed lead-acid battery (SPB), greatly restrain the release of hydrogen from negative plates, at the same time the generated oxygen, due to overcharge of positive plates, arrive at negative plates through the diaphragm and compose with lead in the negative, thus enable the recombination of gas inside of the battery and prevent the case of water loss so that water addition is free.

Comparing to flat battery, the spiral battery is made at high pressure through the spiral of plates of only 1mm. Special technique fashion characterizes the battery in many aspects:

1. Superior high rate discharge capability, with max. discharge rate of  $18C_{10}$
2. Outstanding performance of high/low temperature, able to work under the temperature of  $-55^{\circ}\text{C} \sim 75^{\circ}\text{C}$
3. Steady high work voltage, higher power density
4. Robust structure have excellent performance of shock resistance
5. No floating electrolyte, able to placed at any direction




- 6. Fast chargeable charge is possible, 95% plus capacity may be charged within 40 minutes
- 7. Super service life, design float charging service life is more than 8 years
- 8. Excellent deep discharge performances in low current

Main application:

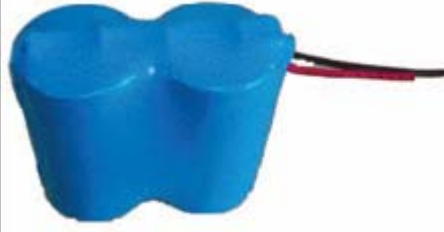

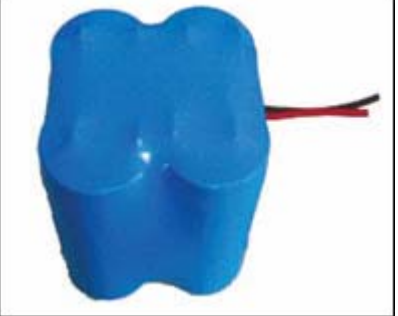

Instrument, electric tools, physical exercise devices, medical devices, solar light, electricity transferring equipment, standby power supply, Hybrid electric car and the start of the car



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the integrated battery specifications of bosfa SPB series pure lead spiral batteries

| type      | Serial Number | Nominal voltage (V) | Capacity (C10Ah) | Dimensions (mm) |       |        |              | Weight (kg) | Picture   |
|-----------|---------------|---------------------|------------------|-----------------|-------|--------|--------------|-------------|---|
|           |               |                     |                  | Length          | width | Height | Total height |             |   |
| SPB-2.5   | S-001         | 2                   | 2.5              | Diameter 34.5   |       | 61.2   | 68.1         | 0.15        |   |
| SPB-5     | S-002         | 2                   | 5                | Diameter 44.5   |       | 73     | 81.5         | 0.29        |   |
| SPB-8     | S-003         | 2                   | 8                | Diameter 44.5   |       | 100    | 108          | 0.45        |   |
| 3-SPB-2.5 | M-001         | 6                   | 2.5              | 110             | 44    | 70     | 70           | 0.45        |  |
| 3-SPB-8   | M-002         | 6                   | 8                | 135             | 51    | 100    | 100          | 1.4         |   |
| 6-SPB-25  | M-003         | 12                  | 25               | 203             | 139   | 164    | 169          | 9           |  |
| 6-SPB-30  | M-004         | 12                  | 30               | 203             | 139   | 164    | 169          | 9.6         |   |
| 6-SPB-50  | M-005         | 12                  | 50               | 254             | 173   | 199    | 205          | 19.2        |   |
| 6-SPB-60  | M-006         | 12                  | 60               | 254             | 173   | 199    | 205          | 20.4        |   |

the grouped battery specifications of SPB series pure lead spiral batteries

| type      | Serial Number | (V)<br>Nominal voltage | Capacity<br>(C10Ah) | (mm)Dimensions |       |        |              | Weight<br>(kg) | Picture   |
|-----------|---------------|------------------------|---------------------|----------------|-------|--------|--------------|----------------|---|
|           |               |                        |                     | Length         | width | Height | Total height |                |   |
| 2-SPB-2.5 | S-004         | 4                      | 2.5                 | 69             | 34.5  | 61.2   | 66           | 0.30           |    |
| 2-SPB-5   | S-005         | 4                      | 5                   | 89             | 44.5  | 73     | 80           | 0.63           |   |
| 2-SPB-8   | S-006         | 4                      | 8                   | 89             | 44.5  | 100    | 105          | 0.95           |   |
| 3-SPB-2.5 | S-007         | 6                      | 2.5                 | 104            | 34.5  | 61.2   | 66           | 0.44           |   |
| 3-SPB-5   | S-008         | 6                      | 5                   | 134            | 44.5  | 73     | 80           | 0.91           |   |
| 3-SPB-8   | S-009         | 6                      | 8                   | 134            | 44.5  | 100    | 105          | 1.43           |   |
| 4-SPB-2.5 | S-010         | 8                      | 2.5                 | 69             | 69    | 61.2   | 66           | 0.59           |  |
| 4-SPB-5   | S-011         | 8                      | 5                   | 89             | 89    | 73     | 80           | 1.2            |   |
| 4-SPB-8   | S-012         | 8                      | 8                   | 89             | 89    | 100    | 105          | 1.9            |   |
| 6-SPB-2.5 | S-013         | 12                     | 2.5                 | 104            | 69    | 61.2   | 66           | 0.9            |  |
| 6-SPB-5   | S-014         | 12                     | 5                   | 134            | 89    | 73     | 80           | 1.8            |   |
| 6-SPB-8   | S-015         | 12                     | 8                   | 134            | 89    | 100    | 105          | 2.8            |   |

|           |       |    |     |     |     |     |     |     |   |
|-----------|-------|----|-----|-----|-----|-----|-----|-----|---|
| 6-SPB-2.5 | M-007 | 12 | 2.5 | 110 | 88  | 70  | 70  | 0.9 |  |
| 6-SPB-8   | M-008 | 12 | 8   | 135 | 102 | 100 | 100 | 2.7 |   |
| 6-SPB-16  | M-009 | 12 | 16  | 135 | 102 | 202 | 202 | 5.6 |  |

the electrical performance of bosfa SPB series pure lead spiral batteries

| type: SPB-2.5(2V2.5Ah) |                         |                       |                         |                       |                         |                       |
|------------------------|-------------------------|-----------------------|-------------------------|-----------------------|-------------------------|-----------------------|
|                        | discharge to 1.85V      |                       | discharge to 1.75V      |                       | discharge to 1.65V      |                       |
| 时间<br>time             | constant<br>current (A) | constant<br>power (W) | constant<br>current (A) | constant<br>power (W) | constant<br>current (A) | constant<br>power (W) |
| 2min                   | 14.8                    | 26.9                  | 18                      | 32                    | 20.8                    | 35.6                  |
| 5min                   | 9.8                     | 18.3                  | 11                      | 20.1                  | 12.2                    | 21.7                  |
| 10min                  | 6.8                     | 12.6                  | 7.3                     | 13.7                  | 7.8                     | 14.3                  |
| 15min                  | 5.1                     | 9.9                   | 5.7                     | 10.7                  | 5.8                     | 10.7                  |
| 20min                  | 4.2                     | 8.3                   | 4.5                     | 8.6                   | 4.8                     | 9                     |
| 30min                  | 3.2                     | 6.3                   | 3.3                     | 6.4                   | 3.4                     | 6.6                   |
| 45min                  | 2.3                     | 4.6                   | 2.4                     | 4.7                   | 2.5                     | 4.8                   |
| 1h                     | 1.8                     | 3.6                   | 1.84                    | 3.7                   | 1.9                     | 3.7                   |
| 2h                     | 1                       | 1.95                  | 1.04                    | 2                     | 1.1                     | 2.02                  |
| 3h                     | 0.75                    | 1.41                  | 0.78                    | 1.56                  | 0.79                    | 1.58                  |
| 4h                     | 0.57                    | 1.14                  | 0.6                     | 1.2                   | 0.61                    | 1.22                  |
| 5h                     | 0.46                    | 0.92                  | 0.48                    | 1                     | 0.49                    | 1                     |
| 8h                     | 0.3                     | 0.6                   | 0.32                    | 0.65                  | 0.32                    | 0.75                  |
| 10h                    | 0.25                    | 0.5                   | 0.26                    | 0.52                  | 0.26                    | 0.52                  |
| 20h                    | 0.13                    | 0.27                  | 0.14                    | 0.3                   | 0.14                    | 0.3                   |

| type: SPB-5(2V5Ah) |                    |                      |                    |                      |                      |                    |
|--------------------|--------------------|----------------------|--------------------|----------------------|----------------------|--------------------|
|                    | discharge to 1.85V |                      | discharge to 1.75V |                      | discharge to 1.65V   |                    |
| time               | time               | constant current (A) | constant power (W) | constant current (A) | constant current (A) | constant power (W) |
| 2min               | 26.2               | 48.2                 | 33.5               | 52.7                 | 39.7                 | 56.2               |
| 5min               | 18.3               | 34.3                 | 21.8               | 37.7                 | 24.6                 | 39.8               |
| 10min              | 12.6               | 24                   | 14.5               | 26.2                 | 15.7                 | 27.5               |
| 15min              | 9.8                | 18.8                 | 11                 | 20.4                 | 11.7                 | 21.2               |
| 20min              | 8.1                | 15.6                 | 8.9                | 16.8                 | 9.4                  | 17.5               |
| 30min              | 6                  | 11.7                 | 6.5                | 12.5                 | 6.8                  | 13                 |
| 45min              | 4.4                | 8.6                  | 4.7                | 9.1                  | 4.9                  | 9.4                |
| 1h                 | 3.5                | 6.9                  | 3.7                | 7.2                  | 3.8                  | 7.4                |
| 2h                 | 1.95               | 3.9                  | 2                  | 4                    | 2.1                  | 4.1                |
| 3h                 | 1.5                | 3                    | 1.5                | 3                    | 1.6                  | 3.1                |
| 4h                 | 1.2                | 2.3                  | 1.2                | 2.3                  | 1.2                  | 2.4                |
| 5h                 | 0.9                | 1.9                  | 1                  | 1.9                  | 1                    | 1.9                |
| 8h                 | 0.6                | 1.2                  | 0.6                | 1.2                  | 0.6                  | 1.2                |
| 10h                | 0.5                | 1                    | 0.5                | 1                    | 0.5                  | 1                  |
| 20h                | 0.26               | 0.5                  | 0.3                | 0.5                  | 0.3                  | 0.5                |
| type: SPB-8(2V8Ah) |                    |                      |                    |                      |                      |                    |
|                    | discharge to 1.85V |                      | discharge to 1.75V |                      | discharge to 1.65V   |                    |
| time               | time               | constant current (A) | constant power (W) | constant current (A) | constant current (A) | constant power (W) |
| 2min               | 33.5               | 61.7                 | 42.9               | 67.5                 | 50.8                 | 71.9               |
| 5min               | 26.4               | 49.4                 | 31.4               | 54.3                 | 35.4                 | 57.3               |
| 10min              | 20.2               | 38.4                 | 23.2               | 41.9                 | 25.1                 | 44                 |
| 15min              | 15.7               | 30.1                 | 17.6               | 32.6                 | 18.7                 | 34                 |
| 20min              | 13                 | 25                   | 14.2               | 26.9                 | 15                   | 28                 |
| 30min              | 9.6                | 18.7                 | 10.4               | 20                   | 10.9                 | 20.8               |
| 45min              | 7                  | 13.8                 | 7.5                | 14.6                 | 7.8                  | 15                 |
| 1h                 | 5.6                | 11                   | 5.9                | 11.5                 | 6.1                  | 11.8               |
| 2h                 | 3.1                | 6.2                  | 3.2                | 6.4                  | 3.4                  | 6.6                |
| 3h                 | 2.4                | 4.8                  | 2.4                | 4.8                  | 2.6                  | 4.96               |
| 4h                 | 1.92               | 3.8                  | 1.9                | 3.8                  | 1.9                  | 3.84               |
| 5h                 | 1.44               | 3                    | 1.6                | 3                    | 1.6                  | 3                  |
| 8h                 | 0.96               | 1.92                 | 0.96               | 1.9                  | 0.96                 | 1.92               |
| 10h                | 0.8                | 1.6                  | 0.8                | 1.6                  | 0.8                  | 1.6                |
| 20h                | 0.42               | 0.8                  | 0.43               | 0.8                  | 0.43                 | 0.8                |

| type: 3-SPB-2.5(6V2.5Ah) |      |                      |                    |                      |                      |                    |
|--------------------------|------|----------------------|--------------------|----------------------|----------------------|--------------------|
|                          |      | discharge to 5.55V   |                    | discharge to 4.95V   |                      | discharge to 4.95V |
| time                     | time | constant current (A) | constant power (W) | constant current (A) | constant current (A) | constant power (W) |
| 2min                     | 14.8 | 80.7                 | 18                 | 96                   | 20.8                 | 106.8              |
| 5min                     | 9.8  | 54.9                 | 11                 | 60.3                 | 12.2                 | 65.1               |
| 10min                    | 6.8  | 37.8                 | 7.3                | 41.1                 | 7.8                  | 42.9               |
| 15min                    | 5.1  | 29.7                 | 5.7                | 32.1                 | 5.8                  | 32.1               |
| 20min                    | 4.2  | 24.9                 | 4.5                | 25.8                 | 4.8                  | 27                 |
| 30min                    | 3.2  | 18.9                 | 3.3                | 19.2                 | 3.4                  | 19.8               |
| 45min                    | 2.3  | 13.8                 | 2.4                | 14.1                 | 2.5                  | 14.4               |
| 1h                       | 1.8  | 10.8                 | 1.84               | 11.1                 | 1.9                  | 11.1               |
| 2h                       | 1    | 5.85                 | 1.04               | 6                    | 1.1                  | 6.06               |
| 3h                       | 0.75 | 4.23                 | 0.78               | 4.68                 | 0.79                 | 4.74               |
| 4h                       | 0.57 | 3.42                 | 0.6                | 3.6                  | 0.61                 | 3.66               |
| 5h                       | 0.46 | 2.76                 | 0.48               | 3                    | 0.49                 | 3                  |
| 8h                       | 0.3  | 1.8                  | 0.32               | 1.95                 | 0.32                 | 2.25               |
| 10h                      | 0.25 | 1.5                  | 0.26               | 1.56                 | 0.26                 | 1.56               |
| 20h                      | 0.13 | 0.81                 | 0.14               | 0.9                  | 0.14                 | 0.9                |

| type: 3-SPB-8(6V8Ah) |      |                      |                    |                      |                      |                    |
|----------------------|------|----------------------|--------------------|----------------------|----------------------|--------------------|
|                      |      | discharge to 5.55V   |                    | discharge to 4.95V   |                      | discharge to 4.95V |
| time                 | time | constant current (A) | constant power (W) | constant current (A) | constant current (A) | constant power (W) |
| 2min                 | 33.5 | 185.1                | 42.9               | 202.5                | 50.8                 | 215.7              |
| 5min                 | 26.4 | 148.2                | 31.4               | 162.9                | 35.4                 | 171.9              |
| 10min                | 20.2 | 115.2                | 23.2               | 125.7                | 25.1                 | 132                |
| 15min                | 15.7 | 90.3                 | 17.6               | 97.8                 | 18.7                 | 102                |
| 20min                | 13   | 75                   | 14.2               | 80.7                 | 15                   | 84                 |
| 30min                | 9.6  | 56.1                 | 10.4               | 60                   | 10.9                 | 62.4               |
| 45min                | 7    | 41.4                 | 7.5                | 43.8                 | 7.8                  | 45                 |
| 1h                   | 5.6  | 33                   | 5.9                | 34.5                 | 6.1                  | 35.4               |
| 2h                   | 3.1  | 18.6                 | 3.2                | 19.2                 | 3.4                  | 19.8               |
| 3h                   | 2.4  | 14.4                 | 2.4                | 14.4                 | 2.6                  | 14.88              |
| 4h                   | 1.92 | 11.4                 | 1.9                | 11.4                 | 1.9                  | 11.52              |
| 5h                   | 1.44 | 9                    | 1.6                | 9                    | 1.6                  | 9                  |
| 8h                   | 0.96 | 5.76                 | 0.96               | 5.7                  | 0.96                 | 5.76               |
| 10h                  | 0.8  | 4.8                  | 0.8                | 4.8                  | 0.8                  | 4.8                |
| 20h                  | 0.42 | 2.4                  | 0.43               | 2.4                  | 0.43                 | 2.4                |

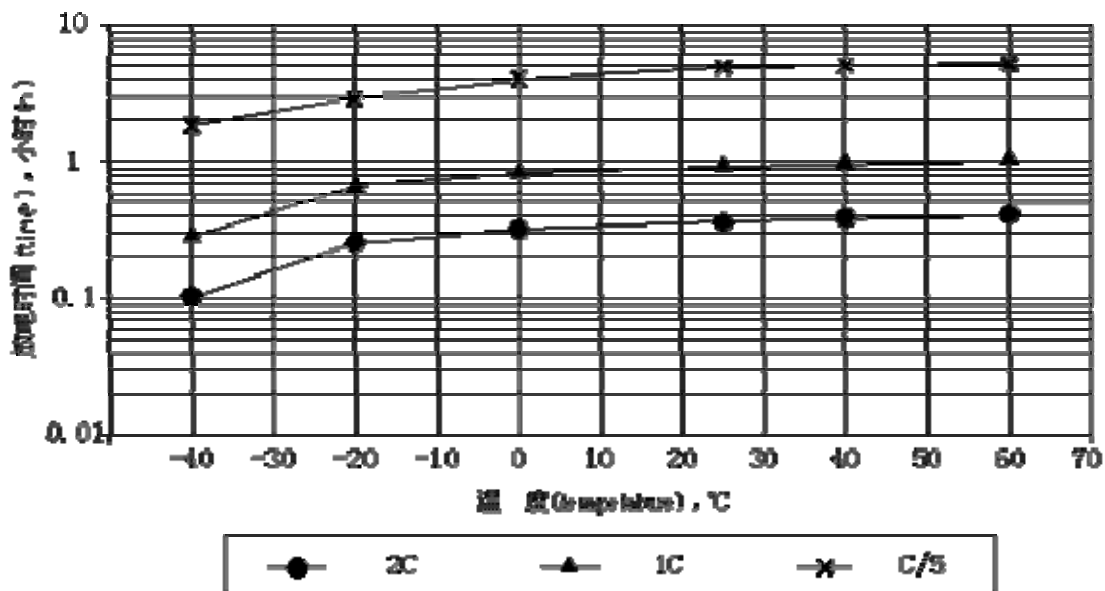
| type: 6-SPB-2.5(12V2.5Ah) |      |                      |                    |                      |                      |                    |
|---------------------------|------|----------------------|--------------------|----------------------|----------------------|--------------------|
|                           |      | discharge to 11.1V   |                    | discharge to 10.5V   |                      | discharge to 9.9V  |
| time                      | time | constant current (A) | constant power (W) | constant current (A) | constant current (A) | constant power (W) |
| 2min                      | 14.8 | 161.4                | 18                 | 192                  | 20.8                 | 213.6              |
| 5min                      | 9.8  | 109.8                | 11                 | 120.6                | 12.2                 | 130.2              |
| 10min                     | 6.8  | 75.6                 | 7.3                | 82.2                 | 7.8                  | 85.8               |
| 15min                     | 5.1  | 59.4                 | 5.7                | 64.2                 | 5.8                  | 64.2               |
| 20min                     | 4.2  | 49.8                 | 4.5                | 51.6                 | 4.8                  | 54                 |
| 30min                     | 3.2  | 37.8                 | 3.3                | 38.4                 | 3.4                  | 39.6               |
| 45min                     | 2.3  | 27.6                 | 2.4                | 28.2                 | 2.5                  | 28.8               |
| 1h                        | 1.8  | 21.6                 | 1.84               | 22.2                 | 1.9                  | 22.2               |
| 2h                        | 1    | 11.7                 | 1.04               | 12                   | 1.1                  | 12.12              |
| 3h                        | 0.75 | 8.46                 | 0.78               | 9.36                 | 0.79                 | 9.48               |
| 4h                        | 0.57 | 6.84                 | 0.6                | 7.2                  | 0.61                 | 7.32               |
| 5h                        | 0.46 | 5.52                 | 0.48               | 6                    | 0.49                 | 6                  |
| 8h                        | 0.3  | 3.6                  | 0.32               | 3.9                  | 0.32                 | 4.5                |
| 10h                       | 0.25 | 3                    | 0.26               | 3.12                 | 0.26                 | 3.12               |
| 20h                       | 0.13 | 1.62                 | 0.14               | 1.8                  | 0.14                 | 1.8                |

| type: 6-SPB-8(12V8Ah) |                      |                    |                      |                    |                      |                    |
|-----------------------|----------------------|--------------------|----------------------|--------------------|----------------------|--------------------|
|                       |                      | discharge to 11.1V |                      | discharge to 10.5V |                      | discharge to 9.9V  |
| time                  | constant current (A) | constant power (W) | constant current (A) | time               | constant current (A) | constant power (W) |
| 2min                  | 33.5                 | 370.2              | 42.9                 | 405                | 50.8                 | 431.4              |
| 5min                  | 26.4                 | 296.4              | 31.4                 | 325.8              | 35.4                 | 343.8              |
| 10min                 | 20.2                 | 230.4              | 23.2                 | 251.4              | 25.1                 | 264                |
| 15min                 | 15.7                 | 180.6              | 17.6                 | 195.6              | 18.7                 | 204                |
| 20min                 | 13                   | 150                | 14.2                 | 161.4              | 15                   | 168                |
| 30min                 | 9.6                  | 112.2              | 10.4                 | 120                | 10.9                 | 124.8              |
| 45min                 | 7                    | 82.8               | 7.5                  | 87.6               | 7.8                  | 90                 |
| 1h                    | 5.6                  | 66                 | 5.9                  | 69                 | 6.1                  | 70.8               |
| 2h                    | 3.1                  | 37.2               | 3.2                  | 38.4               | 3.4                  | 39.6               |
| 3h                    | 2.4                  | 28.8               | 2.4                  | 28.8               | 2.6                  | 29.76              |
| 4h                    | 1.92                 | 22.8               | 1.9                  | 22.8               | 1.9                  | 23.04              |
| 5h                    | 1.44                 | 18                 | 1.6                  | 18                 | 1.6                  | 18                 |
| 8h                    | 0.96                 | 11.52              | 0.96                 | 11.4               | 0.96                 | 11.52              |
| 10h                   | 0.8                  | 9.6                | 0.8                  | 9.6                | 0.8                  | 9.6                |
| 20h                   | 0.42                 | 4.8                | 0.43                 | 4.8                | 0.43                 | 4.8                |



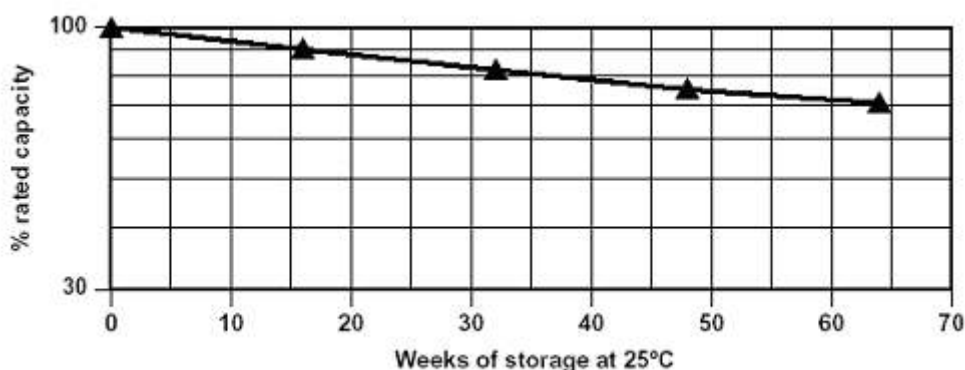
characteristic curve of bosfa SPB series pure lead spiral batteries

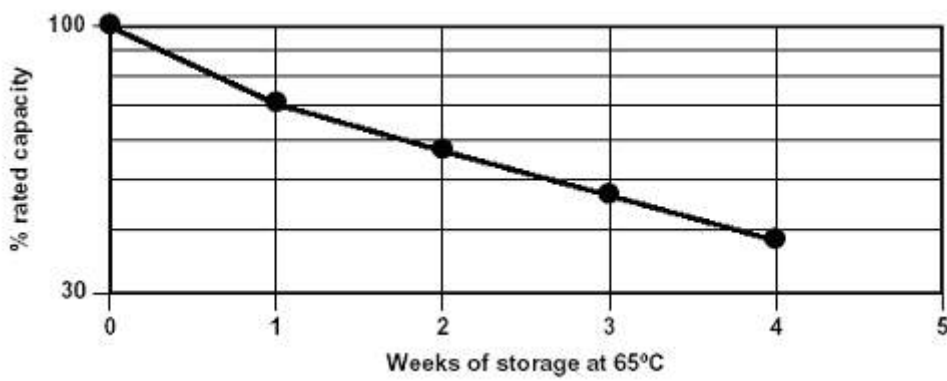
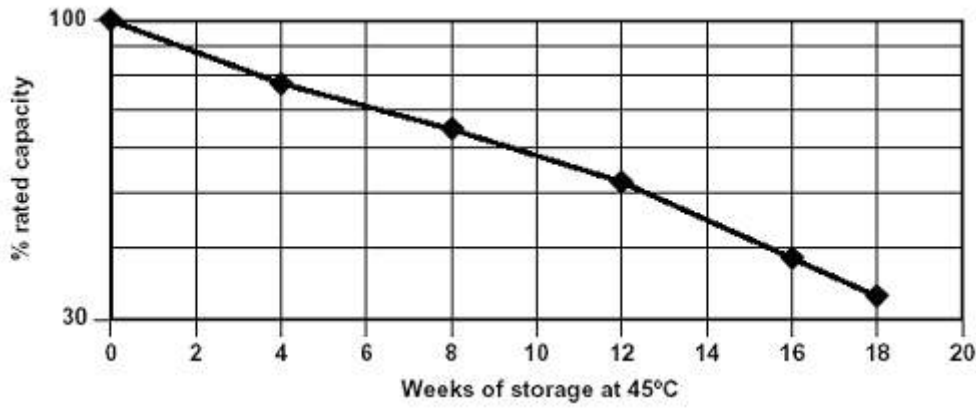
Capacity affected by temperature



Storage time affected by temperature

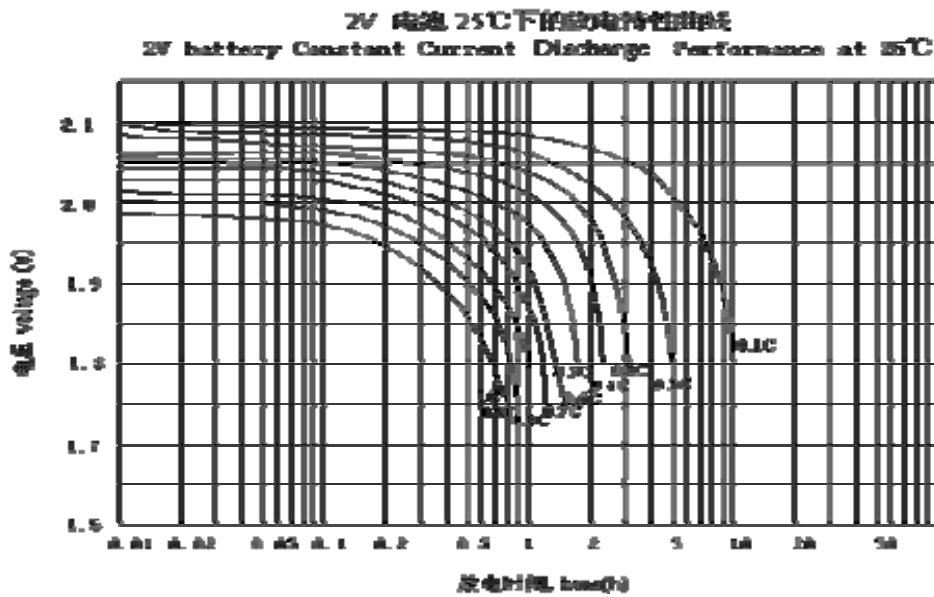
Most batteries lose their stored energy when allowed to stand on open circuit due to the fact that the active materials are in a thermodynamically unstable state. The rate of self - discharge is dependent both on the chemistry of the system as well as on the temperature at which the battery is stored.

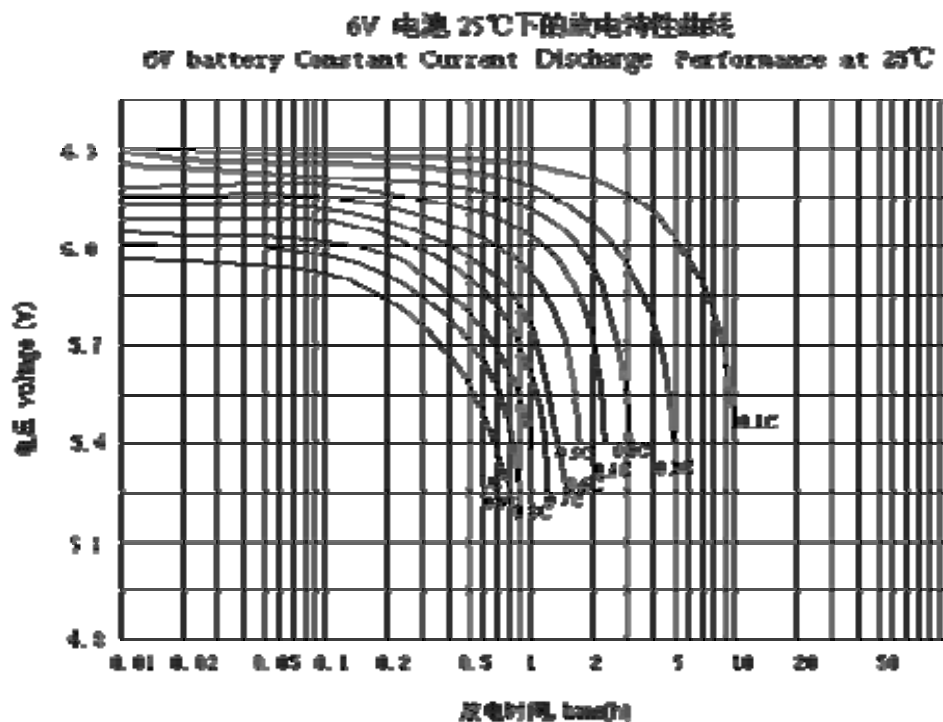




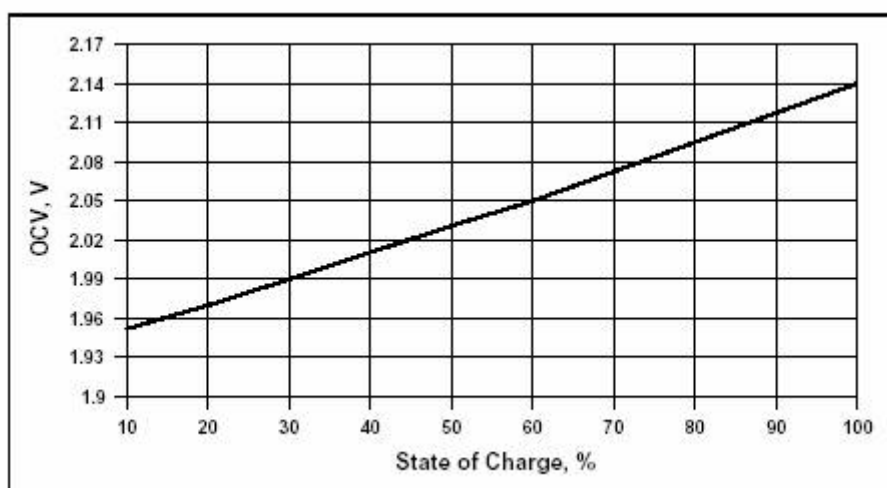
Storage time affected by temperature

#### 4. Discharge characteristic





**Open Circuit Voltage Vs. State of Charge**



Charge constant voltage

Standby: voltage 2.27~2.35V/cell at 25°C (25°C)

Cycle: initial charging current less than 0.6C<sub>10</sub>, voltage 2.45~2.5V /cell at 25°C