

Battery characteristics



- **Sealed Construction:** the unique construction and sealing technique of our batteries ensure that no electrolyte leakage can occur from the terminals or case. This insures a safe, efficient operation of our batteries in any position.
- **Absorptive Glass Mat System (AGM System):** Our batteries make use of fine mat separators of glass fibre wherein sufficient electrolyte is absorbed to provide the longest life and steady serve. This system prevents the escape of electrolyte from the separator which causes leakage.
- Our batteries' design effectively controls the generation of gas and allows recombination of over 90% of gas generated during the normal use. They operate in any position without loss of capacity, electrolyte and service life.
- They operate maintenance-free, position-free, leakage-free, and are "non-spillable".
- The performance is stable and reliable. The battery can withstand overcharge, overdischarge, vibration, and shock, and is capable of extended storage.
- Long Service Life: Our batteries have long life in float or cyclic service. The expected life of float service is shown on Figure 5 and life of cyclic service Figure 4.
- Our batteries are equipped with a safe, **low pressure venting system**, which operates at 1 psi to 6 psi, designed to release excess gas and reseal automatically in the event that gas pressure rises to a level above the normal rate. Thus, there is no excessive build-up of gas in the batteries. This low-pressure venting system, coupled with the extraordinarily high recombination efficiency, make our batteries the safest sealed lead acid batteries available.
- **Low Self Discharge:** Because of the use of Lead-calcium grids alloy, batteries can be stored long periods of time without re-charge.
High Recovery Capability: batteries have an excellent charge acceptance and recovery capability even after deep discharge.
- UL&CE Component approved

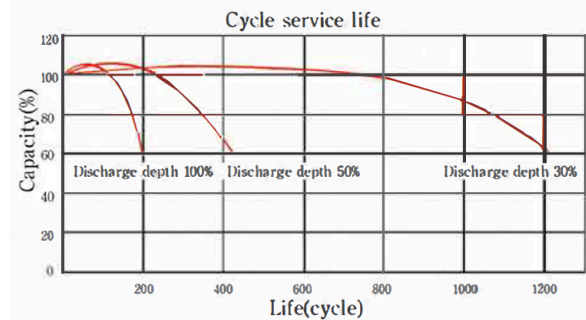


Figure 4

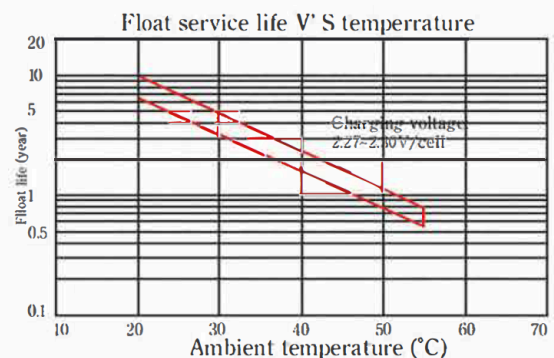


Figure 5

Standard Battery Features

Discharging

1. Final Discharging Voltage

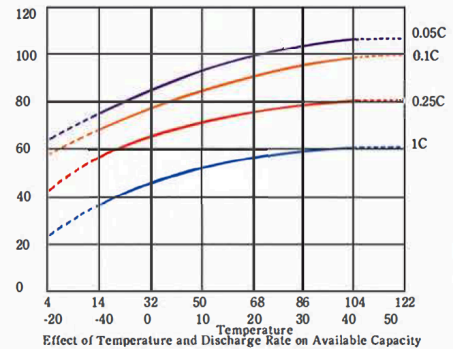
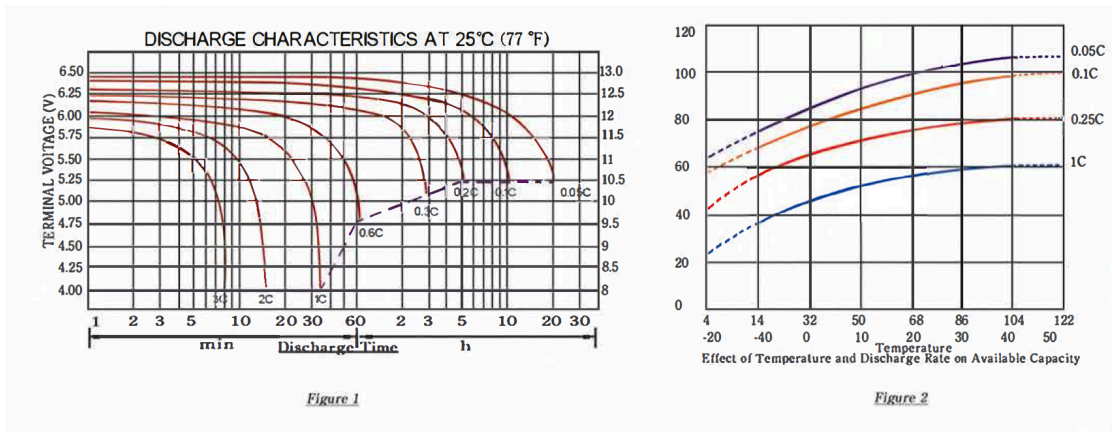
The final discharging voltage is the battery terminal voltage in close circuit voltage per cell to which a battery discharging safely and maximize battery. The higher discharging current is the lower cut-off discharging voltage of battery will be.

2. Battery Discharging Characteristics

The discharging capacity of battery depends on the discharge rate being used and the ambient temperature. Figure 1 shows the different discharging current corresponding discharging capacity at 25 °C (77 °F). They show that the rated capacity of a battery is reduced when it is discharged at a value of current that exceeds its 10-hours or 20-hours rate.

3. Temperature Effects in Relation to Battery Capacity

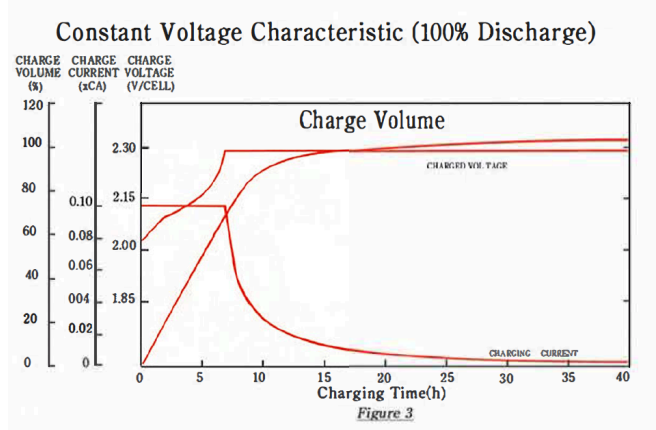
At a higher temperature, the capacity of battery increases and conversely at a lower temperature, the capacity of battery decreases. Figure 2 shows the effects of different temperature in relation to battery capacity.



Charging Methods

Correct charging is one of the most important factors to consider when using VRLA (valve regulated lead acid) batteries. Battery performance and service life will be directly affected by the charging methods.

Constant voltage charging is the recommended method of charging for VRLA batteries. It is necessary to closely control the actual voltage to ensure that it is within the limits advised (A) Standby service: 2.23-2.30 vpc at 25°C/77°F; (B) Cycle service: 2.40-2.50 vpc at 25°C/77°F Charging Time(h). It is suggested that the initial current be set within 0.3C Amps. Figure 3 indicates the time taken to fully recharge the battery.



It is also seen that the charging current is decreased to approx. 0.5-4mA/Ah under charging voltage 2.30 vpc, and 3-10mA/ Ah under charging voltage 2.40 vpc when the battery is fully charged at 25 °C/77°F. Note: it is necessary to ensure that the voltage is correctly set. Constant current charging is generally not recommended for VRLA batteries. If the batteries are not removed from the charger as soon as possible after reaching a state of full charge, considerable damage will occur to the batteries due to overcharging. The required recharged capacity is 1.07 to 1.15 times discharged capacity.

Battery Life

Battery life depends on a number of key factors, including (A) Cycle use or standby use, (B) Operating temperature of the battery, and (C) method of charging utilized

Cyclic Life: Giving due consideration to the above factors, the actual life of a battery in cycle service is dependent on the depth of discharge of each cycle. The greater the depth of discharge of each cycle is the lesser the number of cycles available from the battery will be.

Standby Life: The estimated life under float service of PS series are 5 years at 20 °C /68 °F; PK series are 10 years at 20 °C/68°F; PL series are 15 years at 20 °C/68°F The float service life is affected by the factors listed above and the number of discharging, the depth of discharging the battery suffers during its service life. The more and the deeper a battery discharges, the shorter the battery life will be. The higher the temperature is, the shorter the battery life will be. If the battery temperature remains at an elevated level for an extended period of time, the expected life is reduced by 50% for each 8°C to 10°C of constant temperature above 20°C/68°F.

Storage of Battery

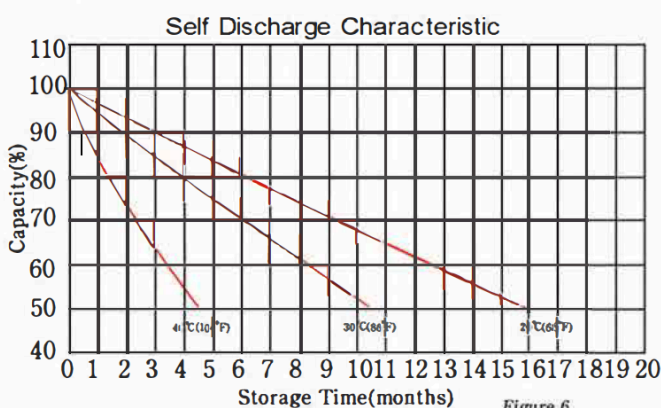
The battery should be stored under the following conditions.

1. Low humidity
2. Below 68°F (20°C)
68°F to 86°F (20°C to 30°C)
3. Clean place, and
4. Avoid direct sunlight.

Storage Ambient	Recommended Interval
Below 20 °C (68°F)	12months
20 °C to 30 °C (68°C to 86°F)	6months
30 °C to 40 °C (86°C to 104°F)	3months

After long term storage, all batteries deliver less than rated 86°F to 104°F capacity on first cycle. In cyclic application, full capacity may be obtained through several charge/discharge cycles, typically 2-3 cycles. When batteries are placed in extended storage, it is recommended that they receive a refresh charge at recommended intervals.

The self-discharge rate is highly dependent on the storage temperature as shown in Figure 6.



Lower temperatures allow the battery to be stored for longer periods. Each 10°C results in a halving of self-discharge rate and doubles storage.

The ideal storage condition for a battery is under ventilation, at a dry place and the temperature is 25°C. The self-discharge rate is closely related to the storage temperature under open circuit condition. The higher the temperature is, the less the capacity left after storage. The battery capacity will be reduced due to self-discharge during storage. If it is not recharged in time,



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the battery may be damaged or out of service. The remaining capacity can be generally estimated by measuring the open circuit voltage of the battery, which helps to decide whether or not to give the battery supplementary charge. It is suggested that if the single Grid voltage is lower than 2.1V or the battery has been stored for longer than 6 months, it is necessary to recharge the battery timely. After storage, it's advised that battery should be recharged uninterruptedly under constant voltage (14.4 - 15.0 V), which should be not more than 16 hours.

General Product features of all our batteries:

1. Maintenance-Free: no need to add water or other liquid throughout the usage of battery within its service life.
2. High reliability and Long life: special sealed structures and fire-retardant battery case ensure no electrolyte leakage in the course of the use, let alone fire.
3. High rate between weight and energy, cubage and energy, small resistance, high-output power.
4. Low self-discharge rate: monthly self-discharge rate is not more than 2% under 20
5. Batteries are fully charged before dispatched from factory, no flowing electrolyte, and safe transportation
6. Easily recovery: over discharge the battery to 0 V, place the battery under short circuit condition after 15 days, it can still be recovered after recharging.
7. Solid copper terminal easy to install and connect; strong conductivity.



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Solylakay Batteries

GEL Series

Nominal Voltage: 12V

Capacity: From 7 AH to 250AH

Design Life: 8 years for GS series, 12 years for GK series

Characteristic: Superior deep cycle design; High power density; Thick plates and high-density active material; Longer life in deep cycle applications; Excellent recovery from deep discharge.

Battery Type	Rated Voltage (V)	Rated Capacity (AH)	Dimensions(MM)				Weight (KG)
			Length	Width	Height	Total Height	
GS7-12	12	7	151	65	95	101	2.1
GS7.2-12	12	7.2	151	65	95	101	2.15
GS8-12	12	8	151	65	95	101	2.45
GS10-12	12	10	151	98	95	101	3.3
GS12-12	12	12	151	98	95	101	3.6
GS18-12	12	18	181	77	167	167	5.2
GS20-12	12	20	181	77	167	167	5.8
GS25-12	12	25	166	175	125	125	8.2
GS28-12	12	28	166	175	125	125	8.8
GK33-12	12	33	195	130	155	160	9.9
GK38-12	12	38	197	165	170	170	12.6
GK40-12	12	40	197	165	170	170	13.9
GK55-12	12	55	229	138	210	213	17
GK65-12	12	65	355	167	179	179	20.6
GK70-12	12	70	258	166	210	213	22.6
GK75-12	12	75	258	166	210	213	23.6
GK90-12	12	90	307	169	210	213	27
GK100-12	12	100	330	171	220	223	30.6
GK120-12	12	120	410	175	227	227	35
GK135-12	12	135	342	172	280	285	41
GK150-12	12	150	485	172	240	240	44.5
GK160-12	12	160	532	207	215	218	48
GK200-12	12	200	522	238	218	222	61
GK250-12	12	250	520	260	220	224	70
GK100-6	6	100	195	170	210	213	16
GK150-6	6	150	260	180	248	252	23
GK180-6	6	180	298	177	228	232	30
GK190-6	6	190	243	188	275	275	30
GK300-6	6	300	295	178	345	350	44
GK180-8	8	180	260	182	295	300	38.5

PK Series

Nominal Voltage: 12V

Capacity: from 33AH to 250AH

Design Life: 10 years

Characteristic: special lead-calcium alloy plate, high capability adsorptive clapboard, valve-regulated and sealed configuration, no dissociative acid, maintenance-free operation, low self-discharge and used safely till turn 90°, good consistency and no need uniform charge.

Battery Type	Rated Voltage (V)	Rated Capacity (AH)	Dimensions(MM)				Weight (KG)
			Length	Width	Height	Total Height	
PK33-12	12	33	195	130	155	180	10.2
PK35-12	12	35	195	130	155	180	10.5
PK40-12	12	40	197	165	170	170	12.8
PK45-12	12	45	197	165	170	170	14
PK55-12	12	55	229	138	210	228	17
PK65-12	12	65	355	167	179	183	20.6
PK70-12	12	70	258	166	210	228	22.6
PK75-12S	12	75	562	114	188	188	23.6
PK80-12	12	80	355	167	179	183	21.6
PK90-12	12	90	330	171	220	227	25.8
PK90-12B	12	90	406	174	208	233	28
PK100-12	12	100	330	171	220	227	30.6
PK100-12S	12	100	506	110	238	238	31
PK100-12SG	12	100	394	109	285	285	32.5
PK110-12	12	110	280	265	206	210	34
PK120-12	12	120	410	175	227	227	33.4
PK150-12	12	150	485	172	240	240	42.6
PK150-12S	12	150	551	109	287	287	44
PK200-12	12	200	522	238	218	236	61
PK250-12	12	250	520	268	220	249	68.5

Long Life Series

Nominal Voltage: 6V 12V

Capacity: from 4AH to 250AH

Design Life: 8 years for PS series and 13 years for PK series.

Characteristic: special design for demand of long life, special lead-calcium alloy plate and high purity additive ensure long life of battery, high purity electrolyte and additive make battery low self-discharge, valve-regulated and sealed configuration, no dissociative acid, maintenance-free operation.

Battery Type	Rated Voltage (V)	Rated Capacity (AH)	Dimensions(MM)				Weight (KG)
			Length	Width	Height	Total Height	
PS5L-6	6	5	70	47	101	107	0.85
PS10L-6	6	10	151	50	94	100	1.85
PS12L-6	6	12	151	50	94	100	2.1
PS5L-12	12	5	90	70	101	107	1.8
PS7.5L-12	12	7.5	151	65	93	99	2.66
PS10L-12	12	10	151	98	95	101	3.6
PS12L-12	12	12	151	98	95	101	4.1
PS20L-12	12	20	181	77	167	167	5.7
PS28L-12	12	28	175	166	125	125	8.6
PK33L-12	12	33	195	130	159	180	10.5
PK45L-12	12	45	197	165	170	170	15.2
PK50L-12S	12	50	277	106	222	222	17
PK55L-12	12	55	229	138	210	228	11.2
PK65L-12	12	65	355	167	179	183	23.2
PK70L-12	12	70	258	166	210	228	24.8
PK75L-12S	12	75	562	114	188	188	25.8
PK80L-12	12	80	355	167	179	183	26.4
PK100L-12	12	100	330	171	220	227	33.8
PK100L-12S	12	100	506	110	238	238	33.8
PK100L-12SG	12	100	394	109	285	285	33.8
PK120L-12	12	120	410	175	227	227	38.8
PK150L-12	12	150	485	172	240	240	51.0
PK150L-12S	12	150	551	109	287	287	51.2
PK200L-12	12	200	522	238	218	236	71.4
PK250L-12	12	250	520	268	220	249	76.8



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Deep Cycle Series

Nominal Voltage: 12V

Capacity: from 4AH to 250AH

Characteristic: special lead-calcium alloy plate and high purity additive ensure more than 350 cycles on 80% deep discharge, long life and low self-discharge, high recovery capability on deep discharge.

Battery Type	Rated Voltage (V)	Rated Capacity (AH)	Dimensions(MM)				Weight (KG)
			Length	Width	Height	Total Height	
PS4.5D-12	12	4.5	90	70	101	107	16
PS5D-12	12	5	90	70	101	107	17
PS7D-12	12	7	151	65	93	99	2.26
PS7.5D-12	12	7.5	151	65	93	99	2.35
PS8D-12	12	8	151	65	93	99	2.4
PS9D-12	12	9	151	65	93	99	2.60
PS10D-12S	12	10	151	65	114	120	3.6
PS12D-12	12	12	151	98	95	101	3.8
PS18D-12	12	18	181	77	167	167	5.6
PS20D-12	12	20	181	77	167	167	5.9
PS22D-12	12	22	181	77	167	167	6.4
PS24D-12	12	24	175	166	125	125	8.6
PS28D-12	12	28	175	166	125	125	9.2
PS33D-12	12	33	195	130	155	180	10.8
PK45D-12	12	45	197	165	170	170	14.8
PK55D-12	12	55	229	138	210	228	18
PK65D-12	12	65	355	167	179	183	21.6
PK70D-12	12	70	258	166	210	228	22.8
PK75D-12S	12	75	562	114	188	188	25.8
PK80D-12	12	80	355	167	179	183	25.8
PK100D-12	12	100	330	171	220	227	31.2
PK100D-12S	12	100	506	110	238	238	31.6
PK100D-12SG	12	100	394	109	285	285	31.6
PK110D-12	12	110	330	171	220	227	33.6
PK120D-12	12	120	410	175	227	227	36.8
PK150D-12	12	150	485	172	240	240	46.8
PK150D-12S	12	150	551	109	287	287	46.6
PK200D-12	12	200	522	238	218	236	65.4
PK250D-12	12	250	520	268	220	249	75.8