CB Series

Lead-Carbon Battery

Cyclic Lead Carbon

FOTONA batteries

The Role of Carbon:

The addition of carbon increases the pore size of the negative plate, allowing the acid to pass through and be dispersed in the lead paste.

The positive effects of this can improve charge acceptance under high current conditions and enhancement of the PSoC performance of the battery.

- to improve conduction of energy
- lower internal resistance
- capacity contribution
- to limite growth of sulfation
- to improve microstructure

Main properties:

- Combination of the properties of lead-acid batteries and super capacitors
- Suitable for high power PSoC charging
- High power, fast charging and discharging
- Longer life span than traditional VRLA batteries

Applications:

- Home energy storage system
- Smart power grid system
- Distributed energy storage system
- Solar and wind energy storage system
- Big UPS
- Invertor system with cycle requirement
- Generation and battery hybrid energy storage system

Advantages:

- Design life is 20 years (more than 2000 cycles @ 80% DOD)
- Combine the advantage of VRLA battery and supercapacitor
- Ideal for PSoC cycle application in Renewable Energy (RE).
- High power, rapid charge/discharge
- Add functional activated carbon and graphene to negative plates to get excellent acceptance in charge performance
- Waterproof, anti-salt treatment, shockproof module installation design
- Comply with IEC60896,IEC61427 etc
- Lead Carbon batteries can perfectly be used with good performance without being full charged

Recommended charge voltage (V/Cell) :

	Float Service	Cvcle Service
Absorption		2.35 - 2.40V
Float	2.25- 2.30 V	2.25 - 2.30V
Storage	2.20- 2.25 V	2.20 -2.25V

Failure modes of flat plate VRLA lead acid batteries in case of intensive cycling

The most common failure modes are:

- Softening or shedding of the active material. During discharge the lead oxide (PbO_2) of the positive plate is transformed into lead sulfate ($PbSO_4$), and back to lead oxide during charging. Frequent cycling will reduce cohesion of the positive plate material due to the higher volume of lead sulfate compared to lead oxide.
- Corrosion of the grid of the positive plate. This corrosion reaction accelerates at the end of the charge process due to the necessary presence of sulfuric acid.
- Sulfation of the active material of the negative plate. During discharge the lead of the negative plate is also transformed into lead sulfate ($PbSO_4$). When left in a low state-of-charge, the lead sulfate crystals on the negative plate grow and harden and form and impenetrable layer that cannot be reconverted into active material. The result is to decrease capacity until the battery cannot work.

It takes time to recharge a lead acid battery

Ideally, a lead acid battery should be charged a rate not exceeding 0.2C, and the bulk charge phase should be followed by eight hours of absorption charge. Increasing charge current and charge voltage will shorten recharge time at the expense of reduced service life due to temperature increase and faster corrosion of the positive plate due to the higher charge voltage.

Lead carbon: better partial state-of-charge performance, more cycles, and higher efficiency

Replacing the active material of the negative plate by a lead carbon composite potentially reduces sulfation and improves charge acceptance of the negative plate.

The advantages of lead carbon therefore are:

- Less sulfation in case of partial state-of-charge operation.
- Lower charge voltage and therefore higher efficiency and less corrosion of the positive plate.
- And the overall result is to improve cycle life.

Tests have shown that our lead carbon batteries do withstand at least six hundred 100% DoD cycles.

The tests consist of a daily discharge to 10.8V with $I = 0.2C_{20}$,followed by approximately two hours rest in discharged condition, and then a recharge with $I = 0.2C_{20}$.

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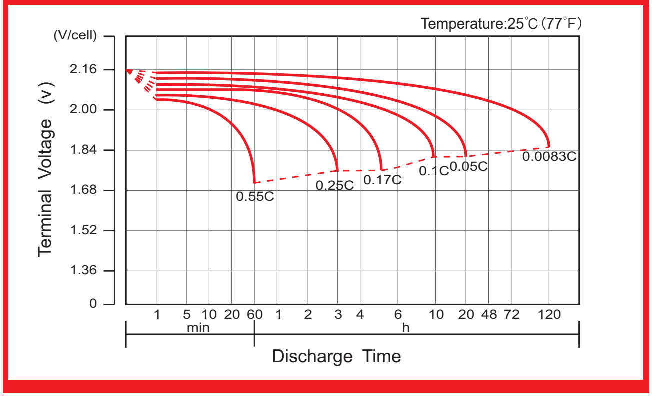
Specification

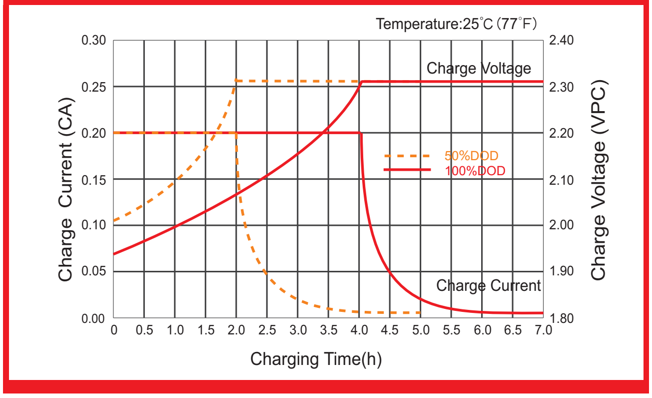
Int'l Model	Volt (V)	Capacity (Ah@20h)	Dimension (mm)				Approx. Weight	Terminal	
			L	W	H	T.H.		Type	Position
CB200-6	6	200	306	168	220	225	31	T5 (M8X18)	F
CB210-6	6	210	260	180	247	252	30	T5 (M8X18)	F
CB225-6	6	225	243	187	275	275	32.5	T5 (M8X18)	F
CB230-6	6	230	260	180	265	272	35	T5 (M8X18)	F
CB280-6	6	280	295	178	346	350	45.8	T5 (M8X16)/DT	F
CB300-6	6	300	295	178	346	350	47	T5 (M8X16)/DT	F
CB350-6	6	350	295	178	404	410	55	T5 (M8X16)/DT	F
CB380-6	6	380	295	178	404	410	57.5	T5 (M8X16)/DT	F
CB20-12	12	20	166	175	126	126	8.4	T2 (M6X16)	B
CB30-12	12	30	196	130	155	167	10.2	T3 (M6X16)	A
CB35-12	12	35	198	166	174	174	14.2	T3 (M6X16)	B
CB50-12	12	50	229	138	208	212	17.7	T3 (M6X16)	B
CB60-12	12	60	350	167	178	178	23	T3 (M6X16)	B
CB75-12	12	75	260	169	211	215	26	T3 (M6X16)	A
CB90-12	12	90	307	169	211	216	30.0	T3 (M6X16)	A
CB100-12	12	100	331	176	214	220	33	T4 (M8X16)/AP	A
CB110-12	12	110	407	173	210	233	39	T5 (M8X18)	A
CB120-12	12	120	341	173	283	288	40.5	T5 (M8X18)	B
CB135-12	12	135	484	171	241	241	46	T4 (M8X18)	A
CB180-12	12	180	532	206	216	222	58.5	T4 (M8X18)	C
CB200-12	12	200	522	240	219	225	65.0	T5 (M8X18)	C
CB220-12	12	220	520	269	203	209	71	T5 (M8X18)	C
CB260-12	12	260	520	268	220	226	78	T5 (M8X18)	C

Characteristic Curve

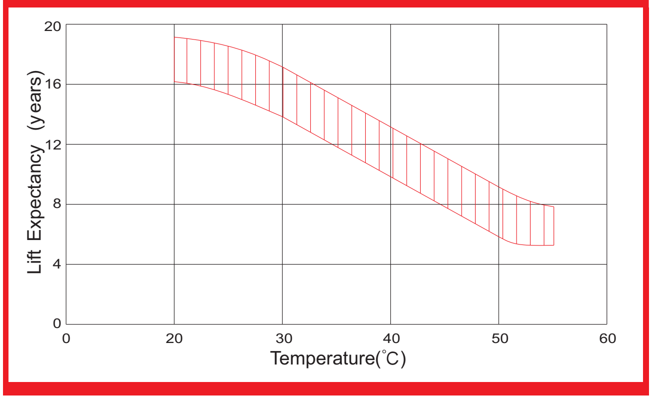
Discharge Characteristics Curve



Charge Characteristic Curve for Cycle Use (IU)



Effect of Temperature on Design Life



Cycle Life in Relation to Depth of Discharge