### Note: This information applies ONLY to 12 volt single lead acid batteries of the types listed. WARNING: Data is not necessarily valid for conditions where multiple 12 volt batteries are connected in strings (series or parallel)

#### See notes below the data table for battery strings.

Lead Acid BatteryTypes	Bulk Charging (Constant Current) 12 volt Battery	Absorption Charging (Constant Voltage) 12 volt Battery	Float Charging (Constant Voltage) 12 volt Battery	Trickle Charging (charge maintenance during extended storage)	Temperature Compensation	Open Circuit Voltage (OCV) @ 20% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 50% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 60% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 70% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 90% State of Charge (SOC)	Special notes	Other Guidelines
Standard Flooded/W et Automotive SLI (Caloum) Exide Select Exide Classic Exide Commercial Exide Curling Edge Exide Marine Starring Flooded SuperCrank Flooded SuperCrank	Charge at a constant current rate of no more than 10 times l <sub>20</sub> to a voltage of 14.8V (example; For C20-100AFr, the max charge current is 106A or 50A).	Charge with 14.8V - 15.0V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20-100Mr, the low current shut off is 1%x 100 or 1A).	13.5v - 13.8	Charge voltage on point - 12.60v Charge voltage off point - 13.5v Limit current to 0.4 times I <sub>20</sub>	Charging Tangersteine Composition (2016) the Utility of Garging Weights on the properties for a temperature large of 15.5 SPC (GAT-TP). For average operating temporatures below this range (collect hau) the minimum Voltage set point should be composed with an increase at a rate of 0.03 Volts Per Cell (0.33 Volts for a 12 v battery) for every 10°C (11°F). The average coprimating temporatures show this image (collect hau) the every 10°C (11°F). The average set of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the Cell (0.38 Volts for a 12 v battery) for every 10°C (11°F). The conference of the	Not recommended	12.44v	12.52v	12.60v	12.77	hatery Temperature: Entration should be longify to a supportance of a long OPT (15%) for set of fiction charging and black STST (10%) In hist over behaving effects. AC Engole Charge: Limitations: Some DC charges will have what in vierres of a sin AC engole wave form to charging input: Lessoir replete can case buttry heating and gassing multing in reduced 16k. Ripple current exerctions during the float charging public behavior to compare the structure of the structure of the structure of the structure of the structure of the structure of the structure of the structure of the structure -i. OD row to at 13.8 volts). Operating Temperature The recommend operating temperature ange is 10/C -307 (007 -807) for optimid operation. Low or temperature s volt 11 min capacity structure. Higher temperatures may where the limit structure is 59% (127).	Storger: For open circuit storage it is recommended that the battery be stored indoors in a clean, dy location. Never store (or openate) is an antitylet and/source. Keep away isomalicies that stores. Storage integretations thand be between 50% - 77% (10°C) and the store of the
Flooded/W et Extreme Cycling (Całcium) Extre Extreme Exide Marine Dual Purpose	Charge at a constant current rate of no more than 10 times I <sub>20</sub> to a voltage of 14.8V (example; For C20-100Arr, the max charge current is 106A or 50A).	Charge with 14.8V - 15.0V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20-100Mr, the low current shut dfl is 1%x 100 or 1A).	13.5v - 13.8	Charge voltage on point - 12.60v Charge voltage off point - 13.5v Limit current to 0.4 times I <sub>40</sub>	Character Temperature Composition: All the lined sharing willings are purposed in far interpretent manager (15.25% (26.87)TF). For a range operating temperatures below this range (outler than) the minimum Voltage set point should be composated with an increase a a rate of 0.053 Volta PerCell (0.38 Volta for a 12 v battery) for every 10°C (18.87). The strain of the temperature of the composated with a decrease a area of 0.055 Volta Per Cell (0.38 Volta for a 12 v battery) for every 10°C (18°F). Example: a 152 v battery of the temperature (16.9757713) (0.038) = 13.22 volta.	Not recommended	12.44v	12.52v	12.60v	12.77	Battery Temperature: Batteries should be brough to a supportance of a lease 07F (157C) for most officiant charging and block 95T (207C) to listi over behaving effects. AC Ripple varse-finite the charging input: Exercisive ripple can cancel batty heating and gassing resulting in reduced 18E. Ripple current exercisions during the food charging phases blood for eace 5 Areas for every 100 AH of formality capacity (Ease) feed to the size of the theory or eace 5 Areas for eacy 100 AH of formality capacity (Easer) feed to the local varying phases (boold not eace 5 Areas for eace 100 AH of formality capacity (Easer) feed to the local varying phases (boold con- ceed 5 Areas for eacy 100 AH of formality capacity (Easer) feed to the local varying how feed with the local transformed to the local to cancel - 5 No the local varying (2007 - 807) for epitiming operation. Lower temperatures will limit capacity capacity angles. Higher temperatures may make to like the limit of the size of the local varying the limit of the local varying the phase local do not size of limits. Lower temperatures will limit capacity capacity angles. Higher temperatures may make to like Austimum size of (2017 - 807).	Surger: For open circuit storage it is recommended that the battery be stored indoors in a clean, dy location. Never store (or openat) in an airtight end/sourse. Keep nevy factorize that success. Storage imperiance in aband be between 600° 777 (170° 777 Batteries should be fally charged prior to storage. Batteries should be be boost charged nevery of mustino when the hattery volgene reads 122. 2016. Storage at deviated imperiance will excit in accelerate at each solid biotheres of the hatter is hardered bound be fally charged prior to storage. Batteries should be boost charged never of mustino when the hattery volgene reads 122. 2016. Storage at deviated imperatives will excit in accelerate at each solid fold-storage. A general rule of than is harder. Storage with the proper charge can nexil in excessive sulfation and can be detrimental to battery performance and life.
Flooded/W et Deep Cycle & Marine (Antimony) Exide Marine Deep Cycle Exide Special Heavy Duty and Floor Scrubber	Charge at a constant current rate of no more than 10 times b <sub>0</sub> to a voltage of 14.7V (example; For C20=100AHr, the max charge current is 106A or 50A).	Charge with 14.7V - 14.9V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20-100Mr, the low current shut off is 1%x 100 or 1A).	132v-134v	Charge voltage on point - 12.80v Charge voltage off point - 13.2v Limit current to 0.4 times I <sub>80</sub>	Charging Temperature Composition: All the listed sharing voltages are appropriate for x-interposition ange of 15.25°C (GN-77F). For a versue operating temperatures below this range (colder than) the minimum Voltage set point should be composated with an increase at rate of 0.053 Volta For Cell (0.38 Volta for a 12 v battery) for every 10°C (187 han) the minimum voltage at point should be composated with a decrease at rate of 0.055 Volta For Cell (0.38 Volta for a 12 v battery) for every 10°C (187 F). Example: at 59°F and 142 volta point Corrected Voltage = 14.2 + ((0577713) 0.003) = 14.55 volta	12.1v	12.44v	12.52v	12.60v	12.77	Battery Temperature: Batteria should be brought to a temperature of at least 07F (15°C) for most officient charging and below 58°T (20°C) in hiir over beating effects. AC Ringle Charge Limitations: Some DC charges will have what in referred to as an AC pipel wave-form to the charging input: Lessoir repipel can case burby beating and gassing resulting in reduced 16. Ripple current exerctions during the foot charging phases should no case of the structure of the structure of the structure of the structure structure of the structu	Storage: For open circuit storage it is recommended that the battery be stored indoors in a clean, day location. Never store (or operate) in an antight enclosure. Keep news (2000) and the store store of the store store of the store of the store store of the store of the store of the store store of the store of the store store of the store of the store of the store store of the store of the store store of the store of the store of the store store of the store of the store of the store of the store of the store of the store of the store temperatures will easily charged prior to store and the store of the store of the store store of the store of the store store of the store of the store store of the store of the s
Gel cell Exide Prevailer	Charge at a constant current rate of no more than 10 times l <sub>25</sub> to a voltage of 14.1V (example; For C20=100AHr, the max charge current is 106A or 50A).	Charge with 14.1V - 14.4V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20-100Mr, the low current shut dfl is 1%x 100 or 1A).	13.5v - 13.8v with current limited to 4 times I <sub>80</sub> .	Charge voltage on point - 12.75v Charge voltage off point - 13.5v Limit current to 0.4 times I <sub>20</sub>	Charging Temperature Compensation: All the listed charging voltages are appropriate for a temperature mage of 15-297 (68-775), voltages are pair handle be compensated with the increme at a real work voltage are pair handle be compensated with a linearea at a real work voltage are penit microperatures allow the inarge (warmer than ) the voltage are penit microperatures allow the inarge (warmer than ) the voltage are penit microperatures allow the inarge (warmer than ) the voltage are penit microperatures allow the inarge (warmer than ) the voltage are penit and 12-2 voltage (warmer than ) the voltage are all 12-2 voltage (warmer than ) and 12-2 voltage (warmer than ) (055-77)/18/10.3) = 13.9 volts	12.0v	12.40 v	12.50v	12.60v	12.90v	Battery Temperature: Batteries should be brough to a supportance of at lease 07F (157C) for superdistical support of the strength of the strength of the strength of the strength of AC Ringle Charge Limitations: Some DC charges will have what is referred to as an AC imple wave. Simits the charging input: Exercisive rippice can cause that by heating and gassing resulting in robused 16E. Rippic errorst exercisions during the foot charging public blocks of the strength of the strength of the strength of the strength of the strength of the strength of the strength of the strength of the strength of the strength of control at 13.8 volts). Operating Temperature: The recommend operating temperature ange is 107C - 307C 047F 847F for optimid operation. Lower temperatures will limit capacity starpler. Higher temperatures may make the like Market and the strength operation strength on the strength operation.	Surger: For open circuit storage it is recommended that the battery be stored indoors in a clean, dy location. News tools (or opened) in an airlight enclosure. Keep areas foundaries that stores. Storage imperiance handle be beived stored by the storage of the storage storage of the storage of the storage of the storage batteries should be belowed charged every of mustin ow when the hattery volgene rates is 27 volts. Storage at deviated temperatures will easil in accelerate dates of solid doctages. A general rule of thus is that the storage of the storage of the storage of the storage at deviated temperatures will easil in accelerate dates of solid doctages. A general rule of thus is that the CSN of the storage of the storage of the storage at deviated temperatures will easile the storage of the storage batteries and the storage at deviated temperatures will easile the storage of the storage of the storage at deviated temperatures will easile the storage of the storage of the storage at deviated temperatures will easile the storage of the storage at deviated temperatures at the storage of the storage of the storage at deviated temperatures at the storage of the storage at deviated at the storage at deviate at the storage of the storage at deviated temperatures at the storage of the storage at deviated at the storage at deviate at the storage of the storage at the storage at the storage at the storage at the storage temperature at the storage of the storage at the stor
Flat Plate and Spiral AGM Exide Erge Exide Vortex Exide Roadforce Exide AGM SuperCrank AGM SuperCrank AGM PowerSport	Charge at a constant current rate of no more than 10 times l <sub>20</sub> to a voltage of 14.1V (example: For C:20=100Ar, the max charge current is 10x6A or 50A).	Charge with 14.1V - 14.4V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example, C20–100Ahr, the low current shut df is 1%x 100 or 1A).	13.6v- 13.8v with current limited to 4 times I <sub>00</sub> .	Charge voltage on point - 12.75v Charge voltage off point - 13.6v Limit current to 0.4 times I <sub>20</sub>	Charging Temperature Compensation: All the listed charging vulnages are based on a temperature of 77° E/2°C, For average operating temperature block whis argue (could what) the maximum of the strength of the strength of the strength of the strength D318 volts, $T^{-}$ (D022 volts °C) for a orage operating temperatures bloch this range (varient that) the maximum voltage set points should be compensated with a decrease at an ter of 00.18 volts, $T^{+}$ (0.03 volts °C). Employ at 65° ma 142 volts ter point Corrected Voltage = 142 - (77- 65) x (0.015)) = 13.32 volts	12.0v	12.40v	12.50v	12.60v	12.90v	Battery Temperature: Batteries should be brought to a temperature of at least 60°F (15°C) for most efficient charging and below 85°F (30°C) to limit over hearing effect. AC Rippic Charge Limitations: Some Orice August with law with interfered to an AC or physics and the state of the state interference of the state of the value of the state of the state value (Chargine). This is that value of the state of the state of the state of the state and the state of the state value (Chargine). This is that value of the state of the state of the state of the state and the state of the state of the state of the state of the state of	Surger: For open circuit storage it is recommended that the battery be stored indoors in a clean, dy location. Never store (or openate) in an artight enclosure. Keep way domnlices that stores. Songet imperatures thought be byteness 2007–777 (UPC - Ter (UPC - TFG (UPC - Batteries should be fully charged prior to storage. Batteries should be bytenis tharged every for multion when the history voltage makes 12.2 volta. Storage at elevated temperatures will result in accelerated rates of self-disharged. A general rule of huben bi- halved. Batteries should be fully charged byten the store of the store of the self-disharged and the store of the self-openate result in accelerate rules of self-disharged. A general rule of huben bi- halved. Batteries should be the proper distance of the self-disharged and the self-openate rule of huben bi- halved. Batteries of the self-disharged properties of the self-disharged properties of the self-disharged properties and the self-disharged properties and the self-disharged properting of the self-disharged properties and the self-disharged properties

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Helpful explanations

Calcium and Animony-rotations refer to metal alloy addrives used in battery grint. These alloys tave small effects on the charge valtages.
 Distributory in the registed monoy-rotations refer to metal alloy addrives, used in battery grint. These alloys tave small effects on the charge valtages.
 Distributory in the registed monoy-rotations are performed in the battery grint. These alloys tave small effects on the charge valtages.
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# Ex 24 velt systems that are compressioned of the (2.13 Velt Abstraints connected in an entry that are charged with 34 velt charges relation to parallel battery connections). 1) All draging classes that the connected in the special batter (and the special battery connections). 2) All draging current merini detect of 12 cell numbers as listed does (due to the series connection). 3) All draging merinemini detect of 12 cell numbers as listed does (due to the series connection). 3) All draging merinemini detect of 12 cell numbers as listed does (due to the series connection). 3) All draging merinemini detect of 12 cell numbers as listed does (due to the series connection). 3) All draging merinemini detect of 12 cell numbers as listed does (due to the series connection).

# For 44 volt systems that are compressing of four (61 32-ob barratine connected in a works that are charged with 40 volt charger of white the parallel battery connections) 19. All dwarps (optime) interess X = (10 barrations are listed for advoltage of the top the second of the seco

### Note: This information applies ONLY to 8 volt single lead acid batteries of the types listed.

WARNING: Data is not necessarily valid for conditions where multiple 12 volt batteries are connected in strings (series or parallel)

#### See notes below the data table for battery strings.

Lead Acid Battery Types (C	Bulk Charging Constant Current) 8 volt Battery	Absorption Charging (Constant Voltage) 8 volt Battery	Float Charging (Constant Voltage) 8 v olt Batterv	Trickle Charging (charge maintenance during extended storage)	Temperature Compensation	Open Circuit Voltage (OCV) @ 10% State of Charge (SOC)	50% State of	Open Circuit Voltage (OCV) @ 60% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 70% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 90% State of Charge (SOC)	Special notes	Other Guidelines
Flooded/Wet Deep Cycle tha (Antimony) v Exide Golf Cart 2 Exide Special Heavy Duty C20	rent rate of no more an 10 times I <sub>20</sub> to a voltage of 9.78V (example: For	Charge with 9.78V - 9.91V limit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20–100Ahr, the low current shut off is 1%x 100 or 1A).		Charge voltage on point - 8.25v Charge voltage off point - 8.78v Limit current to 0.4 times I <sub>20</sub>	Charging Temperature Compensation: All the listed charging voltages are appropriate for a temperature range of 15-25°C (68°-779). For average operating temperatures kelow this range (colder than) the maximum voltage set point should be compensated with an increase at a rate of 0.063 Volts Fer Cell (0.25 Volts for a 8 v hattery) for every 10°C (18° F.) For average operating temperatures above this range (varmer than) the maximum voltage set point should be compensated with a decrease at a rate of 0.063 Volts Fer Cell (0.25 Volts for a 8 v battery) <b>Example:</b> at 93° Fan 94 volt set point Corrected Voltage = 9.4 · ((05-77)/18) x (0.25)) = 9.15 volts	7.65v	8.04v	8.16v	8.25v	8.45	mput. Excessive rupple can cause battery heating and gasing reasting in reduced life. Ripple current excursions during the float charging phase should not exceed 5 Amps for every 100 AH of nominal capacity (Example: 4 amps for 80 AH battery) Ripple voltage excursions during float should not exceed +-5 % of the float voltage. (Example: 4 - 0.46 volts at 9.2 volts) Operating Temperature: The recommend operating	Storage: For open circuit storage it is recommended that the battery be stored indoors in a clean, dry location. Never store (or operate) in an aritipit encloaure. Keep away from direct heat sources. Storage temperature should be between OPT- 777 (107C-2527). Datarctics should be determined to the storage of the storage of the storage storage. Batterise should be fully charged prior to storage Batterise should be bone charged every 6 months or when the battery voltage reaches 8.16 volts. Storage at elevated temperatures will reade it and in the storage of the discharge. A general rule of thumb is that for every 18°F discharge. A general rule of thumb is that for every 18°F excessive sufficient and can be detrimential to battery performance and life.

#### Helpful explanations

Calcium and Antimony notations refer to metal alloy additives used in battery grids. These alloys have small effects on the charge voltages.
 Bukk charging is the registive metal and and aggressive re-charge method. It is typically only used in applications that need rapid recovery for deeply discharged batteries. Battery cooling may be required.
 Bubspritor charge is an aggressive method where current is allowed to diminish as the battery is charged at a lower voltage to diminish as the battery is charged at a lower voltage to diminish as the battery is charged at a lower voltage to down's the other provides of the battery list charge that provides the lower of the battery is charged at a lower voltage to down's top diff a diptify discharged battery were were proportioned to hold charge without damaging battery list.
 Tricke charge is a dage where the battery is charged at a lower voltage to down's top diff a diptify discharged battery were were proportioned to hold charge without damaging battery list.
 Tricke charge is a dage where the battery is charged at a lower could be taken as reflective of technology listed, but attery were were proportant to hold charge without damaging battery list.
 The discharge to Equitable taken were man 20 hour capacity as measured in amp-hours (Ah). Similarly, lay refers to the current discharge rate for O hour capacity. Brow request has measured in ang-hours (Ah). Similarly, lay refers to the current discharge rate for O hour capacity. Brow request has measured in ang-hour (Ah). Similarly, lay refers to the current discharge rate for O hour capacity. Brow request has measured in ang-hours (Ah). Similarly, lay refers to the current discharge rate for O hour capacity as measured in ang-hours (Ah). Similarly, lay refers to the current discharge rate for O hour capacity as measured in ang-hours (Ah). Similarly, lay refers to the current discharge rate for O hour capacity as measured in ang-hours (Ah). Simila

8) To estimate C20 capacity for 8 volt GC batteries - multiply RC minutes at 56 amps times 1.35 = C20 capacity. For example, RC minutes at 56 amps is rated at 110 minutes. The C20 estimate is 110 times 1.35 = 149 Ahr.

# For 16 volt systems that are comprised of two (2) 8 volt batteries connected in series that are charged with 16 volt chargers (with no parallel battery connections) 1) All charging voltages double (due to series connected) as listed in the above table. 2) All charging voltages double (due to series connection) as listed in the above (due to the series connection.) 3) All charging times remain identical to 8 volt numbers as listed above (due to the series connection.)

# For 24 volt systems that are comprised of four (3) 8 volt batteries connected in series that are charged with 24 volt chargers (with no parallel battery connections) 1) All charging voltages increase X 3 (due to series connection) as listed in the above table. 2) All charging unrents remain identical to 8 volt numbers as listed above (due to the series connection.) 3) All charging times remain identical to 8 volt numbers as listed above (due to the series connection.)

#### For 8 volt battery strings using two batteries in parallel connection (positive to positive and negative to negative)

and we construct in parameter contraction (bosine's cooperative and measure or measure). I) All changing ourients double as listed above in order to charge in same amount of time as listed in above table. 3) All changing times double as listed above in order to charge in same amount of time as listed in above table.

### Note: This information applies ONLY to 6 volt single lead acid batteries of the types listed. WARNING: Data is not necessarily valid for conditions where multiple 6 volt batteries are connected in strings (series or parallel)

### See notes below the data table for battery strings.

## or before this SOC before battery use.

Lead Acid Battery Types	Bulk Charging (Constant Current) 6 volt Battery	Absorption Charging (Constant Voltage) 6 volt Battery	Float Charging (Constant Voltage) 6 volt Battery	Trickle Charging (charge maintenance during extended storage)	Temperature Compensation	Open Circuit Voltage (OCV) @ 10% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 50% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 60% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 70% State of Charge (SOC)	Open Circuit Voltage (OCV) @ 90% State of Charge (SOC)	Special notes	Other Guidelines
Flooded/Wet Golf Cart, Deep Cycle & Marine (Antimony) Exide Golf Cart Exide Floor Scrubber	constant current rate of no more than 10 times I <sub>20</sub> to a voltage of 7.35V (example; For C20=100Ahr, the max charge	Charge with 7.35V - 7.45V lmit for 12 to 24 hrs or when current drops below 1% of the C20 rating (example; C20=100Ahr, the ow current shut off is 1%x 100 or 1A).	6.6v - 6.7v	Charge voltage on point - 6.2v Charge voltage off point - 6.6v Limit current to 0.4 times t <sub>bo</sub>	Charging Temperature Compensation: All the listed charging voltages are appropriate for a temperature rarge of 15-25°C (68°-77)°F. For average operating temperatures below this range (colder than) the aminum voltages et point should be compensated with an increase at a rate 0.063 Volts Pee Cell (0.19 Volts for a 6 v hattery) for every 10°C (18°F.) For average operating temperatures above this range (warmer than) the maximum voltage set point should be compensated with a decrease at a rate of 0.063 Volts Pee Cell (0.19 Volts for a 6 v battery) for every 10°C (18°F.) Fample: at 95°F and 7.1 volt set point Corrected Voltage = 7.1 - (((95-77)/18) x (0.19)) = 6.91 volts	5.75v	6.04v	6.13v	6.20v	6.33	temperature of at least 60°F (15°C) for most efficient charging and below 85°F (20°C) to limit over heating effects. AC Ripple Charge Limitations: Some DC chargers will have what is referred to as an AC ripple wave-form to the charging input. Excessive ripple can cause battery heating and gassing resulting in reduced life. Ripple current excursions during the foat charging phase should not exceed 5 Amps for every 100 AH of hourinal capacity (Examplet 4 amps for 80 AH battery) Ripple voltage excursions during float should not exceed +5 % of the float voltage. (Examplet 4 amps for 80 AH battery) Ripple to the excursions during float should not exceed +5 % of the float voltage. (Examplet 4 amps for 80 AH battery) Operating Temperature: The recommend operating temperature rais is 10°C - 30° (CDF-86°F) for optimal operation. Lower temperatures will limit capacity output. Higher temperatures may reduce life. Mattimum operating temperature is	be fully charged prior to storage. Batteries should be boost charged every 6 months or when the battery voltage reaches 6.13 volts. Storage at elevated temperatures will result in accelerated rates of self discharge. A general rule of thum is that for every 18°F (10°) above 77°F (25°C) the time before boost charging will be haved. Storage without proper charge

#### Helpful explanations

1) Calcium and Antimony notations refer to metal alloy additives used in battery grids. These alloys have small effects on the charge voltages.

2) Bulk charging is the rapid and most aggressive re-charge method. It is typically only used in applications that need rapid recovery for deeply discharged batteries. Battery cooling may be required. 3) Absorption charge is an aggressive method where current is allowed to diminish as the battery naturally comes to full charge. It can be used for deeply discharged batteries. Battery cooling may be required.

Float charge is a stage where the battery is charged at a low er voltage to slow ly 'top off' a slightly discharged battery.
 Trickle charging is used to maintain charge during a long storage period. Charge voltage on/off points are very important to hold charge w ithout damaging battery life.

6) State of Charge (SOC) is a highly variable number. Data should be taken as reflective of technology listed, but actual performance may be plus/minus 0.10 volts. 7) The reference to C<sub>so</sub> in the table above means 20 hour capacity as measured in amp-hours (Ahr). Similarly, I<sub>so</sub> refers to the current discharge rate for 20 hour capacity. For example, a C<sub>so</sub> of 100 Ahr would have an I<sub>so</sub> of 5 amps (5 amps times 20 hours = 100 Ahr)

8) To estimate C<sub>20</sub> capacity for 6 volt GC batteries - multiply RC minutes at 75 amps times 1.68 = C<sub>20</sub> capacity. For example, RC minutes at 75 amps is rated at 110 minutes. The C<sub>20</sub> estimate is 110 times 1.68 = 185 Ahr.

## For 12 volt systems that are comprised of two (2) 6 volt batteries connected in series that are charged with 12 volt chargers (with no parallel battery connections) 1) All charging voltages double (due to series connection) as listed in the above table.

- All charging times remain identical to 6 volt numbers as listed above (due to the series connection.)
   All charging times remain identical to 6 volt numbers as listed above (due to the series connection.)

## For 24 volt systems that are comprised of four (4) 6 volt batteries connected in series that are charged with 24 volt chargers (with no parallel battery connections). 1) Al charging voltages increase X 4 (due to series connection) as Isted in the above table. 2) Al charging currents remain identical to 6 volt numbers as Isted above (due to the series connection.)

All charging times remain identical to 6 volt numbers as listed above (due to the series connection.)

# For 6 volt battery strings using two batteries in parallel connection (positive to positive and negative to negative) 1) Al charging voltages remain the same as listed in above table. 2) Al charging currents double as listed above in order to charge in same amount of time as listed in above table. 3) Al charging immes double as listed above in order to charge in same amount of time as listed in above table.