

## **Carefree® Sealed Lead Acid (SLA)**

### [MSDS](#)

EaglePicher's Carefree® lead acid batteries are sealed and do not require maintenance during long periods of operation. If you do not find what you are looking for or would like more information, please contact us.

**Click on Part Number to view data sheet.**

Carefree® Sealed Lead Acid (SLA) Batteries							
Nominal Voltage	Nominal AH @ 77°F	Length (in)	Width (in)	Height w/o Terminals (in)	Height w/ Terminals (in)	Weight (lb)	Part Number
12.00	1.30	3.82	1.69	2.05	2.26	1.25	<a href="#">CF-12V1.3</a>
12.00	2.00	7.01	1.38	2.40	2.64	1.82	<a href="#">CF-12V2</a>
12.00	3.00	5.28	2.64	2.40	2.64	2.43	<a href="#">CF-12V3</a>
12.00	4.50	3.54	2.76	3.98	4.21	3.75	<a href="#">CF-12V4.5</a>
12.00	7.20	5.94	2.56	3.74	3.98	5.84	<a href="#">CF-12V7.2</a>
12.00	12.00	5.95	3.86	3.74	3.97	8.85	<a href="#">CF-12V12</a>
12.00	14.00	8.50	2.80	5.51	5.51	10.60	<a href="#">CF-12V14L</a>
12.00	17.00	7.12	3.03	6.57	6.57	13.20	<a href="#">CF-12V17</a>
12.00	18.00	7.12	3.03	6.57	6.57	13.80	<a href="#">CF12V18</a>
12.00	25.00	6.50	4.90	6.90	7.20	17.30	<a href="#">CF-12V25</a>
12.00	26.00	6.50	6.90	4.90	4.90	19.20	<a href="#">CF-12V26</a>
12.00	29.00	6.51	4.91	7.39	7.39	21.20	<a href="#">CF-12V29FR-S9</a>

**Material Safety Data Sheet**

May be used to comply with  
OSHA's Hazard Communication Standard.  
29 CFR 1910.1200 Standard must be  
consulted for specific requirements.

**U.S. Department of Labor**

Occupational Safety and Health Administration  
(Non-Mandatory Form)  
Form Approved  
OMB No. 12 18-0072

**Identity (As Used on Label and List)****CAREFREE or HE Rechargeable Battery**

**Note:** Blank spaces are not permitted. If any item is not applicable, or  
no information is available, the space must be marked to indicate that

**Section I**

Manufacturer's Name	Emergency Telephone Number
Eagle-Picher Industries, Inc.	417-659-9635 800-424-9300 (CHEMTREC)
Address (Number, Street, City State, and Zip Code)	Telephone Number for Information
P.O. Box 130	417-659-9635
14212 Bethel Road	Date Prepared
Seneca, MO 64865	12 Sept. 02
	Signature of Preparer (optional)

**Section II - Hazardous Ingredients/Identity Information**

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Lead CAS #7439-92-1	0.050 mg/m <sup>3</sup>	0.15 mg/m <sup>3</sup>		50%
Lead Oxides CAS #1314-41-6 - 1317-36-8	0.050 mg/m <sup>3</sup>	0.15 mg/m <sup>3</sup>		25%
38% Sulfuric Acid, 1.28 s.g. CAS #7664-93-9	1.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>		18%

GROUND SHIPMENTS: NOT REGULATED PER 49 CFR 173.159 (d)

AIR SHIPMENTS: Not Regulated Per IATA, Special Provisions 4.4, A67

OCEAN SHIPMENTS: Not Regulated

THIS PRODUCT IS AN ARTICLE UNDER OSHA

**Section III - Physical/Chemical Characteristics**

Boiling Point	N/A	Specific Gravity (H <sub>2</sub> O=1)	N/A
Vapor Pressure (mm Hg.)	N/A	Melting Point	N/A
Vapor Density (Air=1)	N/A	Evaporation Rate (Butyl Acetate=1)	N/A

Solubility in Water

N/A

Appearance in Odor

N/A

**Section IV - Fire and Explosion Hazard Data**

Flash Point (Method Used)	Flammable Limits	LEL	UEL
Direct Flame to Battery Case	UL-94HB, 94V-O on FR UNITS	N/A	N/A

Extinguishing Media

Water, Foam, Dry

Special Fire Fighting Procedures

N/A

Unusual Fire and Explosion Hazards

Keep lighted cigarettes, sparks and flames away. Explosion can result from improper charging and  
ignition of charging gases. Explosion can result if charged in gas tight enclosures.

(Reproduce Locally)

OSHA 174, Sept. 1985

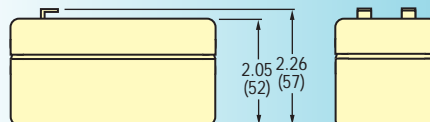
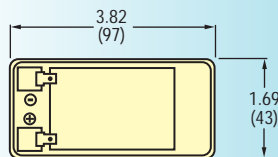
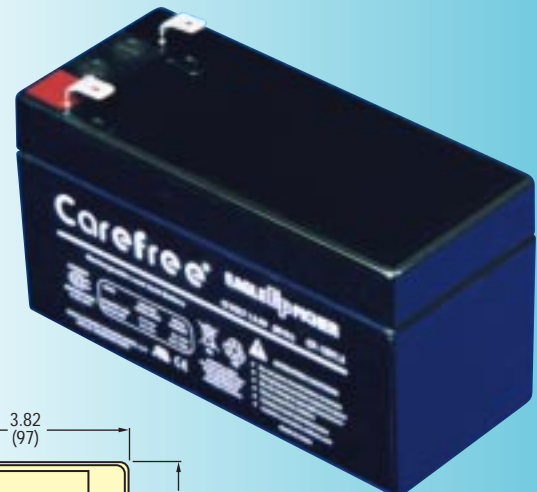
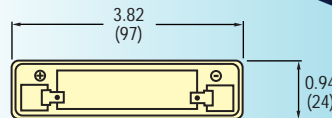
Section V - Reactivity Data			
Stability	Unstable		Conditions to Avoid
	Stable	XX	
Incompatibility (Materials to Avoid)			
Solvents may dissolve battery case material.			
Hazardous Decomposition or Byproducts			
Severe overcharge and overheating may cause sulfur oxide fumes.			
Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	XX	
Section VI - Health Hazard Data			
Routes(s) of Entry	Inhalation?	Skin?	Ingestion?
Eyes	Yes	Yes	Yes
Health Hazards (Acute and Chronic)			
Severe burns and eye damage from sulfuric acid electrolyte.			
Illness from sulfur oxide fumes			
Contains lead which is known to cause birth defects or other reproductive harm.			
Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
NA	No	No	No
Signs and Symptoms of Exposure			
Irritation and Acid Burns			
Pungent odor and respiratory irritation			
Medical Conditions			
Generally Aggravated by Exposure			
N/A			
Emergency and First Aid Procedures			
For sulfur oxide fumes, disconnect batteries, evacuate and ventilate.			
External, flush areas contaminated by sulfuric acid electrolyte with water.			
Internal, drink large quantities of water or milk, followed by milk of magnesia, beaten eggs, or vegetable oil			
Section VII - Precautions for Safe Handling and Use			
Steps to Be Taken in Case Material is Released or Spilled			
Avoid contact with sulfuric acid electrolyte from battery. Flush with water.			
Neutralize with solution of baking soda in water.			
Waste Disposal Method			
Unlawful to dispose in landfill. Do not incinerate, puncture, disassemble or mutilate			
Dispose with automotive battery scrap in accordance with local and federal regulations.			
Precautions to be taken in Handling and Storing			
Batteries with released electrolyte shall be sealed in polyethylene bags.			
Keep batteries away from children			
Other Precautions			
Do not crack battery cases. Do not overcharge. Do not short circuit battery terminals.			
Keep lighted cigarettes, sparks and flames away from charging batteries.			
Section VIII - Control Measures			
Respiratory Protection ( <i>Specific Type</i> )			
N/A			
Ventilation	Local Exhaust	Specific	
	Mechanical ( <i>General</i> )	Other Natural convection	
Protective Gloves		Eye Protection	
Use rubber gloves if case is cracked		Recommended	
Other Protective Clothing or Equipment			
N/A			
Work/Hygienic Practices			
N/A			

#### Specifications CF-6V1.3

Nominal Voltage .....	6V
Nominal Capacity at 77°F (25°C) Voltage readings are per cell	
20 Hour Rate (0.065 amps to 1.75 volts) .....	1.3 ampere hours
10 Hour Rate (0.12 amps to 1.75 volts) .....	1.2 ampere hours
5 Hour Rate (0.19 amps to 1.75 volts) .....	0.95 ampere hours
1 Hour Rate (0.82 amps to 1.60 volts) .....	0.82 ampere hours
1/2 Hour Rate (1.5 amps to 1.60 volts) .....	0.75 ampere hours
Max. Physical Size	
Length.....	3.82 inches (97mm)
Width .....	0.94 inches (24mm)
Height (excluding terminals) .....	2.05 inches (52mm)
Height (including terminals).....	2.28 inches (58mm)
Weight .....	0.68 lbs (0.31kg)
Energy Density	
(20 Hour Rate) .....	1.06 watt hrs/cu in
(20 Hour Rate) .....	11.47 watt hrs/lbs
Operating Temperature Range	
Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)
Recharging Methods:	
Float Charging: Constant Potential Source of 6.8 to 6.9 volts continuously.	
Routine Charging: Constant Potential Source of 7.25 to 7.45 volts with a charging current of 0.48 ampere maximum.	
Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.	
Case Material: ABS	

#### Specifications CF-12V1.3

Nominal Voltage.....	12.0V
Nominal Capacity at 77°F (25°C) Voltage readings are per cell	
20 Hour Rate (0.065 amps to 1.75 volts) .....	1.3 ampere hours
10 Hour Rate (0.12 amps to 1.75 volts) .....	1.2 ampere hours
5 Hour Rate (0.22 amps to 1.60 volts) .....	1.1 ampere hours
1 Hour Rate (0.75 amps to 1.60 volts) .....	0.75 ampere hours
1/2 Hour Rate (1.37 amps to 1.60 volts).....	0.685 ampere hours
Max. Physical Size:	
Length.....	3.82 inches (97mm)
Width .....	1.69 inches (43mm)
Height (excluding terminals) .....	2.05 inches (52mm)
Height (including terminals).....	2.26 inches (57mm)
Weight .....	1.25 lbs (0.57kg)
Energy Density	
(20 Hour Rate) .....	1.07 watt hrs/cu in
(20 Hour Rate) .....	12.48 watt hrs/lbs
Operating Temperature Range:	
Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)
Recharging Methods:	
Float Charging: Constant Potential Source of 13.5 to 13.8 volts continuously.	
Routine Charging: Constant Potential Source of 14.4 to 15.0 volts with a charging current of 0.43 ampere maximum.	
Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.	
Case Material: ABS	
Above data are average values which can be obtained within 3 charge/discharge cycles. These are not minimum values.	



### Maintenance-Free Rechargeable Batteries

#### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

#### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

#### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

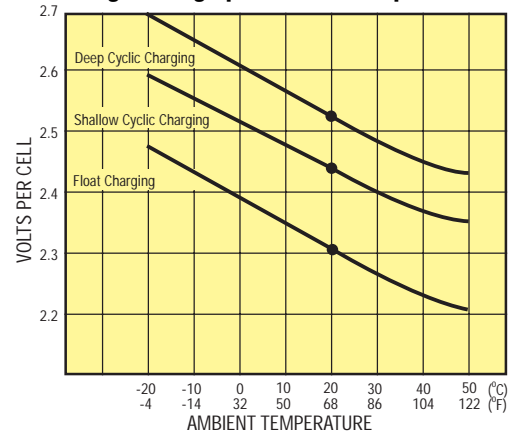
#### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

#### Installation Care

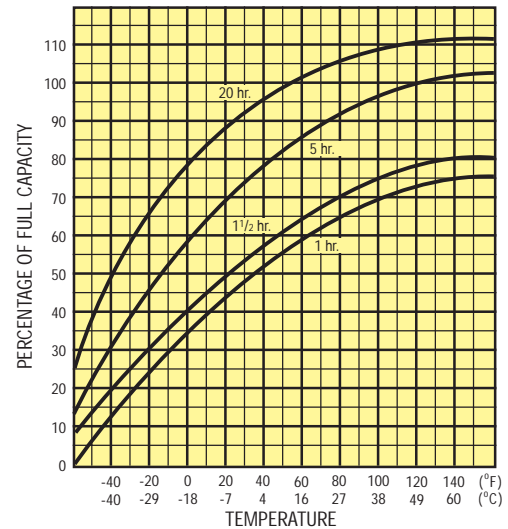
All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

Charge Voltage per Cell vs. Temperature



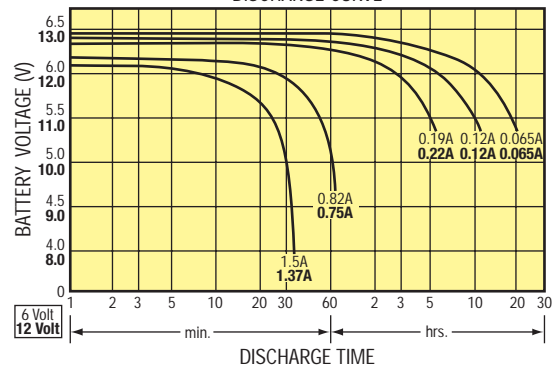
Capacity as Affected by Temperature

@ VARIOUS RATES OF DISCHARGE

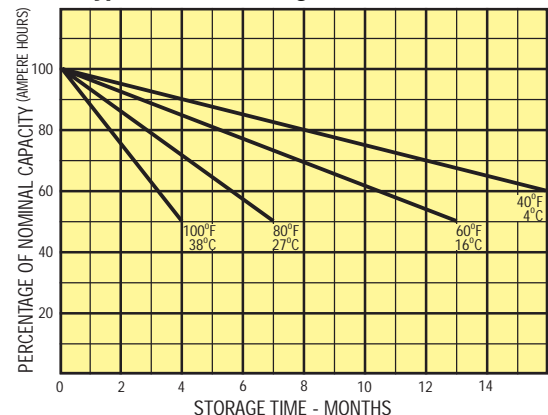


Typical Voltage Characteristic (70°F)

DISCHARGE CURVE



Typical Self-Discharge Characteristics



**Maintenance-Free Rechargeable Batteries****Specifications CF-12V2**

Nominal Voltage ..... 12.00V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(0.10 amps to 1.75 volts)..... 2.00 ampere hours

10 Hour Rate

(0.18 amps to 1.75 volts)..... 1.80 ampere hours

5 Hour Rate

(0.30 amps to 1.75 volts)..... 1.50 ampere hours

1 Hour Rate

(1.30 amps to 1.60 volts)..... 1.30 ampere hours

1/2 Hour Rate

(2.10 amps to 1.60 volts)..... 1.05 ampere hours

Max. Physical Size:

Length ..... 7.01 inches (178mm)

Width ..... 1.38 inches (35mm)

Height (excluding terminals) ..... 2.40 inches (61mm)

Height (including terminals) ..... 2.64 inches (67mm)

Weight: ..... 2.18 lbs (.99kg)

Energy Density

(20 Hour Rate) ..... 1.04 watt hrs/cu in

(20 Hour Rate)..... 13.19 watt hrs/lbs

Operating Temperature Range:

Discharge..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

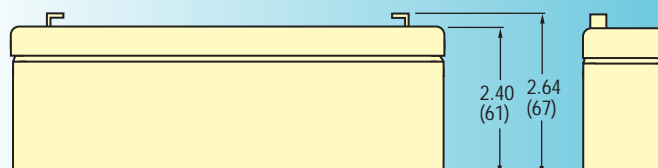
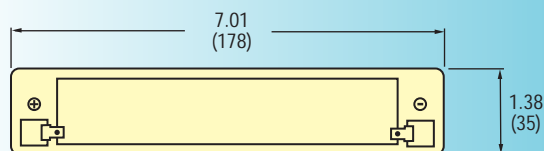
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 0.8 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS





## Maintenance-Free Rechargeable Batteries

### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

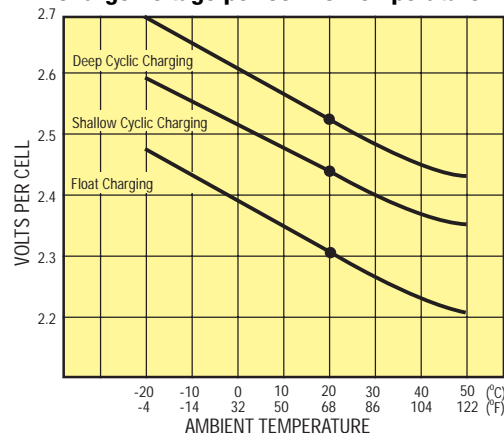
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

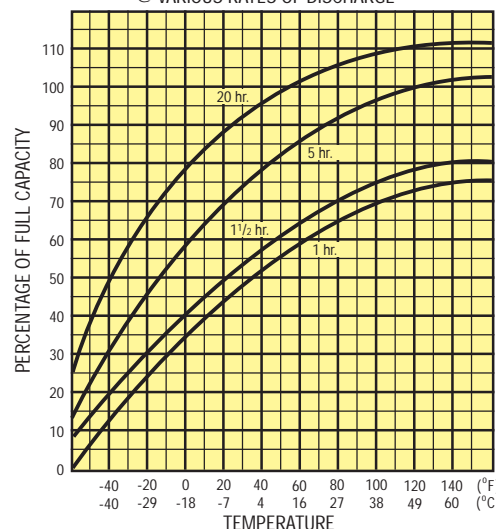
### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

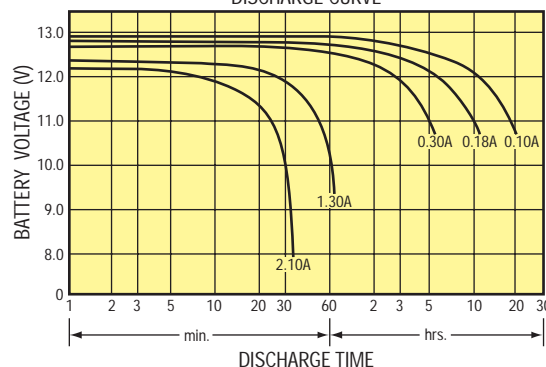
### Charge Voltage per Cell vs. Temperature



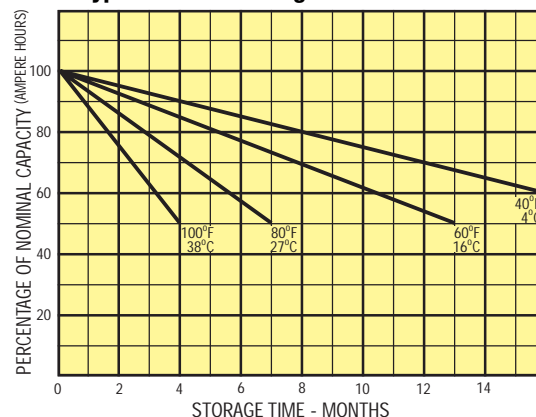
### Capacity as Affected by Temperature @ VARIOUS RATES OF DISCHARGE



### Typical Voltage Characteristic (70°F) DISCHARGE CURVE



### Typical Self-Discharge Characteristics



**Maintenance-Free Rechargeable Batteries****Specifications CF-12V3**

Nominal Voltage ..... 12.00V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(0.16 amps to 1.75 volts)..... 3.20 ampere hours

10 Hour Rate

(0.3 amps to 1.75 volts)..... 3.00 ampere hours

5 Hour Rate

(0.51 amps to 1.75 volts)..... 2.55 ampere hours

1 Hour Rate

(2.17 amps to 1.60 volts)..... 2.17 ampere hours

1/2 Hour Rate

(3.15 amps to 1.60 volts)..... 1.58 ampere hours

Max. Physical Size:

Length .....5.28 inches (134mm)

Width ..... 2.64 inches (67mm)

Height (excluding terminals)..... 2.40 inches (61mm)

Height (including terminals) ..... 2.64 inches (67mm)

Weight ..... 3.08 lbs (1.4kg)

Energy Density

(20 Hour Rate) ..... 1.09 watt hrs/cu in

(20 Hour Rate)..... 14.81 watt hrs/lbs

Operating Temperature Range:

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

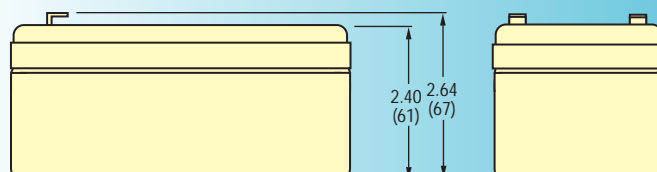
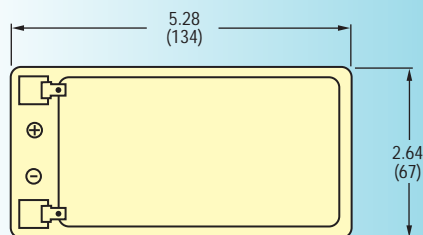
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 1.28 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS





#### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

#### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

#### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

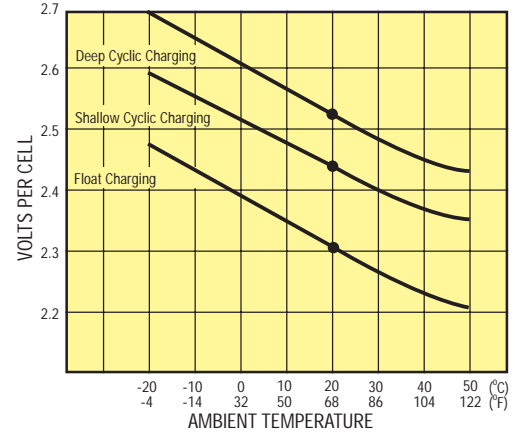
#### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

#### Installation Care

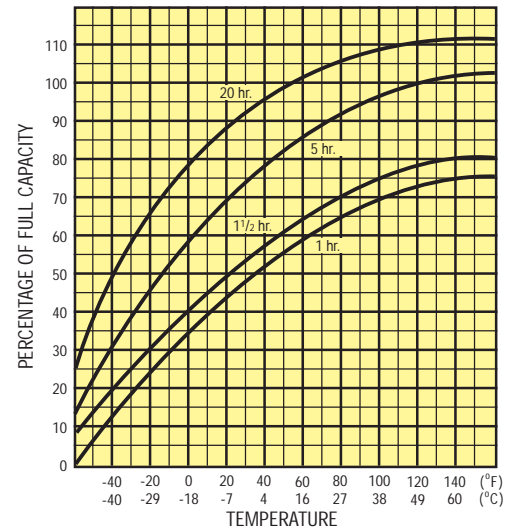
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Charge Voltage per Cell vs. Temperature



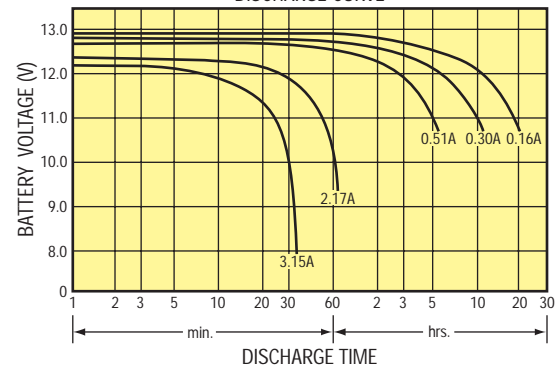
Capacity as Affected by Temperature

@ VARIOUS RATES OF DISCHARGE

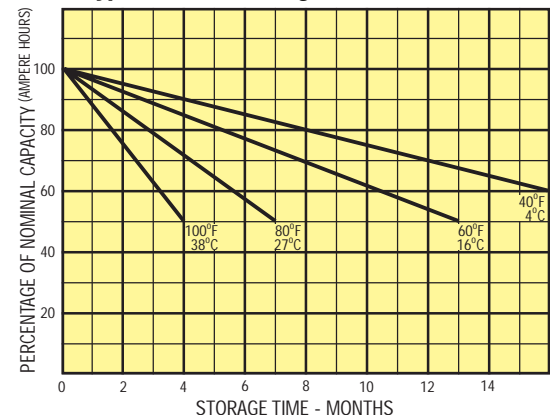


Typical Voltage Characteristic (70°F)

DISCHARGE CURVE



Typical Self-Discharge Characteristics



#### Specifications CF-6V4.5

Nominal Voltage ..... 6V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.225 amps to 1.75 volts) .....	4.5 ampere hours
10 Hour Rate (0.42 amps to 1.75 volts) .....	4.2 ampere hours
5 Hour Rate (0.72 amps to 1.75 volts) .....	3.6 ampere hours
1 Hour Rate (3.06 amps to 1.60 volts) .....	3.06 ampere hours
1/2 Hour Rate (4.73 amps to 1.60 volts) .....	2.37 ampere hours

Max. Physical Size

Length.....	2.76 inches (70mm)
Width .....	1.85 inches (47mm)
Height (excluding terminals) .....	3.98 inches (101mm)
Height (including terminals).....	4.21 inches (107mm)
Weight .....	1.87 lbs (0.85kg)

Energy Density

(20 Hour Rate) .....	1.33 watt hrs/cu in
(20 Hour Rate).....	14.44 watt hrs/lbs

Operating Temperature Range:

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge..... 0°F to +120°F (-18°C to +49°C)

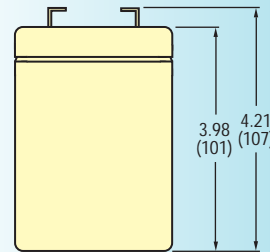
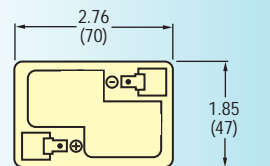
Recharging Methods:

Float Charging: Constant Potential Source of 6.8 to 6.9 volts continuously.

Routine Charging: Constant Potential Source of 7.25 to 7.45 volts with a charging current of 1.6 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS



#### Specifications CF-12V4.5

Nominal Voltage ..... 12V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.225 amps to 1.75 volts) .....	4.5 ampere hours
10 Hour Rate (0.42 amps to 1.75 volts) .....	4.2 ampere hours
5 Hour Rate (0.72 amps to 1.75 volts) .....	3.6 ampere hours
1 Hour Rate (3.06 amps to 1.60 volts) .....	3.06 ampere hours
1/2 Hour Rate (4.73 amps to 1.60 volts) .....	2.37 ampere hours

Max. Physical Size

Length.....	3.54 inches (90mm)
Width .....	2.76 inches (70mm)
Height (excluding terminals) .....	3.98 inches (101mm)
Height (including terminals).....	4.21 inches (107mm)
Weight .....	3.79 lbs (1.72kg)

Energy Density

(20 Hour Rate) .....	1.39 watt hrs/cu in
(20 Hour Rate).....	14.40 watt hrs/lbs

Operating Temperature Range:

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

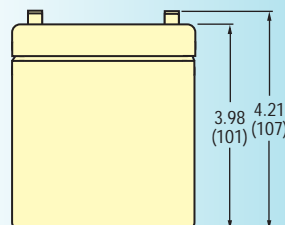
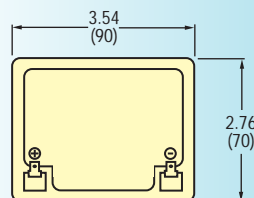
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 1.6 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS



### Maintenance-Free Rechargeable Batteries

#### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

#### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

#### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

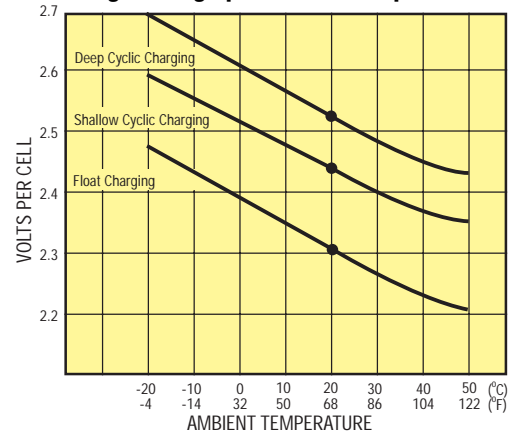
#### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • **MUST BE RECYCLED OR DISPOSED OF PROPERLY**

#### Installation Care

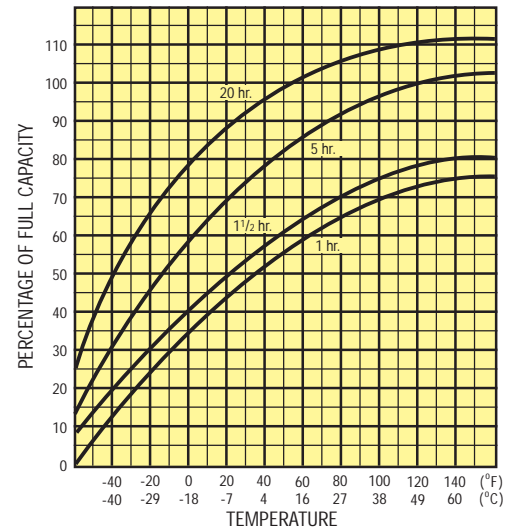
All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

**Charge Voltage per Cell vs. Temperature**



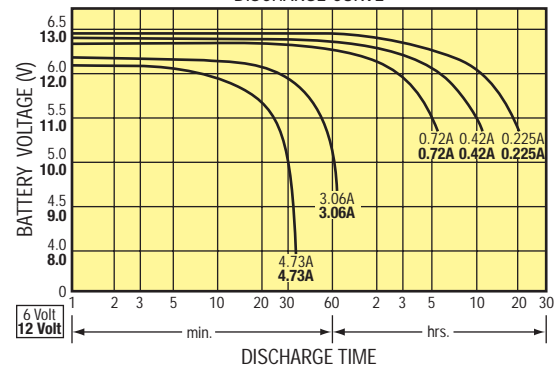
**Capacity as Affected by Temperature**

@ VARIOUS RATES OF DISCHARGE

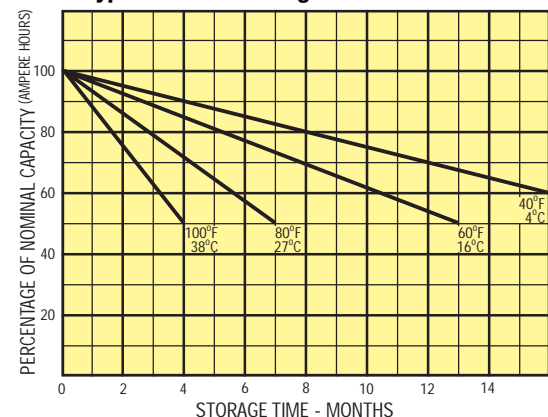


**Typical Voltage Characteristic (70°F)**

DISCHARGE CURVE



**Typical Self-Discharge Characteristics**



### Maintenance-Free Rechargeable Batteries

#### Specifications CF-12V7.2

Nominal Voltage ..... 12.00V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(0.36 amps to 1.75 volts)..... 7.20 ampere hours

10 Hour Rate

(0.67 amps to 1.75 volts)..... 6.70 ampere hours

5 Hour Rate

(1.22 amps to 1.75 volts)..... 6.10 ampere hours

1 Hour Rate

(4.10 amps to 1.60 volts)..... 4.10 ampere hours

1/2 Hour Rate

(7.56 amps to 1.60 volts)..... 3.78 ampere hours

Max. Physical Size:

Length ..... 5.94 inches (151mm)

Width ..... 2.56 inches (65mm)

Height (excluding terminals)..... 3.74 inches (95mm)

Height (including terminals) ..... 3.98 inches (101mm)

Weight ..... 5.86 lbs (2.66 kg)

Energy Density

(20 Hour Rate) ..... 1.54 watt hrs/cu in

(20 Hour Rate)..... 14.79 watt hrs/lbs

Operating Temperature Range

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

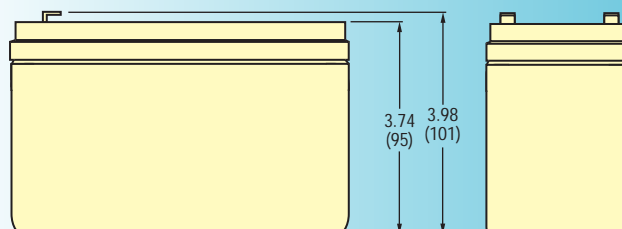
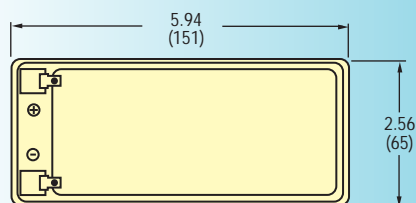
Recharging Methods

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 2.8 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS





### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

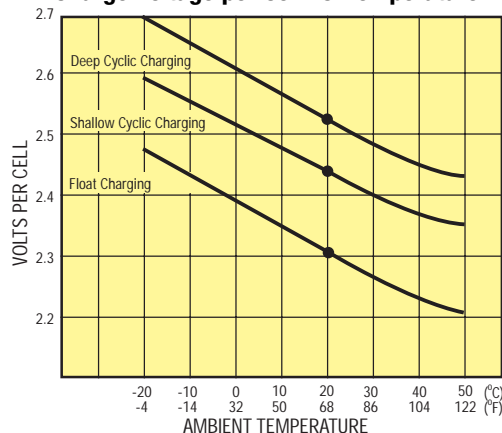
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • **MUST BE RECYCLED OR DISPOSED OF PROPERLY**

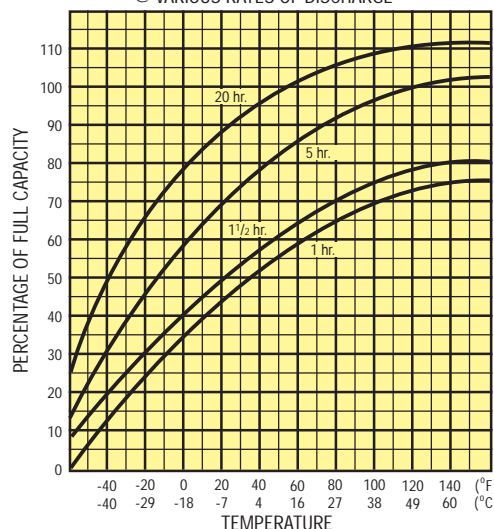
### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

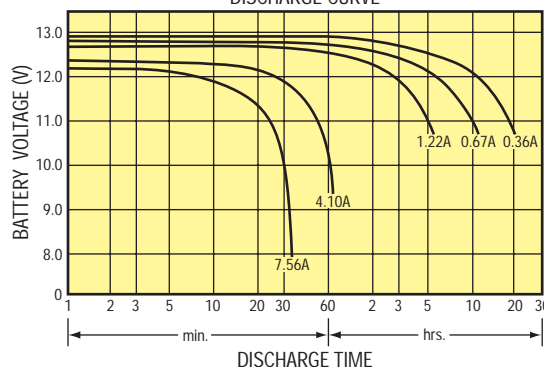
**Charge Voltage per Cell vs. Temperature**



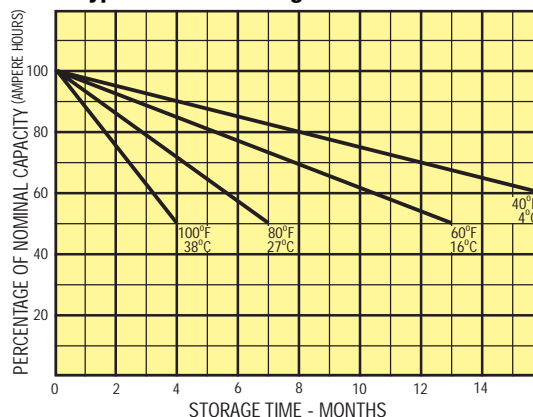
**Capacity as Affected by Temperature**  
@ VARIOUS RATES OF DISCHARGE



**Typical Voltage Characteristic (70°F)**  
DISCHARGE CURVE



**Typical Self-Discharge Characteristics**



#### Specifications CF-6V12

Nominal Voltage..... 6.00V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.60 amps to 1.75 volts) .....	12.00 ampere hours
10 Hour Rate (1.12 amps to 1.75 volts) .....	11.20 ampere hours
5 Hour Rate (1.92 amps to 1.75 volts) .....	9.60 ampere hours
1 Hour Rate (7.75 amps to 1.60 volts) .....	7.75 ampere hours
1/2 Hour Rate (12.6 amps to 1.60 volts).....	6.30 ampere hours

Max. Physical Size

Length.....	5.95 inches (151mm)
Width .....	1.97 inches (50mm)
Height (excluding terminals) .....	3.70 inches (94mm)
Height (including terminals).....	3.94 inches (100mm)
Weight .....	4.63 lbs (2.10kg)

Energy Density

(20 Hour Rate) .....	1.66 watt hrs/cu in
(20 Hour Rate).....	15.55 watt hrs/lbs

Operating Temperature Range

Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)

Recharging Methods:

Float Charging: Constant Potential Source of 6.8 to 6.9 volts continuously.

Routine Charging: Constant Potential Source of 7.25 to 7.45 volts with a charging current of 4.0 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS

#### Specifications CF-12V12

Nominal Voltage ..... 12V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.60 amps to 1.75 volts).....	12 ampere hours
10 Hour Rate (1.12 amps to 1.75 volts) .....	11.2 ampere hours
5 Hour Rate (1.92 amps to 1.75 volts) .....	9.6 ampere hours
1 Hour Rate (7.75 amps to 1.60 volts) .....	7.75 ampere hours
1/2 Hour Rate (12.6 amps to 1.60 volts).....	6.3 ampere hours

Max. Physical Size

Length.....	5.95 inches (151mm)
Width .....	3.86 inches (98mm)
Height (excluding terminals) .....	3.74 inches (95mm)
Height (including terminals).....	3.97 inches (101mm)
Weight .....	9.25 lbs (4.2kg)

Energy Density

(20 Hour Rate) .....	1.70 watt hrs/cu in
(20 Hour Rate).....	16.27 watt hrs/lbs

Operating Temperature Range

Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)

Recharging Methods:

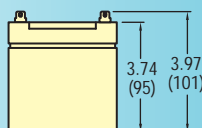
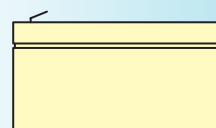
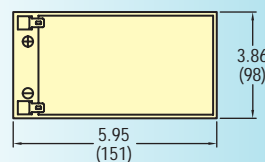
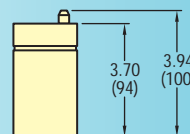
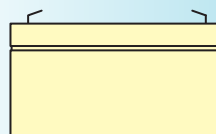
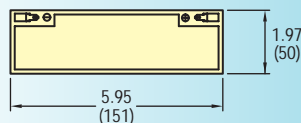
Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 4.0 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.187 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.

Case Material: ABS

Above data are average values which can be obtained within 3 charge/discharge cycles. These are not minimum values.





### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

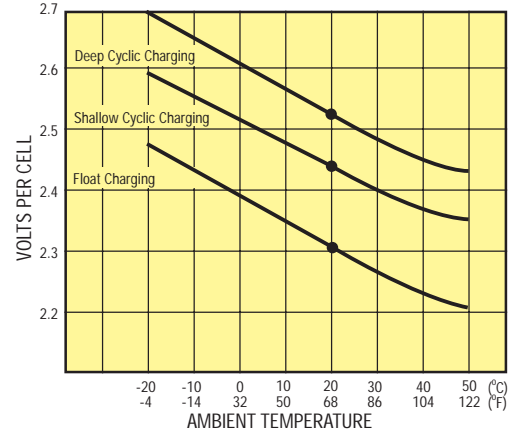
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • **MUST BE RECYCLED OR DISPOSED OF PROPERLY**

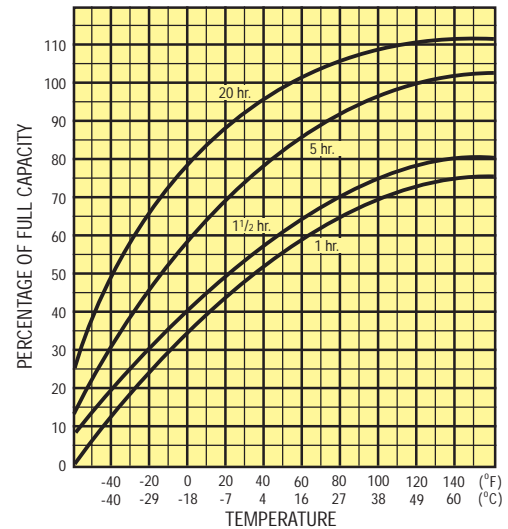
### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

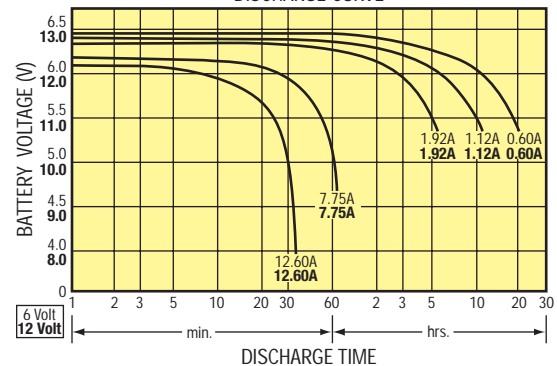
**Charge Voltage per Cell vs. Temperature**



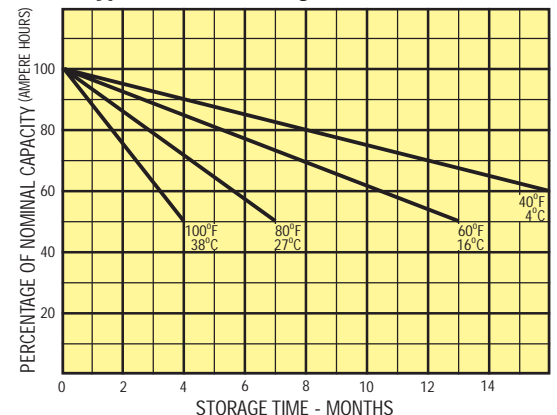
**Capacity as Affected by Temperature**  
@ VARIOUS RATES OF DISCHARGE



**Typical Voltage Characteristic (70°F)**  
DISCHARGE CURVE

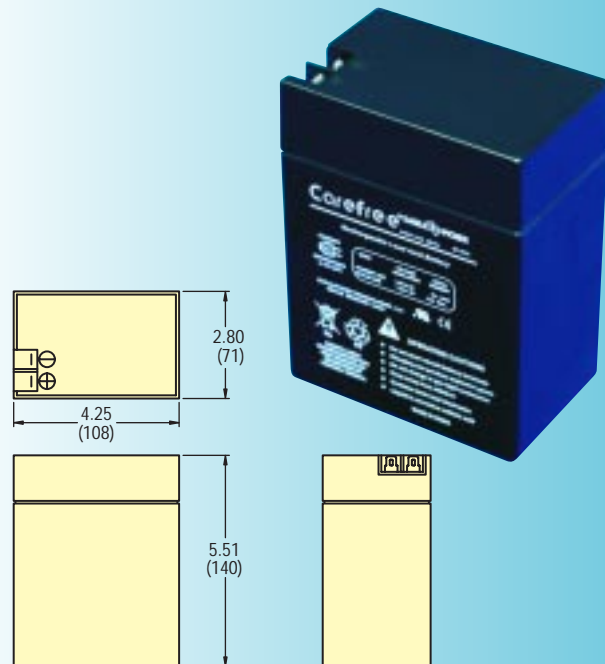


**Typical Self-Discharge Characteristics**



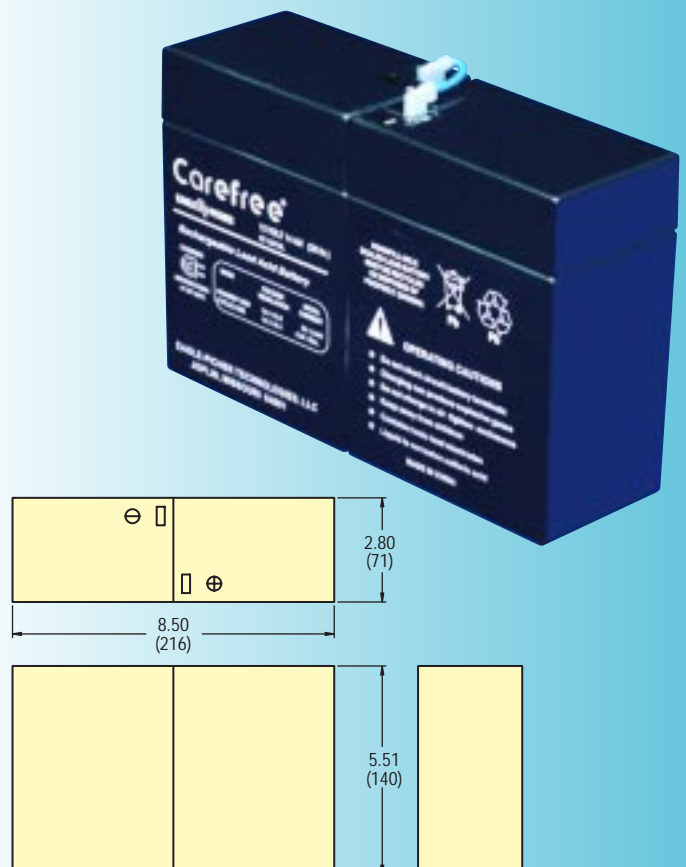
#### Specifications CF-6V14

Nominal Voltage .....	6V
Nominal Capacity at 77°F (25°C) Voltage readings are per cell	
20 Hour Rate (0.70 amps to 1.75 volts).....	14 ampere hours
10 Hour Rate (1.30 amps to 1.75 volts).....	13 ampere hours
5 Hour Rate (2.12 amps to 1.75 volts) .....	10.6 ampere hours
1 Hour Rate (8.56 amps to 1.60 volts) .....	8.56 ampere hours
1/2 Hour Rate (14.70 amps to 1.60 volts).....	7.35 ampere hours
Max. Physical Size	
Length.....	4.25 inches (108mm)
Width .....	2.80 inches (71mm)
Height (excluding terminals) .....	5.51 inches (140mm)
Height (including terminals).....	5.51 inches (140mm)
Weight .....	5.22 lbs (2.37kg)
Energy Density	
(20 Hour Rate) .....	1.37 watt hrs/cu in
(20 Hour Rate).....	16.09 watt hrs/lbs
Operating Temperature Range	
Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)
Recharging Methods:	
Float Charging: Constant Potential Source of 6.8 to 6.9 volts continuously.	
Routine Charging: Constant Potential Source of 7.25 to 7.45 volts with a charging current of 5.6 ampere maximum.	
Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.250 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.	
Case Material: ABS	



#### Specifications 12V14L

Nominal Voltage .....	12V
Nominal Capacity at 77°F (25°C) Voltage readings are per cell	
20 Hour Rate (0.70 amps to 1.75 volts).....	14 ampere hours
10 Hour Rate (1.30 amps to 1.75 volts).....	13 ampere hours
5 Hour Rate (2.12 amps to 1.60 volts) .....	10.6 ampere hours
1 Hour Rate (8.56 amps to 1.60 volts) .....	8.56 ampere hours
1/2 Hour Rate (14.70 amps to 1.60 volts).....	7.35 ampere hours
Max. Physical Size	
Length.....	8.50 inches (216mm)
Width .....	2.80 inches (71mm)
Height (excluding terminals) .....	5.51 inches (140mm)
Height (including terminals).....	5.51 inches (140mm)
Weight .....	10.6 lbs (4.8kg)
Energy Density	
(20 Hour Rate) .....	1.31 watt hrs/cu in
(20 Hour Rate).....	15.85 watt hrs/lbs
Operating Temperature Range:	
Discharge .....	-60°F to +140°F (-51°C to +60°C)
Charge .....	0°F to +120°F (-18°C to +49°C)
Recharging Methods:	
Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.	
Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 4.6 ampere maximum.	
Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.250 wide, negative terminal is 0.030 stock by 0.187 wide, mates with Amp Faston series or equal.	
Case Material: ABS	



### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

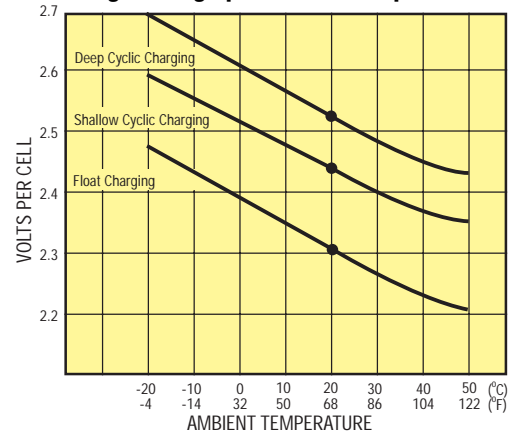
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • **MUST BE RECYCLED OR DISPOSED OF PROPERLY**

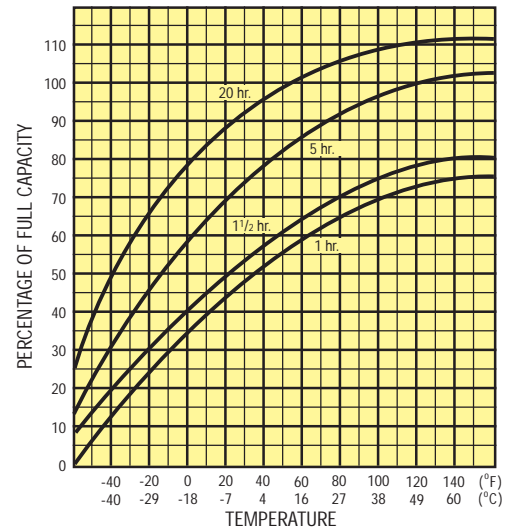
### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

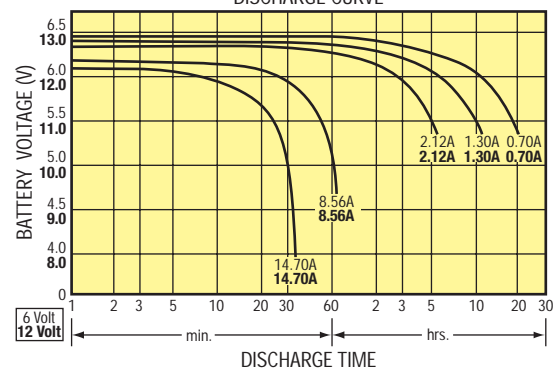
**Charge Voltage per Cell vs. Temperature**



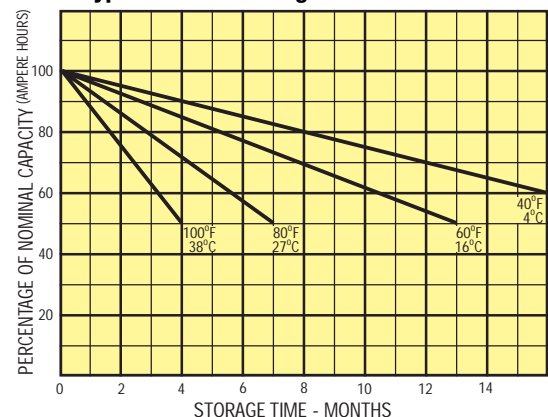
**Capacity as Affected by Temperature**  
@ VARIOUS RATES OF DISCHARGE



**Typical Voltage Characteristic (70°F)**  
DISCHARGE CURVE



**Typical Self-Discharge Characteristics**



**Maintenance-Free Rechargeable Batteries****Specifications CF-12V17**

Nominal Voltage .....12.00V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(0.85 amps to 1.75 volts)..... 17.00 ampere hours

10 Hour Rate

(1.58 amps to 1.75 volts)..... 15.80 ampere hours

5 Hour Rate

(2.72 amps to 1.75 volts)..... 13.60 ampere hours

1 Hour Rate

(11.6 amps to 1.60 volts)..... 11.60 ampere hours

1/2 Hour Rate

(17.85 amps to 1.60 volts)..... 8.93 ampere hours

Max. Physical Size

Length ..... 7.12 inches (181mm)

Width ..... 3.03 inches (77mm)

Height (excluding terminals)..... 6.57 inches (167mm)

Height (including terminals) ..... 6.57 inches (167mm)

Weight ..... 12.55 lbs (5.7kg)

Energy Density

(20 Hour Rate) ..... 1.49 watt hrs/cu in

(20 Hour Rate)..... 15.45 watt hrs/lbs

Operating Temperature Range

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

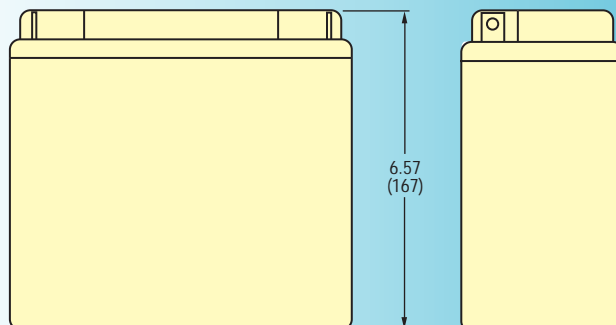
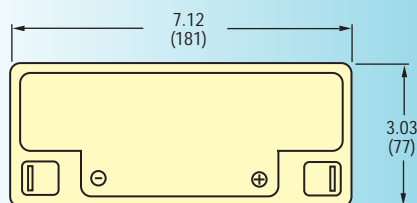
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.6 volts with a charging current of 6.8 ampere maximum.

Terminal: Standard is tin plated brass, bolt and nut.

Case Material: ABS





## Maintenance-Free Rechargeable Batteries

### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

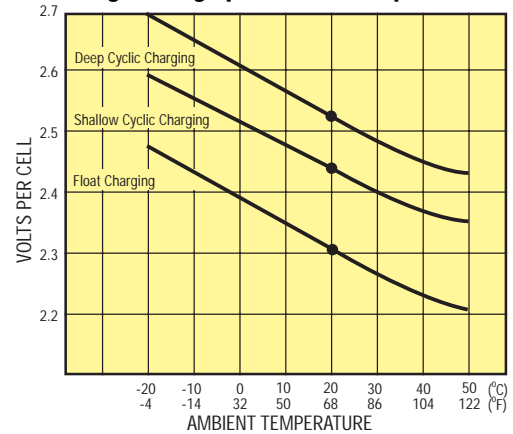
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

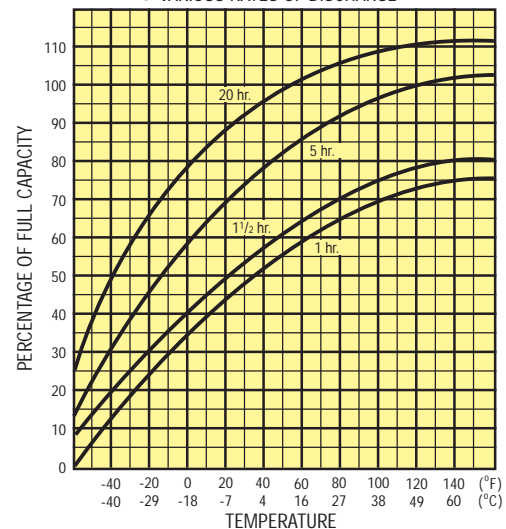
### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

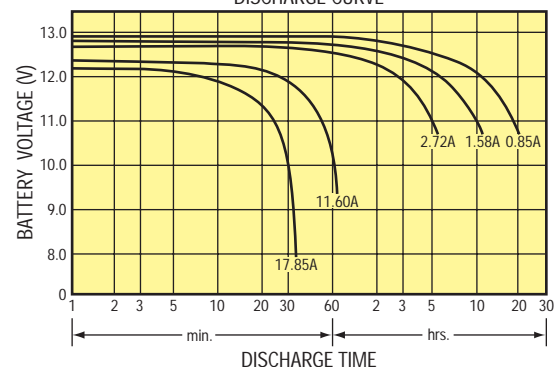
Charge Voltage per Cell vs. Temperature



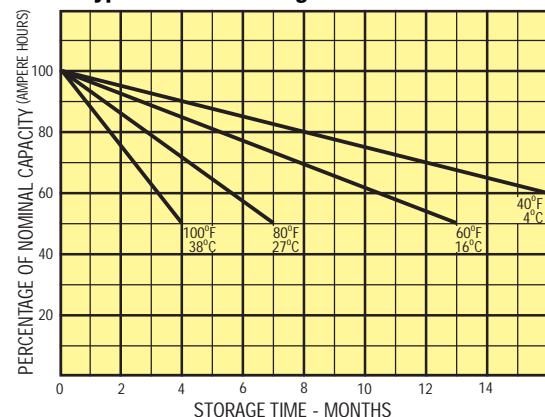
Capacity as Affected by Temperature  
@ VARIOUS RATES OF DISCHARGE



Typical Voltage Characteristic (70°F)  
DISCHARGE CURVE



Typical Self-Discharge Characteristics



#### Specifications CF-6V18

Nominal Voltage ..... 6V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.9 amps to 1.75 volts) ..... 18 ampere hours

10 Hour Rate (1.7 amps to 1.75 volts) ..... 17 ampere hours

5 Hour Rate (3 amps to 1.60 volts) ..... 15 ampere hours

1 Hour Rate (10 amps to 1.60 volts) ..... 10 ampere hours

1/2 Hour Rate (18.7 amps to 1.60 volts) ..... 9.35 ampere hours

Max. Physical Size

Length ..... 3.60 inches (91mm)

Width ..... 3.34 inches (85mm)

Height (excluding terminals) ..... 6.49 inches (165mm)

Height (including terminals) ..... 6.70 inches (170mm)

Weight ..... 6.80 lbs (3kg)

Energy Density

(20 Hour Rate) ..... 1.38 watt hrs/cu in

(20 Hour Rate) ..... 15.88 watt hrs/lbs

Operating Temperature Range:

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

Recharging Methods:

Float Charging: Constant Potential Source of 6.8 to 6.9 volts continuously.

Routine Charging: Constant Potential Source of 7.25 to 7.45 volts with a charging current of 6.0 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.250 wide, negative terminal is 0.030 stock by 0.250 wide, mates with Amp Faston series or equal.

Case Material: ABS

#### Specifications CF-12V18

Nominal Voltage ..... 12V

Nominal Capacity at 77°F (25°C) Voltage readings are per cell

20 Hour Rate (0.9 amps to 1.75 volts) ..... 18 ampere hours

10 Hour Rate (1.6 amps to 1.75 volts) ..... 16 ampere hours

5 Hour Rate (2.72 amps to 1.75 volts) ..... 13.6 ampere hours

1 Hour Rate (11.6 amps to 1.60 volts) ..... 11.6 ampere hours

1/2 Hour Rate (18.5 amps to 1.60 volts) ..... 9.25 ampere hours

Max. Physical Size

Length ..... 7.12 inches (181mm)

Width ..... 3.03 inches (77mm)

Height (excluding terminals) ..... 6.57 inches (167mm)

Height (including terminals) ..... 6.57 inches (167mm)

Weight ..... 12.55 lbs (5.7kg)

Energy Density

(20 Hour Rate) ..... 1.57 watt hrs/cu in

(20 Hour Rate) ..... 15.65 watt hrs/lbs

Operating Temperature Range

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

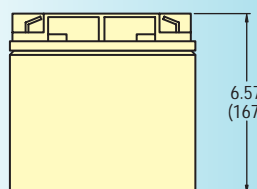
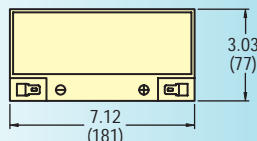
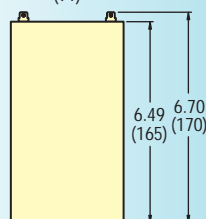
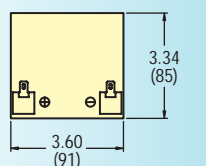
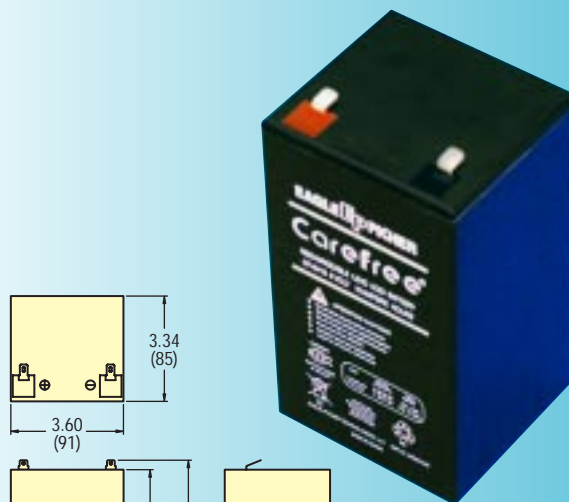
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 6.8 ampere maximum.

Terminal: Standard is tin plated brass, positive terminal is 0.030 stock x 0.250 wide, negative terminal is 0.030 stock by 0.250 wide, mates with Amp Faston series or equal.

Case Material: ABS





**Maintenance-Free Rechargeable Batteries**

**Charging vs Temperature**

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

**Capacity vs Temperature**

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

**Self-Discharge Characteristics**

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

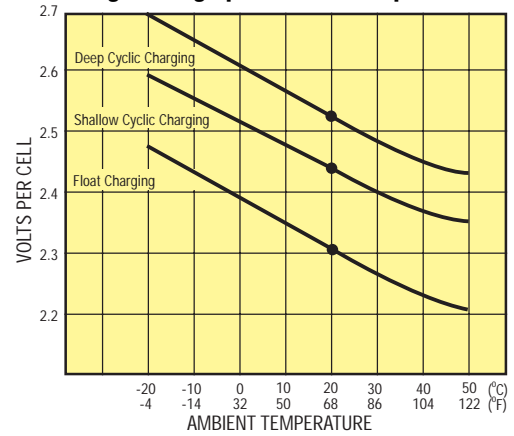
**Battery Operating Conditions & Cautions**

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • **MUST BE RECYCLED OR DISPOSED OF PROPERLY**

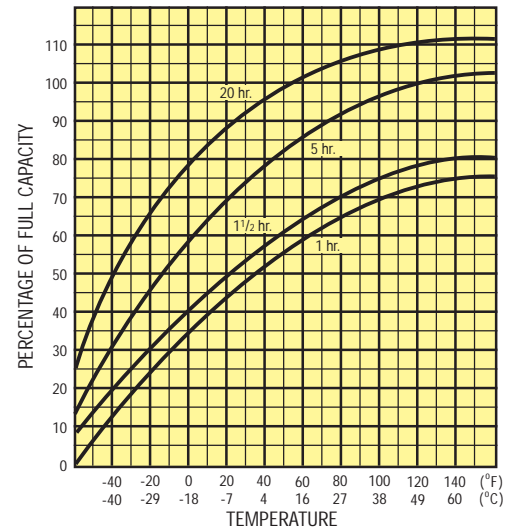
**Installation Care**

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

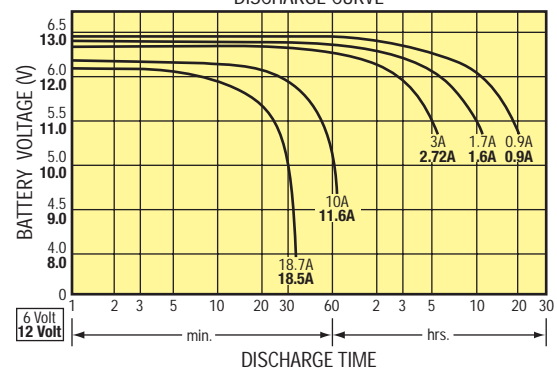
**Charge Voltage per Cell vs. Temperature**



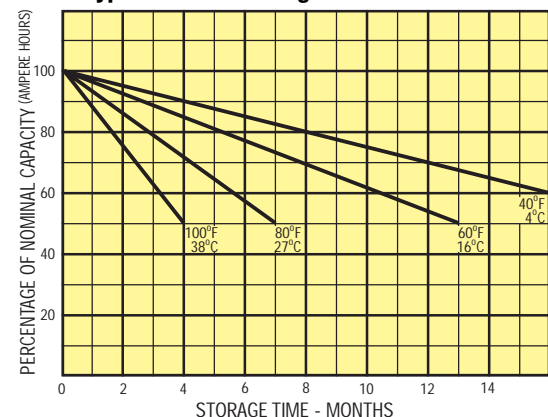
**Capacity as Affected by Temperature**  
@ VARIOUS RATES OF DISCHARGE



**Typical Voltage Characteristic (70°F)**  
DISCHARGE CURVE



**Typical Self-Discharge Characteristics**



### Maintenance-Free Rechargeable Batteries

#### Specifications CF-12V25

Nominal Voltage ..... 12.00V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(1.25 amps to 1.75 volts)..... 25.00 ampere hours

10 Hour Rate

(2.24 amps to 1.75 volts)..... 22.40 ampere hours

5 Hour Rate

(3.84 amps to 1.75 volts)..... 19.20 ampere hours

1 Hour Rate

(15.5 amps to 1.60 volts)..... 15.50 ampere hours

1/2 Hour Rate

(2.56 amps to 1.60 volts)..... 12.80 ampere hours

Max. Physical Size

Length ..... 6.50 inches (165mm)

Width ..... 4.90 inches (125mm)

Height (excluding terminals)..... 6.90 inches (175mm)

Height (including terminals)..... 7.20 inches (182mm)

Weight ..... 18.70 lbs (8.5kg)

Energy Density

(20 Hour Rate) ..... 1.44 watt hrs/cu in

(20 Hour Rate)..... 17.43 watt hrs/lbs

Operating Temperature Range:

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

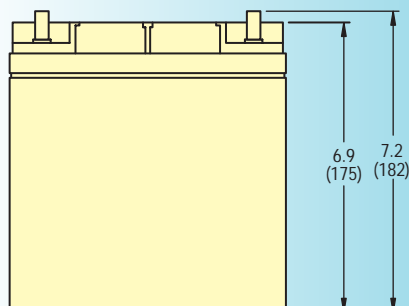
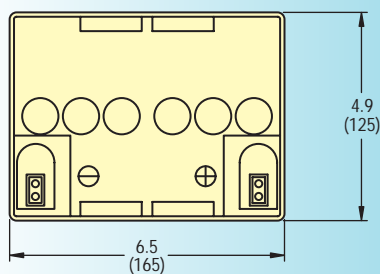
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 9.6 ampere maximum.

Terminal: Standard is threaded insert, bolt and washer

Case Material: ABS



#### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

#### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

#### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

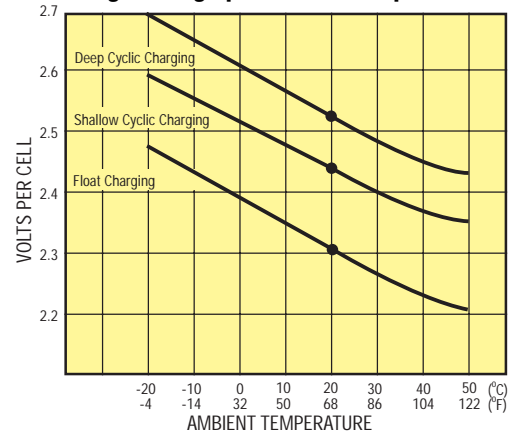
#### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

#### Installation Care

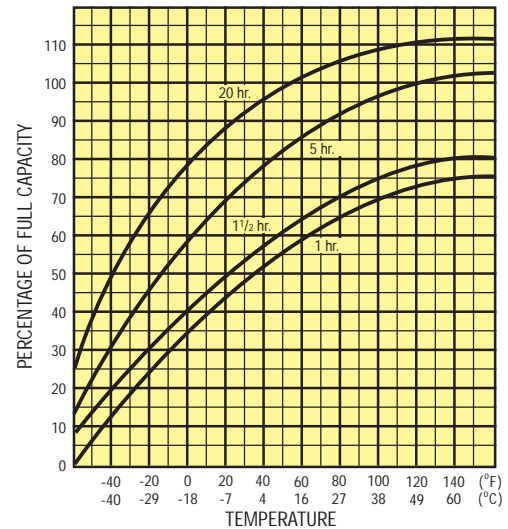
All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

Charge Voltage per Cell vs. Temperature



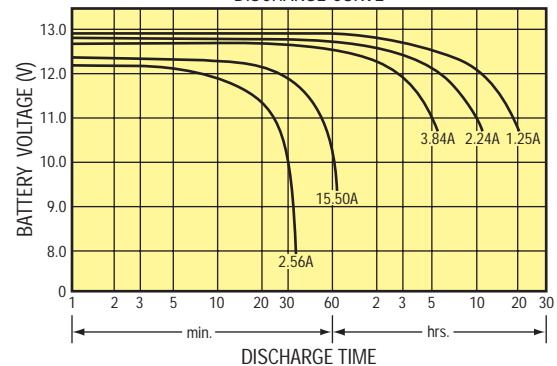
Capacity as Affected by Temperature

@ VARIOUS RATES OF DISCHARGE

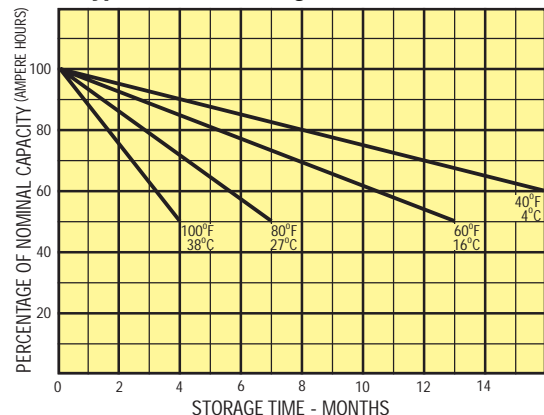


Typical Voltage Characteristic (70°F)

DISCHARGE CURVE



Typical Self-Discharge Characteristics



**Maintenance-Free Rechargeable Batteries****Specifications CF-12V26**

Nominal Voltage ..... 12V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(1.30 amps to 1.75 volts) ..... 26 ampere hours

10 Hour Rate

(2.42 amps to 1.75 volts) ..... 24.2 ampere hours

5 Hour Rate

(4.42 amps to 1.75 volts) ..... 22.1 ampere hours

1 Hour Rate

(15.1 amps to 1.60 volts) ..... 15.1 ampere hours

1/2 Hour Rate

(25 amps to 1.60 volts) ..... 12.5 ampere hours

Max. Physical Size

Length ..... 6.50 inches (166mm)

Width ..... 6.90 inches (175mm)

Height (excluding terminals) ..... 4.90 inches (125mm)

Height (including terminals) ..... 4.90 inches (125mm)

Weight ..... 20.3 lbs (9.2kg)

Energy Density

(20 Hour Rate) ..... 1.42 watt hrs/cu in

(20 Hour Rate) ..... 16.25 watt hrs/lbs

Operating Temperature Range

Discharge ..... -60°F to +140°F (-51°C to +60°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

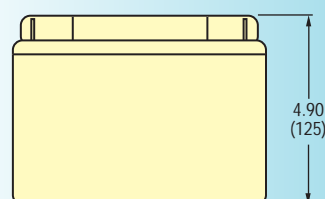
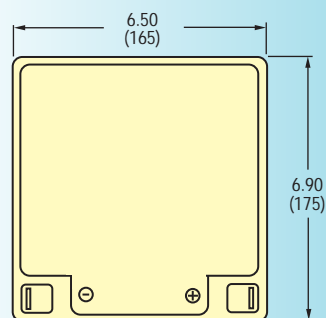
Recharging Methods:

Float Charging: Constant Potential Source of 13.6 to 13.8 volts continuously.

Routine Charging: Constant Potential Source of 14.5 to 14.9 volts with a charging current of 9.6 ampere maximum.

Terminal: Standard is tin plated brass, bolt and nut.

Case Material: ABS





## Maintenance-Free Rechargeable Batteries

### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°F) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

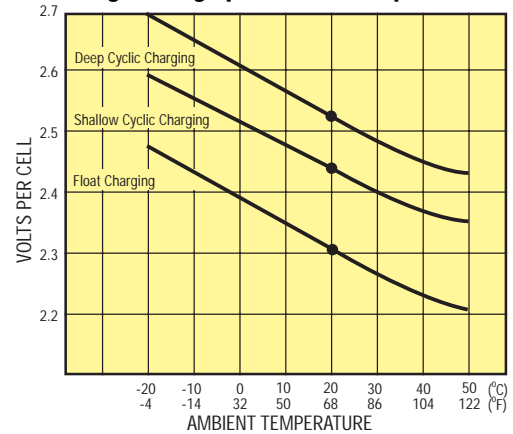
### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

### Installation Care

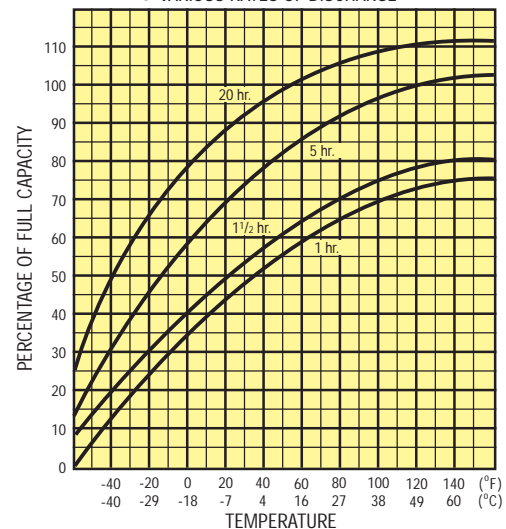
All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

Charge Voltage per Cell vs. Temperature



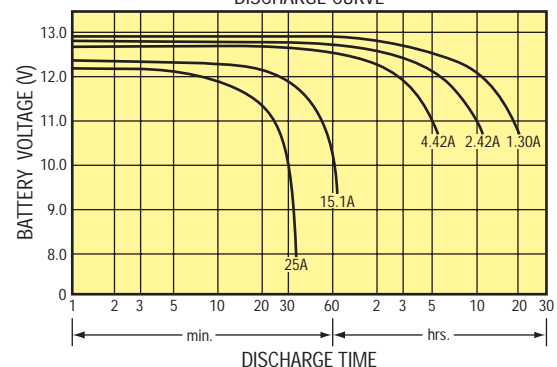
Capacity as Affected by Temperature

@ VARIOUS RATES OF DISCHARGE

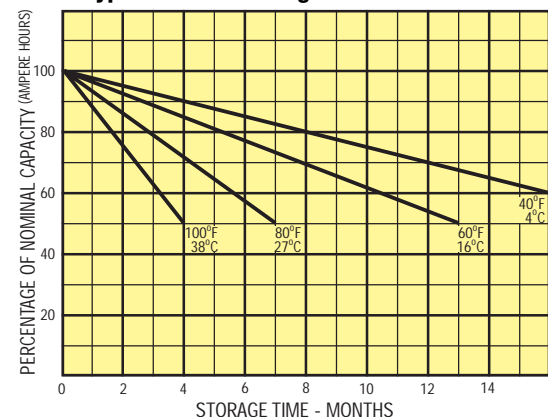


Typical Voltage Characteristic (70°F)

DISCHARGE CURVE



Typical Self-Discharge Characteristics



### Maintenance-Free Rechargeable Batteries

#### Specifications CF-12V29FR-S10

Nominal Open Circuit Voltage .....12.7V

Nominal Working Voltage ..... 11.9V

Nominal Capacity at 77°F (25°C)

Voltage readings are per cell

20 Hour Rate

(1.45 amps to 1.75 volts)..... 29.0 ampere hours

10 Hour Rate

(2.70 amps to 1.75 volts)..... 27.0 ampere hours

5 Hour Rate

(4.80 amps to 1.75 volts)..... 24.0 ampere hours

1 Hour Rate

(17.00 amps to 1.6 volts)..... 17.0 ampere hours

1/2 Hour Rate

(24.90 amps to 1.6 volts)..... 12.4 ampere hours

Max. Physical Size:

Length ..... 6.51 inches (165mm)

Width ..... 4.91 inches (125mm)

Height ..... 7.39 inches (188mm)

Weight ..... 21.2 lbs (10.0kg)

Energy Density

(20 Hour Rate) ..... 1.47 watt hrs/cu in

(20 Hour Rate)..... 16.4 watt hrs/lbs

Operating Temperature Range

Discharge ..... -60°F to +165°F (-50°C to +74°C)

Charge ..... 0°F to +120°F (-18°C to +49°C)

Recharging Methods:

Float Charging: Constant Potential Source of 13.7 to 13.9 volts continuously.

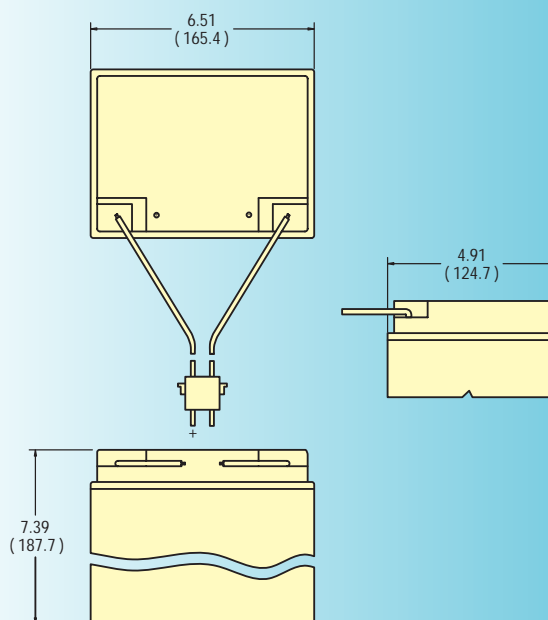
Routine Charging: Constant Potential Source of 14.7 to 15.1 volts with a charging current of 10.0 ampere maximum.

Terminal: Cable assembly with TEW-105 (#12 AWG) tinned copper wire; orange - negative, brown - positive; 7.12 inches long from edge of battery to end of connector; AMP connector housing 770017-1 and 2 AMP sockets 770004-3

Case Material: Polycarbonate Flame Class: UL94 V-0 exceeds oxygen index 28

Float Life Expectancy: 8+ years at 77°F (25°C)

Two Year Full Warranty at average battery temperature of 77°F (25°C) or less





## Carefree® CF-12V29FR-S10

### Maintenance-Free Rechargeable Batteries

#### Charging vs Temperature

The charging of Carefree batteries is best accomplished in a temperature range of 60°F to 90°F. Charging within this temperature range requires no temperature compensation. For applications over a wider temperature range, charging voltage must be changed as a function of temperature. (see chart at right)

#### Capacity vs Temperature

The efficiency of the lead-acid system decreases as the temperature decreases and increases as temperature increases from room temperature (70°) as illustrated. These four curves shown are based on discharges at the 20 hour, 5 hour, 1 1/2 hour and 1 hour rates.

#### Self-Discharge Characteristics

High temperature increases the rate of self-discharge of all battery systems but even in this respect, the lead-calcium battery is perhaps least affected. In general, the rate of self-discharge can be expected to double for each 20°F rise in temperature above 70°F.

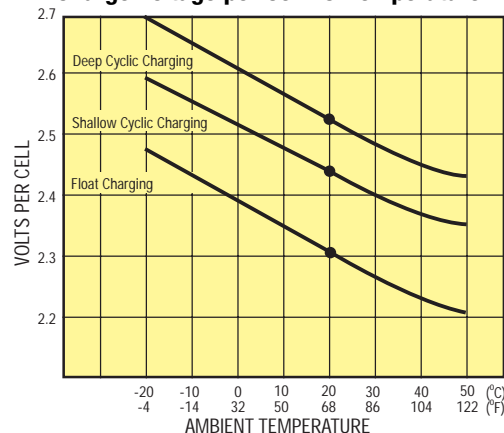
#### Battery Operating Conditions & Cautions

Battery contains toxic material (lead) and corrosive fluid (sulfuric acid) • Charging can produce explosive gases • Do not charge in gas tight enclosures • Charge battery in a well-ventilated area away from sparks, flames or smoking • Use approved voltage controlled charger • Do not short-circuit battery terminals, as this can cause an explosion or fire • Keep batteries and chargers away from children • Charge battery as soon as possible after use • Do not store battery in discharged state • Do not puncture, disassemble, mutilate or incinerate • MUST BE RECYCLED OR DISPOSED OF PROPERLY

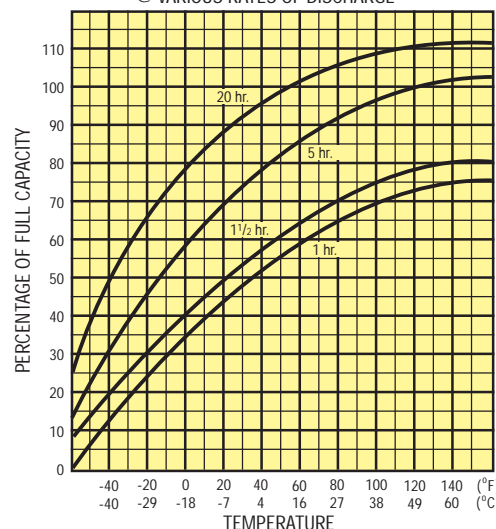
#### Installation Care

All CAREFREE batteries are carefully assembled and with proper charging will provide excellent service. When placing the battery into service it must be inspected to make sure that the battery has not been damaged by rough handling. If the unit has been damaged, there is a possibility of a loss of a small amount of sulfuric acid electrolyte and possible corrosion of adjacent components. Any sulfuric acid can cause severe burns to the skin and eyes. If contact is made with a damaged battery, immediately wash the contacted area with water for at least 5 minutes. When installing the battery in equipment, ventilation must be provided. Toward the end of charge and under overcharge conditions, hydrogen and oxygen gas can be generated. If this gas is allowed to accumulate in the enclosure and a spark is introduced, an explosion could result.

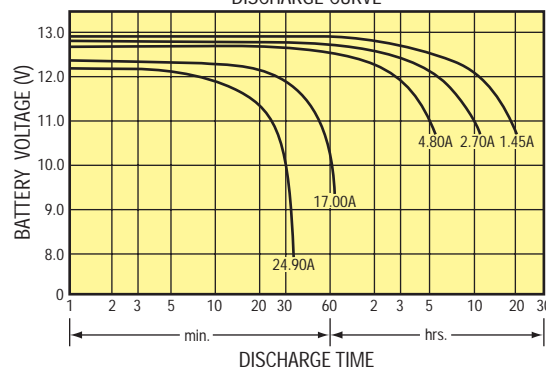
Charge Voltage per Cell vs. Temperature



Capacity as Affected by Temperature  
@ VARIOUS RATES OF DISCHARGE



Typical Voltage Characteristic (70°F)  
DISCHARGE CURVE



Typical Self-Discharge Characteristics

