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The unique design of the Gates Energy Cell overcomes many of the former limitations of the lead-acid system. At the same time, it retains the low cost, reliability, ruggedness and long life which have always been assets of the lead-acid battery. The cell is truly sealed — no acid, acid vapor or water loss — and incorporates recombination of gases within a starved electrolyte system. This unique maintenance-free rechargeable lead-acid cell is constructed with thin, spirally wound, pure lead plates which result in low impedance, low corrosion and long life. The self-resealing safety valve will vent under abusive overcharge conditions at an internal pressure of about 50 psi.

- Can be charged or discharged in any position.
- Use constant current or constant voltage charging.
- The same cell can be used for fast cycling or long-term float applications.

- Low internal impedance allows very high discharge currents
- No loss of electrolyte during normal overcharging
- Excellent mechanical and vibrational strength
- Absolutely no "memory" effects
- No damage due to cell reversal
- The metal can is electrically isolated preventing accidental shorting.
- Fewer cells per battery for lower battery cost and better reliability.
- Cells can be paralleled for additional capacity
- Can be used safely in proximity of electronic circuitries
- Construction allows air transportation without restriction due to IATA "dry battery" classification.

TYPICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$)

Nominal Cell Voltage	2.0V	*Internal Resistance (max) (Charged Cell)	$2.2 \times 10^{-3} \Omega$
Capacity Rating		Storage Time	
20 hour rate (1.25A)	26Ah	$T_A = 0^\circ\text{C}$	7,200 days
10 hour rate (2.50A)	25Ah	$T_A = 23^\circ\text{C}$	1,200 days
1 hour rate (25.0A)	17.5Ah	$T_A = 65^\circ\text{C}$	60 days
Cell Power Rating		Atmospheric Pressure Range	0-8 atmospheres
Peak Power (at 600A)	600W	Cell Charging	
Energy/unit volume (at C/10 rate)	1.47 W-h/in ³	Constant Voltage (Cyclic)	2.40-2.60V
	0.09 W-h/cm ³	(Float)	2.30-2.40V
Energy/unit weight (at C/10 rate)	14 W-h/lb	Constant Current (Cyclic) (max)	C/5 rate
	31 W-h/kg	(Float) (max)	C/500 rate
Cell Temperature Range		**Cycle Life	200 - 2,000 cycles
Storage	-65°C to +65°C	***Expected Float Life	8 years
Discharge	-65°C to +65°C		
Charge	-40°C to +65°C		

*Measured on Hewlett-Packard 4328A milliohm meter

**200 cycles — 100% depth of discharge, one cycle per day (Charge 2.45V constant voltage, no current limit, Discharge C/5 rate)
2000 cycles — 25% depth of discharge (Charge 2.45V/cell for 7.5 hrs. — 2.0A current limit, Discharge C/2 rate for 30 min)

More cycles are available with shallower discharges

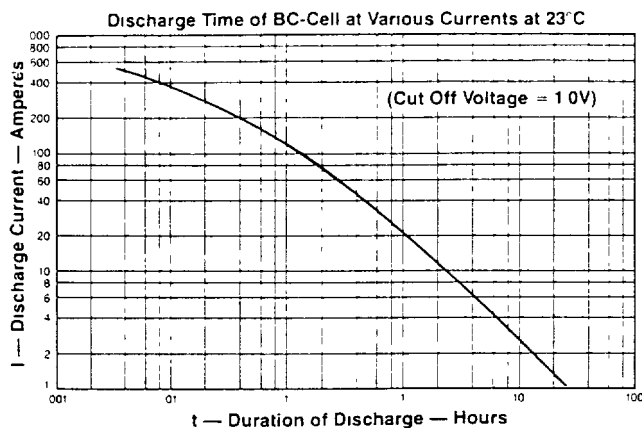
***Based on accelerated test methods, 2.35 volts constant voltage charge at 23°C ambient temperature



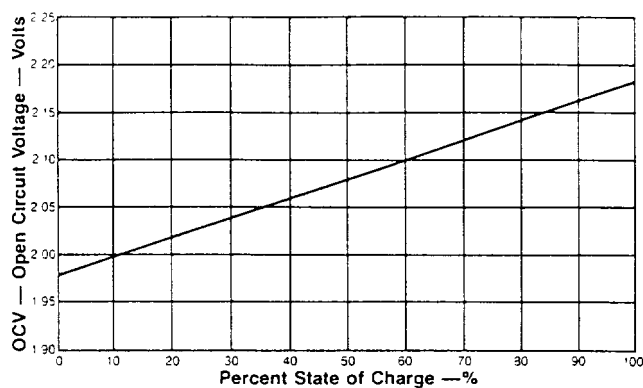
Shown 40% actual size.

**2V, 25.0Ah
sealed
rechargeable
"BC" cell**

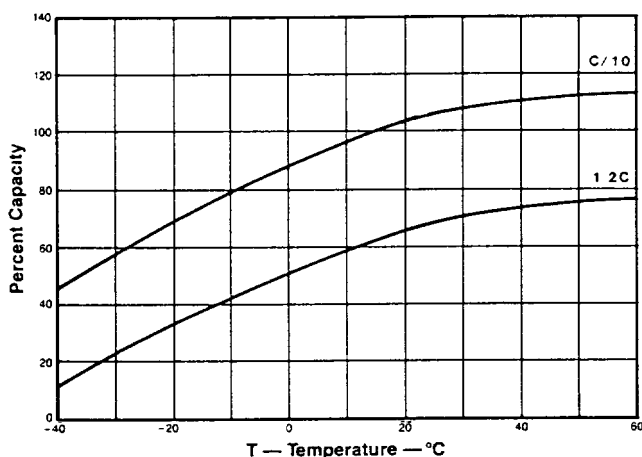
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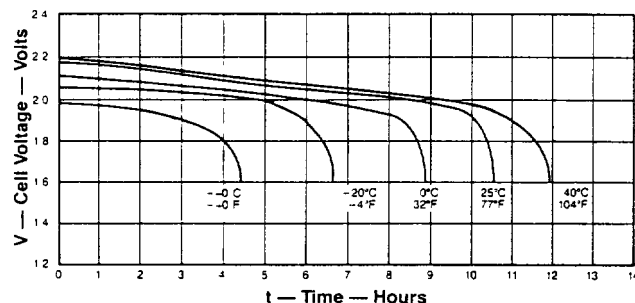
Discharge Characteristics. Based on data from standard production, 90% of all cells produced by GEP meet or exceed these discharge characteristics. New cells must be cycled or floated appropriately before full rated capacity, as shown on this curve, is reached.



State of Charge. This curve of OCV vs state of charge is accurate within 20% of the rated capacity of the cell being measured if it has not been charged or discharged within the past 24 hours. The accuracy increases to 5% if the cell has not been charged or discharged within the past five days.



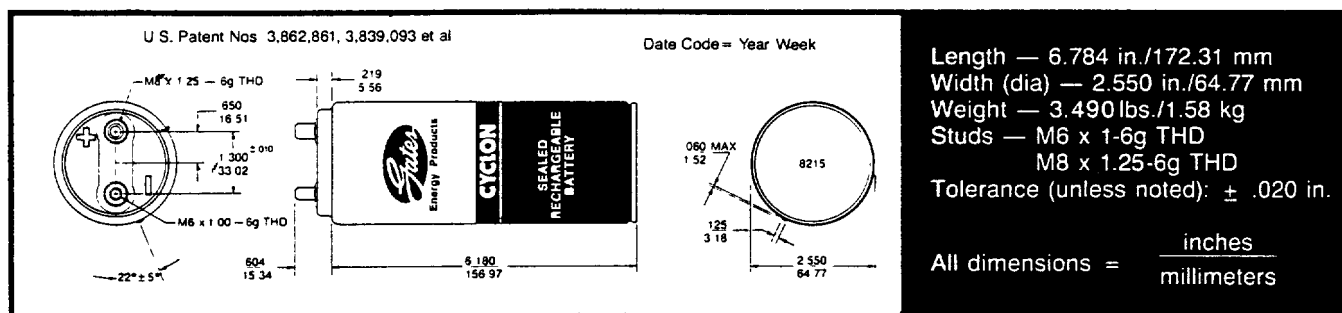
Temperature Characteristics. The graph illustrates the capacity available in the cell as a function of temperature at two different discharge rates.



Voltage Regulation. The voltage regulation of the Gates cell is equal to or better than any other commercially available system. Typical curves shown.

Leaving the Gates Energy Cell connected to a load for a long period of time after it has been discharged may cause difficulties in recharging and/or reduce cell life. The cell should be put on open circuit or recharged soon after the discharge is completed.

Note: When assembling cells into batteries nut torque must not exceed 35 in.-lb / 3.95 N-m.



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(303) 744-4806

Gates
Energy Products

Gates Energy Products Limited

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North Acton,
London,
NW10 6NF.
Tel: 01 961 3993
Telex: 8951668

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. 1218-0072



IDENTITY (As Used on Label and List)

Sealed Lead Battery closed cylindrical

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

Gates Energy Products, Inc.

Emergency Telephone Number

Not Applicable

Address (Number, Street, City, State, and ZIP Code)

617 N. Ridgeview Drive

Telephone Number for Information

(816) 429-2165

Warrensburg, MO 64093

Date Prepared

March 1, 1990

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 - Lead Oxides		0.05 ug/m ³		69
Sulfuric Acid Electrolyte		1.0 mg/m ³		21
Non-Hazardous Materials		- - - - -		10

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H ₂ 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 and Odor N/A			

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) Non-flammable	Flammable Limits N/A	LEL	UEL
Extinguishing Media Multi-purpose dry chemical or multi-purpose CO ₂ .			
Special Fire Fighting Procedures Cool battery exterior to prevent rupture. Acid mists and vapors in a fire are toxic and corrosive.			
Unusual Fire and Explosion Hazards Hydrogen gas may be produced and may explode if ignited. Remove all sources of ignition. Ventilate area.			

(Reproduce locally)

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	

Avoid Shorting.

Use only approved charging methods.

Incompatibility (Materials to Avoid)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Do not puncture battery case.

Section VI — Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
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Health Hazards (Acute and Chronic)

Not applicable for finished product used in normal conditions.

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
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Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Battery contains acid electrolyte. If battery case is punctured,
completely flush any released material from skin or eyes with water.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Avoid contact with acid materials. Use soda ash or
lime to neutralize. Flush with large amounts of water.

Waste Disposal Method

Place in acid resistant containers. Dispose in accordance with Federal,
State and local regulations. Do not incinerate.

Precautions to Be Taken in Handling and Storing

Other Precautions

Read manufacturers literature, which is available upon request.

Section VIII — Control Measures Not applicable for finished product.

Respiratory Protection (Specify Type)

Ventilation	Local Exhaust	Special
	Mechanical (General)	Other

Protective Gloves

Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices