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genesis® EP

PURELEAD

Battery Selection Guide

Visit us at **www.enersys.com**

EnerSys® Power/Full Solutions

RESERVE POWER

Publication No: US-GPL-SG-AA January 2017

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EnerSys® is the world's largest industrial battery manufacturer with manufacturing and assembly plants located around the world, over 9,000 employees and a worldwide sales and distribution network. A leader in both Valve Regulated Lead Acid (VRLA) and Vented Lead Acid (VLA) battery technologies, EnerSys is a major supplier to telecommunications, Uninterrupted Power Supply (UPS), data processing, electronic, defense, aviation and material handling markets across the globe.

EnerSys operates several of the first lead acid battery plants in the United States to receive the ISO 9001 certificates of registration, covering the company's product design, manufacturing, assembly and customer service functions.

The management systems governing the manufacture of this product are certified to ISO 9001:2008, covering 20 key elements, assures customers that EnerSys has fully documented and implemented manufacturing and quality systems that are consistently followed.

The environmentally progressive Warrensburg, Missouri plant, home base of the Genesis EP battery product lines, covers 320,000 square feet on 33 acres and employs more than 600 people. EnerSys was the first battery company in the United States to receive ISO 14001 certification. ISO 14001 focuses on the environmental management system of the business and provides a systematic approach to resource conservation.

EnerSys supports its customers through global field sales offices and a select network of authorized Value Added Centers (VACs) and international representatives and distributors. EnerSys offers technical support and customer service unparalleled in the industry. Additionally, the sales and support team is committed to meeting and exceeding the individual needs of each customer.

Value-Added Services

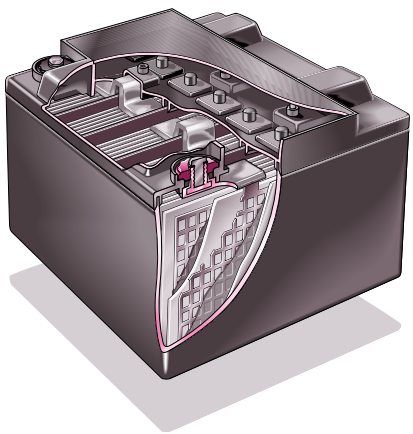
In addition to our manufacturing capability, EnerSys® is proud to provide its customers with the following services:

- customized manufacturing design
- battery recycling
- online technical information
- charging support
- product testing
- onsite technical seminars
- battery samples
- application engineering
- technical documentation

Applications

Batteries from the EnerSys pure lead-tin family are used in a wide variety of standby and portable/cyclic applications including those in:

- telecommunications
- electronics
- UPS
- defense installations
- computer back-up
- electric vehicles
- medical equipment
- solar power
- lawn and garden equipment



Features and Benefits

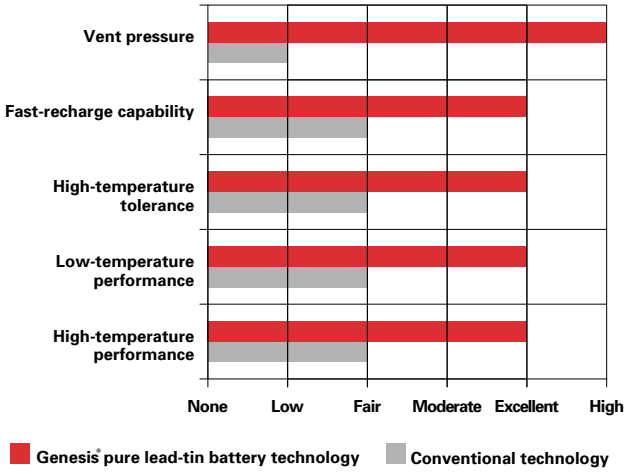
Sealed pure-lead cells were invented by a predecessor company of EnerSys® in 1973. The purity of the materials used is key to supporting the Genesis® EP battery's performance benefits. A longer service life, meaning fewer replacements and the cost associated with it, combined with higher reliability and fewer system failures, result in a lower long-term cost of ownership to the end user or equipment owner.

What are the advantages of EnerSys technology?

1. **Power density** - Per unit weight, the power provided by pure lead-tin products offers the greatest high-rate power density for your energy dollar. Genesis EP batteries greater volumetric power allows engineers to consider more energy-supporting features or design smaller, lighter packages. At high-rate and pulse discharges, the EnerSys Genesis EP battery products offer the best performance value when compared with competitive product in applications at less than 100 minutes of discharge.
2. **Cycle life** - Compared to competitive lead products (offering up to 200 full cycles), pure lead-tin batteries provide 50% to 100% greater full cycle capability. The Genesis EP battery will deliver up to 400 cycles (80% DOD, C/5). And, because the Genesis battery incorporates a high vent-pressure design, The EnerSys Genesis EP batteries experience no "dry out" failure mode from repeated recharges.
3. **Float life** - Conventionally sealed-lead batteries vary greatly in specified standby life: from three to six years at 68°F (20°C). Genesis EP batteries, however, offer a ten-year design life at 77°F (25°C), to 80% of rated capacity. At 68°F (20°C), Genesis EP battery single cells offer a fifteen-year design life.
4. **High stable voltage delivery** - The high stable voltage delivery of a pure lead-tin battery results from its low internal resistance. The flat discharge voltage profile of batteries, similar to nickel cadmium, combined with our products' low internal resistance, means our batteries are able to discharge and recharge their power more quickly and efficiently and offer greater application flexibility. The pure lead-tin construction also gives more watts-per-unit weight at high discharge rates than conventional lead-acid product.
5. **Widest temperature range** - Due to strong construction and high vent pressures, these batteries will maintain their performance and physical parameters in extreme conditions. At high temperatures, the chemical reaction in a battery that causes aging is accelerated. Pure lead-tin technology resists that chemical reaction more effectively than alloyed lead, thus allowing a battery to have a longer service life. At high temperatures, when conventional lead batteries experience internal moisture loss from venting and case side wall distention, the Genesis EP battery, with its steel can (metal jacket) and high venting pressure, does not experience these life-robbing conditions. Genesis EP batteries have twice the delivered capacity of conventional sealed-lead batteries at temperatures below -4°F (-20°C), offering unparalleled low-temperature performance.

   Genesis EP battery electrodes are thinner, allowing more electrodes per cell, and therefore greater electrode surface area than conventional sealed-lead, thick electrode batteries. As a result, our batteries can reach a high state of charge in fast-charging applications in one-fourth the time of conventional, sealed-lead, thick plate batteries. This is 50% to 100% overall better performance for your energy dollar.
6. **Rugged construction** - Due to their strong external packaging and internal pure lead-tin composition, the Genesis EP battery can withstand not only extreme temperatures but also harsh usage.

The pure lead-tin advantage



The external case for the EP product is constructed from UL 94V-0 rated non-halogenated flame-retardant materials. Genesis battery products are shock and vibration resistant, designed to offer higher tolerance levels to meet demanding applications, including those in commercial and outdoor applications. The company's focus on battery-case integrity and high vent pressure, coupled with pure lead-tin's low grid-corrosion rate, means Genesis batteries provide the longest service life possible.

7. **Fastest recharge** - EnerSys® pure lead-tin chemistry allows Genesis® EP batteries to offer the highest recharge efficiency of any sealed-lead battery on the market. With pure lead-tin, you can achieve a 95% state of recharge in less than one hour - without loss of capacity or electrolyte using conventional constant voltage charging techniques.

   Flexible charging options are possible with a Genesis EP battery, as no current limit is required when using a constant voltage charger.

8. **Orientation/placement/transport** - Due to the products' mechanical design, Genesis EP batteries can be mounted and operated in any position, except inverted, an attractive feature for less accessible areas.

   Genesis EP batteries offer UL94 V-0 non-halogenated flame retardant packaging, thus allowing the mounting of systems in sensitive areas and human environments. Genesis EP batteries are classified as "nonspillable batteries", and are excepted from the Department of Transportation's (DoT) comprehensive packaging requirements if the following conditions are satisfied:

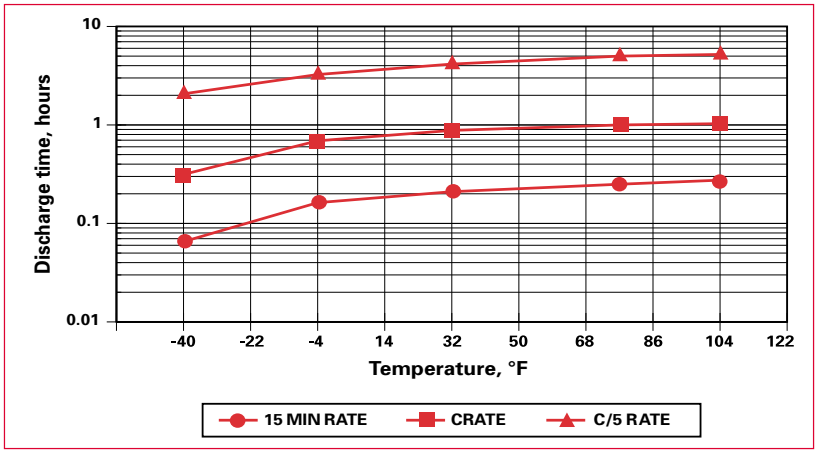
   (1) The battery is protected against short circuits and is securely packaged and (2) The battery and outer packaging must be plainly and durably marked "NONSPILLABLE" or "NONSPILLABLE BATTERY". Genesis EP battery shipments from EnerSys Warrensburg location, will be properly labeled in accordance with applicable regulations. **Packaging changes performed at other locations may require additional labeling, since in addition to the battery itself containing the required marking, the outer packaging of the battery must also contain the required marking: "NONSPILLABLE" or "NONSPILLABLE BATTERY".**

   Genesis EP batteries have been tested and determined to be in compliance with the vibration and pressure differential tests contained in 49 CFR § 173.159(d). Genesis EP batteries are classified as "Nonspillable" and meet the conditions from
   § 173.159. They do not have an assigned UN number nor do they require additional DOT hazard labeling.

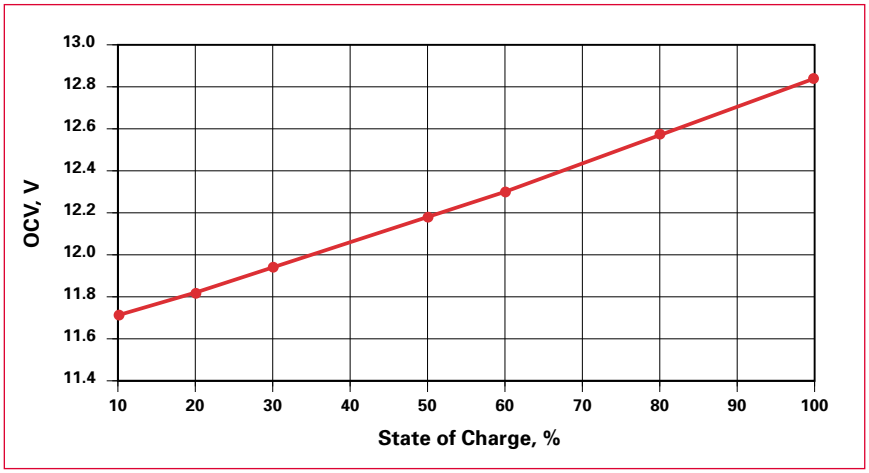
   All batteries that have been tested and determined to be in compliance with the DOT Hazardous Material Regulations, the International Civil Aeronautics Organization (ICAO), and the International Air Transport Association (IATA) Packaging Instruction 806 and Special Provision A67, are therefore exempt from all other requirements of these regulations and classified as a "nonspillable battery".

9. **Shelf life** - Pure lead-tin batteries have an extremely low self-discharge rate, thus providing extended storage capability while maintaining high State of Charge (SOC) levels for dependable operation.

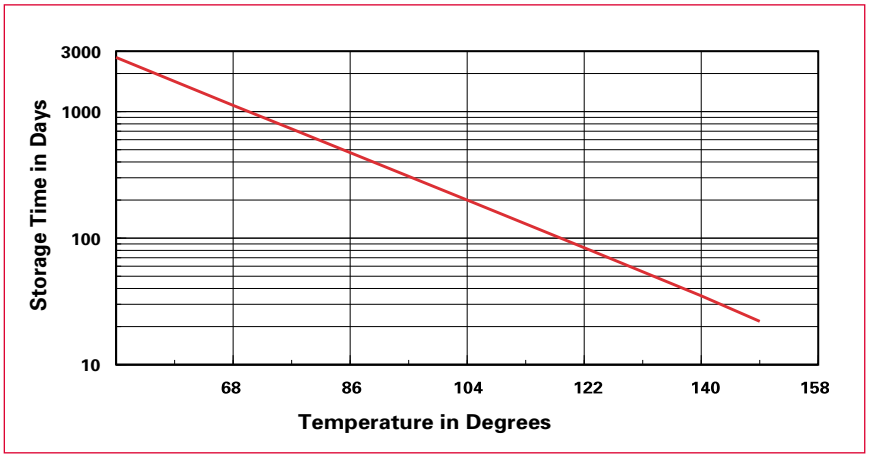
   Genesis EP batteries have a shelf life more than two times that of conventional lead batteries. To assure maximum reliability, EnerSys recommends that all stored cells/batteries be recharged (boost charged) once every 24 months or when the open circuit voltage drops to 12.00 volts per battery, whichever occurs earlier. Inventory should be checked more frequently if storage temperature regularly exceeds 77°F (25°C).



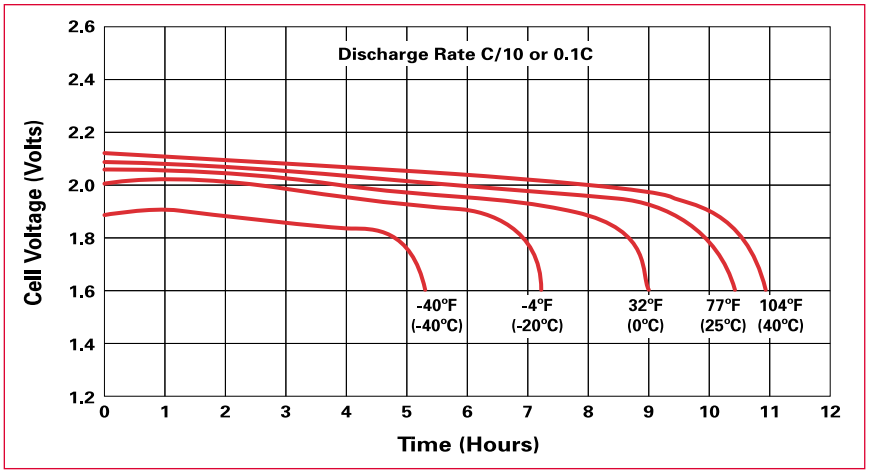
SOC for Genesis® batteries



Storage time as a function of temperature for Genesis® batteries (Fully charged battery)



Voltage regulation for Genesis® batteries



Charging recommendations:

Broadly speaking, a battery may be recharged using either a Constant Voltage (CV) charger or a Constant Current (CC) charger, or a modification of either or both of these.

The exact regime chosen generally depends upon the time and economic constraints imposed by the system. CC charging is widely used in cyclic applications where a recharge must be accomplished in a relatively short time period. CV charging, where a single voltage level is applied across the battery terminals, is the most suitable method to recharge Genesis EP battery products. Depending on the CV charger's current limit, it is possible to recharge these batteries from a 100% discharged condition to better than 95% state of charge in less than one hour, using only the cyclic charge voltage.

CV charging

CV charging should be within the following ranges:

Fast Chargers, 12 volts:
14.7 to 15.0 volts @ 77°F (25°C)

Float Chargers, 12 volts:
13.5 to 13.8 volts @ 77°F (25°C)

To avoid thermal runaway in warmer temperatures, and to improve charge acceptance in colder temperatures, the charger voltage should be compensated by approximately 10 mV per 77°F (18mV per degree centigrade) variance from 77°F (25°C). This is a negative coefficient, with the voltage being lowered as the temperature increases, and vice versa.

There is no need to limit the inrush current to the battery during the initial phase of CV charging. The low internal resistance of Genesis® EP batteries allows for large inrush current without damage.

Since not all of the charge returned is accepted to replenish the electro-chemical potential, a good rule of thumb to use is that the charge returned should be 105% to 110% of the capacity delivered on the previous discharge.

Most current waveforms are not pure DC nor are they pure sine waves. Therefore, consult the EnerSys® Application Engineering Department for assistance when evaluating the charger current waveforms for your specific application.

Genesis® EP battery product family (All capacities at 10 hr. rate 77°F (25°C) to 1.67Vpc)

Battery Type	Capacity	Part Number	Internal res. of fully charged cell mΩ @ 77°F (25°C)**	Nominal short circuit current for charged battery**	Dimensions								
					Length		Width		Height		Weight		Brass Terminal (metric)
					in	mm	in	mm	in	mm	lb	kg	
G13EP	13Ah	0770-2007	21.4	600A	6.91	175.5	3.28	83.3	5.11	129.8	10.8	4.9	M6
G13EPX*	13Ah	0770-2003	21.4	600A	7.00	177.7	3.37	85.5	5.17	131.2	11.8	5.4	M6
G16EP	16Ah	0769-2007	19.1	675A	7.15	181.6	3.00	76.2	6.61	167.9	13.5	6.1	M6
G16EPX*	16Ah	0769-2003	19.1	675A	7.27	184.6	3.11	78.9	6.67	169.3	14.8	6.7	M6
G26EP	26Ah	0765-2001	12.3	1150A	6.57	166.9	6.92	175.8	4.96	126.0	22.3	10.1	M6
G26EPX*	26Ah	0765-2003	12.3	11500A	6.64	168.6	7.05	179.0	5.01	127.3	23.6	10.7	M6
G42EP	42Ah	0766-2001	8.8	1480A	7.77	197.4	6.53	165.9	6.72	170.7	32.9	14.9	M6
G42EPX*	42Ah	0766-2003	8.8	1480A	7.87	199.8	6.66	169.1	6.80	172.8	35.3	16.0	M6
G70EP	70Ah	0771-2001	6.1	2100A	13.02	330.7	6.62	168.1	6.93	176.0	53.5	24.3	M6
G70EPX*	70Ah	0771-2003	6.1	2100A	13.03	330.9	6.63	168.4	6.97	176.9	56.1	25.5	M6
G200EP	200Ah	0797-2101	3.15	4000A	22.87	580.9	4.93	125.2	12.44	316.0	132.3	60.0	M6

** Metal jacket design for extreme duty*
*** Tests per IEC 60896 Part 21*

Genesis® EP battery performance specifications

Constant current discharge/amps to 1.67Vpc @ 77°F (25°C)

Battery Type	Nominal Ah 10hr Rate	Duration									
		5 min	10 min	15 min	30 min	60 min	90 min	5 hr	8 hr	10 hr	20 hr
G13EP	13Ah	70.8	43.6	32.2	18.6	10.4	7.3	2.5	1.6	1.3	0.7
G16EP	16Ah	90.0	54.8	40.1	23.0	12.7	8.9	3.0	2.0	1.6	0.8
G26EP	26Ah	143.4	90.7	67.4	39.0	21.7	15.1	5.0	3.2	2.6	1.4
G42EP	42Ah	212.0	138.4	104.1	60.8	33.8	23.5	7.9	5.1	4.2	2.3

Constant current discharge/watts per cell to 1.67Vpc @ 77°F (25°C)

Battery Type	Nominal Ah 10hr Rate	Duration									
		5 min	10 min	15 min	30 min	60 min	90 min	5 hr	8 hr	10 hr	20 hr
G13EP	13Ah	758.4	481.8	361.2	231.6	121.2	85.8	29.4	19.2	15.6	8.4
G16EP	16Ah	975.6	609.6	453.6	264.6	190.2	105.0	36.0	23.4	19.2	10.2
G26EP	26Ah	1532	995	751	444	251	175.8	59	38	31	16
G42EP	42Ah	2291	1540	1173	698	394	276	94	62	51	28

Charging/Temperature/Life:

Battery Type	Charging Per Cell		Temperature Range		Life Expectancy	
	Cyclic	Float	Storage and Discharge	Charge	C/5 Cycle Life 80% DOD	Float Life 77°F (25°C)
G13EP **G16EP** **G26EP** **G42EP**	CV 14.7-15.0 CC*	CV 13.5-13.8 CC*	-40°F to 113°F (-40°C to 45°C)	-40°F to 113°F (-40°C to 45°C)	400	10 years (15 years)
G13EPX **G16EPX** **G26EPX** **G42EPX**	CV 14.7-15.0 CC*	CV 13.5-13.8 CC*	-40°F to 140°F (-40°C to 60°C)	-40°F to 140°F (-40°C to 60°C)	400	10 years (15 years)

Maximum recommended storage time before recharge *- 24 months @ 77°F (25°C) or 2.0Vpc, whichever is earlier*

**Users planning to use CC should consult the EnerSys Application Engineering Department*

Genesis EP battery mechanical specifications

Battery Type	Dimensions*											
	Length - Max (A)		Width - Max (B)		Height - Max (C)		Terminal Spacing -Nom. (D)		Terminal Height - Nom. (E)		Weight - Nom.	
	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg
G13EP	6.91	175.5	3.28	83.3	5.11	129.8	5.56	141.2	0.81	20.6	10.8	4.9
G13EPX	7.00	177.7	3.37	85.5	5.17	131.2	5.56	141.2	0.81	20.6	11.8	5.4
G16EP	7.15	181.6	3.00	76.2	6.61	167.9	5.74	145.8	0.67	16.9	13.5	6.1
G16EPX	7.27	184.6	3.11	78.9	6.67	169.3	5.74	145.8	0.67	16.9	14.8	6.7
G26EP	6.57	166.9	6.92	175.8	4.96	126.0	5.26	133.5	1.06	27.0	22.3	10.1
G26EPX	6.64	168.6	7.05	179.0	5.01	127.3	5.26	133.5	1.11	28.2	23.6	10.7
G42EP	7.77	197.4	6.53	165.9	6.72	170.7	6.27	159.1	0.87	22.0	32.9	14.9
G42EPX	7.87	199.8	6.66	169.1	6.80	172.8	6.27	159.1	0.91	23.2	35.3	16.0

*See drawings on page 9

Genesis® EP battery performance specifications (Continued)

Constant current discharge/amps to 1.67Vpc @ 77°F (25°C)

Battery Type	Duration									
	5 min	10 min	15 min	30 min	60 min	90 min	5 hr	8 hr	10 hr	20 hr
G70EP (70Ah)	331.7	218.5	165.7	98.5	57.0	n/a	13.6	9.0	7.3	3.9
G200EP (200Ah)	640.8	475.6	380.4	241.9	150.8	n/a	36.9	24.3	19.8	10.4

Constant power discharge/watts per battery to 1.67Vpc @ 77°F (25°C)

Battery Type	Duration									
	5 min	10 min	15 min	30 min	60 min	90 min	5 hr	8 hr	10 hr	20 hr
G70EP (70Ah)	3604.0	2443.0	1879.0	1139.0	669.0	n/a	162.0	107.0	87.0	46.0
G200EP (200Ah)	6726.0	5148.0	4189.0	2736.0	1746.0	n/a	442.0	293.0	238.0	125.0

Charging/Temperature/Life

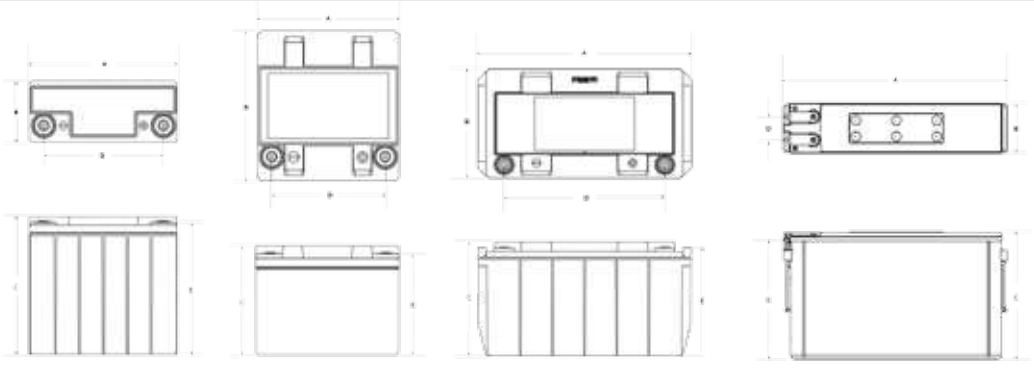
Battery Type	Charging Per Cell		Temperature Range		Life Expectancy	
	Cyclic	Float	Storage and Discharge	Charge	C/5 Cycle Life 80% DOD	Float Life 77°F (25°C)
G70EP	CV 14.7-15.0 CC**	CV 13.5-13.8 CC*	-40°F to 113°F (-40°C to 45°C)	-40°F to 113°F (-40°C to 45°C)	400	10 years 15 years
G70EPX*	CV 14.7-15.0 CC**	CV 13.5-13.8 CC*	-40°F to 140°F (-40°C to 60°C)	-40°F to 140°F (-40°C to 60°C)	400	10 years 15 years

Maximum recommended storage time before recharge - 24 months @ *77°F (25°C)* or 2.0Vpc, whichever is earlier

**Users planning to use CC should consult the EnerSys Application Department

Genesis® EP battery mechanical specifications

Battery Type	Dimensions											
	Length - Max (A)		Width - Max (B)		Height - Max (C)		Teminal Spacing - Nom. (D)		Terminal Height - Nom. (E)		Weight - Nom	
	in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg
G70EP	13.02	330.7	6.62	168.1	6.93	176.0	9.69	246.1	6.53	165.9	53.5	24.3
G70EPX*	13.03	330.9	6.63	168.4	6.97	176.9	9.69	246.1	6.57	166.9	56.0	25.5
G200EP	22.87	580.9	4.93	125.2	12.44	316.0	2.25	57.2	11.48	291.6	132.3	60.0



G13EP and G16EP | G26EP and G42EP | G70EP | G200EP

All shown without metal jacket

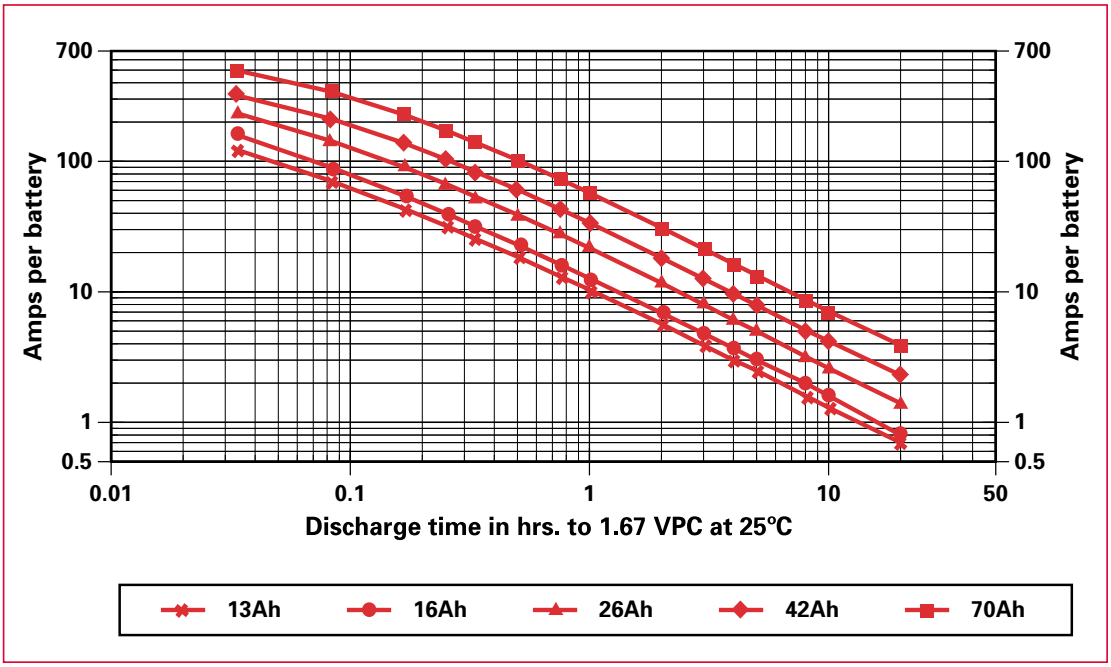
Recognized by UL File no. MH12544 (excludes G200EP); G200EP recognized by UL File no. MH18697

Caution: Batteries contain toxic materials (Pb and H2SO4) • Avoid short circuit • Do not charge in gas-tight container

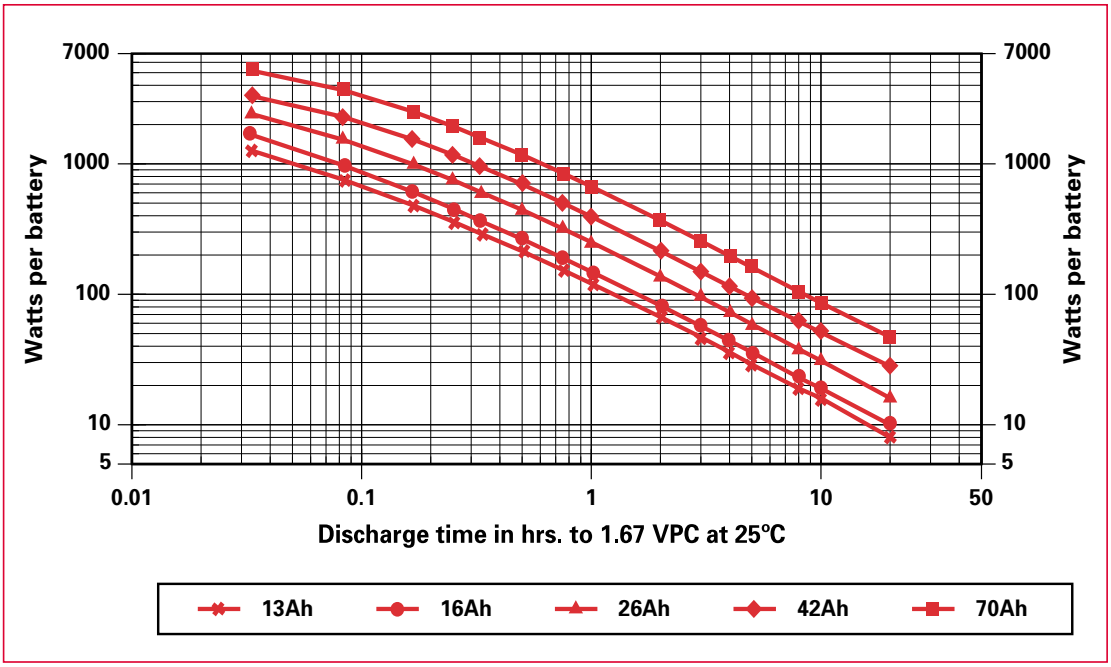
Sealed-lead rechargeable battery must be recycled or disposed of properly. Contact EnerSys® Customer Service for details.

*Metal jacket designed for extreme duty.

Genesis® EP battery constant current (CC) discharge



Genesis® EP battery constant power (CP) discharge



EnerSys® Standard Product List

Part Number	Description	Voltage	10 Hr Rate	Performance Specifications	Mechanical Specifications
0770-2007	G13EP	12V	13Ah	Page 8	Page 8
0770-2003	G13EPX	12V	13Ah	Page 8	Page 8
0769-2007	G16EP	12V	16Ah	Page 8	Page 8
0769-2003	G16EPX	12V	16Ah	Page 8	Page 8
0765-2001	G26EP	12V	26Ah	Page 8	Page 8
0765-2003	G26EPX	12V	26Ah	Page 8	Page 8
0766-2001	G42EP	12V	42Ah	Page 8	Page 8
0766-2003	G42EPX	12V	42Ah	Page 8	Page 8
0771-2001	G70EP	12V	70Ah	Page 9	Page 9
0771-2003	G70EPX	12V	70Ah	Page 9	Page 9
0797-2101	G200EP	12V	200Ah	Page 9	Page 9

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