

Liberty[®]
SERIES

C&D
TECHNOLOGIES

12-373

LIBERTY SERIES 1000



VALVE REGULATED LEAD-CALCIUM BATTERY FOR STANDBY APPLICATIONS

Capacities from 100 to 600 Ampere-hours (8 hours to 1.75 VPC) 343 to 2060 Watts per cell (15 mins to 1.67 VPC)

C&D Technologies valve regulated lead-acid (VRLA) batteries are engineered to provide performance reliability and consistency over the life of the product. Designed using C&D's patented processes, these products offer long battery life with minimal maintenance. The versatile Liberty® Series 1000 10-year VRLA product fits virtually anywhere and provides superior performance in the most demanding applications.

APPLICATIONS

Telecom	Switchgear Utility	UPS
<ul style="list-style-type: none"> • Customer Premise • Broadband • Wireless • PBX • Repeaters • Fixed Wireline • Outside Plants • Underground Battery Vaults 	<ul style="list-style-type: none"> • Electric Utility • Railway Signals • Emergency Systems • Manufacturing Facilities <ul style="list-style-type: none"> - Assembly Lines - Process Controls • Petrochemical processing plants • Pipelines 	<ul style="list-style-type: none"> • Data Centers • Network Operations Centers • Industrial Process Control Facilities • Semiconductor Manufacturing • Banks & Financial Markets • Power Generation Plants • Hospital & Testing Laboratories • Emergency 911 response centers

SPECIFICATIONS

Electrolyte at 77°F (25°C)	1.300 specific gravity nominal sulfuric acid
System float voltages	2.25–2.27 volts per cell
Life expectancy	10 years, full float service at 77°F (25°C)
Container and cover	High-impact, flame-retardant PVC Flammability ratings: UL 94-V0; ASTM D-635, self-extinguishing Oxygen index > 32
Safety vent system	Low-pressure release valve with flash arrester

Note: AC ripple current from the charger shall not exceed 5 percent of the 8 hour (ampere-hour) rating of the battery.

FEATURES & BENEFITS

- Advanced, computer-controlled thermal cover-to-jar weld for greater reliability and consistency
- Automated, state-of-the-art, cast-on strap process ensures consistent, high-quality, low electrical-resistance welds
- Through-the-partition intercell connection shortens current paths and increases performance
- Copper-to-copper connections minimize resistance, especially at high rates, and shorten maintenance time by reducing the need for retorquing connections
- Patented and time-tested C&D post seal design with secondary epoxy seal to increase integrity
 - Leak-free operation
 - Superior reliability
- Two-fold vent system, comprised of a low-pressure safety valve with flash arrester, minimizes bulging and prevents flashback explosion from external ignition source
- Thick radial grid design for both positive and negative plates improves current carrying capacity and performance resulting in long float life
- Fully automated vacuum and filling operation results in uniform acid volume distribution and consistent float voltage
- Immobilized electrolyte technology using an absorbent glass mat design (AGM) offers safe handling and storage
- Non-spillable designation for lower shipping cost
- High-impact resistant PVC container and cover provide excellent water vapor retention, preventing dry out and oxygen infiltration

MEASURABLE QUALITY AND OUTSTANDING PERFORMANCE

- 100 percent of cells tested for conductance, voltage and capacity
- Tested in accordance with Bellcore TR-NWT-000766 specifications
- 100 percent of cells tested to 95 percent capacity at the 8 hour rate to 1.75 VPC

SPECIFICATIONS

	LS 12-100	LS 10-100	LS 6-200	LS 4-300	LS 2-600*
Nominal voltage	12 volts	10 volts	6 volts	4 volts	2 volts
Number of cells	6 / unit	5 / unit	3 / unit	2 / unit	1 / unit
Rated 8-hr to capacity (ampere-hours to 1.75 VPC)	100 Ah to 10.5 volts	100 Ah to 8.75 volts	200 Ah to 5.25 volts	300 Ah to 3.5 volts	600 Ah to 1.75 volts
Rated 15-min capacity (watts per cell to 1.67 VPC)	344	344	688	1030	2060
Internal resistance per cell	0.000786 Ohms	0.000786 Ohms	0.000393 Ohms	0.000262 Ohms	0.000131 Ohms
Short circuit current	2545 A	2545 A	5089 A	7634 A	15267 A
Unit height	8.95 in (227 mm)	8.95 in (227 mm)	8.95 in (227 mm)	8.95 in (227 mm)	8.95 in (227 mm)
Unit length (includes handles)	16.58 in (421 mm)	16.58 in (421 mm)	16.58 in (421 mm)	16.58 in (421 mm)	16.58 in (421 mm)
Unit width	6.84 in (174 mm)	6.84 in (174 mm)	6.84 in (174 mm)	6.84 in (174 mm)	6.84 in (174 mm)
Weight	95 lbs (43 kg)	81 lbs (38 kg)	95 lbs (43 kg)	95 lbs (43 kg)	95 lbs (43 kg)
Plate thickness positive	0.140 in (3.56 mm)				
negative	0.085 in (2.16 mm)				
Terminal characteristics	0.625 in diameter, threaded copper insert, 0.75 in deep. Fasten with 1/4-20 stainless steel hex bolt /washer.				

* 2 cells connected in parallel for 2-volt units

RATINGS IN AMPERES AT 77°F (25°C)

Final volts per cell	RESERVE TIME														
	Models	1 min	5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	8 hr	10 hr	20 hr
1.95	LS12-100	123.2	115.1	104.8	94.6	70.0	45.7	28.1	20.7	16.3	13.5	11.6	9.1	7.5	4.1
	LS10-100	123.2	115.1	104.8	94.6	70.0	45.7	28.1	20.7	16.3	13.5	11.6	9.1	7.5	4.1
	LS6-200	246.5	230.2	209.5	189.3	140.1	91.4	56.3	41.3	2.7	27.0	23.1	18.1	15.0	8.3
	LS4-300	372.6	348.5	317.8	287.6	213.4	139.1	85.5	62.0	49.0	40.5	34.7	27.2	22.5	12.4
	LS2-600	739.4	690.6	628.6	567.8	420.2	274.2	168.8	124.0	98.0	81.0	69.3	54.3	45.0	24.8
1.90	LS12-100	187.5	169.4	147.0	126.8	87.4	55.5	33.4	24.2	19.0	15.8	13.5	10.5	8.6	4.7
	LS10-100	187.5	169.4	147.0	126.8	87.4	55.5	33.4	24.2	19.0	15.8	13.5	10.5	8.6	4.7
	LS6-200	374.9	338.8	293.9	253.6	174.9	110.9	66.7	47.2	38.1	31.6	27.0	21.0	17.2	9.3
	LS4-300	562.4	508.2	440.9	380.4	262.3	166.4	100.1	72.6	57.1	47.4	40.5	31.5	25.9	14.0
	LS2-600	1124.7	1016.4	881.8	760.9	524.6	332.7	200.2	145.1	114.3	94.8	81.0	62.9	51.7	27.9
1.88	LS12-100	216.1	191.0	161.5	137.0	93.0	58.1	34.8	25.2	19.9	16.5	14.2	11.0	9.1	4.8
	LS10-100	216.1	191.0	161.5	137.0	93.0	58.1	34.8	25.2	19.9	16.5	14.2	11.0	9.1	4.8
	LS6-200	431.9	382.3	323.2	273.9	185.7	113.5	69.7	50.4	39.8	33.0	28.3	22.1	18.1	9.7
	LS4-300	616.2	548.5	467.9	399.6	273.0	171.3	102.5	74.3	58.9	49.0	42.1	32.9	27.1	14.4
	LS2-600	1295.2	1148.3	970.7	820.2	562.0	350.9	208.0	151.1	119.5	99.1	84.7	65.8	53.9	28.3
1.85	LS12-100	258.6	224.2	183.5	151.9	101.5	62.4	37.1	26.9	21.2	17.5	15.0	11.6	9.5	5.0
	LS10-100	258.6	224.2	183.5	151.9	101.5	62.4	37.1	26.9	21.2	17.5	15.0	11.6	9.5	5.0
	LS6-200	517.1	448.4	367.0	303.8	203.0	124.8	74.2	53.8	42.4	35.1	30.0	23.2	19.0	9.9
	LS4-300	775.7	672.6	550.5	455.8	304.5	187.3	111.3	80.7	63.6	52.6	44.9	34.8	28.4	14.9
	LS2-600	1551.4	1345.3	1100.9	911.5	609.0	374.5	222.6	161.4	127.2	105.3	89.9	69.6	56.9	29.7
1.84	LS12-100	272.7	233.9	189.3	155.8	103.2	63.3	37.6	27.3	21.6	17.9	15.3	11.9	9.7	5.1
	LS10-100	272.7	233.9	189.3	155.8	103.2	63.3	37.6	27.3	21.6	17.9	15.3	11.9	9.7	5.1
	LS6-200	545.4	467.9	378.6	311.7	206.5	126.6	75.1	54.6	43.2	35.8	30.6	23.8	19.5	10.2
	LS4-300	818.2	701.8	567.9	467.5	309.7	189.8	112.9	81.8	64.4	53.3	45.5	35.2	28.7	15.0
	LS2-600	1636.4	1403.6	1135.8	935.0	619.4	379.6	225.8	163.6	128.9	106.6	90.9	70.4	57.4	30.0
1.80	LS12-100	329.4	272.4	213.0	171.7	110.1	67.0	39.7	28.7	22.5	18.6	15.8	12.2	10.0	5.2
	LS10-100	329.4	272.4	213.0	171.7	110.1	67.0	39.7	28.7	22.5	18.6	15.8	12.2	10.0	5.2
	LS6-200	658.8	544.9	426.0	343.5	220.1	134.1	79.4	57.4	45.1	37.2	31.7	24.5	20.0	10.4
	LS4-300	988.2	817.3	639.0	515.2	330.2	201.1	119.2	86.0	67.6	55.8	47.5	36.7	29.9	15.6
	LS2-600	1976.5	1634.7	1278.0	1030.4	660.3	402.2	238.3	172.1	135.3	111.6	95.1	73.5	59.9	31.2
1.78	LS12-100	358.4	284.2	218.2	175.3	112.0	68.0	40.2	29.1	22.8	18.8	16.1	12.4	10.1	5.3
	LS10-100	358.4	284.2	218.2	175.3	112.0	68.0	40.2	29.1	22.8	18.8	16.1	12.4	10.1	5.3
	LS6-200	716.5	569.3	435.1	350.1	224.5	135.5	80.5	58.2	45.7	37.7	32.1	24.8	20.2	10.5
	LS4-300	1075.1	852.5	654.5	525.9	336.1	204.0	120.7	87.2	68.5	56.5	48.2	37.2	30.3	15.8
	LS2-600	2149.6	1708.0	1305.3	1050.4	673.4	406.6	241.6	174.6	137.2	113.2	96.4	74.4	60.6	31.5
1.75	LS12-100	401.7	302.2	225.4	180.3	115.1	69.4	41.0	29.6	23.3	19.2	16.4	12.6	10.3	5.4
	LS10-100	401.7	302.2	225.4	180.3	115.1	69.4	41.0	29.6	23.3	19.2	16.4	12.6	10.3	5.4
	LS6-200	803.5	604.4	450.7	360.6	230.1	138.8	82.1	59.3	46.6	38.4	32.7	25.0	20.6	10.7
	LS4-300	1205.2	906.5	676.1	540.9	345.2	208.2	123.1	88.9	69.9	57.7	49.1	37.5	30.9	16.1
	LS2-600	2410.4	1813.1	1352.2	1081.9	690.4	416.4	246.3	177.8	139.7	115.3	98.2	75.0	61.9	32.2

Note: Liberty Series 1000 batteries are tested to 95 percent of published rates at time of shipment at 8 hour rate to 1.75 VPC. Additional ratings and application information is available in the Battery Selection Program at www.cdstandbypower.net

RATINGS IN KW PER CELL AT 77°F (25°C)

Final volts per cell	RESERVE TIME										
	Models	1 min	5 min	10 min	15 min	20 min	30 min	1 hr	3 hr	5 hr	8 hr
1.95	LS12-100	0.240	0.225	0.207	0.188	0.170	0.139	0.091	0.041	0.028	0.018
	LS10-100	0.240	0.225	0.207	0.188	0.170	0.139	0.091	0.041	0.028	0.018
	LS6-200	0.480	0.451	0.413	0.375	0.339	0.279	0.181	0.083	0.055	0.037
	LS4-300	0.720	0.676	0.620	0.563	0.509	0.418	0.272	0.124	0.083	0.055
	LS2-600	1.440	1.353	1.239	1.126	1.017	0.836	0.544	0.248	0.165	0.111
1.90	LS12-100	0.357	0.324	0.284	0.247	0.216	0.172	0.109	0.048	0.032	0.021
	LS10-100	0.357	0.324	0.284	0.247	0.216	0.172	0.109	0.048	0.032	0.021
	LS6-200	0.713	0.649	0.568	0.493	0.431	0.343	0.219	0.096	0.063	0.042
	LS4-300	1.070	0.973	0.851	0.740	0.647	0.515	0.328	0.144	0.095	0.063
	LS2-600	2.139	1.946	1.703	1.480	1.294	1.030	0.657	0.289	0.189	0.126
1.85	LS12-100	0.479	0.421	0.349	0.291	0.249	0.196	0.122	0.053	0.035	0.023
	LS10-100	0.479	0.421	0.349	0.291	0.249	0.196	0.122	0.053	0.035	0.023
	LS6-200	0.958	0.842	0.698	0.581	0.497	0.392	0.243	0.106	0.070	0.046
	LS4-300	1.436	1.263	1.047	0.872	0.746	0.588	0.365	0.159	0.105	0.070
	LS2-600	2.873	2.525	2.094	1.744	1.492	1.175	0.729	0.319	0.209	0.139
1.80	LS12-100	0.593	0.502	0.399	0.324	0.274	0.211	0.130	0.056	0.037	0.024
	LS10-100	0.593	0.502	0.399	0.324	0.274	0.211	0.130	0.056	0.037	0.024
	LS6-200	1.186	1.005	0.799	0.649	0.548	0.422	0.260	0.113	0.073	0.048
	LS4-300	1.779	1.507	1.198	0.973	0.822	0.633	0.391	0.169	0.110	0.072
	LS2-600	3.558	3.015	2.396	1.946	1.643	1.265	0.781	0.338	0.219	0.145
1.75	LS12-100	0.703	0.547	0.416	0.337	0.284	0.219	0.134	0.058	0.038	0.025
	LS10-100	0.703	0.547	0.416	0.337	0.284	0.219	0.134	0.058	0.038	0.025
	LS6-200	1.406	1.094	0.832	0.673	0.568	0.438	0.268	0.116	0.075	0.050
	LS4-300	2.109	1.642	1.249	1.010	0.853	0.657	0.402	0.174	0.113	0.074
	LS2-600	4.218	3.283	2.497	2.020	1.705	1.314	0.804	0.348	0.226	0.149
1.70	LS12-100	0.801	0.575	0.426	0.343	0.289	0.222	0.134	Not recommended to discharge longer than 1 hour below 1.75 VPC.		
	LS10-100	0.801	0.575	0.426	0.343	0.289	0.222	0.134			
	LS6-200	1.602	1.149	0.853	0.687	0.579	0.445	0.268			
	LS4-300	2.403	1.724	1.279	1.030	0.868	0.667	0.402			
	LS2-600	4.805	3.448	2.558	2.060	1.737	1.335	0.803			
1.67	LS12-100	0.857	0.592	0.436	0.343	Not recommended to discharge longer than 15 min. below 1.70 VPC.					
	LS10-100	0.857	0.592	0.436	0.343						
	LS6-200	1.715	1.186	0.872	0.687						
	LS4-300	2.571	1.777	1.309	1.030						
	LS2-600	5.143	3.554	2.618	2.060						
1.65	LS12-100	0.893	0.603	0.436	0.344						
	LS10-100	0.893	0.603	0.436	0.344						
	LS6-200	1.787	1.205	0.873	0.689						
	LS4-300	2.680	1.808	1.309	1.033						
	LS2-600	5.360	3.615	2.618	2.067						
1.63	LS12-100	0.929	0.612	0.437	0.345						
	LS10-100	0.929	0.612	0.437	0.345						
	LS6-200	1.859	1.223	0.874	0.691						
	LS4-300	2.788	1.836	1.310	1.036						
	LS2-600	5.576	3.671	2.620	2.072						

Note: Liberty Series 1000 batteries are tested to 95 percent of published rates at time of shipment at 8 hour rate to 1.75 VPC. Additional ratings and application information is available in the Battery Selection Program at www.cdstandbypower.net

OPTIONAL ACCESSORIES

STEEL JACKETS

For demanding applications, C&D provides optional components to enhance battery life. An optional steel jacket is available to preserve jar shape and maintain element compression in high-temperature operations.



RELAY RACK BATTERY TRAYS

C&D manufactures a wide range of battery trays to mount in 19 inch (48.3 cm) and 23 inch (58.4 cm) relay racks. Please see 12-1064 for more information.



MODULAR RACKS WITH PANELS

C&D is a major supplier of high-quality VRLA battery racks to Telecommunications, Switchgear & Control, and UPS markets. Both standard and modular racks are designed and manufactured to suit all cell configurations, including multi-row and multi-tier layouts. C&D racks meet seismic loading requirements. Contact C&D Technologies for additional information.



MODULAR RACK

C&D's modular racks provide a flexible, efficient method for racking Liberty Series 1000 batteries. These attractive, durable racks provide accessibility to the batteries and are easy to install. Racks are available in 29 inch (73.7 cm) and 43 inch (109.2 cm) lengths and are stackable. Optional panels are available to completely enclose racks, providing a cabinet-like appearance. Please see 12-380 for more information. Complete standby power systems from C&D include batteries, racks, and electronics.





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