



THE *m-s endur™* SERIES VRLA BATTERY THE TRUE LONG-LIFE BATTERY™

**FOR STANDBY APPLICATIONS
CAPACITIES FROM 345-1985 AMPERE-HOURS**



The msEndur™ is the latest advancement in valve regulated lead-acid (VRLA) batteries for standby applications. By combining C&D Technologies' history of battery research and design with advanced MSE technology, C&D has created the msEndur — The True Long-Life Battery™. The msEndur batteries are unmatched in power density with space saving module designs and have a 20-year design life that will reduce total cost of ownership, backed by a 7-year full warranty.

FEATURES & BENEFITS

ADVANCED SYSTEM FEATURES

- Modular design for ease of installation and stacking flexibility
- Space saving design for the greatest amount of power in a small footprint
- Tin-plated copper connectors minimize maintenance
- Various options and accessories for customized system flexibility and expansion

ADVANCED MATERIALS

- Advanced microporous absorbed glass mat separators for ultra-low float current — reduces grid corrosion for a long, usable service life
- Proprietary calcium alloys to minimize positive grid corrosion and growth — maximizes battery life
- Robust thermoplastic container — enhances product quality and improves strength over other container materials for safe operation with flammability rating UL-94: 5VB
- Highly efficient, proprietary plate processing for high utilization of active material — results in high energy density

ADVANCED PROCESSES

- Advanced formation process results in a narrow float voltage window making on-site float matching unnecessary
- Highly controlled manufacturing processes for exceptional and consistent plate quality

ADVANCED SERVICE LIFE AND WARRANTY

- Proprietary cell design and manufacturing process provides for documented long-lasting service life
- Industry leading 7-year full warranty

ADVANCED EXPERIENCE

- Nearly 100 years of experience in the battery industry
- The only producer and marketer of complete battery and electronics systems for total power solutions
- Fully backed by a worldwide network for local service

ADVANCED DESIGN FEATURES

1. Large Post Design

- Lower current resistance
- Larger area for easy access by test equipment

2. Computer-controlled Proprietary Heliarc Weld

- High quality consistent weld
- 100% tested for maximum reliability

3. Threaded Copper Inserted Post

- Reduces resistance to current
- Improves high rate performance
- High torque limit to 160in-lbs
- Minimal maintenance required

4. Robust Post Seal Design

- Patented bonding process for bushing to cover seal
- Patent-pending flexible post seal on msEndur AT-2000

5. Proven Jar-to-Cover Seal

- More robust than competitive seal designs
- All cells are 100% factory tested
- Ensures maximum product reliability

6. Moss Shield

- Extends battery life by preventing premature shorting

7. Patented Positive Grid Design

- Proprietary grid design reduces plate growth
- Thick lead-calcium-tin positive plate — 0.275 in (7mm) for 20-year design life

8. C-Wrap AGM

- Prevents plates from shorting on the sides and edges

9. Patented Ribbed Jar Design

- Provides extra strength, self-supporting container
- Provides space-efficient airflow gap for uniform cell temperatures
- Better heat dissipation optimizes life

10. Insulated Plate Boot

- Prevents shorting at bottom of plate
- Improves product quality

11. Deep Well Support Bridge

- Allows plate growth without affecting performance
- Reduces stress on jar-to-cover and post seals
- Supports the element in horizontal position
- Increases the life of battery

12. Container Material

- PC/ABS blend provides improved thermal and strength properties

SPECIFICATIONS

| Cell Model | AT-07 | AT-09 | AT-11 | AT-15 | AT-19 | AT-23 | AT-27 | AT-35 |
|---|---|------------|-------------|-------------|-------------|-------------|--------------|--------------|
| Cell Type | AT-350 | AT-460 | AT-580 | AT-810 | AT-1040 | AT-1260 | AT-1500 | AT-2000 |
| Nominal Voltage Rated Capacity (8 hr to 1.75) | 345 | 460 | 575 | 805 | 1035 | 1265 | 1495 | 1985 |
| Positive Plates | 3 | 4 | 5 | 7 | 9 | 11 | 13 | 17 |
| Plate Thickness | 0.275" (7mm) | | | | | | | |
| Plate Alloy | Lead-Calcium-Tin | | | | | | | |
| Recommended Operating Temperature | 77°F (25°) ±10°F (5.5°) | | | | | | | |
| Acceptable Temperature Range | 40°F – 100°F (4°C-43°C) | | | | | | | |
| Depth in (mm) | 23.1 (587.5) | | | | | | | |
| Height in (mm) | 3.0 (76.2) | 3.8 (96.5) | 4.5 (114.3) | 5.9 (149.9) | 7.4 (188.0) | 8.9 (226.0) | 10.3 (261.6) | 13.4 (339.0) |
| Width in (mm) | 8.9 (226.0) | | | | | | | |
| Weight lbs (kg)** | 63 (28) | 80 (36) | 98 (45) | 132 (60) | 167 (75) | 204 (91) | 237 (108) | 317 (143) |
| Electrolyte Volume gal (l)** | 1.1 (5.0) | 1.5 (6.8) | 1.8 (8.2) | 2.4 (10.9) | 3.1 (14.1) | 3.7 (16.8) | 4.3 (19.6) | 5.6 (25.5) |
| Connector Initial Torque | 160in-lbs (18N-m) | | | | | | | |
| Re-Torque for Scheduled Maintenance | 125in-lbs (14N-m) | | | | | | | |
| Open Circuit Voltage (Fully Charged) | 2.15 VPC at 77°F (25°) | | | | | | | |
| Constant Voltage Charge (Float) | 2.25 - 2.27 VPC at 77°F (25°) | | | | | | | |
| Float Current at 77°F (25°) mA** | 22.5 | 30.0 | 37.5 | 52.5 | 67.5 | 82.5 | 97.5 | 127.0 |
| Charger Temperature Correction: | +2mV/degF below 77°F -2mV/degF above 77°F | | | | | | | |
| Hydrogen Evolution at Max Re-charge* Cubic Feet Per Hour | 0.000187 | 0.000141 | 0.000112 | 0.000080 | 0.000062 | 0.000051 | 0.000043 | 0.000033 |
| Internal Resistance ohms** | 0.000816 | 0.000612 | 0.000490 | 0.000350 | 0.000272 | 0.000223 | 0.000188 | 0.000138 |
| Conductance Values KMhos*** | 2.4 | 2.9 | 3.3 | 4.4 | 5.8 | 6.4 | 6.6 | 7.5 |
| Short Circuit Current A** | 2500 | 3400 | 4200 | 5900 | 7600 | 9200 | 10900 | 14266 |

* Per IEEE 1187 specifications, **Data Subject to change ±5%, ***Variation of ±25% acceptable

RATINGS IN AMPERES AT 77F (25C) PER CELL

| FV/Cell | Model | 1 hr | 2 hr | 3 hr | 4 hr | 5 hr | 6 hr | 7 hr | 8 hr |
|---------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| 1.75 | AT-07 | 186.3 | 122.2 | 92.5 | 74.9 | 63.1 | 54.6 | 48.1 | 43.1 |
| | AT-09 | 248.3 | 163.0 | 123.3 | 99.8 | 84.1 | 72.7 | 64.2 | 57.4 |
| | AT-11 | 310.4 | 203.7 | 154.1 | 124.8 | 105.1 | 90.9 | 80.2 | 71.8 |
| | AT-15 | 434.6 | 285.2 | 215.8 | 174.7 | 147.1 | 127.3 | 112.3 | 100.5 |
| | AT-19 | 558.8 | 366.7 | 277.4 | 224.6 | 189.2 | 163.7 | 144.4 | 129.2 |
| | AT-23 | 682.9 | 448.2 | 339.1 | 274.5 | 231.2 | 200.1 | 176.5 | 157.9 |
| | AT-27 | 807.1 | 529.7 | 400.7 | 324.4 | 273.2 | 236.4 | 208.5 | 186.7 |
| | AT-35 | 1044.1 | 687.5 | 523.4 | 425.9 | 360.3 | 312.9 | 276.8 | 248.3 |
| 1.80 | AT-07 | 172.7 | 114.7 | 87.5 | 71.3 | 60.4 | 52.5 | 46.5 | 41.8 |
| | AT-09 | 230.2 | 152.9 | 116.6 | 95.1 | 80.5 | 70.0 | 62.0 | 55.7 |
| | AT-11 | 287.8 | 191.1 | 145.8 | 118.8 | 100.7 | 87.5 | 77.5 | 69.6 |
| | AT-15 | 402.9 | 267.5 | 204.1 | 166.3 | 141.0 | 122.6 | 108.5 | 97.5 |
| | AT-19 | 518.0 | 344.0 | 262.4 | 213.9 | 181.2 | 157.6 | 139.6 | 125.3 |
| | AT-23 | 633.2 | 420.4 | 320.7 | 261.4 | 221.5 | 192.6 | 170.6 | 153.2 |
| | AT-27 | 748.3 | 496.9 | 379.0 | 308.9 | 261.8 | 227.6 | 201.6 | 181.0 |
| | AT-35 | 971.9 | 646.7 | 495.8 | 405.8 | 345.1 | 300.9 | 267.1 | 240.4 |
| 1.84 | AT-07 | 159.1 | 108.6 | 83.4 | 68.1 | 57.7 | 50.1 | 44.4 | 39.9 |
| | AT-09 | 212.2 | 144.9 | 111.2 | 90.7 | 76.9 | 66.9 | 59.2 | 53.2 |
| | AT-11 | 265.2 | 181.1 | 139.0 | 113.4 | 96.1 | 83.6 | 74.0 | 66.4 |
| | AT-15 | 371.3 | 253.5 | 194.5 | 158.8 | 134.6 | 117.0 | 103.6 | 93.0 |
| | AT-19 | 477.4 | 325.9 | 250.1 | 204.2 | 173.1 | 150.4 | 133.2 | 119.6 |
| | AT-23 | 583.5 | 398.4 | 305.7 | 249.6 | 211.5 | 183.9 | 162.8 | 146.2 |
| | AT-27 | 689.6 | 470.8 | 361.3 | 294.9 | 250.0 | 217.3 | 192.4 | 172.8 |
| | AT-35 | 896.5 | 612.1 | 471.9 | 387.0 | 329.3 | 287.2 | 255.0 | 229.5 |
| 1.86 | AT-07 | 150.6 | 104.4 | 80.5 | 65.8 | 55.8 | 48.6 | 43.0 | 38.6 |
| | AT-09 | 200.8 | 139.2 | 107.3 | 87.8 | 74.5 | 64.8 | 57.4 | 51.5 |
| | AT-11 | 251.0 | 174.0 | 134.1 | 109.7 | 93.1 | 80.9 | 71.7 | 64.4 |
| | AT-15 | 351.4 | 243.6 | 187.8 | 153.6 | 130.3 | 113.3 | 100.4 | 90.1 |
| | AT-19 | 451.9 | 313.2 | 241.4 | 197.5 | 167.5 | 145.7 | 129.0 | 115.9 |
| | AT-23 | 552.3 | 382.8 | 295.1 | 241.3 | 204.7 | 178.1 | 157.7 | 141.6 |
| | AT-27 | 652.7 | 452.4 | 348.8 | 285.2 | 242.0 | 210.5 | 186.4 | 167.4 |
| | AT-35 | 849.4 | 589.0 | 456.1 | 374.7 | 319.2 | 278.5 | 247.4 | 222.7 |

RATINGS IN KILOWATTS AT 77F (25C) PER CELL

| FV/Cell | Model | 1 min | 5 min | 10 min | 15 min | 20 min | 30 min | 45 min | 1 hr |
|---------|--------|-------|-------|--------|--------|--------|--------|--------|-------|
| 1.67 | AT-07 | 0.802 | 0.758 | 0.699 | 0.641 | 0.586 | 0.498 | 0.412 | 0.357 |
| | AT-09 | 1.070 | 1.010 | 0.932 | 0.854 | 0.781 | 0.664 | 0.549 | 0.476 |
| | AT-11 | 1.337 | 1.263 | 1.166 | 1.068 | 0.977 | 0.830 | 0.687 | 0.596 |
| | AT-15 | 1.872 | 1.768 | 1.632 | 1.495 | 1.367 | 1.162 | 0.962 | 0.834 |
| | AT-19 | 2.407 | 2.273 | 2.098 | 1.922 | 1.758 | 1.494 | 1.236 | 1.072 |
| | AT-23* | – | – | – | – | – | – | – | – |
| | AT-27 | 3.476 | 3.283 | 3.030 | 2.776 | 2.539 | 2.158 | 1.786 | 1.548 |
| | AT-35* | – | – | – | – | – | – | – | – |

*Contact C&D for rates

STANDARD AT SYSTEMS. 24VDC, 48VDC, AND 120VDC

| Cell Model | Cell Type | Total Plates | System Part Number | System Drawing Number | Number of Cells | System Voltage | Modules | | | | | Num. Stacks | System | | | |
|------------|-----------|--------------|--------------------|-----------------------|-----------------|----------------|-------------|--------|-------------|------|--------|-------------|--------|--------|-------|-------|
| | | | | | | | Cell Layout | | Width/Stack | | Height | | Weight | | | |
| | | | | | | | Width | Height | in | mm | in | | mm | lbs | kg | |
| AT-07 | AT-350 | 7 | R0762012CE01 | R0762012CE01-00 | 12 | 24 | 6 | X | 2 | 21.4 | 544.6 | 1 | 24.8 | 630.4 | 1013 | 459 |
| | | 7 | R0764024CE01 | R0764024CE01-00 | 24 | 48 | 6 | X | 4 | 21.4 | 544.6 | 1 | 44.7 | 1136.2 | 1967 | 892 |
| | | 7 | R0765060CE01 | R0765060CE01-00 | 60 | 120 | 6 | X | 5 | 21.4 | 544.6 | 2 | 54.6 | 1389.0 | 4888 | 2217 |
| | | 7 | R0768120CE01 | R0768120CE01-00 | 120 | 240 | 6 | X | 8 | 26.1 | 663.7 | 3 | 84.4 | 2147.6 | 9717 | 4408 |
| AT-09 | AT-460 | 9 | R0943012CE01 | R0943012CE01-00 | 12 | 24 | 4 | X | 3 | 18.7 | 476.0 | 1 | 34.7 | 883.3 | 1263 | 573 |
| | | 9 | R0962012CE01 | R0962012CE01-00 | | | 6 | X | 2 | 26.1 | 663.7 | 1 | 24.8 | 630.4 | 1235 | 560 |
| | | 9 | R0946024CE01 | R0946024CE01-00 | 24 | 48 | 4 | X | 6 | 18.7 | 476.0 | 1 | 64.5 | 1641.9 | 2469 | 1120 |
| | | 9 | R0964024CE01 | R0964024CE01-00 | | | 6 | X | 4 | 26.1 | 663.7 | 1 | 44.7 | 1136.2 | 2407 | 1092 |
| | | 9 | R0948060CE01 | R0948060CE01-00 | 60 | 120 | 4 | X | 8 | 18.7 | 476.0 | 2 | 84.4 | 2147.6 | 6087 | 2761 |
| | | 9 | R0967120CE01 | R0967120CE01-00 | 120 | 240 | 6 | X | 7 | 26.1 | 663.7 | 3 | 74.5 | 1894.8 | 11909 | 5402 |
| AT-11 | AT-580 | 11 | R1143012CE01 | R1143012CE01-00 | 12 | 24 | 4 | X | 3 | 21.4 | 544.6 | 1 | 34.7 | 883.3 | 1487 | 674 |
| | | 11 | R1162012CE01 | R1162012CE01-00 | | | 6 | X | 2 | 30.4 | 773.2 | 1 | 24.8 | 630.4 | 1459 | 662 |
| | | 11 | R1146024CE01 | R1146024CE01-00 | 24 | 48 | 4 | X | 6 | 21.4 | 544.6 | 1 | 64.5 | 1641.9 | 2915 | 1322 |
| | | 11 | R1164024CE01 | R1164024CE01-00 | | | 6 | X | 4 | 30.4 | 773.2 | 1 | 44.7 | 1136.2 | 2851 | 1293 |
| | | 11 | R1148060CE01 | R1148060CE01-00 | 60 | 120 | 4 | X | 8 | 21.4 | 544.6 | 2 | 84.4 | 2147.6 | 7258 | 3292 |
| | | 11 | R1167120CE01 | R1167120CE01-00 | 120 | 240 | 6 | X | 7 | 30.4 | 773.2 | 3 | 74.5 | 1894.8 | 14121 | 6405 |
| AT-15 | AT-810 | 15 | R1534012CE01 | R1534012CE01-00 | 12 | 24 | 3 | X | 4 | 21.4 | 544.6 | 1 | 44.7 | 1136.2 | 1959 | 889 |
| | | 15 | R1543012CE01 | R1543012CE01-00 | | | 4 | X | 3 | 27.9 | 708.7 | 1 | 34.7 | 883.3 | 1924 | 873 |
| | | 15 | R1538024CE01 | R1538024CE01-00 | 24 | 48 | 3 | X | 8 | 21.4 | 544.6 | 1 | 84.4 | 2147.6 | 3859 | 1750 |
| | | 15 | R1546024CE01 | R1546024CE01-00 | | | 4 | X | 6 | 27.9 | 708.7 | 1 | 64.5 | 1641.9 | 3784 | 1716 |
| | | 15 | R1548060CE01 | R1548060CE01-00 | 60 | 120 | 4 | X | 8 | 27.9 | 708.7 | 2 | 84.4 | 2147.6 | 9428 | 4276 |
| | | 15 | R1567120CE01 | R1567120CE01-00 | 120 | 240 | 6 | X | 7 | 39.5 | 1004.3 | 3 | 74.5 | 1894.8 | 18502 | 8392 |
| AT-19 | AT-1040 | 19 | R1934012CE01 | R1934012CE01-00 | 12 | 24 | 3 | X | 4 | 26.1 | 663.7 | 1 | 44.7 | 1136.2 | 2399 | 1088 |
| | | 19 | R1943012CE01 | R1943012CE01-00 | | | 4 | X | 3 | 33.5 | 849.9 | 1 | 34.7 | 883.3 | 2367 | 1074 |
| | | 19 | R1938024CE01 | R1938024CE01-00 | 24 | 48 | 3 | X | 8 | 26.1 | 663.7 | 1 | 84.4 | 2147.6 | 4735 | 2148 |
| | | 19 | R1946024CE01 | R1946024CE01-00 | | | 4 | X | 6 | 33.5 | 849.9 | 1 | 64.5 | 1641.9 | 4665 | 2116 |
| | | 19 | R1948060CE01 | R1948060CE01-00 | 60 | 120 | 4 | X | 8 | 33.5 | 849.9 | 2 | 84.4 | 2147.6 | 11628 | 5274 |
| | | 19 | R1948120CE01 | R1948120CE01-00 | 120 | 240 | 4 | X | 8 | 33.5 | 849.9 | 4 | 84.4 | 2147.6 | 23256 | 10549 |
| AT-23 | AT-1260 | 23 | R2334012CE01 | R2334012CE01-00 | 12 | 24 | 3 | X | 4 | 30.4 | 773.2 | 1 | 44.7 | 1136.2 | 2843 | 1290 |
| | | 23 | R2343012CE01 | R2343012CE01-00 | | | 4 | X | 3 | 39.5 | 1004.3 | 1 | 34.7 | 883.3 | 2810 | 1275 |
| | | 23 | R2338024CE01 | R2338024CE01-00 | 24 | 48 | 3 | X | 8 | 30.4 | 773.2 | 1 | 84.4 | 2147.6 | 5619 | 2549 |
| | | 23 | R2346024CE01 | R2346024CE01-00 | | | 4 | X | 6 | 39.5 | 1004.3 | 1 | 64.5 | 1641.9 | 5546 | 2516 |
| | | 23 | R2348060CE01 | R2348060CE01-00 | 60 | 120 | 4 | X | 8 | 39.5 | 1004.3 | 2 | 84.4 | 2147.6 | 13828 | 6272 |
| AT-27 | AT-1500 | 27 | R2734012CE01 | R2734012CE01-00 | 12 | 24 | 3 | X | 4 | 43.6 | 1107.9 | 1 | 44.7 | 1136.2 | 3310 | 1501 |
| | | 27 | R2743012CE01 | R2743012CE01-00 | | | 4 | X | 3 | 45.5 | 1156.5 | 1 | 34.7 | 883.3 | 3308 | 1500 |
| | | 27 | R2738024CE01 | R2738024CE01-00 | 24 | 48 | 3 | X | 8 | 43.6 | 1107.9 | 1 | 84.4 | 2147.6 | 6550 | 2971 |
| | | 27 | R2746024CE01 | R2746024CE01-00 | | | 4 | X | 6 | 45.5 | 1156.5 | 1 | 64.5 | 1641.9 | 6539 | 2966 |
| | | 27 | R2748060CE01 | R2748060CE01-00 | 60 | 120 | 4 | X | 8 | 45.5 | 1156.5 | 2 | 84.4 | 2147.6 | 16309 | 7398 |
| | | 27 | R2748120CE01 | R2748120CE01-00 | 120 | 240 | 4 | X | 8 | 45.5 | 1156.5 | 4 | 84.4 | 2147.6 | 32618 | 14795 |
| AT-35 | AT-2000 | 35 | R3534012CE01 | R3534012CE01-00 | 12 | 24 | 3 | X | 4 | 43.6 | 1107.9 | 1 | 44.7 | 1136.2 | 4196 | 1903 |
| | | 35 | R3526012CE01 | R3526012CE01-00 | | | 2 | X | 6 | 30.4 | 773.2 | 1 | 64.5 | 1641.9 | 4237 | 1922 |
| | | 35 | R3538024CE01 | R3538024CE01-00 | 24 | 48 | 3 | X | 8 | 43.6 | 1107.9 | 1 | 84.4 | 2147.6 | 8316 | 3772 |