CROWN BATTERY
SINCE 1926
A CENTURY OF POWER.
A LEGACY OF PERFORMANCE.
100 YEARS

Safety. First.

Battery Handling, Maintenance & Test Procedures

Crown FLA and AGM Starter batteries feature advanced engineering, intelligent, robust construction and proven innovations that combine to deliver on-demand starting and reserve power for automotive, light truck, heavy-duty commercial, stationary engine and recreational equipment applications. Our precision-automated assembly process consistently ensure best-in-class performance, reliability and return on investment

Safety is Your Responsibility

Crown Flooded Lead Acid (FLA) Starter batteries are maintenance-free, safe, and high-performance batteries for Automotive, Heavy-Duty Commercial, Stationary Power, and Recreational Vehicle internal combustion applications. The chemistry and plate design of Crown Starter batteries deliver key benefits over competitive products and are designed to increase the adhesion of high-density C-Force™ active mass to provide the best available reliability, usable life, and durability.

To achieve the results you need, Crown Battery recommends best practices and maintenance practices that are designed to ensure dependable service life. Be sure to follow these safety precautions when working with batteries:

- Wear appropriate protective gear including safety glasses, protective footwear and gloves to prevent electrical shocks and ensure fall protection. Battery electrolyte can cause blindness or severe burns. If exposed to electrolyte, immediately flush affected area with water and seek medical attention.
- Remove watches and jewelry and avoid causing sparks with tools. When possible, use tools with insulated or non-conductive handles when securing batteries or cabling in the application.
- All lead acid batteries generate highly flammable hydrogen gas. Keep sparks, flames, and cigarettes away from batteries at all times.
- Maintain good ventilation when working on or charging batteries.
- **Check battery fluid conditions only if your battery allows access via removable vents. After cell inspections, always verify that vent caps are secured tightly to batteries.**
- **Always disconnect negative cable FIRST and connect it LAST to prevent dangerous sparks.**

Crown Battery's Starter Battery lineup includes a full array of FLA and AGM products for traditional IC and Hybrid "start/stop" vehicle applications, as well as 12-volt auxiliary batteries used in all-electric vehicles.

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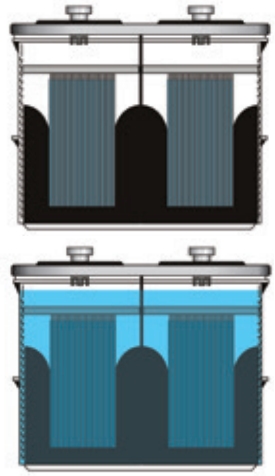
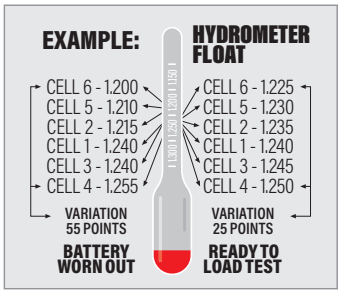
FLA BATTERY HANDLING, MAINTENANCE & TEST PROCEDURES

1. VISUAL INSPECTION:

Check battery age or length of service. Expired battery life is the primary reason for battery failure or service issues.	If cells are accessible — check fluid levels. Fluid should be above the plates. If fluid levels are low — replace the battery.
Inspect battery for damage or leaks. If damage is observed — replace the battery.	For AGM batteries, look for evidence of bulging or concave battery containers.



2. STATE-OF-CHARGE INSPECTION:



STATE OF CHARGE LEVEL	SPECIFIC GRAVITY
100%	1.265 or Greater
75%	1.225 – 1.230
50%	1.190 – 1.205
25%	1.150 – 1.175
Discharged	1.125 or Less

AGM STATE OF CHARGE LEVEL — REFER TO SECTION 3

WARNING: Check battery fluid conditions only if your battery allows access via removable vents. Do not remove pressure relief valves on AGM Batteries as this will damage the product. For FLA batteries, if the electrolyte is accessible, verify battery state-of-charge by inspecting the specific gravity of the battery electrolyte after charging service is completed. Hydrometer reading of all cells should be at least 1.225 and show less than 50 points difference between high and low.

- More than 50 points difference: replace the battery
- Less than 50 point difference, but some cells read less than 1.225, recharge the battery

Replace the vent caps during recharge. Charge the battery according to the practices shown on the following page until the battery specific gravities or open circuit voltage indicate a full charge condition. If charging won't restore a full state-of-charge, replace the battery.

3. OPEN CIRCUIT VOLTAGE AND ELECTRICAL LOAD TEST:

If the battery is sealed (ex. AGM) or when its electrolyte is not accessible, or if inspection of the battery's fluid does not verify battery viability — check the battery's open circuit voltage to verify state of charge.

Determine the approximate state-of-charge from the chart below:

STATE OF CHARGE LEVEL	AGM BATTERY 12-VOLT OPEN CIRCUIT VOLTAGE	FLA BATTERY 12-VOLT OPEN CIRCUIT VOLTAGE	FLA BATTERY 6-VOLT OPEN CIRCUIT VOLTAGE
100%	12.80 >	12.60 >	6.30 >
75%	12.60	12.40	6.20
50%	12.30	12.20	6.10
25%	12.00	12.00	6.00
0%	11.80	11.70	5.95

Batteries with less than 75% state of charge should be charged before an electrical load test is applied to the battery. When load testing batteries, remove all battery cables, disconnecting the negative cables first. Make sure the battery terminals are free of corrosion or dirt.

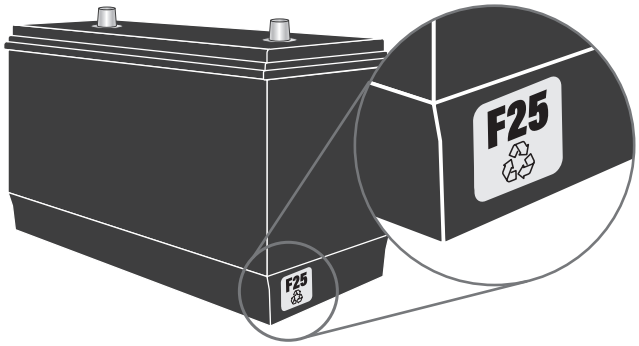
For heavy-duty batteries with threaded stud terminals, attach a lead charging post to the threaded stud terminal before testing. Using a carbon pile load tester or heavy duty adjustable load tester, apply a load test equivalent to 50% of the battery CCA Rating (0°F / -18°C) for 15 seconds; remove the load. Refer to the chart above to determine the minimum passing voltage.

If the test voltage is above the minimum, return the battery to service.
If test voltage is below the minimum, replace the battery.

AMBIENT TEMPERATURE	15-SECOND MINIMUM VOLTAGE
70°F / 21°C and Above	9.5 Volts
50°F / 10°C and Above	9.4 Volts
30°F / -1°C and Above	9.1 Volts
15°F / -9°C and Above	8.7 Volts
0°F / -18°C and Above	8.5 Volts
Below 0°F / -18°C	8.0 Volts

BATTERY MANAGEMENT BEST PRACTICES

INVENTORY RECEIPTS	STORAGE BEST PRACTICES	SAFETY. FIRST.
Upon receipt of batteries, examine the shipment for indications of impact or damage.	Always store batteries upright and within reach; whenever possible, use gravity flow racks to make it easy to store and rotate stock.	Wear protective gear (safety glasses, protective footwear and gloves) when handling batteries. Always keep sparks or open flames away from stock.
Always notify your supplier of shipment damage or other issues.	Follow FIFO (first-in, first-out) stock guidelines; batteries have a shelf life.	Take care to avoid mixing new and scrap batteries on the same rack or pallet; avoid storing batteries in direct sunlight or high temperatures.
Before inventory storage, verify the inventory receipt quantities with the shipment packing list.	Batteries marked with Date Codes older than 6-7 months from the current date should be boost-charged before sale.	FLA and AGM lead batteries can be recycled at qualified battery disposal agents. Never mix scrap lead and lithium batteries because of safety and operational risks.



MONTH			YEAR		
A – January	E – May	I – September	24 – 2024	28 – 2028	32 – 2032
B – February	F – June	J – October	25 – 2025	29 – 2029	33 – 2033
C – March	G – July	K – November	26 – 2026	30 – 2030	34 – 2034
D – April	H – August	L – December	27 – 2027	31 – 2031	35 – 2035

STATE OF CHARGE LEVEL	12 VOLT BATTERY OPEN CIRCUIT VOLTAGE
100%	12.6 or Greater
75% – 100%	12.4 – 12.6
50% – 75%	12.2 – 12.4
25% – 50%	12.0 – 12.2
0% – 25%	11.7 – 12.0
0%	11.7 or Less

RECOMMENDED CHARGING PRACTICES

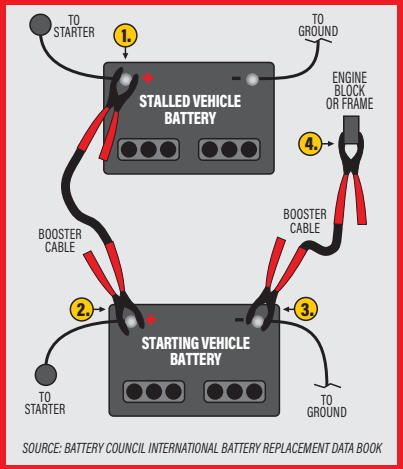
- Before charging service, refer to the charger manufacturer's instructions for correct charger-to-battery connection and equipment operation.
- Power off the charger before connection to the battery to avoid sparking.
- For batteries fitted with threaded stud terminals or GM-type side terminals, use only lead charging posts that ensure a flush lead-to-lead terminal surface contact. Verify that charging posts are securely tightened to the terminal, which will enable safe and effective charging service. Never connect the charger to a stainless steel bolt or stud.
- To avoid battery explosion, never charge a frozen battery. Frozen batteries should be warmed to room temperature before charging service begins.
- If the battery's electrolyte is accessible, check battery electrolyte levels to ensure that liquid levels are above the top of the plates in all cells. If plates are not covered, add only enough water to cover plates, replace vent caps and place on charge. Be sure no open flame or spark is near while the battery's vent caps are exposed. After charging, fill with water and replace vent caps on the battery.
- Charging service should be terminated if batteries become excessively hot or if violent gassing or discharge of electrolyte occurs during charge.
- Avoid "quick" or "fast" charging batteries in all cases. Limit charger input current to 25% of the batteries reserve capacity minutes rating. Lower current input charges the battery more uniformly and creates less heat, which reduces the possibility of overcharge. Remember: overcharging ruins batteries.
- Monitor battery state-of-charge throughout the charging period, continuing the charge until a three-hour period shows no additional voltage or tapering of charge current. Refer to page 1 for full-charge voltage and specific gravity points. Refer to page 2 for 100% state-of-charge references.

RECOMMENDED JUMP-STARTING PRACTICES

Refer to the vehicle owner's manual for manufacturer's recommended procedure.

Make it a point to wear personal protective equipment whenever jump-starting batteries — shield your eyes and face at all times, wear heavy-duty protective gloves before touching batteries or jumper cables.

Make certain that battery vent caps are tight and level. Place a heavy cloth over both batteries' vent caps. Keep a safe distance between vehicles involved in jump-starting, making sure vehicles don't come into contact while jump-starting occurs.



SOURCE: BATTERY COUNCIL INTERNATIONAL BATTERY REPLACEMENT DATA BOOK

1. Connect one end of the booster cable to the positive terminal of the discharged battery.
2. Connect the other end of the positive booster cable to the positive terminal of the assisting battery.
3. Connect one end of the negative booster cable to the negative terminal of the assisting battery.
4. Complete the jump-start connection by securing the other end of the negative booster cable to the engine block of the vehicle having the discharged battery — as far away from the discharged battery as possible. Be aware of safety risks while completing this connection — moving fan blades, belts and fuel lines.

LIMITED WARRANTY

1. **SCOPE OF LIMITED WARRANTY:** Free Replacement Period: All Crown batteries are warranted to be free from defects in material and workmanship. Any battery which demonstrates a defect in material and workmanship (discharged or sulfated batteries do not apply) within a Free Replacement Period specified by Crown Battery Manufacturing Company will be replaced or repaired at the option of Crown Battery, free of charge, except for the cost of transportation of the battery. Please reference your current Crown Battery Price Schedule to determine the Free Replacement Period available for Crown Battery's lineup of SLI battery products.
2. **LIMITATIONS:** In all sales other than direct retail sales by the seller of batteries considered to be consumer products to individual consumers, the foregoing warranty is in lieu of all other warranties not expressly set forth herein, whether express, implied or statutory, including those of merchantability or fitness for a particular purpose. The seller's liability for breach of this warranty or for any other purpose is limited, at seller's option, to the replacement of the battery or a refund of the purchase price of the battery.

   In any event, the seller's maximum liability shall be limited to the refund of the price paid for the battery. THE SELLER IS NOT RESPONSIBLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL COSTS, INCLUDING ANY EXPENSES FOR INSTALLATION, TOWING, ELECTRICAL SYSTEMS TESTS, CHARGING A BATTERY OR LOSS OF TIME. PLEASE NOTE: SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, OR EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.
3. **EXCLUSIONS:** The limited warranty does not apply to batteries that are only discharged, have broken containers, covers or damaged terminals, have been frozen, overcharged, sulfated, have foreign material or additive put in the electrolyte, or when evidence of neglect or abuse is present. The warranty does not apply if Crown Battery's proprietary manufacturing code markings have been tampered with or destroyed, if the battery is used in applications for which it is not designed, or if it was installed incorrectly or charged in reverse. Batteries installed in electric vehicle applications must not be used to run auxiliary loads that are unaccounted for by the battery charging system, and such use will void the warranty.
4. **WARRANTY SERVICE:** Return the suspect battery to any factory service center or factory authorized specialist or merchant. If an authorized representative cannot be located, contact Crown Battery's Customer Service Department via phone (**+1.419.334.7181**) or email (**commercial@crownbattery.com**). An authorized factory representative will be appointed to perform warranty service.

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100 YEARS SINCE 1926

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