

CAT® BATTERY CARE & MAINTENANCE GUIDE

Important: Always Wear Eye Protection



SAFETY PRECAUTIONS

1400 CCA at 0°F (-18°C)
 Distr. by: Caterpillar Inc., Peoria, Illinois 61629 USA
 Made in USA

DO NOT OPEN
RECYCLE
DO NOT TIP

⚠ DANGER/POISON
 SHIELD EYES. EXPLOSIVE GASES CAN CAUSE BLINDNESS OR INJURY. NO SPARKS, FLAMES OR SMOKING. SULFURIC ACID CAN CAUSE BLINDNESS OR SEVERE BURNS. FLUSH EYES IMMEDIATELY WITH WATER. GET MEDICAL HELP FAST.

KEEP OUT OF THE REACH OF CHILDREN. CONTAINS SULFURIC ACID. FOR MEDICAL EMERGENCY IN USA OR CANADA CONTACT: 800-452-8624. OTHER COUNTRIES CONTACT: 303-893-1322

Date Battery Purchased: 1 2 3 4 5 6 7 8 9 0
 Month: J F M A M J J A S O N D
 Year: 1 2 3 4 5 6 7 8 9 0
 Battery Voltage: 6V or 12V

Pb

Important: Always Wear Eye Protection ALWAYS WEAR SAFETY GLASSES AND A FACE SHIELD WHEN WORKING ON OR NEAR BATTERIES.

All batteries generate explosive hydrogen gas. Keep sparks, flames and cigarettes away from batteries at all times. Do not connect or disconnect "live" circuits. To avoid creating sparks, always turn charging and testing equipment OFF before attaching or removing clamps.

ALWAYS DISCONNECT GROUNDED CABLE FIRST AND CONNECT IT LAST TO PREVENT DANGEROUS SPARKS.

Perform all work in a well ventilated area. Never lean directly over a battery while boosting, testing or charging it.

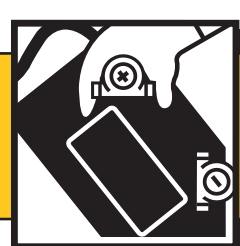
PROTECT YOUR EYES!

Batteries contain corrosive sulfuric acid that can destroy clothing and burn the skin. Neutralize acid spills with a paste made of baking soda and water.

BE CAREFUL!

NEVER USE COMPRESSED AIR FOR CLEANING NEAR A BATTERY.

Rapid air movement from compressed air combined with dust, dirt, etc. will create static electricity, which may lead to an explosion.



PROPER INSTALLATION

FOLLOW SAFETY PRECAUTIONS – WEAR PROPER EYE PROTECTION.

- Before removing old battery, mark the positive (+) and negative (-) cables for proper connection to the new battery.
- Always disconnect the ground cable first [usually negative (-)] to avoid any sparking around battery. Then disconnect the positive (+) cable and carefully remove the old battery.
- Clean and inspect the battery tray. When necessary, replace the tray and hold-down assembly. Also replace the battery cables if needed. Cable ends MUST be clean and corrosion free.

4. Put corrosion protection washers on battery terminals, install new battery in same position as old one, and tighten hold-down. Be sure terminals will clear hood, fender, box lid, etc.

5. Connect positive (+) cable first, then connect ground cable last. Use a special side terminal torque tool to tighten side terminal cables without damage. Never over tighten or hammer cables onto terminals.

6. Coat terminals and cable connection with a corrosion protection spray.



IN-MACHINE/VEHICLE SERVICE

FOLLOW SAFETY PRECAUTIONS – WEAR PROPER EYE PROTECTION.

Prior to any testing, visually inspect the battery. Look for:

- Cracked or broken case or cover
- Leaking case-to-cover seal
- Damaged or leaking terminals
- Loose cable connections
- Corrosion

Neutralize any corrosion with a baking soda/water paste or battery cleaner spray.

Scrape or brush off the residue and wash the area with clean water. Following your visual inspection, check the battery's state of charge with a voltmeter.

PROTECT YOUR EYES!

NEVER USE COMPRESSED AIR FOR CLEANING NEAR A BATTERY.

Rapid air movement from compressed air combined with dust, dirt, etc. will create static electricity, which may lead to an explosion.

Note: The Cat Digital Battery Analyzer (Part # 177-2330) enables you to determine whether a battery is bad or in need of a recharge in just 20 seconds, without having to remove the battery from the machine or vehicle. It quickly and accurately tests the condition of 12-volt and 6-volt batteries, even discharged to as low as one volt.



LOAD TESTING

FOLLOW SAFETY PRECAUTIONS – WEAR PROPER EYE PROTECTION.

First perform an open circuit voltage test using the Caterpillar® Digital Voltmeter, 4C6600, for a fast, accurate test.

Then perform an adjustable load test. A load test is the best way to determine if the battery is delivering adequate electrical performance. Make sure your variable load tester is working properly.

IF DISCHARGED – RECHARGE!

1. You can't load test a discharged battery. Always attempt to charge it before load testing if below 12.4 volts. If above 12.0 volts, remove surface charge before charging. Refer to the charging instructions below for important information.

TURN TESTER OFF!

2. To avoid sparking, be sure load tester is OFF and battery is disconnected before hook-up. Use computer memory saver to retain the machine's electronic memory while the battery is disconnected.

RED TO POSITIVE & BLACK TO NEGATIVE.

3. Connect the positive (+) tester clamp to the positive (+) battery terminal. Then connect the negative (-) tester clamp to the negative (-) battery terminal. Always protect your eyes.

SET AT 1/2 COLD CRANKING AMPERE (CCA) RATING*.

4. Set the tester for one-half the battery's 0°F cold crank rating and apply the load for 15 seconds. Battery ambient temperature must be 10°C (50°F) or greater.

**9.5 VOLTS OK FOR 12V BATTERY!
4.7 VOLTS OK FOR 6V BATTERY!**

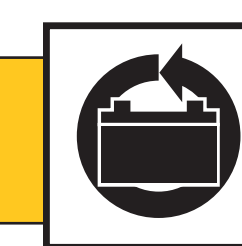
5. With the load still on the battery, check the tester reading. A steady reading of 9.5 volts for 12V battery or 4.7 volts for 6V battery while under load indicates a good battery.

LESS THAN 9.5 VOLTS OR 4.7 VOLTS RECHARGE OR REPLACE.

6. If the reading is below 9.5 or 4.7 volts under load, boost charge the battery and test it again. If the second reading is still low, replace the battery.

* (If the CCA rating is unknown, use 200 for auto batteries, 350 for commercial batteries and 100 for small-engine batteries.)

FOR COMPLETE LOAD TEST PROCEDURE INFORMATION REFER TO THE CATERPILLAR BATTERY LOAD TESTER SEHS9249.



ROTATE BATTERY STOCK

USE OLDEST BATTERIES FIRST.

Batteries require periodic stock rotation and routine charging. Always rotate stock using the FIFO (First In, First Out) method... instead of FISH (First In, Still Here).

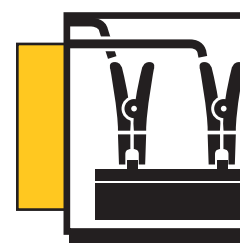
Batteries used at Caterpillar manufacturing facilities or shipped from the battery manufacturer for the replacement market have a label affixed to the battery (or stamped on battery carton if provided) with the following shipping date codes:

Example: **A3** = Battery shipped January 2003

REMEMBER... IF BATTERIES ARE STORED WET OR DRY, YOU MUST ALWAYS ROTATE YOUR STOCK!

MONTH	
A - January	G - July
B - February	H - August
C - March	J - September
D - April	K - October
E - May	L - November
F - June	M - December

YEAR	
8 - 1998	3 - 2003
9 - 1999	4 - 2004
0 - 2000	5 - 2005
1 - 2001	6 - 2006
2 - 2002	7 - 2007



JUMP STARTING

SHIELD EYES AND FACE AT ALL TIMES... NEVER LEAN DIRECTLY OVER BATTERY WHEN TESTING, JUMP STARTING OR PERFORMING OTHER MAINTENANCE.

Be sure any vent caps are tight and level, then place a damp rag over the vent caps of both batteries. Be sure machines/vehicles do not touch each other.

- Connect one end of positive (+) booster cable to positive (+) terminal of discharged battery, wired to starter or solenoid.
- Connect other end of positive (+) booster cable to positive (+) terminal of assisting battery.

3. Connect one end of negative (-) booster cable to negative (-) terminal of assisting battery, wired to ground.

4. Complete hook-up by connecting other end of negative (-) booster cable TO ENGINE BLOCK OF STALLED MACHINE OR VEHICLE-AS FAR AWAY FROM BATTERY AS POSSIBLE... AWAY FROM MOVING FAN AND FUEL LINES.

5. Start both machines or vehicles and remove cables in reverse order of connection. Discard the rag.



IMPORTANT: BOTH BATTERIES OR SETS OF BATTERIES MUST BE THE SAME VOLTAGE! DO NOT MIX VOLTAGES!



DRY CHARGE ACTIVATION

IMPORTANT... WEAR PROPER EYE PROTECTION!

IMPORTANT

Each vent opening is sealed with a removable plastic plug. Do not remove this plug until you are ready to fill the battery with electrolyte. Only when you are ready to fill, remove and discard the seal plugs. Use large vent caps to close openings when battery is filled and placed in service.

ACTIVATION

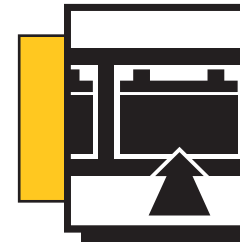
1. Fill each cell to proper level with battery-grade sulfuric acid of 1.265 specific gravity. Battery and acid must be at a temperature of 16°C to 38°C (60°F to 100°F) at time of filling.

2. Apply a load of 1/2 the CCA rating for 10 seconds.

3. The battery is ready for use or must be given a "booster" charge with 10 seconds test voltage reading as follows:

Size	Ready	Boost
12V	9V or more	below 9V
8V	6V or more	below 6V
6V	4.5V or more	below 4.5V

⚠ DANGER/POISON Causes Severe Burns
 Contains sulfuric acid - Avoid contact with skin, eyes or clothing.
 Antidote: External - Flush with water.
 Internal - Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil.
 Call physician immediately.
 Eyes - Flush with water for 15 minutes and get prompt medical attention.

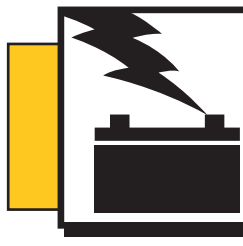


BATTERY STORAGE TIPS

Storage temperature is critical for batteries. Batteries should be stored in a cool, dry area in an upright position. Keep them as cool as possible, but above freezing for maximum life.

- Do not stack batteries more than 2 high (3 high if automotive). Batteries must be in cartons or have protected corrugated packaging placed between each stacked layer.
- Test non-maintenance free wet batteries every 4-6 months, Maintenance Free every 12 months, and recharge if necessary.
- Dry batteries that are not activated have unlimited shelf life.

ALWAYS TEST BATTERY BEFORE INSTALLATION, AND CHARGE IF NECESSARY.



CHARGING TIPS

FOLLOW SAFETY PRECAUTIONS – WEAR PROPER EYE PROTECTION.

Batteries should be boost charged if the open circuit voltage (voltmeter) reading is below 12.4 volts. See chart at right.

- Prior to charging, read the manufacturer's instructions for proper charger hook-up and use.
- Turn charger OFF and disconnect battery prior to hook-up to avoid dangerous sparks.
- Use charts below for normal charge of a battery based on the ambient temperature at time of charge. Note - there is a potential of battery explosion when batteries are overcharged.
- A battery that has NOT begun to accept the MINIMUM (1/2 of recommended) charging current WITHIN 15 minutes at the highest charger setting (or voltage) should be replaced.
- If violent gassing or spewing of electrolyte occurs or the battery case feels hot to the touch, temporarily reduce or halt charging.
- NEVER attempt to charge a frozen battery. Allow it to warm up to room temperature before placing on charge.

PROTECT YOUR EYES!

BATTERY CHARGING RATE/TIME TABLES	
Amp Hour Rating	Charging Rate
15-34	5 Amps
35-49	7.5 Amps
50-69	10 Amps
70-99	15 Amps
100-129	20 Amps
130-164	25 Amps
165-199	30 Amps
200-249	35 Amps

OPEN CIRCUIT VOLTAGE			
12 Volt Battery	8 Volt Battery	6 Volt Battery	Charging Time
12.40 & above	8.27 & above	6.20 & above	Load Test No Charging Required
12.39-12.20	8.26-8.13	6.19-6.10	2.0 Hours
12.19-12.00	8.12-8.00	6.09-6.00	3.0 Hours
Below 12.00	Below 8.00	Below 6.00	4.0 Hours

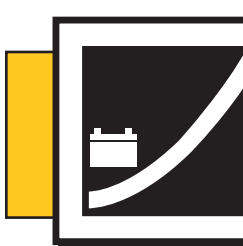
Optimum charging volts for 12-volt battery vs. temperature for lead acid batteries, utilizing an alternator.

TEMP C	TEMP F	*MF CA/CA Opt Voltage	*LOW ANTIMONY Opt Voltage	*HYBRID Opt Voltage	AGM Opt Voltage	GEL Opt Voltage
> 52	> 126	12.94	12.64	12.64	12.64	12.64
41-52	105-126	13.32	13.02	13.02	12.90	12.80
26-40	78-104	13.80	13.50	13.50	13.02	13.02
20-25	68-77	14.10	14.10	14.10	13.50	13.50
0-19	32-67	14.46	14.16	14.16	14.16	14.16
< 0	< 32	15.90	15.60	15.60	15.60	15.60

Optimum charging volts for 12-volt battery vs. temperature for lead acid batteries, utilizing a charger.

TEMP C	TEMP F	*MF CA/CA Float Volts	*MF CA/CA Equalize Volts	*LOW ANTIMONY Float Volts	*LOW ANTIMONY Equalize Volts	*HYBRID Float Volts	*HYBRID Equalize Volts	AGM Float Volts	AGM Equalize Volts	GEL Float Volts	GEL Equalize Volts
80	176	12.90	14.70	12.60	13.20	12.60	13.80	12.90	13.50	12.80	12.90
60	140	12.94	14.74	12.64	13.24	12.64	13.84	12.90	13.54	12.80	12.94
40	104	13.32	15.12	13.02	13.62	13.02	14.22	13.02	13.92	13.02	13.32
20	68	13.80	15.60	13.50	14.10	13.50	14.70	13.50	14.40	13.50	13.80
0	32	14.46	16.26	14.16	14.76	14.16	15.36	14.16	15.06	14.16	14.46
-30	-22	15.90	17.70	15.60	16.20	15.60	16.80	15.60	16.50	15.60	15.90

*Use Caterpillar Data Sheet, PEHJ0073 to identify chemical construction of Caterpillar Batteries to determine recommended charging voltages in previous tables.



CHOOSE PLENTY OF POWER

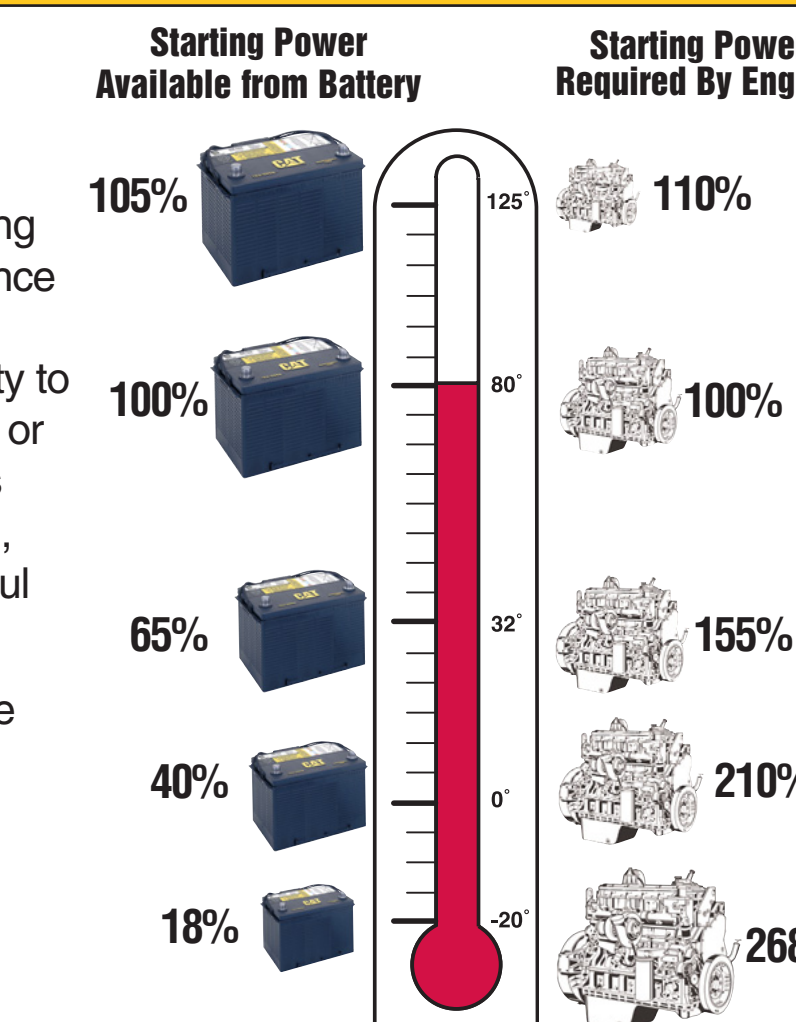
CHOOSE COLD CRANKING AMPS... NOT MONTHS OF WARRANTY!

Always use a battery that has enough cranking power, reserve capacity and vibration resistance to get the job done. Consider the machine or vehicle manufacturer's recommended capacity to be a minimum-capacity guideline. A machine or vehicle that has a lot of electrical accessories such as on-board computers, air conditioning, two-way radios, etc., will need a more powerful battery for optimum performance.

Along with electrical accessories, temperature also has an effect on battery performance.

Machines or vehicles that are operated in extremely hot or cold climates may need a battery with a higher CCA rating.

REMEMBER... YOU CAN'T BUY A BATTERY WITH TOO MUCH POWER!



Temperature has a dramatic effect on a battery's ability to crank an engine. Not only do cold temperatures rob batteries of power, they also thicken motor oil, making engines harder to start. And heat can damage batteries by causing internal components to wear out quickly while also making engines difficult to start.