

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Separate and independent diesel generators 0, 1A, 2A and 1B with:
 1. For diesel generator 0, 1A and 2A:
 - a) A separate day fuel tank containing a minimum of 250 gallons of fuel.
 - b) A separate fuel storage system containing a minimum of 31,000 gallons of fuel.
 2. For diesel generator 1B, a separate fuel storage tank/day tank containing a minimum of 29,750 gallons of fuel.
 3. A separate fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With either one offsite circuit or diesel generator 0 or 1A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour, and 4.8.1.1.2.a.4, for one diesel generator at a time, within ~~four~~ ^{eight} hours, and at least once per 8 hours thereafter; restore at least two offsite circuits and diesel generators 0 and 1A to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- b. With one offsite circuit and diesel generator 0 or 1A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour, and 4.8.1.1.2.a.4, for one diesel generator at a time, within ~~three~~ ^{six} hours, and at least once per 8 hours thereafter; restore at least one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore at least two offsite circuits and diesel generators 0 and 1A to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

ELECTRICAL POWER SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION (Continued)

- c. With both of the above required offsite circuits inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.2.a.4, for one diesel generator at a time, within ~~four~~ ^{eight} hours, and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- d. With diesel generators 0 and 1A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within ~~two~~ ^{four} hours and at least once per 8 hours thereafter; restore at least one of the inoperable diesel generators 0 and 1A to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore both diesel generators 0 and 1A to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- e. With diesel generator 1B of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour, and 4.8.1.1.2.a.4, for one diesel generator at a time, within ~~three~~ ^{six} hours, and at least once per 8 hours thereafter; restore the inoperable diesel generator 1B to OPERABLE status within 72 hours or declare the HPCS system inoperable and take the ACTION required by Specification 3.5.1.
- f. With diesel generator 2A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4, for diesel generator 1A, within ~~one~~ ^{two} hours, and at least once per 8 hours thereafter; restore the inoperable diesel generator 2A to OPERABLE status within 72 hours or declare standby gas treatment system subsystem B, Unit 2 drywell and suppression chamber hydrogen recombiner system, and control room and auxiliary electric equipment room emergency filtration system train B inoperable and take the ACTION required by Specifications 3.6.5.3, 3.6.6.1., and 3.7.2.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by manually transferring unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each of the above required diesel generators shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in the day fuel tank.
 2. Verifying the fuel level in the fuel storage tank.
 3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day fuel tank.
 4. Verifying the diesel starts from ambient condition and accelerates to 900 rpm + 5%, -2% in less than or equal to 13 seconds. ~~The~~ generator voltage and frequency shall be 4160 ± 150 volts and 60 + 3.0, -1.2 Hz within 13 seconds ~~after~~ the start signal.
 5. Verifying the diesel generator is synchronized, loaded to greater than or equal to 2600 kw within 60 seconds ~~and~~ operates with this load for at least 60 minutes.
 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
 7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day fuel tanks.
- c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

* (See insert attached)

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- * These diesel generator starts from ambient conditions shall be performed only once per 184 days in these surveillance tests and all other engine starts for the purpose of surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer, so that mechanical stress and wear on the diesel engine is minimized.

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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting diesel generators 0, 1A and 1B simultaneously, during shutdown, and verifying that all three diesel generators accelerate to 900 rpm + 5, -2% in less than or equal to 13 seconds.
- f. At least once per 10 years by:
 - 1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite or equivalent solution, and
 - 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND, of the ASME Code in accordance with ASME Code Section 11, Article IWD-5000.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.6.B. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests, on a per nuclear unit basis, is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position c.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

TABLE 4.8.1.1.2-1

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 100 Valid Tests*</u>	<u>Test Frequency</u>
≤ 1	At least once per 31 days
2	At least once per 14 days
3	At least once per 7 days
≥ 4	At least once per 3 days

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the last 100 tests are determined on a per nuclear unit basis.

WITH THE EXCEPTION OF THE SEMI ANNUAL FAST
START, NO STARTING TIME REQUIREMENTS ARE
REQUIRED TO MEET THE VALID TEST REQUIREMENT
OF REGULATORY GUIDE 1.108 -

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3/4.8 ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1 and 3/4.8.2 A.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least Division I or II of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of one of the two onsite A.C. sources. Division III supplies the high pressure core spray (HPCS) system only.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that (1) the facility can be maintained in the shutdown or refueling condition for extended time periods and (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The surveillance requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, with the exception noted in Appendix B to the FSAR, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977.

INSERT B

The surveillance requirements for demonstrating the OPERABILITY of the unit batteries are in accordance with the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Station and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage onfloat charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

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- * With the exception of the semi-annual fast start no starting time requirements are required to meet the valid test requirement of Regulatory Guide 1.108.

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3/4.8 ELECTRICAL POWER SYSTEMS

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3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Separate and independent diesel generators 0, 1A, 2A and 2B with:
 1. For diesel generator 0, 1A and 2A:
 - a) A separate day fuel tank containing a minimum of 250 gallons of fuel.
 - b) A separate fuel storage system containing a minimum of 31,000 gallons of fuel.
 2. For diesel generator 2B, a separate fuel storage tank/day tank containing a minimum of 29,750 gallons of fuel.
 3. A separate fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:

- a. With either one offsite circuit or diesel generator 0 or 2A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour, and 4.8.1.1.2.a.4. for one diesel generator at a time, within 4 hours, and at least once per 8 hours thereafter; restore at least two offsite circuits and diesel generators 0 and 2A to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. right +
- b. With one offsite circuit and diesel generator 0 or 2A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour, and 4.8.1.1.2.a.4. for one diesel generator at a time, within 2 hours, and at least once per 8 hours thereafter; restore at least one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore at least two offsite circuits and diesel generators 0 and 2A to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. dit +

ELECTRICAL POWER SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

- c. With both of the above required offsite circuits inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.2a.4., for one diesel generator at a time, within ~~8~~ ^{eight} hours, and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- d. ^{four} With diesel generators 0 and 2A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1a. within 1 hour and 4.8.1.1.2a.4., for one diesel generator at a time, within ~~two~~ hours and at least once per 8 hours thereafter; restore at least one of the inoperable diesel generators 0 and 2A to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore both diesel generators 0 and 2A to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- e. ^{six} With diesel generator 2B of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1a. within 1 hour, and 4.8.1.1.2a.4., for one diesel generator at a time, within ~~2~~ ^{within one hour} hours, and at least once per 8 hours thereafter; restore the inoperable diesel generator 2B to OPERABLE status within 72 hours or declare the HPCS system inoperable and take the ACTION required by Specification 3.5.1.
- f. With diesel generator 1A of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1a. and 4.8.1.1.2a.4. for diesel generator 2A, within ~~2~~ ^{two} hours and at least once per 8 hours thereafter; restore the inoperable diesel generator 1A to OPERABLE status within 72 hours or declare standby gas treatment system subsystem A, Unit 1 drywell and suppression chamber hydrogen recombiner system, and control room and auxiliary electric equipment room emergency filtration system train A inoperable and take the ACTION required by Specifications 3.6.5.3, 3.6.6.1, and 3.7.2; continued performance of Surveillance Requirements 4.8.1.1.1a. and 4.8.1.1.2a.4. for diesel generator 2A is not required provided the above systems are declared inoperable and the ACTION of their respective specifications is taken.

ELECTRICAL POWER SYSTEMS

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SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by manually transferring unit power supply from the normal circuit to the alternate circuit.

4.8.1.1.2 Each of the above required diesel generators shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8.1.1.2-1 on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in the day fuel tank.
 2. Verifying the fuel level in the fuel storage tank.
 3. Verifying the fuel transfer pump starts and transfers fuel from the storage system to the day fuel tank.
 4. Verifying the diesel starts from ambient condition and accelerates to 900 rpm \pm 5%, -2% in less than or equal to 13 seconds. The generator voltage and frequency shall be 4160 ± 150 volts and 60 ± 3.0 , -1.2 Hz within 13 seconds after the start signal.
 5. Verifying the diesel generator is synchronized, loaded to greater than or equal to 2600 kw within 60 seconds and operates with this load for at least 60 minutes.
 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
 7. Verifying the pressure in all diesel generator air start receivers to be greater than or equal to 200 psig.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day fuel tanks.
- c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to 0.05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77, and an impurity level of less than 2 mg. of insolubles per 100 ml. when tested in accordance with ASTM-D2274-70.

* (See insert attached)

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- * These diesel generator starts from ambient conditions shall be performed only once per 184 days in these surveillance tests and all other engine starts for the purpose of surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer, so that mechanical stress and wear on the diesel engine is minimized.

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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting diesel generators 0, 2A, and 2B simultaneously, during shutdown, and verifying that all three diesel generators accelerate to 900 rpm + 5, -2% in less than or equal to 13 seconds.
- f. At least once per 10 years by:
 - 1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite or equivalent solution, and
 - 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND, of the ASME Code in accordance with ASME Code Section 11, Article IWD-5000.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.6.B. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests, on a per nuclear unit basis, is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position c.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

TABLE 4.8.1.1.2-1

DIESEL GENERATOR TEST SCHEDULE

Number of Failures in
Last 100 Valid Tests*

Test Frequency

≤ 1	At least once per 31 days
2	At least once per 14 days
3	At least once per 7 days
≥ 4	At least once per 3 days

*Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, Revision 1, August 1977, where the last 100 tests are determined on a per nuclear unit basis.

WITH THE EXCEPTION OF THE SEMIANNUAL FAST
START, NO STARTING TIME REQUIREMENTS ARE
REQUIRED TO MEET THE VALID TEST REQUIREMENT
OF REGULATORY GUIDE 1.108.

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BASES

3/4.8.1 and 3/4.8.2 A.C. SOURCES and ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for (1) the safe shutdown of the facility and (2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least Division I or II of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of one of the two onsite A.C. sources. Division III supplies the high pressure core spray (HPCS) system only.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that (1) the facility can be maintained in the shutdown or refueling condition for extended time periods and (2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The surveillance requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, with the exception noted in Appendix B to the FSAR, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977.

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The surveillance requirements for demonstrating the OPERABILITY of the unit batteries are in accordance with the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Station and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage onfloat charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

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