

4.7 AUXILIARY ELECTRICAL POWER

Applicability: Applies to surveillance requirements of the auxiliary electrical supply.

Objective: To verify the availability of the auxiliary electrical supply.

Specification:

A. Diesel Generator

1. Each diesel generator shall be started and loaded to not less than 80% rated load every two weeks.
2. The two diesel generators shall be automatically actuated and functionally tested during each refueling outage. This shall include testing of the diesel generator load sequence timers listed in Table 3.1.1.
3. Each diesel generator shall be given a thorough inspection at least once per 24 months.
4. The diesel generators' fuel supply shall be checked following the above tests.
5. The diesel generators' starting batteries shall be tested and monitored per Specification 4.7.B.

B. Station Batteries and Diesel Generator Starting Batteries

1. Weekly surveillance will be performed to verify the following:
 - a. The active metallic surface of the plates shall be fully covered with electrolyte in all batteries.
 - b. The designated pilot cell voltage is greater than or equal to 2.09 volts for Station Battery B and 2.0 volts for Station Battery C while the respective battery is on a float charge.
 - c. The overall battery voltage is greater than or equal to 125.4 volts for Station Battery B and 120 volts for Station Battery C while the respective battery is on a float charge. (Diesel battery; 112 volts).
 - d. The pilot cell specific gravity, corrected to 77°F, is greater than or equal to 1.190.

2. Quarterly Surveillance will be performed to verify the following:
 - a. The active metallic surface of the plates shall be fully covered with electrolyte in all batteries.
 - b. The voltage of each connected cell is greater than or equal to 2.09 volts for Station Battery B and 2.0 volts for Station Battery C while the respective battery is on a float charge.
 - c. The specific gravity, for each tenth cell, is greater than or equal to 1.190 when corrected to 77°F. The specific gravity and electrolyte temperature of every tenth cell (Diesel; every fourth cell) shall be recorded for surveillance review.

3. Annual surveillance will be performed to verify the following:
 - a. The active metallic surface of the plates shall be fully covered with electrolyte in all batteries.
 - b. The voltage of each connected cell is greater than or equal to 2.09 volts for Station Battery B and 2.0 volts for Station Battery C while the respective battery is on a float charge.
 - c. The specific gravity for each cell is greater than or equal to 1.190 when corrected to 77°F. The electrolyte temperature and specific gravity for every cell shall be recorded for surveillance review.

4. At least once per 12 months, the diesel generator battery capacity shall be demonstrated to be able to supply the design duty loads (diesel start) during a battery service test.

5. At least once per 24 months, the following tests will be performed to verify battery capacity (Perform during plant shutdowns for Station Batteries B and C. Perform during plant shutdowns or during the 24-month Diesel Generator inspections for the Diesel Generator Starting Batteries.):
 - a. Battery capacity shall be demonstrated to be at least 80% of the manufacturers' rating when subjected to a battery capacity discharge test.

- b. If Station Battery B or C is demonstrated to have less than 85% of manufacturers ratings during a capacity discharge test it shall be replaced during the subsequent refueling outage. If a Diesel Generator Starting Battery is demonstrated to have less than 85% of manufacturers ratings during a capacity discharge test, it shall be replaced within 2 years.
- c. Station battery capacity shall be demonstrated to be able to supply the design duty cycle loads during a battery service test.

Basis: The biweekly tests of the diesel generators are primarily to check for failures and deterioration in the system since last use. The manufacturer has recommended the two week test interval, based on experience with many of their engines. One factor in determining this test interval (besides checking whether or not the engine starts and runs) is that the lubricating oil should be circulated through the engine approximately every two weeks. The diesels should be loaded to at least 80% of rated load until engine and generator temperatures have stabilized (about one hour). The minimum 80% load will prevent soot formation in the cylinders and injection nozzles. Operation up to an equilibrium temperature ensures that there is no over-heat problem. The tests also provide an engine and generator operating history to be compared with subsequent engine-generator test data to identify and correct any mechanical or electrical deficiency before it can result in a system failure.

The test during refueling outages is more comprehensive, including procedures that are most effectively conducted at that time. These include automatic actuation and functional capability tests, to verify that the generators can start and assume load in less than 20 seconds and testing of the diesel generator load sequence timers which provide protection from a possible diesel generator overload during LOCA conditions. Thorough inspections will detect any signs of wear long before failure.

The manufacturer's instructions for battery care and maintenance with regard to the floating charge, the equalizing charge, and the addition of water will be followed. In addition, written records will be maintained of the battery performance. Station batteries will deteriorate with time, but precipitous failure is unlikely. The station surveillance procedures follow the recommended maintenance and testing practices of IEEE STD. 450 which have demonstrated, through experience, the ability to provide positive indications of cell deterioration tendencies long before such tendencies cause cell irregularity or improper cell performance.

The battery service test is a special capacity test to demonstrate the capability of the battery to meet the system design requirements. The Oyster Creek design duty cycle loads are determined by a LOCA subsequent to a loss of AC power. The battery performance test is a capacity test on the battery to check it against the manufacturer's specified capacity and is used to determine when the battery has arrived at the end of its life.

IEEE Standard 450-1975 recommends battery performance testing once per five years. IEEE Standard 308-1974 recommends battery performance testing once per three years. The Oyster Creek Technical Specifications require a performance test once per two years. Both IEEE Standards recommend decreasing the surveillance interval to annually when battery capacity falls below 85% of rated.

The diesel generator batteries are challenged every two weeks to perform the 80% load test. This effectively performs an uninstrumented battery service test. The biweekly diesel start, when combined with the annual battery service test, provides an extensive amount of data on battery performance characteristics. This test data negates the need to lower the battery performance test interval from biennial to annually.

The station batteries are required for plant operation, and performing the station battery performance test requires the reactor to be in COLD SHUTDOWN. The guidance in IEEE 450-1975 would result in 3 performance tests to reach 85% service life, followed by 3 performance tests to complete battery life. The guidance in IEEE 308-1974 would result in 5 performance tests to reach 85% service life, followed by 3 performance tests to complete battery life. The Oyster Creek Technical Specifications require 8 performance tests to reach 85% service life, followed by 2 performance tests to complete battery life. The requirement which would result in a reactor shutdown for the sole purpose of performing a battery performance test during the last 15% of battery life cannot be justified to increase battery test performance from 2 to 3 in a 3-year period. Additionally, the increase in battery performance testing during the first 85% of battery service life would result in a greater level of battery reliability by identifying, and causing to be corrected, small anomalies in cell performance thereby reducing battery failure probability.

The diesel batteries shall be tested and monitored in accordance with the requirements of Specification 4.7.B to ensure their viability.

The requirement to replace any battery in the next refueling outage or within 2 years which demonstrates less than 85% of manufacturers capacity during a capacity discharge test provides additional assurance of continued battery operability.