



## CABLES QUALIFIED FOR USE IN NUCLEAR PLANTS

Cables that are used in Nuclear powered generating stations have certain specific rigorous requirements based on the application. All cables that relate to the safe shutdown of the reactor must meet a qualification regimen to insure that the cables will perform their intended function in the event of an emergency that requires the reactor to shut down. Cables used for this application are known as Class 1E qualified cables. The qualification program is intended to demonstrate that the cables will endure in the natural service environment of a nuclear reactor (which has radiation and heat present) and still be able to shut down the reactor in the event of an emergency at the end of its design life. Forty years was the original benchmark because it is the design life of a typical nuclear powered generating station.

Qualification requirements are found in IEEE Standard 383. In order to demonstrate compliance, the cables must pass the following tests:

**Thermal Aging Study** – This is required to determine the time and temperature necessary to accelerate cable aging in order to simulate its postulated condition after a 40-year life. As existing plants are reaching the 40-year design life, several are under evaluation for 20-year life extensions. Next generation plants under development are being designed for 60-year life.

**Normal Aging Qualification** – This test is used to demonstrate the ability of the cable to operate throughout its design life under normal nuclear conditions. The cables are aged thermally and

exposed to normal radiation levels in an accelerated manor.

**LOCA (Loss of Cooling Accident)** – This is the defining accident that the cables installed inside the containment area must be prepared to endure. The LOCA test is conducted on thermal and radiation aged cable samples at an accelerated rate to simulate the reactor design life. Cables are required to endure a high temperature/pressure steam and radiation environment for an extended period of time.

**HELB (High Energy Line Break)** – This is another accident event which may occur. Class 1E cables must remain serviceable to shut down the reactor during this type of an event. This test simulates a failure of a high pressure, high temperature (superheated) steam line.

**VTFT (Vertical Tray Flame Test)** – This third situation involves a fire in the plant. The cables must demonstrate that in a vertical ladder type cable tray, the cables will pass a flame test when burned with a 70,000 Btu flame source. The requirement is to demonstrate that the cables will not propagate the fire so that a safe shut down of the reactor can occur any time during the life of the plant.

After the cables pass the above tests, an Engineering Report is written which documents the details of each test. This report then becomes evidence of compliance for cables used in Class 1E applications.

Application Engineering