

Equipment Qualification

Background

Equipment qualification is required to provide documented evidence that safety-related equipment can perform its function(s) during and/or after specified normal, abnormal and accident conditions.

Westinghouse provides environmental qualification testing and analysis services, seismic testing and analysis services, irradiation testing and analysis services and electromagnetic compatibility (EMC) qualification services to support equipment qualification from its global operations.

Description

Environmental Qualification Analysis and Testing

Westinghouse has a walk-in environmental chamber to conduct temperature and humidity testing of instrumentation and control (I&C) systems, electrical equipment and other parts, components and assemblies.

Environmental chamber specifications are:

- Size: 12x12x11 feet (3.6x3.6x3.4 m)
- Capability: -40 to 185 F (-40 to 85 C), 20 to 98 percent relative humidity, 16-channel temperature monitoring



Walk-in environmental chamber

Seismic Qualification Analysis and Testing

Westinghouse has a digitally controlled, independent, tri-axial seismic table. The seismic table is modular and can be used to test full-size cabinets as well as components and subassemblies.

A full range of services and engineering expertise in comprehensive plant-specific or generic seismic qualification testing and analysis is available. The programs can include:

- Seismic simulation (random, complex)
- Vibration and resonance search testing
- In-situ testing
- Modal testing
- Seismic analysis

Seismic table specifications are:

- Test object weight: Up to 4,000 pounds (1,814 kilograms)
- Input displacements: ± 7 inches (± 17.8 centimeters)
- Input velocity: ± 94 inches/second (± 2.4 meters/second)
- Peak spectral acceleration: 30 g max (5% damping) test unit with 300 lb (136 kg) 6 g max (5% damping) with 4,000-pound test unit

EMC Qualification Testing

Electromagnetic interference (EMI), radio-frequency interference (RFI) and power surges have been identified as environmental conditions that can affect the performance of safety-related electrical equipment. Qualification to EMI/RFI and power surge was not historically considered as part of equipment qualification since most legacy I&C systems were less vulnerable to EMI/RFI and power surge and historical data supported successful operation in the nuclear plant environment. Computer-based digital I&C systems and advanced analog systems require assessment of EMC since they have greater vulnerability to the nuclear plant EMI/RFI and power surge environment.

Equipment that is not safety related may also require EMC testing to characterize the reliability of the equipment in the nuclear plant EMI/RFI environment.

The Westinghouse EMC facility can test the ability of Class 1E parts, components and assemblies to withstand interference from other electrical sources without causing harmful interference with other electrical or electronic equipment.

Westinghouse has a semi-anechoic chamber (20.5x20.5x20.5 feet) (6.25x6.25x6.25 meters) in addition to multiple ground plane sites to conduct EMC testing. The large capacity chamber provides room for fully integrated system-level testing.

Irradiation Testing

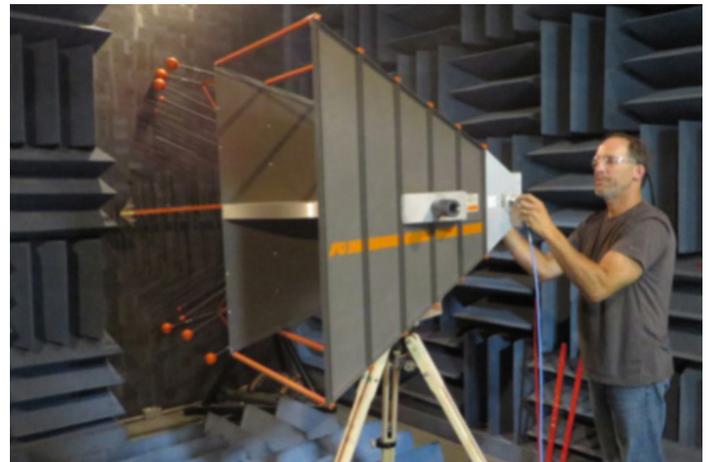
Westinghouse has a cobalt-60 source that can deliver a gamma-ray dose, with maximum rates up to 900,000 rad/hour (9,000 Gy/hour) for small material sample sizes, and nominal rates between 300 to 8,000 rad/hour (3 to 80 Gy/hour) for larger size components in its clean hot cell. Equipment can be qualified for operation in certified dose rates and total integrated doses.

Experience

Westinghouse experience includes qualification of equipment installed in over 100 operating units and recent qualification of equipment for Westinghouse **AP1000®** nuclear reactor systems. We have dedicated personnel experienced in all aspects of safety-related applications who are available to support comprehensive qualification programs.



Seismic table



EMC testing