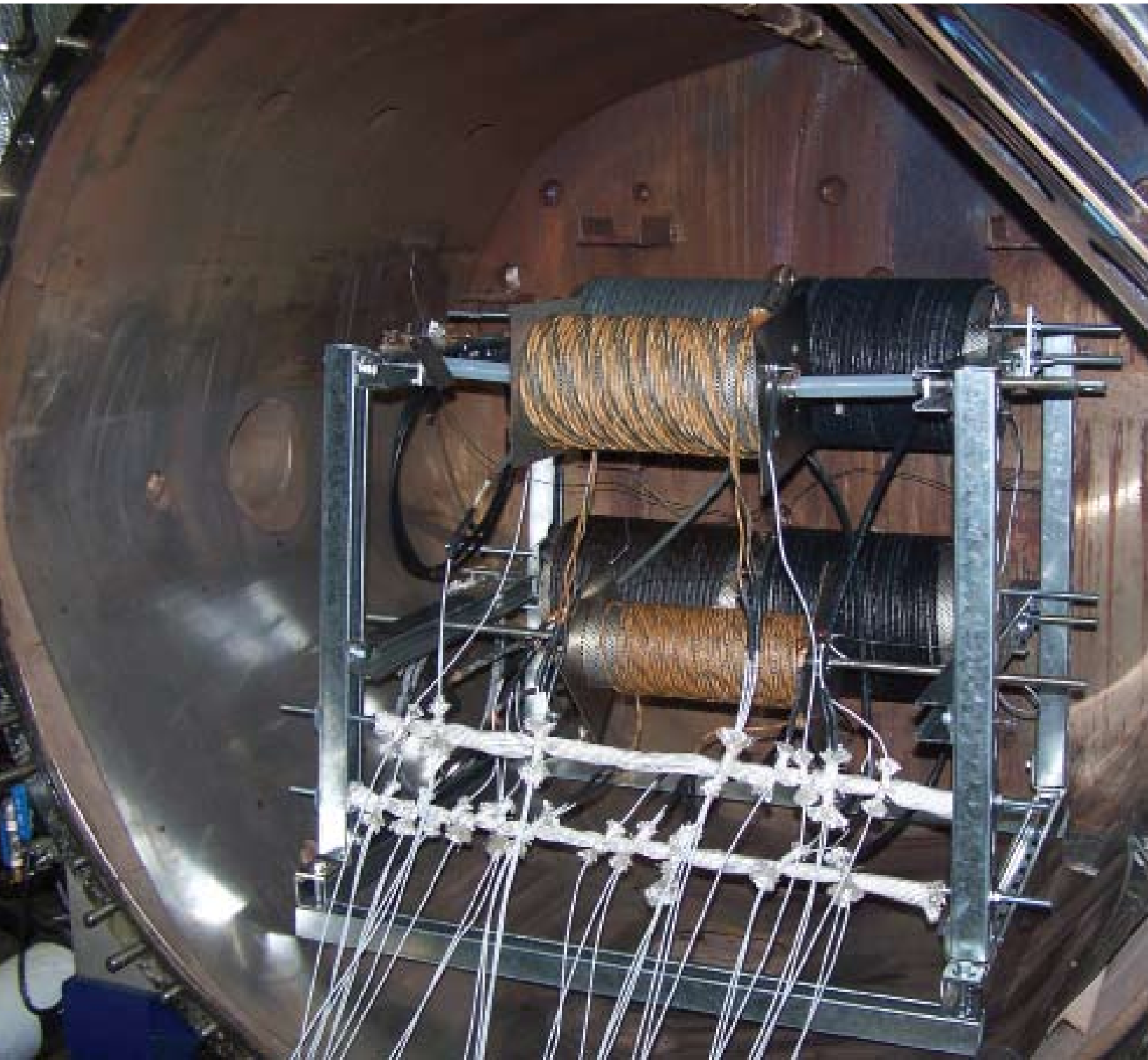




**KINECTRICS**

# Nuclear Equipment Qualification

Helping You Meet The Standard



# EQUIPMENT QUALIFICATION SERVICES

## Qualification Tests

- Thermal and Radiation Aging
- Seismic and Vibration Simulations
- Cyclic Aging
- Steam Event Simulations (LOCA / MSLB / HELB)
- Electromagnetic / Radio Frequency Interference (EMI / RFI)

## Testing and Quality Standards

- IEEE 323 / 344
- IEEE Component Qualification Standards
- CSA N290.13/N289.3
- ASME QME-1
- 10 CFR 50 Appendix B, NQA-1, CNSA Quality Programs
- Multiple International Standards

## Qualification Reports and Technical Support

- Test Strategy Development
- Activation Energy Determination
- Forensic Analysis Support
- Detailed Qualification Reports

## ENVIRONMENTAL TEST CHAMBERS AND THERMAL AGING OVENS

Kinectrics has a variety (14+) of ovens and chambers used to perform accelerated thermal aging of components and determine component or system activation energies. The ovens vary in size to accommodate both large and small components. Environmental chamber humidity can be closely controlled to meet specific environmental conditions.

Features and maximum capabilities:

- Temperatures between -100°F and 1300°F
- Humidity ranges typically between 5% and 95%
- Tracking and recording of temperatures according to required profiles
- Alarm notifications to aid in managing anomalous events, such as loss of power



## STEAM TEST SIMULATION

Kinectrics has upgraded its steam plant to enable testing for the new advanced reactor design, including chemical spray, simulation of loss of coolant accident (LOCA), main steam line break (MSLB) and high energy line break (HELB). Kinectrics' test facility permits close control of steam conditions to meet IEEE-323 margin standards while minimizing over-test during simulations. The graph illustrated was obtained in a trial run using a reference mass in the steam test chamber. Kinectrics also has facilities on site to support Design Basis Accident (DBA) testing, including analytical chemistry lab for production and testing of DBA chemical spray.

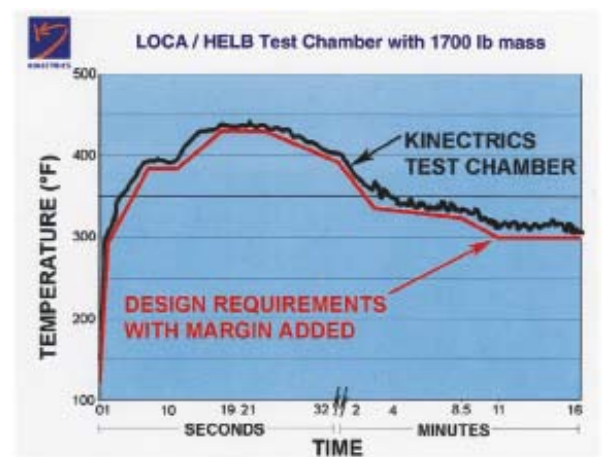


## SEISMIC TESTING

Kinectrics is equipped with a tri-axial seismic testing table and a single axis random input motion (RIM) table capable of performing a full range of seismic testing required for qualification.

Capabilities include:

- Sine sweep search for resonate frequencies
- Testing accelerations up to 12 g's
- Payload capacity as large as 4000 lbs.
- RIM testing (Required Input Motion)



## EMI / RFI

IEEE 323 standard imposes EMI / RFI testing for electrical components. Kinectrics provides this service in accordance with the standard, with tests encompassing:

- Power surge vulnerability
- EMI resistance (shielded room)
- Full spectrum testing

Performance testing meets the requirements of key industry standards including: IEEE 323, IEEE 603, IEEE 7-4.3.2, IEEE 1613, IEEE C37.90.1 and IEEE C37.90.2.



## THE TECHNICAL EDGE

Kinectrics' comprehensive laboratory and analytical capabilities are employed in each qualification activity. Materials Specialists in metals, polymers, and other non-metallic components are on staff at Kinectrics to assist with qualification plan development and issue resolution.

Core competencies in electrical engineering and testing can also be drawn on to perform required functional tests of high voltage test specimens well beyond the capabilities of other qualification test laboratories.

Kinectrics provides in-depth technical capabilities in working with clients to develop optimum test programs that meet individual schedule, equipment performance, and desired maintenance objectives.

## FORENSIC ANALYSIS

In the unlikely event of issues being encountered in the qualification program, Kinectrics has staff with extensive experience in diagnostics and condition assessment of metal and polymer materials. Some of our capabilities include providing in-depth analysis of materials, identifying the root causes of failure, and material performance testing. We can assess aging and failure mechanisms, as well as recommend and develop improved replacement materials or repair methodologies. Applications include coatings, paints, gaskets, diaphragms, bladders, fiber-based epoxies, etc.

## QUALIFICATION REPORTS

The qualification report is the final record of the work performed in qualifying each component. The report contains all information needed to help plant engineers manage the EQ life cycle and determine real aging based on measured environmental conditions.

Our equipment qualification experts are familiar with the details of specific Standards and have actively served on the technical committees that developed these important industry criteria.



Kinectrics' reports are thorough and well organized to facilitate ease-of-use years after qualification efforts have been completed. Our EQ team has successfully delivered qualification reports on a large number of safety related mechanical and electrical components, including but not limited to:

Actuators	Valves	Batteries
Solenoid valves	Pressure Transmitters	Shield Plugs
Cables	Motor Starters	Hydrogen Igniters
Relays	Pressure switches	Heaters
Airlock & Containment Seals	Conduit & Seals	Vibration Detectors
Positioners	DC Transmitters	Power Transformer
Terminal Blocks	Bearings Material	Material Transport Packages



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