

Electrochemical Corrosion Potential (ECP) Probes

fact sheet

Electro-chemically active elements, such as excess oxygen, dissolved in the coolant stream can cause inter-granular stress corrosion cracking (IGSCC) in the reactor vessel and piping systems. This can result in additional outage time and increased costs for reactor internal replacements or repairs. The initiation of IGSCC can be mitigated by both injecting hydrogen to neutralize the free oxygen and by monitoring the electrochemical corrosion potential (ECP) in various locations.

A proven solution to measure the ECP in your reactor vessel and plant

For more than 10 years, GE Energy has designed and built ECP Probes for Boiling Water Reactors (BWRs). These detectors can be installed in several locations to measure the electro-chemical corrosion potential in the plant: in the core plate area underneath the fuel, near the bottom head drain, in recirculation pump lines, and in reactor water cleanup lines. In combination with a GE Energy electronic monitoring system, the probes enable operators to continuously monitor ECP and to adjust hydrogen injection rates to maximize corrosion protection. The constant data provided by the ECP probes also eliminates the need to inject unnecessary and excess hydrogen into the reactor, thereby decreasing operating costs keeping dosage rates at lower levels. They can also be used in plants that utilize GE Energy's NobleChem* process.

Customized solutions to meet your needs

GE recommends that BWRs use detectors that accurately monitor ECP when hydrogen injection is turned off, as well as when hydrogen is being injected. At present, many plants utilize a system that can monitor data from two different types of probes:

- An iron/iron oxide ECP probe for measurements without hydrogen injection; and,
- A platinum ECP probe for measurements during hydrogen injection.

Additional ECP probes have been designed and manufactured for special applications, such as stainless steel and carbon steel. If you have a special request please, contact your local GE Energy representative.

Since GE Energy supplies the BWR fleet with Local Power Range Monitors (LPRMs), we have designed and manufactured special ASME code LPRMs with multiple ECP probes. GE has installed ECP probes on various ASME code flange assemblies, including reactor recirculation lines, bottom head drain lines, reactor clean up lines, and other flange locations. Certain detectors can also be installed as cartridge assemblies, utilizing GE Energy's Mitigation Monitoring System (MMS) that allows for simple replacement of probes – even during an operating cycle.



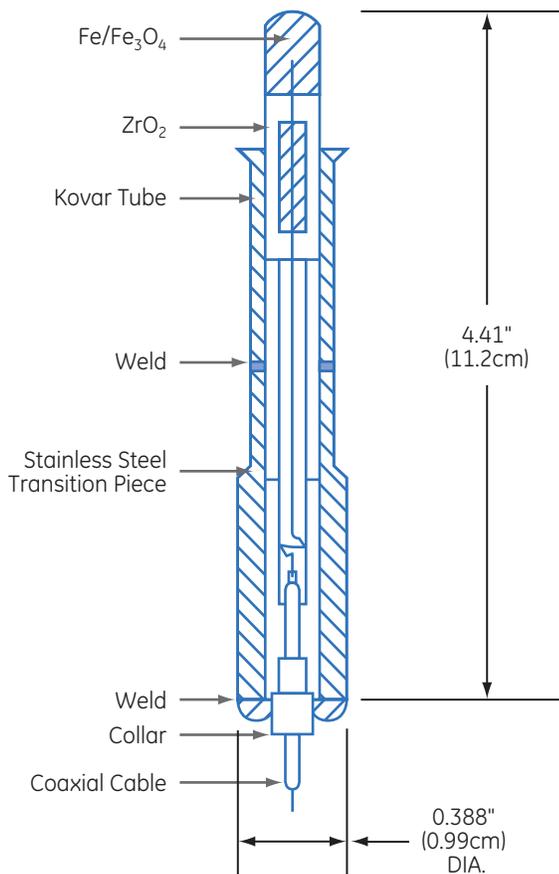
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Experience you can trust

Trust GE to customize and deliver the right ECP probe for your site. Our detectors are installed in reactors at over 20 BWR sites around the world – we have the experience you need to design a probe that will allow you get accurate and reliable measurements for ECP.

Prior to shipment, all of our probes are tested in a several week autoclave test to monitor ECP when the hydrogen levels are adjusted and readings are compared to a reference probe.

Iron/Iron Oxide ECP Probe



Operating characteristics:

Design Pressure: 1250 psig

Design Temperature: 300 °C

Temp Ramp rate: 3 °C/min

Insulation resistance > 1 × 10⁸ ohms with 9 ± 1 VDC applied, prior to installation.

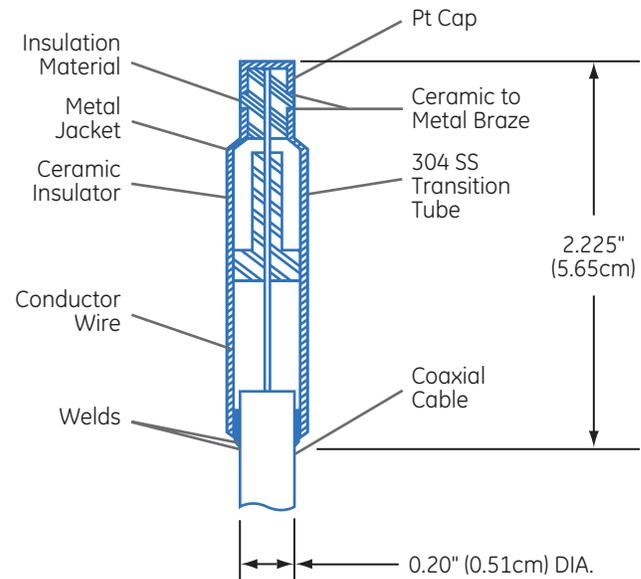
Note: ECP probes shall not be exposed to flow velocities greater than those described in the applicable GE Design Specification.

GE Energy makes the following type of platinum and iron/iron oxide ECP assemblies for BWRs:

- Cartridge Assembly for Mitigation Monitoring System
- Flange Assemblies
- LPRM Assemblies

Note: ECP LPRMs are custom-designed to position the electrodes at the desired elevation and to position water flow holes in the LPRM housing adjacent to the electrodes. To assure proper flow to the electrodes, holes must be EDM machined in the guide tube at the same elevation.

Pt Electrode Insulation Material



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GEA-14329 Rev A (01/2006)