THERMO ELECTRIC CORPORATION

Self-Powered Neutron Detectors has been used effectively as in-core flux monitors in nuclear power reactors world-wide. The basic properties of these radiation sensors include nuclear, electrical and mechanical characteristics. The proper choice of the self-powered detector emitter to provide the proper response time and radiation sensitivity desired for use in an effective in-core radiation monitoring system.

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SPND can be of many types. The typical inconel type SPND is a coaxial cable consisting of an inner electrode of inconel (the emitter), surrounded by insulation and an outer electrode of inconel (the collector). Preferably, the lead cable and detector sections are integral, i.e. the signal wire of the lead cable mates directly to the emitter; the insulation of both sections are identical and the collector of the detector section is also the outer sheath of the lead cable section.In Self-Powered Neutron Detectors (SPNDs), the interactions of neutrons and atomic nuclei are used to produce a current which is proportional to the neutron fluence rate (flux).

Fig: SPND Cable

Application of SPND:

- It is used for core flux measurement in Nuclear reactor.
- The design of SPND is rugged, simple, flexible and long lived.
- It is used for high flux-high temperature.
- Indication or control.
- It is used for mapping or permanent installation.

Advantages of SPND:

- SPND doesn't require power supply.
- SPND structure is simple and robust.

- SPND has small mechanical size which is desired for in-core installation.
- The stability of SPND is good under temperature and pressure condition.
- SPND generates a reproducible linear signal.

Technical Specification of Inconel type SPND:

For Detector:

Emitter Material	Inconel 600
Emitter Diameter	1.40 mm
Sensitive Length	Can be made upon request
Insulator	MgO
Collector Material	Inconel 600
Outer Diameter of detector	3.00 mm

For Cable:

Length of Cable	Can Be made on request
Insulator	MgO
Sheath Material	Inconel 600
Outer Diameter of Cable	1.60 mm

Characteristics:

Measured Quantity	Neutron Flux
Insulation resistance (at room temperature)	$\geq 1 \times 10^{12} \Omega$ at 250 VDC
Insulation Resistance (at 300°C)	$\geq 5 \times 10^{8} \Omega$ at 250 VDC

Tempsens Instrument has 40 years of experience in manufacturing of temperature sensors. To enhance our customer's success we provide high quality products and services for "Temperature solution", tailored to their needs, and deliver to meet their schedule.