Philtec Application Note

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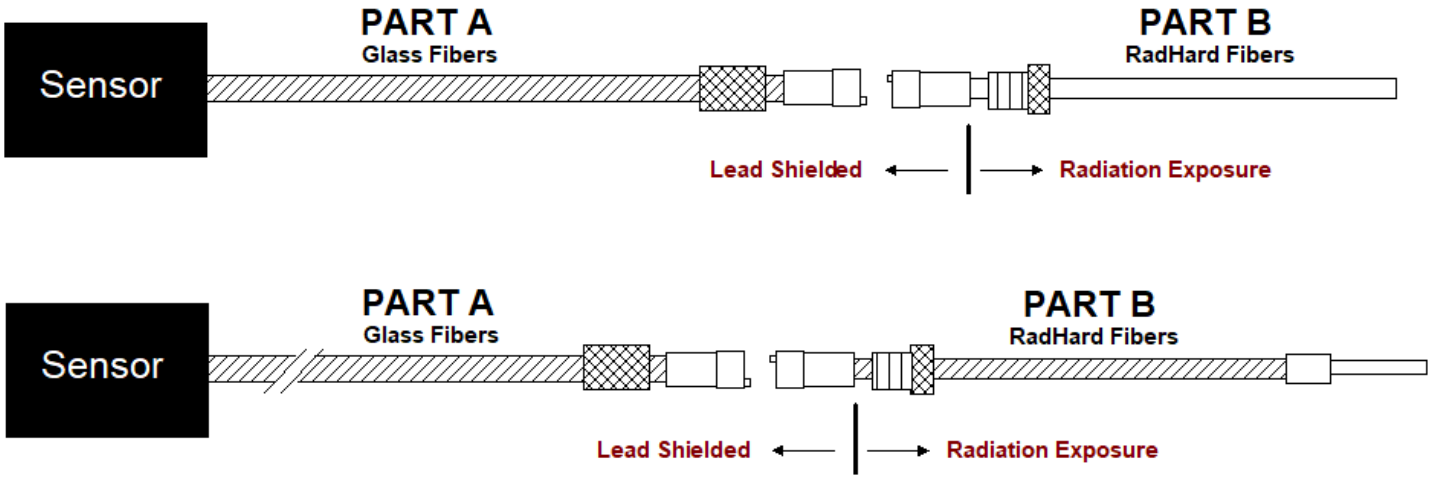
Radiation Resistant Sensor Systems



SENSOR SYSTEMS

Radiation resistant (RadHard) fiber is much more costly than conventional glass fiber. For that reason, ***the amount of RadHard fiber used should be minimized as much as possible:***

- **Connectorize the sensor system**

Glass fiber with long lengths can be used on the sensor side of the connector.
Short length RadHard fibers are used on the measuring probe side.

- **Use the smallest diameter probe that will make the required measurement**

Small probes use less fiber than large probes, and therefore are more cost effective.

RADIATION RESISTANT MATERIALS

Part B probes are constructed using stainless steel tubing.

For jacketing of the fiber optic cables use:
- Interlocking stainless steel, or
- Peek Shrink Tubing

Contact the factory for design help or a quotation

Radiation Resistant Sensors

RECENT DEVELOPMENTS

In 2007*, we reported that fibers made from synthetic fused silica on silica optical fiber with high OH will withstand radiation of 10^8 rad. Today, new radiation resistant (RadHard) fibers have radiation resistant and attenuation recovery characteristics which are far superior to conventional pure silica core fiber. Some are MIL-PRF-49291 certified. These fibers are designed to operate for extended periods of time on low earth orbits, near and deep space, and in applications where risk of exposure to man-made radiation is great.

One fiber supplier claims RadHard fibers can be used for high irradiative environments (for example gamma rays, X-flash, neutrons protons) up to a dose of about 10 kGy. For extreme irradiative environments (some MGy dose) Super RadHard fiber is recommended.

Note: 1 Gy = 100 Rad

Figure 1 shows the attenuation comparison between traditional silica (quartz) fiber and new RadHard fiber.

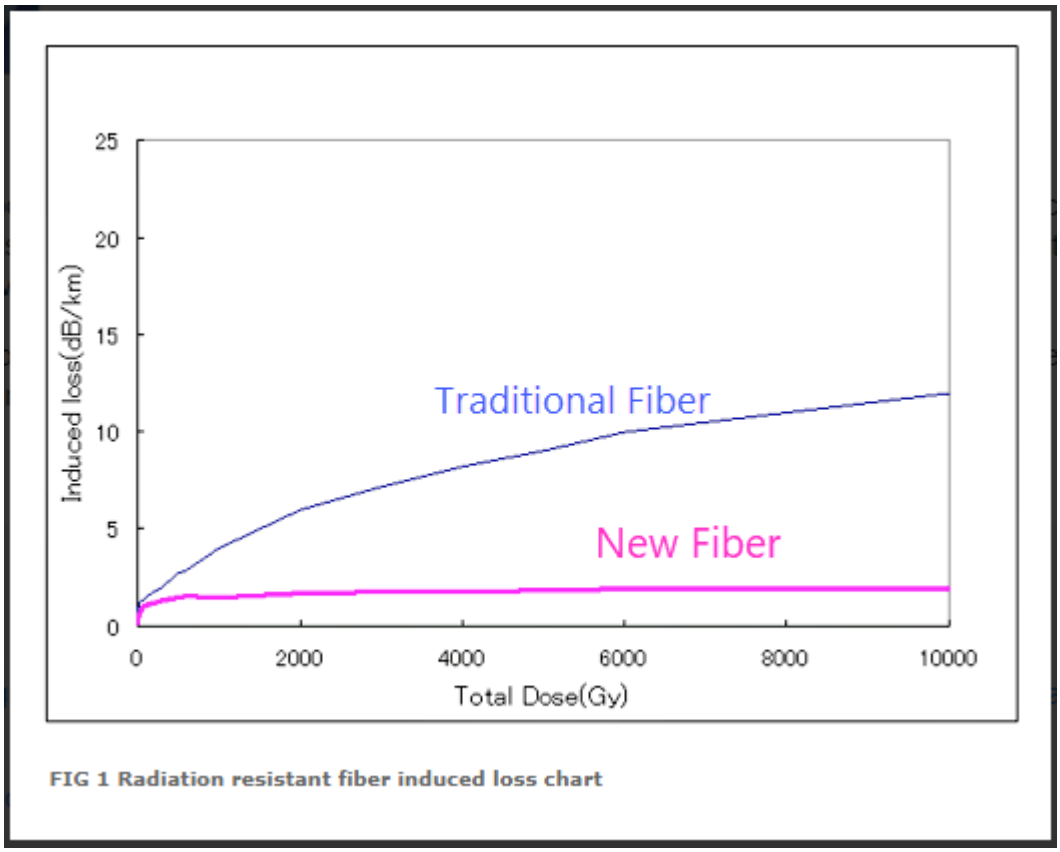


FIG 1 Radiation resistant fiber induced loss chart

* http://www.philtec.com/downloadssupport/documentlibrary/documents/applicationnotes/V6N37_Radiation.pdf