Radiation-Hardened Single-Mode Optical Fiber for Space and Nuclear Environments – Er-5/125-R with Ultra-Low RIA

Product Overview

Built on a radiation-tolerant pure-silica core design with optimized dopant profiles, the Er-5/125-R fiber exhibits exceptionally low radiation-induced attenuation (RIA) even after prolonged exposure to high-dose gamma rays (>100 kGy) and neutron flux. Its robust structure suppresses color center formation, maintaining signal integrity and mechanical reliability where conventional fibers would rapidly degrade.

The fiber complies with stringent aerospace and nuclear industry standards for long-term stability under thermal cycling (-65°C to +125°C), vibration, and mechanical stress. With standard 125 µm cladding and dual acrylate coating, it remains fully compatible with commercial fusion splicers, connectors, and cabling processes—enabling seamless integration into existing photonic architectures without compromising radiation resilience.

Technical Specifications

Brand Name	Winner
Model Number	Er-5/125-R

Fiber Type	Radiation-Hardened Single-Mode Fiber (Pure-Silica Core)
Operating Wavelength	1260–1625 nm (optimized for 1310/1550 nm)
Cladding Diameter	125 ± 1 μm
Coating Diameter	245 ± 10 μm
Radiation Resistance	Tested up to 100 kGy (gamma), minimal RIA at 1550 nm
Attenuation @1550 nm	⩽0.45 dB/km (pre-irradiation); stable post-exposure
Proof Tension	⩾100 kpsi
Key Performance	Ultra-low radiation-induced attenuation (RIA) High mechanical strength for launch and in-reactor deployment Excellent thermal stability across wide temperature range Compatible with standard G.652.D splicing and termination

Applications

- In-core and ex-core radiation/temperature sensing in nuclear power plants
- Real-time dosimetry and health monitoring of reactor structural components

- Inter-satellite and intra-satellite data links in LEO, MEO, and GEO orbits
- Optical feedthroughs for particle accelerators and fusion research facilities
- Space telescope instrumentation requiring radiation-immune signal transmission

Handling & Integration

Supplied as bare fiber on radiation-clean spools. For optimal performance in high-radiation zones, avoid tight bends (15 mm radius) and ensure hermetic or hydrogen-free packaging to prevent synergistic degradation effects. The fiber’ s standard geometry allows direct replacement of conventional SMF in radiation-prone segments of optical networks.