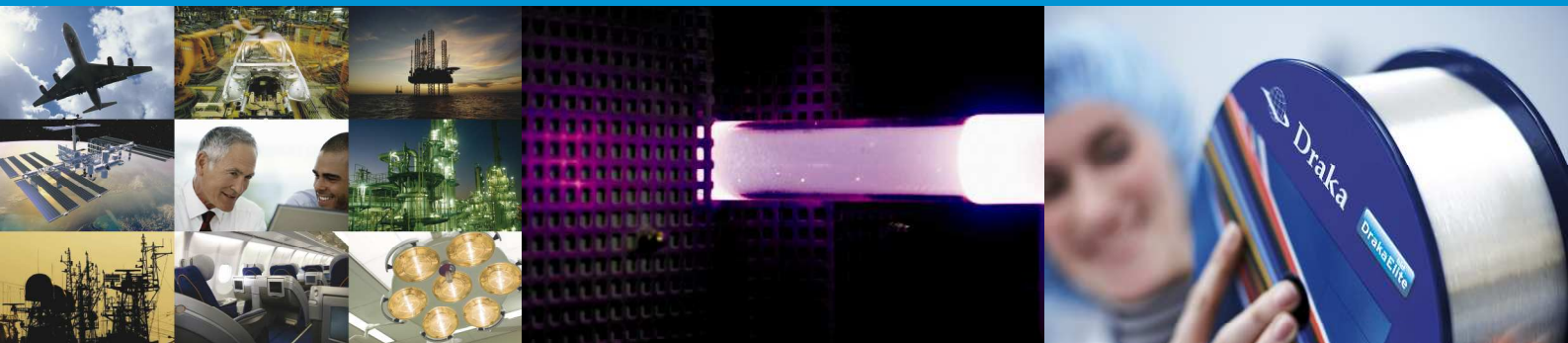


Provides performances in terms of bandwidth and attenuation in radiative environments



Specialty Fiber



Issue date: 07/10  
Supersedes: 12/09

**Product Type:** RadHard 50  $\mu\text{m}$  MMF / 62.5  $\mu\text{m}$  MMF / SMF qualified under MIL-PRF-49291

**Coating Type:** Dual Layer Primary Coating (DLPC9) (500  $\mu\text{m}$ : DLPC2)

For data transmission in specific radiative environments

- Military/Defense/Aerospace
- Nuclear power plants
- High energy physics laboratories and Industrial
- Sensors



Value Innovation is a way of looking at the world. How we can help our customers do more, make more, save more, achieve more.



### Radiation resistance and MIL-PRF-49291 certifications

For many years Draka Communications has offered multimode and single-mode fibers improved for use in radiative environments (e.g. gamma rays, X-flash, neutrons protons). These DrakaElite™ fibers have been designed for reduced sensitivity to radiation effects. One reason of this excellent behavior is the use of the proprietary PCVD glass deposition process, which allows phosphorous-free operation<sup>1,2,3</sup>. Moreover, Draka Communications maintains a dedicated production line, optimized for these RadHard products. In addition to that, Draka's PCVD process allows realization of very accurate refractive index profiles that guarantee enhanced performances in terms of bandwidth and attenuation. Draka Communications offers three optical fiber products, which have been qualified for MIL-PRF-49291 specifications:

- DrakaElite™ RadHard 62.5 / 125 / 242  $\mu\text{m}$  MMF (MIL-PRF-49291/6-03)
- DrakaElite™ RadHard 50 / 125 / 242  $\mu\text{m}$  MMF (MIL-PRF-49291/1-01)
- DrakaElite™ RadHard 9 / 125 / 242  $\mu\text{m}$  SMF (MIL-PRF-49291/7-01)

The qualification approval under these performance specifications is maintained by the USA Defense Supply Center Columbus (DSCC-VQ); the qualified product list (QPL) can be checked at:

<http://www.dscsc.dla.mil/programs/qmlqpl/QPLdetail.asp?QPL=49291>

Special versions of the 50  $\mu\text{m}$  fiber are the 10Gb/s OM3 and OM4 MaxCap RadHard fibers offering 10GBASE-SX applications over 300m / 550m.

The Radiation-Induced Attenuation (RIA) of each fiber strongly depends on the radiation conditions. RIA generally decreases with: decreasing dose-rate, decreasing total dose, longer annealing time, increasing temperature, increasing injected power and longer wavelengths.

### Coating

The 242  $\mu\text{m}$  primary coating used for these DrakaElite™ RadHard products is the well-known dual layer UV curable acrylate DLPC9 offering optimized performances in stringent tight-buffer cable applications and high resistance to micro-bending.

In addition DrakaElite™ RadHard multimode fibers can be equipped with 500  $\mu\text{m}$  coating DLPC2, also MIL-PRF-49291 approved. Also single-mode fibers can be equipped with this 500  $\mu\text{m}$  DLPC2 coating, however this combination has not been offered for MIL approval.

### Standards

DrakaElite™ RadHard MIL-PRF-49291 qualified fiber products comply with or exceed the relevant IEC 60793-2-10 multimode fiber standard, the relevant IEC 60793-2-50 single-mode fiber standard, ITU-T Rec. G.652, the relevant TIA/EIA 492 standards and Telcordia GR-20-CORE. In addition, the PCVD fiber production plant of Draka Communications in Eindhoven (Netherlands) is qualified according to the USA DoD product assurance program standard MIL-790.

Features	Benefits
Hardened for radiative environments	Minimized attenuation increase under radiation exposure

**Provides performances in terms of bandwidth and attenuation in radiative environments**
**Product Type: 50 µm MMF / 62.5 µm MMF / SMF qualified under MIL-PRF-49291 Issue date: 07/10**  
**Coating Type: Dual Layer Primary Coating (DLPC9) (500 µm: DLPC2) Supersedes: 12/09**
**DrakaElite™ RadHard 50/125/242 (500) µm Multimode Fiber**
**MIL Specification**

MIL Specification	49291/1-01 (242 µm coating diameter)
MIL Specification	49291/1-02 (500 µm coating diameter)

**Attenuation**

Attenuation Coefficient at 850 nm	≤ 2.4 dB/km (MIL-PRF-49291/1: ≤ 3.5 dB/km)
Attenuation Coefficient at 1300 nm	≤ 0.6 dB/km (MIL-PRF-49291/1: ≤ 1.0 dB/km)

Modal Bandwidth 850/1300 nm	≥ 500 / 500 MHz.km
All other specifications:	Draka Communications datasheet 50/125 µm Multimode Fiber

**DrakaElite™ RadHard 50/125/242 (500) µm OM3 / OM4 (10 Gb/s) Multimode Fiber**
**MIL Specification**

MIL Specification	49291/1-01 (242 µm coating diameter)
MIL Specification	49291/1-02 (500 µm coating diameter)

**Attenuation**

Attenuation Coefficient at 850 nm	≤ 2.4 dB/km (MIL-PRF-49291/1: ≤ 3.5 dB/km)
Attenuation Coefficient at 1300 nm	≤ 0.6 dB/km (MIL-PRF-49291/1: ≤ 1.0 dB/km)

EMBc 850 nm	OM3: ≥ 2000 MHz.km	OM4: ≥ 4700 MHz.km
Modal Bandwidth 850/1300 nm	OM3: ≥ 1500 / 500 MHz.km	OM4: ≥ 3500 / 500 MHz.km
All other specifications:	Draka Communications datasheet: MaxCap-OM3 and MaxCap-OM4 50/125 µm Multimode Fiber	

**DrakaElite™ RadHard 62.5/125/242 (500) µm Multimode Fiber**
**MIL Specification**

MIL Specification	49291/6-03 (242 µm coating diameter)
MIL Specification	49291/6-05 (500 µm coating diameter)

**Attenuation**

Attenuation Coefficient at 850 nm	≤ 3.0 dB/km (MIL-PRF-49291/6: ≤ 3.5 dB/km)
Attenuation Coefficient at 1300 nm	≤ 0.7 dB/km (MIL-PRF-49291/6: ≤ 1.0 dB/km)

Modal Bandwidth 850/1300 nm	MIL-PRF-49291/6	Non-MIL-PRF compliant
OFL	≥ 300 / 600 MHz.km	≥ 200 / 600 MHz.km
RML / EMBc	≥ 385 / 700 MHz.km	
All other specifications:	Draka Communications datasheet 62.5/125 µm Multimode Fiber	

**DrakaElite™ RadHard 9/125/242 (500) µm Single-Mode Fiber**
**MIL Specification**

MIL Specification	49291/7-01 (242 µm coating diameter)
MIL Specification	49291/7-02 (500 µm coating diameter; no QPL)

**Attenuation**

Attenuation Coefficient at 1310 nm	≤ 0.4 dB/km
Attenuation Coefficient at 1550 nm	≤ 0.3 dB/km
All other specifications:	Draka Communications datasheet SSMF

**References:**

<sup>1</sup> Lydtin H. "A Technique Suitable for Large-Scale Fabrication of Optical Fibers", *Journal of Lightwave Technology*, LT-4 (8), pp. 1034-1038, 1986.

<sup>2</sup> Girard S., Keurinck J., Ouerdane Y., Meunier J-P., Boukenter A., "Gamma-rays and pulsed X-ray radiation responses of germanosilicate single-mode optical fibers : influence of cladding codopants", *Journal of Lightwave Technology*, 22 (8), pp. 1915-1922, 2004.

<sup>3</sup> Henschel H. "Radiation hardness of present optical fibers", *SPIE Vol 2425 Optical Fiber Sensing and Systems in Nuclear Environments*, pp. 21-31, 1994.

## How can we be of service to you?

Value Innovation is a way of looking at the world. How can we help our customers do more, make more, save more, achieve more?

Take DrakaElite™. Based on our proprietary manufacturing process and our control of all technological building blocks, we offer an extensive portfolio of specialized optical fibers that have been designed, developed, manufactured

and tested for every environment. Whether you want to guide, amplify, transmit, process, control or sense light, Draka has the fiber you need, whatever your environment. And if for some reason we don't have exactly what you need, well, we'll just make it.

That's Value Innovation in action.

**Draka Communications**

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The Draka Communications policy of continuous improvement may cause in changed specifications without prior notice