METRIC

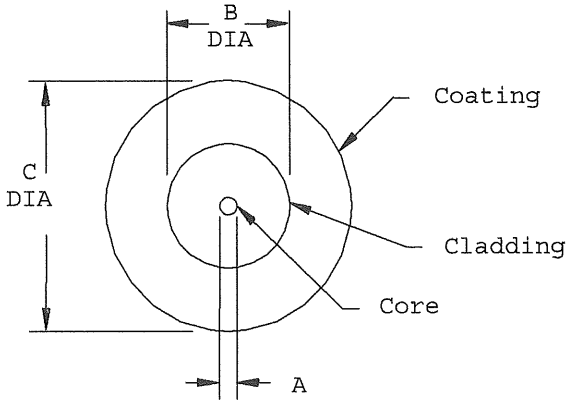
MIL-PRF-49291/7C
10 January 2003
SUPERSEDING
MIL-F-49291/7B
29 November 1994

PERFORMANCE SPECIFICATION SHEET

FIBER, OPTICAL, TYPE II, CLASS 5, SIZE II, COMPOSITION A, WAVELENGTH D, RADIATION RESISTANT (METRIC)

This specification is approved for use by all departments and Agencies of the Department of Defense.

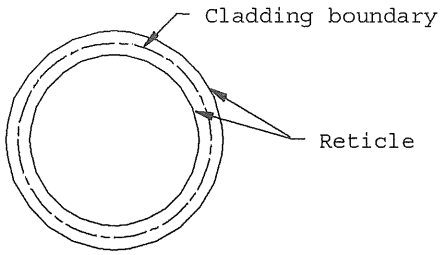
The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-PRF-49291.



PIN	Dimensions		
	A (μm)	B (μm)	C (μm)
M49291/7-01 M49291/7-01A	1/	125 ± 1	250 ± 15
M49291/7-02 M49291/7-02A	1/	125 ± 1	500 ± 25

1/ Core diameter is not a specified attribute. Refer to the mode field diameter specifications.

FIGURE 1. Dimensions and configuration of optical fiber construction.



Circle (solid)	Diameter (μm)
Inner	124.0
Second	126.0

FIGURE 2. Tolerance fields.

DIMENSIONS AND CONFIGURATION:

Diameter: See figures 1 and 2.

Ovality:
Core: Not applicable.
Cladding: $\leq$ 2 percent.

Offset:
Core-to-cladding: $\leq$ 1 μm.
Fiber-to-coating: coating-cladding concentricity error $\leq$ 10.5 μm (overall coating concentricity ratio (OCCR) $\geq$ 0.70 for 250 μm diameter coatings and $\geq$ 0.84 for 500 μm diameter coatings).

Mode field diameter: Nominal range 8.5 to 10.0 μm, maximum tolerance of each individual production unit $\pm$ 0.7 μm.

Splices: Not allowed.

Tensile strength (proof test): 690 MPa.

Fiber mass/unit length: 0.1 kg/km maximum.

Change in optical transmittance: Measurements to be made at 1310 $\pm$ 20 nm.

Maximum attenuation rate: 0.4 dB/km at 1310 $\pm$ 20 nm
0.3 dB/km at 1550 $\pm$ 20 nm

Numerical aperture: Not applicable.

Bandwidth: Not applicable.

Chromatic dispersion: ≤ 3.2 ps/nm/km at 1310 nm ± 20 nm, ≤ 22 ps/nm/km at 1550 ± 20 nm.

Transient Attenuation: Not applicable.

Macrobend attenuation: Performed at 1310 ± 20 nm.

ENVIRONMENTAL:

Temperature range: See table I.

TABLE I. Temperature range.

PIN	Operating (°C)	Nonoperating (°C)	Storage (°C)
M49291/7-01 M49291/7-02	-46 to +85	-55 to +85	-55 to +85
M49291/7-01A M49291/7-02A	-46 to +85	-55 to +85	-55 to +85

Fluid immersion aging: Not applicable.

Dynamic tensile strength: Applicable.

Fungus: Applicable.

Storage temperature: Applicable.

Nuclear radiation resistance: Nuclear radiation resistance requirements and test conditions shall be as shown below and in tables II and VI:

Light launch conditions: In accordance with EIA/TIA-455-78.
Wavelength: 1310 ± 25 nm.
Source type: Laser diode with FWHM spectral width ≤ 10 nm.

TABLE II. Nuclear radiation requirement applicability.

PIN	Steady state gamma	Prompt gamma	Neutron
M49291/7-01 M49291/7-02	Applicable	Not applicable	Not applicable
M49291/7-01A M49291/7-02A	Applicable	Applicable	Applicable

TABLE III. Steady state gamma radiation test conditions.

PIN	Test temperature (°C)	Dose rate rad (Si)/sec	Total Dose (rad (Si))
M49291/7-01 M49291/7-02	-28 ± 2 25 ± 2 85 ± 2	50 +0, -20	Classified
M49291/7-01A M49291/7-02A	-46 ± 2 25 ± 2 71 ± 2	3000 +0, -20	3000

TABLE IV. Prompt gamma radiation test conditions.

Parameter	Value
Test temperature (°C)	-46 ± 2 25 ± 2 71 ± 2
Total dose (rad (Si))	≥ 450
Pulse duration (ns)	≤ 100
Dose rate (rad (Si)/sec)	1.4×10^{10} nominal
Dose deposition profile	variance ≤ 20 percent
Energy spectrum	simulate hard x-ray with end point energy ≥ 2 MeV

TABLE V. Neutron radiation test conditions.

Parameter	Value
Test temperature (°C)	-46 ± 2 25 ± 2 71 ± 2
Nominal fluence	1.0×10^{12} neutrons/cm^2
Pulse duration (ms)	≤ 1
Equivalent energy	1.0 MeV equivalent damage in silicon (Si)
Dose deposition profile	variance ≤ 10 percent
Gamma radiation total dose	Minimized to the maximum extent practicable

(Some nuclear radiation resistance characteristics of this optical fiber are classified and shall be obtained from the qualifying activity. Application

to receive these requirements must be made through the Department of the Navy, Naval Surface Warfare Center, Dahlgren Division, ATTN: Code B35, 17320 Dahlgren Road, Dahlgren, VA 22448-5100. Information concerning security clearance classification and "need to know" must be detailed in the request.)

TABLE VI. Radiation test requirements.

PIN	Maximum induced attenuation (dB/km)	Attenuation at specified recovery time (dB/km)	Specified recovery time (sec)
M49291/7-01 M49291/7-02	≤ 50 1/	≤ 15 @ -28°C ≤ 5 @ 25°C ≤ 5 @ 85°C 1/	1,000
M49291/7-01A M49291/7-02A	None	≤ 2.0 @ -46°C ≤ 1.5 @ 25°C ≤ 1.0 @ 71°C 1/	2/

1/The radiation induced loss for a given threat. The total dose associate with the threat is classified and not necessarily equal to the test total dose.

2/There is no specified maximum recovery time. However, the time taken to recover within the specified maximum attenuation shall be recorded.

QUALITY CONFORMANCE:

In group A testing single-mode fiber attenuation may be measured using EIA-455-61.

In group C testing the mechanical strippability test may be omitted if the optical fiber coatings have not changed from when the mechanical strippability test was last performed. The manufacturer shall provide a certificate of compliance for mechanical strippability in the group C test report.

Part or identifying number (PIN). (See figure 1 and table VII):

M49291/7-01
M49291/7-01A
M49291/7-02
M49291/7-02A

PIN	Superseding
M49291/7-01	M49291/01-007 1/
M49291/7-01A	None
M49291/7-02	None
M49291/7-02A	None

1/ PIN is as shown in MIL-F-49291/7(NAVY).

Qualification by similarity:

Manufacturers who are qualified under this specification sheet and whose optical fiber with a change in the glass (composition, profile, etc.) passes the visual and mechanical, fiber length, attenuation uniformity, attenuation rate, numerical aperture (MM only), core diameter (MM only), cutoff wavelength (SM only), mode field diameter (SM only), transient attenuation (MM only), macrobend attenuation, bandwidth (MM only), chromatic dispersion, temperature cycling and nuclear radiation resistance specified herein, are qualified under this specification sheet for the optical fiber with changed glass.

Manufacturers who are qualified under this specification sheet and whose optical fiber with a change in the coating (composition, thickness, etc.) passes the visual and mechanical, fiber length, attenuation rate, transient attenuation (MM only), macrobend attenuation, coating diameter, overall coating concentricity ratio, mechanical strippability, dynamic tensile strength, thermal shock, storage temperature, temperature humidity cycling, temperature cycling, life aging and fungus resistance specified herein, are qualified under this specification sheet for the optical fiber with changed coating.

Custodians:
Army - CR
Navy - SH
Air Force - 11
NASA - NA

Review activities:
Navy - AS
Air Force - 02, 13, 19, 33, 93, 99
DIA - DI
DLA - CC

Preparing activity:
Navy - SH

Agent:
DLA - CC

(Project 6010-0042)