METRIC

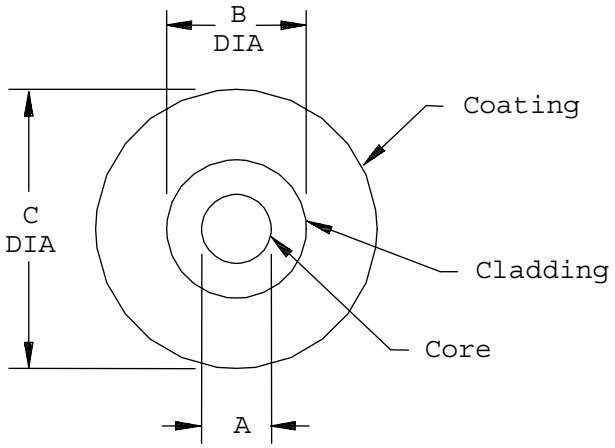
MIL-PRF-49291/6C
10 January 2003
SUPERSEDING
MIL-F-49291/6B
29 November 1994

PERFORMANCE SPECIFICATION SHEET

FIBER, OPTICAL, TYPE I, CLASS I, SIZE IV, COMPOSITION A, WAVELENGTH B, RADIATION RESISTANT (METRIC)

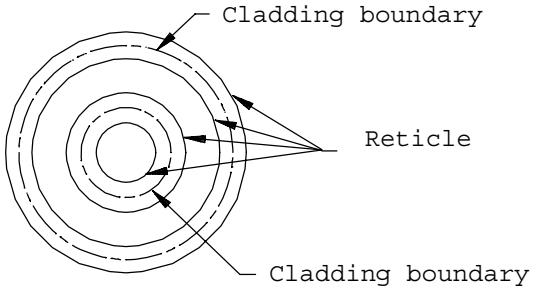
This specification is approved for use by all Departments and Agencies of the Department of Defense.

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.



Fiber	PIN	Dimensions		
		A (µm)	B (µm)	C (µm)
Space qualified Standard	M49291/6-02S M49291/6-03	62.5 ± 3 62.5 ± 3	125 ± 1 125 ± 1	250 ± 15 250 ± 15
Space qualified Standard	M49291/6-04S M49291/6-05	62.5 ± 3 62.5 ± 3	125 ± 1 125 ± 1	500 ± 25 500 ± 25

FIGURE 1. Dimensions and configuration of optical fiber construction.



Circle (solid)	Diameter (µm)
Inner	59.5
Second	65.5
Third	124.0
Fourth	126.0

FIGURE 2. Tolerance fields.

DIMENSIONS AND CONFIGURATION:

Diameter: See figures 1 and 2. (Diameter requirements are based on selecting fibers with end-points tolerances of 125 ± 1 µm from production with a 125 ± 2 µm tolerance.)

Ovality:
Core: ≤ 6 percent.
Cladding: ≤ 2 percent.

Offset:
Core-to-cladding: ≤ 4 µm.
Fiber-to-coating: coating-cladding concentricity error ≤ 10.5 µm (overall coating concentricity ratio (OCCR) ≥ 0.70 for 250 µm diameter coatings and ≥ 0.84 for 500 µm diameter coatings).

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 1300 ± 20 nm.

Maximum attenuation rate: 3.5 dB/km at 850 ± 20 nm
1.0 dB/km at 1300 ± 20 nm

Numerical aperture: 0.275 ± 0.015 at 850 nm ± 25 nm.

Overfill Bandwidth: ≥ 600 MHz-km at 1300 nm ± 20 nm.
≥ 300 MHz-km at 850 nm ± 20 nm.

RML/EMB_c Bandwidth: ≥ 700 MHz-km at 1300 nm ± 20 nm.
≥ 385 MHz-km at 850 nm ± 20 nm.

Chromatic dispersion: The zero dispersion wavelength shall be not less than 1320 nm and not greater than 1365 nm. The dispersion slope at the zero dispersion wavelength shall not be greater than 0.11 ps/nm^2km.

Transient Attenuation: ≤ 1.5 dB at 1300 nm.

Macrobend attenuation: Performed at 1300 ± 20 nm.

ENVIRONMENTAL:

Temperature range: See table I.

TABLE I. Temperature range.

PIN	Operating (°C)	Nonoperating (°C)	Storage (°C)
M49291/6-02S M49291/6-04S	-55 to +85	-62 to +85	-62 to +85
M49291/6-03 M49291/6-05	-46 to +85	-55 to +85	-55 to +85

Fluid immersion aging: Not applicable.

Dynamic tensile strength: Applicable.

Fungus: Applicable.

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

Light launch conditions: In accordance with EIA-455-50.
Wavelength: 1300 ± 25 nm.
Source type: LED with FWHM spectral width ≤ 160 nm.

TABLE II. Steady state gamma radiation test conditions.

PIN	Test temperature (°C)	Dose rate	Total Dose (rad Si))
M49291/6-02S M49291/6-04S	25 ± 2 85 ± 2	50 rad (Si)/min	10 krad (Si)
M49291/6-03 M49291/6-05	-28 ± 2 25 ± 2 85 ± 2	50 +0, -20 rad (Si)/sec	Classified

(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 III. Steady state gamma radiation test requirements.

PIN	Maximum induced attenuation (dB/km)	Attenuation at specified recovery time (dB/km)	Specified recovery time (sec)
M49291/6-02S M49291/6-04S	≤ 6	≤ 5	10,000
M49291/6-03 M49291/6-05	≤ 50 1/	≤ 15 @ -28°C 1/ ≤ 5 @ 25°C ≤ 5 @ 85°C	1,000

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.

QUALITY CONFORMANCE:

In group A testing length may be measured using mechanical methods.

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.

The following additional requirements and tests are applicable to space qualified PIN:

a. Storage temperature: Applicable.
b. Thermal vacuum outgassing: Applicable.
c. Odor: Applicable.
d. Toxicity: Applicable.

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

M49291/6-02S
M49291/6-03
M49291/6-04S
M49291/6-05

TABLE IV. Supersession data.

PIN	Superseding
M49291/6-02S	None
M49291/6-04S	None
M49291/6-03	D49291/01-006 1/
	M49291/6-01
	M49291/6-02
M49291/6-05	None

1/ PIN is as shown in MIL-F-49291/6(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

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