

INCH-POUND

MIL-PRF-64266/23
3 February 2014

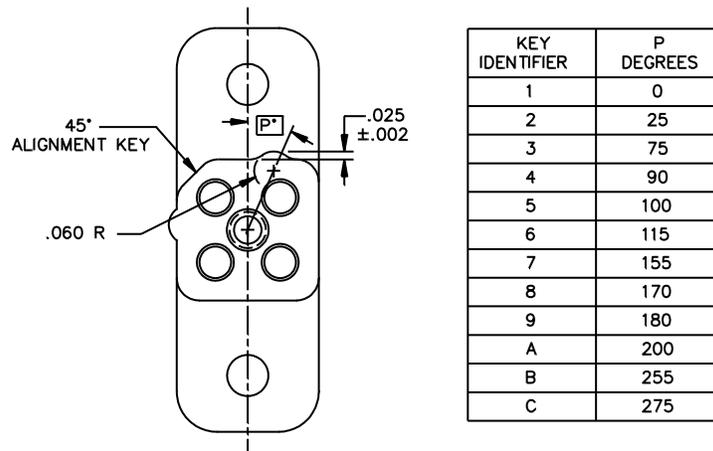
PERFORMANCE SPECIFICATION SHEET

CONNECTORS, FIBER OPTIC, RECTANGULAR,
PLUG, BACKPLANE STYLE,
MULTIPLE REMOVABLE TERMINI,
SINGLE FIBER CABLES, BLIND MATED,
NONENVIRONMENT RESISTING, TEMPERATURE RANGES 1 & 2

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

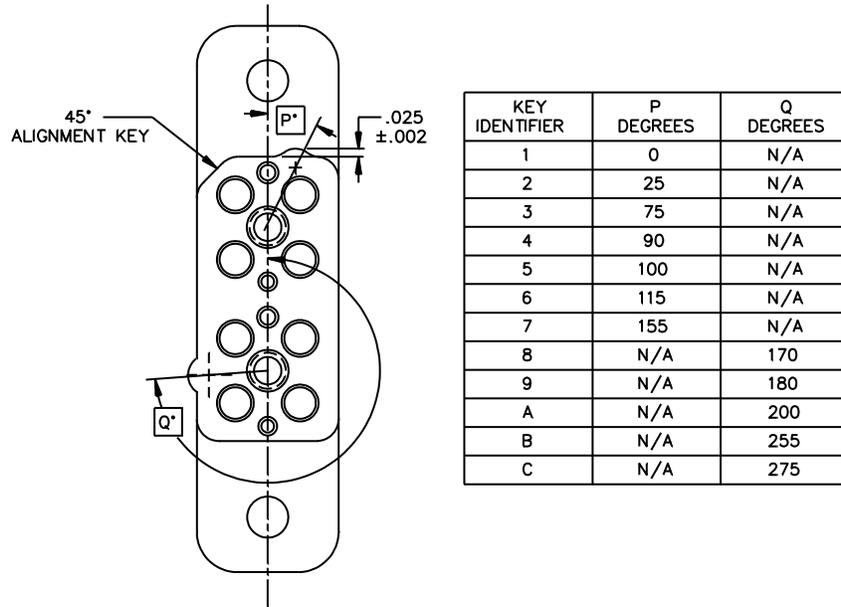
The requirements for acquiring fiber optic connectors described
herein shall consist of this specification sheet and MIL-PRF-64266.

SCOPE. The performance requirements specified herein cover a connector plug that is affixed to a backplane printed circuit board (PCB), affixed to a motherboard, or mounted directly onto the back edge of a circuit card rack. The mating connector receptacle is mounted at the back edge of the PCB that is inserted into the backplane PCB, motherboard, or rack. Mating of the connector plug to the connector receptacle is accomplished by a blind mate after the PCB is inserted into the backplane, motherboard or rack. Once the connector receptacle is correctly inserted into the backplane, motherboard or rack, the connector halves are held together with the locking features on the circuit card, motherboard or rack. Cable entry resistant features for the single fiber cables, when used with a backshell, include ability to restrict movement, position, and twist; however, there are no features to capture the cabling or to prevent the penetration of various environments.



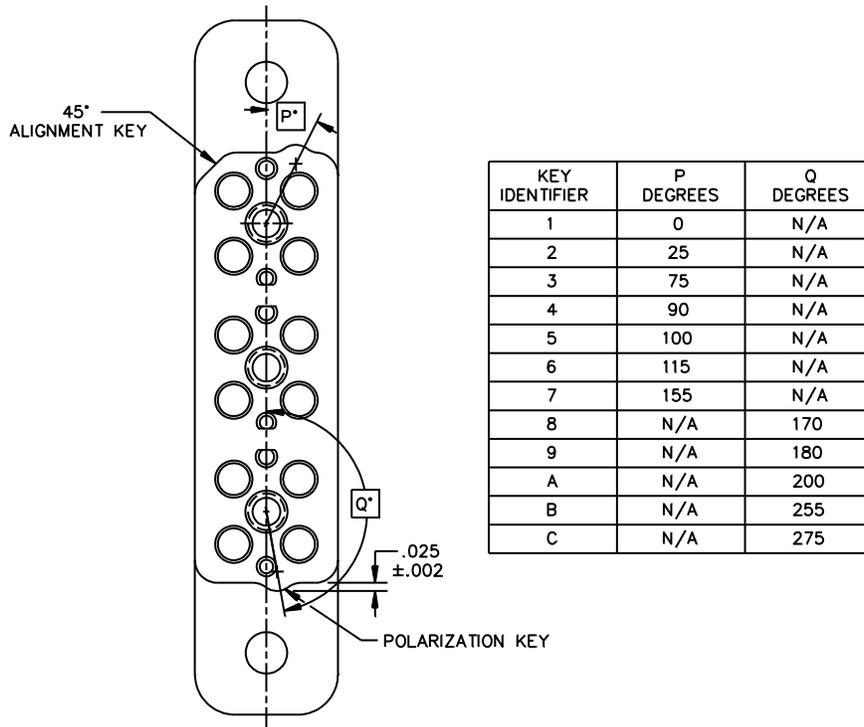
Four Cavity Connector

FIGURE 1. Footprint dimensions.



Eight Cavity Connector

FIGURE 1. Footprint dimensions – Continued.



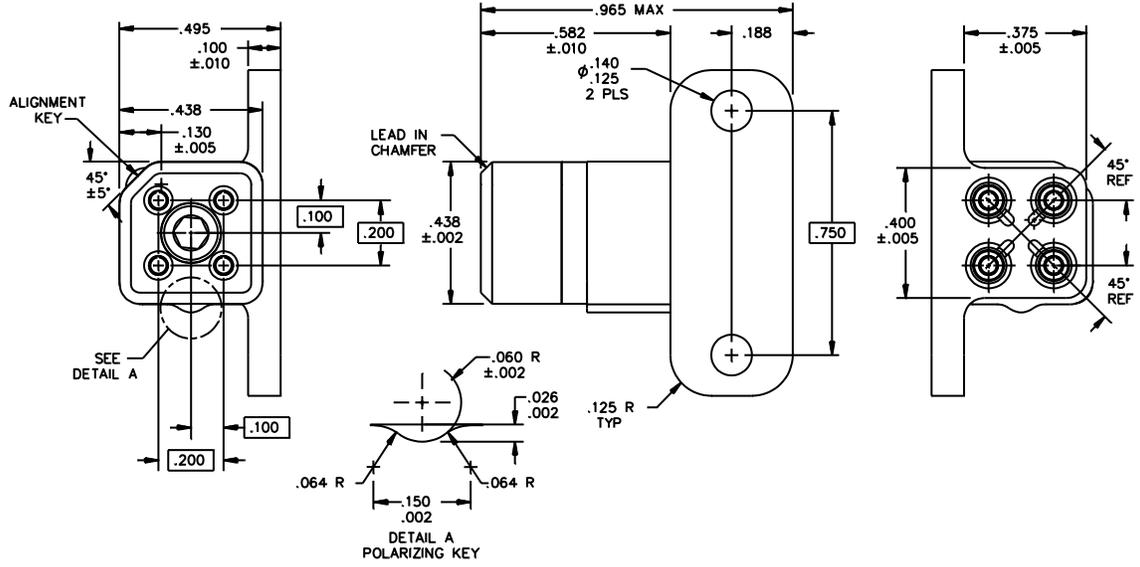
12 Cavity Connector

FIGURE 1. Footprint dimensions – Continued.

Notes:

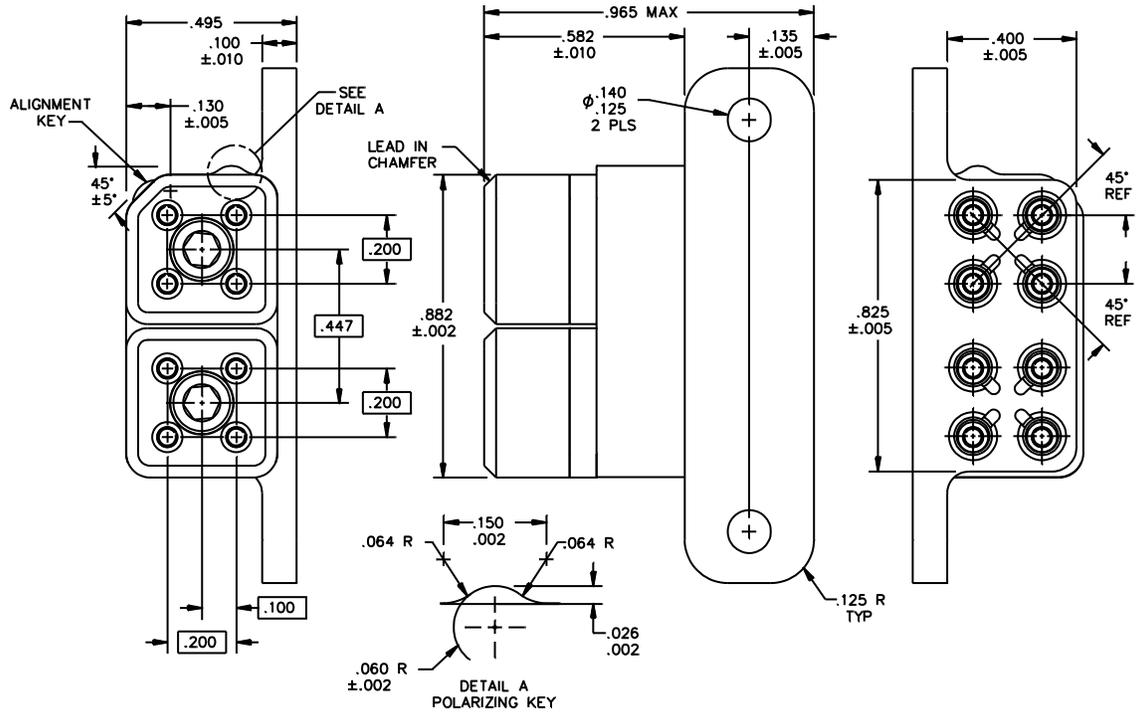
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions apply to plated/finished part.
4. Metric equivalents are in millimeters (mm).
5. Connector internal configuration is not shown. The connector plug to connector receptacle interface dimensions shall be in accordance with figure 1.
6. A mating connector receptacle shall be able to blind mate to the connector plug by means of having the alignment key of the connector plug and the alignment keyway of the connector receptacle in the same orientation and by having the lead-in chamfers on both connector plug and connector receptacle contribute to enable the blind mate.
7. Envelop length dimensions are specified to one decimal place to expedite inspection process unless otherwise indicated.
8. Position for placing the polarizing key for the given key identifier is provided in figure 2.

FIGURE 1. Footprint dimensions – Continued.



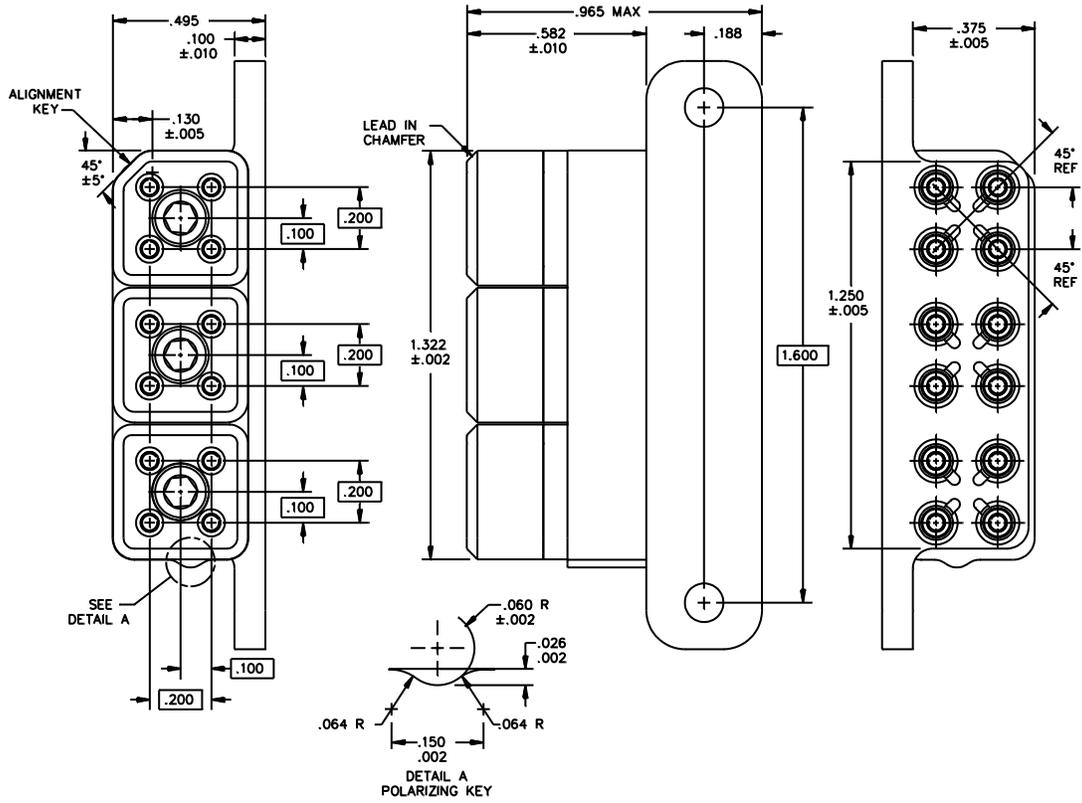
Four Cavity Connector

FIGURE 2. Polarizing key positions.



Eight Cavity Connector

FIGURE 2. Polarizing key positions - Continued.



Notes:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions apply to plated/finished part.
4. Metric equivalents are in millimeters (mm).
5. Each polarizing key identifier only has one polarizing key and this polarizing key is at the position listed in the table for this figure.
6. Refer to detail A on figure 1 for polarizing key dimensions.

Twelve Cavity Connector

FIGURE 2. Polarizing key positions - Continued.

REQUIREMENTS:

Dimensions and configurations: See figures 1 herein except position for placement of the polarizing key shall conform to figure 2. When not specified, the default position for placing the polarizing key shall be that of key identifier 1. See [MIL-PRF-64266](#), figure 1 for terminus cavity dimensions.

Temperature ranges.

Operating:	-67°F to 329°F	(-55°C to 165°C)
Non-operating:	-40°F to 168°F	(-40°C to 70°C)
Storage:	-40°F to 168°F	(-40°C to 70°C)

Weight. Weight shall not exceed the specified value in table I for the applicable number of cavities and material.

TABLE I. Connector plug weight (without termini).

Cavity designator	No. of cavities	Composite		Aluminum		Stainless steel	
		ounce	grams	ounce	grams	ounce	grams
U	04	.14	4	.28	8	.78	22
V	08	.25	7	.53	15	1.4	40
W	12	.35	10	.74	21	2.1	59

Fabrication procedure. Standard fabrication procedure for both the terminus termination (placement of the terminus onto the end of a fiber optic cable) and the assembly of the connector and backshell onto the fiber optic cabling shall be used. Standard fabrication procedure shall be in accordance with [MIL-STD-1678-4](#). Copies of these documents are available online at <http://quicksearch.dla.mil/> or from the Standardization Document order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.

Termini. The connector in the specification sheet shall use the MIL-PRF-29504/18 and MIL-PRF-64266/24 termini. For unoccupied termini cavities, the connector shall be able to use dummy terminus, per MIL-PRF-29504/19.

Alignment sleeve retainer (ASR): A MIL-PRF-64266/26 ASR cannot be installed into a connector plug and shall not be provided with the connector plug as part of this PIN. The MIL-PRF-64266/26 ASR, when application requires that an ASR be provided as a separate component, shall be obtained through a separate PIN (M64266/26).

Keying, plug-to-receptacle. The connector plug shall be keyed with the connector receptacle to permit connector plug insertion into the connector receptacle in only one orientation.

Polarization keys. Keying positions shall be designed "1" through "9" and "A" through "C" as shown in figure 2. Key position designator "1" is the common polarization key position and the one to specify when there is no need to have multiple connectors with multiple polarization key positions.

Backshell configurations. The configuration for the connector plug shall be straight whereas the one for the connector receptacle shall be at a 90 degree angle (i.e., cable entry end shall be at a 90 degree angle to the backshell-to-connector interface). The connector shall be qualified with this backshell configuration. The backshell shall be removable and optional (connector shall be functional without the use of the backshell).

Backshell means of attachment. The means and interface dimensions to ensure that a backshell remains affixed or coupled to a connector plug are shown in figure 1. The envelop dimensions for the backshell are shown in figure MIL-PRF-64266/29. This coupling shall be sufficient to ensure no backing off of the backshell during mechanical shock or vibration.

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Qualification. Qualification shall consist of performing testing specified as listed in table II. Qualification shall consist of performing tests in table II for both temperature range 1 (TR1) and temperature range 2 (TR2). There is no separate qualification for only one temperature range. The testing specified as listed in table II is for backplane connectors is valid only once the front card edge connector to MIL-PRF-64266/25 is qualified. Otherwise, the same test sequence as specified in [MIL-PRF-64266/25](#) must be performed with the exceptions cited for the individual tests on this specification sheet. Performance of the limited sequence of tests in table II is valid if the only difference between the previously qualified MIL-PRF-64266/25 connector plug and the MIL-PRF-64266/23 connector plug are the dimensional changes to reduce the footprint (based on having no jackscrew) and the dimensions to ensure a blind mate.

For qualification, all cavities shall be populated with qualified MIL-PRF-29504/20 termini. Termini qualification is not performed using a MIL-PRF-64266 connector under this specification sheet.

Identification marking. Applicable. Both initial and after environmental testing.

Backshell and backshell accessory attachment. Not applicable.

Connector coupling engagement and disengagement torque. Not applicable.

ASR retention radial strength. Applicable except that both a clockwise and counterclockwise radial torque shall be applied to ASR (Alignment Sleeve Retainer) while the ASR is affixed to the connector plug. In each direction, the radial torque shall be applied at 15 +5/-0 in-lb (85 N-cm) and maintained for at least one minute. There shall be no rotational displacement between the ASR and the connector plug or any cracking of the alignment sleeves.

ASR retention axial strength. Applicable except that a pressure shall be applied to the mating surface of ASR while the ASR is affixed to the connector plug. The mating surface for this test is the surface that comes into contact with the connector receptacle. An axial pressure shall be applied on the ASR mating surface at 100 +5/-0 lb/sq in (0.69 MPa) and maintained for at least one minute. The test shall be repeated with the axial pressure applied to the connector plug back surface (i.e., surface that mates with the backshell). There shall be no axial displacement between the ASR and the connector plug or any cracking of the alignment sleeves.

Maintenance aging, termini. Applicable.

Maintenance aging, ASR (Alignment sleeve retainer). Applicable except that the ASR shall be tightened to the connector plug when reaffixed with the torque specified in table III. Both connector plug and ASR shall show no wear or damage. No cracking or other damage shall occur to the alignment sleeves.

Cable pull-out force. Not applicable.

External bending moment. Not applicable.

Cable seal flexing. Not applicable.

Twist. Applicable.

Mating durability. Applicable except connector receptacle shall be affixed to the backplane on the rack or directly mounted to the rack. Connector plug shall be mounted on the circuit card. Each cycle shall consist of mating and de-mating the circuit card from the rack with the connector plug fully engaged to the connector receptacle with each mate.

Backplane mating durability. Not applicable.

Crush. Not applicable.

Water pressure. Not applicable.

Banding strap attachment integrity. Not applicable.

Compression fitting engagement integrity. Not applicable.

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TABLE II. Qualification inspections (except inoperability)
for backplane connector once card front edge connector is qualified.

Test performed <u>1/</u> , <u>19/</u>	Number of cavities Fiber size (microns) Temperature range	Test sample configurations <u>2/</u>				
		8	8	8	4	12
		SM	MM 50/125	MM 62.5/125	SM	SM
		TR2	TR2	TR2	TR2	
Group 1 (4 mated pairs) <u>3/</u>						
Interoperability <u>4/</u> , <u>5/</u> , <u>6/</u>		X	X	X	X	
Visual and mechanical						
Size		X	X	X	X	
Weight		X	X	X	X	
Identification marking		X	X	X	X	
Screw threads		X	X	X	X	
Workmanship		X	X	X	X	
Functional						
ASR retention radial strength		X			X	
ASR retention axial strength <u>15/</u>		X			X	
Terminus insertion and removal						
Terminus retention force						
Maintenance aging, termini						
Maintenance aging, ASR						
Shell to shell conductivity						
Connector coupling engage/disengage torque <u>14/</u>						
Backshell and accessory attachment						
Banding strap attachment integrity						
Compression fitting engagement integrity						
Backshell mating durability						
Optical						
Insertion loss (initial)		X	X	X	X	
Return loss (SM only) <u>17/</u>		X			X	
Crosstalk						

See notes at end of table.

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TABLE II. Qualification inspections (except inoperability) for backplane connector once card front edge connector is qualified.- Continued.

Test performed <u>1/</u> , <u>19/</u>	Number of cavities Fiber size (microns) Temperature range	Test sample configurations <u>2/</u>				
		8	8	8	4	12
		SM	MM 50/125	MM 62.5/125	SM	SM
		TR2	TR2	TR2	TR2	TR2
Group 2 (2 mated pairs)						
Backshell-to-connector mating torque						
Cable pull out force (retention)						
External bending moment						
Cable seal flexing						
Twist		X				
Mating durability		X			X	X
Return loss <u>18/</u>		X			X	X
Impact						
Crush						
Vibration: swept sine (TR1)						
Vibration: random (TR1)						
Vibration: swept sine (TR2)						
Vibration: random (TR2)						
Vibration: random with temperature (TR2)						
Return loss						
Shock: MIL-S-901 <u>13/</u>						
Shock: half-sine pulse (TR2)						
Insertion loss verification						
Water pressure						
Modified SO ₂ /salt spray						
Insert retention radial						
Group 3 (2 mated pairs)						
Thermal shock (TR1)						
Thermal shock (TR2)		X			X	X
Temperature/humidity cycling						
Temperature cycling (TR1)						
Temperature cycling (TR2)						
Altitude immersion						
Life aging (temperature life) (TR1)						
Life aging (temperature life) (TR2) <u>16/</u>						
Insert retention radial strength <u>7/</u> , <u>12/</u>						
Insert retention axial strength <u>12/</u>						
Freezing water						
Insertion loss verification		X			X	X
Return loss		X			X	X
Sand & dust						
Connector coupling engage/disengage torque						
Identification marking		X			X	X
Insert retention radial strength						

See notes at end of table.

TABLE II. Qualification inspections (except inoperability) for backplane connector once card front edge connector is qualified – Continued.

Test performed <u>1/</u> , <u>19/</u>	Number of cavities Fiber size (microns) Temperature range	Test sample configurations <u>2/</u>				
		8	8	8	4	12
		SM	MM 50/125	MM 62.5/125	SM	SM
		TR2	TR2	TR2	TR2	TR2
Group 4 (2 mated pair + parts) <u>3/</u>						
Electromagnetic effects (2mp) <u>8/</u>						
Fluid immersion (2 mated pair)						
Shell to shell conductivity (initial)						
Salt spray (2 mated pair) <u>10/</u>						
Salt spray (TR2)						
Connector coupling engage/disengage torque						
Shell to shell conductivity						
Flammability (1 mated pair) <u>11/</u>						
Fungus resistance (parts) <u>9/</u>						
Ozone exposure (parts) <u>9/</u>						
Insertion loss verification						

1/ Qualification for MIL-PRF-64266/23 consist of performing tests in this table for temperature range 2 (TR2). For each connector with a different number of cavities, the recommended sequence is to perform the 8 cavity connector first (or simultaneously). Then the other connectors with a different number of cavities can be obtained with performing only the tests listed. Otherwise, the entire test sequence listed for connector with 8 cavities must be performed. This limited test sequence is valid only under the constraints specified under "Qualification" in this specification sheet.

2/ "X" indicates test applies for particular part(s).

3/ Group 1 mated pair are to be used for Groups 2 and 3 tests. Group 4 can be done before Group 1 with separate samples.

4/ Interoperability test samples. Separate samples are required for interoperability testing. Connector interoperability samples are to be fully populated with termini on single fiber cable and configured without backshells. Backshell interoperability samples are to be constructed with terminated cables that fully populate the connector of the shell size under the test. See Requirement 4103 of [MIL-STD-1678-4](#) for test sample configuration.

5/ Interoperability test source. This testing is done by DLA Land and Maritime-TEB which maintains/retains the interoperability standards. Please note that separate test samples are required for interoperability testing. These test samples will then be retained by DLA Land and Maritime as interoperability standards.

6/ Interoperability fiber types. Interoperability is performed on both single mode and multimode for each connector with a different number of cavities.

7/ Configuration requiring testing. To be performed for connectors with multiple piece inserts only.

8/ Electromagnetic effects. Not applicable.

9/ Parts required. Polymeric parts from 1 mated pair. Assembly is not required.

10/ Two options for salt spray: a. Use same two mated pair from the fluid immersion test. b. Use separate mate pair (If option b, can use one cable of sufficient length to loop around to the cable entrance of each backshell).

11/ Options for flammability. Two mated pair from the fluid immersion, salt spray, or Group 2/3 samples after that Group's test completion may be used.

12/ Post temperature life test. For non-metallic connectors, perform insert retention axial strength and insert retention radial strength after conclusion of the temperature life test.

13/ Shock test. Standard shock fixture 4A for bulkhead mounting shall be used. Supplement test fixture that shall be used and the mounting shall be performed as specified in Measurement 3202 of [MIL-STD-1678-3](#).

14/ Perform on card front edge connector plug configuration only.

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15/ Perform on composite connectors only.

16/ Temperature life (TR2). Perform for connector only if there are not the same materials (including insert) and/or manufacturing process.

17/ Return loss. Return loss shall be obtained using the test setup and procedures per Measurement 2105 of [MIL-STD-1678-2](#) for MIL-PRF-29504/20 termini with a domed end face and PC polish and for MIL-PRF-29504/20 termini with a domed end face and APC polish.

18/ Return loss after mating durability. If failure occurs, ferrule end faces may be re-polished and test redone.

19/ Optical measurements. Optical measurements are to be obtained as specified using the test setup and procedures in [MIL-STD-1678-2](#).

TABLE III. Torque to install ASR.

No. of cavities	ASR torque ^{1/} +/- 1 in-lb (+/- .11 N-m)			
	Composite		Metal	
	In-lb	N-m	In-lb	N-m
04	2.0	.25	4.0	.50
08	2.0	.25	4.0	.50
12	2.0	.25	4.0	.50

^{1/} Increments are rounded to nearest 0.05 N-m for compatibility with a torque wrench.

Freezing water. Not applicable.

Sand and dust. Not applicable.

Electromagnetic effects. Not applicable.

Salt spray. Applicable.

Shell-to-shell conductivity: Not applicable.

Modified SO₂/salt spray. Not applicable.

Altitude immersion. Applicable.

Fluid immersion. Not applicable.

Qualification by similarity.

Connector configurations to test. The below qualification by similarity is valid if tested M64266/23 connectors with a straight cable entry angle backshell on the connector plugs and a 90 degree cable entry angle backshell on the connector receptacles for each two connector mated pair going through one group of tests.

Greater number of cavities. This qualification by similarity is applicable when testing connectors with a larger number of cavities in this specification sheet from the initial connector with eight cavities qualified in this specification sheet. If a connector with eight cavities is qualified, and connectors with a larger number of cavities with similar design, construction, and materials meet the inspections in table II, then the connectors with a larger number of cavities inspected is qualified.

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Lesser number of cavities. This qualification by similarity is applicable when testing connectors with a lesser number of cavities in this specification sheet form the initial connector with eight cavities qualified in this specification sheet. If a connector with eight cavities is qualified, and a connector with a lesser number of cavities having similar design, construction, and materials meet inspections in table II and as performed in the qualification test sequence, then the connector with a lesser number of cavities inspected is qualified.

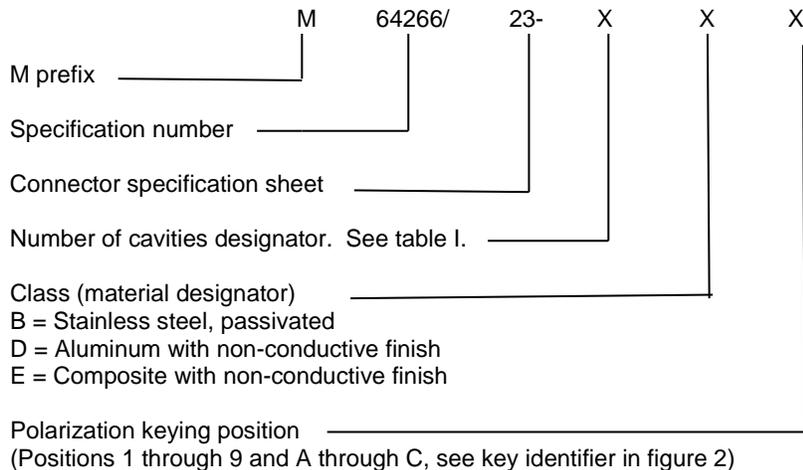
Alternate material. If a connector in this specification sheet made from aluminum is qualified, and MIL-PRF-64266/25 connectors made from composite or stainless steel in this specification sheet meet the alternate material inspections specified in [MIL-PRF-64266/25](#), then a connector in this specification sheet made from the same alternate material is qualified. Otherwise, the alternative material inspections listed for the MIL-PRF-64266/25 connector shall be performed.

Alternate plating or plating process. If a connector with one plating or plating process in this specification sheet is qualified, and connectors made with an alternate (different type) plating or same type plating using an alternate plating process in this specification sheet meet the plating and plating process specified in 4.7.5.5 of the MIL-PRF-64266 base specification, then the connectors with the alternate plating or plating process, as applicable, inspected are qualified.

Marking:

Part or Identification Number (PIN). Marked on shell of the connector.

Part or Identifying Number (PIN). Mark on coupling ring of the backshell.



PIN example: M64266/23-UC1

Installation and removal tools. Termini shall be inserted onto the connector and terminated onto the fiber optic cables using only the tools and equipment listed in [MIL-STD-1678-6](#) for the termini termination and connector assembly procedures.

Mating counterpart connector. M64266/24

Referenced documents. In addition to MIL-PRF-64266, this specification sheet references the following documents:

- MIL-PRF-64266/24
- MIL-PRF-64266/25
- MIL-PRF-64266/26
- MIL-PRF-64266/29
- MIL-STD-1678-2
- MIL-STD-1678-3
- MIL-STD-1678-4

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MIL-STD-1678-6
MIL-PRF-28876
MIL-S-901
MIL-PRF-29504/18
MIL-PRF-29504/19
MIL-PRF-29504/20

Standardization based on lessons learned. For the older, existing fiber optic, multiple termini connectors; each vendor has a different mechanism and assembly process. The logistic support is taxing the system. For instance, at several JFOWG (Joint Fiber Optic Working Group) meetings, the Navy school house reported that training on the MIL-PRF-28876 connector assembly took a significant portion of the time and cost for the fiber optic curriculum. This leads to logistic difficulties in adding new training material and obtaining (paying for) parts needed in this connector assembly. The implementation of this lesson learned is that the connector configuration and assembly process for any new connector and any new backshell configuration introduced must be standardized to the maximum extent feasible.

CONCLUDING MATERIAL

Custodians:
Army – CR
Navy – SH
Air Force – 85
DLA – CC

Preparing activity:
DLA – CC

Review activities:
Navy – AS
Air Force – 13, 19, 93, 99
DIA – DI
NASA – NA

(Project 6060-2013-021)

NOTE: The activities listed above were interested in this document on the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.