

**INCH-POUND**

MIL-PRF-64266/16A  
w/ Amendment 1  
1 December 2014  
SUPERSEDING  
MIL-PRF-64266/16A  
16 October 2013

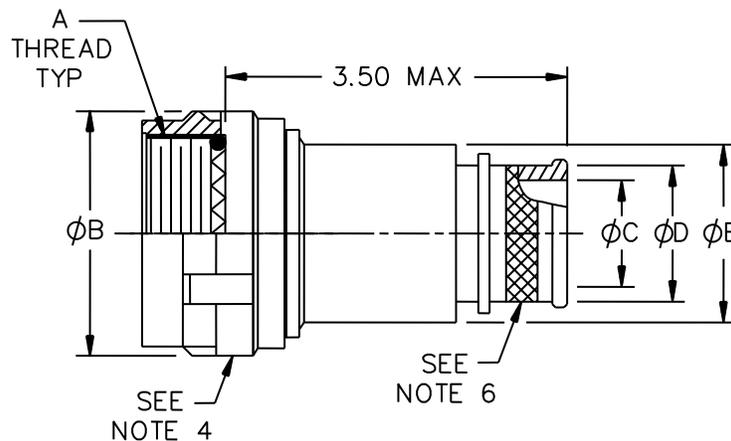
PERFORMANCE SPECIFICATION SHEET

CONNECTORS, FIBER OPTIC, CIRCULAR, PLUG AND RECEPTACLE STYLE,  
MULTIPLE REMOVABLE GENDERLESS TERMINI, SCREW THREADS,  
BACKSHELL, SOLID, SINGLE FIBER CABLES,  
BANDED ADAPTER/CABLE STRAIN RELIEF INTERFACE,  
NONENVIRONMENT RESISTING

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 backshell intended for use with a MIL-PRF-64266  
or MIL-DTL-38999 connector plug or receptacle in a fiber optic only application. This backshell is intended for the  
cable harness configuration in which a bundle of single fiber cables (simplex optical cables) are routed through  
material, such as cable wrap, to the connector plug or receptacle. This backshell is used for interface with the  
connector plug or receptacle on one end and contains an interface (platform) to secure the cable wrap with a banding  
strap on the other end. As an alternative, this platform may be used to secure a cable strain relief (such as heat  
shrink) to the cable entrance end of the backshell. This backshell is one of a solid shell configuration. This  
configuration consists of a solid shell (or body) a coupling nut on one end and banding adapter/cable strain relief  
interface components (no gland) on the other end. The coupling nut on the shell mates with the connector.



Straight backshell

FIGURE 1. Straight, 45 and 90 degree backshell orientations.

MIL-PRF-64266/16A  
w/AMENDMENT 1

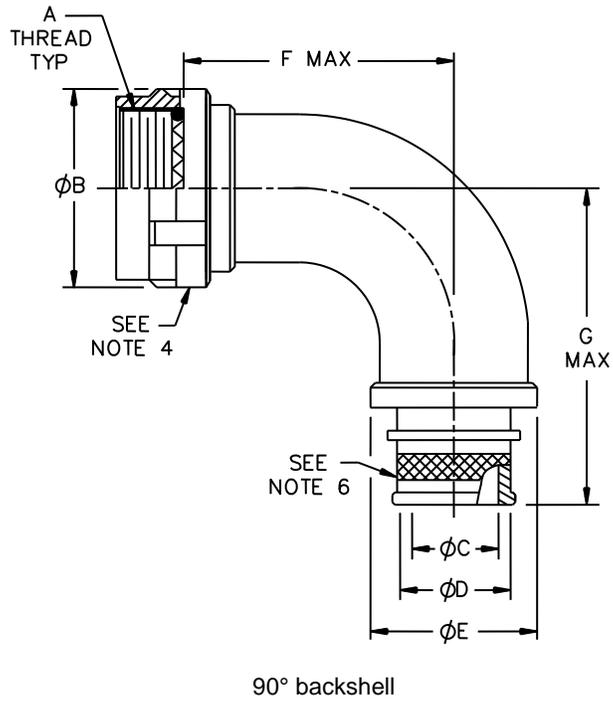
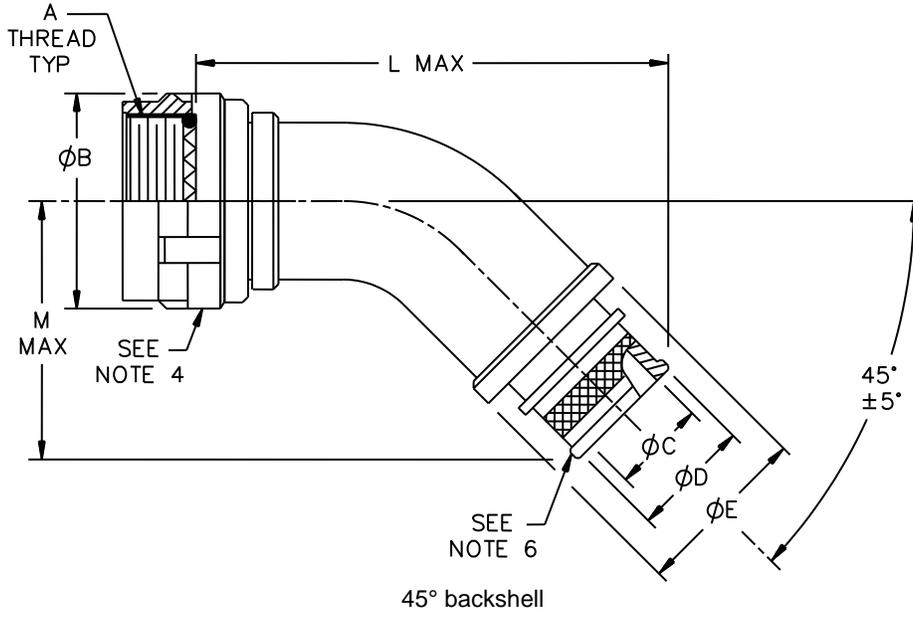


FIGURE 1. Straight, 45 and 90 degree backshell orientations - Continued.

MIL-PRF-64266/16A

w/AMENDMENT 1

Shell size	A thread ISO metric	B dia Max		C dia min		D dia max		E dia max	
		inches	mm	inches	mm	inches	mm	inches	mm
11	M15x1.0-6H	1.00	25.4	.31	7.9	.51	13.0	1.38	35.1
13	M18x1.0-6H	1.13	28.7	.38	9.7	.58	14.7	1.38	35.1
15	M22x1.0-6H	1.25	31.8	.50	12.7	.65	16.5	1.38	35.1
17	M25x1.0-6H	1.38	35.1	.50	12.7	.81	20.6	1.56	39.6
19	M28x1.0-6H	1.50	38.1	.63	16.0	.91	23.1	1.56	39.6
21	M31x1.0-6H	1.63	41.4	.69	17.5	1.05	26.7	1.81	46.0
23	M34x1.0-6H	1.75	44.5	.75	19.1	1.18	30.0	1.81	46.0
25	M37x1.0-6H	1.88	47.8	.94	23.9	1.18	30.0	2.12	53.8

Shell Size	F Max		G Max		L Max		M Max	
	inches	mm	inches	mm	inches	Mm	Inches	mm
11	2.0	50.8	3.7	94.0	4.0	101.6	2.5	63.5
13	2.1	53.3	3.7	94.0	4.2	106.7	2.6	66.0
15	2.1	53.3	3.8	96.5	4.2	106.7	2.6	66.0
17	2.2	55.9	3.9	99.1	4.2	106.7	2.6	66.0
19	2.2	55.9	3.9	99.1	4.3	109.2	2.7	68.6
21	2.3	58.4	4.0	101.6	4.3	109.2	2.7	68.6
23	2.4	61.0	4.0	101.6	4.4	111.8	2.8	71.1
25	2.4	61.0	4.0	101.6	4.5	114.3	2.8	71.1

NOTES.

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Dimensions apply to plated/finished part.
4. Backshell internal configuration not shown. The backshell interface dimensions shall be in accordance with figure A-6 of [MIL-PRF-64266](#).
5. See table V herein for relationship of cable entry code to shell size.
6. This interface shall be compatible for use of both a banding strap and heat shrink. Banding strap is one with a .25 inch (6.35 mm) nominal band width and a .375 inch (9.53 mm) maximum buckle (locking mechanism) width. Backshell shall withstand an applied 160 lb (712 N) linear force around the circumference of the backshell at the band interface surface. The force shall be applied by placing a banding strap onto the backshell using a banding tool.

FIGURE 1. Straight, 45 and 90 degree backshell orientations - Continued.

REQUIREMENTS.

Temperature ranges.

Operating.	-67°F to 329°F (-55°C to 165°C)
Non-operating.	-40°F to 185°F (-40°C to 85°C)
Storage.	-40°F to 185°F (-40°C to 85°C)

Dimensions and configurations. See figure 1 herein and [MIL-PRF-64266](#), figure A-6.

Weight. Weight shall not exceed the specified value in table I for the applicable shell size, cable entry angle and material.

MIL-PRF-64266/16A

w/AMENDMENT 1

TABLE I. Backshell weights.

Shell size	Cable entry angle	Composite		Aluminum		Stainless steel	
		ounce	gram	ounce	gram	ounce	gram
11	straight	1.13	32	1.94	55	5.42	154
	45°,90°	1.30	37	2.39	68	7.18	204
13	straight	1.30	37	2.25	64	6.41	182
	45°,90°	1.44	41	2.57	73	7.36	209
15	straight	1.44	41	2.57	73	7.36	209
	45°,90°	1.62	46	2.89	82	8.17	232
17	straight	1.76	50	3.03	86	8.80	250
	45°,90°	1.94	55	3.70	105	10.07	286
19	straight	1.94	55	3.20	91	9.57	272
	45°,90°	2.08	59	3.70	105	10.70	304
21	straight	2.39	68	4.15	118	11.97	340
	45°,90°	2.71	77	4.96	141	14.22	404
23	straight	2.39	68	4.47	127	12.46	354
	45°,90°	2.89	82	5.10	145	13.41	381
25	straight	2.71	77	4.96	141	14.22	404
	45°,90°	3.20	91	5.60	159	16.30	463

Fabrication procedure. Standard fabrication procedure (for both the terminus placement/termination onto the end of fiber optic cabling and the assembly of the connector and backshell onto the fiber optic cabling) shall be used. Standard fabrication procedure shall be in accordance with NAVAIR [01-1A-505-4/T.O. 1-1A-14-4/TM 1-1500-323-24-4](#). A copy of this document can be obtained at web site: <https://jswag.navair.navy.mil>.

Backshell capture mechanism at the cable entry end (for banding strap or strain cable strain relief). A capture adapter/platform, external on and at the cable entry end of the backshell, shall be used to secure either a stainless steel banding strap or a cable strain relief (such as shrink tubing or heat shrink boot) to the backshell.

Requirement for locking mechanism on the backshell coupling nut. The backshell coupling nut shall include a ratchet type locking mechanism (anti-coupling device) to ensure that a backshell mated to a connector maintains full thread engagement (maintains complete coupling). Complete coupling of the mated connector and backshell is achieved by a clockwise rotation of the coupling nut. The anti-coupling mechanism or feature shall be between the backshell coupling nut and the backshell shell only. The locking mechanism shall be sufficient to ensure no backing off of the coupling nut during mechanical shock or vibration.

Wrench flats on composite backshells. Backshell body coupling nuts constructed from composite material shall contain wrench flats or a non-movable hex nut. This wrench flat or hex nut shall be sufficient to permit applying a torque for affixing the backshell to the connector. Two pieces of [SAE AMS-DTL-23053/5](#) heat shrink, a minimum of 2 inches in length (before shrinkage), shall be provided with each backshell. One piece of heat shrink shall permit shrinkage directly over the banding platform and cabling exiting the backshell. The other piece of heat shrink shall permit shrinkage over a banding strap affixing cable wrap or braid to the gland nut banding platform.

Qualification. Qualification shall consist of performing testing specified as listed in table II. Backshells qualified to this specification sheet shall include components for interface with banding strap/cable strain relief.

MIL-PRF-64266/16A

w/AMENDMENT 1

TABLE II. Qualification inspections (except interoperability).

	Straight	Straight	45 Degree	90 Degree
Cable entry angle	15	15	15	15
Shell size 11/	15	15	15	15
Fiber size (microns)	SM	MM	SM	SM
Temperature range	TR2	TR2	TR2	TR2
Environmental/non-E	Environmental	Environmental	Environmental	Environmental
Specification sheet	/16	/16	/16	/16
Test performed <u>2/</u> , <u>8/</u> , <u>9/</u> , <u>12/</u>				
Group 1 (4 mated pairs)				
Interoperability <u>6/</u>	X <u>7/</u>	X <u>7/</u>	X <u>7/</u>	X <u>7/</u>
Visual & Mechanical				
Size	X		X	X
Weight	X		X	X
Identification marking	X	X	X	X
Screw threads	X			
Workmanship	X		X	X
Functional				
Banding strap attachment integrity	X			
Compression fitting engagement integrity				
Backshell mating durability	X			
Optical				
Insertion loss (initial	X	X	X	X
Return loss (SM only)	X	X		
Group 2 (2 mated pairs)				
Backshell-to-connector mating torque	X			
Cable pull out force (retention)				
External bending moment	X			
Cable seal flexing				
Twist	X			
Impact	X			
Crush	X			
Vibration: Swept sine (TR1)				
Vibration: Random (TR1)				
Vibration: Swept sine (TR2)	X		X	X
Vibration: Random (TR2)	X			
Vibration: Random with temperature (TR2)	X			
Shock: <u>MIL-S-901</u> 10/	X	X		
Shock: Half-sine pulse (TR2)				
Insertion loss verification				
Water pressure				
Modified SO <sub>2</sub> /salt spray	X			

See notes at end of table.

MIL-PRF-64266/16A

w/AMENDMENT 1

TABLE II. Qualification inspections (except interoperability) – Continued.

	Straight	Straight	45 Degree	90 Degree
Cable entry angle	15	15	15	15
Shell size <sup>11/</sup>	15	15	15	15
Fiber size (microns)	SM	MM	SM	SM
Temperature range	TR2	TR2	TR2	TR2
Environmental/non-E	Environmental	Environmental	Environmental	Environmental
Specification sheet	/16	/16	/16	/16
Test performed <sup>2/</sup> , <sup>8/</sup> , <sup>9/</sup> , <sup>12/</sup>				
Group 3 (2 mated pairs)				
Thermal shock (TR1)				
Thermal shock (TR2)	X			
Temperature/humidity cycling				
Temperature cycling (TR1)				
Temperature cycling (TR2)	X			
Altitude immersion				
Life aging (Temperature life) (TR1)				
Life aging (Temperature life) (TR2)	X			
Freezing water				
Insertion loss verification	X <sup>7/</sup>			
Sand & dust				
Identification marking	X			
Group 4 (2 mated pair + parts) <sup>1/</sup>				
Electromagnetic effects (2 mated pair)	X		X	X
Fluid immersion (2 mated pair)	X			
Shell to shell conductivity (initial)	X			
Salt spray (2 mated pair) 4.9.6.10.1 <sup>3/</sup>	X			
Salt spray (TR2) 4.9.6.10.2				
Shell to shell conductivity	X			
Flammability (1 mated pair) <sup>4/</sup>	X			
Fungus resistance (parts) <sup>5/</sup>	X			
Ozone exposure (parts) <sup>5/</sup>	X			
Insertion loss verification				

- <sup>1/</sup> 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.
- <sup>2/</sup> TR1 = test as specified for temperature range 1. TR2 = test as specified for temperature range 2.
- <sup>3/</sup> Two options: a. Use same two mated pair from the fluid immersion test. b. Use separate mated pair (If option b, can use one cable of sufficient length to loop around to the cable entrance of each backshell).
- <sup>4/</sup> One mated pair from the fluid immersion, salt spray, or Group 2/3 samples after that Group's test completion may be used.
- <sup>5/</sup> Parts only; assembly not required.
- <sup>6/</sup> Interoperability. 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-TEB as interoperability standards.
- <sup>7/</sup> Interoperability is performed on both single mode and multimode for each shell size.
- <sup>8/</sup> Specific test practices for physical, mechanical, environmental and material tests, including clarifications and further details, are found in [MIL-STD-1678-3](#).
- <sup>9/</sup> Specific test practices for the optical performance tests, including clarifications and further details, are found in [MIL-STD-1678-2](#).
- <sup>10/</sup> Shock test. Standard shock fixture 4A for bulkhead mounting shall be used. Supplement test fixture that shall be used and the mounting that shall be performed are specified in Measurement 3202 of [MIL-STD-1678-3](#).
- <sup>11/</sup> See qualification by similarity for other shell sizes if shell size 15 is being qualified. Otherwise, use this qualification table for the other shell sizes also.
- <sup>12/</sup> Full qualification list for the backshell with a straight cable entry angle contains more testing requirements than the 45 or 90°. Only by qualifying the straight backshell first, a further reduced test sequence as listed in the table can be used to qualify the backshell configurations with a 45 and 90° cable entry angle. Otherwise the full qualification listed for the backshell with the straight cable entry angle must be performed for backshell configurations with a 45 and 90° cable entry angle.

Backshell and backshell accessory attachment. Not applicable.

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

Banding strap attachment integrity. For a backshell containing a rear adapter with a banding platform, no buckling, cracking or other backshell damage (including to plating) shall result from attachment of a banding strap when applied to the conditions of note 6 in figure 1.

Backshell-to-connector mating torque. The backshell threads shall withstand the applied torque to mate (affix) the backshell to the connector that is specified in table III with no damage. The backshell shall be mated to a connector mounted in a suitable fixture to prevent movement of the connector during the test. The torque shall be applied to the backshell at a rate of approximately 10 in-lb per second until the specified applied torque is obtained. This torque shall be applied for a minimum of 1 minute.

TABLE III. Backshell-to-connector mating torque.

Shell size	Mating torque <sup>1/</sup> ± 5 in-lb (± .55 N-m)			
	Composite		Metal	
	in-lb	N-m	in-lb	N-m
11	50	5.65	100	11.30
13	50	5.65	150	16.95
15	50	5.65	150	16.95
17	50	5.65	150	16.95
19	50	5.65	150	16.95
21	100	11.30	175	19.75
23	100	11.30	175	19.75
25	100	11.30	175	19.75

<sup>1/</sup> Increments are rounded to nearest 0.05 N-m for compatibility with a torque wrench.

Cable pull-out force. Not applicable.

Cable seal flexing. Applicable.

Twist. Applicable. A 5 lb weight shall be applied to the entire cable bundle. Perform on a shell size 15 backshell.

Mating durability. Not applicable.

Backshell mating durability. Backshell shall be assembled and completely disassembled for 25 assembly (mating) cycles. Each cycle shall include connector-to-backshell coupling (mating) as part of the backshell assembly. No optical measurements need to be performed during or after this test. A separate piece of cabling may be used for this test. This test may be performed prior to test sample assembly for Group I optical tests.

MIL-PRF-64266/16A

w/AMENDMENT 1

External bending moment. Applicable. Applied bending moment shall be as specified in table IV.

TABLE IV. Backshell applied bending moment.

Shell size	Minimum applied bending moment <sup>1/</sup>					
	Composite		Aluminum		Stainless steel	
	in-lb	N-m	in-lb	N-m	in-lb	N-m
11	25	2.85	125	14.15	125	14.15
13	25	2.85	275	31.10	275	31.10
15	50	5.65	300	33.90	300	33.90
17	50	5.65	300	33.90	300	33.90
19	50	5.65	300	33.90	300	33.90
21	75	8.50	300	33.90	300	33.90
23	75	8.50	300	33.90	300	33.90
25	100	11.30	300	33.90	300	33.90

<sup>1/</sup> Increments are rounded to nearest 0.05 N-m for compatibility with a torque wrench.

Impact. Applicable.

Crush. Applicable.

Water pressure. Not applicable.

Banding strap attachment integrity. No buckling, cracking or other backshell damage (including to plating) shall result from attachment of a banding strap when applied to the conditions of note 6 in figure 1.

Freezing water immersion. Not applicable.

Sand and dust. Applicable.

Electromagnetic effects. Applicable except for backshell classes D and E material designators. When not tested as part of the initial qualification, the backshell shall be assembled to a MIL-PRF-64266/1 or MIL-PRF-64266/3 receptacle. Electromagnetic effects testing shall be conducted both with and without mating the MIL-PRF-64266/1 or MIL-PRF-64266/3 receptacle to a mating plug connector or dust cover.

Salt spray. Applicable.

Shell-to-shell conductivity. Applicable. Perform both initial and after salt spray. For a backshell mated to a connector plug, the voltage drop of the mated connector plug-to-backshell shall be measured from a point on the rear accessory thread of the connector plug to a point on the backshell 1.0 ± .25 inch from the innermost backshell threads that mate with the backshell gland nut. For a backshell mated to a connector receptacle, the voltage drop of the mated connector receptacle-to-backshell shall be measured from a point on the flange of the connector receptacle adjacent to the mounting hole to a point on the backshell 1.0 ± .25 inch from the innermost backshell threads that mate with the backshell gland nut. When tested as part of the initial qualification, the voltage drop between the connector receptacle and connector plug shall be measured also.

Modified SO<sub>2</sub>/salt spray. Applicable.

Altitude immersion. Applicable.

Fluid immersion. Applicable.

Cleaning procedures. Each shipment of backshells shall include recommended cleaning procedures. The following wording or equivalent is recommended: "To clean, use lint free wipe dampened with alcohol and blow dry with air."

Qualification by similarity.

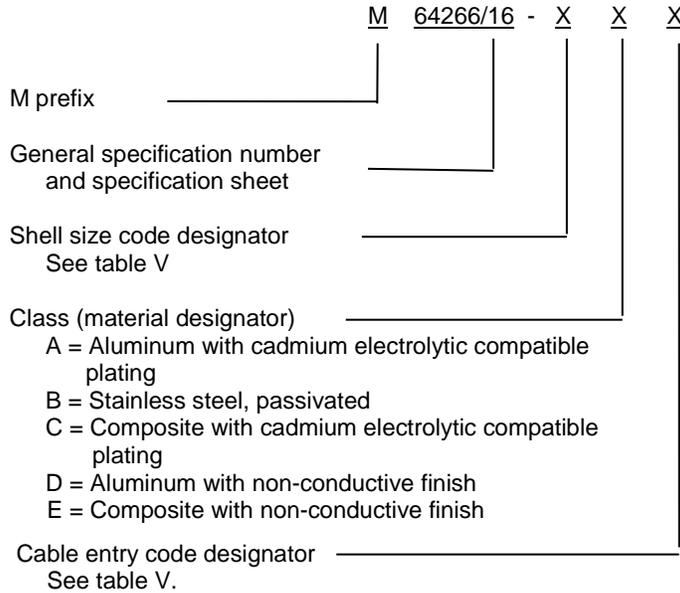
MIL-PRF-64266/16A

w/AMENDMENT 1

**Non environmental backshells.** If a connector backshell that is environmental resisting and of a specified shell size is qualified to MIL-PRF-64266/13, and connector backshells of the same shell size and same cable entry end configuration in this specification sheet that are not environmental resisting meet the visual and mechanical size, weight, identification marking, workmanship, screw thread and backshell mating durability inspections, then the connector backshells of the same shell size and same cable entry end configuration that are not environmental resisting are qualified.

Marking.

Part or Identification Number (PIN). Marked on coupling ring of the backshell.



PIN example. M64266/16-CAA

TABLE V. PIN code designators.

Shell size	Shell size code	Cable entry code 1/	Cable entry angle	Connector type	# of entry cables
11	B	A	Straight	M64266	2
	B	B	45°	M64266	2
	B	C	90°	M64266	2
11	B	L	Straight	M64266	4
	B	M	45°	M64266	4
	B	N	90°	M64266	4
11	B	D	Straight	M38999	2
	B	E	45°	M38999	2
	B	F	90°	M38999	2
13	C	A	Straight	M64266	6
	C	B	45°	M64266	6
	C	C	90°	M64266	6
13	C	D	Straight	M38999	4
	C	E	45°	M38999	4
	C	F	90	M38999	4

See note at end of table.

## MIL-PRF-64266/16A

## w/AMENDMENT 1

TABLE V. PIN code designators - Continued.

Shell size	Shell size code	Cable entry code 1/	Cable entry angle	Connector type	# of entry cables
15	D	A	Straight	M64266	10
	D	B	45°	M64266	10
	D	C	90°	M64266	10
15	D	L	Straight	M64266	8
	D	M	45°	M64266	8
	D	N	90°	M64266	8
15	D	D	Straight	M38999	5
	D	E	45°	M38999	5
	D	F	90°	M38999	5
17	E	D	Straight	M38999	8
	E	E	45°	M38999	8
	E	F	90°	M38999	8
19	F	D	Straight	M38999	11
	F	E	45°	M38999	11
	F	F	90°	M38999	11
21	G	D	Straight	M38999	16
	G	E	45°	M38999	16
	G	F	90°	M38999	16
23	H	A	Straight	M64266	36
	H	B	45°	M64266	36
	H	C	90°	M64266	36
	H	L	Straight	M64266	18
	H	M	45°	M64266	18
	H	N	90°	M64266	18
23	H	D	Straight	M38999	21
	H	E	45°	M38999	21
	H	F	90°	M38999	21
25	J	D	Straight	M38999	37
	J	E	45°	M38999	37
	J	F	90°	M38999	37
25	J	G	Straight	M38999	29
	J	J	45°	M38999	29
	J	K	90°	M38999	29

1/ Cable entry code based on cable entry angle, connector type and number of cavities in the connector insert.

Mating counterpart. Backshell mates with MIL-PRF-64266/1 wall mounting receptacle, MIL-PRF-64266/2 plug, and MIL-PRF-64266/3 jamnut mounting receptacle.

Installation and removal tools. Adjustable or 1.25 inches (31.8 mm) open end wrench, strap wrench, and scissors.

MIL-PRF-64266/16A

w/AMENDMENT 1

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

MIL-S-901  
MIL-DTL-38999  
MIL-PRF-28876  
MIL-PRF-64266/1  
MIL-PRF-64266/2  
MIL-PRF-64266/3  
MIL-PRF-64266/13  
NAVAIR 01-1A-505-4/T.O. 1-1A-14-4/TM 1-1500-323-24-4  
SAE AMS-DTL-23053/5

Standardization based on lessons learned. For the older, existing fiber optic, multiple termini connectors; each vendor has a different backshell aramid yarn capture 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 backshell configuration and assembly process for any new connector and any new backshell configuration introduced must be standardized to the maximum extent feasible.

Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

CONCLUDING MATERIAL

Custodians:  
Army - CR  
Navy - AS  
Air Force - 85  
DLA - CC

Preparing activity:  
DLA - CC  
  
(Project 6060-2014-055)

Review activities:  
Army - TE  
Navy - SH  
Air Force - 13, 19, 93, 99  
MISC - DI  
MISC - MDA

Civil agencies:  
GSA - FAS  
NASA - NA

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>.