

**INCH-POUND**

MIL-PRF-64266/14A  
w/ Amendment 1  
1 December 2014  
SUPERSEDING  
MIL-PRF-64266/14A  
16 October 2013

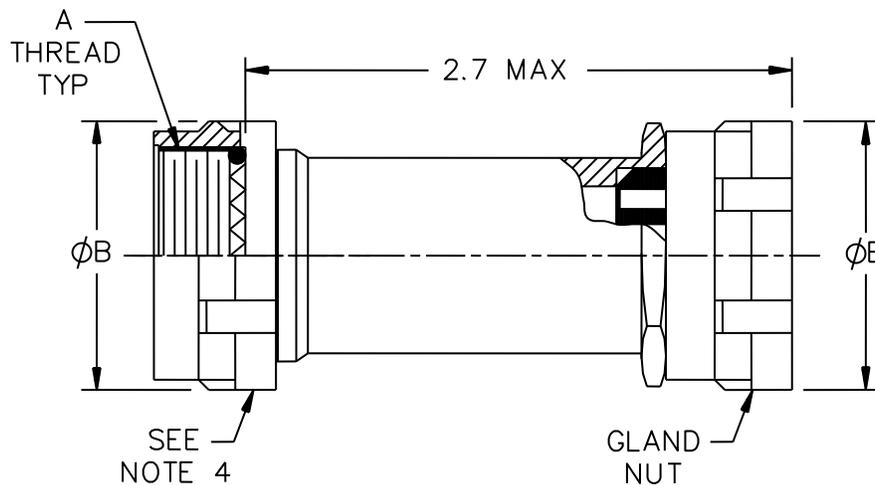
PERFORMANCE SPECIFICATION SHEET

CONNECTORS, FIBER OPTIC, CIRCULAR, PLUG AND RECEPTACLE STYLE,  
MULTIPLE REMOVABLE GENDERLESS TERMINI, SCREW THREADS,  
BACKSHELL, SOLID, SINGLE FIBER CABLES,  
NO CABLE ENTRY END INTERFACE,  
ENVIRONMENT 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.

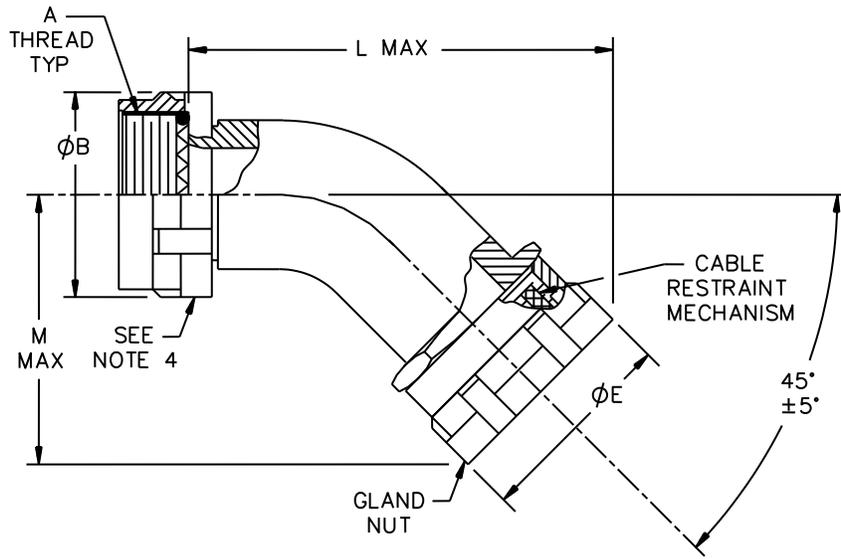
SCOPE. The performance requirements specified herein cover a backshell intended for use with a MIL-DTL-38999 or MIL-PRF-64266 connector plug or receptacle in a fiber optic only application. This backshell is intended for an open cable harness configuration in which a bundle of single fiber cables (simplex optical cables) are routed to the connector plug or receptacle with no external protection. This backshell is used for interface with the connector plug or receptacle on one end and contains no interface on the other end. Environmental resistant features include ability to restrict movement, position, and twist of each cable in addition to eliminate or reduce penetration of various environments. This backshell is one of a solid shell configuration. This configuration consists of a solid shell (or body) with coupling nut on one end, a gland nut on the other end and gland components. The coupling nut on the shell mates with the connector. The gland nut on the other end of the shell secures the gland into the backshell.



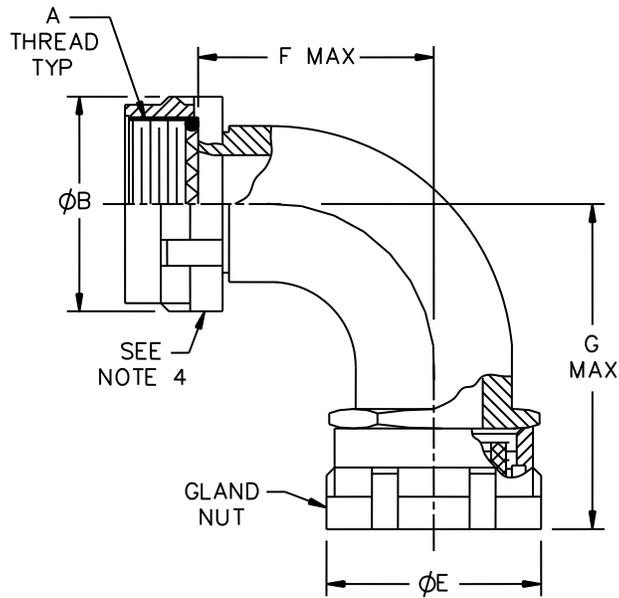
Straight Backshell

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

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45° backshell



90° backshell

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

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Shell size	A Thread ISO Metric	Dia B Max		Dia C Min 6/		Dia E Max	
		inches	mm	inches	mm	inches	mm
11	M15x1.0-6H	1.00	25.4	.31	7.9	1.38	35.1
13	M18x1.0-6H	1.13	28.7	.38	9.7	1.38	35.1
15	M22x1.0-6H	1.25	31.8	.50	12.7	1.38	35.1
17	M25x1.0-6H	1.38	35.1	.50	12.7	1.56	39.6
19	M28x1.0-6H	1.50	38.1	.63	16.0	1.56	39.6
21	M31x1.0-6H	1.63	41.4	.69	17.5	1.81	46.0
23	M34x1.0-6H	1.75	44.5	.75	19.1	1.81	46.0
25	M37x1.0-6H	1.88	47.8	.94	23.9	2.12	53.8

Shell size	F Max		G Max		L Max		M Max	
	inches	mm	inches	mm	inches	mm	inches	cm
11	1.8	45.7	3.7	94.0	3.6	91.4	2.1	53.3
13	1.8	45.7	3.7	94.0	3.8	96.5	2.2	55.9
15	1.9	48.3	3.8	96.5	3.9	99.1	2.2	55.9
17	2.0	50.8	3.9	99.1	4.0	101.6	2.2	55.9
19	2.1	53.3	3.9	99.1	4.0	101.6	2.3	58.4
21	2.1	53.3	4.0	101.6	4.1	104.1	2.4	61.0
23	2.2	55.9	4.0	101.6	4.2	106.7	2.4	61.0
25	2.2	55.9	4.0	101.6	4.3	109.2	2.5	63.5

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. Minimum for opening in the diameter of the gland nut shall be dimension "C". This minimum in the opening dimension is specified for interface with the single fiber cable bundle.

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.



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Cable diameter range. Cable restraint mechanism and environmental sealing design shall accommodate a single fiber cable with a minimum diameter of 0.067 inch (1.7 mm) and a maximum diameter of .087 inch (2.2 mm).

Qualification. Qualification shall consist of performing testing specified as listed in table II. Backshells qualified to this specification sheet shall include components to retain the cable restraint mechanism at the cable entry end.

TABLE II. Qualification inspections (except interoperability).

Cable entry angle Shell size 11/ Fiber size (microns) Temperature range Environmental/non-E Specification sheet Test performed <u>2/, 8/, 9/, 12/</u>	Straight	Straight	45 Degree	90 Degree
	15	15	15	15
	SM	MM	SM	SM
	TR2	TR2	TR2	TR2
	Environmental	Environmental	Environmental	Environmental
	/14	/14	/14	/14
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				
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 10/</u>	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.

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

	Straight	Straight	45 Degree	90 Degree
Cable entry angle				
Shell size <u>11/</u>	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	/14	/14	/14	/14
Test performed <u>2/</u> , <u>8/</u> , <u>9/</u> , <u>12/</u>				
Group 3 (2 mated pairs)				
Thermal shock (TR1)				
Thermal shock (TR2)	X			
Temperature/humidity cycling	X			
Temperature cycling (TR1)				
Temperature cycling (TR2)	X			
Altitude immersion	X			
Life aging (Temperature life) (TR1)				
Life aging (Temperature life) (TR2)	X			
Freezing water	X			
Insertion loss verification	X <u>6/</u>			
Sand & dust	X			
Identification marking	X			
Group 4 (2 mated pair + parts) <u>1/</u>				
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 <u>3/</u>	X			
Salt spray (TR2) 4.9.6.10.2				
Shell to shell conductivity	X			
Flammability (1 mated pair) <u>4/</u>	X			
Fungus resistance (parts) <u>5/</u>	X			
Ozone exposure (parts) <u>5/</u>	X			
Insertion loss verification				

1/ 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.

2/ TR1 = test as specified for temperature range 1. TR2 = test as specified for temperature range 2.

3/ 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).

4/ One mated pair from the fluid immersion, salt spray, or Group 2/3 samples after that Group's test completion may be used.

5/ Parts only; assembly not required.

6/ 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.

7/ Interoperability is performed on both single mode and multimode for each shell size.

8/ Specific test practices for physical, mechanical, environmental and material tests, including clarifications and further details, are found in [MIL-STD-1678-3](#).

9/ Specific test practices for the optical performance tests, including clarifications and further details, are found in [MIL-STD-1678-2](#).

10/ 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](#).

11/ 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.

12/ 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.

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

Banding strap attachment integrity. Not applicable.

Backshell and backshell accessory attachment. Not applicable.

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.

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

TABLE IV. Backshell applied bending moment.

Shell size(s)	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.

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Impact. Applicable.

Crush. Applicable.

Water pressure. Not applicable.

Freezing water immersion. 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 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.

Backshell configurations to test. The below qualification by similarity is valid if M64266/14 backshells were placed on the connector receptacles and one M64266/12 backshell and one M64266/13 backshell was placed on the connector plugs for each two connector mated pair going through one group of tests.

Temperature range. For inspections and tests performed for this qualification by similarity, tests for temperature range 2 shall be performed for those tests done differently dependent upon the temperature range.

Larger shell sizes. This qualification by similarity is applicable when testing larger shell sizes in this specification sheet and the initial shell size 15 is qualified to this specification sheet. If a connector backshell of shell size 15 is qualified to this specification sheet, and a larger connector backshell with similar design, construction, and materials meet the interoperability, visual and mechanical, size, weight, identification marking, workmanship, screw threads, backshell mating durability, insertion loss, vibration (swept sine only), shock (MIL-S-901 only), altitude immersion, temperature cycling and electromagnetic effects inspections and tests are performed in the qualification test sequence, then the backshell of the larger shell size inspected is qualified.

Smaller shell sizes. This qualification by similarity is applicable when testing smaller shell sizes in this specification sheet from the initial shell size 15 qualified in this specification sheet. If a connector backshell of shell size 15 is qualified, and a smaller connector backshell with similar design, construction, and materials meet the interoperability, visual and mechanical, size, weight, identification marking, workmanship, screw thread,

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backshell mating durability, insertion loss, bending moment, mechanical shock and vibration (swept sine only) inspections and tests as performed in the qualification test sequence, then the backshell of the smaller shell size inspected is qualified.

Cable entry angle. If a connector backshell with a straight cable entry angle and specified shell size in this specification sheet is qualified, and connector backshells with 45 degree and 90 degree entry angles in this specification sheet meet the inspections specified in table II, then the connector backshells with 45 degree and 90 degree entry angles for the same shell size are qualified. This qualification by similarity is allowed under the constraint that the same coupling nuts on the shell and same gland components are used as is on the backshell with the straight cable entry angle.

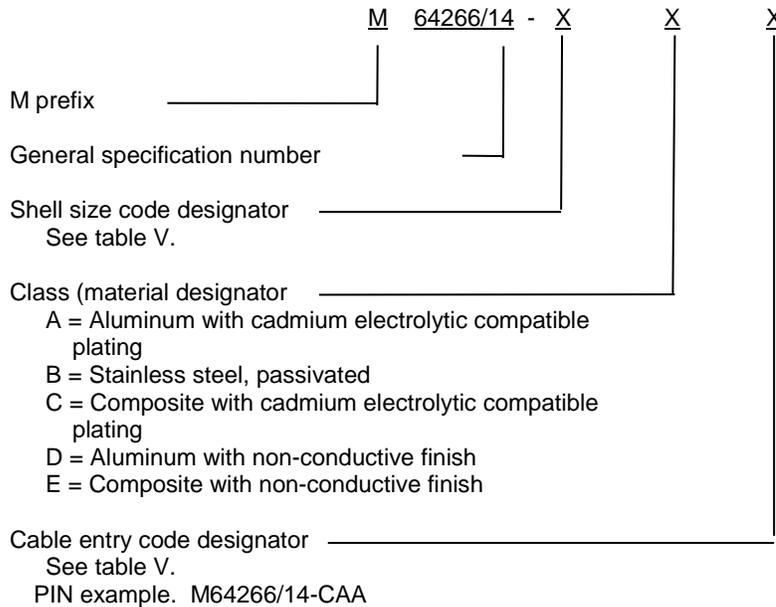
Shell sizes in addition to shell sizes 11, 13, 15, and 23. If a connector backshell of shell sizes 11, 13, 15 and 23 in this specification sheet is qualified, and connector backshells of intermediate shell sizes (for use with MIL-DTL-38999 connectors) in this specification sheet meet the visual and mechanical size, weight, identification marking, workmanship, screw thread and backshell mating durability inspections, then the connector backshells of intermediate shell sizes are qualified.

Alternate backshell material. If a connector backshell in this specification sheet made from aluminum is qualified, and connector backshells made from composite or stainless steel in this specification sheet meet the visual and mechanical, size, weight, identification marking, workmanship, screw thread, backshell mating durability, insertion loss, return loss, external bending moment, twist, impact, crush, shock, thermal shock, temperature humidity cycling, temperature cycling, life aging, sand and dust, fluid immersion, shell-to-shell conductivity, modified SO<sub>2</sub>/salt spray, vibration (as performed in the qualification test sequence), electromagnetic effects, salt spray, flammability, fungus resistance, and ozone exposure inspections, then the backshells of the alternate material inspected are qualified.

Alternate plating or plating process. If a connector backshell with one plating or plating process in this specification sheet is qualified, and connector backshells 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 backshells with the alternate plating or plating process, as applicable, inspected are qualified.

Marking.

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



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TABLE V. PIN code designators.

Shell size	Shell size code	Cable entry code	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
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	M	90o	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.

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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.

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

MIL-DTL-38999  
MIL-S-901  
MIL-STD-1678-2  
MIL-STD-1678-3  
MIL-PRF-64266/1  
MIL-PRF-64266/2  
MIL-PRF-64266/3  
MIL-PRF-28876  
NAVAIR 01-1A-505-4/T.O. 1-1A-14-4/TM 1-1500-323-24-4

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 6060-2014-053)

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

Civil agencies:  
GSA - FAS  
NASA - NA

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