

INCH-POUND

MIL-PRF-64266/18
22 September 2011

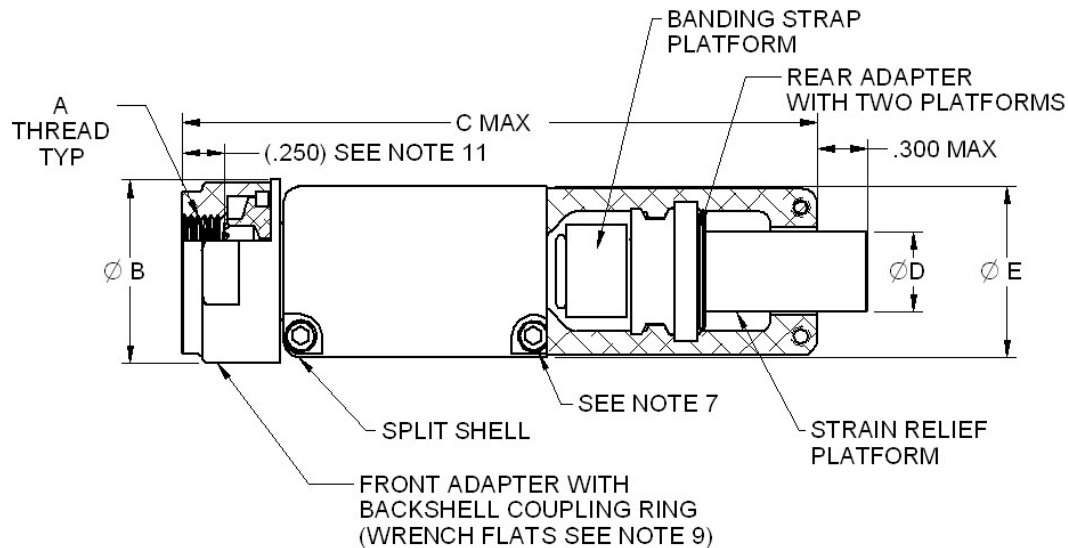
PERFORMANCE SPECIFICATION SHEET

CONNECTORS, FIBER OPTIC, CIRCULAR, PLUG AND RECEPTACLE STYLE,
MULTIPLE REMOVABLE TERMINI, SCREW THREADS,
BACKSHELL, SPLIT, MULTIPLE FIBER CABLES,
STRENGTH MEMBER CAPTURE AT CABLE ENTRY INTERFACE,
ENVIRONMENT RESISTING, TEMPERATURE RANGE 1

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 one of a split (clam shell) shell configuration consisting of a front adapter, rear adapter, two (split) shell halves, and heat shrink sleeves. This backshell is intended for cable end interface with a multiple fiber cable with an arimid yarn type strength member. Two rear adapter configurations allow capture of the multiple fiber cable strain relief by either banding strap or compression fitting. Environmental resistant features include ability to restrict movement, position, and twist in addition to eliminate or reduce penetration of various environments.



Straight Backshell

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

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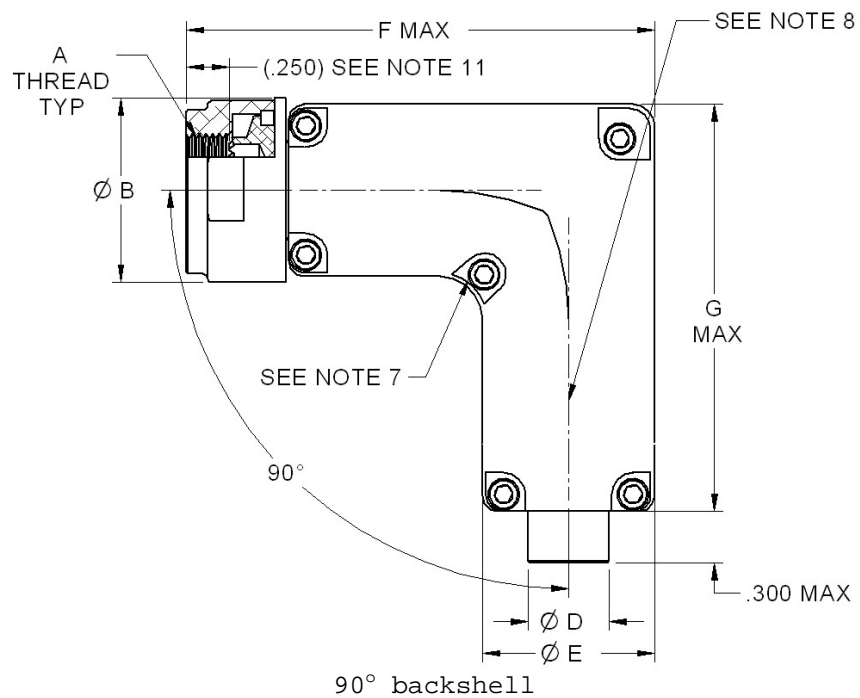
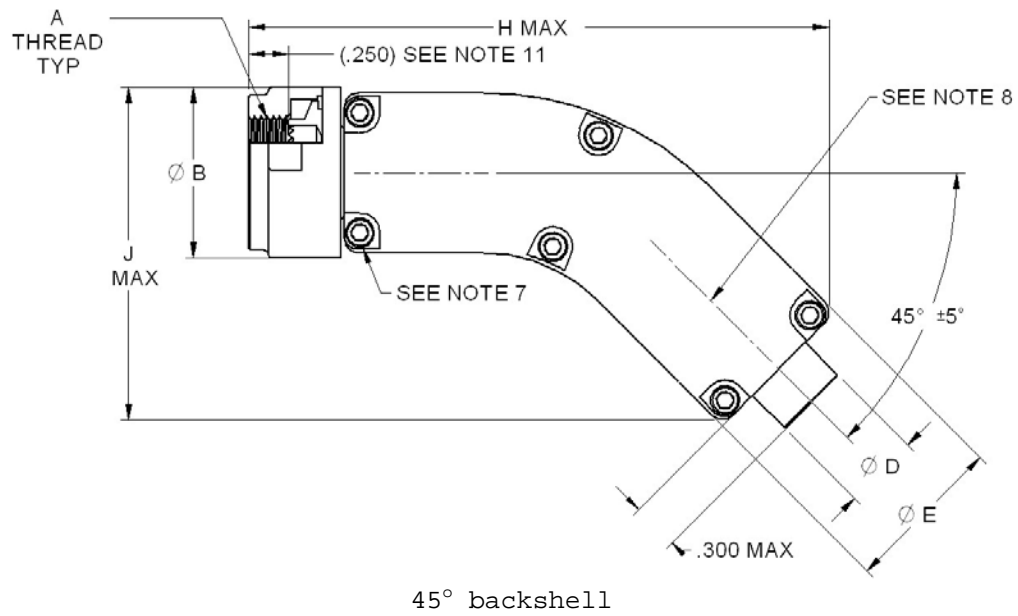


FIGURE 1. Straight, 45 and 90 degree backshell orientations - Continued.

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Shell size	A Thread ISO Metric	Dia B Max		Dia D Max		Dia E Max	
		inches	mm	inches	mm	inches	mm
11	M15x1.0-6H	0.960	24.38	0.50	12.7	0.960	24.38
13	M18x1.0-6H	1.085	27.56	0.50	12.7	1.085	27.56
15	M22x1.0-6H	1.255	31.88	0.75	19.5	1.255	31.88
23	M34x1.0-6H	1.695	43.05	1.25	31.8	1.750	44.50

Shell size	F Max		G Max		J Max		H Max		C Max	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
11	3.0	76.2	3.5	88.9	3.5	88.9	4.9	124.5	4.0	101.6
13	3.0	76.2	3.6	91.4	3.6	91.4	5.0	127.0	4.0	101.6
15	3.2	81.3	3.7	94.0	3.8	94.0	5.3	134.6	4.7	119.4
23	3.7	94.0	5.0	127.0	5.0	127.0	6.1	154.9	4.7	119.4

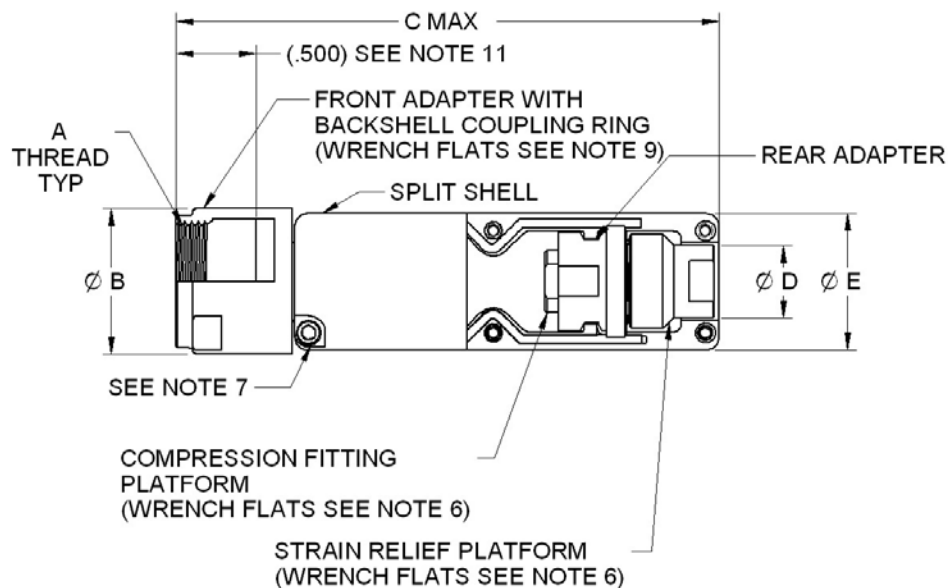
Notes:

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. Rear adapter configurations. Rear adapter may be configured with one of two platforms to capture (constrain) the cable strain relief. The cable strain relief is the cable strength member (such as arimid yarn or Kevlar).
 - a. Rear adapter with banding platform. 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 (9.525 mm) maximum buckle (locking mechanism) width. Backshell shall withstand an applied 160 lb (711.72 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. The cable strength member (Kevlar) capture mechanism for the arimid yarn (Kevlar) on the multiple fiber cable shall be the banding strap.
 - b. Rear adapter with compression fitting platform (alternative configuration). The cable strength member (Kevlar) capture mechanism for the arimid yarn (Kevlar) on the multiple fiber cable shall be of a compression fitting type design. Engagement of the compression fitting shall be done using two wrenches. The distance between wrench flats, for the two different wrench flats on the compression fitting, shall be 7/16 (11.11 mm) and 11/16 (17.46 mm), 7/16 (11.11 mm) and 11/16 (17.46 mm), 5/8 (15.875 mm) and 15/16 (23.81 mm), and 1-1/16 (26.99 mm) and 1-1/4 inch (31.75 mm) for shell sizes 11, 13, 15 and 23, respectively.
6. Screws used shall be captive and fastened using a 3/32 inch (2.38 mm) hex wrench for shell sizes 11, 13, and 15 and a 7/64 inch (3.57 mm) hex wrench for shell size 23.
7. Rear adapter and front adapter for backshells with the 45 degree and the 90 degree cable entry angles shall be the same as that for the backshells with a straight cable entry angle.

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

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8. Wrench flats. Wrench flats shall be placed on the front adapter coupling ring. The distance between wrench flats shall be $7/8$ (22.23 mm), $15/16$ (23.81 mm), $1-1/8$ (28.56 mm), and $1-5/8$ inch (41.28 mm) for shell sizes 11, 13, 15 and 23, respectively.
9. Strip length. Strip length shall be standardized as specified in fabrication procedure in accordance with NAVSEA Drawing 8283460. The strip length shall be the same length for backshells with a straight, 45 degree and 90 degree cable entry angles.
10. Distance from front of coupling ring to connector mating surface. This dimension provided for reference only to determine horizontal dimension for a mated connector with backshell.
11. Envelop length dimensions are specified to one decimal place to expedite inspection process unless otherwise indicated.

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

Refer to figure 1 for dimensional tables and notes.
 Illustrations for 45 and 90 degree orientations in figure 1 apply to figure 2.

FIGURE 2. Straight backshell orientation with alternative rear adapter.

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REQUIREMENTS:

Dimensions and configurations: See figure 1 herein and MIL-PRF-64266, figure A-6.

Temperature ranges.

Operating:	-18°F to 150°F	(-28°C to 65°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 shell size, cable entry angle, and material.

TABLE I. Backshell weights.

Shell size(s)	Cable entry angle	Composite		Aluminum		Stainless steel	
		lb	grams	lb	grams	lb	grams
11	straight	0.09	40.1	0.14	61.2	0.31	140.6
	45°	0.10	43.1	0.14	63.5	0.32	142.9
	90°	0.12	52.2	0.15	68.0	0.34	154.2
13	straight	0.12	54.4	0.18	81.6	0.41	186.0
	45°	0.13	56.7	0.19	83.9	0.42	188.2
	90°	0.15	68.0	0.20	90.7	0.45	204.1
15	straight	0.18	81.6	0.27	122.5	0.62	279.0
	45	0.19	86.2	0.28	127.0	0.63	283.5
	90°	0.23	102.1	0.30	136.1	0.68	306.2
23	straight	0.41	183.7	0.61	276.7	1.39	628.2
	45°	0.43	192.8	0.63	283.5	1.40	635.0
	90°	0.51	229.1	0.68	306.2	1.52	689.5

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 NAVSEA Drawing 8283460. A copy of this document can be obtained at Web Site: <https://fiberoptics.nswc.navy.mil/> in the NAVSEA Drawing section under Component Information. If unable to access this Web Site, request an application by e-mail to NSWC DD Warfare Systems Department at DLGR_NSWC_Foweb@navy.mil.

Qualification. Qualification shall consist of performing testing specified as listed in table V.

Backshells qualified to this specification sheet shall include a rear adapter configured with a banding strap platform and a strain relief platform. As an alternative, the backshell being provided can instead have a rear adapter configured with a compression fitting platform (see figures 1 and 2). A rear adapter configured with a banding strap platform and a strain relief platform is preferred.

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Backshell capture mechanism for the cable strength member: An arimid yarn capture mechanism shall be used to secure the multiple fiber cable to the backshell. The capture mechanism shall be part of the backshell rear adapter, configured as a banding strap platform used to secure a banding strap to this platform or configured as a compression fitting platform (see figure 1, note 6).

Cable restraint mechanism. Backshell shall contain means to provide environmentally resisting support for the multiple fiber cable exiting the backshell. Support shall restrict movement during cable pull, vibration and shock (act as a vibration dampener), and restrict cable twist (act as an anti-rotation mechanism). The term "heat shrink sleeve" shall be used in this specification sheet as the generic term for material placed on each of the two platforms on the rear adapter. Uses for this material may include a degree of environmental sealing, to restrict cable twist, and to provide a degree of limiting the bend placed in the cable as it exits the backshell.

Requirement for the backshell coupling nut. The backshell coupling nut shall be used as the means 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. This coupling shall be sufficient to ensure no backing off of the coupling nut during mechanical shock or vibration.

Wrench flats on coupling nut. Front adapter coupling nuts 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 (see figure 1, note 9).

When the backshells being supplied have the rear adapter configured with a banding strap platform and a strain relief platform, two pieces of SAE AMS-DTL-23053/5 heat shrink, a minimum of 2 inches (50.8 mm) in length (before shrinkage), shall be provided with each backshell as part of the PIN (see Markings below). One piece of heat shrink shall permit shrinkage directly over the platform on the rear adapter where the cabling exits the backshell (strain relief platform). The other piece of heat shrink shall permit shrinkage over a banding strap affixing the arimid yarn to the banding strap platform on the rear adapter.

Cable diameter range. Cable restraint mechanism and environmental sealing design shall accommodate a multiple fiber cable with the diameter ranges specified in table II.

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TABLE II. Backshell cable diameter ranges.

Shell Size 1/	Shell size designator	Cable diameter number	Cable diameter range (inch)	Cable diameter range (mm)
11	B	1	.240 - .250	6.10 - 6.35
	B	2	.280 - .315	7.11 - 8.00
	B	3	.305 - .346	7.75 - 8.79
13	C	1	.280 - .315	7.11 - 8.00
	C	2	.305 - .346	7.75 - 8.79
	C	3	.423 - .465	10.4 - 11.81
15	D	1	.495 - .515	12.57 - 13.08
	D	2	.380 - .423	9.65 - 10.74
	D	3	.423 - .465	10.4 - 11.81
	D	4	.305 - .346	7.75 - 8.78
23	H	1	.768 - .866	19.50 - 22.00
	H	2	.900 - 1.000	22.86 - 25.40

1/ Cable diameters for other shell sizes are to be determined.

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

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 inch-pound 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 ± 5 in-lb (± XX N cm)			
	Composite		Metal	
	in-lb	N-cm	in-lb	N-cm
11	50	565	100	1130
13	50	565	150	1695
15	50	565	150	1695
23	100	1130	175	1977

Cable pull-out force. Applicable.

Cable seal flexing. Applicable.

Twist. Applicable.

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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. A new banding strap and new pieces of heat shrink shall be used for each 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					
	Composite		Aluminum		Stainless steel	
	in-lb	N-cm	in-lb	N-cm	in-lb	N-cm
11	25	282	125	1412	125	1412
13	25	282	275	3107	275	3107
15	50	565	300	3390	300	3390
23	75	847	300	3390	300	3390

Impact: Applicable.

Crush: Applicable.

Water pressure: Applicable.

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.

Compression fitting engagement integrity. For a backshell containing a rear adapter with a compression fitting platform, no buckling, cracking or other backshell damage (including to plating) shall result from engagement of a compression mechanism when applied to the conditions of note 6 in figure 1.

Freezing water: Applicable.

Sand and dust: Applicable.

Electromagnetic effects. Applicable. 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 connector receptacle. Electromagnetic effects testing shall be conducted both with and without mating the MIL-PRF-64266/1 or MIL-PRF-64266/3 connector receptacle to a mating connector plug or dust cover.

Salt spray: Applicable.

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Shell-to-shell conductivity. Applicable. Both initial and after salt spray. 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 \pm 0.25 inch (25.4 \pm 6.35 mm) from the cable entry end on the backshell rear adapter. 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 \pm 0.25 inch (25.4 \pm 6.35 mm) from the cable entry end on the backshell rear adapter. When tested as part of the initial qualification, the voltage drop between the connector receptacle and connector plug shall be measured also.

Modified SO₂/salt spray. Applicable.

Altitude immersion. Not 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 inspection: Qualification inspection (except interoperability shall be performed in accordance with table V.

TABLE V. Qualification inspections (except interoperability).

Test performed 1/	Cable entry angle			
	Straight	Straight	45 Degree	90 Degree
	SM fiber	MM fiber	SM fiber	SM fiber
Group 1 (4 mated pairs)				
Interoperability 2/	X 3/	X 3/	X 3/	X 3/
Visual and mechanical				
Size	X		X	X
Weight	X		X	X
Identification marking	X	X	X	X
Screw threads	X			
Workmanship	X		X	X
Bending strap	X			
Compression fitting	X			
Backshell mating	X			
Optical				
Insertion loss	X	X		
Return loss (SM only)	X	X 4/		

See footnotes at end of table

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TABLE V. Qualification inspections (except interoperability) - Continued.

Test performed <u>1/</u>	Cable entry angle			
	Straight SM fiber	Straight MM fiber	45 degree SM fiber	90 degree SM fiber
Group 2 (2 mated pairs) 5/				
Backshell-to-connector mating torque	X			
Cable pull out force (retention)	X		X	X
External bending moment	X			
Cable seal flexing	X			
Twist	X			
Impact	X			
Crush	X			
Vibration: Swept sine (TR1) 6/	X		X	X
Vibration: Random (TR1)	X			
Shock: MIL-S-901 7/	X	X		
Water pressure	X		X	X
Modified SO2/salt spray	X			
Group 3 (2 mated pairs) 5/				
Thermal shock (TR1)	X			
Temperature/humidity cycling	X			
Temperature cycling (TR1)	X			
Life aging (Temperature life) (TR1)	X			
Freezing water	X			
Sand and dust	X			
Identification marking	X			
Group 4 (2 mated pair + parts) 5/				
Electromagnetic effects (2mp) 8/	X		X	X
Fluid immersion (2 mated pair)	X			
Shell to shell conductivity (initial)	X			
Salt spray (2 mated pair) 9/	X			
Shell to shell conductivity	X			
Flammability (1 mated pair) 3/ 10/	X			
Fungus resistance (parts) 11/	X			
Ozone exposure (parts) 11/	X			

- 1/ Specific test practices. Specific test practices for the optical performance tests, including clarifications and further details, are found in MIL-STD-1678-2.
- 2/ Interoperability. This testing is done by DSCC-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 DSCC as interoperability standards.
- 3/ Interoperability is performed on both single mode and multimode for each shell size.
- 4/ Perform in lieu of Backshell and insert retention nut test.
- 5/ 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.
- 6/ TR1 = test as specified for temperature range 1.
- 7/ 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.
- 8/ Specific test practices for this test, including clarifications and further details, are found in Measurement 3308 of MIL-STD-1678-3.

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TABLE V. Qualification inspections (except interoperability) - Continued.

- 9/ Two options: 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).
- 10/ 2 mated pair from the fluid immersion, salt spray, or group 2/3 samples after that group's test completion may be used.
- 11/ Parts only, assembly not required.

Qualification by similarity.

Backshell configurations to test. The below qualification by similarity is valid if M64266/18 backshells with a straight cable entry angle were placed on the connector receptacles and M64266/18 backshells with a straight cable entry angle were placed on the connector plugs for each two connector mated pair going through one group of tests. Backshells tested initially for qualification shall have the rear adapter configured with a banding strap platform and a strain relief platform.

Larger shell sizes. This qualification by similarity is applicable when testing larger shell sizes in this specification sheet from the initial shell size 15 qualified in this specification sheet. If a connector backshell of one shell size is qualified, and connector backshells with similar design, construction, and materials meet the interoperability, visual and mechanical, size, weight, identification marking, workmanship, screw threads, banding strap attachment integrity (or compression fitting engagement integrity, as applicable), backshell mating durability, insertion loss, vibration (swept sine only), shock (MIL-S-901 only), water pressure, temperature cycling and electromagnetic effects inspections, then the backshells 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 one shell size is qualified, and connector backshells with similar design, construction, and materials meet the interoperability, visual and mechanical, size, weight, identification marking, workmanship, screw thread, backshell mating durability, insertion loss, bending moment, mechanical shock and vibration (swept sine only) and as performed in the qualification test sequence, then the backshells 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 V, 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 front adapter and same rear adapter design are used as is on the backshell with the straight cable entry angle (see figure 1, note 8).

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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, cable pullout force, external bending moment, impact, crush, shock, water pressure, thermal shock, temperature humidity cycling, temperature cycling, life aging, sand and dust, fluid immersion, shell-to-shell conductivity, modified SO₂/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 is qualified. If there is a material change of rear adapter, then banding strap attachment integrity shall be included.

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 a alternate (different type) plating or same type plating using an alternate plating process in this specification sheet meet the visual and mechanical, weight, identification marking, workmanship, banding strap attachment integrity, backshell mating durability, external bending moment, thermal shock, sand and dust, electromagnetic effects, fluid immersion, salt spray, shell-to-shell conductivity and modified SO₂/Salt spray (as performed in the qualification test sequence), then the backshells with the alternate plating or plating process, as applicable, inspected is qualified.

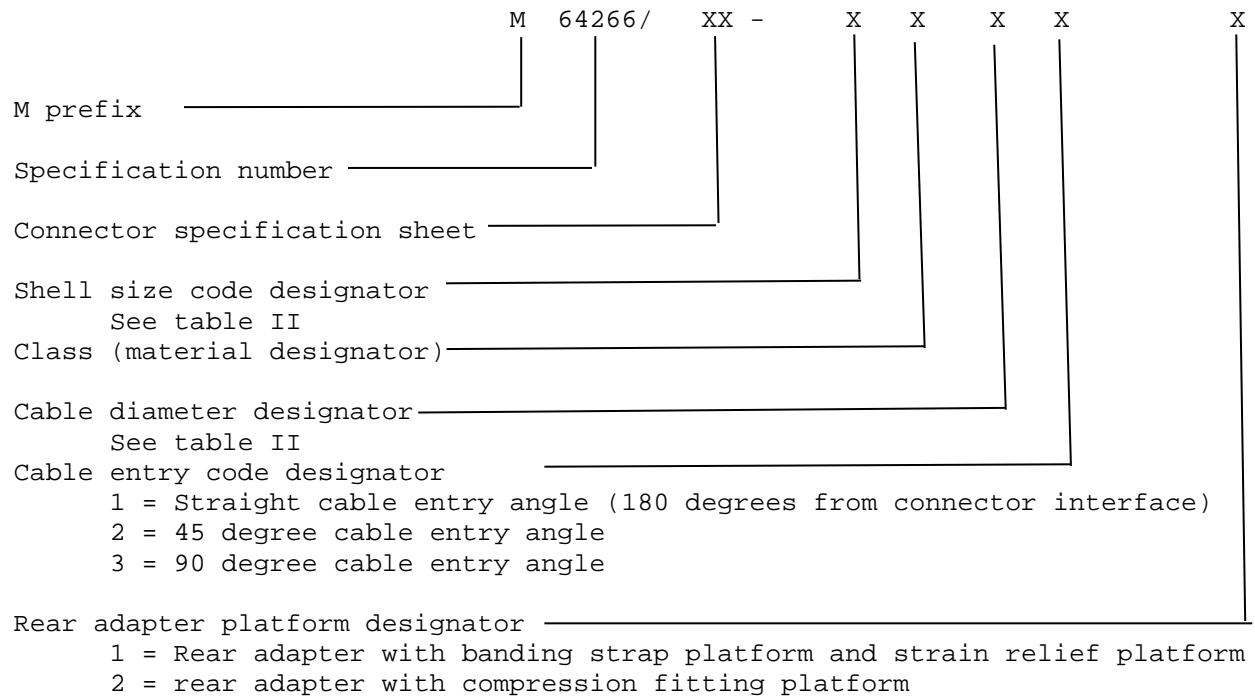
Alternate rear adapter. Backshell shall be qualified to this specification sheet containing a rear adapter configured with a banding strap platform and a strain relief platform. A rear adapter configured with a compression fitting platform, that meet the size, weight, identification marking, workmanship, screw thread, backshell mating durability, insertion loss, return loss, cable pullout force, external bending moment, impact, crush, shock, water pressure, thermal shock, temperature humidity cycling, temperature cycling, life aging, sand and dust, fluid immersion, electromagnetic effects, salt spray inspections, shall be qualified for use as an alternative rear adapter for backshells in this specification sheet.

Marking:

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

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



PIN example: M64266/18-CA111

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: Backshells shall be assembled onto the connector and multiple fiber, fiber optic cable using only the tools and equipment listed in NAVSEA Drawing 8283460 for the connector accessories assembly procedure.

NOTES:

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

MIL-PRF-64266/1	MIL-S-901	SAE AMS DTL-23053/5
MIL-PRF-64266/2	MIL-STD-1678-2	NAVSEA drawing 8283460
MIL-PRF-64266/3	MIL-STD-1678-3	

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Standardization based on lessons learned. For the older, existing fiber optic, multiple termini connectors; each vendor has a different backshell arimid 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.

Custodians:

Army - CR
Navy - SH
Air Force - 85
DLA - CC

Preparing activity:

DLA - CC

(Project 6060-2011-012)

Review activities:

Navy - AS
Air Force - 13, 19, 93, 99
DIA - DI
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.daps.mil/>.