

Circular Industrial Connectors are packaged and sold in modules so that users may select the exact components to suit their requirements.

To properly select those components, the following questions must be answered:

- 1) What is the wire size to be connected?
- 2) How many wires are there to connect?
- 3) What is the voltage requirement?
- 4) If a cable is involved, what is the cable diameter?
- 5) If a conduit is involved, what type of conduit and trade size?
- 6) For stationary receptacles, what mounting arrangement is required?
- 7) Are any accessories or special application considerations involved?

With above information it is possible to rapidly specify the Industrial Interfaces Connector configuration exactly suited to your needs.

There are few things to keep in mind when specifying and ordering the modular components comprising Industrial Interfaces Connectors.

- 1) The inserts are capable of accepting different types and sizes of terminals. To give users maximum flexibility, the terminals are ordered separately for the Spectre Connectors. See the information in the insert selection guide and the terminal selection guide in the specification section.
- 2) Except for the Direct Flange Mount Front Shells, a back shell is always required to complete a connector half.
- 3) Angle adapters are available.
- 4) We are system problem solvers! If you do not see the solution to your problem in the catalog, give us a call. We would be delighted to work with you. Our products exist because of your needs.
- 5) Unlike most connector vendors, we deliver PROMPTLY. Delivery is designed into our products and supported by an in-depth inventory stock policy monitored by MRP computer software. We do appreciate knowing your requirements early and will gladly deliver your shipment to your JIT delivery date.

Modular Design for Maximum Flexibility

CATALOG NUMBER SELECTION

Having determined the insert and terminal requirements:

- 1) Select the catalog number from the proper front shell page that describes the shell and insert type required.
- 2) Select the catalog number from the proper back shell page that describes the size and type required.
- 3) Repeat these steps for the other side of the connector.
- 4) Select dust caps as required.
- 5) From the terminal selection guide, select the appropriate terminals for front shells that are sold without terminals.
- 6) Select the necessary insertion and removal tools and the proper crimp tools and locators from the tool selection guide.

Agency Approvals

National Electric Code: Spirit connectors conform to the NEC if applied within the constraints of the code.
 Underwriters Laboratories: Spirit series connectors are recognized under the Underwriters Laboratories Component Recognition Program. File No.: E81982 (N).
 Canadian Standards Association: Spirit series connectors are certified by CSA under File No.: LR56804-1, -2, -3.
 Spirit conforms to the JIC and Machine Tool Standard NFPA79
 Spirit meets NEMA 4X, enclosure requirements.
 Spirit 600V inserts meet the spacing requirements of VDE (3mm through air, 4mm over surface)

Mechanical

Cord Strain Relief: 35 lb min. throughout range per UL 514. Spirit values exceed 100 lb on most applications (50 lb with sleeve glands).
 Metallic Liquid-Tight Conduit Strain Relief: 150 lb min. per UL 514 for Type M
 Termination Crimp Strengths: Spirit values exceed UL 486 for all wire gauges specified
 Mating Cycles: 500 mate/unmate cycles without excessive wear
 Shock: 50 G min., all planes. Coupling nut is spring loaded to resist impact damage
 Vibration: Complies with MIL STD 202F, Test Method 204, Test Condition B. Coupling nut is spring loaded to resist loosening under vibration.

Electrical

Voltage: Each insert is stated as AC/DC values
 Current: Determined by the bulk temperature rise, including ambient, not exceeding the insert temperature rating which is 90°C. In general, the connectors are capable of carrying the currents of the SO Cable they are designed to accommodate. The NEC Tables on Current Ratings of Wires in Conduit also may be used as a reference to allowable currents.

Current Ratings Min. (Amperes) — All Circuits							
		Terminal Size					
Circuits		10	12	14	16	18	20
2	0	30	25	18	13	10	7
3	0	25	20	15	10	7	5
4-6	5	20	16	12	8	6	4
7-24		17.5	14	10.5	7	5	3.5
25-42		15	12	9	6	4	3
43+		12.5	10	7.5	5	3.5	2.5

In specific applications larger currents may be adequately handled by a few circuits without difficulty, but in no instance should more than the following maximums be applied to the terminals:

Terminal No.	Absolute Maximum Current
10 or 12	35A
14 or 16	15A
18 or 20	10A

Contact the factory for advice if the application is questionable. In no instance should the bulk temperature exceed 90°C including ambient when maximum current is applied.

All ratings apply to applications where the connector is not disengaged under load.

Dielectric Withstanding Voltage: Conforms to UL 498. Tested at 1000V plus twice rated voltage for 1 minute between terminals and terminals to the shell.

Insulation Resistance: 5000 MΩ typical at 25°C, 40 to 60% relative humidity

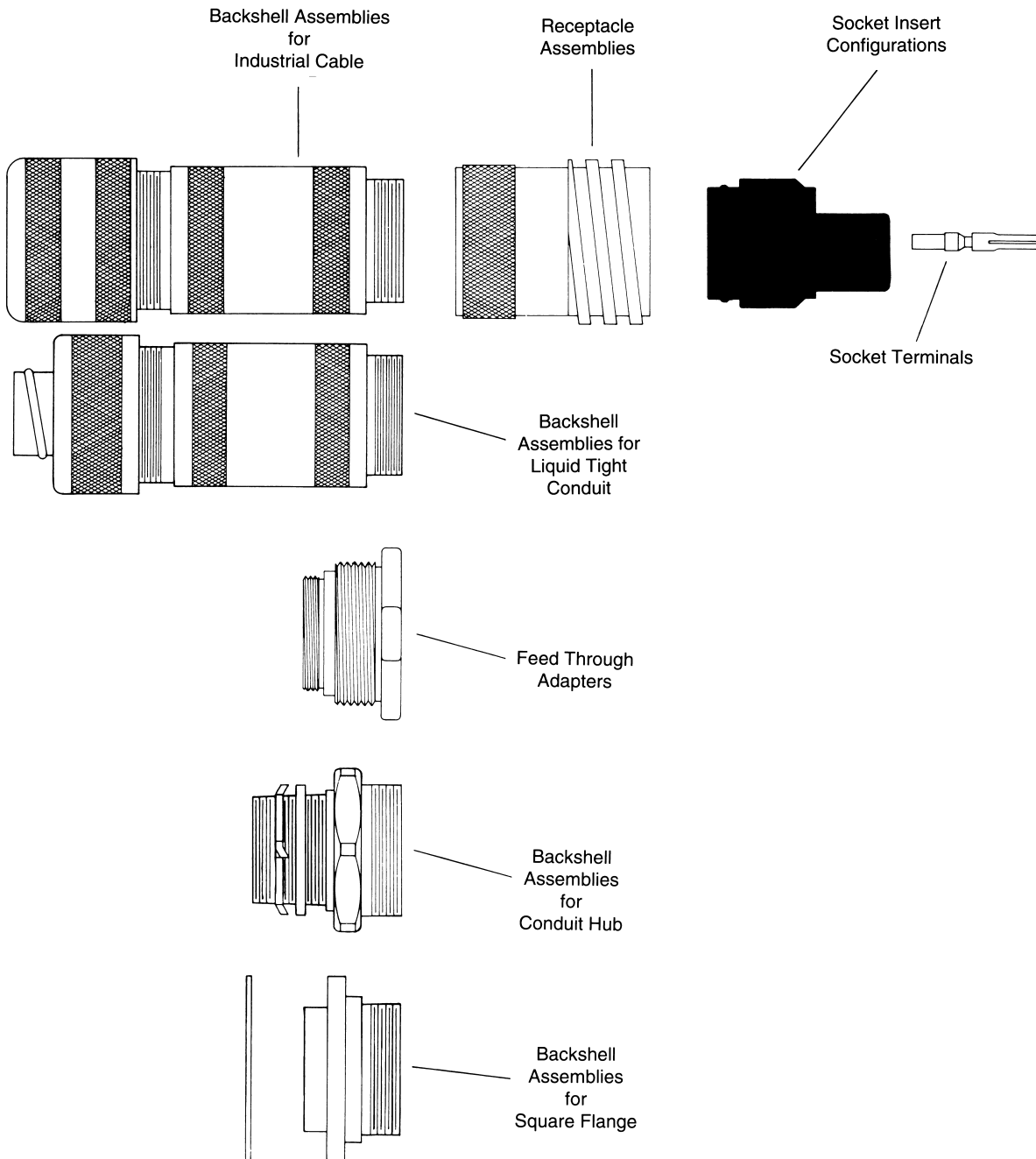
Millivolt Drop: Voltage probes located 1/4" away from crimp barrel

Terminal No.	Wire AWG	Current (Amperes)	mV Drop
16 Tin	16	1.0	1.5
20 Gold	20	1.0	3.1

Environmental

Temperature: -40 to +194°F
 Humidity: 100 MΩ min. insulation resistance after 96 hours of 95 to 100% relative humidity at 100°C (MIL STD 202F Test Method 103B Condition B)
 Moisture Seals: No water enters electrical chamber when subjected to water spray per UL 514. Dust caps afford additional seal protection as well as preventing entry of mud, chips and other debris.
 Corrosion: No exposure of base metal evident after 500 hours in salt spray per MIL STD 1344. Shells are inert to most caustics. Hard-coat finish is approved for offshore marine duty.
 Chemical Resistance: Inserts impervious to most oils, alcohols, fuels, glycols, salts, soaps and mild alkalis. Contact factory for specific applications.

- To determine length of total assembled connector, total "L" dimensions of selected components
- To determine length of mated pair of total assembled connectors, subtract 5/8" from total of all "L" dimensions

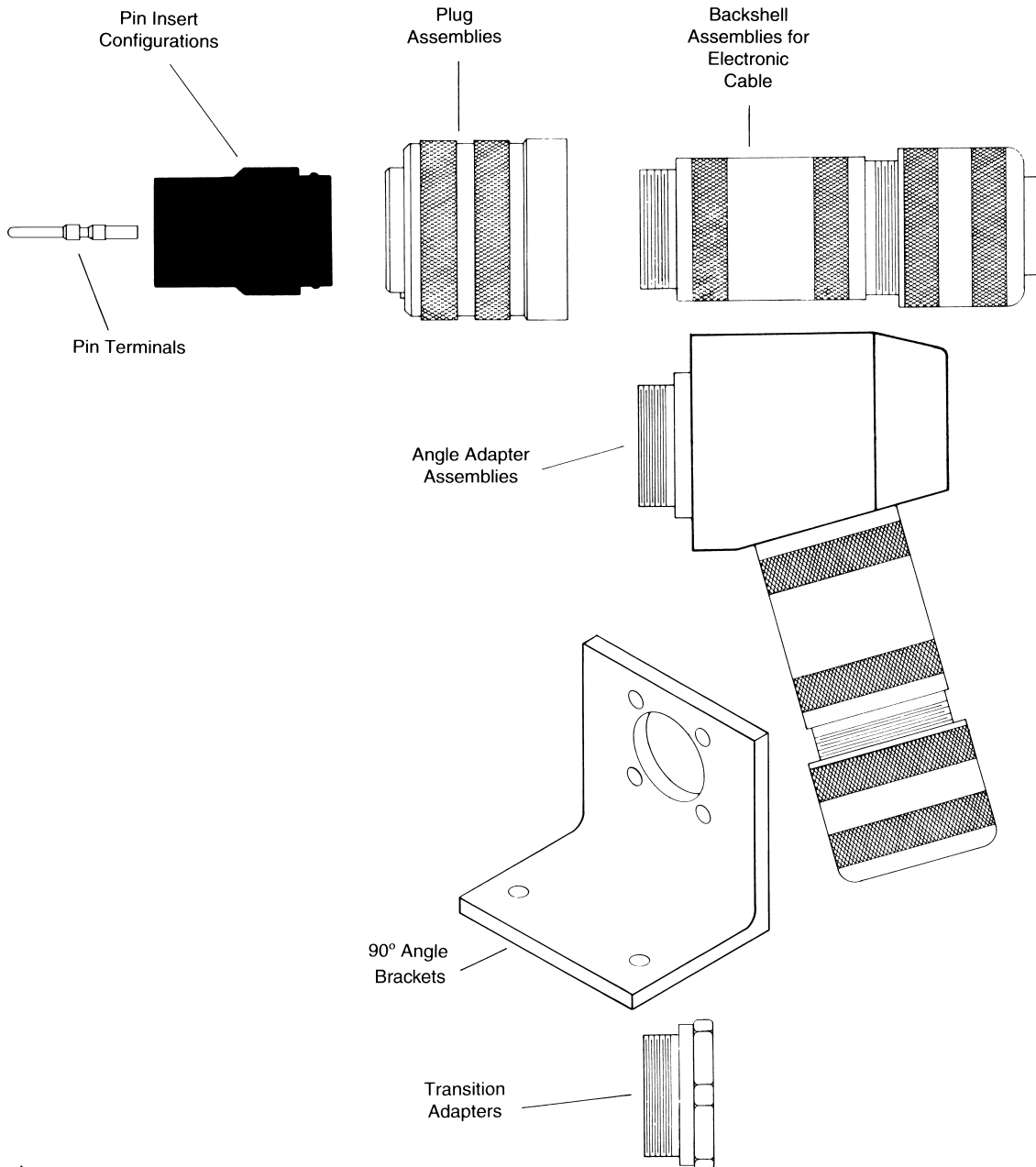


Circular Industrial Connectors has developed the Spirit connector series expressly to meet the rugged applications of the industrial environment. It is a modularized design concept not encumbered with extraneous Mil Spec requirements. The uncompromised design offers features and degrees of freedom not previously available.

The Spirit modularized building block concept allows for the assembly of thousands of connector variations through the use of the relatively few components listed in this catalog. An assortment of back shell hardware is available including cable attachment; liquid tight conduit attachment; Mil Spec dimensioned square flange panel mount and pipe thread; and box or conduit hub attachments. All back shell hardware interfaces with either plug or receptacle shells.

Spirit is also the answer for connector applications requiring alternate key positions, reversed inserts or hardware variations — once termed specials with long lead delivery — now available as standard parts.

Combining the performance capabilities of Spirit, as listed in this catalog, with its flexibility, availability and resulting cost economies clearly defines the express design mandate of Circular Industrial Connectors.

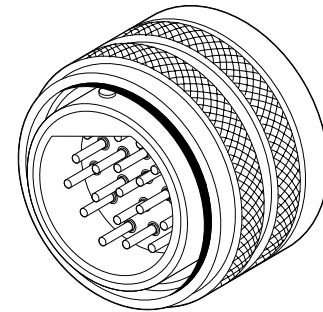


FEATURES



Circular Industrial™ Connectors Spirit™ Front Shell Assembly Plug Assembly

84750



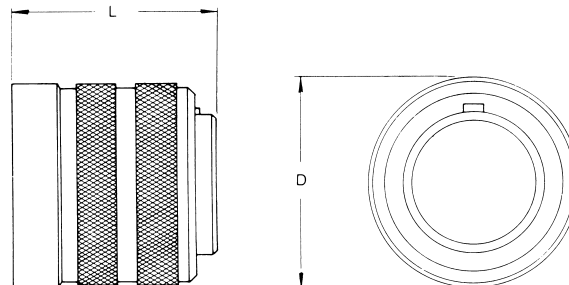
- ACME coupling ensures easy mating
- The modular design provides flexibility to use various insulator keying options and panel mounting
- Double shrouding seals and hard plastic, chemically resistant insulator make this a robust assembly

Spirit front shell assemblies are designed to accept all inserts of the appropriate shell size. Shell material is 6061-T6 machined aluminum dark hardcoated with teflon sealcoat for maximum corrosion protection with built-in thread lubrication.

ACME coupling threads fully mate and unmate in less than 2-1/2 turns. Spring loaded coupling nut resists vibration.

In field insert keying is achieved by alignment of a molded key letter on the rear of the insert with an indicator on the rear of the shell during assembly. Eight alternate keying positions are provided.

Assemblies are rugged throughout with coarse mating threads and have plug key protection by heavy wall sections. Double shrouding by the insert and shell walls provide added protection.



ORDERING INFORMATION AND DIMENSIONS

Max. No. of Circuits	Order No.		Wire Range AWG	Shell Size	Terminal Finish	Voltage Rating
	With Pin Insert	With Socket Insert				
5	84750-1033	84750-1073	14-18	17	Tin	600
5	84750-1013	84750-1053	16-20	17	Tin	600
8	84750-1113	84750-1153	14-18	17	Tin	250
8	84750-1093	84750-1133	16-20	17	Tin	250
11	84750-1193	84750-1233	18-22	17	Tin	250
11	84750-1183	84750-1223	20-24	17	Gold	250
(4) 12 (5) (3)	84750-4173	84750-4193	8-10 12-16 16-20	30	Tin	600
(4) 12* (5) (3)	84750-4253	84750-4263	8-10 10-16 14-20	30	Tin	600
19	84750-4033	84750-4073	14-18	30	Tin	600
19	84750-4013	84750-4053	16-20	30	Tin	600

Max. No. of Circuits	Order No.		Wire Range AWG	Shell Size	Terminal Finish	Voltage Rating
	With Pin Insert	With Socket Insert				
35 (33) (2)	84750-4113	84750-4153	18-22 16-20	30	Tin	250
35 (33) (2)	84750-4103	84750-4143	20-24 16-20	30	Gold	250
20	84750-7033	84750-7073	10-14	36	Tin	600
20	84750-7013	84750-7053	12-16	36	Tin	600
37	84750-7113	84750-7153	14-18	36	Tin	600
37	84750-7093	84750-7133	16-20	36	Tin	600
50	84750-7193	84750-7233	18-22	36	Tin	250
50	84750-7183	84750-7223	20-24	36	Gold	250

Shell Size	Dimension	
	L	D
17	32.38 (1.275)	33.32 (1.312)
30	32.38 (1.275)	50.16 (1.975)
36	32.38 (1.275)	57.15 (2.250)

* Indicates assembly without terminals

Unless otherwise indicated, assemblies include prepackaged front shell, insert, terminals and instruction sheet. Terminal package includes 10% spares. All front shells require a back shell to complete the connector half.

FEATURES



Circular Industrial™ Connectors Spirit™ Front Shell Assembly Receptacle Assembly

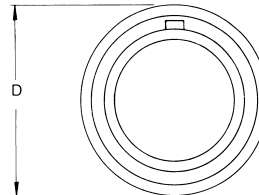
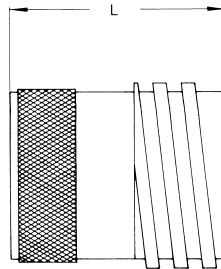
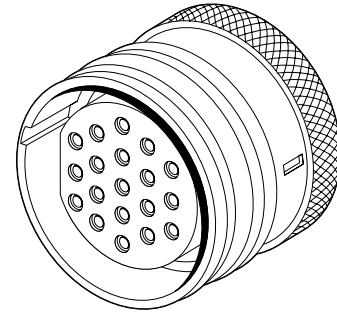
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- ACME coupling ensures easy mating
- The modular design provides flexibility to use various insulator keying options and panel mounting
- Double shrouding seals and hard plastic, chemically resistant insulator make this a robust assembly

Spirit front shell assemblies are designed to accept all inserts of the appropriate shell size. Shell material is 6061-T6 machined aluminum dark hardcoated with teflon sealcoat for maximum corrosion protection with built-in thread lubrication.

ACME coupling threads fully mate and unmate in less than 2-1/2 turns.

In field insert keying is achieved by alignment of a molded key letter on the rear of the insert with an indicator on the rear of the shell during assembly. Eight alternate keying positions are provided.



ORDERING INFORMATION AND DIMENSIONS

Max. No. of Circuits	Order No.		Wire Range AWG	Shell Size	Terminal Finish	Voltage Rating
	With Pin Insert	With Socket Insert				
5	84750-0033	84750-0073	14-18	17	Tin	600
5	84750-0013	84750-0053	16-20	17	Tin	600
8	84750-0113	84750-0153	14-18	17	Tin	250
8	84750-0093	84750-0133	16-20	17	Tin	250
11	84750-0193	84750-0233	18-22	17	Tin	250
11	84750-0183	84750-0223	20-24	17	Gold	250
(4) 12 (5) (3)	84750-3173	84750-3193	8-10 12-16 16-20	30	Tin	600
(4) 12* (5) (3)	84750-3253	84750-3263	8-10 10-16 14-20	30	Tin	600
19	84750-3033	84750-3073	14-18	30	Tin	600
19	84750-3013	84750-3053	16-20	30	Tin	600

Max. No. of Circuits	Order No.		Wire Range AWG	Shell Size	Terminal Finish	Voltage Rating
	With Pin Insert	With Socket Insert				
35 (33) (2)	84750-3113	84750-3153	18-22 16-20	30	Tin	250
35 (33) (2)	84750-3103	84750-3143	20-24 16-20	30	Gold	250
20	84750-6033	84750-6073	10-14	36	Tin	600
20	84750-6013	84750-6053	12-16	36	Tin	600
37	84750-6113	84750-6153	14-18	36	Tin	600
37	84750-6093	84750-6133	16-20	36	Tin	600
50	84750-6193	84750-6233	18-22	36	Tin	250
50	84750-6183	84750-6223	20-24	36	Gold	250

Shell Size	Dimension	
	L	D
17	34.92 (1.375)	30.14 (1.187)
30	34.92 (1.375)	44.45 (1.750)
36	34.92 (1.375)	50.80 (2.000)

* Indicates assembly without terminals

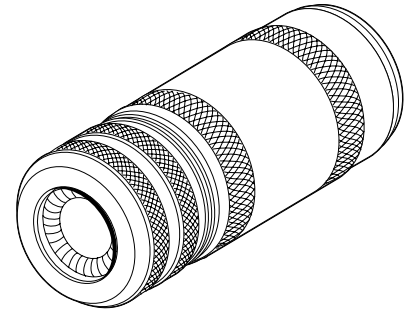
Unless otherwise indicated, assemblies include prepackaged front shell, insert, terminals and instruction sheet. Terminal package includes 10% spares. All front shells require a back shell to complete the connector half.

FEATURES



Circular Industrial™ Connectors Spirit™ Back Shell Assembly Cable Back Shell

84751



- The expandable elastomer diaphragm has NEMA 4X sealing and adapts to a wide range of cable diameters
- The Stainless Steel strain relief spring has an extraordinary strain relief without the use of tools or hardware

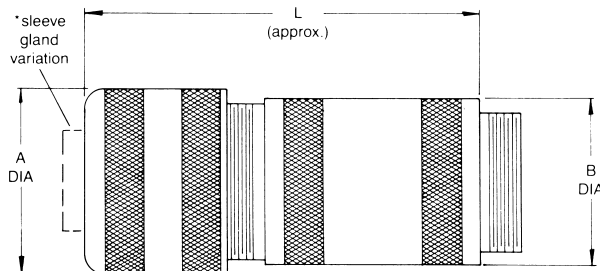
Spirit cable back shells achieve extraordinary sealing and strain relief through the independent action of expandable elastomers and spring pressure loading. The Stainless Steel strain relief spring closes around the cable as the compression nut is threaded downward. High, but controlled pressure is applied to the cable yielding superior holding power without damage to the cable. Pulling the cable increases the spring force on the cable, further enhancing the holding power when needed.

Sealing is accomplished by an expandable elastomer diaphragm which conforms to the cable diameter when inserted into the shell. Wide-range cable diameter performance is possible without an assortment of sealing grommets typical in conventional designs.

For smaller diameter cable, such as electronic cable or for discrete wire applications, a cable sleeve gland variation is available. The strain relief action is similar, but in this case the seal is obtained by the spring compressing the sleeve gland around the cable or wire bundle.

Back shell assemblies are threaded to front shell assemblies. Hand tightening the back shell pressurizes the insert in the front shell and provides the peripheral seal. No wrenching required.

To allow the Spirit cable back shells to be used with very small diameter electronic cable, noreprene thermoplastic elastomer bushings are available.



ORDERING INFORMATION AND DIMENSIONS

Shell Size	Order No.		Cable Range (in.)	Dimension			
	Long Back Shell	Short Back Shell		A	B	L (Long)	L (Short)
17	84751-0013	84751-0023	.250-.350	29.36 (1.156)	26.67 (1.050)	57.15 (2.250)	41.27 (1.625)
17	84751-0033	84751-0043	.350-.500	29.36 (1.156)	26.67 (1.050)	57.15 (2.250)	41.27 (1.625)
17	84751-0053	84751-0063	.500-.650	29.36 (1.156)	26.67 (1.050)	57.15 (2.250)	41.27 (1.625)
30	84751-3013	84751-3033	.500-.700	44.45 (1.750)	41.27 (1.625)	101.60 (4.000)	73.02 (2.875)
30	84751-3043	84751-3053	.700-.950	44.45 (1.750)	41.27 (1.625)	101.60 (4.000)	73.02 (2.875)
30	84751-3063	84751-3073	.950-1.150	44.45 (1.750)	41.27 (1.625)	101.60 (4.000)	73.02 (2.875)
36	84751-6013	84751-6023	.700-.900	50.80 (2.000)	47.62 (1.875)	133.35 (5.250)	82.55 (3.250)
36	84751-6033	84751-6043	.900-1.150	50.80 (2.000)	47.62 (1.875)	133.35 (5.250)	82.55 (3.250)
36	84751-6053	84751-6063	1.150-1.350	50.80 (2.000)	47.62 (1.875)	133.35 (5.250)	82.55 (3.250)
36	84751-6073	84751-6083	1.350-1.425	50.80 (2.000)	47.62 (1.875)	133.35 (5.250)	82.55 (3.250)

* Sleeve gland variation

Assembly includes prepackaged back shell, cable seal, strain relief spring and compression nut, fully assembled

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FEATURES



Circular Industrial™ Connectors

Spirit™

Back Shell Assemblies

Liquid-Tight Conduit

Back Shells

- Direct attachment eliminates transition adapters
- Available for several metallic liquid tight conduits. This provides flexibility in industrial applications to meet UL and NEC requirements.

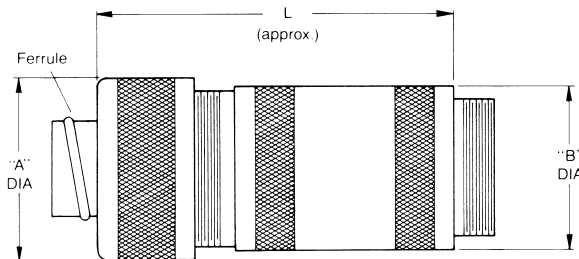
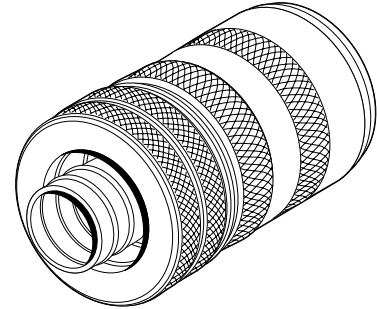
Spirit liquid-tight conduit back shell assemblies will accept direct attachment of various sizes of liquid-tight conduit. Back shells are dimensioned to standard conduit sizes which eliminates transition adapters from connector shell to conduit.

Back shells are available for several metallic liquid-tight conduits. Choose the back shell style you require by referring to the conduit composition chart. Then, determine the back shell required in the catalog number chart for the trade size you require.

Backshell assemblies are threaded to front shell assemblies. Hand tightening the back shell pressurizes the insert to the front shell and achieves maximum holding force. No wrenching required.

Shell material is 6061-T6 machined aluminum dark hardcoated with teflon sealcoat for maximum corrosion protection with built-in thread lubrication.

84751



ORDERING INFORMATION AND DIMENSIONS

Shell Size	Order No.		Conduit Trade Size	Back Shell Style	Dimension			
	Long Back Shell	Short Back Shell			A	B	L (Long)	L (Short)
17	84751-0103	84751-0113	3/8	M	29.36 (1.156)	26.67 (1.050)	50.80 (2.000)	34.92 (1.375)
17	84751-0163	84751-0173	1/2	M	29.36 (1.156)	26.67 (1.050)	50.80 (2.000)	34.92 (1.375)
30	84751-3103	84751-3113	1/2	M	44.45 (1.750)	41.27 (1.625)	92.07 (3.625)	63.50 (2.500)
30	84751-3163	84751-3173	3/4	M	44.45 (1.750)	41.27 (1.625)	92.07 (3.625)	63.50 (2.500)
30	84751-3223	84751-3233	1	M	44.45 (1.750)	41.27 (1.625)	92.07 (3.625)	63.50 (2.500)
36	84751-6113	84751-6123	3/4	M	50.80 (2.000)	47.62 (1.875)	123.82 (4.875)	73.02 (2.875)
36	84751-6173	84751-6183	1	M	50.80 (2.000)	47.62 (1.875)	123.82 (4.875)	73.02 (2.875)

Conduit Composition	Description	Back Shell Style	Conduit Types
Metallic	Plastic Over Metal	M	ALT, AT, CSA, EF, EFL, HC, HEX, LA, LOR, LT, OR, UXTL, UA, ZHN

Assembly includes prepackaged back shell, plastic seal, liquid-tight conduit ferrule and compression nut, fully assembled

* Contact factory for non-metallic conduit types

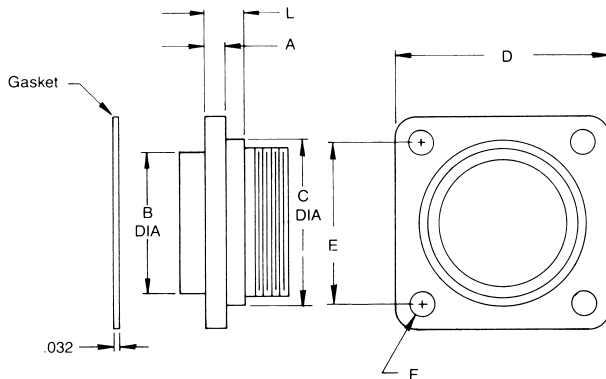
Circular Industrial™ Connectors

Spirit™

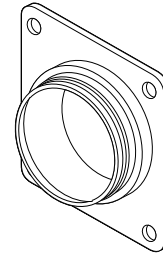
Back Shell Assembly

Square Flange Back Shell

84751



Spirit square flange adapters are threaded to front shell assemblies. Hand tightening the adapter pressurizes the insert to the front shell and achieves maximum holding force. No wrenching required. Square flange adapters are designed to MS mounting dimensions to eliminate the need for changing drawings when connector systems are upgraded.



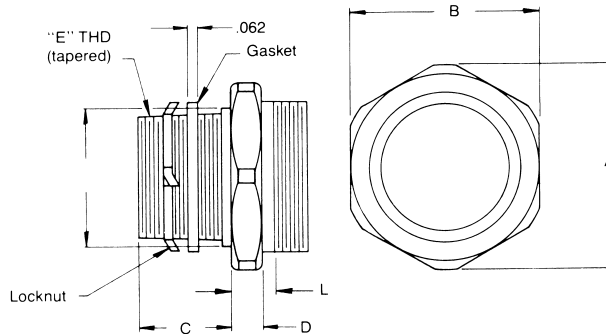
Shell Size	Order No.	Dimension							Panel Mount Hole Diameter	Panel Mount Screw Size	MIL Spec Ref
		A	B	C	D	E	F	L			
17	84751-0143	3.17 (.125)	21.59 (.850)	25.40 (1.000)	32.53 (1.281)	24.61 (.969)	3.81 (.150)	7.92 (.312)	26.16 (1.030)	No. 6	MS 16
30	84751-3143	3.17 (.125)	38.10 (1.500)	41.40 (1.630)	50.80 (2.000)	39.67 (1.562)	4.49 (.177)	7.92 (.312)	45.21 (1.780)	No. 8	MS 28
36	84751-6143	3.17 (.125)	43.68 (1.720)	46.22 (1.820)	57.15 (2.250)	44.45 (1.750)	5.30 (.209)	7.92 (.312)	51.56 (2.030)	No. 10	MS 32

Assembly includes flange back shell and neoprene gasket

To mount flange on inside of panel place gasket on other side and assemble front shell after flange is mounted.
Maximum panel thickness for this application is .125".

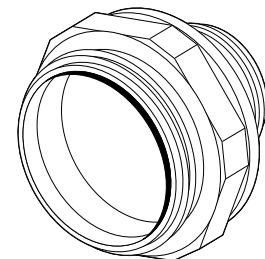
Conduit Hub Back Shell

84751



Spirit conduit hub adapters allow for a variety of connector mounting methods. The freedom to select wire way or panel mount through use of a knockout punch; hub or pendant mount; or 90° or 45° angle conduit coupling attachment are but a few of the possibilities.

Shell material is 6061-T6 machined aluminum dark hard coated with Teflon* seal coat for maximum corrosion protection with built-in thread lubrication.



Shell Size	Order No.	Trade Size	Dimension					E Thread	Panel Mount Hole Diameter
			A	B	C	D	L		
17	84751-0503	1/2	31.75 (1.250)	28.57 (1.125)	14.12 (.556)	5.38 (.212)	7.92 (.312)	1/2 - 14 NPT	22.22 (.875)
30	84751-3503	3/4	49.60 (1.953)	44.45 (1.750)	15.24 (.600)	6.98 (.275)	9.52 (.375)	3/4 - 14 NPT	28.16 (1.109)
30	84751-3513	1	49.60 (1.953)	44.45 (1.750)	16.51 (.650)	6.98 (.275)	9.52 (.375)	1 to 11-1/2 NPT	34.92 (1.375)
36	84751-6503	1	55.14 (2.171)	50.80 (2.000)	16.51 (.650)	10.05 (.396)	12.59 (.496)	1 to 11-1/2 NPT	34.92 (1.375)
36	84751-6513	1-1/4	55.14 (2.171)	50.80 (2.000)	17.78 (.700)	10.05 (.396)	12.59 (.496)	1-1/4 to 11-1/2 NPT	44.04 (1.734)

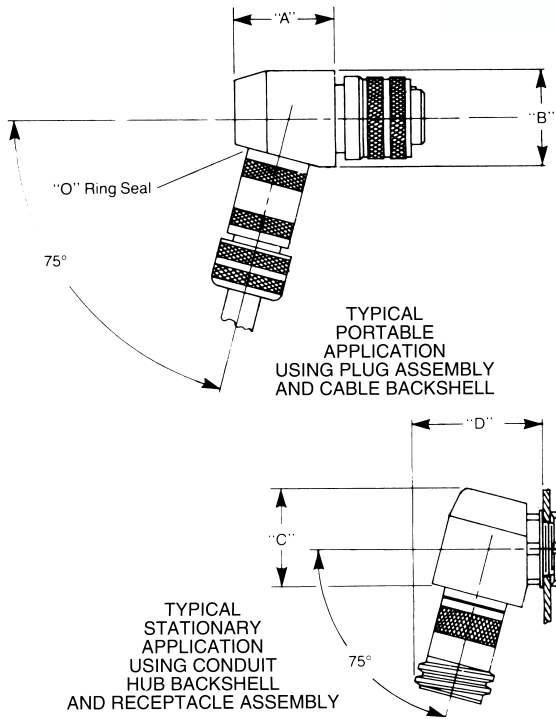
* Teflon is a registered trademark of E.I. DuPont de Nemours and Company

Note: Do not use with 84750-4173 or 84750-4253. Improper spacings of power conductors can result.

Assembly includes prepackaged back shell, neoprene gasket and locknut

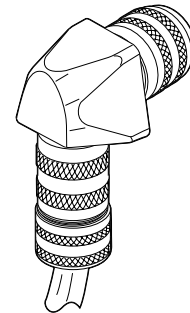
75° Angle Adapter

84752



Spirit angle adapters are designed to be threaded to a variety of front shell and back shell combinations. The same adapter can be assembled to the portable or stationary half of the connector. A hub adapter must be used as a stationary mount to enable adjustment of the take out angle.

Shell material is 6061-T6 machined aluminum dark hard coated with Teflon* seal coat for maximum corrosion protection with built-in thread lubrication.

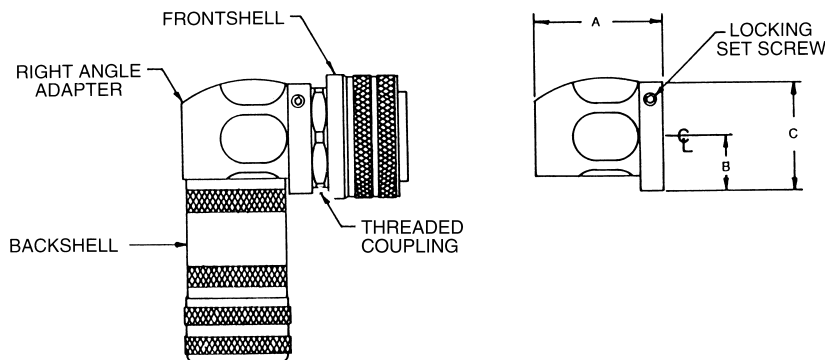


Shell Size	Order No.	Dimension			
		A	B	C	D
17	84752-0553	44.45 (1.750)	38.10 (1.500)	47.62 (1.875)	47.62 (1.875)
30	84752-3553	53.97 (2.125)	50.80 (2.000)	56.74 (2.234)	60.32 (2.375)
36	84752-6553	60.32 (2.375)	57.15 (2.250)	62.89 (2.476)	69.85 (2.750)

Assembly includes angle shell, O-ring seal and instruction sheet
Note: Front shell and back shell sold separately

Right Angle Adapter for Portable Front Shells

84752



Shell Size	Order No.	Shell Material	Dimension		
			A	B	C
36	84752-6753	Aluminum	68.07 (2.680)	57.15 (2.250)	28.44 (1.120)

Assembly includes angle shell, set screws, O-ring seals and threaded coupling

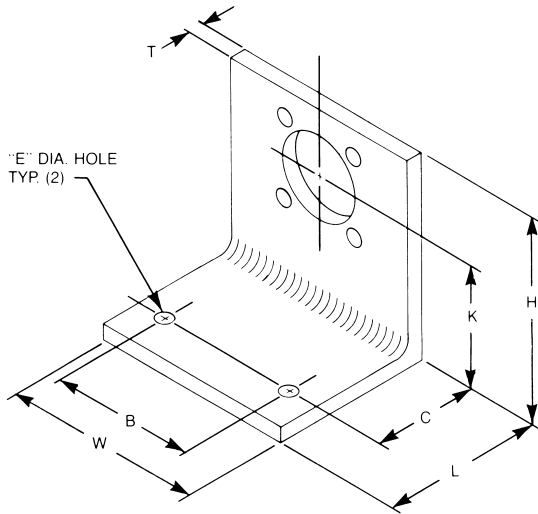
Note: Front shell and back shell sold separately

* Teflon is a registered trademark of E.I. DuPont de Nemours and Company

Circular Industrial™ Connectors
Spirit™ Accessories
90° Angle Brackets

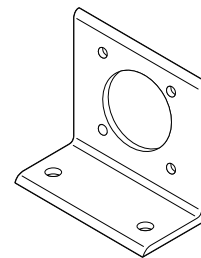
Flange Mount

84752



Angle brackets are available for either flange-mount applications or for feed-through adapter mountings. The flange mount would be used where seal on the mounted side is not required. The feed-through adapter mounting would be used where seal is required on both sides of the bracket. An example would be an in-line cable connection on the external frame of a machine.

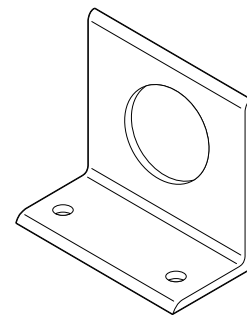
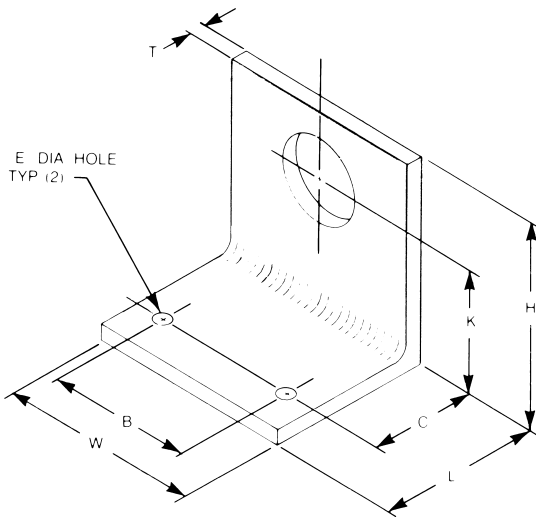
Material is aluminum angle stock black anodized.



Shell Size	Order No.	Description	Dimension							
			T	W	L	K	H	E	C	B
17	84752-0202	Flange Bracket	4.74 (.187)	63.50 (2.500)	76.20 (3.000)	38.10 (1.500)	63.50 (2.500)	6.98 (.275)	38.10 (1.500)	44.45 (1.750)
30	84752-3202	Flange Bracket	6.35 (.250)	88.90 (3.500)	63.50 (2.500)	50.80 (2.000)	88.90 (3.500)	6.98 (.275)	44.45 (1.750)	63.50 (2.500)
36	84752-6202	Flange Bracket	6.35 (.250)	88.90 (3.500)	63.50 (2.500)	50.80 (2.000)	88.90 (3.500)	6.98 (.275)	44.45 (1.750)	63.50 (2.500)

Feed-Through Adapter Mount

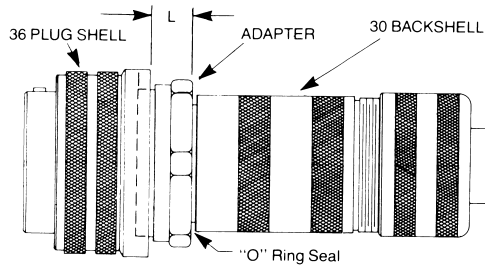
84752



Shell Size	Order No.	Description	Knockout Trade Size	Dimension							
				T	W	L	K	H	E	C	B
30	84752-3212	Feed-Through Bracket	1-1/2"	6.35 (.250)	88.90 (3.500)	63.50 (2.500)	50.80 (2.000)	88.90 (3.500)	6.98 (.275)	44.45 (1.750)	63.50 (2.500)
36	84752-6212	Feed-Through Bracket	2"	6.35 (.250)	88.90 (3.500)	63.50 (2.500)	50.80 (2.000)	88.90 (3.500)	6.98 (.275)	44.45 (1.750)	63.50 (2.500)

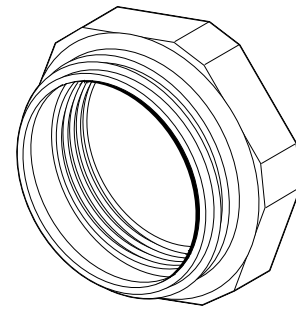
Transition Adapter

84752



Spirit transition adapters permit the use of different front shell and back shell sizes allowing increased cable and conduit ranges. This adapter assembles between front shell and back shell.

Shell material is 6061-T6 machined Aluminum dark hard coated with Teflon* seal coat for maximum corrosion protection with built-in thread lubrication.

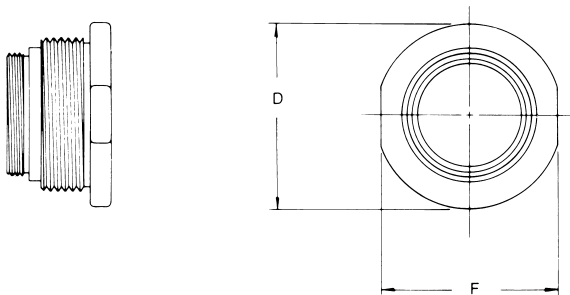


Order No.	Description	Front Shell Size	Back Shell Size	Dimension L
84752-3223	Expansion Adapter	30	36	12.70 (.500)
84752-6223	Reducing Adapter	36	30	11.43 (.450)

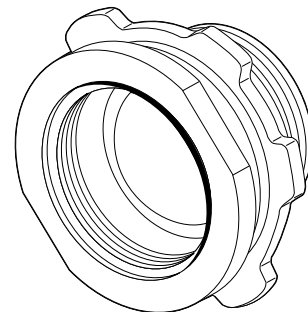
Assemblies include O-ring seal and instructions

Feed-Through Mounting Adapter

84752



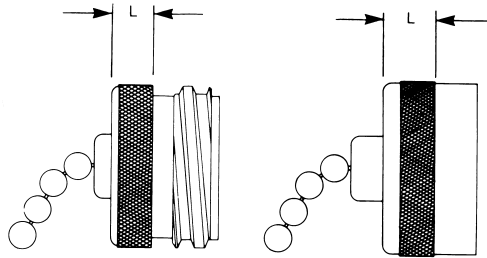
To allow connectors using receptacle front shells and cable or liquid-tight conduit back shells to be mounted on frames, bulk-heads or NEMA enclosures.



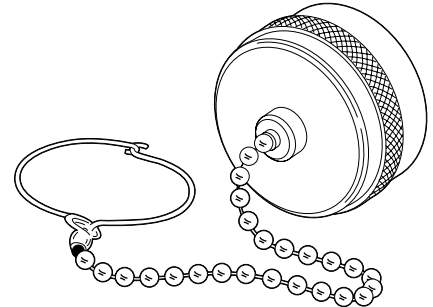
Shell Size	Order No.	Knockout Trade Size (in.)	Mounting Hole Diameter	Dimension	
				D	F
30	84752-3233	1-1/2"	49.19 (1.937)	57.15 (2.250)	53.97 (2.125)
36	84752-6233	2"	61.11 (2.406)	66.67 (2.625)	63.50 (2.500)

* Teflon is a registered trademark of E.I. DuPont de Nemours and Company
Assembly includes locknut and O-ring

Metal-Threaded Dust Covers



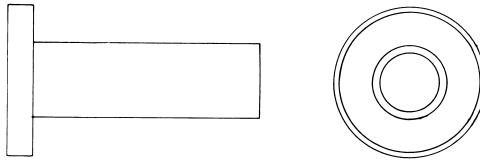
Spirit dust covers are available in all shell sizes and assure environmental integrity when connectors are in an unmated condition. Material is machined 6061-T6 dark hard-coated aluminum. 6" Stainless Steel chain and mounting loop for attachment to front shell assemblies is permanently attached.



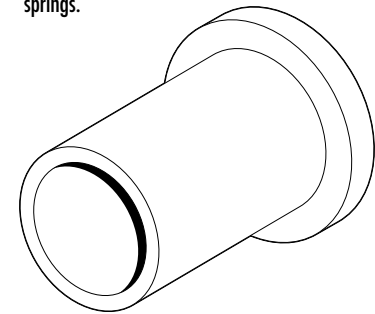
Shell Size	Order No.		Dimension L Additional Length to Connector
	Plug Dust Cap	Receptacle Dust Cap	
17	84752-0433	84752-0443	9.52 (.375)
30	84752-3433	84752-3443	9.52 (.375)
36	84752-6433	84752-6443	9.52 (.375)

Assembly includes dust cover, seals and stainless steel chain with mounting loop and instruction sheet

Small Diameter Sleeve Glands



The small diameter sleeve gland replaces flat diaphragm glands to accommodate the smaller wire diameters or discrete wire bundles. Sleeve glands cannot be used on extra large diameter back shells (84751-3063, 84751-3073, 84751-6053, and 84751-6063) due to the utilization of larger plungers and springs.



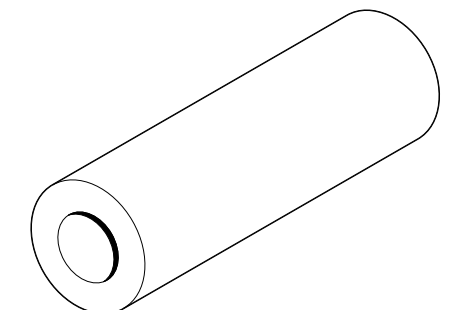
Shell Size	Gland Order No.	Cable Range (in.)	For Use with the Following Back Shells
17	84752-0310	.250-.350	84751-0033, 84751-0043
30	84752-3310	.450-.700	84751-3043, 84751-3053
36	84752-6310	.650-.900	84751-6033, 84751-6043

See pages V-25 to V-26 for cable types, etc.

Cable Range Reducers



Cable range reducers allow the use of very small diameter electronic cable in the Spirit cable back shields. The Norprene thermoplastic bushing accessories are available to retrofit existing cable back shells to accept the cable diameters shown.



Order No.	Description	Cable Range (in.)	Use With	
			Long Back Shells	Short Back Shells
84998-0011	Bushing — 5 Pack	.130-.180	84751-0013	84751-0023
84998-0012	Bushing — 5 Pack	.180-.250	84751-0033	84751-0043
84998-0013	Bushing — 5 Pack	.200-.250	84751-3013	84751-3033
84998-0014	Bushing — 5 Pack	.250-.310	84751-3013	84751-3033
84998-0015	Bushing — 5 Pack	.310-.370	84751-3013	84751-3033
84998-0016	Bushing — 5 Pack	.370-.440	84751-3013	84751-3033
84998-0017	Bushing — 5 Pack	.520-.620	84751-6013	84751-6023

FEATURES AND SPECIFICATIONS



Circular Industrial™ Connectors Spirit™ Technical Specifications

Agency Approvals

National Electric Code: Spirit connectors conform to the NEC if applied within the constraints of the code.

Underwriters Laboratories: Spirit series connectors are recognized under the Underwriters Laboratories Component Recognition Program. File No.: E81982 (N).

Canadian Standards Association: Spirit series connectors are certified by CSA under File No.: LR56804-1, -2, -3.

Spirit conforms to the JIC and Machine Tool Standard NFPA79

Spirit meets NEMA 4X, enclosure requirements.

Spirit 600V inserts meet the spacing requirements of VDE (3mm through air, 4mm over surface)

Mechanical

Cord Strain Relief: 35 lb min. throughout range per UL 514.

Spirit values exceed 100 lb on most applications (50 lb with sleeve glands).

Metallic Liquid-Tight Conduit Strain Relief: 150 lb min. per UL 514 for Type M

Termination Crimp Strengths: Spirit values exceed UL 486 for all wire gauges specified

Mating Cycles: 500 mate/unmate cycles without excessive wear

Shock: 50 G min., all planes. Coupling nut is spring loaded to resist impact damage

Vibration: Complies with MIL STD 202F, Test Method 204, Test Condition B. Coupling nut is spring loaded to resist loosening under vibration.

Electrical

Voltage: Each insert is stated as AC/DC values

Current: Determined by the bulk temperature rise, including ambient, not exceeding the insert temperature rating which is 90°C. In general, the connectors are capable of carrying the currents of the SO Cable they are designed to accommodate. The NEC Tables on Current Ratings of Wires in Conduit also may be used as a reference to allowable currents.

Current Ratings Min. (Amperes) — All Circuits							
Circuits		Terminal Size					
		10	12	14	16	18	20
2	0	30	25	18	13	10	7
3	0	25	20	15	10	7	5
4-6	5	20	16	12	8	6	4
7-24		17.5	14	10.5	7	5	3.5
25-42		15	12	9	6	4	3
43+		12.5	10	7.5	5	3.5	2.5

In specific applications larger currents may be adequately handled by a few circuits without difficulty, but in no instance should more than the following maximums be applied to the terminals:

Terminal No.	Absolute Maximum Current
10 or 12	35A
14 or 16	15A
18 or 20	10A

Contact the factory for advice if the application is questionable. In no instance should the bulk temperature exceed 90°C including ambient when maximum current is applied.

All ratings apply to applications where the connector is not disengaged under load.

Dielectric Withstanding Voltage: Conforms to UL 498. Tested at 1000V plus twice rated voltage for 1 minute between terminals and terminals to the shell.

Insulation Resistance: 5000 MΩ typical at 25°C, 40 to 60% relative humidity

Millivolt Drop: Voltage probes located 1/4" away from crimp barrel

Terminal No.	Wire AWG	Current (Amperes)	mV Drop
16 Tin	16	1.0	1.5
20 Gold	20	1.0	3.1

Environmental

Temperature: -40 to +194°F

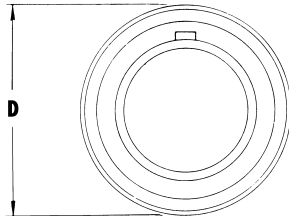
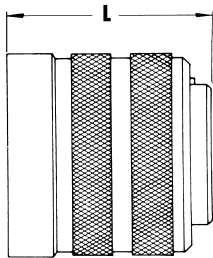
Humidity: 100 MΩ min. insulation resistance after 96 hours of 95 to 100% relative humidity at 100°C (MIL STD 202F Test Method 103B Condition B)

Moisture Seals: No water enters electrical chamber when subjected to water spray per UL 514. Dust caps afford additional seal protection as well as preventing entry of mud, chips and other debris.

Corrosion: No exposure of base metal evident after 500 hours in salt spray per MIL STD 1344. Shells are inert to most caustics. Hard-coat finish is approved for offshore marine duty.

Chemical Resistance: Inserts impervious to most oils, alcohols, fuels, glycols, salts, soaps and mild alkalis. Contact factory for specific applications.

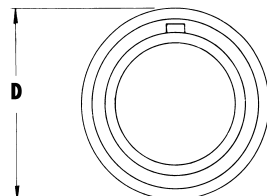
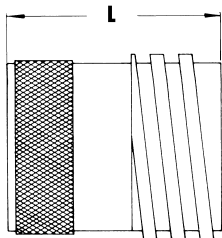
SPECTRE™
Front Shell
Straight Plug Assembly
84750



Shell Size	Dimensions	
	L	D
17	1.275 (.050)	1.312 (.052)
30	1.275 (.050)	1.975 (.078)
36	1.275 (.050)	2.250 (.089)

Maximum No. of Circuits	AWG Wire Range	Shell Size	Accepts Terminal Size	Voltage Rating	Standard Service with Pin Insert	Reverse Service with Socket Insert
5	14-20	17	14, 16	600	84750-1252	84750-1262
8	14-20	17	14, 16	250	84750-1272	84750-1282
11 (10) (1)	18-24 14-20	17	18, 20 14, 16	250	84750-1292	84750-1302
12 (4) (5) (3)	8-10 10-16 14-20	30	8 10, 12 14, 16	600	84750-4252	84750-4262
19	14-20	30	14, 16	600	84750-4212	84750-4222
35 (33) (2)	18-24 14-20	30	18, 20 14, 16	250	84750-4232	84750-4242
20	10-16	36	10, 12	600	84750-7252	84750-7262
37	14-20	36	14, 16	600	84750-7272	84750-7282
50	18-24	36	18, 20	250	84750-7292	84750-7302

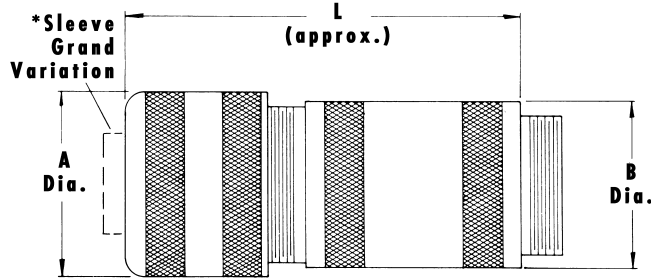
Front Shell
Straight Receptacle Assembly



Shell Size	Dimensions	
	L	D
17	1.375 (.054)	1.187 (.047)
30	1.375 (.054)	1.750 (.069)
36	1.375 (.054)	2.000 (.079)

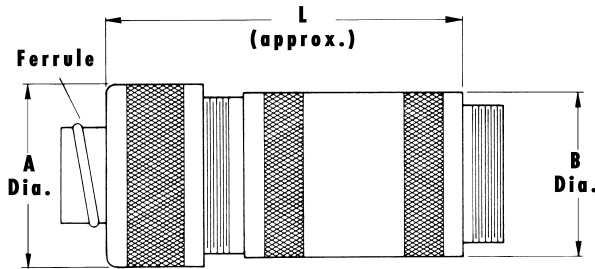
Maximum No. of Circuits	AWG Wire Range	Shell Size	Accepts Terminal Size	Voltage Rating	Standard Service with Socket Insert	Reverse Service with Pin Insert
5	14-20	17	14, 16	600	84750-0262	84750-0252
8	14-20	17	14, 16	250	84750-0282	84750-0272
11 (10) (1)	18-24 14-20	17	18, 20 14, 16	250	84750-0302	84750-0292
12 (4) (5) (3)	8-10 10-16 14-20	30	8 10, 12 14, 16	600	84750-3262	84750-3252
19	14-20	30	14, 16	600	84750-3222	84750-3212
35 (33) (2)	18-24 14-20	30	18, 20 14, 16	250	84750-3242	84750-3232
20	10-16	36	10, 12	600	84750-6262	84750-6252
37	14-20	36	14, 16	600	84750-6282	84750-6272
50	18-24	36	18, 20	250	84750-6302	84750-6292

Note: Terminals are ordered separately. See the terminal selection guide.



Shell Size	Cable Range (in.)	Backshell	Dimensions mm (inches)		
			A	B	L
17	*.250 -.350	84751-0022	29.36 (1.16)	26.67 (1.05)	41.28 (1.63)
17	.350 -.500	84751-0042	29.36 (1.16)	26.67 (1.05)	41.28 (1.63)
30	*.450 -.700	84751-3032	44.45 (1.75)	41.28 (1.63)	73.03 (2.88)
30	.700 -.950	84751-3052	44.45 (1.75)	41.28 (1.63)	73.03 (2.88)
30	.950 -1.150	84751-3072	44.45 (1.75)	41.28 (1.63)	73.03 (2.88)
36	*.650 -.900	84751-6022	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)
36	.900 -1.150	84751-6042	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)
36	1.150 -1.350	84751-6062	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)
36	1.350 -1.425	84751-6082	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)

* Sleeve gland variation

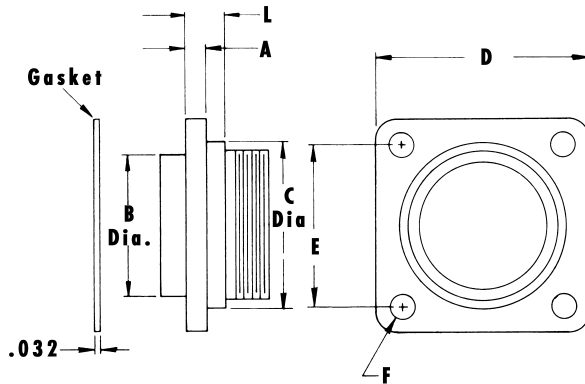


Backshell
Liquid-Tight Conduit

Shell Size	Conduit Trade Size	Backshell Style	Backshell	Dimensions (in.)		
				A	B	L
17	3/8	M	84751-0112	29.36 (1.16)	26.67 (1.05)	34.93 (1.38)
17	1/2	M	84751-0172	29.36 (1.16)	26.67 (1.05)	34.93 (1.38)
30	1/2	M	84751-3112	44.45 (1.75)	41.28 (1.63)	63.50 (2.50)
30	3/4	M	84751-3172	44.45 (1.75)	41.28 (1.63)	63.50 (2.50)
30	1	M	84751-3232	44.45 (1.75)	41.28 (1.63)	63.50 (2.50)
36	3/4	M	84751-6122	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)
36	1	M	84751-6182	50.80 (2.00)	47.63 (1.88)	82.55 (3.25)

Conduit Composition	Description	Dimensions	Conduit Types
Metallic	Plastic Over Metal	M	ALT, AT, CSA, EF, EFL, HC, HEX, LA, LOR, LT, OR, UXTL, UA,ZHN

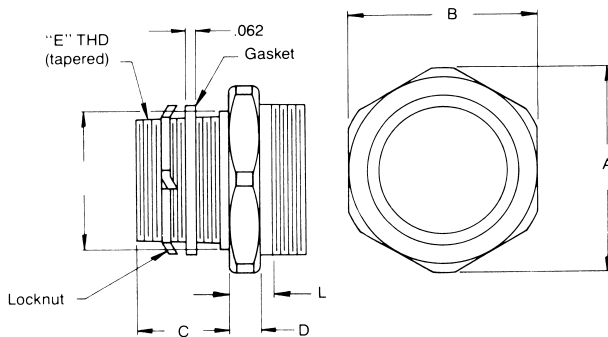
SPECTRE™
Backshell
Square Flange
84752



Shell Size	Order No.	A	B	C	D	E	F	L	Panel Mount Hole Dia.	Panel Mount Screw Size	Mil. Spec Ref.
17	84752-0142	3.175 (.125)	21.590 (.850)	25.400 (1.000)	32.512 (1.280)	24.613 (.969)	3.810 (.150)	7.925 (.312)	26.162 (1.030)	#6	MS 16
30	84752-3142	3.175 (.125)	38.100 (1.500)	41.402 (1.630)	50.800 (2.000)	39.675 (1.562)	4.496 (.177)	7.925 (.312)	45.212 (1.780)	#8	MS 28
36	84752-6142	3.175 (.125)	43.689 (1.720)	46.228 (1.820)	57.150 (2.250)	44.450 (1.750)	5.309 (.209)	7.925 (.312)	51.562 (2.030)	#10	MS 32

Assembly includes pre-packaged backshell, neoprene gasket, and tie wrap.
To mount flange on inside panel place gasket on other side and assemble front shell after flange is mounted.
Maximum panel thickness for this application is .125 inches.

Backshell
Conduit Hub
84751



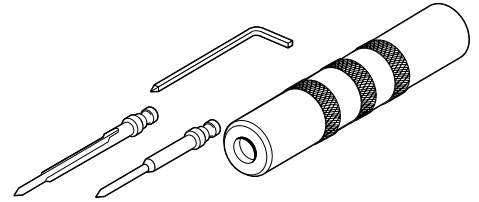
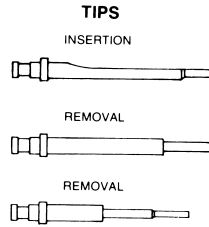
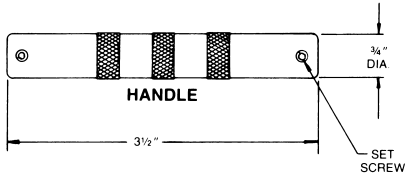
Shell Size	Trade Size	Order No.	A	B	C	D	L	E Thread	Panel Mount Hole Diameter
17	1/2	84751-0502	31.750 (2.250)	28.575 (1.125)	14.122 (.556)	5.385 (.212)	7.925 (.312)	1/2 - 14 NPT	22.225 (.875)
30	3/4	84751-3502	49.606 (1.953)	44.450 (1.750)	15.240 (.600)	6.985 (.275)	9.525 (.375)	3/4 - 14 NPT	27.686 (1.109)
30	1	84751-3512	49.606 (1.953)	44.450 (1.750)	16.510 (.650)	6.985 (.275)	9.525 (.375)	1 - 11-1/2 NPT	34.925 (1.375)
36	1	84751-6502	55.169 (2.172)	50.800 (2.000)	16.510 (.650)	10.058 (.396)	12.598 (.496)	1 - 11-1/2 NPT	34.925 (1.375)
36	1-1/4	84751-6512	55.169 (2.172)	50.800 (2.000)	17.780 (.700)	10.058 (.396)	12.598 (.496)	1-1/4 - 11-1/2 NPT	44.040 (1.734)

Assembly includes pre-packaged backshell, neoprene gasket and locknut
NOTE: Do not use with 84750-4172 or 84750-4252. Improper spacings of power conductors can result.

Insertion and Removal Tools

84749

Insertion kits must be used in assembling the front shells.



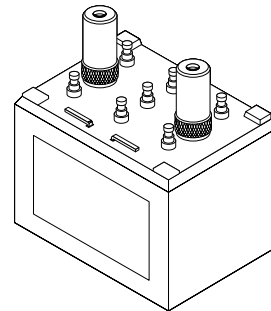
Terminal Size No.	Color Code	Kits		Tips Only			
		Insertion	Removal	Insertion Tips		Removal Tips	
				Piercing	Insertion	Pin	Socket
8	Red	84749-6043	84749-6044	84749-6144	84749-6143	84749-6145	84749-6144
10, 12	Yellow	84749-6014	84749-6008	84749-6117	84749-6114	84749-6112	84749-6108
14, 16	Blue	84749-6003	84749-6001	84749-6115	84749-6103	84749-6102	84749-6101
18, 20	Red	84749-6020	84749-6018	84749-6115	84749-6120	84749-6119	84749-6118

Above kits include 1 handle and 1 each of 2 tips required. Terminal size is the maximum wire size the terminal will accommodate. Removal kits are recommended when large numbers of assemblies are involved and rework is anticipated.

Master Tool Kit

Terminal Size No.	Order No.	Includes
14, 16, 18, 20	84749-6002	2 handles and 7 tips in tool caddy
8, 10, 12	84749-6017	2 handles and 7 tips in tool caddy

These kits include all required insertion and removal tools required to work with terminal sizes shown



Circular Industrial™ Connectors Spirit™ and Spectre™ Tool Selection Guide

The terminals are designed to crimp properly with standard commercially available four star indent crimp tools with full cycle action. The standard indent settings are used for the wire being crimped.

Locators must be used to position terminals at the right depth for proper crimping. The locators accommodate both pins and sockets.

Terminal locators are mounted on the tool in the same manner as MIL Spec locators and include set screws.

Crimp tools may be purchased from Molex

ORDERING INFORMATION

Hand Crimp Tools			Pneumatic Crimp Tools		
Terminal Size No.	Daniels PN: AF8 MIL Spec: M22520/1-01 Color Code: Blue	M309 Modified Red	WA27F M22520/29	WA27-309EP Modified	Locator Order No.
8	—	84749-6027	—	84749-6041	84749-6028
10	—	84749-6027	—	84749-6041	84749-6010
12	84749-6011	84749-6027	84749-6040	84749-6041	84749-6010
14, 16	84749-6011	84749-6027	84749-6040	84749-6041	84749-6022
18, 20	84749-6011	84749-6027	84749-6040	84749-6041	84749-6022

Above tools crimp all wire sizes accommodated by terminals listed

Locators fit all crimp tools listed. Locators are required to properly position terminal.

Pneumatic Crimp Tool Accessories		
Description	Order No.	Daniels PN
Bench Mount	84749-6038	WA27BUV
Foot Switch	84749-6039	WATO

Modular Design For Maximum Flexibility

Circular Industrial Connectors are packaged and sold in modules so that the user may select the exact components to suit his requirements.

To properly select those components, the following questions must be answered:

- (1) What is the wire size to be connected?
- (2) How many wires are there to connect?
- (3) What is the voltage requirement?
- (4) If a cable is involved, what is the cable diameter?
- (5) If a conduit is involved, what type of conduit and trade size?
- (6) For stationary receptacles, what mounting arrangement is required?
- (7) Are any accessories or special application considerations involved?

With the above information it is possible to rapidly specify the Circular Industrial Connector configuration exactly suited to your needs.

There are a few things to keep in mind when specifying and ordering the modular components comprising Circular Industrial Connectors.

- (1) the inserts are capable of accepting different types and sizes of terminals. See the information in the insert selection guide and the terminal selection guide in the specification section.
- (2) A backshell is always required to complete a connector half.

- (3) Angle adapters are available.
- (4) We are system problem solvers! If you do not see the solution to your problem in the catalog, give us a call. We would be delighted to work with you. Our products exist because of your needs.
- (5) Unlike most connector vendors, we deliver PROMPTLY. Delivery is designed into our products and supported by an in-depth inventory stock policy monitored by MRP computer software. We do appreciate knowing your requirements early and will gladly deliver your shipment to your JIT delivery date.

Catalog Number Selection

Having determined the insert and terminal requirements:

The insert selected defines the shell size required and all connector components will begin with the same first two digits.

- (1) Select the catalog number from the proper front shell page that describes the shell and insert type required.
- (2) Select the catalog number from the proper backshell page that describes the size and type required.
- (3) Repeat these steps for the other side of the connector.
- (4) Select dust caps as required.
- (5) From the guide section, select the appropriate terminals.
- (6) Select the necessary insertion and removal tools and the proper crimp tools and locators from the tool selection guide.

FEATURES AND SPECIFICATIONS

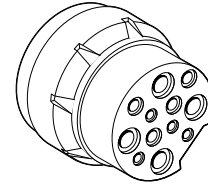


Circular Industrial™ Connectors Spirit™ and Spectre™ Insert Selection Guide

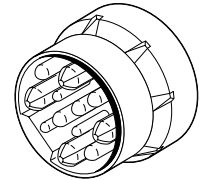
Inserts — Flexibility — Simplicity

The design and material of the inserts offer the user distinctive benefits:

- The UL recognized thermoplastic elastomer combines the low-durometer sealing characteristics of rubber with the long-term aging properties of plastic. The result is a simplified design that is easy to use and understand.
- The multipurpose insert material supports the terminals and provides a seal and will not crack or chip, as frequently occurs with rigid plastic.
- The inserts are reversible between shells, making reverse service an assembly procedure using the same parts.
- Since the inserts may be assembled into the shells in 8 different clocking positions, applications requiring several identifying key distinctions are satisfied with the same parts — assembled differently.
- The inserts are capable of accepting several different terminal sizes and finishes — in the same circuit position! This industry first gives the user the flexibility to exactly meet his requirements — with a few standard parts.
- Each circuit position in the insert has a closed diaphragm that is not broken until preparation for terminal insertion. Thus, circuit positions not required immediately remain sealed and ready for use at a later date. No dummy terminals are required.
- Unlike conventional designs, the pin insert possesses a shroud that surrounds the socket insert when mated. The double shrouding by both the inserts and the shells provides increased sealing and pin terminal protection.
- A make-first-and-break-last condition, insuring a safe ground, is forever present without the use of longer ground pins.

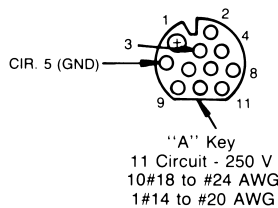
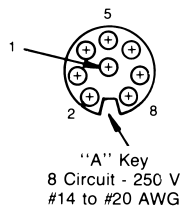
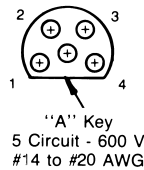


Socket Insert

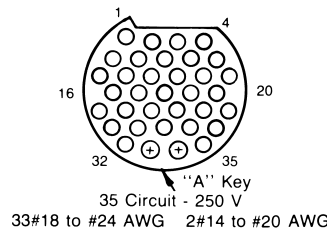
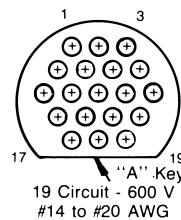
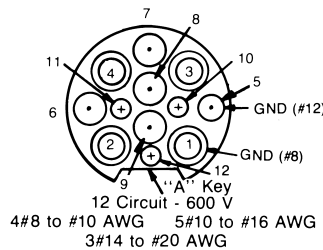


Pin Insert

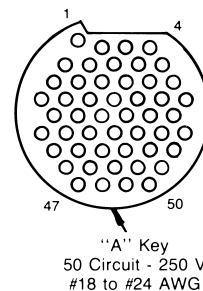
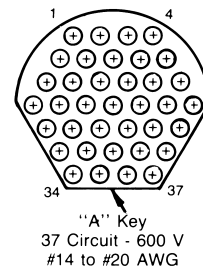
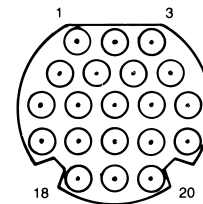
Spirit 17



Spirit 30

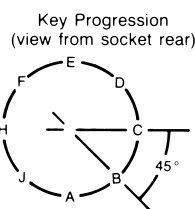


Spirit 36



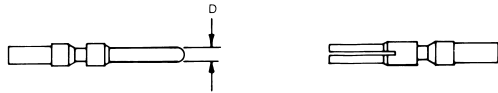
CODE	
○	#18 MAX
+	#14 MAX (fiber optics and coax)
●	#10 MAX
⊙	#8 MAX

Socket front shown



Ulti-Mate Connector Inc.
1872 North Case Street
Orange, Ca 92865
www.umi-c.com
T : 714-637-7099
F : 714-637-7464

Screw Machined Terminals



Spectre front shells do not come with terminals. Users may customize the terminal selection from a variety of sizes, types and finishes to exactly meet their requirements.

To order terminals follow these steps:

- 1) Select the insert that satisfies your requirement above.
- 2) Choose the proper terminal size with the required plating that will accept your wire size and fit the insert you selected.
- 3) Multiply the number of terminals per connector times the number of connectors.
- 4) Order the package sizes and quantities from the terminal chart to meet your requirement plus provide some spares.

If you are going to mix terminal sizes in the same insert, remember that only terminal sizes with the same pin diameter will mate together. Also note very carefully the allowed terminal types and sizes for each of the cores in the insert you selected. A core for a No. 12 terminal, for instance, will not accept a No. 16 terminal. The pages on front shell selection clearly state the allowed terminals for each insert configuration.

Screw machined terminals may be crimped or soldered. Only crimp tools specified should be used. An insertion tool is required for proper assembly of terminals. Refer to hand tool section for crimp and hand tool specification.

Terminal Size No.	Crimp Range AWG	Quantity	Pin Terminal		Socket Terminal		Dimension D Diameter
			Tin	Gold	Tin	Gold	
8	8-10	5	84590-0010	—	84590-0011	—	4.00 (.175)
		10	84590-1010	—	84590-1011	—	
		100	84590-2010	—	84590-2011	—	
		1000	84590-3010	—	84590-3011	—	
10	10-14	5	84590-0014	—	84590-0015	—	3.00 (.118)
		10	84590-1014	—	84590-1015	—	
		100	84590-2014	—	84590-2015	—	
		1000	84590-3014	—	84590-3015	—	
12	12-16	5	84590-0004	—	84590-0005	—	3.00 (.118)
		10	84590-1004	—	84590-1005	—	
		100	84590-2004	—	84590-2005	—	
		1000	84590-3004	—	84590-3005	—	
14	14-18	5	84590-0008	—	84590-0009	—	2.00 (.078)
		10	84590-1008	—	84590-1009	—	
		100	84590-2008	—	84590-2009	—	
		1000	84590-3008	—	84590-3009	—	
16	16-20	5	84590-0006	84590-5006	84590-0007	84590-5007	2.00 (.078)
		10	84590-1006	84590-6006	84590-1007	84590-6007	
		100	84590-2006	84590-7006	84590-2007	84590-7007	
		1000	84590-3006	84590-8006	84590-3007	84590-8007	
18	18-22	5	84590-0016	84590-5016	84590-0017	84590-5017	1.50 (.060)
		10	84590-1016	84590-6016	84590-1017	84590-6017	
		100	84590-2016	84590-7016	84590-2017	84590-7017	
		1000	84590-3016	84590-8016	84590-3017	84590-8017	
20	20-24	5	—	84590-5012	—	84590-5013	1.50 (.060)
		10	—	84590-6012	—	84590-6013	
		100	—	84590-7012	—	84590-7013	
		1000	—	84590-8012	—	84590-8013	

Terminals are screw machined from high-performance Copper alloys. Terminals are lubricated for increased mating life and protection from fret corrosion. Pins and sockets of different sizes with the same D diameter will mate in the same connector.

The ranges shown are estimates compiled from catalogs of over a dozen cable manufacturers taking into account normal tolerance variances. As diameters vary substantially from manufacturer to manufacturer, and from production lot to

production lot, the data should be used for general planning purposes only. Obtain specific range information from your cable source when planning large projects to avoid difficulties.

Cable Diameters Estimated Ranges (in.)							
Wire Size => 12AWG							
Circuits	Description	SO	SDN	SDT	Control	Electronic Cable	
	Outer Jacket Inner Jacket Volts	NEO NEO 600	NEO PE/NYL 600	PVC PVC/NYL 600	PVC PE/PVC 600	PVC PVC 600	PVC PVC 300
2		.565/.625			.350/.410		
3		.590/.655	.340/.400	.340/.400	.400/.460		
4		.640/.710	.390/.450	.390/.450	.440/.500		
5		.700/.770	.425/.485	.425/.485	.530/.600	.520/.590	.430/.490
6		.740/.810	.450/.510	.480/.540	.550/.620	.550/.620	.470/.540
7		.750/.820	.450/.510	.480/.540	.570/.640		
8		.800/.870	.570/.640	.550/.620	.620/.690		
9		.960/1.04	.610/.680	.580/.640	.670/.750		
10		.960/1.04	.610/.680	.620/.690	.690/.770		
11		.990/1.07	.640/.710	.640/.710			
12		.990/1.07	.640/.710	.640/.710	.740/.820	.740/.820	.650/.730
13		1.06/1.14	.670/.740	.680/.750			
14		1.06/1.14	.670/.740	.680/.750	.850/.940		
15		1.10/1.19	.700/.780	.710/.800	.860/.950		
16		1.10/1.19	.700/.780	.710/.800	.870/.960		
17		1.17/1.26	.740/.820		.920/1.02		
18		1.17/1.26	.740/.820		.920/1.02		
19		1.19/1.28	.740/.820	.760/.840	.920/1.02	.900/1.00	.720/.800
20		1.21/1.35	.820/.900	.840/.920	.960/1.06		
21			.850/.930				
22		1.32/1.43					
24		1.37/1.48	.880/.970	.900/1.00	1.05/1.15		
25					1.07/1.17		
26		1.39/1.50					
28		1.42/1.54					
30		1.45/1.60	.950/1.04	.960/1.06	1.15/1.25		
35					1.19/1.30		
36		1.56/1.69					
37		1.56/1.69	1.03/1.15	1.05/1.17	1.23/1.34		

Cable Diameters Estimated Ranges (in.)							
Wire Size => 16AWG							
Circuits	Description	SO	SDN	SDT	Control	Electronic Cable	
	Outer Jacket Inner Jacket Volts	NEO NEO 600	NEO PE/NYL 600	PVC PVC/NYL 600	PVC PE/PVC 600	PVC PVC 600	PVC PVC 300
2		.365/.410	.280/.330	.280/.330	.290/.340		.220/.290
3		.385/.430	.290/.340	.290/.340	.310/.360		.240/.300
4		.410/.460	.320/.370	.320/.370	.340/.390	.350/.410	.290/.350
5		.490/.550	.330/.390	.340/.400	.380/.430	.380/.440	.320/.380
6		.510/.570	.360/.430	.380/.440	.390/.450		.330/.390
7		.530/.590		.380/.440	.410/.470	.430/.510	.370/.430
8		.570/.640	.420/.490	.410/.470	.450/.520		.400/.470
9		.650/.710	.450/.530	.430/.500	.500/.570	.550/.630	.410/.490
10		.670/.740	.450/.530	.450/.540	.550/.630	.570/.660	.430/.520
11		.700/.770	.460/.540	.460/.550	.570/.650		
12		.700/.770	.460/.540	.480/.570	.570/.660	.580/.670	.510/.590
13		.755/.825	.530/.620	.530/.620			
14		.755/.825	.530/.620	.530/.620	.600/.690		
15			.550/.640	.550/.640	.610/.700	.660/.750	.500/.580
16		.780/.870	.550/.640	.550/.640	.630/.720		
17							
18		.780/.870	.570/.660	.570/.660	.650/.740		
19		.850/.940	.580/.670	.580/.670	.660/.750	.700/.790	.570/.660
20		.850/.940		.600/.690	.670/.760		.590/.680
21			.650/.720				
22		.840/.940					
24		.940/1.04	.680/.760	.650/.740	.750/.840		
25		.940/1.04	.690/.770	.660/.750	.760/.850		.670/.760
26		.940/1.04	.690/.770		.810/.900		
27		.950/1.05	.700/.780		.830/.920	.820/.910	
28		1.00/1.12	.700/.800		.840/.930		
30		1.00/1.12	.720/.820		.860/.950		.710/.800
32		1.02/1.15	.720/.820		.890/.980		
34		1.05/1.18	.740/.840				
36		1.05/1.18	.740/.840		.900/1.00	.900/1.20	
37		1.05/1.18	.760/.860		.900/1.00	.900/1.20	

Cable Diameters Estimated Ranges (in.)							
Wire Size => 14AWG							
Circuits	Description	SO	SDN	SDT	Control	Electronic Cable	
	Outer Jacket Inner Jacket Volts	NEO NEO 600	NEO PE/NYL 600	PVC PVC/NYL 600	PVC PE/PVC 600	PVC PVC 600	PVC PVC 300
2		.495/.550	.290/.340	.290/.340	.330/.390		
3		.520/.580	.310/.360	.310/.360	.360/.420		
4		.560/.620	.340/.390	.340/.390	.390/.450	.400/.490	
5		.630/.705	.380/.440	.370/.430	.430/.500	.470/.560	
6		.670/.740	.400/.460	.410/.470	.450/.520		
7		.690/.760	.400/.460	.410/.470	.470/.540	.510/.600	
8		.740/.810	.460/.520	.450/.510	.570/.630		
9		.810/.890	.510/.570	.490/.550	.610/.690	.620/.710	
10		.850/.930	.530/.590	.550/.610	.630/.710		
11		.870/.950	.560/.620	.570/.630			
12		.870/.950	.560/.620	.560/.630	.680/.750	.640/.730	
14		.950/1.03	.580/.650	.590/.660	.710/.780		
15		.980/1.06	.610/.680	.610/.680	.730/.800	.700/.800	
16		.990/1.07	.610/.690	.620/.690	.750/.820		
18		1.05/1.14	.640/.720	.670/.740	.790/.860		
19		1.06/1.15	.640/.720	.670/.740	.810/.890	.780/.880	
20		1.08/1.17	.680/.760	.690/.770	.840/.920	.830/.910	
21			.730/.810				
22		1.15/1.25					
24		1.23/1.33		.780/.850	.960/1.05		
25					.960/1.05		
26		1.25/1.36					
27							.920/1.02
30		1.32/1.42	.830/.910	.860/.950	1.03/1.13		
35					1.03/1.13		
36		1.44/1.54					
37		1.44/1.54	.900/.990	.920/1.02	1.04/1.17		

Cable Diameters Estimated Ranges (in.)							
Wire Size => 18AWG							
Circuits	Description	SO	SDN	SDT	Electronic Cable		
	Outer Jacket Inner Jacket Volts	NEO NEO 600	NEO PVC/NYL 600	PVC PVC/NYL 600	PVC PVC 600	PVC PVC 300	PVC PVC 300
2		.340/.385	.250/.300	.260/.310			.180/.240
3		.360/.400	.265/.315	.275/.325			.190/.250
4		.385/.430	.280/.340	.300/.350			.220/.280
5		.460/.510	.320/.370	.320/.380			.240/.310
6		.490/.550	.360/.400	.350/.420			.270/.340
7		.510/.590	.360/.400	.350/.420	.400/.480		.270/.340
8		.550/.630	.400/.470	.400/.480			.290/.360
9		.570/.650	.420/.490	.400/.490			.310/.380
10		.600/.670	.420/.490	.430/.500			.340/.410
11			.440/.510	.450/.520			.360/.430
12		.640/.710	.440/.510	.450/.520	.500/.580		.360/.430
13			.470/.540				
14		.680/.750	.470/.540				
15			.500/.570	.500/.570			.410/.470
16		.710/.790	.500/.570				
17			.560/.630				
18		.740/.820	.560/.630				
19		.770/.850	.560/.630	.560/.630	.610/.690	.430/.500	
20		.790/.860				.440/.510	
21			.610/.690				
22		.830/.910					
24		.870/.950	.640/.720				
26		.870/.960					
27		.880/.970				.710/.790	
28		.930/1.05					
30		.930/1.05	.660/.740				.570/.640
32		.960/1.08					
34		1.00/1.12					
36		1.00/1.12					
37		1.00/1.12	.720/.800			.820/.910	

Note: See following page for explanation of abbreviations used

The following abbreviations are used

NEO - Neoprene Rubber
 PE/NYL - Polyethelene with Nylon Overlay
 PVC - Polyvinyl Chloride
 PE/PVC - Polyethelene/Polyvinyl Chloride Composite
 PVC/NYL -Polyvinyl Chloride with Nylon Overlay

Wire Size => 10AWG					
Circuits	Description	SO	SDN	SDT	Control
	Outer Jacket Inner Jacket Volts	NEO NEO 600	NEO PE/NYL 600	PVC PVC/NYL 600	PVC PE/PVC 600
2		.610/.670	.410/.470	.410/.470	.460/.520
3		.650/.720	.430/.490	.430/.490	.540/.600
4		.700/.770	.480/.540	.480/.540	.600/.660
5		.780/.840	.560/.620	.560/.620	.670/.730
6		.820/.900	.610/.670	.610/.670	.720/.780
7		.900/1.000	.610/.670	.610/.670	.720/.780
8		.920/1.060	.670/.730	.670/.730	.780/.840
9		1.060/1.160	.750/.810	.750/.810	.890/.950
10		1.080/1.180	.760/.820	.760/.820	.950/1.050
11					.950/1.050
12		1.120/1.200	.800/.860	.800/.860	.980/1.080
13					1.020/1.120
14		1.190/1.270	.890/.950	.890/.950	1.120/1.120
15				.890/.990	1.100/1.200
16		1.260/1.360	.950/1.050	.950/1.060	1.100/1.200
17					1.150/1.250
18					1.150/1.250
19				.980/1.050	1.150/1.250
20		1.390/1.500			

Conduit wire capacity

Trade Size	ID (in.)	Conduit Area (sq. in.)	40% Wire Area (sq. in.)	50% Wire Area (sq. in.)
3/8	.49	.19	.075	.094
1/2	.622	.30	.120	.150
3/4	.824	.53	.210	.260
1	1.049	.86	.340	.430

Reference Information

Number of wires allowed in conduit size

Wire Size	Insulation Thickness	NOM O.D.	40% Fill (NEC)				50% Fill (NFPA 79)			
			3/8	1/2	3/4	1	3/8	1/2	3/4	1
#20	.009	.057	29	47	82	133	37	59	103	166
	.016 (1/64)	.071	19	30	53	86	23	38	66	107
	.032 (2/64)	.100	9	15	26	43	12	19	33	54
#18	.009	.072	18	29	51	83	23	37	64	104
	.016 (1/64)	.081	14	23	40	66	18	29	51	82
	.032 (2/64)	.112	7	12	21	34	9	15	26	43
#16	.009	.084	13	21	38	61	17	27	47	76
	.016 (1/64)	.092	11	18	31	51	14	22	39	64
	.032 (2/64)	.126	6	9	17	27	7	12	21	34
#14	.016 (1/64)	.106	8	13	24	38	10	17	30	48
	.032 (2/64)	.138	5	8	14	22	6	10	17	28
	.048 (3/64)	.174	3	5	9	14	4	6	11	18
#12	.016 (1/64)	.135	5	8	14	23	6	10	18	29
	.032 (2/64)	.158	4	6	10	17	5	7	13	21
	.048 (3/64)	.190	2	4	7	12	3	5	9	15
#10	.016 (1/64)	.154	4	6	11	18	5	8	14	23
	.032 (2/64)	.184	3	4	8	12	3	5	10	16
	.048 (3/64)	.214	2	3	6	9	2	4	7	11

Industrial Interfaces has developed the MIL-C series of cylindrical backshells to meet the rugged applications of the industrial environment. The backshells are intended for use on several different types of MIL Spec connectors as well as popular commercial cylindrical connectors manufactured by Amphenol, AMP, Cannon and others.

In the industrial environment, the conventional backshells have presented performance problems when applied to cable in the areas of seal and strain relief. The Industrial Interfaces' MIL-C backshell series offer an affordable upgrade to improve the biggest single failure mode. In addition, backshells which interface directly to liquid-tight conduits with no additional parts or fittings, are available.

Best of all, MIL-C backshells are designed for delivery. Days rather than months separate you from the exact parts you need.

Features and Benefits

- Stock availability: Modular design allows all ranges, all sizes, to always be in stock
- Competitive prices: Modular design permits larger production runs with lower costs.
- Improved levels of performance: Positive seals, greater strain relief, larger cable ranges
- Two corrosion protection levels available in 200 or 500 hour salt spray rating finishes
- One stop shopping: Everything required for installation is included. Additional fittings or adapters are not required.

Mechanical

Overall part dimensions are given on the included drawing

Materials:

Back shell and compression nut: Brass alloy with corrosion protective finish

Seals: Polychloroprene (cable) or Polypropylene (liquid-tight conduit)

The liquid tight back shell assembly will survive a 100 lb pull test

Each cable back shell, when assembled with the smallest diameter cable in the specified range, will be capable of surviving a dead weight pull of 35 lb for 1 minute.

Each cable back shell, when assembled with midpoint of the range cable, will be capable of a dead weight pull of 50 lb for 1 minute.

Environmental

The back shell, when assembled with the proper cable or liquid-tight conduit and military connector, will meet the rain test requirement defined in UL STD 514. Temperature rating: -40°C to +90°C.

Salt Spray: Two variations are available:

- (1) 200 hour salt spray per Mil STD 202 Method 101 (nickel plated)
- (2) 500 hour salt spray per Mil STD 1344 Method 1001 (olive drab cadmium over electroless nickel)

SPECIFICATIONS



Circular Industrial™ Connectors MIL-C Specifications

Mechanical

Back shell and compression nut material: Brass Alloy with corrosion protective finish

Seals: Polychloroprene (cable) or Polypropylene (liquid tight conduit)

Cable Securement

Each cable back shell when assembled with the smallest diameter cable in the specified range will be capable of surviving a dead weight pull of 35 lb for 1 minute. Each cable back shell when assembled with midpoint of the range cable will be capable of a dead weight pull of 50 lb for 1 minute.

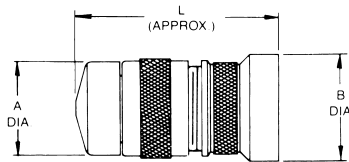
Liquid-Tight Conduit Securement

The metallic assembly will survive a 100-lb pull test.

Environmental

Temperature Rating: -40 to +90 °C

Rain Tight: The back shell when assembled with the proper cable or liquid-tight conduit and military connector will meet the rain test requirement defined in UL STD 514



Thread Size	Order No.	Cable Range (in.)	Order No.	Cable Range (in.)	Order No.	Cable Range (in.)	Dimension Approx.
5/8- 24 UNEF	84770-0014	.225-.350					2.000
11/16- 24 UNEF	84770-0024	.225-.350					2.000
3/4- 20 UNEF	84770-0034	.225-.350					2.000
13/16- 20 UNEF	84770-0044	.225-.350					2.000
7/8- 20 UNEF	84770-0054	.225-.350					2.250
15/16- 20 UNEF	84770-0064	.225-.350					2.000
1- 20 UNEF	84770-0074	.300-.500	84770-0084	.500-.650			2.375
1-1/16- 18 UNEF	84770-0094	.300-.500	84770-0104	.500-.650			2.375
1-1/8- 18 UNEF	84770-0114	.300-.500	84770-0124	.500-.650			2.375
1-3/16- 18 UNEF	84770-0134	.300-.500	84770-0144	.500-.650			2.375
1-1/4- 18 UNEF	84770-0154	.300-.500	84770-0164	.500-.650			2.375
1-5/16- 18 UNEF	84770-0174	.300-.500	84770-0184	.500-.750	84770-0194	.700-.950	2.375
1-3/8- 18 UNEF	84770-0204	.300-.500	84770-0214	.500-.750	84770-0224	.700-.950	2.375
1-7/16- 18 UNEF	84770-0254	.300-.500	84770-0234	.500-.750	84770-0244	.700-.950	2.375
1-1/2- 18 UNEF	84770-0284	.300-.500	84770-0264	.500-.750	84770-0274	.700-.950	2.375
1-5/8- 18 UNEF	84770-0314	.300-.500	84770-0294	.500-.750	84770-0304	.700-.950	3.000
1-3/4- 18 UNS	84770-0334	.300-.500	84770-0324	.500-.750	84770-0344	.700-.950	3.125

Several other ranges and sizes can be made on special order, contact factory with your specific requirement

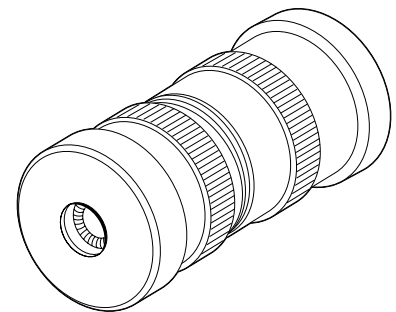
Last Digit	Description	Salt Spray Rating (Hours)
0	Raw Brass	
2	Olive Drab Cadmium over Nickel	500
3	Electroless Nickel	500
4	Nickel	200
6	Olive Drab over Zinc	48

The order numbers above indicate a Nickel plating system rated at 200 hour salt spray. Other finishes are available, contact factory.

Cable Back Shell

84770

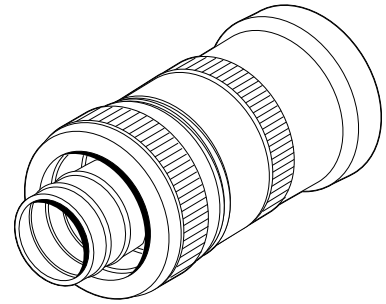
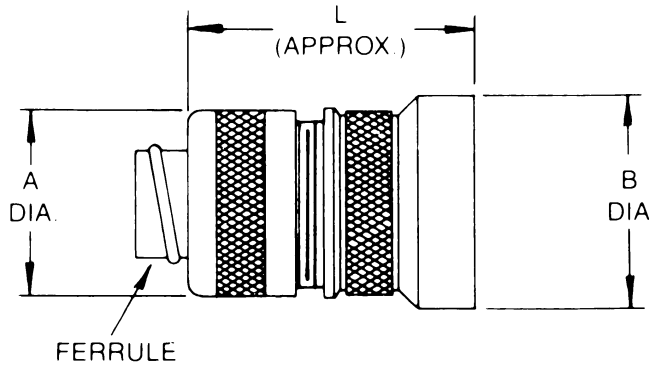
MIL-C cable back shells achieve extraordinary sealing and strain relief through the independent action of expandable elastomer and spring pressure loading. The stainless steel strain relief spring closes around the cable as the compression nut is threaded downward. High but controlled pressure is applied to the cable yielding superior holding power without damage to the cable.



Circular Industrial™ Connectors MIL-C Liquid-Tight Conduit Back Shells

84770

MIL-C liquid-tight conduit back shells will accept direct attachment of various types of metallic liquid-tight conduit. Please contact factory for specific conduit type.



Thread Size	Order No.	Size	Order No.	Size	Order No.	Size	Dimension L Approx.
1 20 UNEF	84770-2014	3/8 LT	84770-2294	1/2 LT			1.875
1-1/16 18 UNEF	84770-2024	3/8 LT	84770-2034	1/2 LT			1.875
1-1/8 18 UNEF	84770-2044	3/8 LT	84770-2054	1/2 LT			1.875
1-3/16 18 UNEF	84770-2064	3/8 LT	84770-2074	1/2 LT			1.875
1-1/4 18 UNEF	84770-2094	3/8 LT	84770-2084	1/2 LT	84770-2104		1.875
1-5/16 18 UNEF	84770-2134	3/8 LT	84770-2114	1/2 LT	84770-2124	3/4 LT	1.875
1-3/8 18 UNEF	84770-2164	3/8 LT	84770-2144	1/2 LT	84770-2154	3/4 LT	1.875
1-7/16 18 UNEF	84770-2194	3/8 LT	84770-2174	1/2 LT	84770-2184	3/4 LT	1.875
1-1/2 18 UNEF	84770-2224	3/8 LT	84770-2204	1/2 LT	84770-2214	3/4 LT	1.875
1-5/8 18 UNEF	84770-2254	3/8 LT	84770-2234	1/2 LT	84770-2244	3/4 LT	2.500
1-3/4 18 UNS	84770-2284	3/8 LT	84770-2264	1/2 LT	84770-2274	3/4 LT	2.625

Liquid-tight conduit back shells are also available for other types of nonmetallic conduit, contact factory with your application

Last Digit	Description	Salt Spray Rating (Hours)
0	Raw Brass	
2	Olive Drab Cadmium over Nickel	500
3	Electroless Nickel	500
4	Nickel	200
6	Olive Drab over Zinc	48

The order numbers above indicate a Nickel plating system rated at a 200 hour salt spray

Thread Size	5015-C	5015-SE	5015-A-A	5015-A-E	5015-B	5015-C-A	5015-C-E	26482-1A	26482-1B	26482-2	38999-1	38999-2	83723-1	83723-2
5/8- 24 UNEF	10, 10S, 10SL	10SL, 12, 12S	10SL	10SL	10SL, 12, 12S		12, 12S		8	10, 10S, 10SL			10, 10S, 10SL	12, 12S
11/16- 24 UNEF			12, 12S	12, 12S		12, 12S		12			13	12		
3/4- 20 UNEF	12, 12S	14, 14S	14, 14S	14, 14S	14, 14S	14, 14S	14, 14S		10	12, 12S			12, 12S	14, 14S
13/16- 20 UNEF								14			15	14		
7/8- 20 UNEF	14, 14S	16, 16S	16, 16S	16, 16S	16, 16S	16, 16S	16, 16S		12	14, 14S				16, 16S
15/16- 20 UNEF								16			17	16		
1- 20 UNEF	16, 16S	18	18	18	18	18	18		14	16, 16S			16, 16S	18
1-1/16- 18 UNEF	18							18		18	19	18	18	
1-1/8- 18 UNEF			20		20	20	20		16					20
1-3/16- 18 UNEF	20	20, 22						20		20	21	20	20	
1-1/4- 18 UNEF			22	22	22	22	22		18					22
1-5/16- 18 UNEF	22							22		22	23	22	22	
1-3/8- 18 UNEF			24	24	24	24	24		20					24
1-7/16- 18 UNEF	24	24, 28						24		24	25	24	24	
1-1/2- 18 UNEF									22					
1-5/8- 18 UNEF			28	28	28	28	28		24					28
1-3/4- 18 UNS	28	32											28	

All reference shell designations are for preliminary reference only. To insure thread conformance, always measure thread of front shell whenever possible. The many variation differences between manufacturers and the multitude of backshell adapters or endbells involved, especially on 5015 commercial types, may not always be reflected in these summary charts. Consult factory if you are in doubt as to the proper backshell to use.

Thread Size	5015-C	5015-SE	5015-A-A	5015-A-E	5015-B	5015-C-A	5015-C-E	26482-1A	26482-1B	26482-2	38999-1	38999-2	83723-1	83723-2
1- 20 UNEF	16, 16S	18	18	18	18	18	18		14	16, 16S			16, 16S	18
1-1/16- 18 UNEF	18							18		18	19	18	18	
1-1/8- 18 UNEF			20		20	20	20		16					20
1-3/16- 18 UNEF	20	20, 22						20		20	21	20	20	
1-1/4- 18 UNEF			22	22	22	22	22		18					22
1-5/16- 18 UNEF	22							22		22	23	22	22	
1-3/8- 18 UNEF			24	24	24	24	24		20					24
1-7/16- 18 UNEF	24	24, 28						24		24	25	24	24	
1-1/2- 18 UNEF									22					
1-5/8- 18 UNEF			28	28	28	28	28		24					28
1-3/4- 18 UNS	28	32											28	

Last Digit	Description	Salt Spray Rating (Hours)
0	Raw Brass	
2	Olive Drab Cadmium over Nickel	500
3	Electroless Nickel	500
4	Nickel	200
6	Olive Drab over Zinc	48

The order numbers above indicate a Nickel plating system rated at a 200 hour salt spray

Note: See selection chart definition on following page.

MIL-C Spec	Series	Mfgr.	Description	Class	Shell Designations				
					Industrial Interfaces	Glenair	Breeze	ESC	Sunbank
Commercial	CPC-Metal	AMP	Plug		CPC-P				
Commercial	CPC-Metal	AMP	Recp		CPC-R				
5015	MS34**	ALL	Crimp Per MIL Spec	D, K, L, U, W	5015-C	A		AF	C
5015	MS31**	ALL	Solder Per MIL Spec	A, E, R	5015-SE	B-A		AD	A
5015 Commer.	97	AMPHENOL	Solder, Non Envir. W/O Endbell	A, B	5015-A-A	B-H	A	AA	A
5015 Commer.	97	AMPHENOL	Solder, Non Envir. W/ Endbell	A, B	5015-SE	B-A		AD	A
5015 Commer.	69	AMPHENOL	CMP/Solder, Envir. W/O Endbell	E, F, R	5015-A-E	B-J	B	AA	A
5015 Commer.	69	AMPHENOL	CMP/Solder, Envir. W/ Endbell	E, F, R	5015-SE	B-A		AD	A
5015 Commer.	10-72*	BENDIX	Solder, W/O Endbell	A, E, F, R	5015-B	B-L	C	AB	A
5015 Commer.	10-72*, CS31**	BENDIX	Solder, W/ Endbell	A, B, E, F, R	5015-SE	B-A		AD	A
5015 Commer.	MS31*	CANNON	CMP/Solder, Non Envir. W/O Endbell	A	5015-C-A	B-M	D	AC	A
5015 Commer.	MS31*	CANNON	CMP/Solder, Non Envir. W/ Endbell	A	5015-SE	B-A		AD	A
5015 Commer.	CA31*	CANNON	CMP/Solder, Envir. W/O Endbell	E, F, R	5015-C-E	B-N	E	AC	A
5015 Commer.	CA31*	CANNON	CMP/Solder, Envir. W/ Endbell	E, F, R	5015-SE	B-A		AD	A
26482	1	ALL	Except MS3114, MS3124 Only MS3114, MS3124	E, F, P	26482-1A	D	H	BA/BN	K
26482	1	ALL		E, F, P	26482-1B	D		BB	M
26482	2	ALL		A, L	26482-2	A		AF	C
38999	I	ALL		E, P, T	38999-1	F	N	BF	F
38999	II	ALL		E, P, T	38999-2	F	N	BF	F
81703	3	ALL		E, L	5015-C	A		AF	C
83723	I & III	ALL	B,T	A, G, K, R, S	83723-1	A	R	AF	C
83723	II	ALL		A, G, R	83723-2	K		AP	P