



So, You Want to Know Connectors...



REFERENCE GUIDE to Cylindrical Connectors

Learn the Amphenol Connector Language



www.amphenol-industrial.com

This booklet is intended to be used as a ready reference to typical standard, miniature and subminiature cylindrical connector part numbers and terminology. Reading its brief pages will not make you a connector expert, but should guide you in becoming familiar with the product, in order to better serve our customers.

Manufacturing connectors since 1932, we take pride that Amphenol Industrial Operations is the undisputed leader in interconnect systems for harsh environment applications. Such applications require a high degree of engineering sophistication and precision manufacturing capability. Innovations like our RADSOK® contact technology can provide roughly 50% more current through the same size pin. Connectors utilizing this RADSOK® technology will outperform similar products in the market hands down.

Amphenol Industrial Operations (AIO), a division of the Amphenol Corporation, is the leading manufacturer of cylindrical connectors in the world. Amphenol Industrial's product lines consist of rectangular, standard miniature, fiber optic, EMI/EMP filter, and a variety of special application connectors.

Headquartered in Sidney, NY, AIO's facility is nestled at the foothills of the Catskill Mountains, and over 307,000 ft². This complex houses over 1,000 employees, incorporating state-of-the-art manufacturing technologies. The facility is both ISO9001 certified and qualified to MIL-STD-790 requirements. Other satellite manufacturing/assembly facilities are located in Nogales, Mexico (25,000 ft²) and Zhuhai, China with (276,000 ft²).

Our manufacturing capabilities include state-of-the-art CNC machining, die-casting, molding, impact and extruding, plating, screw machining and process controls.

AIO also has a fully equipped material evaluation lab and an engineering support organization utilizing the latest in computer aided design software and analysis tools.

Amphenol Industrial Operations is supported by several satellite plants and one of the largest distributor networks in the world.

For more information and for Amphenol catalogs online go to: www.amphenol-industrial.com.

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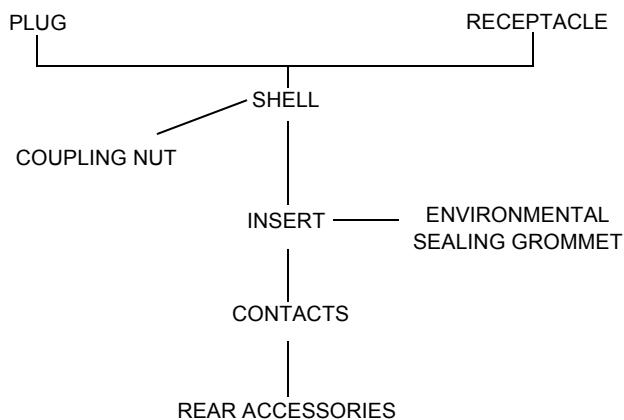
NOTE: SAE AS50151 supersedes MIL-DTL-5015
MIL-DTL-26482 supersedes MIL-C-26482

SECTION I

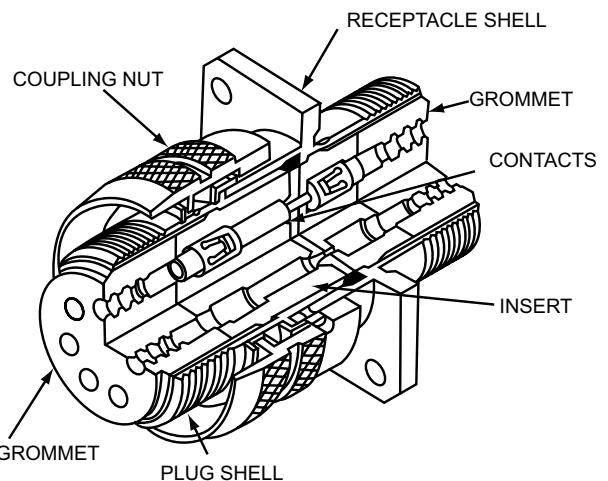
Nomenclature: Cylindrical Connectors

Basic Components

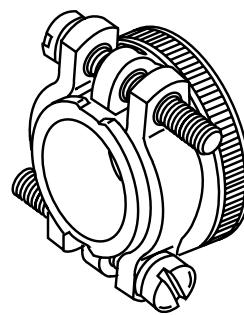
1. Shell (Houses Inserts & Contacts)
2. Insert (Dielectric Contact Insulator) Pin or Socket
3. Contact (Wire End Termination) (Electrical Engagement)
4. Coupling Nut
5. Accessories (Wire Seals, Cable Seals, Wire Support, etc.)



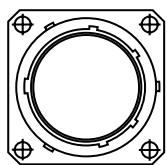
Mated Pair



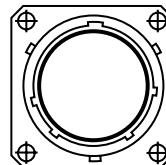
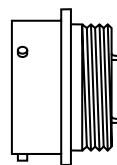
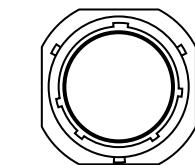
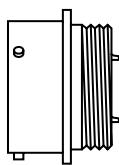
Rear Accessory



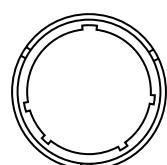
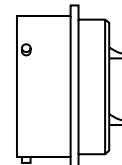
Shell Styles



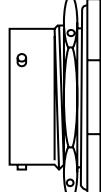
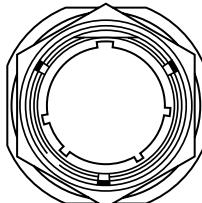
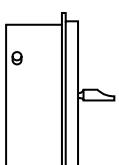
WALL MOUNT RECEPTACLE
DESIGNATION: 00



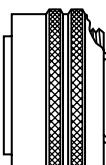
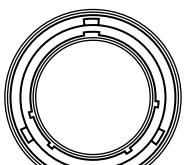
BOX MOUNT RECEPTACLE
DESIGNATION: 02



SOLDER MOUNT RECEPTACLE
(HERMETIC)
DESIGNATION: IH



JAM NUT RECEPTACLE
DESIGNATION: 07



STRAIGHT PLUG
DESIGNATION: 06

* This connector style is sometimes referred to as a cable connecting "plug." It does, however, mate with either a straight or 90 degree plug.

Nomenclature: Cylindrical Connectors and Contacts

Shell Styles (Cont'd.)

Coupling

Threaded, Bayonet

Shell Sizes (Typical SAE AS5015 type)

8S, 10S, 10SL, 12S, 12,
14S, 14, 16S, 16, 18
20, 22, 24, 28, 32, 36, 40, 44, 48

"S" designates short shell and short contacts

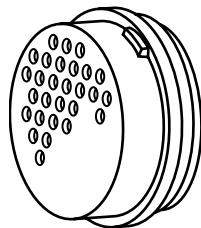
Shell size denotes mating thread diameter in 16ths of an inch. For example, a size 8 shell denotes 8/16 of an inch with a .5000-28 UNEF thread.

Style Designation (PT)

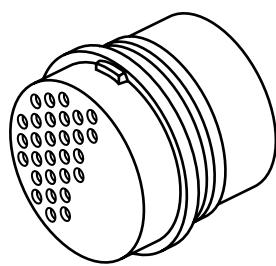
PLUG	SHELL STYLES
06	Straight
08	Angle
09	Flange Mount Receptacle
05	Straight, Less Rear Accessory
RECEPTACLE	SHELL STYLES
00	Wall Mount
01	Cable Connecting or Line Mount Receptacle
02	Box Mount
03	Wall Mount, Less Rear Accessory
04	Line Mount, Less Rear Accessory
07	Jam Nut
IH	Solder Mount Hermetic

Inserts

Insert (Pin or Socket)



Insert & Grommet Assy.



- Solder
- Crimp
- Metal Clip Retention
- Dielectric Retention

May include a soft front interfacial seal (Bonded) if dielectric is hard, and a rear sealing grommet separate or attached.

Contact and Contact Termination Style

Pin – Crimp*



Socket – Crimp*



Pin – Solder

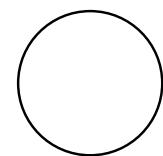
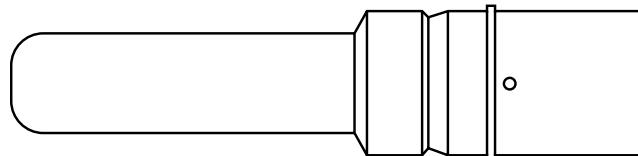


Socket – Solder



*Crimp is removable

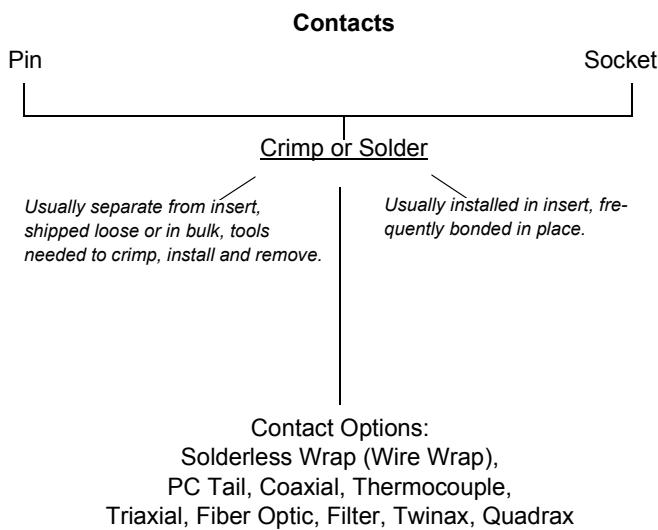
Sizes by Wire Gauge, Examples:



4/0 American
Wire Gauge 4/0

— 22D American Wire Gauge 22-28

Nomenclature: Cylindrical Connectors and Contacts, cont.



Contact Size	22D	22M	22	20	16
American Wire Gauge Wire Size (AWG)	22-28	24-28	22-26	20-24	16-20

Contact Size	12	8	4	0
American Wire Gauge Wire Size (AWG)	12-14	8-10	4-6	0-2

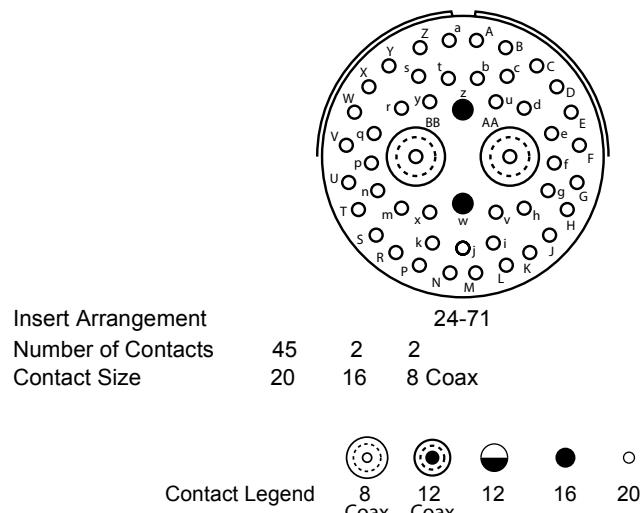
Accessories

- Adapters
 - straight, 90°, 75°
 - conduit, environmental, open wire bundle, EMI, etc.
- Compression ring – wire seal
- Clamp – cable sealing
- Stain relief – clamp, kellem's grip
- Potting boot
 - straight, angle, universal

Contact Versatility - Several types of Contacts can be designed into a Connector Shell

26482 Series I connectors allow users to mix a variety of different power, signal, and high speed contact styles within a common insert.

The insert arrangement below is an arrangement for 26482 Series I connectors. It shows the variety of contacts that can be designed into a shell size 24. Typically, customers specify the contacts sizes and power they require and chose an existing arrangement that fits their needs. For special new configurations, engineering will design the arrangement of contacts to fit within material and performance criteria.



Contacts and Fiber Optic Termini for Cylindrical Connectors

Amphenol's broad contact product range for Cylindrical Connectors includes:

- Standard 500 cycle and 1500 cycle, AS39029 type power and signal contacts
- Crimp contacts for front or rear release connector applications
- Solder type, fixed contacts with cup or eyelet termination
- Thermocouple contacts
- RADSO^K® sockets for high amperage power contacts
- Spring-loaded and push-pull types
- High frequency shielded coax, triax and twinax contacts
- High speed differential twinax and quadrax contacts
- For cylindrical connector attachment to Printed Circuit Boards:
 - PC tail contacts for signal and power applications, in coax, twinax, triax, differential twinax and quadrax designs
 - Compliant pin (Press fit) contacts

SECTION II

Major MIL-Specifications by Type

- Standard, SAE AS50151
- Amphenol AC Threaded Series
- Amphenol 97 Series
- Proprietary Commercial Variations

- Older larger series of connectors
- Found on many pieces of military equipment and commercial applications
- Mostly heavy current carrying connectors
- Early types had only solder type contacts
- Later revision to MIL Spec also added crimp type contacts
- Amphenol supplies both the solder and crimp types to the MIL Spec
- Amphenol supplies both solder and crimp versions under proprietary commercial part numbers
- See Amphenol catalogs:
 - AC and SAE AS50151 IC-5
 - 97 Series 12-022
 - ACA-B and GT Series IC-4
- Basic part number for SAE AS50151 Series as supplied by Amphenol is MS310X F or R†
- SAE AS50151 threaded coupling - 1 key/keyway shell polarization

SAE AS50151 Shell Styles

3100	Wall Mount Receptacle
3101	Cable Connecting Receptacle*
3102	Box Mount Receptacle
3106	Straight Plug
3108	90° Plug
3107	Quick Disconnect Plug (97 Series only)

Contact Sizes

Contact Size	16	12	8	4	0
American Wire Gauge Wire Size (AWG)**	16-20	12-14	8-10	4-6	0-2

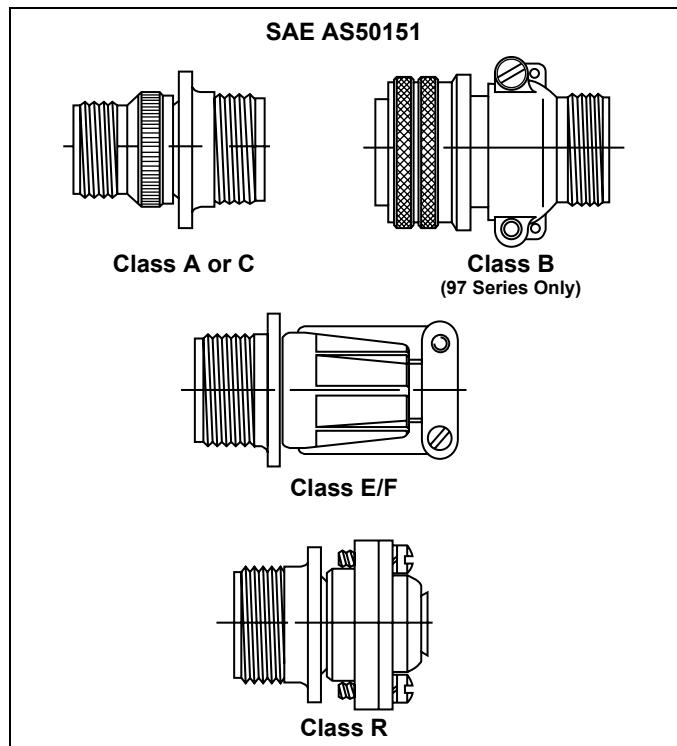
* This connector style is sometimes referred to as a cable connecting "plug." It does, however, mate with either a straight or 90 degree plug.

** Crimp adapter for small gauge wire is available, part number 10-074696-XXX.

† For military specific applications all class of the SAE AS50151 Series I are either canceled or inactive for new design. For the status of specific classes see applicable MS sheets.

SAE AS50151 Part Number

Shell Style	Insert Arrangement	Alternate Rotation
MS*	3102	R
Military Standard	Class	Shell Size
*or 97 Series Proprietary		Contact Type



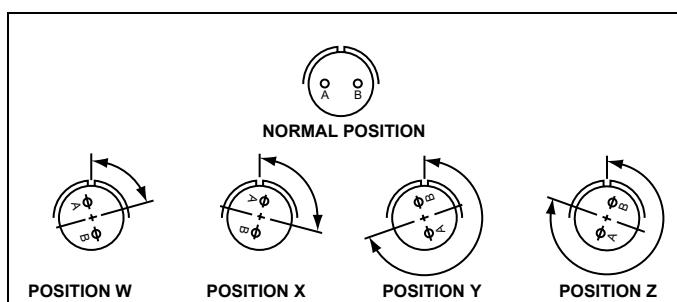
Mating Halves

- Plugs: MS3106, MS3108 or AC_05, AC_06, AC_08 or 97-3106, 97-3107, 97-3108
- Receptacles: MS3100, MS3102, MS3101 or AC_00, AC_01, AC_02 or 97-3101, 97-3100, 97-3102

Other Non-MIL-Mates, Flange Mounted

- Flange Mounted Plug: FP3106, 97-5105
- Thru-bulkhead Receptacle: TBF

Alternate Positions of Insert Arrangements



AC Series how to order

To more easily illustrate ordering procedure, part number ACCL06AF18-1SX(025) is shown as follows:

AC	C	L	06	AF	18-1	S	X	(025)
1	2	3	4	5	6	7	8	9

1. AC designates Amphenol Industrial Series Threaded Connectors
2. C designates Crimp Contacts
S designates Solder Contacts
3. L designates low smoke zero halogen inserts and grommets
Omit for standard resilient inserts and grommets.
4. Shell Style
00 - Wall Mounting Receptacle
01 - Line Receptacle
02 - Box Mounting Receptacle
05 - Straight Plug
06 - Straight Plug with hardware
08 - 90 degree Plug
5. Class
A or AF - General duty connector
E or F - Environmental connector for a wire bundle
PGA or
PGR - Environmental connector for jacketed cable
6. Shell size and insert arrangement
See insert availability in catalog IC-5 on pages 25-27
7. Contact type
P - Pin contacts
S - Socket contacts
R - RADSO^K crimp socket contacts (see catalog IC-5 page 31)
Ask for Brochure SL-391 for Amphe-Power Connectors with RADSO^K Technology.
8. Alternate insert rotation
"W", "X", "Y", "Z" designates that the insert is rotated in its shell from a normal position. No letter required for normal (no rotation) position.
See catalog IC-5 page 28 for availability.
9. Variations

RoHS Compliant



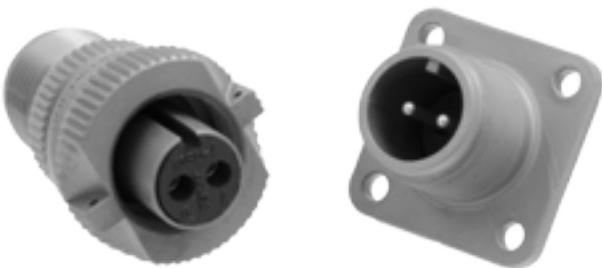
- (072) - Gray zinc nickel finish
- (023) - Electroless nickel finish
- (025) - Black zinc alloy finish
- (G96) - Black hard-coat anodize
- (B30) - Gold plated contacts
- (116) - Non-pre-tinned solder contacts
- (472) - Black zinc alloy finish and solder contacts less pre-filled cup
- (548) - Electroless nickel finish and solder contacts less pre-filled cup
- (724) - Conductive gray zinc nickel finish and solder contacts less pre-filled

MS/Standard how to order

SAE AS50151 (Solder Contacts)

MS	3102	A	18-3	P	W
1	2	3	4	5	6
					7

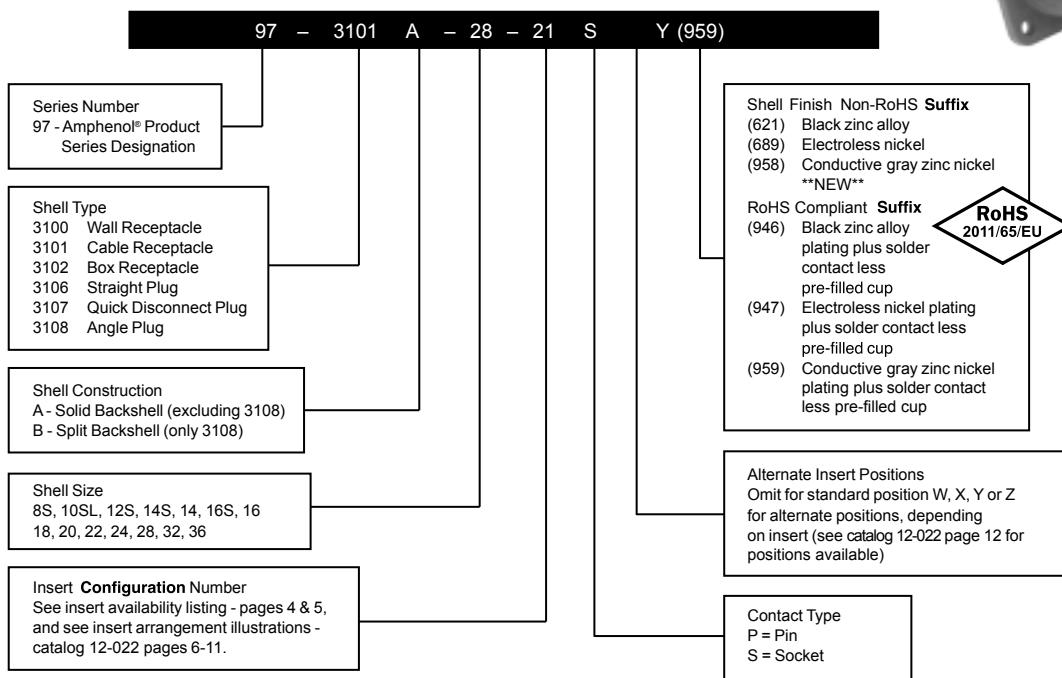
1. Connector Type
MS designates Military Standard
2. Connector Style
3100 wall mounting receptacle
3101 cable connecting receptacle
3102 box mounting receptacle
3106 straight plug
3108 90° plug
3. Service Class
A solid shell for general, non-environmental applications
C solid shell for pressurized applications (MS3102 only)
E environmental resisting
F environmental resisting with strain relief
R lightweight environmental resisting
- 4., 5. Shell size and insert arrangement - see tables, IC-5 pages 25-27.
6. Contact Types
P designates pin contact
S designates socket contact
7. Insert Rotation
"W", "X", "Y", or "Z" designate that insert is rotated in its shell from normal position. No letter required for normal (no rotation) position.



97 series solder type

how to order

Example of part number for solder type connectors is given below.



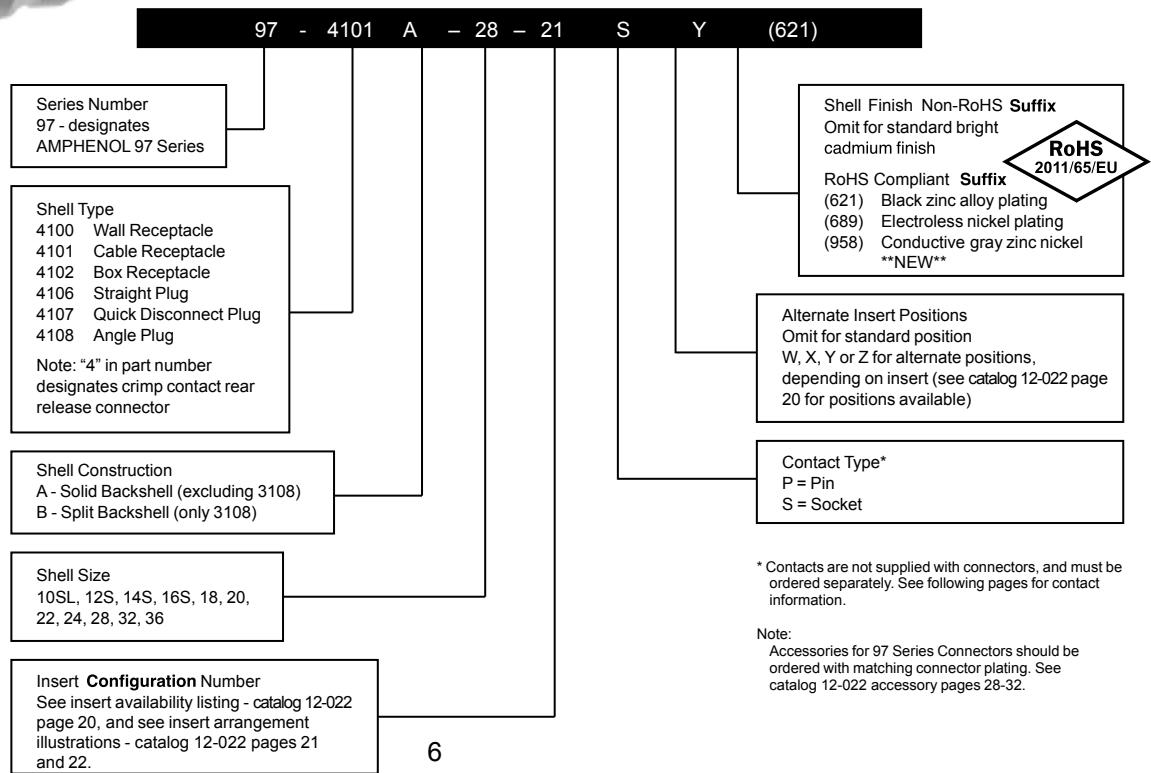
Note: Accessories for 97 Series Connectors should be ordered with matching connector plating. See catalog 12-022 accessory pages 28-32.



97 series crimp type

how to order

Example of part number for crimp type connectors is given below.



* Contacts are not supplied with connectors, and must be ordered separately. See following pages for contact information.

Note:
Accessories for 97 Series Connectors should be ordered with matching connector plating. See catalog 12-022 accessory pages 28-32.

SECTION III

GT Connectors

how to order

Part Number System

GT	C	00	A	FF	36-5	P	W	(014)
1	2	3	4	5	6	7	8	

1. Contact Style and Insert Material

C = Crimp
 CN = Crimp with stainless steel
 S = Solder
 SN = Solder with stainless steel
 CY = Crimp with Viton
 SY = Solder with Viton
 CL = Crimp with low smoke/flame retardant inserts
 SL = Solder with low smoke/flame retardant inserts
 No designation required for Neoprene components

2. Shell Style

01 - Inline receptacle
 02 - Box mount receptacle
 030 - Square flange receptacle - rear panel mount
 05 - Dummy receptacle
 06 - Straight plug
 07 - Jam nut receptacle - rear panel mount
 070 - Jam nut receptacle with accessory threads
 08 - 90° angle plug
 TB - Thru-bulkhead receptacle

3. Connector Class - For details, see catalog IC-4 pages 20-47

A - Adapter for accessory attachment, non-environmental
 AF - Adapter, clamp for individual wires, non-environmental
 AMI - Threaded internal adapter. Thread style/size to be specified at the end of the PN - Ex (M20) or (PG21)
 CF - Adapter, jacketed cable clamp, environmental
 CFZ - Adapter, jacketed cable clamp, individual wire sealing grommet, environmental
 F - Adapter, clamp for individual wires, individual wire sealing grommet, environmental.
 G - Adapter for heat shrink tubing, individual wire sealing grommet, environmental
 GTTB - Thru bulkhead receptacle, accepts mating plug on both sides
 R - Adapter for accessory attachment, individual wire sealing grommet, environmental
 R - (02) No thread, no accessories, environmental with panel sealing gasket
 RMI - Threaded internal adapter with individual wire sealing grommet. Thread style/size to be specified at the end of the PN - Es (M20) or (PG21)
 RV - Adapter, individual wire sealing grommet, environmental
 SB - Adapter for termination of EMI/RFI shielded braid with heat shrink tubing or boot, individual wire sealing grommet, environmental

4. Designation for Mounting Hole - Receptacle Only

FF - UN Threads
 FM - Metric Threads
 No designation for standard through hole mounting holes.

5. Shell Size and Arrangement

See catalog IC-4 pages 48-50

6. Contact Style

P designates pin contacts
 S designates socket contacts

7. Alternate Position

W, X, Y and Z - See catalog IC-4 page 51.
 No suffix required for normal position.

8. Connector Modification*

Omit for standard olive drab with silver plated contacts

i.e.: (A31) Gold/nickel plated contacts
 (025) Black zinc cobalt
 (LC) Less contacts
 (072) Conductive Gray Zinc Nickel
 (116) Solder contacts less pre-filled solder
 (724) Conductive Gray Zinc Nickel with solder contacts less pre-filled solder **RoHS Compliant**
 (RDS) RADSO^K contacts (crimp sockets only)*

* Consult catalog IC-4 page 54 for RADSO^K Technology Advantages.

MATEABILITY WITH IDENTICAL CONTACT ARRANGEMENTS

Connector Style	Mateable with Style
GT01	GT06 / 062 / 064 / 065 / 08
GT02	GT06 / 08
GT030	GT06 / 08
GT06	GT01 / 02 / 030 / 05 / 070 / TB
GT07 / 070	GT06 / 08
GT08	GT01 / 02 / 030 / 05 / 070 / TB
GTTB	GT06 / 08



ACA-B Connectors

how to order

Part Number System (example part number shown)							
ACA	3101	E	10SL-3	P	W	B	(F80)
1	2	3	4	5	6	7	8

1. Connector Series
ACA designates Amphenol® ACA-B Reverse Bayonet Series
2. Shell Style
3101 - Cable connecting receptacle
3102 - Box mount receptacle (Class E only, see sect. 3)
3103 - Wall mount receptacle for rear panel mounting
3106 - Straight plug
3107 - Jam nut receptacle - rear panel mount
(Class A only, see sect. 3)
3108 - 90° angle plug
3. Connector Class
A Environmental, no rear threads (Applies to 3107 only)
E Environmental resisting, with grommet seal and strain relief backshell
F Environmental resisting, with grommet seal and solid backshell with rear accessory threads
G Backshell for heat shrink termination
R Environmental resisting with lightweight endbell
4. Shell Size and Insert Arrangement
See catalog IC-4 pages 48-50 for insert availability charts, and catalog IC-4 pages 55-77 for insert pattern drawings.
5. Contact Style
P designates pin contacts
S designates socket contacts
Note: standard contacts are silver plated. Consult Connector Modification for ordering gold plated contacts.
6. Alternate Position
W, X, Y and Z - See catalog IC-4 page 51.
No suffix required for normal position.
7. Designation for Reverse Bayonet
B designates Reverse Bayonet coupling shells

8. Connector Modification
Omit for standard olive drab connectors with solder type silver plated contacts.
For a modification as listed below, add suffix in parenthesis to the end of the part number. Consult Amphenol Industrial Operations for further description or assistance.

(RDS) with RADSO® contacts (crimp sockets only)*
(F80) with AWG crimp contacts
(FO) less contacts. (contacts are to be ordered separately)
(A176) gold contacts
(T00) metric threads in flange holes
(RFI) grounded - plug only
(F42) less grommet and backshell
(F85) less sleeve and grommet
(A23) electroless nickel plating
(A232) with black zinc cobalt plating
(072) conductive gray zinc nickel **NEW**

* Consult catalog IC-4 page 54 for RADSO® Technology Advantages.

MATEABILITY WITH IDENTICAL CONTACT ARRANGEMENTS

Connector Style	Mateable with Style
ACA3101	ACA 3106, 3108
ACA3102	ACA 3106, 3108
ACA3103	ACA 3106, 3108
ACA3106	ACA 3101, 3102, 3103, 3107
ACA3107	ACA 3106, 3108
ACA3108	ACA 3101, 3102, 3103, 3107



SECTION IV

Major MIL-Specifications by Type

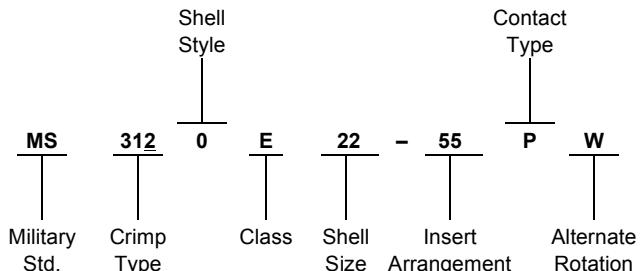
- Miniature, MIL-DTL-26482

Miniature PT-Types MIL-DTL-26482

- Widely used smaller connectors
- Extensive use on military equipment including aircraft as well as commercial applications
- Available with either crimp or solder type contacts
- 3 point bayonet coupling
- Popular low cost series
- 5 Key/keyway shell polarization
- Amphenol supplies MIL-Spec types as well as proprietary versions
- MS311X or PT, solder type contacts (Series 1)
- MS312X or PT-SE, crimp type contacts (front release) (Series 1)
- Modifications of Basic Series are:
 - SP, same as PT except wider flanges for back panel mounting, anodic coating, no MIL P/N, intermates with MS connectors
 - Other modifications and specials available
- For details on above series see Amphenol catalog:
 - “PT Series” 12-070

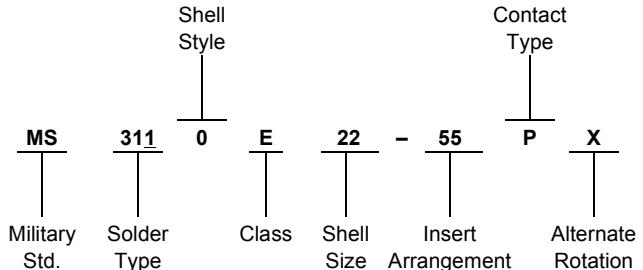
MIL-DTL-26482 Part Number

MS/PT-SE Crimp Series 1



MIL-DTL-26482 Part Number

MS/PT Solder Series 1



Miniature Crimp Connectors

Part Number Breakdown

Proprietary Part Number Construction for Miniature Crimp Connectors

To more easily illustrate ordering procedures, part number PT00SE-20-41PW (SR) is shown as follows:

Part Number							
PT	00	SE	-	20 - 41	P	W	(SR)
1	2	3		4	5	6	7
See code below:							

1. Connector Family
PT designates standard olive drab cadmium plated Tri-Lock coupling connector
SP designates connector similar to PT except for anodic coating and larger flange and mounting holes for back panel mounting of receptacles
2. Shell Style
"00" designates wall mount receptacle
"01" designates cable connecting receptacle
"02" designates box mount receptacle
"06" designates straight plug
"07" designates jam nut receptacle
"08" designates 90° plug
3. Service Class
"SE" designates crimp, environmental (MIL-DTL-26482)
"SP" designates crimp, potted type (MIL-DTL-26482)
Both of the above are Amphenol proprietary versions of the MIL-DTL-26482 Series 1 crimp contact connector and offer 15 lbs. contact retention for size 20 contacts, 25 lbs. for size 16 contacts.
4. "20" designates shell size. Shell sizes available are 8 through 24.
5. "20-41" designates insert arrangement
6. "P" designates pin contacts; "S" for socket contacts
7. "W" designates that insert is rotated in its shell from the standard position to alternate position W. The basic rotations are W, X, Y, and Z. No letter required for normal (no rotation) position.
8. "SR" designates a strain relief clamp.

Indicate optional finishes as follows:
(003) olive drab cadmium plate (standard on "PT")
(100) Suffix added for flat eyelet pin contacts in hermetic versions

OR

RoHS Compliant finish suffix as follow:
(005) anodic coating - Alumilite® (standard on "SP")
(023) electroless nickel
(025) black zinc cobalt plating
(072) conductive gray zinc nickel plating
(424) electroless nickel finish with strain relief
(470) black zinc cobalt plating with strain relief

Part Number Nomenclature for MS/PT Crimp Connectors to MIL-DTL-26482 Specification

To more easily illustrate ordering procedures, part number MS3120E-20-41PW is broken down as follows:

Part Number							
MS	312	0	E	20 - 41	P	W	
1	2	3	4	5	6	7	8
See code below:							

1. "MS" designates Military Standard
2. "312" designates basic family number for MIL-Spec 26482 crimp type
3. Shell Style
"0" designates wall mount receptacle
"1" designates cable connecting receptacle
"2" designates box mount receptacle
"4" designates jam nut receptacle
"6" designates straight plug
"7" designates box mount receptacle with dual mounting holes
"8" designates wall mount receptacle with dual mounting holes
4. Service Class
"E" designates environmental resisting connector
"F" designates environmental resisting connector with strain relief
"P" designates potted type with potting boot
5. "20" designates shell size. Shell sizes available are 8 through 24.
6. "20-41" designates insert arrangement
7. "P" designates pin contacts; "S" for socket contacts
8. "W" designates that the insert is rotated in its shell from the standard position to alternate position W. The basic rotations are W, X, Y, and Z. No letter required for normal (no rotation) position.

Cross Reference - Commercial PT to Comparable Military MS Types			
Amphenol P/N	MS P/N	Amphenol P/N	MS P/N
PT00SE	MS3120E	PT06SE(SR)	MS3126F
PT01SE	MS3121E	MF00SE(SR)	MS3128F
PT02SE	MS3122E	PT07SE(SR)	MS3124F
PT06SE	MS3126E	PT08SE(SR)	None
MF02SE	MS3127E	PT00SP	MS3120P
MF00SE	MS3128E	PT01SP	MS3121P
PT07SE	MS3124E	PT02SP	MS3122P
PT08SE	None	PT06SP	MS3126P
PT00SE(SR)	MS3120F	PT07SP	MS3124P
PT01SE(SR)	MS3121F		

Miniature Solder Connectors

Part Number Breakdown

Part Number Nomenclature for Miniature Solder Connectors

To more easily illustrate ordering procedures, part number PT00A-20-41PW (SR) is shown as follows:

Part Number							
PT	00	A-	20 - 41	P	W	(SR)	
1	2	3	4	5	6	7	8
See code below:							

1. Connector Family

PT designates standard olive drab cadmium plated Tri-Lock coupling connector. This is the Amphenol® proprietary version of the MIL-DTL-26482 solder contact connector.

SP designates connector similar to PT except for anodic coating and larger flange and mounting holes for back panel mounting

2. Shell Style

"00" designates wall mount receptacle

"01" designates cable connecting receptacle

"02" designates box mount receptacle

"06" designates straight plug

"07" designates jam nut receptacle

PTB designates thru-bulkhead receptacle

3. Service Class

"A" designates general duty backshell

"C" designates pressurized receptacle

"E" designates environmental resisting with grommet and clamping nut

"P" designates potted with potting boot

"PG" designates adapter for cable gland for moisture proofing jacketed cables

"H" designates hermetic seal receptacle

4. "20" designates shell size. Shell sizes available are 6 through 24.

5. "20-41" designates insert arrangement

"P" designates pin contacts; "S" for socket contacts

"W" designates that insert is rotated in its shell from the standard position to alternate position W. The basic rotations are W, X, Y, and Z. No letter required for normal (no rotation) position.

8. "SR" designates a strain relief clamp.

Indicate optional finishes as follows:

(003) olive drab cadmium plate (standard on "PT")

OR

RoHS Compliant finish suffix as follow:

(005) anodic coating - Alumilite® (standard on "SP")

(023) electroless nickel

(025) black zinc cobalt plating

(072) conductive gray zinc nickel plating

(424) electroless nickel finish with strain relief

(470) black zinc cobalt plating with strain relief

Part Number Nomenclature for MS/PT Solder Connectors to MIL-DTL-26482 Specification

To more easily illustrate ordering procedures, part number MS3110E20-41PW is shown as follows:

Part Number							
MS	311	0	E	20 - 41	P	W	
1	2	3	4	5	6	7	8
See code below:							

1. "MS" designates Military Standard

2. "311" designates basic family number for MIL-Spec 26482 solder type

3. Shell Style

"0" designates wall mount receptacle

"1" designates cable connecting receptacle

"2" designates box mount receptacle

"4" designates jam nut receptacle

"6" designates straight plug

4. Service Class

"E" designates environmental resisting connector with grommet and clamping nut

"F" designates environmental resisting connector with grommet and strain relief

"J" designates clamp assembly for moisture proofing multi-jacketed cables, with strain relief

"P" designates potted type with potting boot

5. "20" designates shell size. Shell sizes available are 8 through 24.

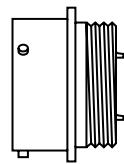
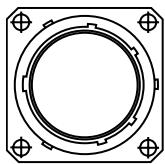
6. "20-41" designates insert arrangement

7. "P" designates pin contacts; "S" for socket contacts

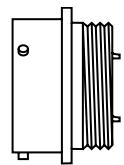
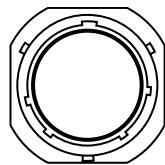
8. "W" designates that the insert is rotated in its shell from the standard position to alternate position W. The basic rotations are W, X, Y, and Z. No letter required for normal (no rotation) position.

Cross Reference - Commercial PT to Comparable Military MS Types			
Amphenol P/N	MS P/N	Amphenol P/N	MS P/N
PT00A	None	PT00E(SR)	MS3110F
PT01A	None	PT01E(SR)	MS3111F
PT02A	None	PT06E(SR)	MS3116F
PT06A	None	PT07E(SR)	MS3114F
PT07A	None	PT00P	MS3110P
PT00C	None	PT01P	MS3111P
PT02C	None	PT02P	None
PT07C	None	PT06P	MS3116P
PTB	MS3119Ref	PT07P	MS3114P
PT00E	MS3110E	PT02H	None
PT01E	MS3111E	PT07H	MS3114H
PT02E	MS3112E	PTI1H	MS3113H
PT06E	MS3116E		
PT07E	MS3114E		

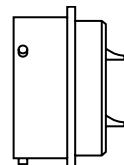
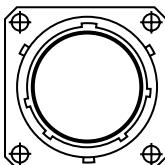
Miniature Shell Styles



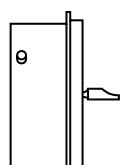
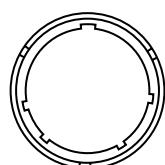
Wall Mount Receptacle



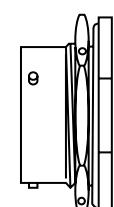
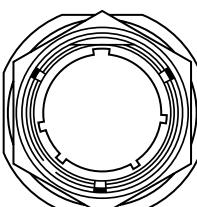
Cable Connecting or Line Mount Receptacle*



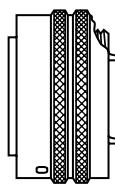
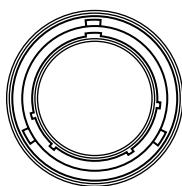
Box Mount Receptacle



Solder Mount Receptacle (Hermetic)



Jam Nut Receptacle



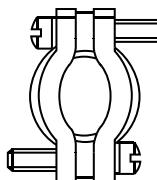
Straight Plug

Also see PTB - Thru- bulkhead, double-ended receptacle in Miniature Cylindrical catalog.

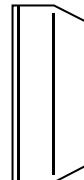
MIL-DTL-26482



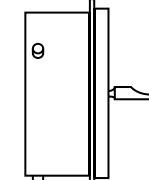
Class E



Class F



Class P



Class H



PG Cable Gland

Shell Sizes

6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Contact Sizes

Contact Size	20	16	12
American Wire Gauge Wire Size (AWG)	20-24	16-20	12-14

* This connector style is sometimes referred to as a cable connecting "plug." It does, however, mate with either a straight or 90 degree plug.

SECTION V

Cross Reference by MIL-Spec to Competitor's Part Number

SAE AS50151 (Solder Type)

Typical Part No. - MS310X

	Amphenol	ITT Cannon	Spacecraft
Class	F, R	F, K, R	F, R
Proprietary Part No. (A.N.-M.S.)	ACS	97310X	CA310X
Shell Size:			
MS3100	X	X	X
MS3101	X	X	X
MS3102	X	X	X
MS3103	X	X	X
MS3106	X	X	X
MS3107	see 97 Series	X	
MS3108	X	X	X

Amphenol Proprietary Intermates: 10-214XXX, 10-244XXX

(Crimp types - front removal)

Amphenol Proprietary Non-Intermates: (5015 Type)

See also GT Series Reverse Bayonet Coupling, catalog 12-024

MIL-DTL-26482 (Solder Type) Series 1

Typical Part No. - MS311X

	Amphenol	Souriau	Cannon	Aero	Cinch	SPI
Type	PT	851	KPT	AE71X	PW	MS311X
Shell Style:						
MS3110	X	X	X	X	X	X
MS3111	X	X	X	X	X	X
MS3112	X	X	X	X	X	X
MS3113	X	X	X			
MS3116	X	X	X	X	X	X
MS3114	X	X	X	X	X	X

MIL-DTL-26482 (Crimp - Front Release) Series 1

Typical Part No. - MS312X

	Amphenol	Cannon	Cinch
Type	PT-SE	KP-SE	PWF
Shell Style:			
MS3120	X	X	X
MS3121	X	X	X
MS3122	X	X	X
MS3126	X	X	X
MS3124	X	X	
MS3127	X	X	
MS3128	X	X	

SECTION VI

Know the Language

Common terms you should know (listed alphabetically)

- **Accessories** - Mechanical devices, such as cable added to connector shells and other such hardware that are attachable to connectors to make up the total connector configuration; while providing wire support and/or wire sealing
- **Bayonet Coupling** - A non-threaded, ramp type of coupling
- **Cable Assembly** - A cable with plugs or connectors on each end
- **Configuration** - Arrangement of contacts in a multiple-contact connector
- **Contacts** - Mechanical component to which electrical engagement is accomplished
- **Contact Size - (Also known as Wire Gauge)** - the largest wire that can be used with a specific contact
- **Contact Spacing** - The distance between the center-lines of adjacent contact areas.
- **Coupling Nut** - Outer threaded or grooved ring which holds mated pair together
- **Crimp Contact** - A contact to which wire is joined by mechanical squeeze
- **EMI or RFI Backshell** - A type of accessory to terminate wire shielding
- **Environmentally Sealed** - Connector provided with gaskets, seals, potting or other devices to keep out moisture, dirt, air or dust that might reduce its performance
- **Extraction/Removal Tool** - A handheld tool used for removing a contact from a connector.
- **Fiber Optic Termini** - Comparable to electrical pin and socket contacts, except they transmit data optically through fibers instead of electrically through wires.
- **Gland** - Resilient ring in rear accessory, provides seal on jacketed cable
- **Grounding Fingers** - A metal strap around plug shell for positive shell-to-shell conductivity/shielding
- **Grommet** - Resilient part at back of insert (attached or separate); gives wire moisture seal
- **Hermetic** - A connector with fused glass insert for air tightness

Connector:

A device providing electrical or signal connection.
It consists of a plug and receptacle.



- **Insert** - The dielectric or insulating inner core, holds contacts
- **Insert Arrangement** - The number, spacing and arrangement of contacts in a connector
- **Insertion Tool** - A small, handheld tool used to insert contacts into a connector
- **Interfacial Seal** - A resilient part on the face of pin inserts which provides moisture seal.
- **Jam Nut** - Hex nut that holds receptacle to a panel
- **Mating Pair** - Two connectors that couple together. Shell size insert arrangement and rotation must be compatible
- **Mating/Unmating Forces** - Torque required to couple/uncouple a mating pair of connectors or contacts
- **"O" Ring** - Doughnut-shaped ring of rubber used as a seal around the mating insulator interface of cylindrical connectors
- **Pin Contact** - Male half of a mated pair of contacts*
- **Plating** - The metal finish applied to contacts and/or shell components (protective) to resist corrosion and wear
- **Plug** - The cable/coupling half of a mating pair
- **Potting Boot** - A type of accessory which forms a mold for potting compound
- **Rear Termination** - An accessory which threads to back of shell
- **Receptacle** - The panel/receiving half of a mating pair
- **Sealing Plug** - Plastic type slug, placed in unused grommet holes to seal
- **Service Rating (Also known as Current Rating)** - The maximum voltage or current that a connector is designed to carry continuously.
- **Shell** - Houses insert and contacts
- **Socket Contact** - Female half of a mated pair of contacts
- **Solder Contact** - A contact to which wire is joined by soldering. Has a cup, hollow cylinder, eyelet or hook to accept a wire for conventional soldered termination.
- **Strain Relief (Also known as Cable Clamp)** - A type of accessory which clamps wires for support

*Note: Male half always goes into female.

SECTION VI

Know the Language - Other Interconnection Product Terms

- **Alternate Rotations** - In cylindrical connectors: Rotation of either an insert or designated key/keyway locations (Alternate Keying) in a connector shell to a different angle than normal position. Allows for variations of mating two halves of cylindrical connectors.
- **Anodize** - Formation of a protective, insulating oxide layer on metal bay electrolytic action.
- **Arc Resistance** - The characteristic of insulating materials to resist carbonization (also known as tracking) of the material surface between electrodes resulting from voltage breakdown.
- **Attenuation** - (this term is used in Filters) The ratio of the input to output power levels in a network (transmission line) when it is excited by a matched source and terminated in a matched load.
- **Back-mounted** - When a connector is mounted from the inside of a panel or box with its mounting flanges inside the equipment.
- **Circuit** - A complete path or electron flow from a negative terminal of voltage source through a conductor and back to the positive terminal.
- **Closed Entry Socket Contacts** - A female contact designed to prevent the entry of a pin or probing device having a cross-sectional dimension greater than the mating pin.
- **Coaxial Cable** - A high-bandwidth cable consisting of two concentric cylindrical conductors with a common axis that is used for high speed data communication and video signals.
- **Compliant Contact** - A press-fit type contact used to attach to a printed circuit board. Has an eyelet end.
- **Conductivity** - The ability of a material to conduct electric current, expressed in terms of the current per unit of applied voltage. It is reciprocal of resistivity.
- **Contact Durability** - Endurance measured by the number of insertion and withdrawal cycles that a connector withstands remaining within its specified performance level.
- **Contact Engaging and Separating Force** - Force needed to either engage or separate pins and sockets when they are out of connector inserts. Values are generally established for maximum and minimum forces.
- **Contact Resistance** - Maximum permitted electrical resistance of pin and socket contacts when assembled in a connector under typical service use.
- **Contact Retention** - The minimum axial load in either direction that a contact must withstand while remaining firmly fixed in its normal position within the connector insert or housing.
- **Continuity** - A continuous path for the flow of current in an electrical circuit.
- **Corrosion** - The destruction of the surface of a metal by chemical reaction.
- **Coupling Torque** - Force required to rotate a coupling ring or jackscrew when engaging a mating pair of connectors.
- **Diallyl Phthalate (DAP)** - (Blue insert in 97 Series) A thermosetting plastic that offers outstanding dimensional stability and resistance to most chemicals and chemical compounds.
- **Dielectric** - Any insulating medium that intervenes between two conductors.

- **Dielectric Withstanding Voltage** - Maximum potential gradient that a dielectric material can withstand without failure.
- **Discontinuity** - A broken connection or the loss of a specific connection characteristic.
- **Edge Connector** - One piece receptacle, containing female contacts designed to receive the edge of a printed circuit board and interconnect on which the male contacts are etched or printed. The connector may contain either a single or double row of female contacts.
- **Edgeboard Connector** - A connector that mates with printed wiring leads running to edge of a PC board.
- **Feed-through** - A conductor that connects patterns on opposite sides of a PC board. Also called interfacial connection.
- **Fiber Optics** - A data transmission medium consisting of glass fibers. Light-emitting diodes send light through the fiber to a detector, which then converts the light back into electrical signals.
- **First Article** - A sample part or assembly manufactured prior to the start of production for the purpose of assuring that the manufacturer is capable of manufacturing a product that will meet the requirements.
- **Front-mounted** - A connector is front-mounted when it is attached to the outside or mating side of a panel. (Can only be installed or removed from the outside of the equipment.
- **Front Release Contacts** - Connector contacts are released from the front side of the connector and then removed from the back wire side of the connector. The removal tool engages the front portion of the contact and pushes it out the back where it is removed by hand.
- **Harsh or Hostile Environment Connector** - A connector designed and engineered for operation in hostile environment conditions, such as extreme high temperatures of 677°C (1,250°F), extreme low temperatures of absolute zero and severe water tight conditions.
- **Header** - A feed through device that introduces a conductive path through an insulating plate.
- **Hermaphroditic Connector** - Interconnecting device in which both mating parts are identical at their mating surfaces. (Also called Sexless Connector)
- **Hermaphroditic Contact** - A contact in which both mating elements are precisely alike at their mating face.
- **Input/Output Connector** - A mating pair of connectors used to carry signals into and out of a panel-mounted subsystem. An example is connector pair that interconnects the individual back panels in a large array of panels.
- **Insert Retention** - Axial load in either direction that an insert must withstand without being dislocated from its normal position in the connector shell.
- **Insertion Force** - The effort, usually measured in ounces, required to engage mating components.
- **Interchangeable** - Characteristic of connectors in which one manufacturer's connector can be replaced by the connector of another manufacturer and provide the same function in the same panel space as the connector it is replacing.
- **Intermateable** - Characteristic of connectors in which a connector half manufactured by one connector will mate directly with a connector half manufactured by a different company

SECTION VI

Know the Language - Other Interconnection Product Terms

- **Keying** - Mechanical arrangement of guide pins and sockets, keying plugs, contacts, bosses, slots, keyways, inserts or grooves in a connector housing, shell or insert that allows connectors of the same size and type to be lined up without the danger of making a wrong connection.
- **Lanyard** - A device attached to certain connectors that permit uncoupling and separation of connector halves by a pull on a wire or cable.
- **Life Cycle** - A test that indicates the time span before failure; the test occurs in a controlled, usually accelerated, environment.
- **Mass Termination** - Method of termination in which terminals that pierce flat cable insulation without stripping to cold flow mate with conductors and form a metal-to-metal joint.
- **Motherboard** - A printed board used for interconnecting arrays of plug-in electronic modules.
- **Operating Temperature** - Maximum internal temperature-resistant capabilities of a connector in continuous service.
- **Outgassing** - De-aeration or other gaseous emission from a printed board assembly (printed board, component of connector) when exposed to a reduced pressure or heat, or both.
- **Panel-mount** - Fixing a connector half to a board, panel or frame. Usually, the female portion of the connector is mounted, and the male half is the removable portion.
- **Plated Through-Hole** - A hole-formed deposition of metal on the sides of the hole and on both sides of the base to provide electrical connection from the conductive pattern on one side to that on the opposite side of the PC board.
- **Poke-Home Contact** - Term applied to a male or female contact to which a wire has been permanently affixed prior to the assembly of the contact into the insert.
- **Positioner** - Device attached to the crimping tool to position conductor barrels between the indentors.
- **Potting** - Sealing of a component (for example the cable end of a multiple contact connector) with a plastic compound or material to exclude moisture, prevent short circuits and provide strain relief.
- **Pre-tinned** - Solder applied to an electrical component prior to soldering.
- **Pre-tinned Solder Cup** - Solder cups with inner surfaces that have been pre-coated with a small amount of tin lead solder or RoHs approved solder.
- **Press-fit Contact** - Either a solid pin or a pin having a compliant member that makes an interference connection with a through-hole on a PC board. The pressure developed between interconnecting surfaces is sufficient to provide gas-tight electrical reliability without the use of solder.
- **Qualified Products List (QPL)** - A list of commercial products that have been pretested and found to meet the requirements of a specification, especially government specifications.
- **Quick-disconnect Coupling** - A design feature, apparent in the quick-disconnect connector; it permits relatively rapid joining and separation.
- **RADSOK® Contact*** - A unique socket contact design with a stamped and formed twisted inner grid. Socket cylinder within the female contact has several equally space longitudinal beams twisted into a hyperbolic shape. As male pin is inserted, axial members in the female half deflect, imparting high current flow across the connections.
- **Ramp** - The sloped channel that accepts the detent pin in a bayonet connector.
- **Rear Release Contacts** - Connector contacts are released and removed from the rear (wire side) of the connector. The removal tool engages the contact from the rear and pulls the contact out of the connector contact retainer.
- **Rear Seal** - Design feature that provides an environmental seal at the rear of plug or receptacle.
- **Removable Contact** - A contact that can be mechanically joined to or removed from an insert. Usually, special tools are required to lock the contact in place or remove it for repair or replacement.
- **RoHS (Restrictions of Hazardous Substances)** - The RoHS Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.
- **Scoop Proof** - Design feature whereby exposed contacts of a connector cannot be touched or damaged by any portion of the mating connector.
- **Serrations** - Small grooves or indentations within a terminal wire barrel that increase the tensile strength and electrical conductivity of the crimped termination.
- **Soldering** - Process of joining metallic surfaces with solder, without the melting of the base metals. Soldering is an economical, versatile and fast termination method. A soldered connection has metallic continuity and excellent long term reliability.
- **Splice Connector** - A joint connecting conductors with good mechanical strength and good conductivity; a terminal that permanently joins two or more wires.
- **Surface Mounting** - The electrical connection of components to the surface of a conductive pattern without utilizing component holes.
- **Thermal Shock** - The effect of heat or cold applied to a material at such a rate that non-uniform thermal expansion or contraction occur. In connectors, the effect can cause inserts and other insulation materials to pull away from metal parts.
- **Thermocouple Contact** - A contact of special material used in connectors employed in thermocouple applications. Materials often used are iron, constantan, copper, chromel and alumel.
- **Tuning Fork Contact** - U-shaped female contact that resembles a tuning fork. It can be stamped or formed.
- **Umbilical Connector** - A connector used to connect cables to a rocket or missile prior to launching, and which is removed from the missile at the time of launching.
- **Wire-Wrapped Connection (Also known as Solderless Wrap)** - A solderless connection made by wrapping bare wire around a square or rectangular terminal with a power or hand tool.

SECTION VI, cont.

Basic Questions to Determine Connector Requirements

- **How many conductors (wires) and what are the wire gauges (size)?**

Smallest contact sizes available by Military Specifications:

SAE AS50151 - size 16

MIL-DTL-26482 - size 20

- **What's your working voltage requirement?**

See catalog insert arrangement table

Catalog IC-4.....ACA-B and GT Series

Catalog IC-5.....AC and SAE AS50151

Catalog 12-070PT Series

- **Are you using your connector in a benign environment or a harsh environment?**

Harsh environment - will need gaskets, grommets and/or glands for environmental sealing

- **Do you want to Solder or Crimp your wires?**

- **Are you going cable to cable or cable to panel?**

Cable plug to Cable receptacle use:

– Straight plug with Inline cable receptacle

– 90° Plug with Inline cable receptacle

Cable plug to Panel receptacle use:

– Straight plug with either a wall mount receptacle, box mount receptacle, or jam nut receptacle

– 90° plug with either a wall mount receptacle, box mount receptacle, or jam nut receptacle

- **What's your cable outer diameter (OD)? Or are you using discrete wires?**

- **Do you have any material restrictions?**

– RoHS requirement

– Stainless steel

– Aluminum

– Neoprene

– Silicon

– Viton

- **What type of plating or finish is preferred?**

Common platings or finishes:

– Olive drab cadmium

– Nickel

– Black zinc alloy

– Electroless nickel

– Anodic coating

– Gray ZnNi (Conductive)

- **Will you need accessories?**

– Cable clamp

– Bushing

– Protection caps (metal or plastic)

– Dummy receptacle

- **Are you using an electrical or signal connector?**

POWER

SAE AS50151

AC Threaded

Amphenol GT Reverse Bayonet

97 Series

– Standard contacts or (High Amperage) RADSO^K®

MIL-DTL-26482

Hermetic

MIL-DTL-26482

PT

SIGNAL

SAE AS50151

AC Threaded

– High Frequency contacts

Filter

PT

AC Threaded (Amphe-dB - IDS-9)

Hermetic

MIL-DTL-26482

PT

AC Threaded

NOTE: Socket contacts are to be used in the connector feeding the power

NOTE: Not all connectors are limited to solely either power or signal. Many connectors can perform both functions.

SECTION VI, cont.

What do you need to Sell?

✓ A Basic Product Knowledge

- Why connectors are needed
- Nomenclature (component parts)
- Typical terms or descriptive words
- Pertinent references to MIL-Spec
- Cross reference Amphenol P/N to MIL P/N

✓ A Catalog

- Know how it is organized
- Keep it current
- Add your own notes for reference

✓ Know Our Website

www.amphenol-industrial.com

- Quickly navigate on-line to -
 - Connector Catalogs
 - Service Instructions
 - Your Contact Information
 - Markets Served
- Connector Basics has this brochure and other valuable basic connector information
- Amphenol One for Distributor Information and Latest Product News

✓ Know Your Organization and Ours

- Who has pricing & delivery data
- Who has technical data
- Who can expedite
- Who can negotiate
- A back up for each of the above

✓ Know Yourself and Your Competitors

- What is negotiable at your account
- What are your strong points
- What are your weak points
- What are your protection points
- Who is your competition

✓ Know Your Customers

- What are their Needs?
- Company Needs – Personal Needs

✓ Learn to Listen (and to See)

- What are they saying?
- What do they mean?
 - How they say it may mean more than what they say
 - What you both see may say more than conversation

✓ Each account is unique

- Don't use a carbon copy approach
- Let your customers know you see them that way

✓ Take time to know the people you deal with

- Both at your account and your facility
- Manage your time and territory like assets
- If business or potential isn't there, maybe you shouldn't be

Conclusion

The data in this booklet was designed to provide you with basic information on Amphenol Industrial connector products.

In order to effectively sell, it is important to remember that knowing your customer and your product go hand in hand.

The sale begins with you!

Connector Sales Worksheet

Page 1 of 2

Customer:	Connector Requirements	#1	#2
Shell			
Shell Style			
Shell Material			
Plating			
Size Restrictions			
Env./Non-Env. Sealed			
Mating & Keying			
Ins./Ext. Force Requirements			
Alternate keying needed			
Coupling			
Threaded			
Bayonet			
Push-Pull			
Environment			
What is the minimum, average and maximum temperature range? How does it vary over time?			
What are the humidity conditions, i.e. dry, occasional moisture, continually wet?			
What are the expected chemical exposures?			
What level of corrosion resistance is expected?			
What atmospheric conditions are expected, i.e. gas type, pressure, altitude, etc...?			
What is the preferred connector body plating material?			
Under what conditions is the connector to be environmental sealed i.e. mated, unmated or both?			
What type of shock and/or vibration are expected?			
Noise Considerations			
What are the EMI / RFI Shielding requirements?			
Contacts			
# of contacts			
Contact plating			
Wire Gauge			
Crimp/Solder			
Insertion Forces for Individual Mating Contacts			
Extraction Forces for Individual Mating Contacts			
Electrical Data			
Current carrying capacity - AC/DC etc.			
Potential Voltage			
Potential Amps			
Frequency Exposure			
Horsepower Ratings Associated with the End Product			
Level of Insulation Resistance			
Level of Dielectric Withstand			

Connector Sales Worksheet

Page 2 of 2

Customer:	Connector Requirements	#1	#2
Grounding			
What type of ground path is required, i.e. shell-to-shell, ground contact to shell, shield to shell, shield to pin, discrete ground contact pair, etc...			
Clamps			
Mechanical			
Kellems			
Overmolded cables (who's doing cables)			
Standards / Conformance			
What standards must the connector meet i.e. Mil-spec, U.L., CSA, CE, SAE, proprietary...?			
Cable Requirements Or Description Of Cable In Use:			
In addition to the following information, a technical drawing / cable specification must accompany this sheet.			
What is the conductor count and what are their respective gages?			
What are the strand gages and strand counts for each conductor?			
What are the minimum, nominal, and maximum conductor diameters?			
What are the minimum, nominal, and maximum conductor insulation thicknesses?			
What is the minimum, nominal, and maximum overall jacket thickness?			
What is the conductor insulation material?			
What is the overall jacket material?			
What type of shielding does the cable contain? Please give specific information including shield type, termination requirements, etc...			
What type of outer jacket material is required?			
Additional			
Production forecast qty / per yr			
Target Price			
Prototypes needed			
When			
Expected production start			
What Stds are required - CSA, UL etc			
Would you like the connector on a cable (attach cable form)			
Are you interested in us looking at your whole system			



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