

NOTE



All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.18 [± 0.007] and angles have a tolerance of $\pm 3^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of Circular Plastic Connectors (CPC). The connectors are available in various shell sizes and standard or reverse sex configurations. The four series available include standard, high, and power density connectors, and a combination standard and power density connector. The CPC's are designed for use with various contacts. Applicable wire sizes range from 30 to 8 AWG and can be crimped with hand tools or by automatic machines.

When corresponding with Tyco Electronics Personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of components are provided in Figure 1.

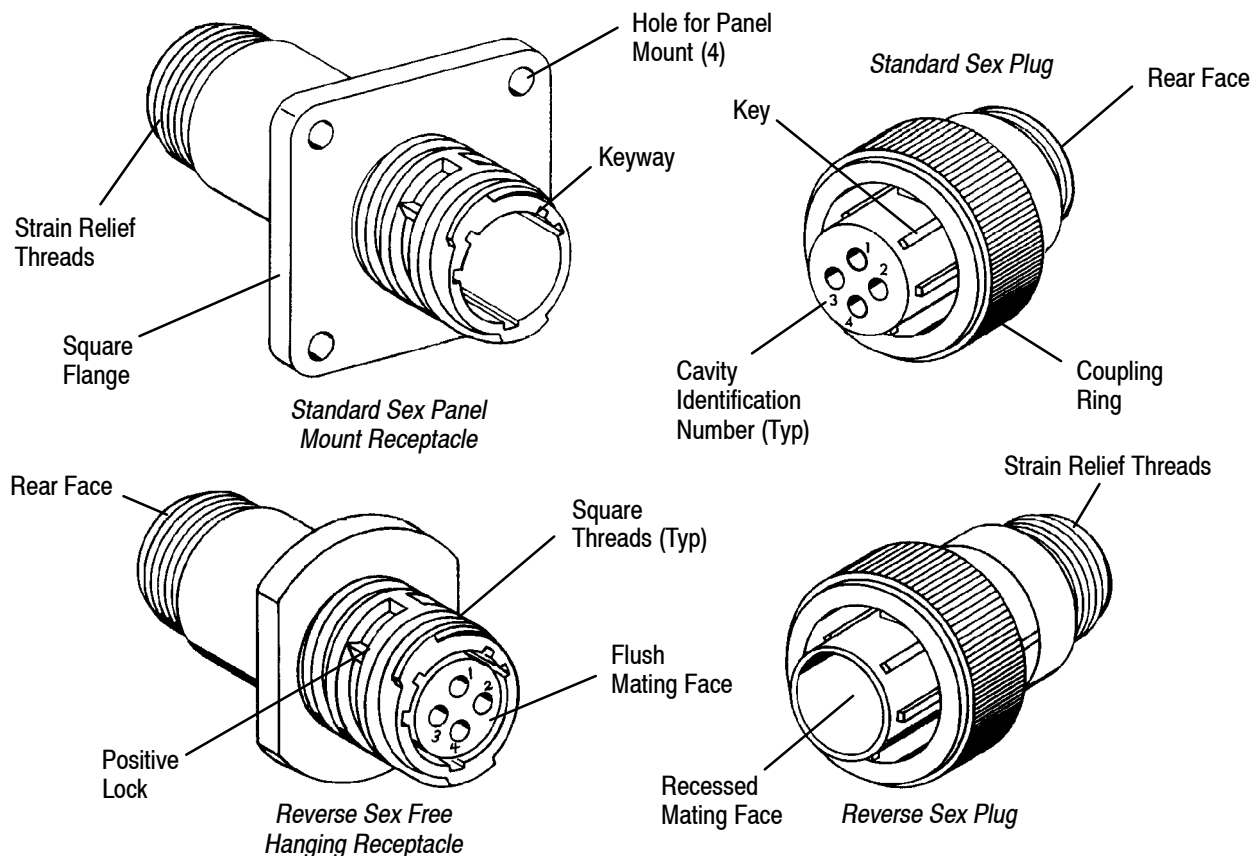


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements
- New format and logo
- Deleted obsolete tooling part numbers and related documents throughout
- Changed Figure 2 to Paragraph 2.5 and renumbered

2.2. Customer Assistance

Product Part Number 206060 and Product Code 5029 are representative of the Circular Plastic Connectors. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Tyco Electronics Representative or, after purchase, by calling the Product Information number at the bottom of page 1.

2.3. Drawings

Customer drawings for specific products are available from the service network. The information contained in the Customer Drawings takes priority if there is a conflict with this specification or with any technical documentation supplied by Tyco Electronics.

2.4. Specifications

Product Specifications provide performance test information. Application Specifications provide application requirements and reference materials.

Product Specifications:

108-10024 — CPC Connectors 108-10037 - Type XII Contacts

108-10042 — Type III+ Contacts 108-12011 - Subminiature COAXICON* Contacts

Application Specifications:

114-10000 — 20DF (Series 2) Contacts

114-10004 — Type III+ (Series 1) Contacts 114-10005 - Type XII (Series 3) Contacts

2.5. Instructional Material

The following list includes available instruction sheets (408-series) that provide assembly procedures for product, operation, maintenance and repair of tooling, as well as setup and operation procedures of applicators; and customer manuals (409-series) that provide setup, operation, and maintenance procedures of machines.

<u>Document Number</u>	<u>Document Title</u>
408-1216	Extraction Tools 3051183-[]
408-2024-2	Hand Crimping Tools 69656-[]
408-2024-3	Instruction/Maintenance/Inspection Sheet for Subminiature COAXICON* Contacts
408-2095	"C" Head Straight Action Hand Tool (SAHT) 69710-1
408-6510	Hand Crimping Tool 90384-1
408-6610	Hand Crimping Tool 90066-7 and Head Assembly 90066-9
408-6614	Hand Crimping Tool 90067-5
408-6695	Hand Crimping Tool 90405-1
408-6709	Hand Crimping Tool 90406-1
408-6736	Insertion Tool 211300
408-7276	Extraction Tool 91019-3
408-7347	Insertion Tools 91002-1, -2
408-7414	Hand Crimping Tool 90225-2
408-7508	Insertion/Extraction Tools 91067-1 and 91067-2
408-7516	Application Tooling for Screw-Machine Contacts
408-7521	Hand Crimping Tool 90265-1
408-7582	Accessories for Circular Plastic Connectors (CPC)
408-7593	Circular Plastic Connectors (CPC)
408-7773	Straight Action Hand Tool 90331-1 for Type III(+) Contacts
408-7799	AMPLIMITE* Solder Pot Contacts 66569-3 and 66570-3
408-7942	Hand Crimping Tool 90310-2
408-7954	Hand Crimping Tool 90374-1
408-8040	Heavy Duty Miniature Quick-Change Applicators (Side-Feed Type)
408-9404	Insertion/Extraction Tool 91285-1 and Replacement Tip Kits 543382-[]
408-9819	PRO-CRIMPER* III Hand Crimping Tool Assembly 58495-1

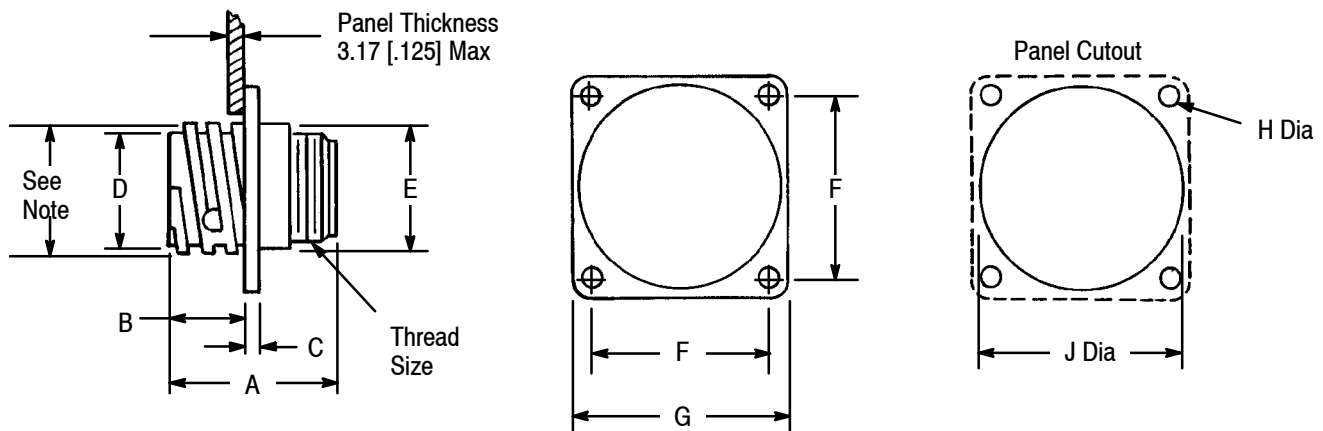
2.6. Manuals

Manual 402-40 is available upon request and can be used as a guide in soldering. This manual provides information on various flux types and characteristics along with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

3. REQUIREMENTS

3.1. Mounting Holes and Panel Cutouts

Dimensions and layout for mounting holes and panel cutouts are shown in Figure 2.



SERIES	ARRANGE- MENT NUMBER	SEX	A MAX	B ± 0.38 [.015]	C ± 0.25 [.010]	D ± 0.25 [.010]	E MAX	F ± 0.25 [.010]	G ± 0.64 [.025]	H $\pm 0.18/0$ [+.007/0]	J	THREAD SIZE
Series 1	11-4	Rev	27.18 [1.070]	10.67 [.420]	2.39 [.094]	17.45 [.687]	18.80 [.740]	21.44 [.844]	28.58 [1.125]	3.18 [.125]	21.34 [.840]	5/8-24 UNEF-2A
		Std	34.29 [1.350]									
	13-9	Std	34.29 [1.350]	10.67 [.420]	2.39 [.094]	20.62 [.812]	22.33 [.879]	24.61 [.969]	32.54 [1.281]	3.18 [.125]	24.87 [.979]	3/4-20 UNEF-2A
	17-14	Rev	27.18 [1.070]	10.67 [.420]	2.39 [.094]	26.67 [1.050]	28.19 [1.110]	28.58 [1.125]	36.45 [1.435]	3.81 [.150]	30.73 [1.210]	15/16-20 UNEF-2A
	17-16	Std	34.29 [1.350]									
	23-24	Std	34.29 [1.350]	13.21 [.520]	3.96 [.156]	36.53 [1.438]	38.35 [1.510]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-2A
Series 2	11-8	Std	27.18 [1.070]	10.67 [.420]	2.39 [.094]	17.48 [.688]	16.00 [.630]	21.44 [.844]	28.58 [1.125]	3.18 [.125]	21.34 [.840]	5/8-24 UNEF-2A
		Rev	20.55 [.809]									
	11-9	Std	20.55 [.809]	10.67 [.420]	2.39 [.094]	26.67 [1.050]	23.95 [.943]	28.58 [1.125]	36.45 [1.435]	3.81 [.150]	30.73 [1.210]	15/16-20 UNEF-2A
	17-28	Std	20.55 [.809]	10.67 [.420]	2.39 [.094]	26.67 [1.050]	23.95 [.943]	28.58 [1.125]	36.45 [1.435]	3.81 [.150]	30.73 [1.210]	15/16-20 UNEF-2A
		Rev	23.47 [.924]	10.67 [.420]	3.96 [.156]	36.53 [1.438]	38.48 [1.515]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-2A
	23-57	Rev	23.47 [.924]	10.67 [.420]	3.96 [.156]	36.53 [1.438]	38.48 [1.515]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-2A
	23-63	Std	23.47 [.924]	10.67 [.420]	3.96 [.156]	36.53 [1.438]	38.48 [1.515]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-2A
	23-63	Std	23.47 [.924]	10.67 [.420]	3.96 [.156]	36.53 [1.438]	38.48 [1.515]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-2A

Figure 2 (cont'd)

SERIES	ARRANGE- MENT NUMBER	SEX	A MAX	B ± 0.38 [.015]	C ± 0.25 [.010]	D ± 0.25 [.010]	E MAX	F ± 0.25 [.010]	G ± 0.64 [.025]	H $\pm 0.18/0$ [+.007/0]	J	THREAD SIZE
Series 3	17-3	Std	41.53 [1.635]	10.67 [.420]	2.39 [.094]	26.67 [1.050]	28.19 [1.110]	28.58 [1.125]	36.45 [1.435]	3.81 [.150]	30.73 [1.210]	15/16-20 UNEF-2A
	23-7	Rev	41.53 [1.635]	13.21 [.520]	3.96 [.156]	36.53 [1.438]	38.35 [1.510]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-SA
Series 4	23-16M	Std	41.53 [1.635]	13.21 [.520]	3.96 [.156]	36.53 [1.438]	38.35 [1.510]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-SA
	23-22M		41.53 [1.635]	13.21 [.520]	3.96 [.156]	36.53 [1.438]	38.35 [1.510]	36.53 [1.438]	44.45 [1.750]	3.81 [.150]	40.89 [1.610]	1-3/8-18 UNEF-SA

NOTE: The first number of the Arrangement Number represents the dimension (in sixteenths) over the threads; the number after the hyphen represents the number of circuits per connector.

Figure 2 (end)

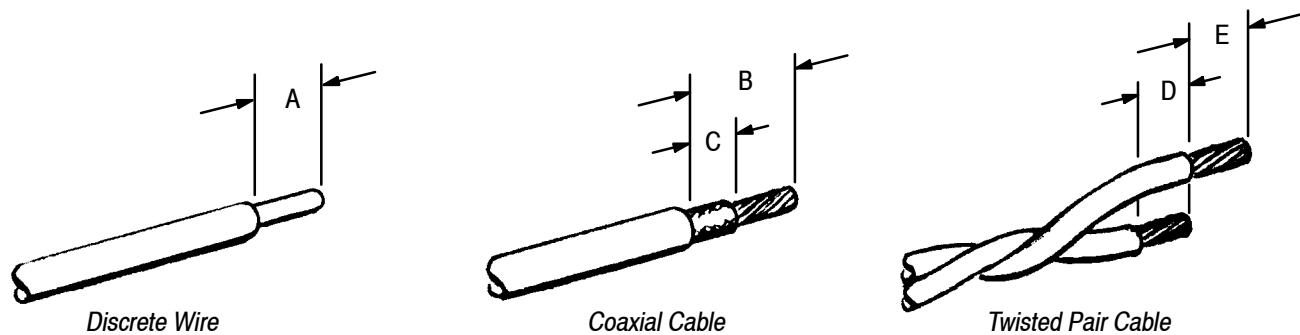
3.2. Wire Size and Preparation

Jacketed or discreet wire may be used with this product. Jacketed cable will provide more protection from damage. Look for information on jacketed cable sealing kits in Instruction Sheet 408-7582.

Contacts are available for the wire sizes specified. Prepare wire for crimping by stripping insulation according to dimensions in Figure 3. DO NOT nick, scrape, or cut the stranded or solid wire conductor during stripping operation.

NOTE


When using twisted pair cable, one wire should be cut shorter than the other by the same distance as the strip length of the longer wire (E).



WIRE SIZE RANGE (AWG)	CONTACT TYPE		WIRE STRIP LENGTH
30-14	III+	Crimp Type	3.96 [.156] (A)
		Solder Type	
26-16		Solder Type (With Preformed Wire Barrel Insulation Support)	
24-20	20 DM (Screw Machine)		3.56 [.140] (A)
28-20	20 DF Precision Formed	With Insulation Support	2.54 [.100] (A)
		Without Insulation Support	2.77 [.109] (A)
28-20	20 DF (Solder Pot)		3.58 [.141] (A)
16-18	XIII		7.14 [.281] (A)
Coaxial Cable	Subminiature COAXICON		Cable Jacket 8.74 [.344] (B) Center Conductor 5.56 [.219] (C)
Twisted Pair 30-28			Short Wire 3.18 [.125] (D) Long Wire 5.56 [.219] (E)

Figure 3

3.3. Loading Contact into Housing

Normally an insertion tool is not required to insert contacts into housings. However, if the wire bundle is large or the individual wires are fragile, the use of an insertion tool is recommended. Refer to Section 5, TOOLING.

3.4. Shield and Strain Relief

If wire at the rear of the housing is subjected to strain, use of a strain relief will prevent damage to the contacts, wires, and housing.

A. Strain Relief Kits

Several types and sizes of strain relief kits are available. Shield and strain relief kits include a shield, strain relief clamps, and two self-tapping screws. They can be attached to the plug and/or receptacle of free-hanging or panel-mounted connectors. Flexible strain relief boots and grippers are used with jacketed cable (or firmly taped discreet wires) to provide wire protection and prevent contact pullout when severe cable-angle applications are encountered, or when connectors are frequently disconnected and reconnected. See Figure 4. Heat shrink sealing boots can also provide a splash-proof strain relief for jacketed cable. See Paragraph 3.4. B.

NOTE

If a strain relief is used on the connector, the wires may be dressed to an angle at the end of the strain relief. However, without use of a strain relief, the wires should not be dressed closer than 63.5 mm [2.50 in.] from the back of the housing. To prevent damage to contacts and/or housing, avoid exerting stress on wire.

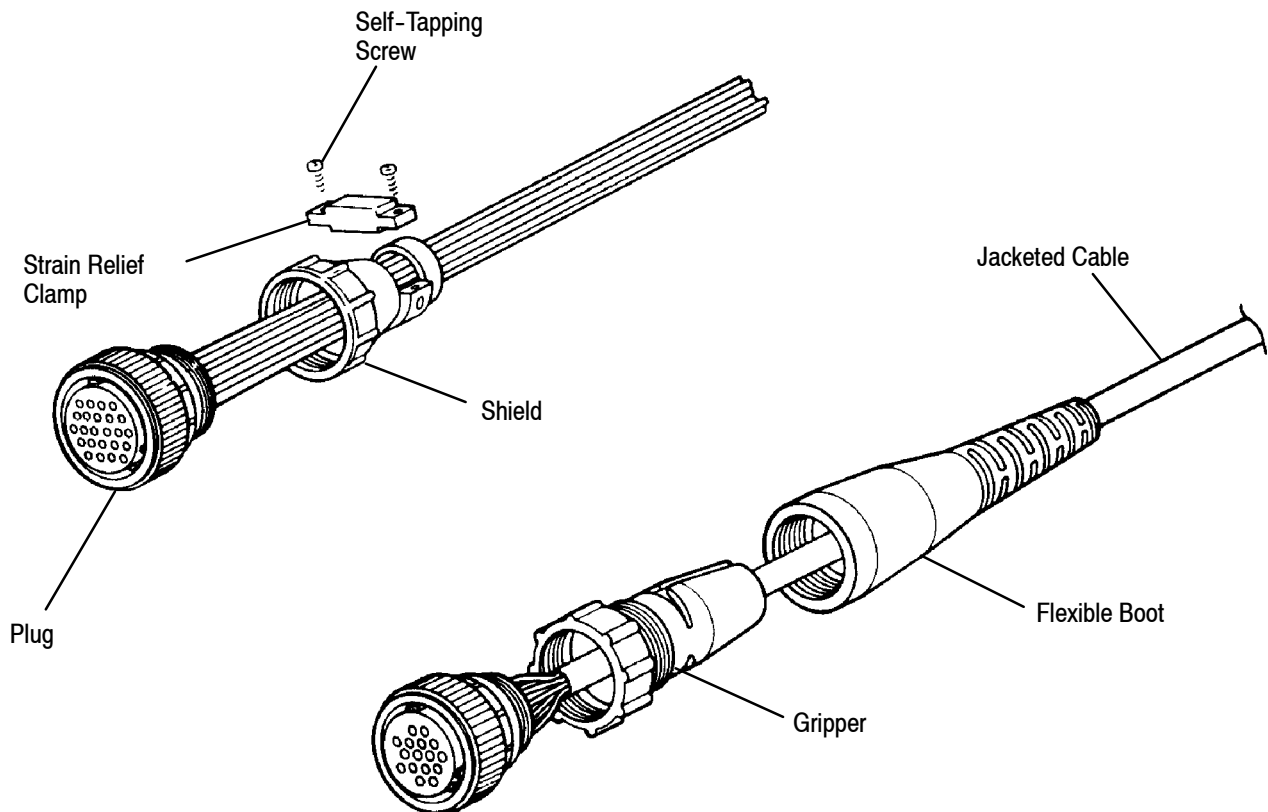
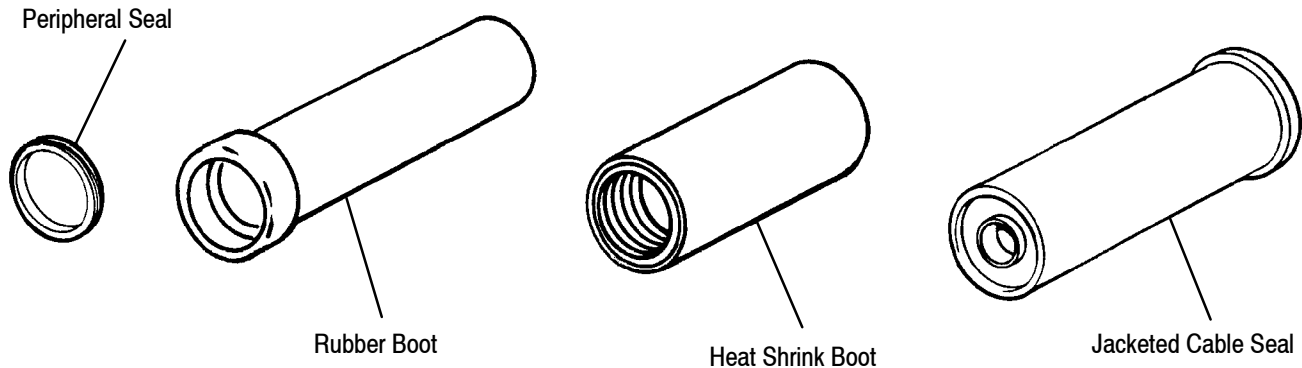


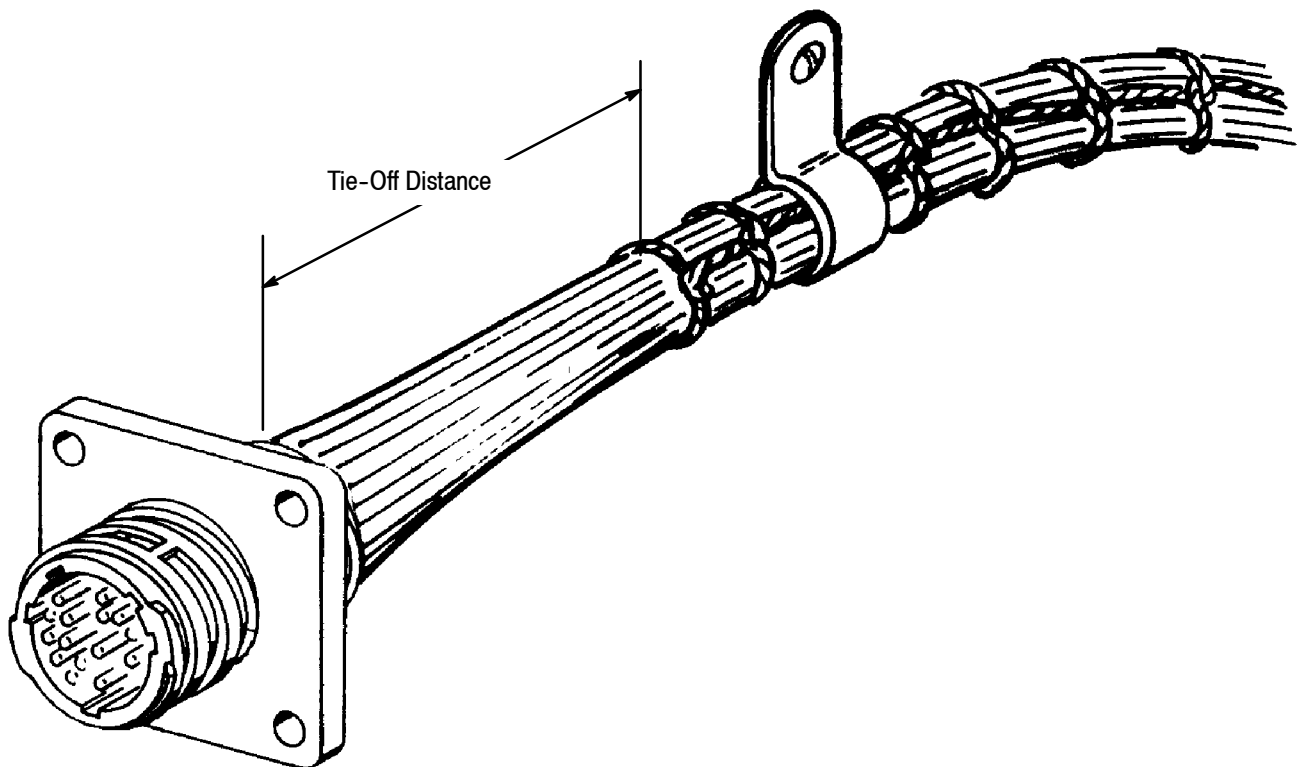
Figure 4

B. Boots and Seals (See Figure 5)

Rubber boots are available and can be used with jacketed cable to provide splash-proof connections for Series 1 and Series 3 connectors. Heat shrinkable sealing boots are available for use with jacketed cable. They will provide an environmentally sealed wire to-connector system and can be used with plugs or receptacles. A jacketed cable seal will also provide an environmentally sealed connection for jacketed cable. Peripheral seals (for receptacles only) are recommended for use in sealing splash-proof applications, or where connectors will be subject to vibration. Instruction material is included in shipments.

*Figure 5***C. Cable Bundle Tie- Off**

When no strain relief is used and wires need to be tied off, tie-off distance should be 50.8 mm [2.00 in.] minimum for up to 12 circuits and 76.2 mm [3.00 in.] minimum for 12 circuits or more. Supporting the cable with wire harness tie-off will avoid strain on the contact retention system, and will prevent contact back-out or failures. See Figure 6.

*Figure 6*

3.5. Polarizing and Keying Features

A. Mating

To prevent accidental disengagement, the CPC's have a positive lock feature. They are designed with polarizing keys and keyways for easy alignment.

NOTE

Align polarizing keys and keyways and insert plug into receptacle; rotate coupling ring clockwise until positive lock snaps into position.

B. Keying Plugs

Use of keying plugs provides keying capabilities for all connector series. Keying plugs are used in socket cavities of standard sex plugs and reverse sex receptacles. They are available in three configurations. See Figure 7.

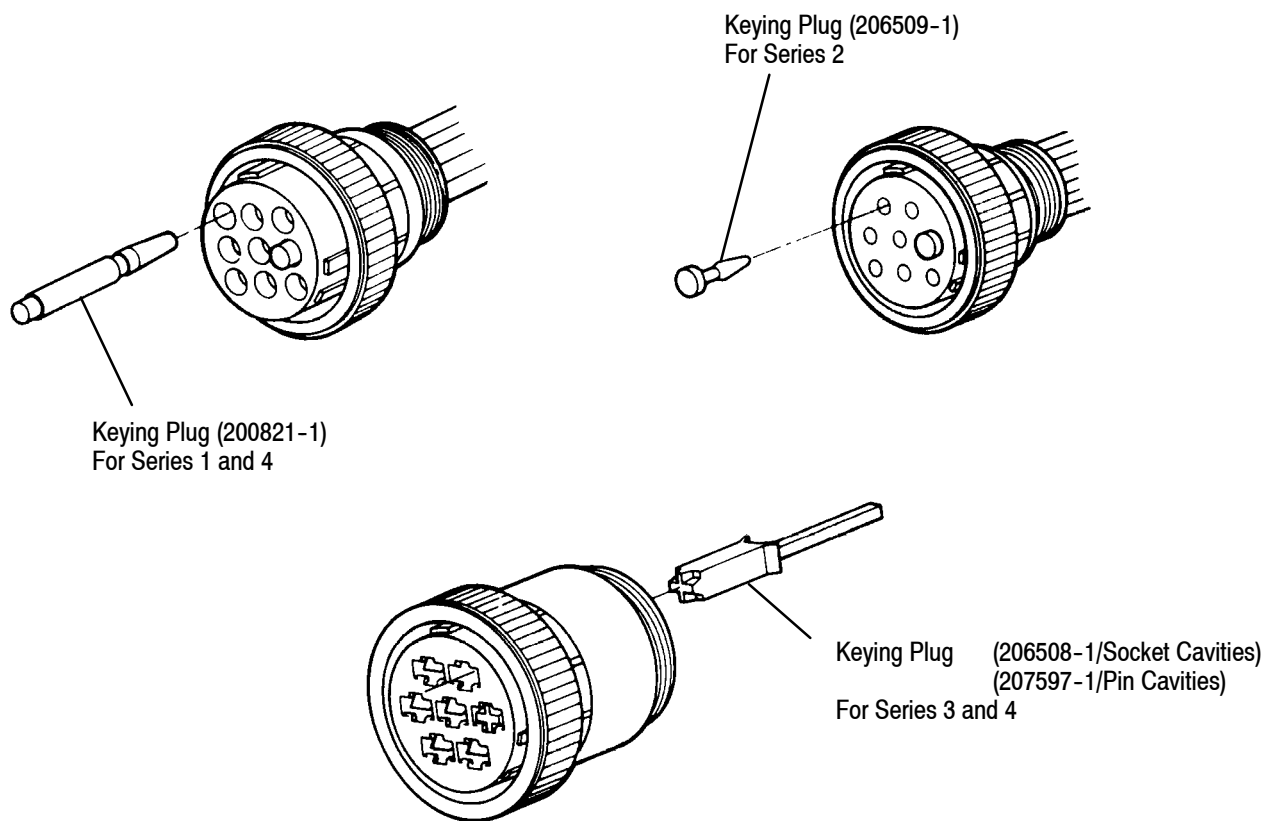


Figure 7

3.6. Contact Crimp Criteria

Contacts must be crimped to a designated height. Refer to the specific Application Specification for particular type of contacts.

3.7. Connector Application

Receptacle connectors are available with mounting flanges for front or rear panel-mount applications, and without flanges for free-hanging applications. Refer to Paragraph 2.5 for applicable instruction sheets on mounting connectors. Square flange receptacles which are pre-loaded with square posted contacts are available.

3.8. Soldering and Cleaning (Solder Pot Contacts Only)

A. Flux Selection

Solder pot contacts must be fluxed prior to soldering. Selection of flux must be compatible with the solder method used, and safety requirements.

B. Cleaning

Removal of fluxes, residues, and activators is mandatory. Cleaning procedures will depend on the type of flux used.

DANGER

Consideration must be given to toxicity and safety requirements recommended by the solvent manufacturer.

NOTE

Consult your local Tyco Electronics Representative for suitable cleaning solvents that can be used with these connectors.

C. Drying

When drying cleaned assemblies, make certain the temperature limitations of -55° to 105° C [-67° to 221° F] are not exceeded. Excessive temperatures may cause housing degradation.

D. Soldering Guidelines

Refer to Paragraph 2.6. for instruction material that is available for establishing soldering guidelines.

3.9. Repair

CAUTION

Care must be exercised to prevent damage to coupling rings of free-hanging connectors.

A. Coupling Ring Replacement

In the event it becomes damaged, the coupling ring, an integral part of the plug housing, can be replaced. Look for instruction sheet information under Paragraph 2.5 of this document.

B. Contacts

Crimped wire contacts as well as solder pot contacts are repairable. Find instructions in applicable Instruction Sheet listed in Paragraph 2.5.

4. QUALIFICATIONS

The Circular Plastic Connector is Recognized in the Component Program of Underwriters Laboratories Inc. (UL), for 250-Volt service, File No. E28476. Each CPC Assembly has a UL flammability rating of 94 V-1. They are CSA International Certified in File No. LR7189. Some connectors are recognized for 600-Volt service. Consult Tyco Electronics for more details.

5. TOOLING

Hand crimping tools and applicators are available for applying crimp type contacts, also Insertion tools and extraction tools assist in assembly and repair. Instruction Sheets describing tool operations, are packaged with the tool. See Figure 8.

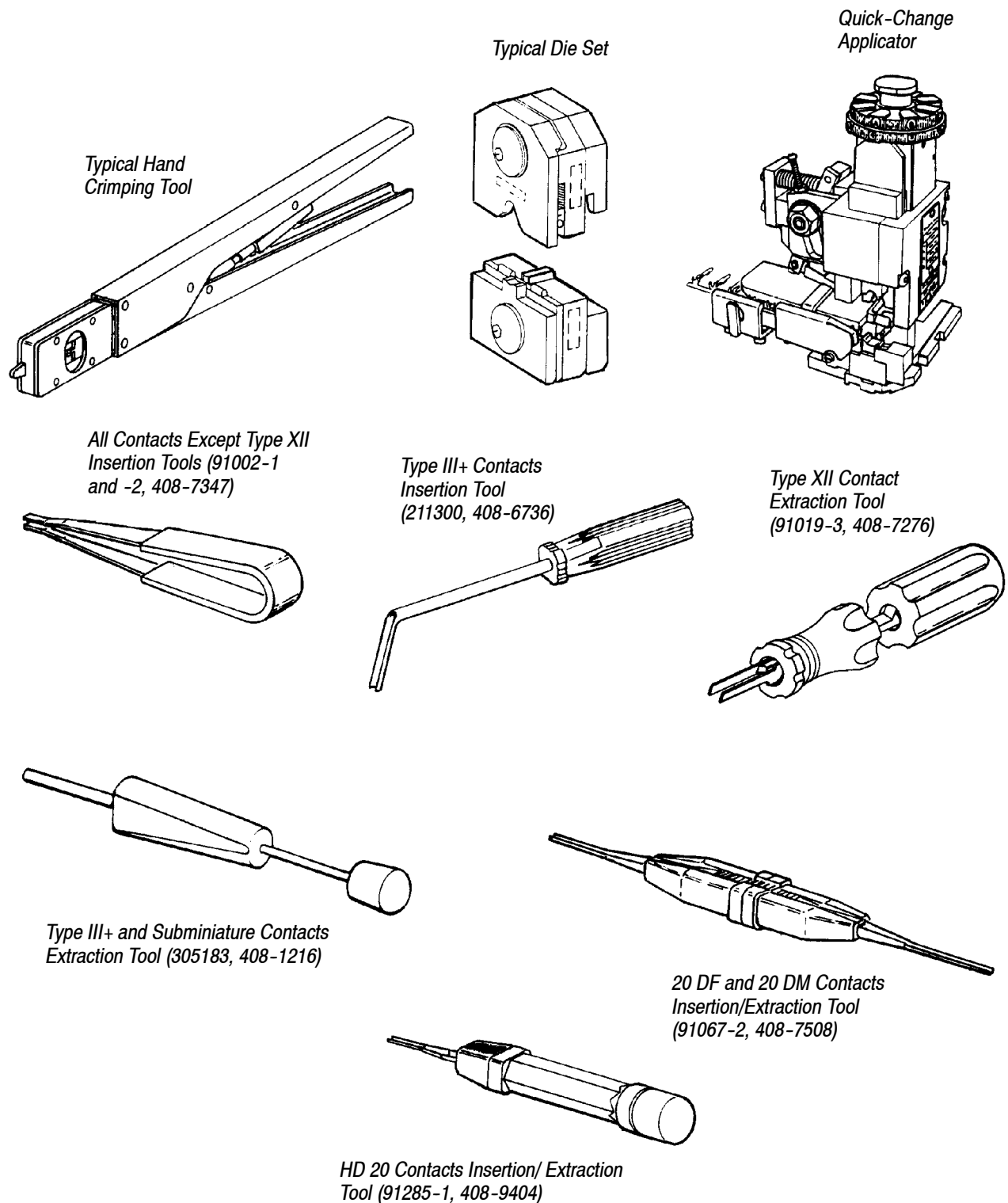


Figure 8 (cont'd)

CONTACT TYPE	WIRE SIZE RANGE (AWG)	TOOLING (DOCUMENT)		
		HAND TOOL	APPLICATOR (408-8040)	POWER UNIT GROUPS■
III+	30-20	90066-7 (408-6510)	466598-2	K
		90225-2 (408-7414)	466585-3	K
	26-24	---	466321-4	K
		---	466908-2	S
	24-20	---	466323-4	K
		---	466907-2	S
		---	466324-2	K
		---	466942-1	S
		---	466383-2	K
	24-16	90067-4 (408-6613)	---	---
		90067-5 (408-6614)	---	---
	18-16	---	466325-2	K
		---	466906-1	S
	18-14	90310-2 (408-7942)	466752-2	K
		90310-3 (408-9387)	466958-1	S
		---	466326-4	K
		---	466923-2	S
20 DF	28-24	90312-1 (408-7694)	466423-1	O
		90374-1 (408-7954)	466423-2	K
		90265-1 (408-7521)	466506-2	K
		---	466903-1■	S
		---	466901-1	S
		---	466758-1	O
		---	466758-2	K
		---	466963-1	S
	26-22	90406-1 (408-6709)	567036-1	O
		---	567036-2	K
	24-20	---	466422-1	O
		---	466422-2	K
		---	466900-1	S
		---	466505-1	O
		---	466505-2	K
		---	466902-1■	S
	22-18	90405-1 (408-6695)	567033-1	O
		---	567033-2	K
20 DM	24-20	601966-1 (408-7516)	599406-7▲	---

■Contact the Tooling Assistance Center number at the bottom of page 1 for available power units for the specific applicators

■Stripper/Crimper Applicator

▲AMP-TAPEMATIC* Stripper/Crimper Machine Requiring a Funnel

Figure 8 (cont'd)

CONTACT TYPE	WIRE SIZE RANGE (AWG)	TOOLING (DOCUMENT)		
		HAND TOOL	APPLICATOR (408-8040)	POWER UNIT GROUPS■
XII	16	90145-2 (408-7175)	---	---
	16-12	90382-2 (408-6561)	567455-2	K
		---	567455-1	O
	14-12	90145-1 (408-7175)	---	---
	10-8	90140-1 (408-7175)	567021-2	K
		90384-1 (408-6510)	---	---
Subminiature COAXICON	28 Twisted Pair (Solid)	69690 (408-2024-3)	---	---
	26 Twisted Pair (Solid or Stranded)		---	---
	28 Twisted Pair (Stranded)	69690-1 (408-2024-3)	---	---
		69690-2 (408-2024-3)	---	---
	30 Twisted Pair (Solid)	69690-2 (408-2024-3)	---	---
		69710-1 (408-2095)	---	---

■Contact the Tooling Assistance Center number at the bottom of page 1 for available power units for the specific applicators.

Figure 8 (end)

6. VISUAL AID

Figure 9 shows a typical application of Circular Plastic Connectors. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

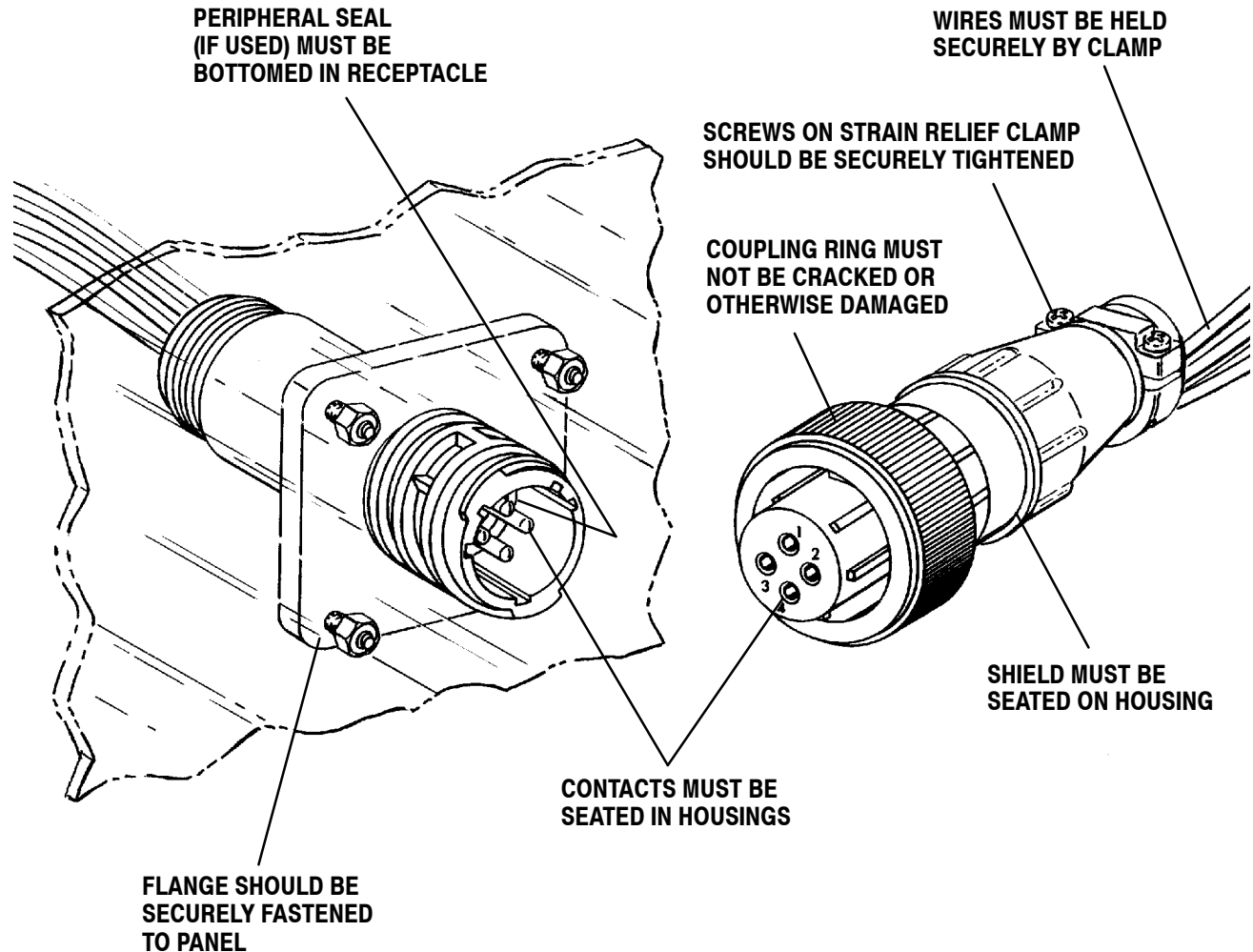


FIGURE 9. VISUAL AID