



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  $\pm 0.13$  [ $\pm .005$ ] and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not drawn to scale.

## 1. INTRODUCTION

This specification covers the requirements for application of FAKRA-compliant SMB 50-Ohm Inline Connectors for use in motor vehicle radio frequency interfaces. These connectors are available in jack assemblies and plug assemblies. The jacks are available in 1 position, and the plugs are available in 1 or 2 position.

Each connector consists of a housing and a lock, and one (1 position) or two (2 position): sub-assembly, ferrule, and pin contact (jack assembly) or socket contact (plug assembly). When assembled, the lock secures the terminated sub-assembly to the housing. Each connector has locking feature (jack has locking tab and plug has locking latch) to ensure full mating. The plug assembly has integral keys, and the jack assembly is available with or without integral keying ribs (the jack must have keying ribs for keying of assemblies). Keying is used for inadvertent mating of similar assemblies. These connectors are terminated using hand or automatic machine crimping tools.

When corresponding with personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

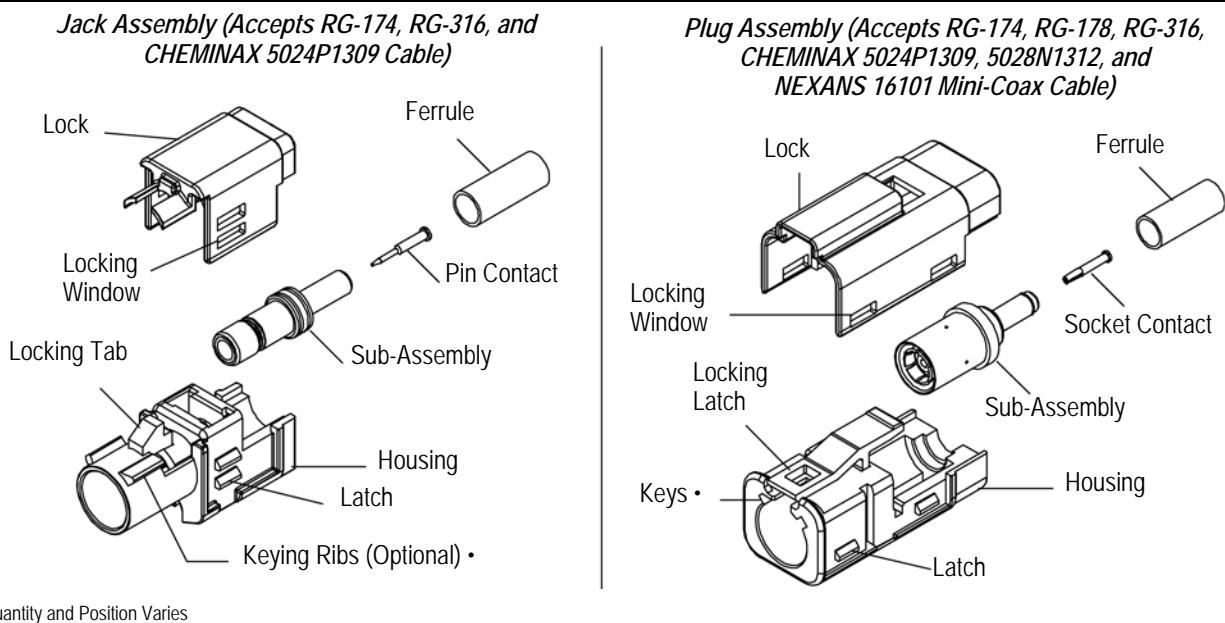


Figure 1

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

This document has been updated to include the latest company logo and to remove RG-58 cable information..

FAKRA is Fachkreis Automobil -- DIN Standardization Committee of Motor Vehicles (FAKRA) 70010

## 2.2. Customer Assistance

Reference Product Base Part Number 638831 and Product Code D955 are representative of FAKRA-SMB 50-Ohm Inline 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 TE representative or, after purchase, by calling Product Information at the number at the bottom page 1.

## 2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the customer drawings and this specification or with any other technical documentation supplied, call Product Information at the number at the bottom of page 1.

## 2.4. Specifications

Product Specification 108-2115, and Product Specifications 108-2054 and 108-2141, provide product performance and test information. Application Specification 114-13043 provides product description and application requirements for related mating connectors. These connectors are compatible with Military Standard (MIL-STD)-348, "Radio Frequency Connector Interfaces", ISO TC22/WG5N44E, SAE/USCAR-17, and SAE/USCAR-18.

## 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. 409-series documents (customer manuals) provide setup, operation and maintenance of machines.

- 408-7424 Checking Terminal Crimp Height or Gaging Die Closure
- 408-8414 FAKRA SMB 50-Ohm R/A PC Board 1-Position Jack Assembly 638817-[ ]
- 408-8426 FAKRA-Compliant SMB 50-Ohm Inline Jack Kit 638831-[ ]
- 408-8427 FAKRA-Compliant SMB 50-Ohm Right-Angle PC Board 2-Position Jack Assembly 638818-[ ]
- 408-8428 FAKRA-Compliant SMB 50-Ohm Inline Plug Kit 638832-[ ], 1326159-[ ], and 1488335-[ ]
- 408-9159 PRO-CRIMPER\* III Hand Crimping Tool 58433-2 f/50-Ohm Hex Crimp Plugs and Jacks
- 408-9657 75-Ohm Hex Crimp Die Assemblies 58425 and 58436
- 408-9830 PRO-CRIMPER III Hand Tool Assembly 58499-1 with Die Assembly 58483-1
- 408-9930 PRO-CRIMPER III Hand Crimping Tool Frame Assembly 354940-1

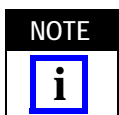
## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Limitations

The connectors are designed to operate in a temperature range of -40° to 100°C [-40° to 212°F].



*Temperature rating of the coaxial cable must be considered when determining operating temperature of the connector and cable assembly.*

### 3.3. Material

#### A. RG-316/RG-174/CHEMINAX 5024P1309 Jack Kit

The lock and housing are polybutylene terephthalate (PBT), UL94-V-0. The shell of the sub-assembly is zinc plated with tin over nickel over copper flash and the dielectric is polytetrafluorethylene. The pin contact is brass plated with gold over nickel. The ferrule is copper plated with nickel.

CHEMINAX is a trademark.

### B. RG-316/RG-174/CHEMINAX 5024P1309 Plug Kit

The lock and housing are PBT, UL94-V-0. The shell of the sub-assembly is zinc plated with tin over nickel over copper flash; the retaining ring is brass plated with tin over nickel; the outer contact is beryllium copper plated with tin over nickel; and the dielectric is PBT. The socket contact is beryllium copper plated with gold over nickel. The ferrule is made of copper plated with nickel.

### C. RG-178/CHEMINAX 5028N1312/NEXANS 16101 Mini-Coax Plug Kit

The lock and housing are PBT, UL94-V-0. The shell of the sub-assembly is brass plated with tin over nickel over copper flash; the retaining ring is brass plated with tin over nickel; the outer contact is beryllium copper plated with tin over nickel; and the dielectric is PBT. The socket contact is beryllium copper plated with gold over nickel. The ferrule is made of copper plated with nickel.

## 3.4. Storage

### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the connectors.

### B. Reeled Contacts

When using tape-mounted reeled contacts, care must be taken to prevent stretching, sagging, or other distortion that would prevent smooth feeding of the reeled product through automatic machine feed mechanisms. Store coil wound reels horizontally and traverse wound reels vertically.

### C. Shelf Life

The connectors should remain in the shipping containers until ready for use to prevent deformation to the contacts. The connectors should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

### D. Chemical Exposure

Do not store connectors near any chemical listed below as they may cause stress corrosion cracking in the contacts.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

## 3.5. Cable Selection and Preparation

### A. Selection

Jacks are available to fit RG-174, RG-316, and CHEMINAX 5024P1309 cables. Plugs are similarly available including RG-178, CHEMINAX 5028N1312, and NEXANS 16101 Mini-Coax Cables.

**NOTE** *CHEMINAX coaxial cable can be obtained by contacting Raychem Division of TE Product Information at 1-800-272-9243. NEXANS coaxial cable can be obtained by contacting Berk-Tek Electronics Division of NEXANS at 252-236-4311.*

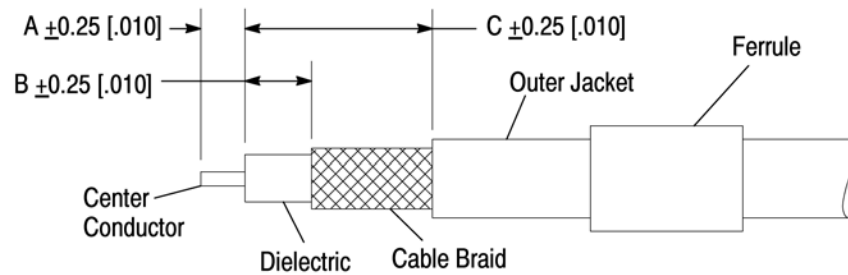
### B. Preparation

- 1) The ferrule must be installed onto the cable.
- 2) Proper strip length is necessary to properly apply the cable to the contact. See Figure 2.

**CAUTION** *Reasonable care must be taken not to nick, scrape, or cut any strands during the stripping operation.*

- 3) The cable braid must be flared.

NEXANS is a trademark.



CONNECTOR	CABLE SIZE (R/U)	DIMENSION $\pm 0.25$ [ $\pm .010$ ]		
		A	B	C
Jack Assembly	RG-174, RG-316, CHEMINAX 5024P1309	3.25 [.128]	2.45 [.096]	9.65 [.380]
Plug Assembly	RG-174, RG-316, CHEMINAX 5024P1309	3.25 [.128]	3.75 [.148]	10.95 [.431]
	RG-178, CHEMINAX 5028N1312 Cable, NEXANS 16101 Mini-Coax (Refer to Paragraph 3.5.A)	3.25 [.128]	3.86 [.152]	10.21 [.402]

Figure 2

### 3.6. Crimped Contact Requirements

Crimp center contact onto center conductor of cable (see Figure 3). Refer to instructions packaged with crimp tooling for appropriate procedures.

#### A. Wire Barrel Crimp

The crimp applied to the wire barrel is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The contact wire barrel crimp height must be within the dimension provided in Figure 3.

#### B. Effective Crimp Length

For optimum crimp effectiveness, the crimp must be within the area shown in Figure 3. Effective crimp length shall be defined as that portion of the wire barrel, excluding bellmouth(s), fully formed by the crimping tool. Instructions for adjusting, repairing, and inspecting tools are packaged with the tools. See Section 5, TOOLING.

**RG-316, RG-174, RG-178, CHEMINAX 5028N1312, NEXANS 16101 Mini-Coax Contact Crimp Requirements**

Note: Pin contact shown. These requirements apply equally to the socket contact.

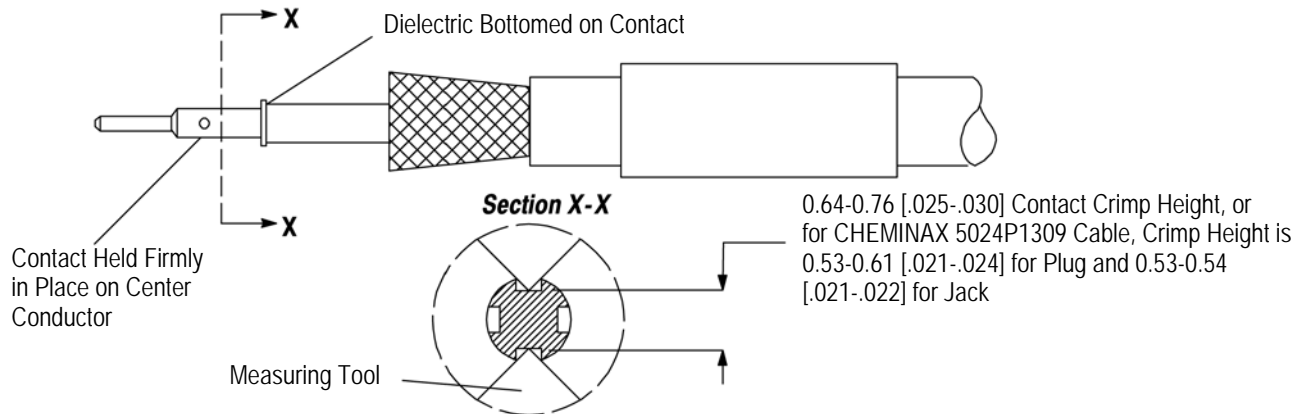


Figure 3

**C. Bellmouths**

Front and rear bellmouths must be evident and conform to the dimensions given in Figure 3.

**D. Cutoff Tabs**

The cutoff tab shall be cut to the dimensions shown in Figure 3.

**E. Burrs**

The cutoff burr shall not exceed the dimensions shown in Figure 3.

**F. Wire Barrel Flash**

The wire barrel flash shall not exceed the dimensions shown in Figure 3, Section X-X.

**G. Conductor Extension**

The conductor must extend beyond the wire barrel, but less than the maximum shown.

**H. Wire Barrel Seam**

The wire barrel seam must be closed with no evidence of wire visible in the seam.

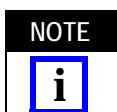
**I. Twist and Roll**

There shall be no twist, roll, deformation or other damage to the mating portion of the crimped contact that will impair usage of the contact. See Figure 3.

**J. Straightness**

The force applied during crimping may cause some bending between the crimped wire barrel and the mating portion of the contact. Such deformation is acceptable within the limits provided in Figure 4.

- 1) The up and down bend of the crimped contact, including cutoff tab and burr, shall not be bent above or below the datum line more than the amount shown.
- 2) The side-to-side bend of the contact may not exceed the limits provided.



*Periodic inspections must be made to ensure crimped contact formation is consistent as shown.*

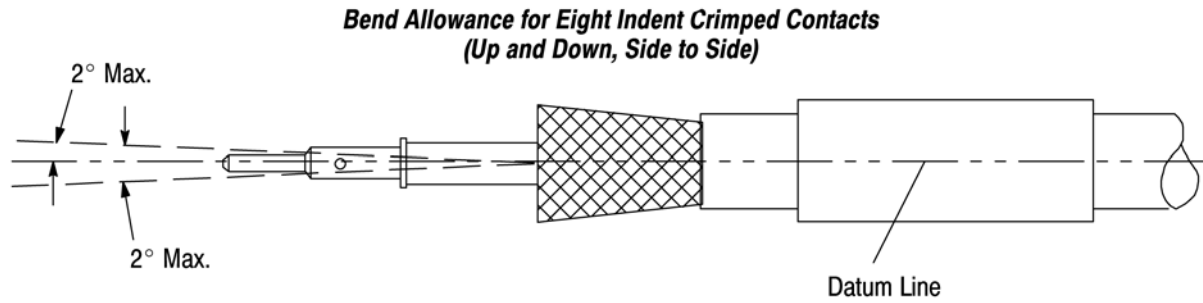
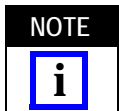


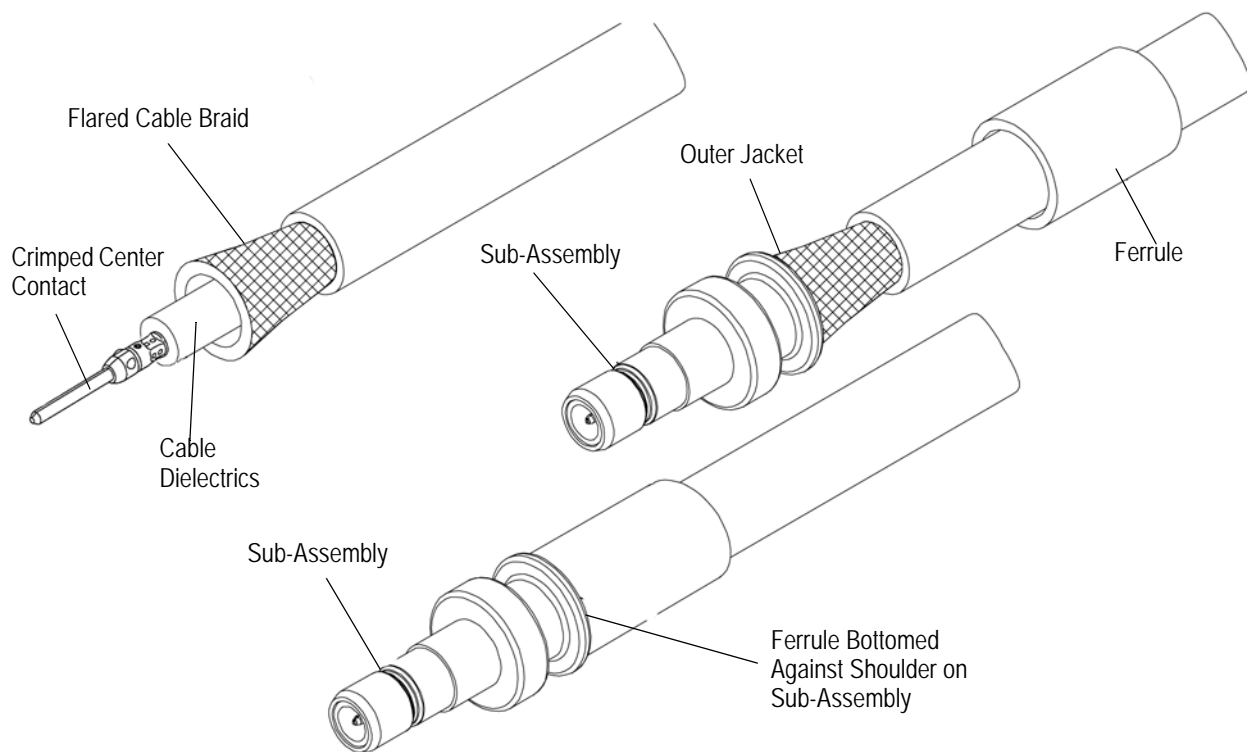
Figure 4

### 3.7. Center Contact to Sub-Assembly Procedures

After the center contact is crimped onto the center conductor, the braid must be flared outwards, away from the coaxial cable dielectric. The center contact is then pushed into the wire end of the sub-assembly. The contact is press-fit into the sub-assembly dielectric. The contact must be pushed forward until it is firmly seated against the dielectric. Slide the ferrule until it bottoms against the shoulder of the sub-assembly. See Figure 5. After this process is complete, the ferrule crimping procedures may begin.



*RG-178, CHEMINAX 5028N1312, and NEXANS 16101 Mini-Coax sub-assembly does not incorporate a press-fit dielectric due to the coaxial cable weak column strength.*



**NOTE:** F-Crimp Shown. NOT 4/8 Indent Crimp

Figure 5

### 3.8. Crimped Ferrule Requirements

The ferrule must be crimped to the cable braid and connector sub-assembly according to instructions packaged with applicable tooling. The crimped ferrule must meet the requirements shown in Figure 6.

#### A. Braid Distribution

The braid must be evenly distributed over the tail end of the sub-assembly.

#### B. Positioning the Ferrule

The ferrule must be positioned over the braid and bottomed against the shoulder of the sub-assembly.

#### C. Ferrule Crimp

The crimp applied to the ferrule is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped ferrule. The crimp height must be within the dimensions provided in Figure 6.

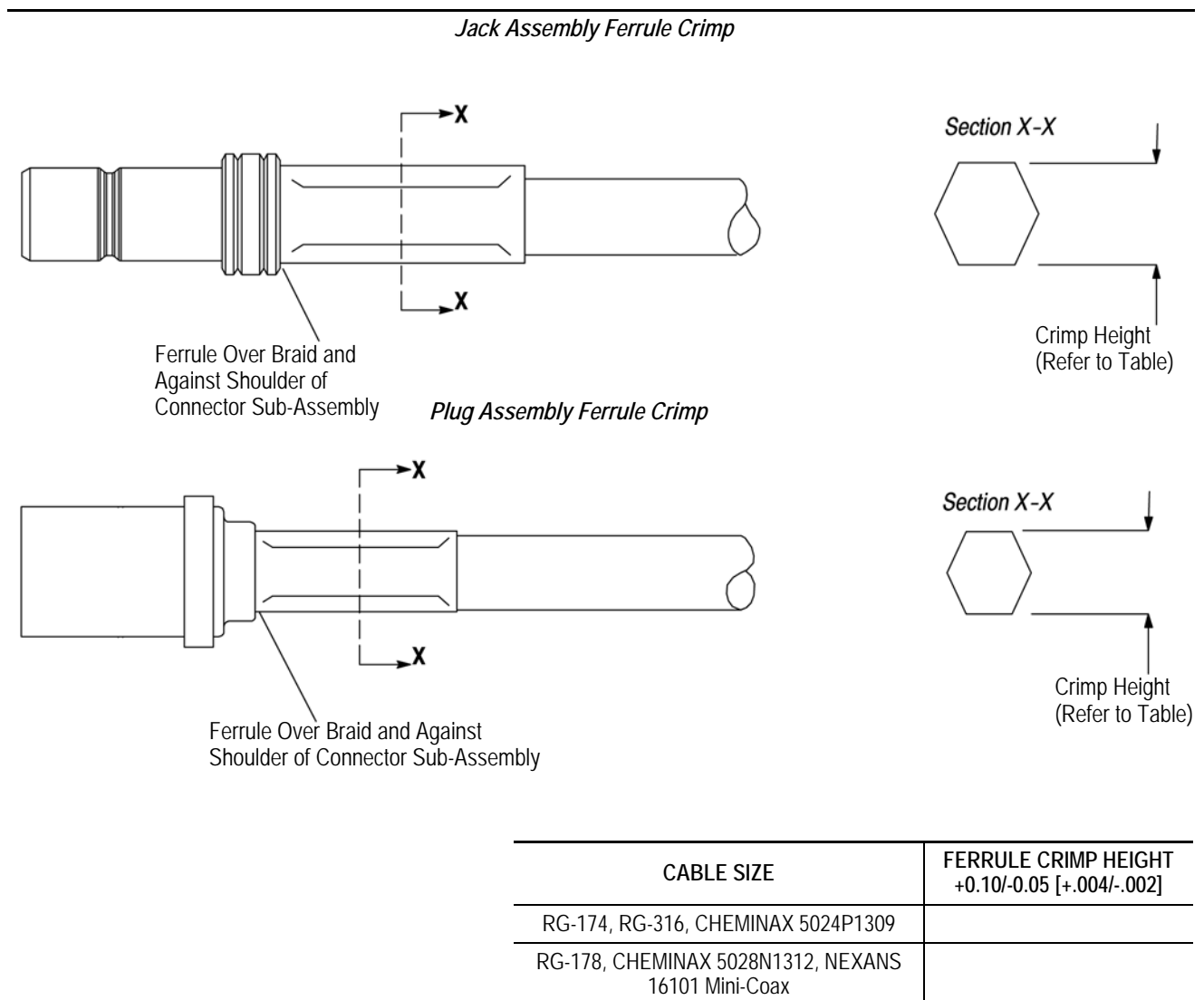


Figure 6

### 3.9. Lock and Housing Assembly

The terminated connector sub-assembly must be installed into the housing, and the lock must be assembled onto the housing. The assembled connector must meet the following requirements. See Figure 7.

- The terminated sub-assembly must be fully seated in the housing.
- The collar of the sub-assembly must bottom on the stop in the housing.
- The ferrule must not protrude from the back of the housing.
- All latches must be fully engaged with the locking windows.

### 3.10. Keying

Keying prevents inadvertent mating of similar assemblies. The keying rib position (jack assembly) must be compatible with the key position (plug assembly). The quantity and position of the keying combinations varies. Keying information is defined on the customer drawing for the specific connector.

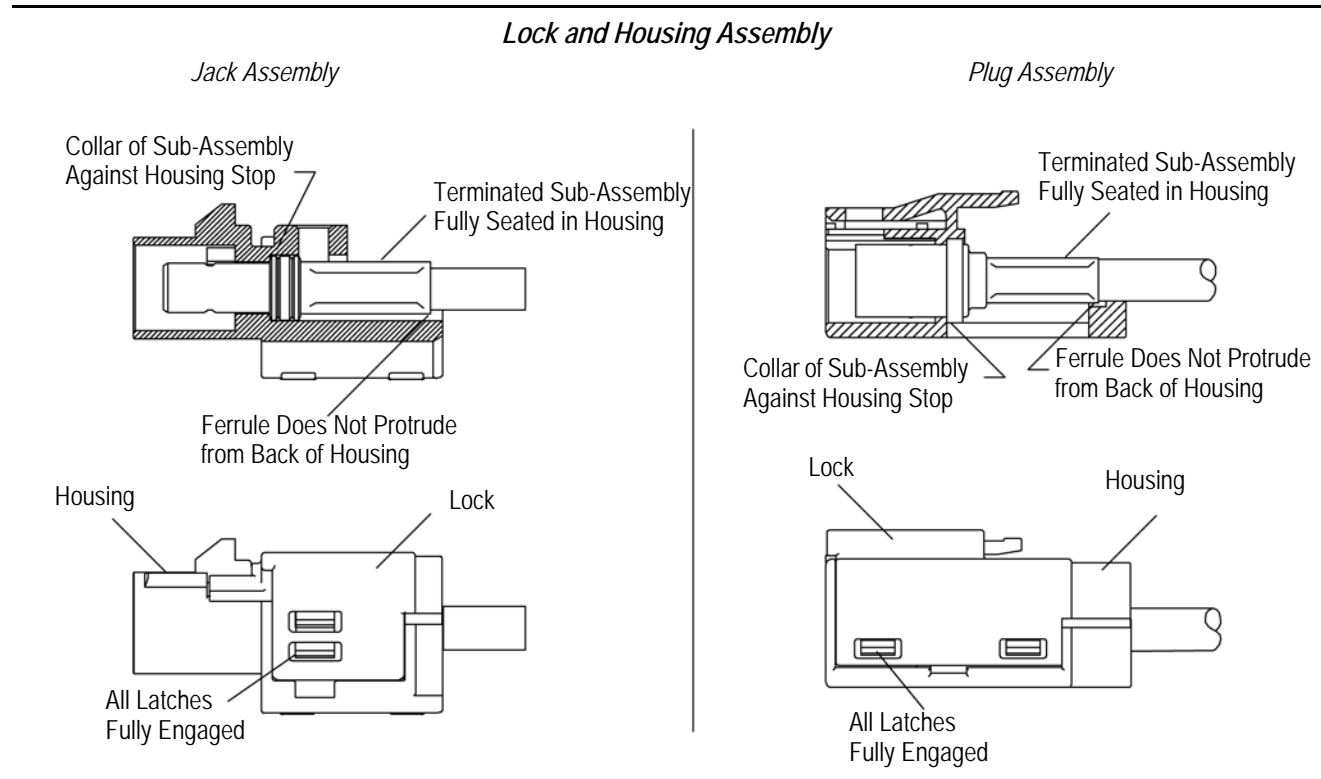


Figure 7

### 3.11. Mating Connectors

After mating, the plug assembly locking latch must be latched and fully seated on the jack assembly locking tab.

### 3.12. Strain Relief

When bending or forming wires, hold the wire bundle at least 6.35 mm [.250 in.] beyond the back of the housing before bending in any direction. If the installation is to be subject to bending forces, strain relief should be provided on the wire bundle approximately 25.4 mm [1.0 in.] from the back of the housing.



*DO NOT bend unsupported wires as this may cause strain on the contact inside the sub-assembly.*



### 3.13. Repair/Replacement

These connector components are not repairable. Any damaged components must be replaced. Terminated contacts, ferrules, or sub-assemblies must NOT be re-used by removing the cable.

## 4. QUALIFICATIONS

FAKRA-Compliant SMB 50-Ohm Inline Connectors are not required to be agency approved.

## 5. TOOLING

Contacts and ferrules which are used in the FAKRA-Compliant SMB 50-Ohm Inline Connectors can be terminated to wire using hand, semi-automatic, or automatic crimping tools. Recommended tooling is provided in Figure 8.



*TE Tooling Engineers have designed machines for a variety of application requirements. For assistance in setting up prototype and production line equipment, contact TE Tool Engineering through your local TE Representative or call the Tooling Assistance Center number at the bottom of page 1.*

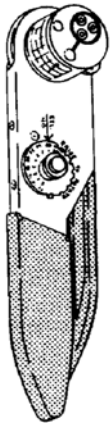
- **Hand Crimping Tool**

Hand crimping tools that accommodate the full wire size range are designed for prototype and low-volume applications such as repair of damaged contacts. PRO-CRIMPER III hand crimping tool assembly is available to crimp the ferrule; and the DMC (military) tool, positioner, and die sets are available to crimp the screw-machine pin or contact, and ferrule.

- **Crimping Die Assemblies**

Crimping Die Assemblies for crimping the contacts are available for the full wire size range. They are designed for easy installation and removal in hand crimping tool frame assemblies or applicators.

DMC is Daniels Manufacturing Company (military-style tool).



*DMC (Military) Tool and Positioner*

CENTER CONTACT TERMINATION TOOLING				
PRODUCT SELECTION			TOOLING SELECTION	
CONNECTOR	CENTER CONTACT	CABLE	HAND TOOL	POSITIONER OR DIE SET
Jack	Pin	RG-174, RG-316, CHEMINAX 5024P1309	AFM8, DMC (Military) M22520/2-01	K1041
Plug	Socket	RG-174, RG-316, RG-178, CHEMINAX 5024P1309, CHEMINAX 5028N1312, NEXANS 16101 Mini-Coax	AFM8, DMC (Military) M22520/2-01	K699



*DMC (Military) Tool and Die*



*PRO-CRIMPER III  
Hand Crimping Tool  
Assemblies 58433-2  
or 58499-1*

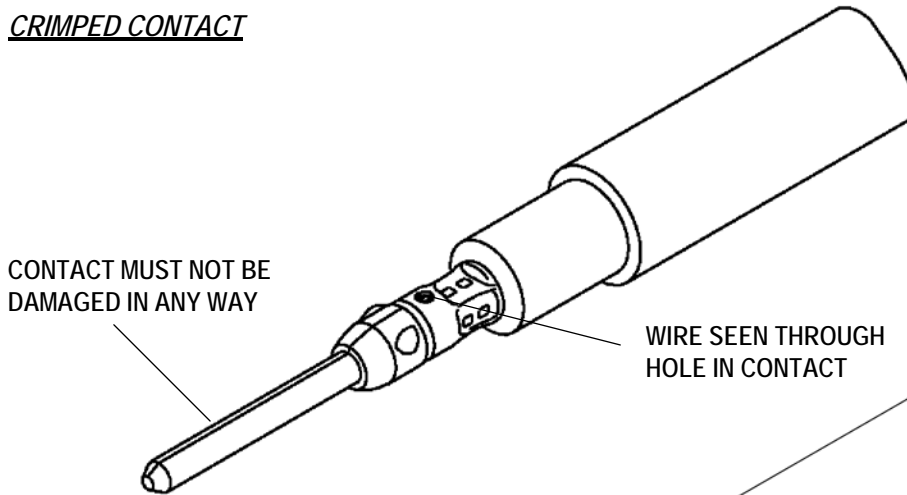
FERRULE TERMINATION TOOLING (w/APPROPRIATE DOCUMENT)					
PRODUCT SELECTION			TOOLING SELECTION		
CONNECTOR	CENTER CONTACT	CABLE	HAND TOOL	HEX DIE SET	HAND TOOL WITH DIE SET
Jack	Pin	RG-174, RG-316, CHEMINAX 5024P1309	Daniels HX4, or Military M22520/05-01, or PRO-CRIMPER III 354940-1 (408-9930)	Daniels Y-1637, or 58483-1 (408-9830)	58499-1 (408-9830)
Plug	Socket	RG-174, RG-316, RG-178, CHEMINAX 5024P1039, 5028N1312, NEXANS 16101 Mini-Coax	Daniels HX4, or Military M22520/05-01, or PRO-CRIMPER III 354940-1 (408-9930)	Daniels Y-1637, or 58483-1 (408-9830)	58499-1 (408-9830)

Figure 8

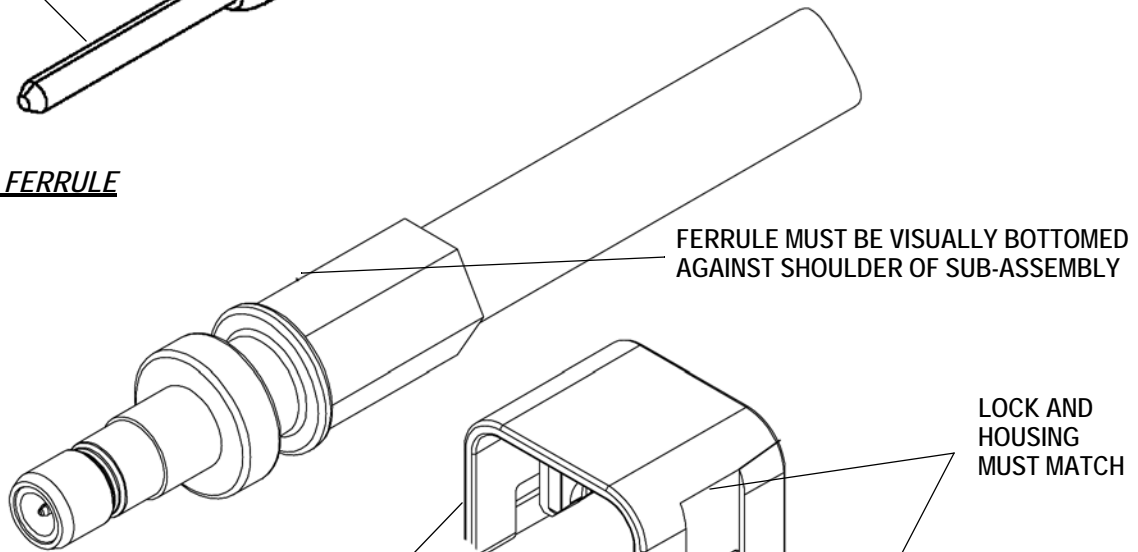
6. VISUAL AID

Figure 9 shows a typical application of FAKRA-Compliant SMB 50-Ohm Inline 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.

CRIMPED CONTACT



CRIMPED FERRULE



LOCK AND HOUSING

COMPONENTS MUST NOT BE DAMAGED IN ANY WAY

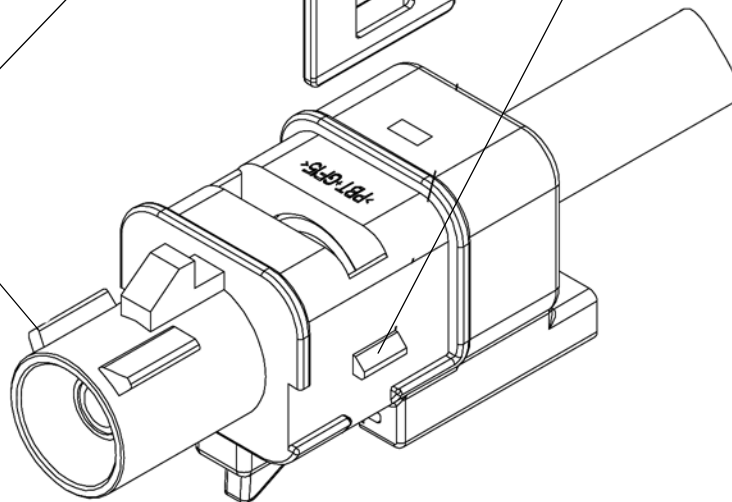
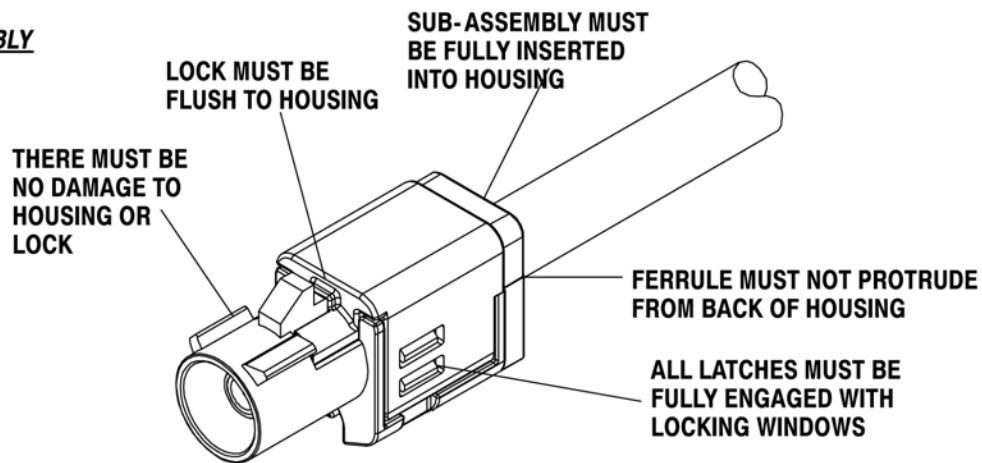


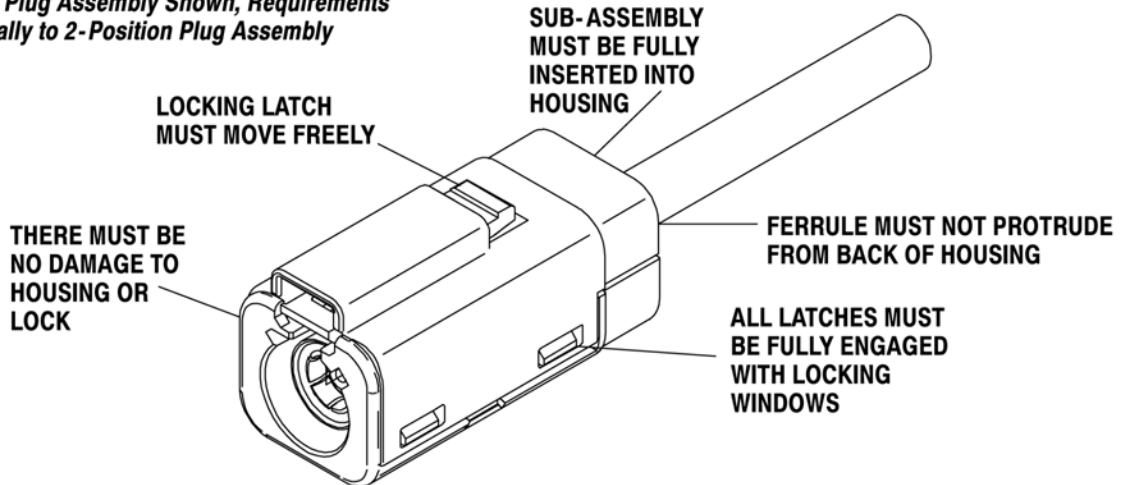
FIGURE 8. VISUAL AID (CONT'D)

**JACK ASSEMBLY**

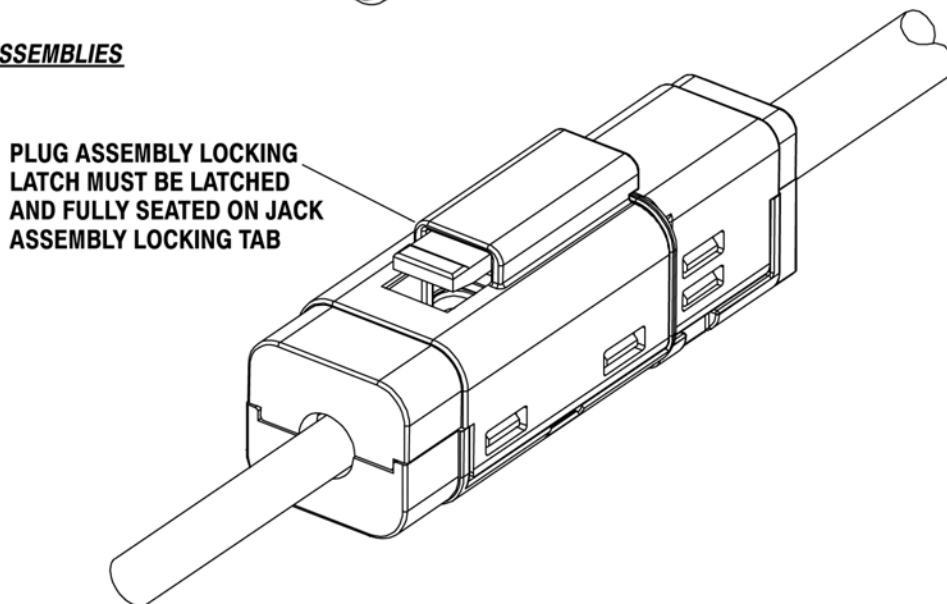


**PLUG ASSEMBLY**

*1-Position Plug Assembly Shown, Requirements Apply Equally to 2-Position Plug Assembly*



**MATED ASSEMBLIES**



**FIGURE 8. VISUAL AID (END)**