



**MORTAL DANGER — HIGH VOLTAGE**

This connector is intended for use in high-voltage applications. Special care must be applied to ensure that the connector functions as intended.

— If you suspect that the connector has been modified, damaged, contaminated, or otherwise compromised, discontinue use immediately.

— This connector should only be serviced by a trained and qualified technician.



**CAUTION**

These high-voltage connectors **must not** be mated with any other type of connectors.



**NOTE**

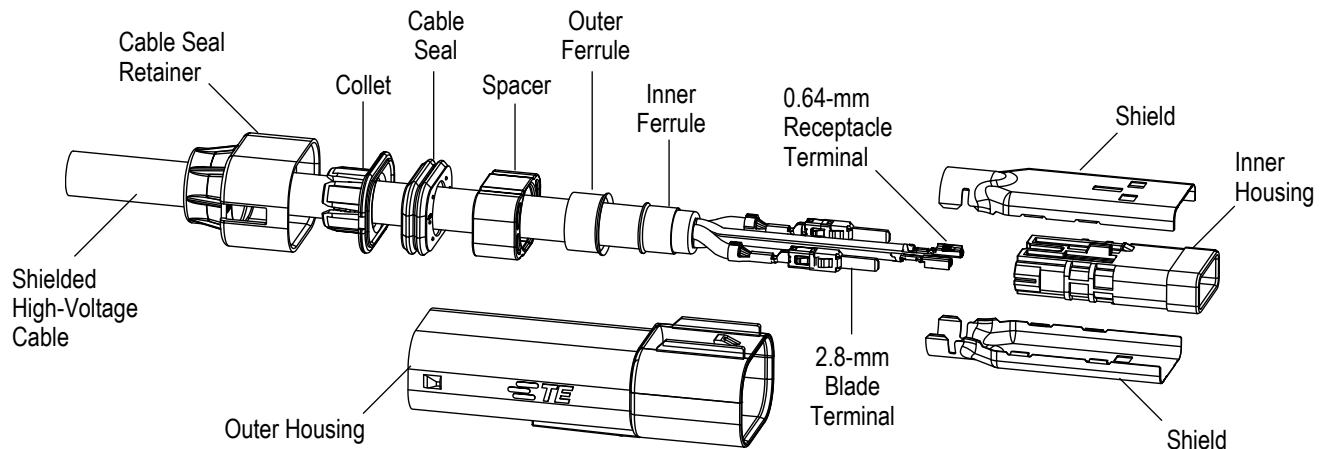
All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  and angles have a tolerance of  $\pm 2^\circ$ . Figures are not drawn to scale.

## 1. INTRODUCTION

This specification covers the requirements for application of AMP+ HVA280 2phm in-line cap connector system. The connector system incorporates conductive (EMI) shields to reduce radiated emissions in the application.

The cap connector is available in five different keying or polarizing configurations with an integrated high voltage inter-lock (HVIL) circuit. Instructions for un-mating of the connector depends on the mating plug connector chosen. Options include a tool-actuated release or time-delayed finger actuation method.

The cap connector incorporates up to two 2.8-mm blade terminals, which mate with two 2.8-mm receptacles in the mating plug connector. The HVIL circuit connection is accomplished with two 0.64-mm blades or a shunt in the mating plug connector. The terminal cavities are numbered on the inner housing of each connector at the wire entry end. The connector housing is molded in orange to denote high voltage.



Basic terms and features of this product are provided in **Figure 1**.

## 2. REFERENCE MATERIAL

### 2.1. Customer Assistance

Reference Product Base Part Number 2103219 and Product Code J710 are representative of AMP+ HVA280 2phm in-line cap connector system. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting [www.te.com](http://www.te.com) or calling the number at the bottom of page 1.

## 2.2. Drawings

Customer drawings for product part numbers are available from [www.te.com](http://www.te.com). Information contained in the customer drawing takes priority.



### NOTE

Reference customer drawing 2103219 lists compatible part number relationships for customer inquiry only and is not a saleable item. For more information on reference drawings, call the number at the bottom of page 1.

## 2.3. Instructional Material

Instruction sheets (408- and 411-series) provide product assembly instructions or tooling setup and operation procedures and customer manuals (409-series) provide machine setup and operating procedures. Instructional material available that pertains to this product are:

- 408-2498 Crimping Head Cross-Reference for Pneumatic Tools
- 408-4070 Pneumatic Head Assembly 679304-1 (For Use with 626 Pneumatic Tooling Assemblies)
- 408-4303 Pneumatic CERTI-CRIMP\* Tool Holder Assemblies (For Use with 626 Pneumatic Tooling Assemblies)
- 408-7424 Checking Terminal Crimp Height Gaging Die Closure
- 408-9930 PRO-CRIMPER\* III Hand Crimping Tool Frame Assembly 354940-1
- 408-10389 Ocean Side-Feed Applicators
- 409-32034 AMP 3K Terminating Machines 1725950-[ ] and AMP 5K Terminating Machines 1725900-[ ]
- 408-32145 SDE HVA280 Die Assembly 2063013-[ ]
- 409-5842 AMP-O-LECTRIC\* Model "G" Terminating Machines 354500-[ ]
- 409-5862 626 Pneumatic Tooling Assemblies 189721-[ ] and 189722-[ ]
- 411-18087 EROGCRIMP\* Crimp Hand Tool 539635-1
- 411-18169 ERGOCRIMP Die Set 539723-2
- 411-18543 Hydraulic Hand Tool 9-1579009-1

## 2.4. Specifications

Application specifications (114-series) provide application requirements for a product.

- 114-13259 AMP+ HVA280 2phi High-Voltage Plug Connector
- 114-13305 AMP+ HVA280 2phi High-Voltage Plug Connector with Shunted HVIL

## 2.5. Standards

The standards that pertain to this product are:

- EIA-60529, "Degrees of Protection Provided by Enclosures (IP Code): IP6K9K and IP67 (mated) and IP2B (unmated)
- SAE/USCAR-2, "Performance Specification for Automotive Electrical Connector Systems"
- SAE/USCAR-37, "High Voltage Connector Performance Supplement to SAE/USCAR-2"

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. Storage

#### A. Shelf Life

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

**B. Chemical Exposure**

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

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

**3.3. Material**

The cap connector is made of thermoplastic materials. The terminals and shields are made of tin and silver-plated copper alloy.

**3.4. Cable and Subcomponent Selection**

The cap connector is designed to accept a wire size range of 2.5 to 4 mm<sup>2</sup>.

The cable and subcomponent combinations that are validated by TE Connectivity (TE) are given in below **Table 1**. These combinations should be used together to ensure optimum connector performance. Alternative cables may be used with the AMP+ HVA280 connector after ensuring performance through validation testing.

CABLE	RECOMMENDED SUBCOMPONENTS	
	PART NUMBER	DESCRIPTION
<b>Kromberg &amp; Schubert</b> <b>2 x 4 (Red and Blue) +2 x</b> <b>0.5 (Black) mm<sup>2</sup> FLR52Y</b> <b>High Voltage</b>	2103169-X	Outer housing, CAP, key X
	2-2141600-2	2.8-mm MCP Blade Contact
	963715-6	Receptacle terminal, MQS 0.64 0.5-0.75mm SQ
	2103170-1	Inner housing, HVA280 2phm cap
	1587723-3	Inner Ferrule
	1587724-3	Outer Ferrule
	2103154-1	Cable Seal
	2103168-1	Cable Seal Retainer
	2103155-1	Collet
	2103153-1	Spacer
	2103171-1	Shield
<b>Cable Supplier:</b> <b>COROPLAST</b> <b>Cable Construction: 2 x 4.0</b> <b>mm<sup>2</sup></b> <b>Number: 9-2641</b>	2400718-1	2P, 2.8x0.8, TAB outer HSG, SLD, COD 1
	2385870-1	Inner Housing, HVA280 2PHM Cap
	2-2141600-2	2.8-mm MCP Blade Contact
	1-2103171-2	Shield Cap
	1587723-3	Inner Ferrule
	1587724-3	Outer Ferrule
	2103153-1	Spacer
	2103154-1	Cable Seal
	2103168-1	Cable Seal Retainer
2103155-1	Collet	

CABLE	RECOMMENDED SUBCOMPONENTS	
	PART NUMBER	DESCRIPTION
<b>Cable Supplier:</b> <b>COROPLAST</b> <b>Cable Construction: 2 x 4.0 mm<sup>2</sup></b> <b>Number: 9-2641</b>	2103169-X	Outer housing, CAP, key X
	2-2141600-2	2.8-mm MCP Blade Contact
	2103170-1	Inner housing, HVA280 2phm cap
	1587723-3	Inner Ferrule
	1587724-3	Outer Ferrule
	2103154-1	Cable Seal
	2103168-1	Cable Seal Retainer
	2103155-1	Collet
	2103153-1	Spacer
	2103171-1	Shield

### 3.5. Assembly

Assembly steps are described for 2x4+2x0,5 mm<sup>2</sup> cable option. For cable options without HVIL contacts and related cable cores, steps related to HVIL contacts are not relevant.

1. The seal retainer, collet, seal, spacer, and outer ferrule must be slid over the cable. Orientation of each component is shown.



2. Fifty (50) mm must be stripped and removed from the outer jacket, exposing the braided cable shield as shown.



**CAUTION**

The wire conductor must not be nicked, scrapped, or cut during the stripping process.

3. The inner ferrule must be inserted over the cable shield until it stops against the outer jacket as shown.



4. The braided cable shield must be folded back over the inner ferrule as shown.



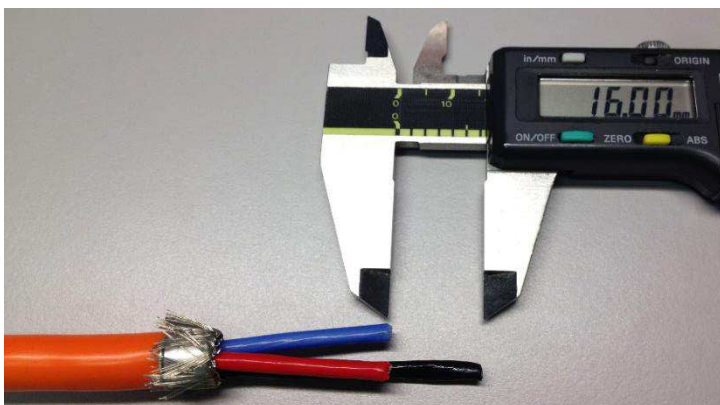
5. The shield must be trimmed so that it is approximately flush with the ferrule where it meets the outer jacket.



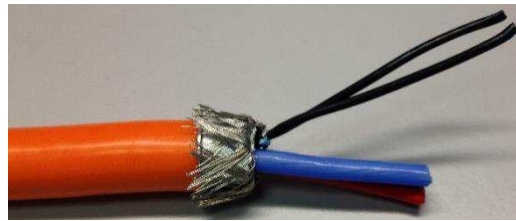
6. The foil separator must be removed to expose the three discrete cables.



7. The red and blue conductors must be cut by 16 mm as shown. The black jacket contains the two 0.5-mm<sup>2</sup> HVIL circuits covered by a braided shield.



8. The black jacket and braided shield must be removed to expose the two individual 0.5-mm circuits.



9. The two large 4-mm<sup>2</sup> conductor jackets must be stripped by 5.5 mm. The 0.5-mm<sup>2</sup> conductor jackets must be stripped according to 114-18021.



10. The MCP 2.8-mm blade terminals must be applied using the tooling given in Section 5. Crimp requirements must conform to the following.

Conductor crimp height:  $2.15 \pm 0.05$     Conductor crimp width: 3.05    Insulation crimp width:  $4.1 \pm 0.2$

The MQS 0.64-mm receptacle terminals must be applied according to 114-18021. When terminal application is complete, the cable should appear as shown.



**NOTE**

*The terminals should be applied to the wires so that minimal wire twisting is needed when installing the terminals into the inner housing.*

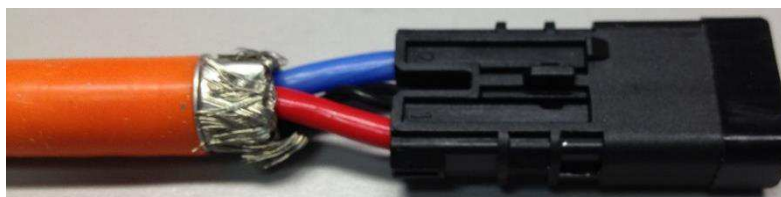


11. The terminals must be inserted into the inner housing until they are fully locked. It is helpful to align all four terminals to the circuit cavities and insert them at one time. After insertion, the assembly should appear as shown.



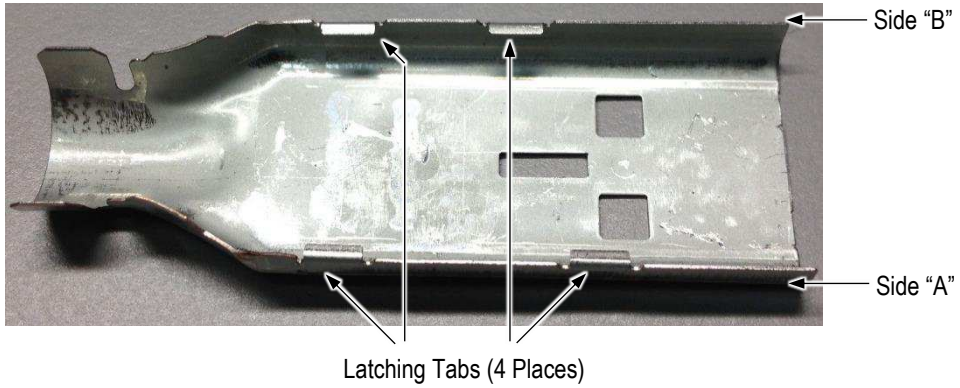
**NOTE**

*Circuit cavity numbers are marked on the cable end of the inner housing.*

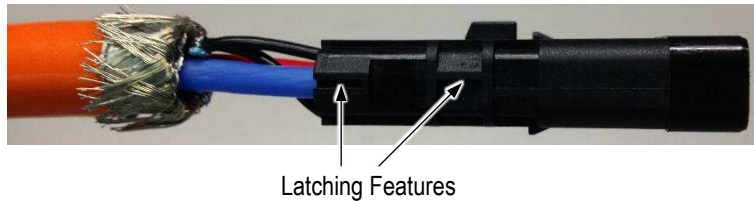


12. The two halves of the shield must be installed at the same time to ensure the correct overlap in the shield ferrule crimp region.

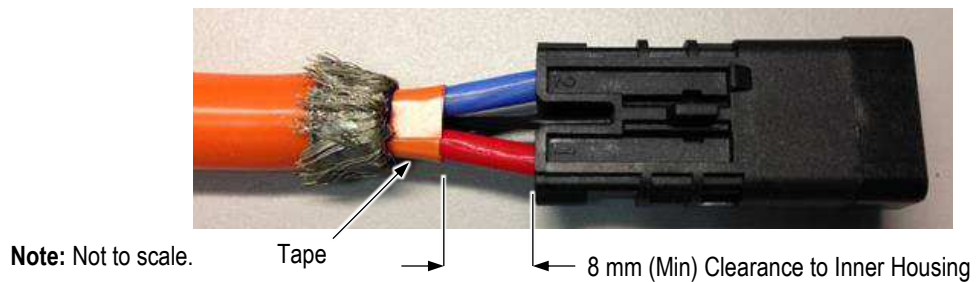
— Each shield has four latching tabs and the sides of the shield are labeled “Side A” and “Side B”. See Detail A.



— The inner housing has latching features on the side, which will interface with the “Side A” and “Side B” latching tabs of the shields.



— As an option for construction, two or three wraps of 150°C rated tape may be used to gather the wires. Tape must not overlap onto the braided shield and must remain clear of the inner housing by no less than 8 mm.

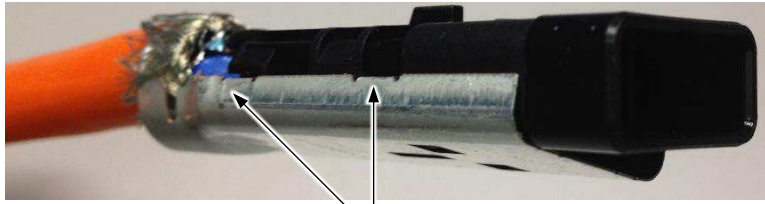


**Note:** Not to scale.

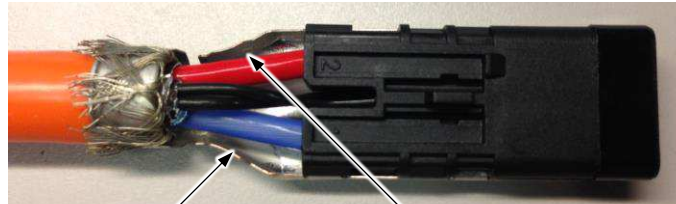
13. The “Side A” latching tabs of one shield must be engaged with the inner housing latching features on the top or bottom of the inner housing.



Shield on Bottom of Inner Housing (Shown)

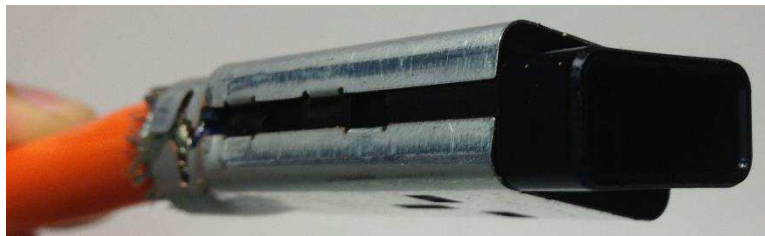


Side “A” Shield Latching Tabs Engaged with Inner Housing Latching Features

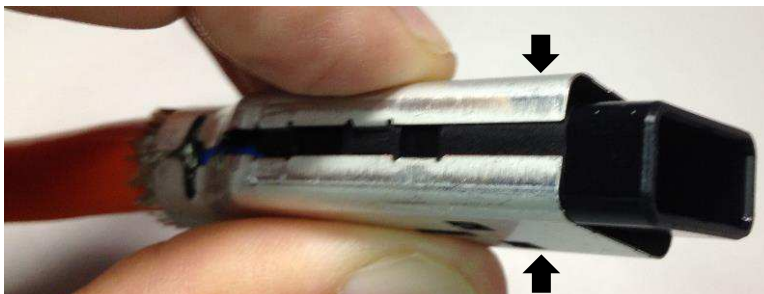


Wires Not in Contact with Sides of Shield

14. The “Side A” latching tabs must be engaged on the second shield with the latching features on the opposite side of the inner housing. The assembly should appear as shown with “Side A” of each shield engaged.



15. The braided shield must be encased inside the ferrule crimp region of the shield. Hand pressure must be applied to the “Side B” edges of the shield until they snap into place.



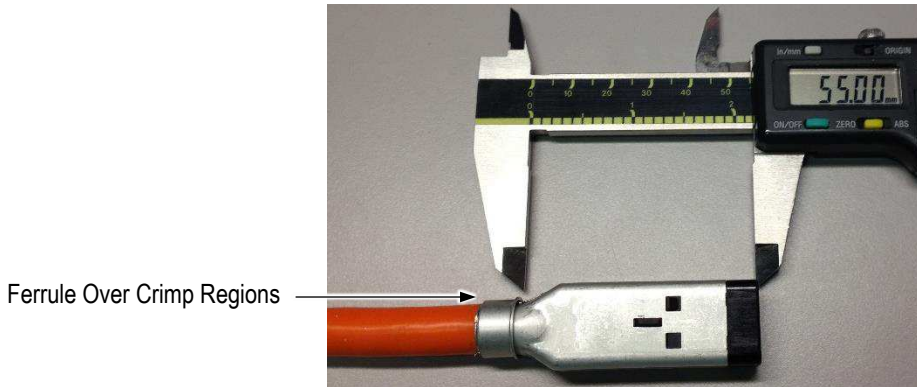
*Apply Pressure*

The assembly should appear as shown.

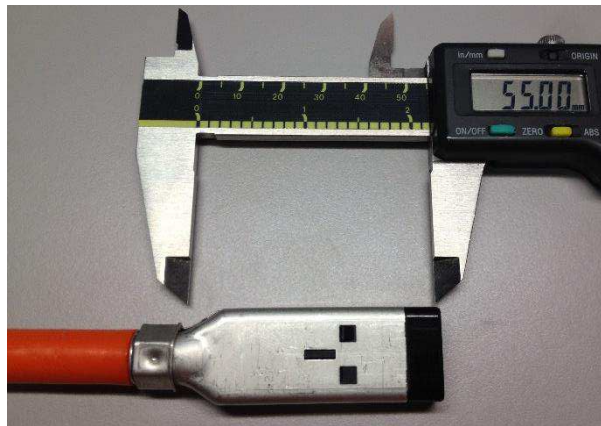




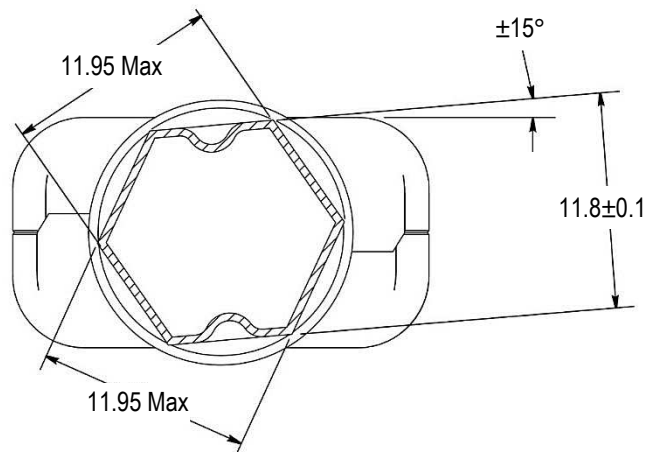
16. The outer ferrule must be slid over the two overlapping crimp regions on the two shield halves as shown. The distance from the front of the inner housing to the edge of the ferrule should be  $55 \pm 1.0$ .



17. The ferrule must be crimped using the tooling detailed in Section 5. The distance from the front of the inner housing to the edge of the ferrule should still be  $55 \pm 1.0$ , and the dimension across the three sets of flats must be as shown.



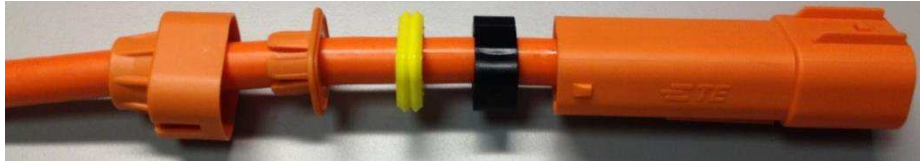
Note: Not to scale.



18. The AMP+ HVA280 2 phm outer housing must be installed onto the crimped cable subassembly as shown.



19. The inner housing must be pushed into the outer housing (the orientation feature of the inner housing will only allow it to enter the outer housing in one orientation). Near the end of the insertion process, the insertion force will rise followed by the inner housing snapping into place with an audible and tactile click.



20. The spacer must be slid along the cable end and into the outer housing until it stops. There is no retention feature for the spacer as it is held in place by the seal.



21. The seal must be slid along the cable and enter the outer housing until it is flush with the outside of the outer housing as shown.



22. The collet must be slid along the cable and up against the seal and outer housing as shown.



23. The seal retainer must be slid along the cable and pressed against the outer housing until it snaps into place. Both latching features of the cable seal retainer must snap into place of the outer housing latch features. The final assembly should appear as shown.



### 3.6. Mating

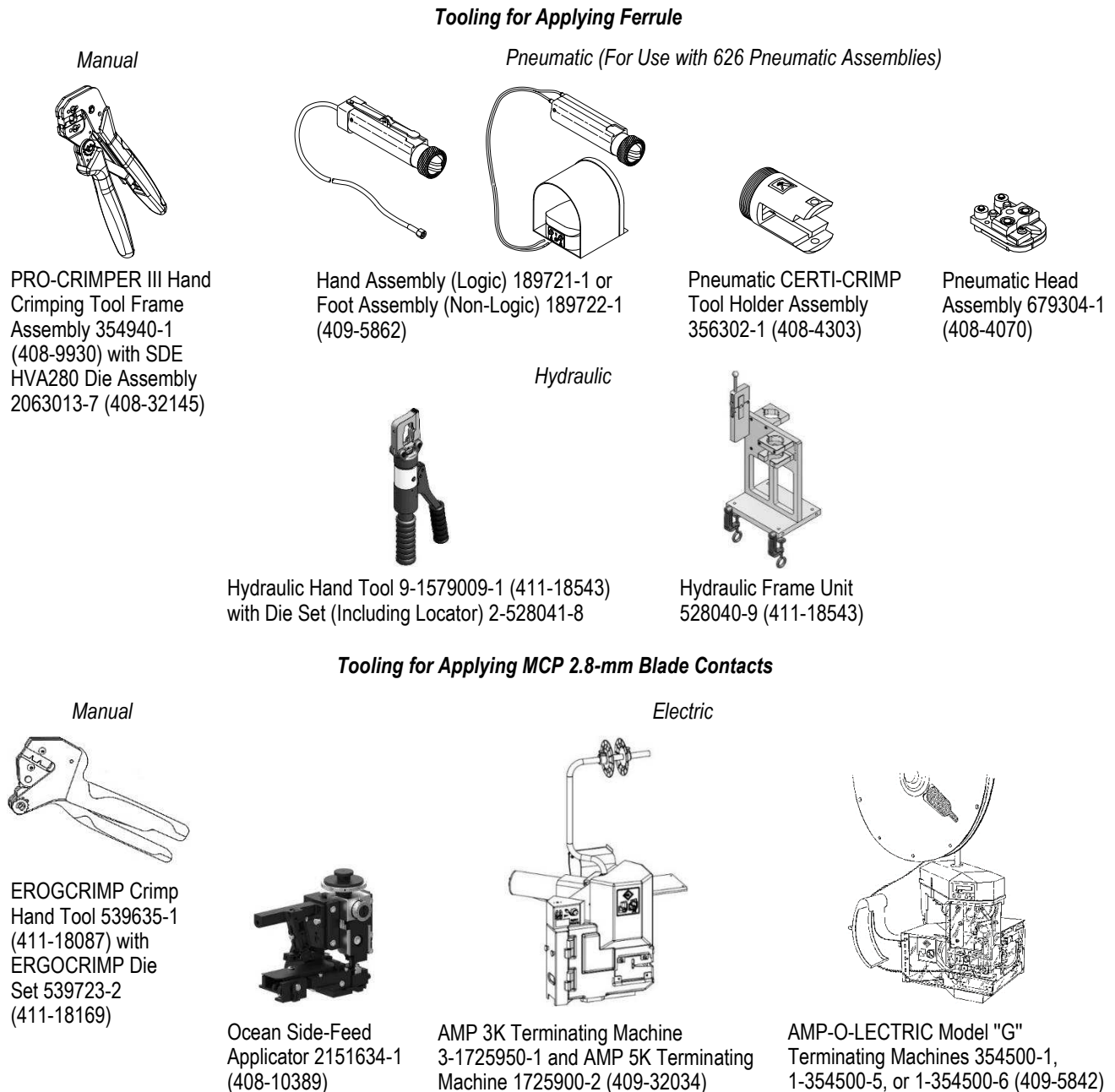
The cap connector mates to all of the different AMP+ HVA280 2phi/2phm plug connectors offered by TE Connectivity. For mating and un-mating instructions, refer to the specifications listed in Paragraph 2.4.

### 4. QUALIFICATION

Agency evaluation for AMP+ HVA280 2phm in-line cap connector was not defined at the time of publication of this specification.

### 5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are given in **Figure 2**.



**Figure 2**

## 6. VISUAL AID

The illustration below shows a typical application of AMP+ HVA280 2phm in-line cap connector. 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.

**CABEL MUST NOT BE  
DAMAGED IN ANY WAY**

**CABLE SEAL RETAINER  
MUST BE FULLY LOCKED  
ON BOTH SIDES**

**HOUSING MUST NOT BE  
DAMAGED IN ANY WAY**



**Figure 3. VISUAL AID**

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## 7. REVISION SUMMARY

Revisions to this application specification include:

- Changed part number and product code in Paragraph 2.2 and drawing number in NOTE of Paragraph 2.3
- Added Paragraph 2.5, and corrected EIA standard number in Paragraph 2.6
- Replaced cable supplier part number with cable description
- Changed dimensions Y and Z in step 17 of Paragraph 3.5
- Replaced tool holder 189767-1 with 356302-1, and changed hydraulic tooling die set part number in Section 5
- Added Cable Supplier details in Table 1 for COFICAB with Recommended Subcomponents.
- Changed Inner Housing PN from 2103170-1 to 2385870-1 in Table 1.
- Removed MQS 0.64 from Coficab BOM, added outer HSG to KS BOM
- In BOM conficab cable changed to coroflex
- Rev. D5: cable option coroplast with 2103219 kit added