



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 ± 0.13 [$\pm .005$] 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 the Multi-load Power Double Lock connector system with a 5.0 mm centerline. The Multi-load Power Double Power Lock connector system is available in 2, 3, and 4 position panel mount configurations and multi-load 4(2+2), 6(2+4), 7(3+4), and 9(2+3+4) position panel mount configurations for a 16 to 24 AWG wire range.

The gasket seals and single wire seals are rated to foaming proof. Terminal position assurance (TPA) accessories are available for all wire sizes. Basic terms and features of this product are provided in Figure 1.

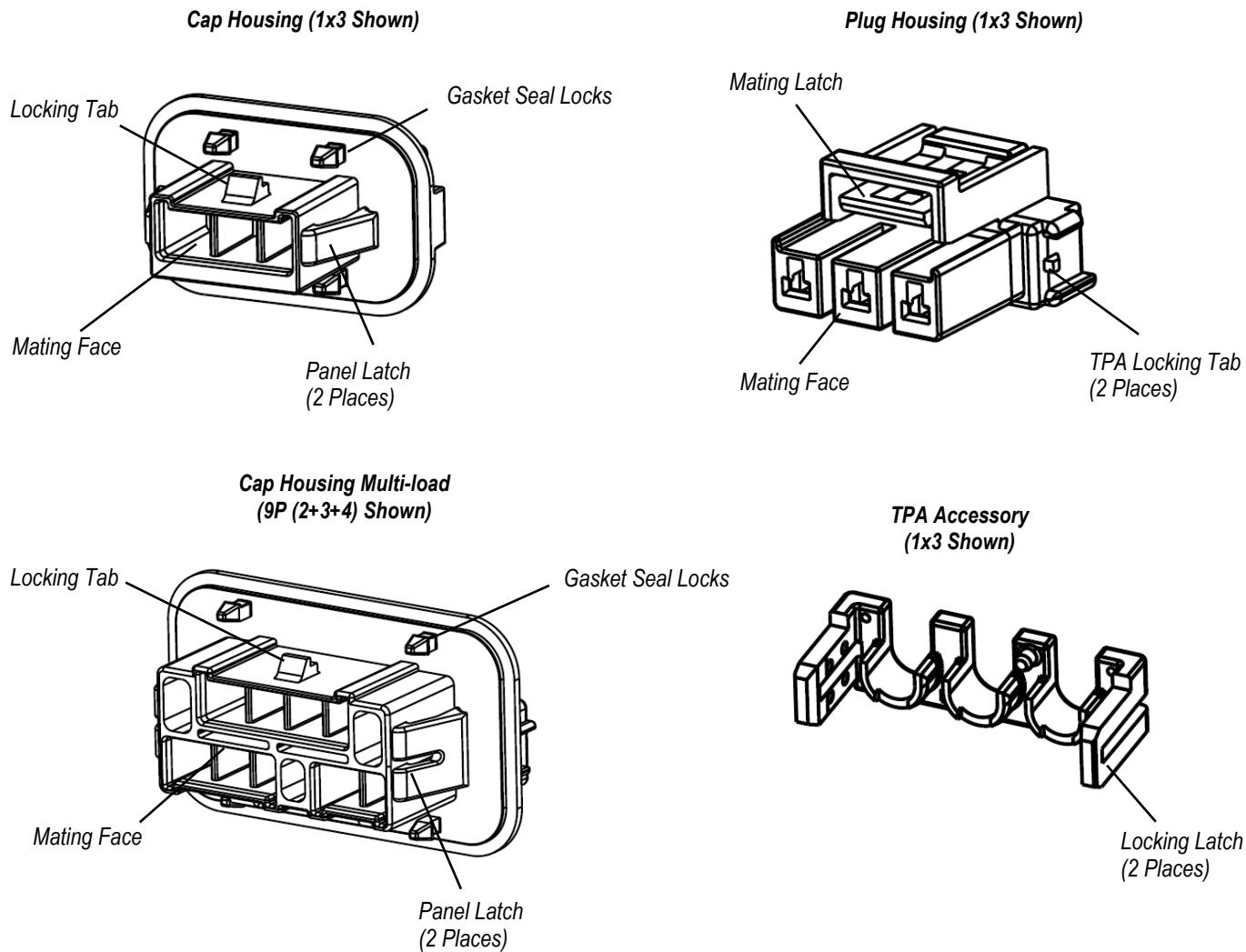
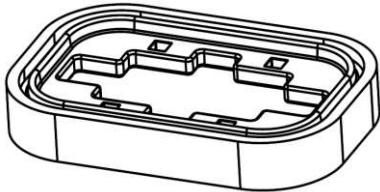


Figure 1 (continued below)

Gasket Seal (1x3 Shown)**Single Wire Seal****Tab Terminal****Receptacle Terminal****Figure 1 (end)**

2. REFERENCE MATERIAL

2.1. Revision Summary

- Initial release

2.2. Customer Assistance

Reference Product Base Part Number 2391515, 2391516, 2391517, 2391518, 2416056, 2391520, 2391531, 2391524, 2391525, 2391527, 2391528 and Product Code 2166, 2167, 2169 are representative of the Power Double Lock 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 or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority.

| | |
|---------|---|
| 2406088 | Tab Terminal, 20-24 AWG Wire Range |
| 2406089 | Tab Terminal, 16-18 AWG Wire Range |
| 2406090 | Receptacle Terminal, 20-24 AWG Wire Range |
| 2406091 | Receptacle Terminal, 16-18 AWG Wire Range |
| 2391531 | Gasket Seal |
| 2391530 | Single Wire Seal |
| 2391516 | Plug Housing (1x2, 1x3, and 1x4) |
| 2391515 | Cap Housing (1x2, 1x3, and 1x4) |
| 2391517 | Cap Housing (multi 4P) |
| 2391518 | Cap Housing (multi 6P) |
| 2416056 | Cap Housing (multi 7P) |
| 2391520 | Cap Housing (multi 9P) |
| 2391522 | TPA Accessory (1x2, 1x3, 1x4, and 1x5) |

**NOTE**

The listing of a drawing or part number in this specification should not be interpreted as an indication of availability. Contact the TE Product Information Center at the number at the bottom of page 1 for product availability.

2.4. Instructional Material

Instructional material that pertains to this product is:

[408-160052](#) Multi-load Power Double Lock Connector System Assembly Procedure

2.5. Specifications

Product Specification [108-160365](#) provides product performance and test results.

3. REQUIREMENTS

3.1. Safety

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

3.2. Storage

A. Ultraviolet Light

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

B. 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.

C. Reels

When using reeled contacts, store coil wound reels horizontally. When storing partial reeled contacts, the end of the strip should be secured to the flange using a wire tie or similar method.

D. 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 |

NOTE

Contacts that contain brass must not be stored or used in environments where these chemicals exist.

3.3. Wire Selection and Preparation

The contacts designed for unsealed applications accept a single stranded copper wire sizes 16 AWG to 24 AWG with an insulation diameter range on each wire of 1.4 to 2.5 mm.

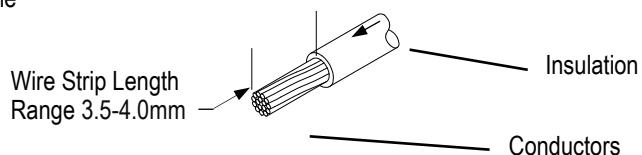
Each wire must be stripped to the dimension given in Figure 2.



CAUTION

Care must be taken not to nick, scrape, or cut any part of the wire during the stripping operation.

Note: Not to Scale



| WIRE | |
|------------|----------------|
| SIZE [AWG] | INSUL DIA (mm) |
| [24-20] | 1.4-2.0 |
| [18-16] | 1.95-2.5 |

Figure 2

For wires using single wire seals, prepare the wire by stripping the wire to the dimensions specified in Figure 2. Install the wire seal onto the wire, flanged end (end opposite the throat) first. Ensure that the wire seal is located such that the wire insulation is flush with or extends beyond the wire seal to the dimensions stated in Figure 3.

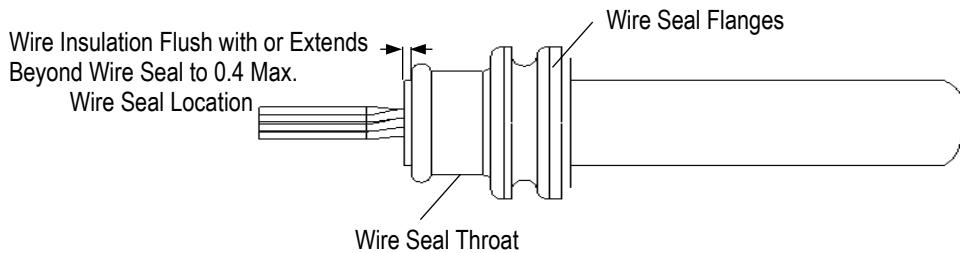


Figure 3



NOTE

The wire seal must be installed onto the wire before or after stripping the wire. It is recommended to install the wire seal after stripping the wire; however, if installing before stripping the wire, the wire seal must be protected from being damaged during the stripping operation.



CAUTION

After installation, there must be no flaws or other damage to the wire seal or wire strands, and the shape of the wire seal must be maintained.

3.4. Contact Crimp

A. Cutoff Tab

The cutoff tab is the remaining portion of the carrier strip after the contact is cut from the strip. The cutoff tab must not exceed the dimensions given in Figure 4.

B. Wire Barrel Crimp

The crimp applied to the wire barrel portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The crimp must be centered on the closed wire barrel. The crimp must result in an "F" crimp where the wire barrel forms a closed seam with no evidence of loose wire strands or wire strands visible in the seam. The crimp height and width must be within the dimensions given in Figure 4.

C. Insulation Barrel Crimp

The crimp applied to the insulation barrel of the contact must result in an "O" crimp where the insulation barrel forms a closed seam with no evidence of wire insulation in the seam and wrap firmly around the wire insulation without cutting into the wire insulation. The crimp height and width must be within the dimensions provided in Figure 4.

D. Wire Barrel Flash

Wire barrel flash is the formation that may appear on both sides of the wire barrel as the result of the crimping process. It must not exceed the dimension provided in Figure 4.

E. Twist and Roll

There should be no twist or roll of the wire barrel or mating portion of the crimped contact that would cause overstress or impair usage. See Figure 4 for allowable limits.

F. Wire End Extrusion Length and Height

The wire conductor ends must extend beyond the end of the wire barrel within the dimensions given in Figure 4. The wire end extrusion height may not exceed the limits given in Figure 4.

G. Bellmouths

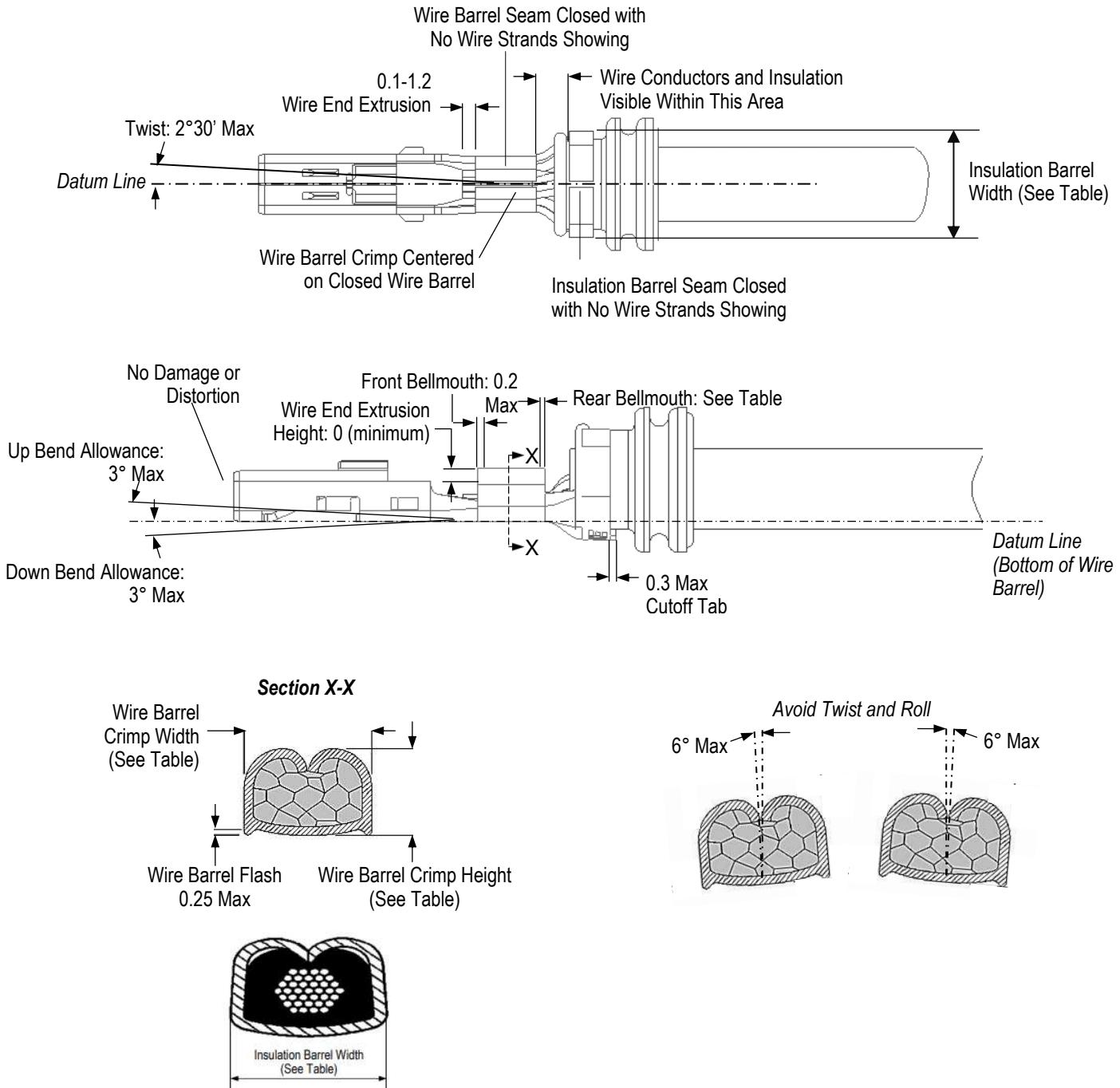
The front bellmouth and rear bellmouth shall conform to the dimensions given in Figure 4.

H. Wire Location

All conductors must be held firmly inside the wire barrel. No strands can be folded back over the wire insulation. The wire insulation must be inside the insulation barrel, but must not enter the wire barrel. The wire conductors and insulation must be visible within the area between the wire barrel and insulation barrel as shown in Figure 4.

I. Bend Allowance

Then bend allowance between the wire barrel and the cable is acceptable within the limits given in Figure 4.



| Base Number | Wire Size (AWG [mm ²]) | Insulation Diameter Range | Wire Crimp | | Insulation Crimp Width | Insulation Crimp Form | Insulation Crimp Height (Ref) | Rear Bellmouth Length |
|-------------|------------------------------------|---------------------------|------------|-----------|------------------------|-----------------------|--|-----------------------|
| | | | Width | Height | | | | |
| 2406089 | 16 [1.3] | 1.95-2.5 | 1.78 | 1.40±0.05 | 3.90 | "O" | Crimp until tight per guidelines in Paragraph 3.4.C 4.1 Max. | 0.25±0.15 |
| 2406091 | 18 [0.82] | | | 1.18±0.05 | | | | |
| 2406088 | 20 [0.52] | 1.4-2.0 | 1.27 | 1.00±0.05 | 3.80 | "O" | Crimp until tight per guidelines in Paragraph 3.4.C 4.1 Max. | 0.25±0.15 |
| | 22 [0.32] | | | 0.97±0.05 | | | | |
| | 24 [0.20] | | | 0.85±0.05 | | | | |

Note: O – O Crimp

Figure 4

3.5. Wire Seal Selection

For foaming proof application, the insulation diameter of the wires must be matched to the correct wire seal. The customer drawing for the wire seal identifies the approved wire insulation range.

| Seal Type | Part Number | Insulation Diameter |
|------------------|-------------|---------------------|
| Single Wire Seal | 2391530-1 | 1.4-2.0 |
| | 2391530-2 | 1.95-2.5 |

Figure 5

3.6. Wire Seal Location and Workmanship

The wire seal shall not enter the wire barrel. The throat of the wire seal must protrude into the transition area (between the wire barrel and insulation barrel) to the minimum stated in Figure 6.

There shall be no cuts, flaws, or other damage to the wire seal. The tips of the insulation barrel may partially pierce the throat of the wire seal; however, the throat must not be split. The insulation barrel crimp must maintain an even grip on the throat of the wire seal without tilting. The wire seal shall not slant beyond the limit provided in Figure 6.

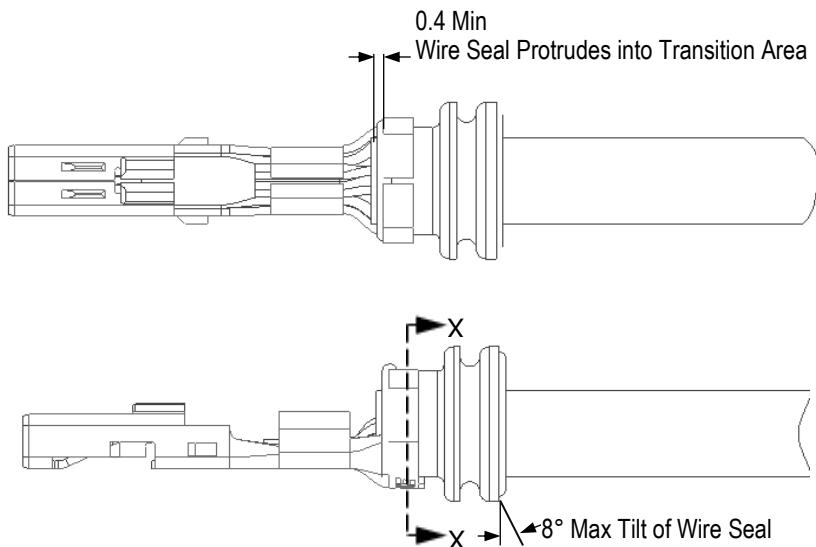


Figure 6: Single Wire Seal Requirements

3.7. Contact Insertion and Extraction

A. Insertion

Each contact must be aligned with the appropriate circuit cavity from the wire end of the housing so that the contact key(s) faces in the same direction as they key in the housing. The contact must be inserted into the circuit cavity until the contact internal latch locks onto the circuit cavity locking finger.

Make sure to align contacts with the desired circuit cavity at the back of the rear housing section. Grasp the wire-directly behind the contact insulation barrel-and push the contact straight into the cavity until it bottoms (there should be an audible click). Pull back lightly on the wire to be sure the contact is locked in place. Refer to Figure 7.

**NOTE**

Gently pulling on the wire after the contact has been inserted will ensure that the contact is locked.

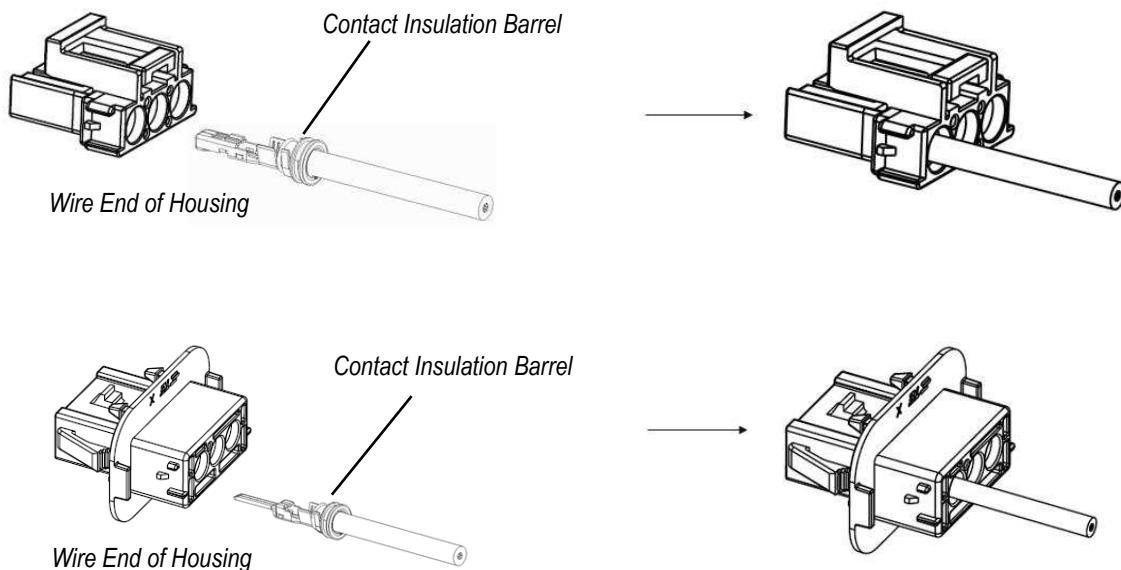


Figure 7

B. Extraction

If the optional TPA accessories are used, the contacts cannot be removed until the accessory is removed from the housing. Contacts must be removed individually from the housing. After extraction, the contact must be inspected for damage or deformation; if evident or questionable, the contact must be replaced. After contact extraction, discard the housing as it may have internal damage. It is important that the housing not be re-used because internal damage cannot always be easily determined.

3.8. Optional TPA Accessory

An optional TPA accessory is available for the plug and cap housings. The following requirements apply for installation and removal:

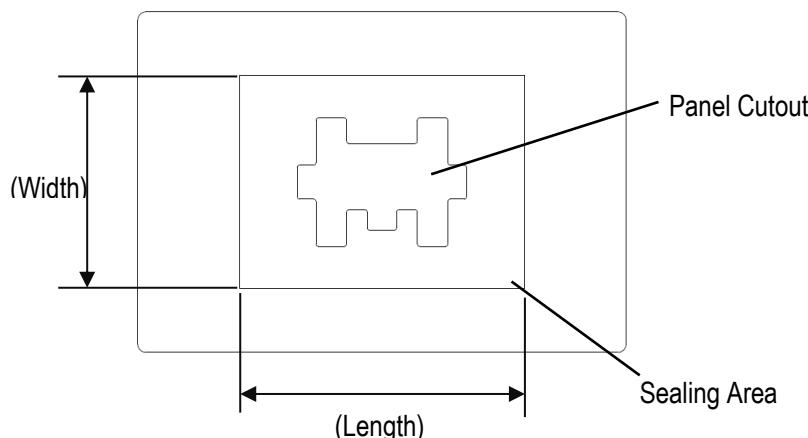
**NOTE**

All contacts must be inserted before the devices can be installed into the housing.

- The TPA must be installed onto the rear of the housing so that the latches are secure to the housing cover locking tabs. There should be an audible click. If the latches do not reach the locking tabs, this indicates that one or more contacts and wire seals have not been fully inserted.
- The TPA must be removed by lifting each latch so that it clears the housing locking tab and pulling the accessory straight from the housing.

3.9. Panel Mounting

Recommended panel cutout dimensions are provided on the customer drawing for the specific cap housing. The Multi-load Power Double Lock connector system supports panel with thickness 1.0 mm. The coplanarity of panel sealing area should be 0.2 mm max. Refer to figure 8 for the dimensions of the sealing area.



| Cap Housing | Position | Length | Width |
|-------------|------------|--------|-------|
| 2391515-2 | 1x2P | 30 | 25 |
| 2391515-3 | 1x3P | 35 | 25 |
| 2391515-4 | 1x4P | 40 | 25 |
| 2391517-1 | 4P (2+2) | 32 | 32 |
| 2391518-1 | 6P (2+4) | 40 | 32 |
| 2416056-* | 7P (3+4) | 40 | 32 |
| 2391520-1 | 9P (2+3+4) | 50 | 32 |

Figure 8

The cap housing must be inserted through the panel in the same direction that the cutout was punched until the flexible panel latches engage the panel. No hardware is required. See Figure 9.

To remove the cap housing from the panel, both latches must be simultaneously depressed, then the cap housing must be gently pulled straight out of the panel. If there is no damage to the cap housing, the cap housing can be re-mounted.

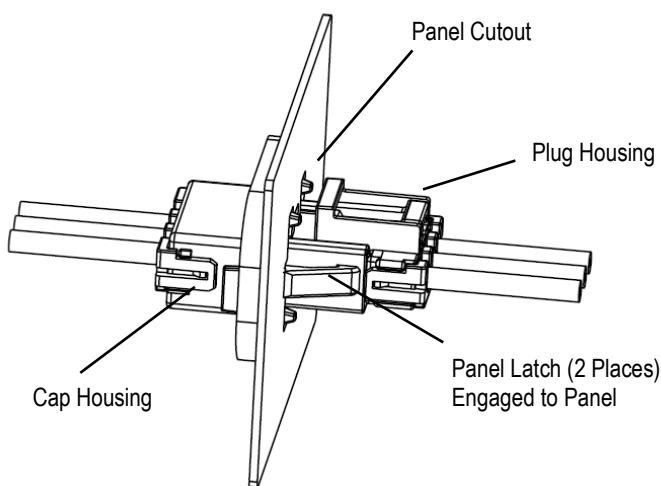


Figure 9

3.10. Mating and Unmating

The mating face of the cap housing must align with the mating face of the plug housing, then the housing must be pushed together until the mating latch is secured to the latch retainer. There should be an audible click. Refer to Figure 11.

To unmate the housings, the plug housing mating latch must be depressed until it is released from the latch retainer, then the housings can be pulled straight apart.



CAUTION

These housings are not intended to be used as an electrical interruption device. To avoid degradation to the contacts, there must be no current flow when unmating.

3.11. Strain Relief and Wire Dress

Wires can be bundled together and supported using cable ties or electrical tap. The wires must remain perpendicular to the housing and avoid an excessively sharp bend radius. The wire bundle must be at least 76.2 mm [3.0 inch] from the back of the housing before bending in any direction. Do not bend unsupported wires as this may cause strain on the contacts.

3.12. Assembly Procedures

See Instruction Sheet [408-160052](#) for assembly procedure instructions.

3.13. Replacement and Repair

Damaged or defective product must not be used. The housings, contacts, TPA, and seals are not repairable.

4. QUALIFICATION

4.1. Underwriters Laboratories Inc. (UL)

The Multi-load Power Double Lock connector system is recognized by Underwriters Laboratories Inc. (UL) in File E28476.

5. TOOLING

Applicators contain the tooling for feeding and crimping strip-form terminals. Automatic machines provide the power to operate the applicator.

Tooling information for product part numbers is available from [www.te.com](#) or by calling the Product Information Center at the number at the bottom of page 1.

5.1. Machine (Power Unit)

The machine provides the force required to drive an applicator for crimping the contacts. These machines can be set up to automatically measure, cut, strip and terminate wire.

5.2. Applicator

Applicators and hand tools for product part numbers are available in Figure 10 and from the [Applicator Search Portal](#) on [www.te.com](#) or by calling the Product Information Center at the bottom of page 1.

| Terminal Par Number | Applicator Part Number |
|---------------------|------------------------|
| 2406088-1 | 4151386-1 |
| 2406089-1 | 4151387-1 |
| 2406090-1 | 4151386-1 |
| 2406091-1 | 4151387-1 |

Note: The feeding pitch needs to be adjusted due to the different pitch between tab terminals and receptacle terminals.

Figure 10

6. VISUAL AID

Figure 11 shows a typical application of this product. 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.

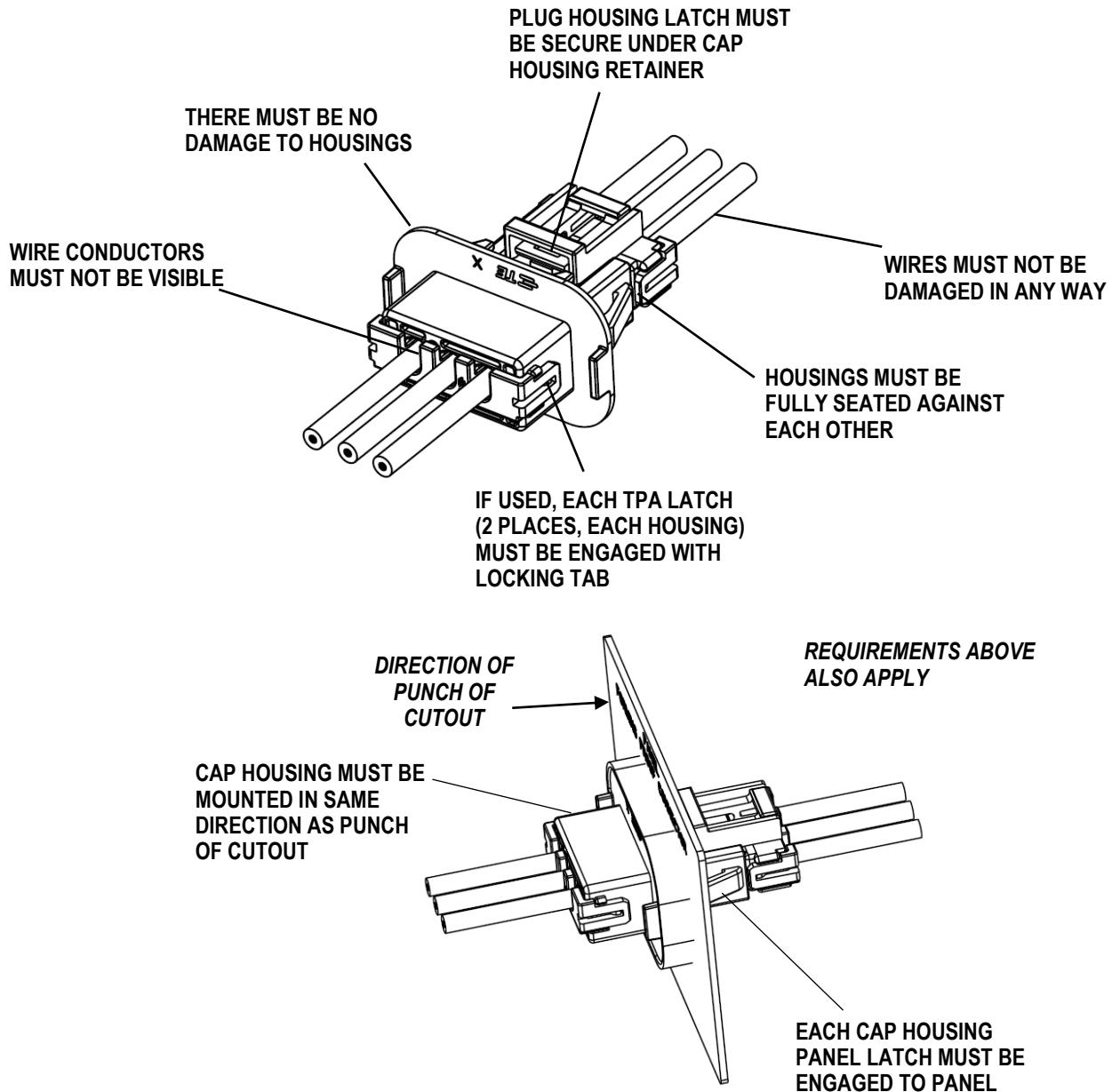


Figure 11