

HC-STAK35-2phi Gen2 High Voltage Connector



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



HIGH-VOLTAGE - MORTAL DANGER

- 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, please discontinue its use immediately.
- This connector should only be serviced by a trained and qualified technician.

1. INTRODUCTION

This specification covers the requirements for assembly and mating/un-mating of the HC-STAK35-2PHI GEN2 Plug.



These high-voltage connectors must NOT be mated with any other type of connector.

When corresponding with TE Connectivity 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.

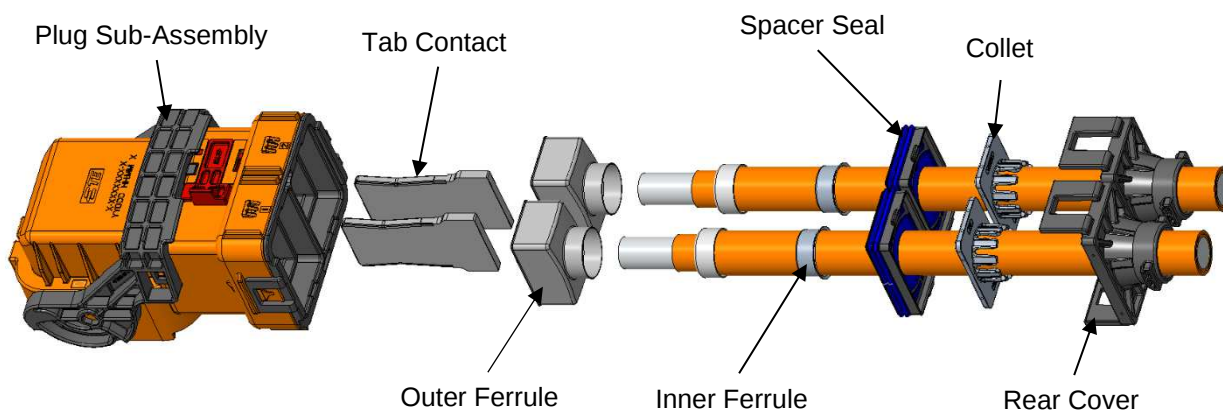


Figure 1: Exploded View HC-STAK35-2PHI GEN2

2. REFERENCE MATERIAL

2.1. Revision Summary

- Revision 1 - Initial release of document.
- Revision 2 - Table 2 plug tab part number updated.
- Revision 3 - Added section 3.12, removed 2385514-C from section 3.13.
- Revision 4 - Table 1 & 2 updated.
- Revision A - Table 1,3 & Figure 9b updated.
- Revision A1 - Updates have been made to Figures 19 & 20, and new Figures 22a & b have been added. Subsequently, the sequence of figure numbers has been rearranged.
- Revision B – Champlain Cable 70 mm² has been updated.
- Revision B1 – Prysmian Cable 70 & 95 mm² details added to table 1 & Cables spec standards updated.
- Revision B2 – Update Table 3, Dimension “A” for 95mm² to 26.1mm.
- Revision C – Updated Table 1 with “95mm² CHAMPLAIN T6 EXRAD” cable details

2.2. Customer Assistance

Reference drawing 2385721 and Product Code L983 represent the HC-STAK35. Use of this base number and product code 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 the Product Information Center at the number at the bottom of page 1.

2.3. Drawings

2.3.1 Customer 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, the Customer Drawing takes preference.

2.3.2 Reference drawings



Reference Drawing C-2385721 is available for part number relationships only and is not a saleable item. Refer to this drawing only for compatible part numbers for customer inquiry. For more information on Reference Drawing, call PRODUCT INFORMATION at the number at the bottom of page 1.

2.4. Cable and Subcomponent Specification

The following cable and subcomponent combinations must be used together to ensure optimum connector performance.



Do NOT nick, scrape, or cut the wire conductor during the stripping process.

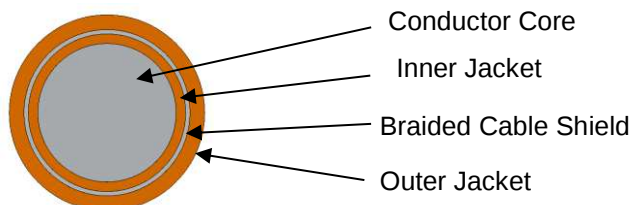


Figure 2: Single Conductor Cable

A. Cable Specification

Dimensions need to be in accordance with the table 1 below and the following technical data:

- Voltage level: 600 V_{AC} / 900 V_{DC}
- Temperature range: -40°C to 150°C / 3000h

According to Standard

- ISO 19642-5
- ISO 19642-9

Table 1: Cable dimensions

Type	Conductor		Core		Screen	Cable		
	Size	Diameter	Outside Diameter		Strand Diameter	Wall Thickness	Outer Diameter	
		MAX	MIN	MAX	MAX	MIN	MIN	MAX
	[mm ²]	[mm]	[mm]		[mm]	[mm]	[mm]	
COFICAB FHLR91XC91X-C ISO T4 HI4XCXC70HHH	70	12.50	13.00	14.40	0.21	0.88	16.60	17.40
COFICAB FHLR91XC91X-C ISO T4 HI4XCXC95HHH	95	14.80	15.30	16.70	0.26	0.88	19.10	19.90
CHAMPLAIN ERGOFLEX UV 15-08678	70	11.86	13.40	14.00	0.28	1.02	16.70	17.30
CHAMPLAIN ERGOFLEX-2 15-08599-001	95	13.71	15.64	16.36	0.25	1.22	19.14	19.86
PRYSMIAN 158089-218MTR	70	12.50	13.00	14.40	0.21	1.10	16.60	17.40
PRYSMIAN 158560-218MTR	95	14.80	15.30	16.70	0.21	1.10	19.10	19.90
CHAMPLAIN T6 EXRAD S200XL 15-08905-001	95	14.30	15.49	16.51	0.20	1.22	19.18	19.90

B. Cable Assembly

The components used on the Header Assembly are specified in the Table 2 below.

Table 2: TE Part numbers for cable assembly

RECOMMENDED SUBCOMPONENTS		
Part Numbers	Quantity	DESCRIPTION
2385722-1	1	Plug assembly, Code A
2385722-2	1	Plug assembly, Code B
2385722-3	1	Plug assembly, Code C
2385722-4	1	Plug assembly, Code D
2840535-1	2	Plug Tab
2385150-1	2	Ferrule, Inner, 70mm ²
2385150-2	2	Ferrule, Inner, 95mm ²
2385151-1	2	Ferrule, Outer, 70mm ²
2385151-2	2	Ferrule, Outer, 95mm ²
2385152-1	2	Cable Seal, 70mm ²
2385152-2	2	Cable Seal, 95mm ²
2381326-1	2	Collet, 70mm ²
2381326-2	2	Collet, 95mm ²

2381178-1	2	Cover, 70mm ²
2381178-2	2	Cover, 95mm ²



See the reference drawing C-2385721 for specific validated wire sizes and part numbers.

3. REQUIREMENTS

3.1. Safety

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

3.2. Shelf Life

The contacts should remain in the shipping containers until ready for use to prevent deformation to the contacts and/or damage to the housings. The products should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions.

3.3. Chemical Exposure

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

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

3.4. Material

The connector assemblies are made of thermoplastic materials and the terminals, shields, and ferrules are tin- and silver-plated copper alloy.

3.5. Circuit Identification

The terminal cavities are numbered on the outer housing of the connector at the wire entry end.

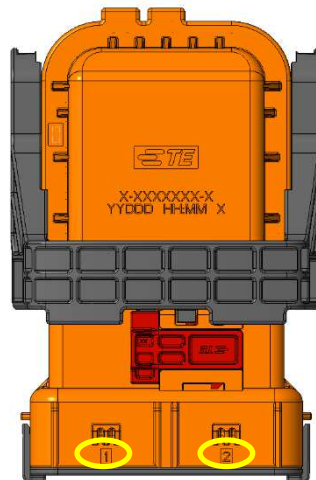


Figure 3: Circuit Identification

3.6. Assembly Procedures

The following procedures show the details of the cable assembly and insertion instructions into the plug subassembly.



Refer to Table 2 for the various components of the cable as shown in an end view of the cable.

1. From the plug end of the cable slide the rear cover, collet, and spacer seal in the order and orientation as shown in Figure 4.

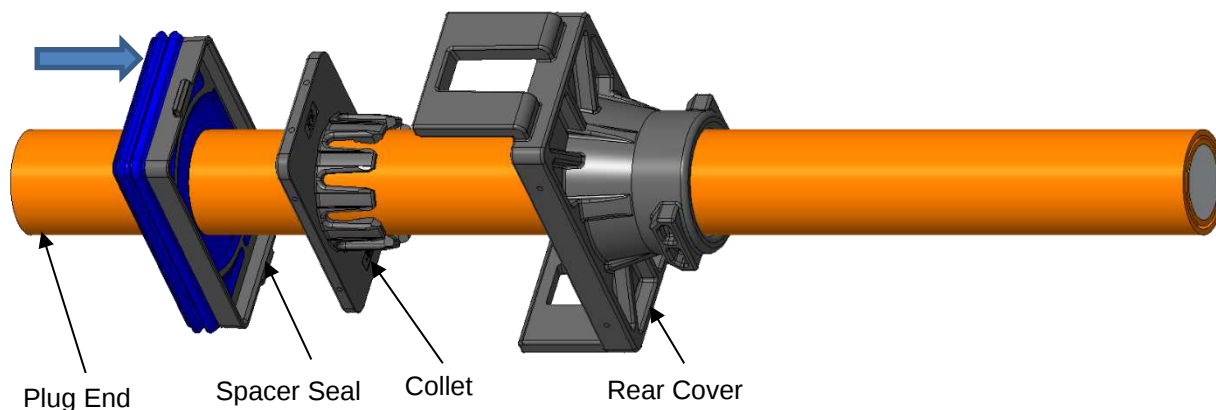


Figure 4: Rear cover, collet, and spacer seal loaded on cable

2. Strip and remove the outer cable jacket, foil (if present), braided shield, and inner jacket from the plug end as shown in Figure 5.

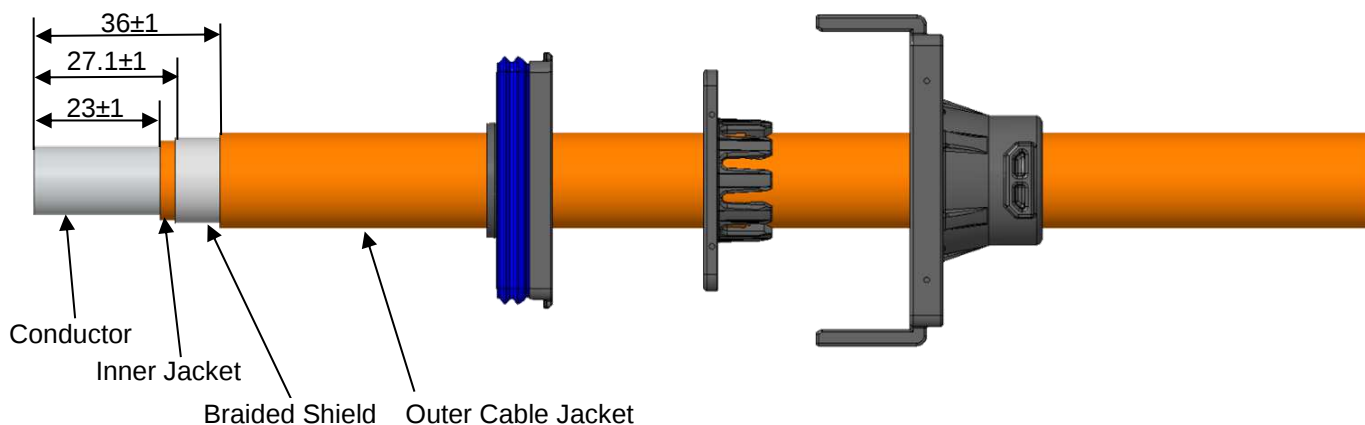


Figure 5: Cable Stripping



Do not cut, nick or scrape the conductive wires during the stripping process.

3. Insert an inner ferrule over the outer jacket as shown in Figure 6.

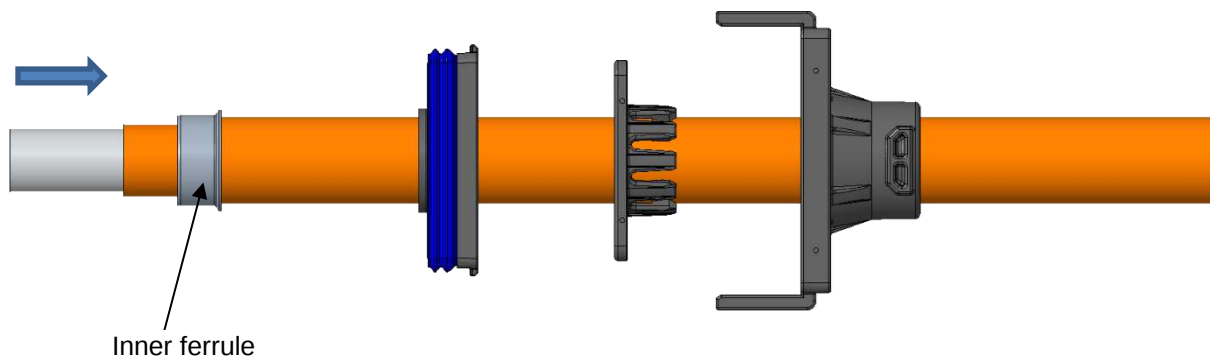


Figure 6: Inner ferrule over outer jacket

4. Fold the braided cable shield back over the inner ferrule, taking care to try to keep inner ferrule positioned such that its edge is flush with the stripped edge of the outer jacket as shown in Figure 7.

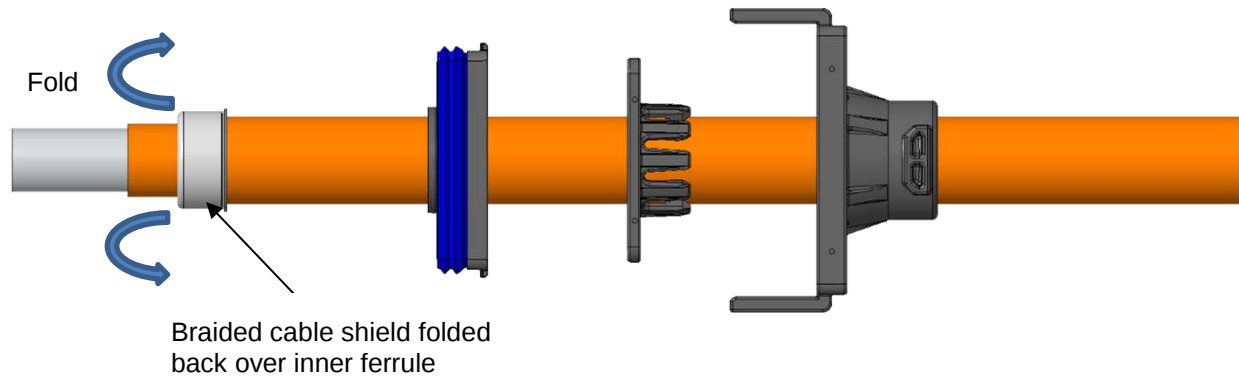


Figure 7: Inner ferrule over outer jacket

5. Insert an outer ferrule onto cable in the orientation shown and over the inner ferrule and folded back braided cable shield. See Figure 8a.

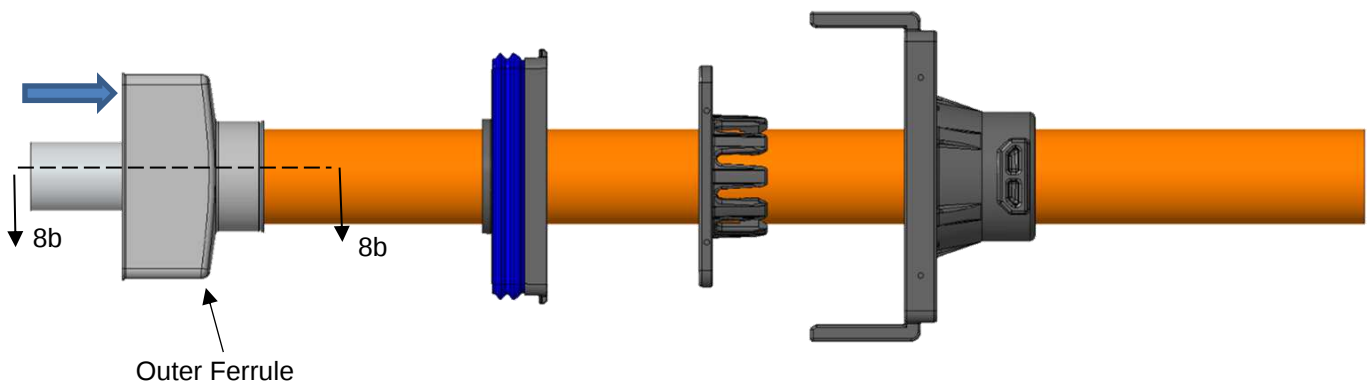


Figure 8a: Slide the outer ferrule over the folded back braided cable shield

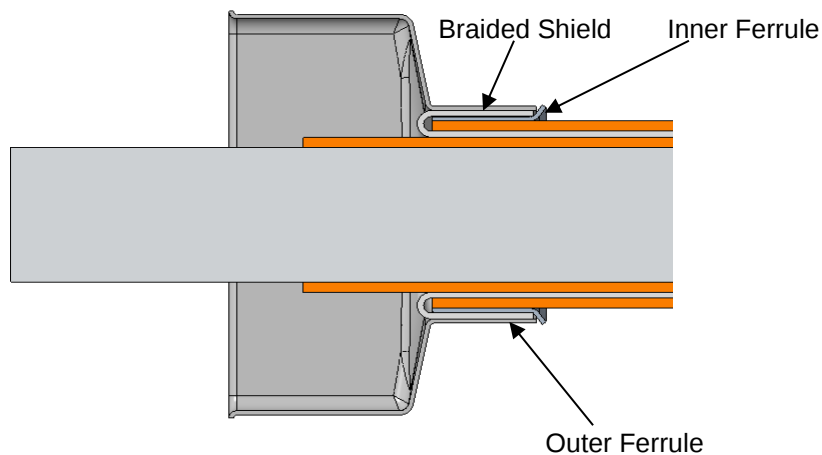


Figure 8b: Cross section



The shielding braid must be spread uniformly on the circumference of the ferrule.

6. Crimp outer ferrule using the tooling specified in Section 4 in place as shown in Figure 9a using dimensions in Table 3.

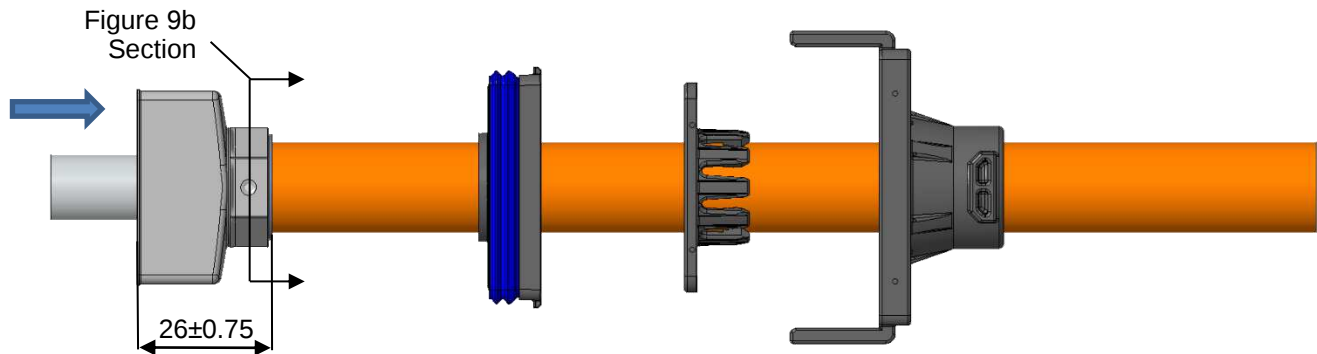


Figure 9a: Ferrule Crimp



Hex crimp dimple and crimp wings must be correctly oriented (Long sides of the inner ferrule box)

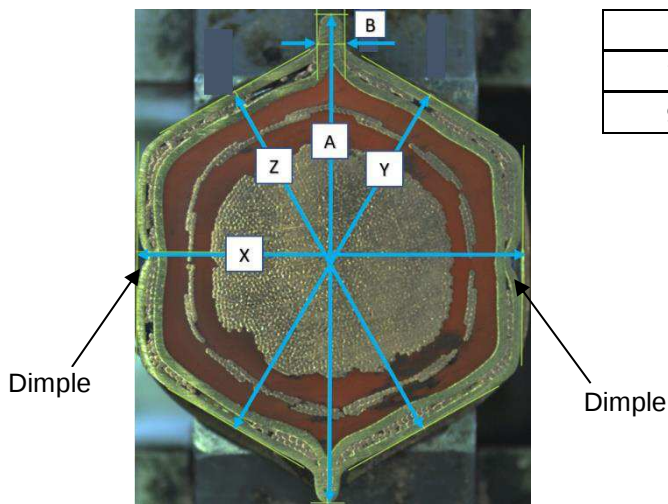


Figure 9b: Hex Crimp

Cable	Dim X	Dim Y	Dim Z	Dim A	Dim B
70mm ²	17.6±0.2	17.9 MAX	17.9 MAX	23.0 MAX	1.6 MAX
95mm ²	20.0±0.2	20.3 MAX	20.3 MAX	26.1 MAX	1.8 MAX

Table 3: Hex Crimp Dimensions



Wire insulation shall NOT be cut or broken during the crimping operation, nor shall the insulation be crimped into the ferrule.



Any loose strands of the braided cable shield seen protruding from the outer ferrule should be trimmed, taking special care not to leave any detached strands attached to the assembly.



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

7. Ultrasonic weld HV Tab as shown in Figure 10. See SAE/USCAR-38 for weld bond appearance, mechanical and electrical requirements. Ensure that the keep-out zones are not violated. This is critical to ensure proper assembly.

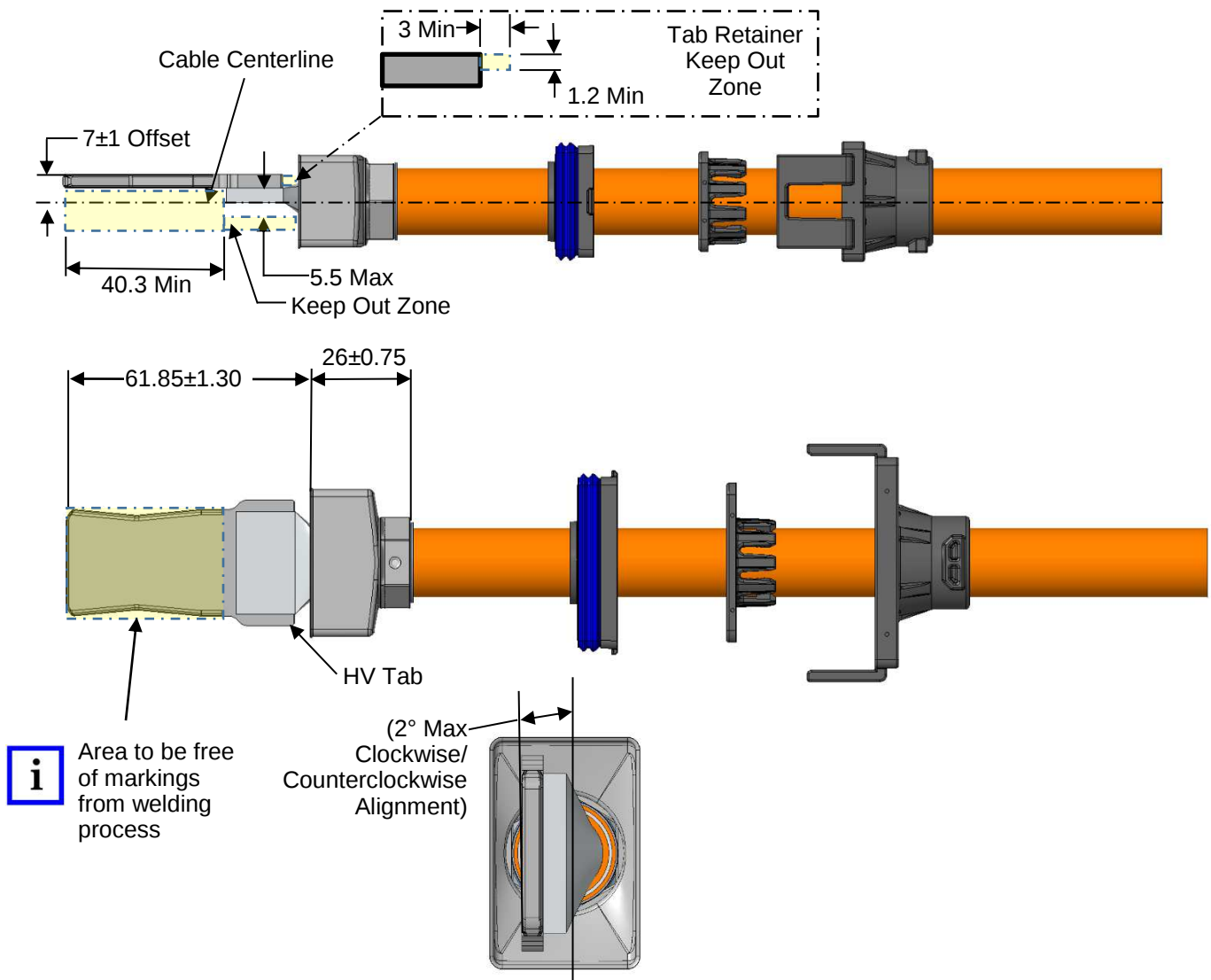


Figure 10: HV Tab ultrasonic welding

8. The following items at a minimum should be inspected and verified:
- Hex crimp dimensions per Table 3,
 - No large burrs/flash on the ferrule crimp,
 - No visible cracking of the ferrule or shields,
 - No loose or detached shield braid strands,
 - The cable insulation is not pinched abraded or cut,
 - The cable jacket to outer ferrule dimension,
 - Weld Nugget, brush, conductor strands, etc. do not violate keep out zone dimensions,
 - Presence and orientation of all components,
 - No deformation to the rectangular section of the inner ferrule,
 - No damage (scratches, etc.) to the HV tab contact surfaces.



Verify cable jacket to outer ferrule dimension just prior to installation into plug assembly.

9. Install the cable assembly into the plug sub-assembly in the orientation shown until it is fully locked as shown in Figure 11. Verify that the cable assembly is completely installed by gently pulling back on the cable.

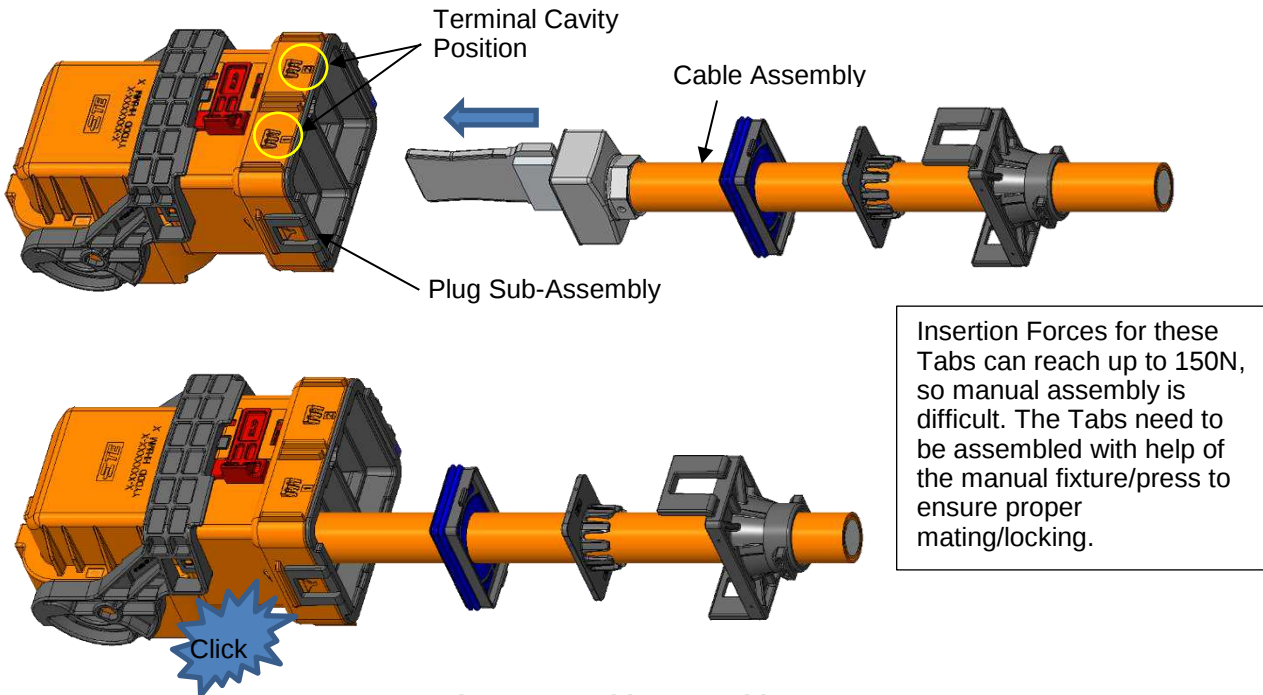


Figure 11: Cable Assembly

10. Slide the spacer seal forward on the cable and into the cable exit end of the plug sub-assembly until it stops against the inside of the plug sub-assembly as shown in Figure 12.

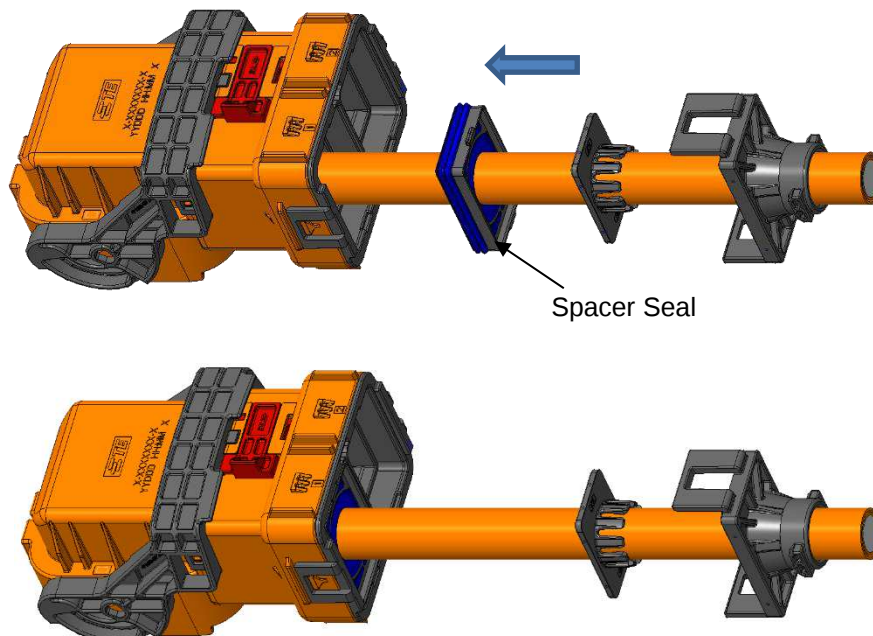


Figure 12: Spacer Seal Assembly

11. Slide the collet forward on the cable and into the spacer seal as shown in Figure 13.

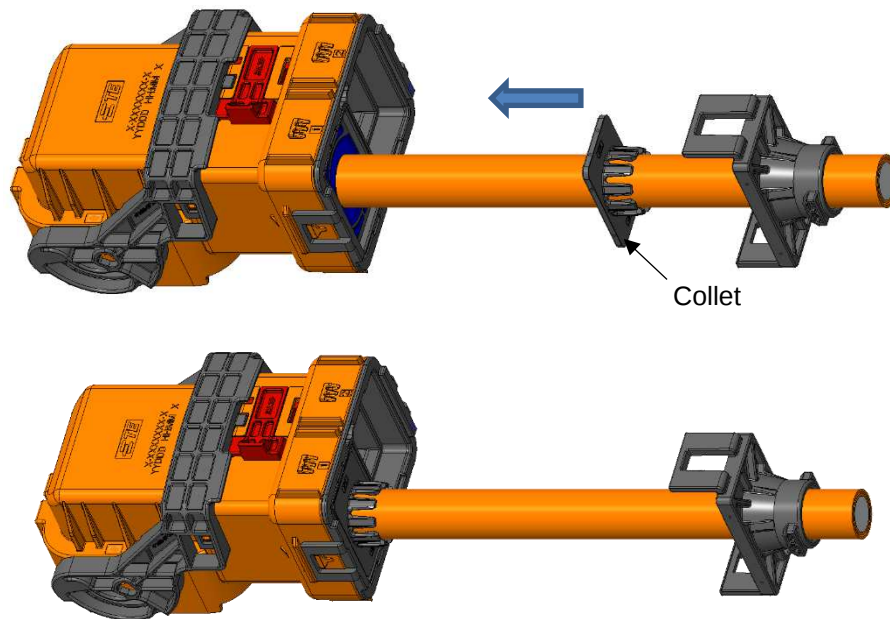


Figure 13: Collet Assembly

12. Slide the rear cover forward on the cable and latch to the plug sub-assembly as shown in Figure 14. Verify that both rear cover latches are fully locked.

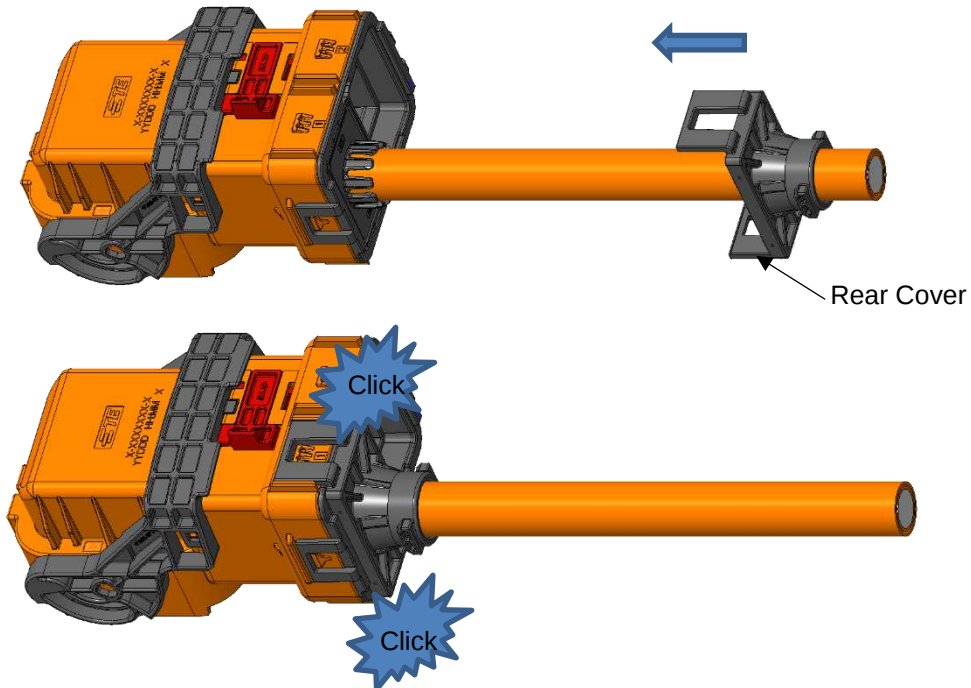


Figure 14: Rear Cover Assembly

13. Repeat steps 8 thru 11 for the other cable assembly to complete the plug-cable assembly as shown in Figure 15.

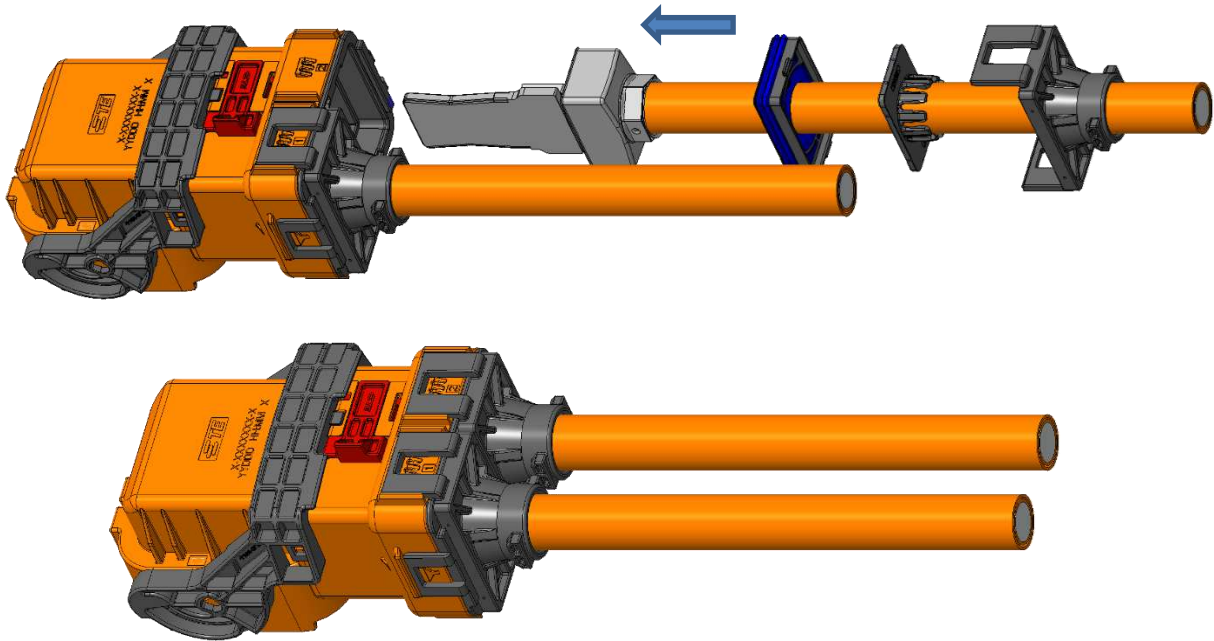


Figure 15: Plug-Cable Assembly

3.7. Contact Probing



Avoid probing the HV tabs in an area that could damage the plating. The best locations for probing are in the probe points shown in Figure 16.



Avoid probing the shunted receptacle contacts. This could damage the contact geometry and/or plating.

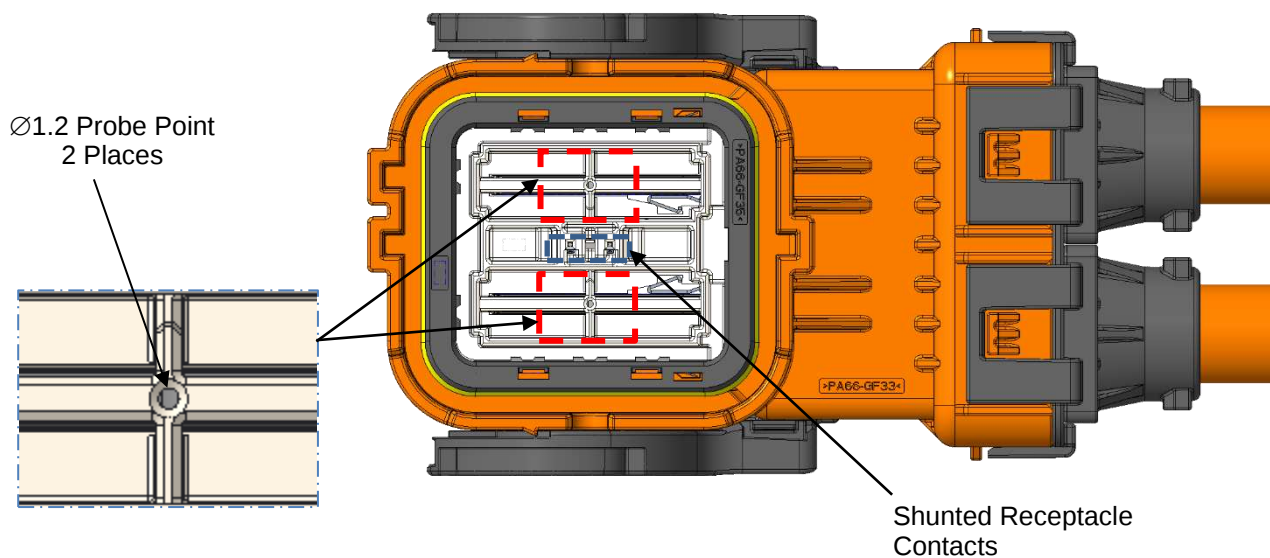


Figure 16: Probe Points

3.8. Connector Mating

1. If the assembly is shipped with the Lever and/or red Connector Position Assurance (CPA) in the closed position first, if necessary, actuate the CPA to the open position, then open the lever to the open position as shown in Figure 17.

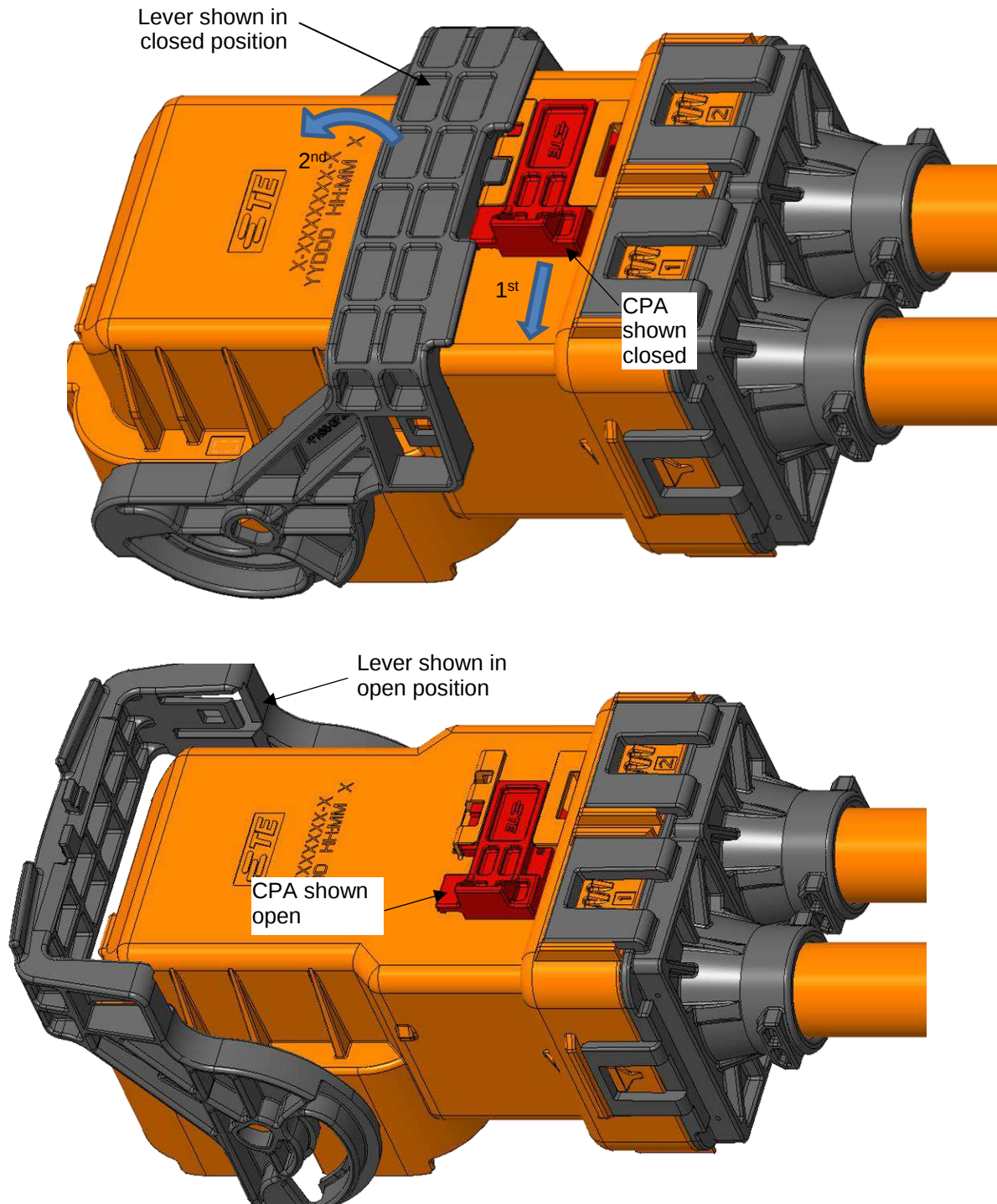


Figure 17: Assembly Lever and CPA in close and open positions

2. Align the plug and header connectors as shown in Figure 18.



Make sure that the lever is still in the fully open position prior to engagement with the mating header.

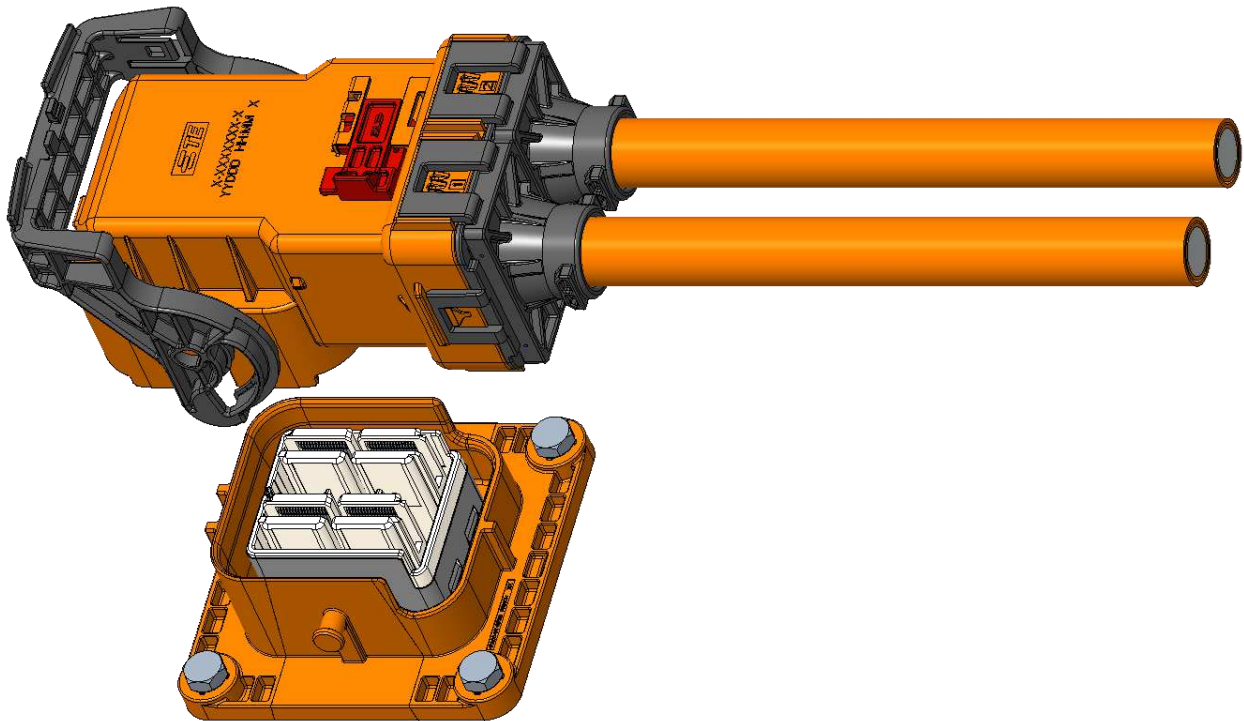


Figure 18: Plug and Header Alignment

3. Holding the plug connector body push the connector halves together until the header ears completely engage with the lever as shown in Figure 19.

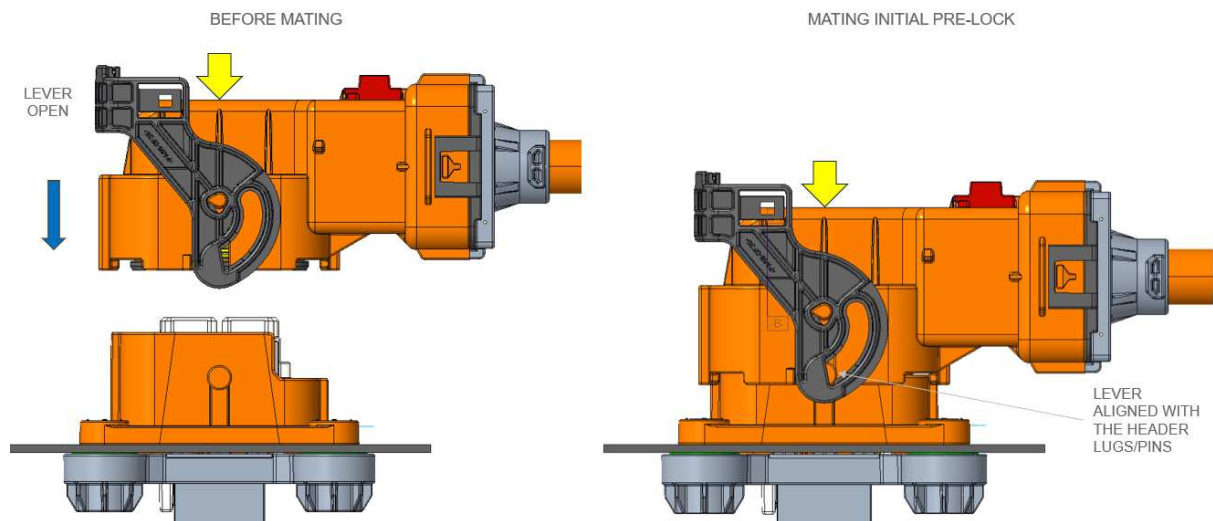


Figure 19: Plug and Header Pre-Lock

4. Rotate the lever towards the connector body until it is completely in the closed position as shown in Figure 20a & b.

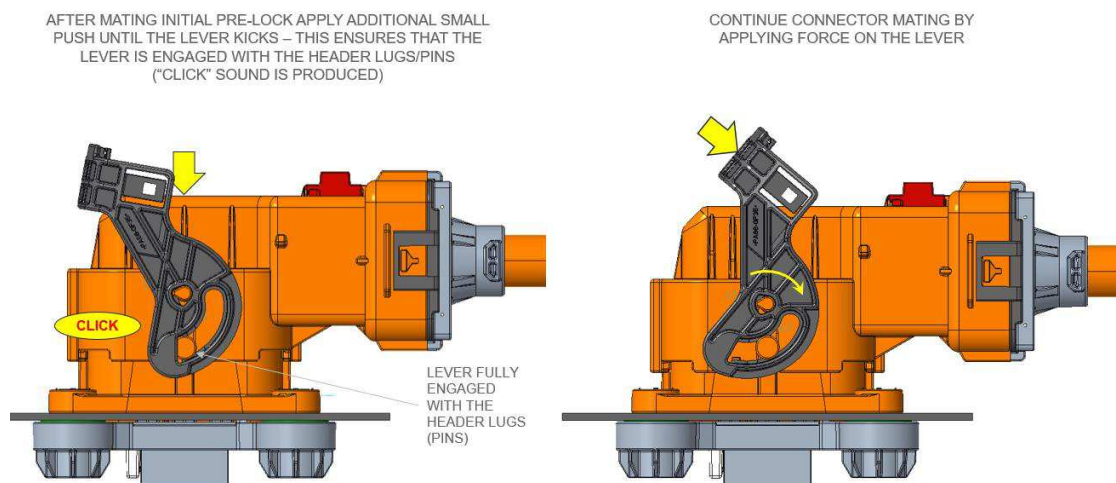


Figure 20a: Lever Actuation from Open to Close

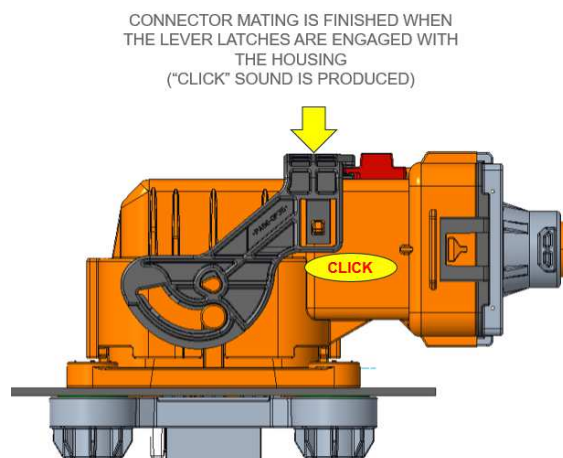


Figure 20b: Connector Mating with Lever Latches Engagement

5. Push the red CPA forward until it stops as shown in Figure 21.

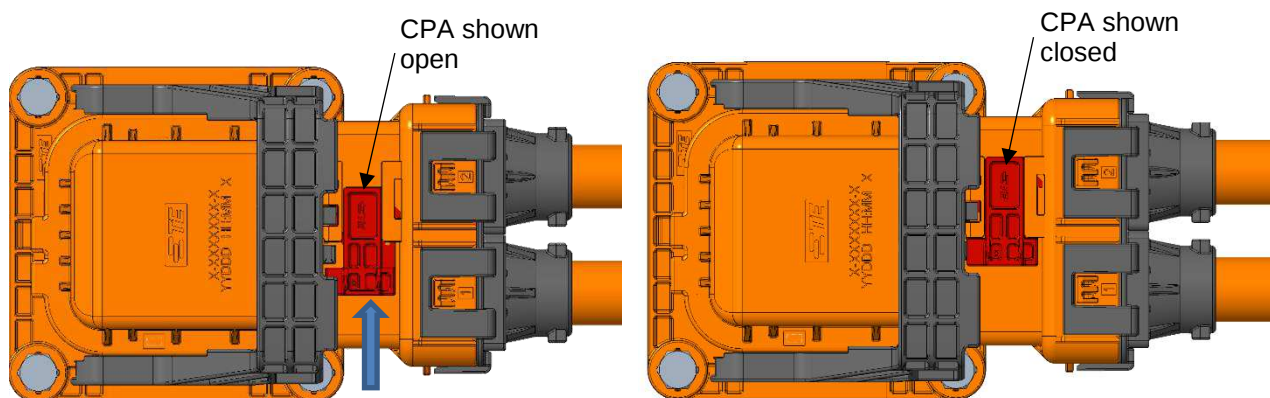
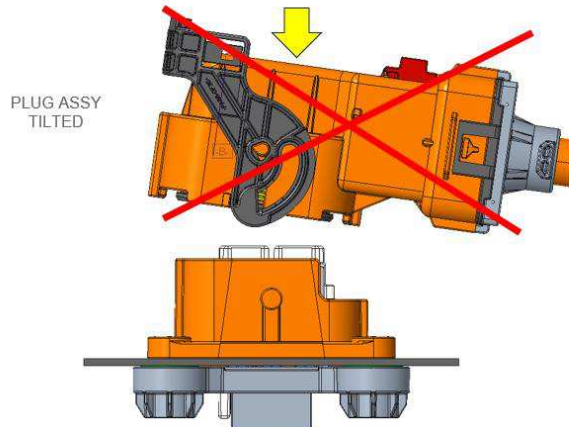


Figure 21: CPA Actuation from Open to Close – Plug and Header Mating



Make sure that the following conditions are avoided during mating process.

KEEP THE PLUG ASSY ALIGNED WITH THE HEADER ASSY. IN AN EXAMPLE SHOWN BELOW, THE PLUG ASSY IS TILTED TOO MUCH AND IT WOULD CAUSE DIFFICULTY FOR CONNECTOR MATING. WEIGHT OF CABLES ON THE BACK OF THE CONNECTOR COULD CAUSE TILTING.



LEVER NEEDS TO BE FULLY OPEN PRIOR TO CONNECTOR MATING PROCESS

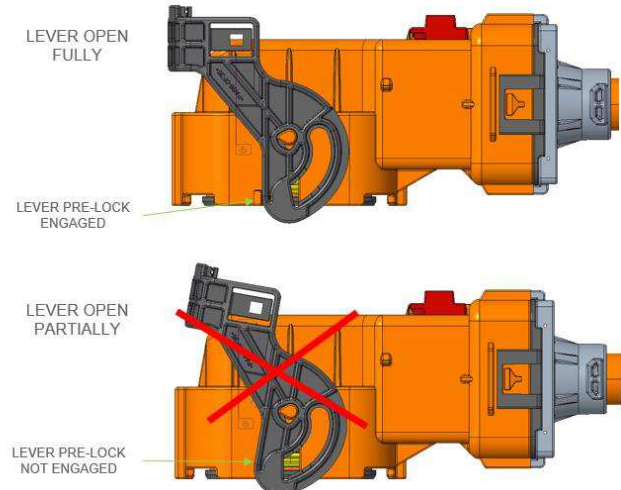
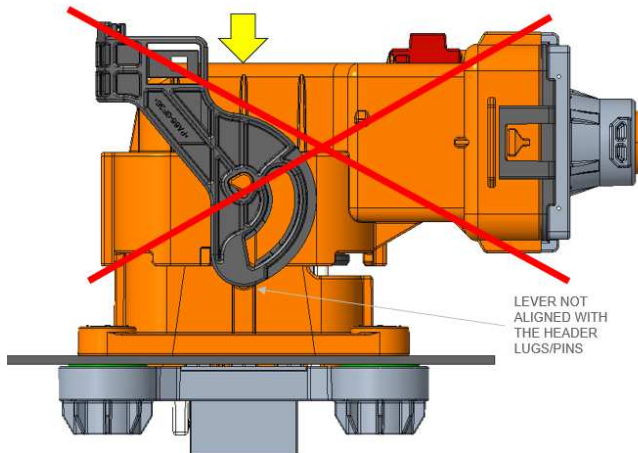


Figure 22a

MATING INITIAL PRE-LOCK NOT FULLY ENGAGED



IF MATING IS CONTINUED WITH FORCING PUSH ON THE LEVER WITH CONDITION SHOWN ON THE LEFT, IT WILL CAUSE DAMAGE TO THE CONNECTOR.

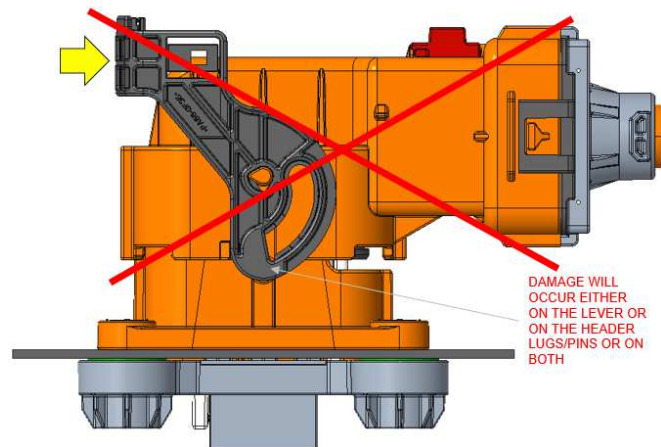


Figure 22b

3.9. Connector Un-mating

1. Push the red CPA forward until it stops as shown in Figure 23.

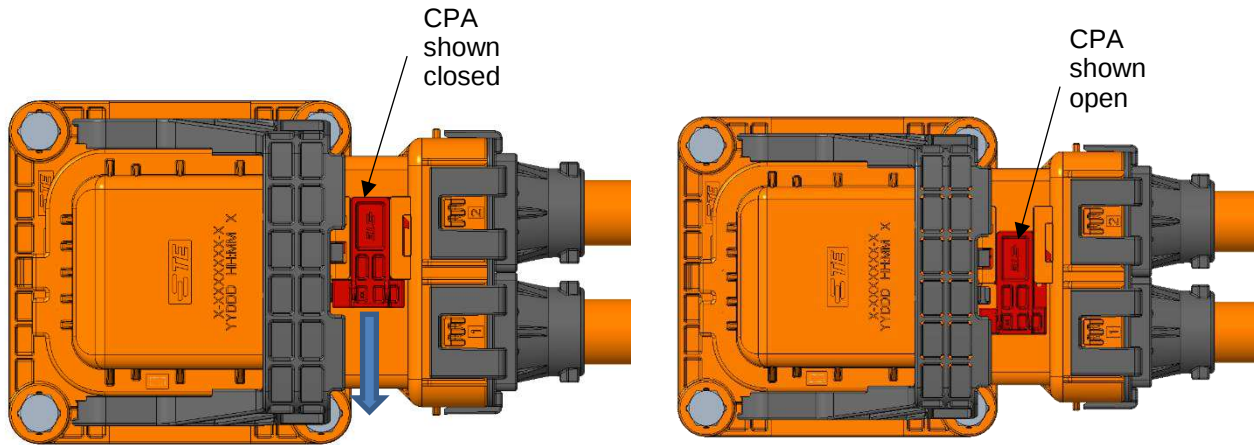


Figure 23: CPA Actuation from Close to Open

2. Rotate the lever away from the connector body until it is completely in the open position as shown in Figure 24.

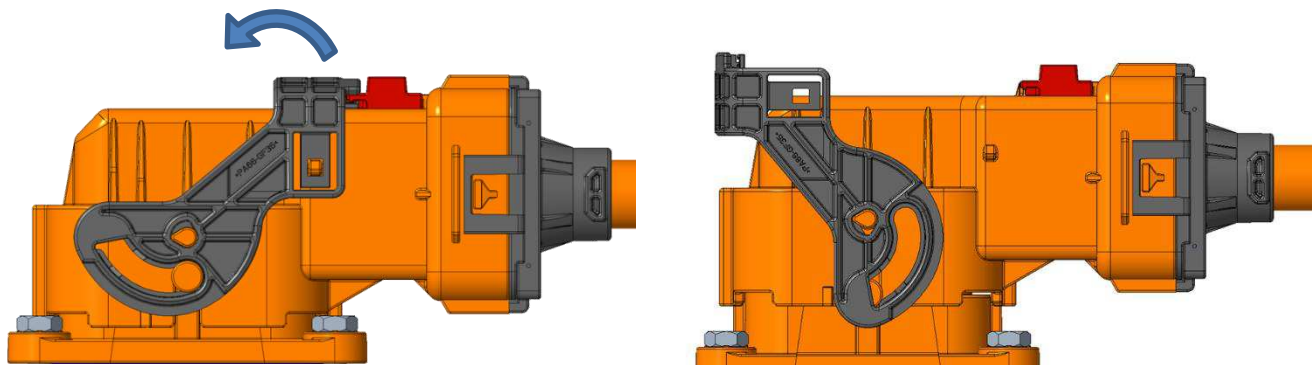


Figure 24: Lever from Close to Open

3. Holding the connector body pull the plug until it is completely separated from the header as shown in Figure 25.



Do not use the lever as a handle to pull the plug apart.

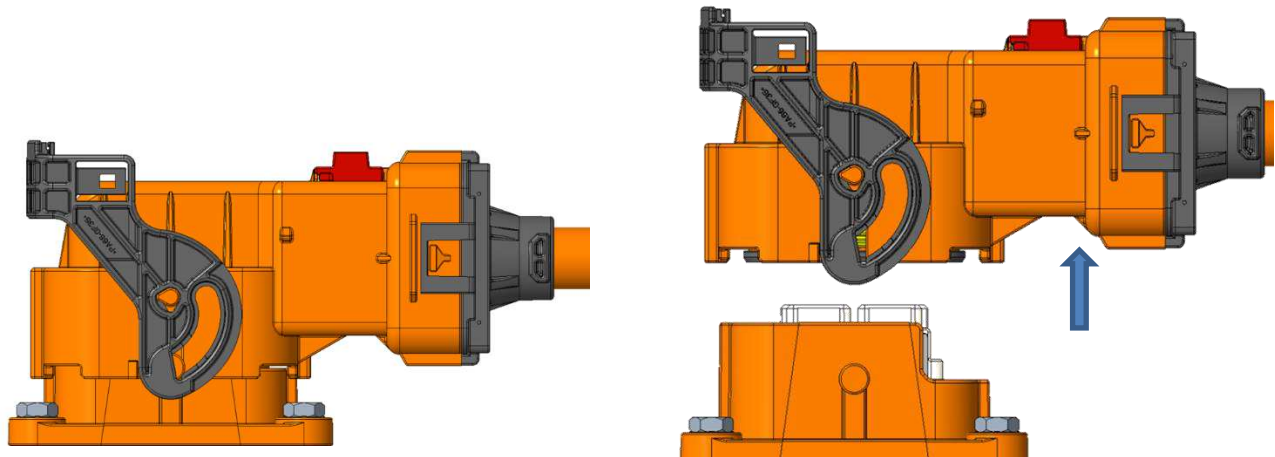


Figure 25: Plug and Header Un-mating

3.10. Dimension of Complete Header Assembly

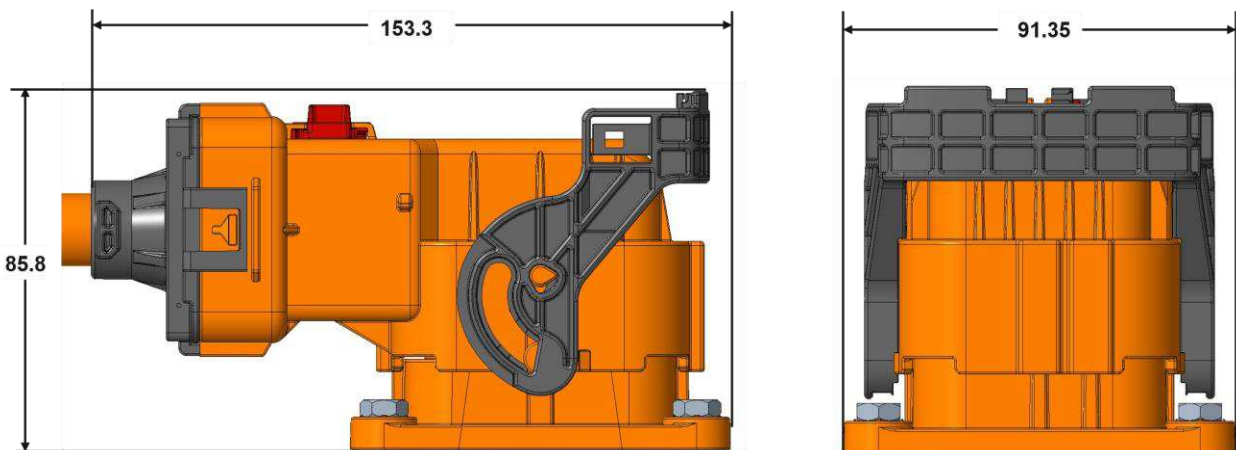


Figure 26: Complete Assembly in Pre-lock Position

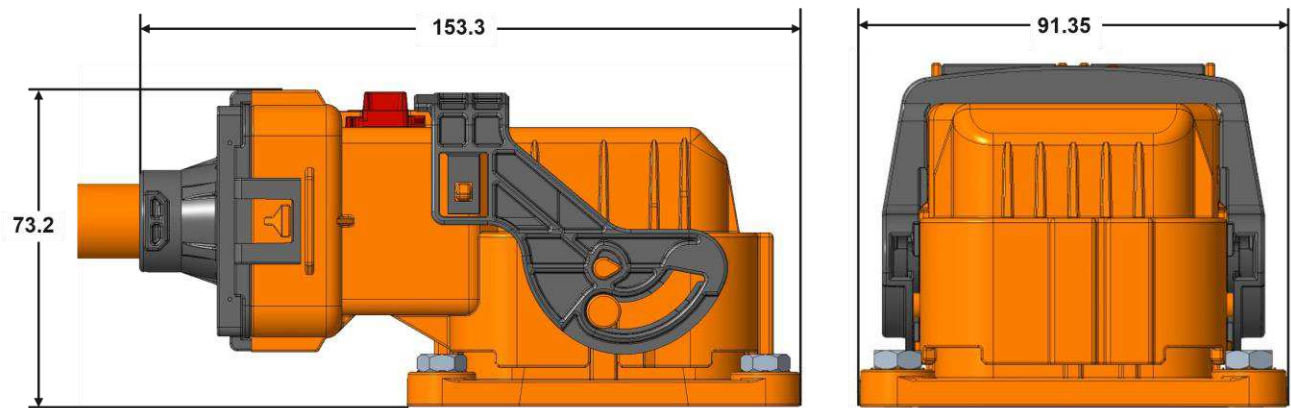


Figure 27: Complete Assembly in Locked Position

3.11. Keying Capability

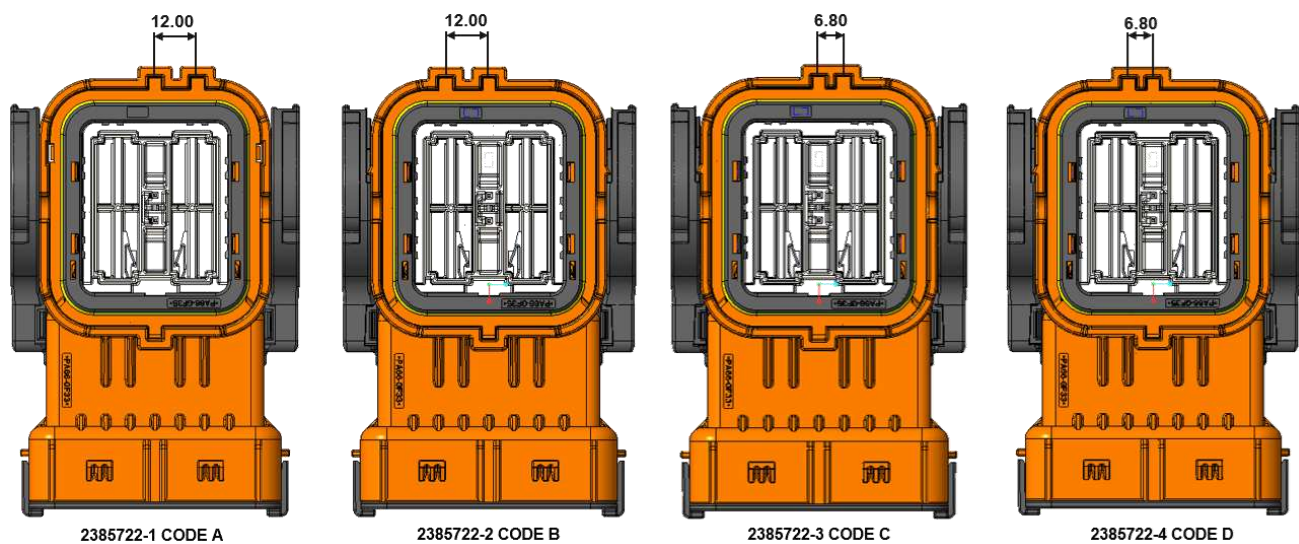


Figure 28: Keying Capability of Plug Sub-Assembly

3.12. Strain Relief Arrangement

System will be validated with strain relief at 100mm. Each application must be evaluated independently with regards to the external influences on the system. Having strain relief, which moves with the connector body, close to the end of the connector will have a positive influence on the performance of the connector. Having strain relief further from the end of the connector or that moves independent of the connector body will have a negative influence on the performance of the connector.

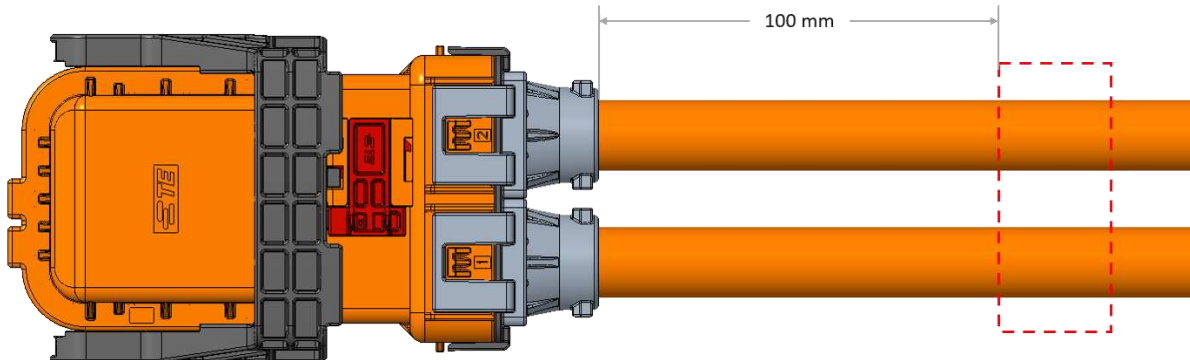


Figure 29: Recommended requirement for strain relief

3.13. Inspecting

For the inspection, refer to the customer drawing numbers 2385152-C, 2381178-C, 2381326-C, 2385150-C, 2385151-C, and 2385722-C.

4. TOOLING

A listing of tooling recommendations covering the full wire size range is provided in Figure 30. Modified designs and additional tooling concepts may be available to meet other application requirements. For additional information, contact one of the service groups at the bottom of page 1.

CABLE	DIE SET	MANUAL TOOLING	PNEUMATIC TOOLING				
			HAND ASSY	FOOT ASSY	TOOL HOLDER		
					RATCHET	NON-RATCHET	HEAD ASSY
70mm ²	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X
95mm ²	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X	X-XXXXXXX-X

Figure 30

5. END OF LINE TESTING

If pressure testing is used to validate sealing function, pressure shall not exceed 7 PSI [48 kPa].

6. NOTE, CAUTION, AND DANGER STATEMENTS



NOTE

Highlights special or important information.



CAUTION

Denotes a condition which may result in product or equipment damage.



DANGER

Denotes an imminent hazard which may result in moderate or severe bodily injury.