


NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 1 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

GS

1.0 OBJECTIVE

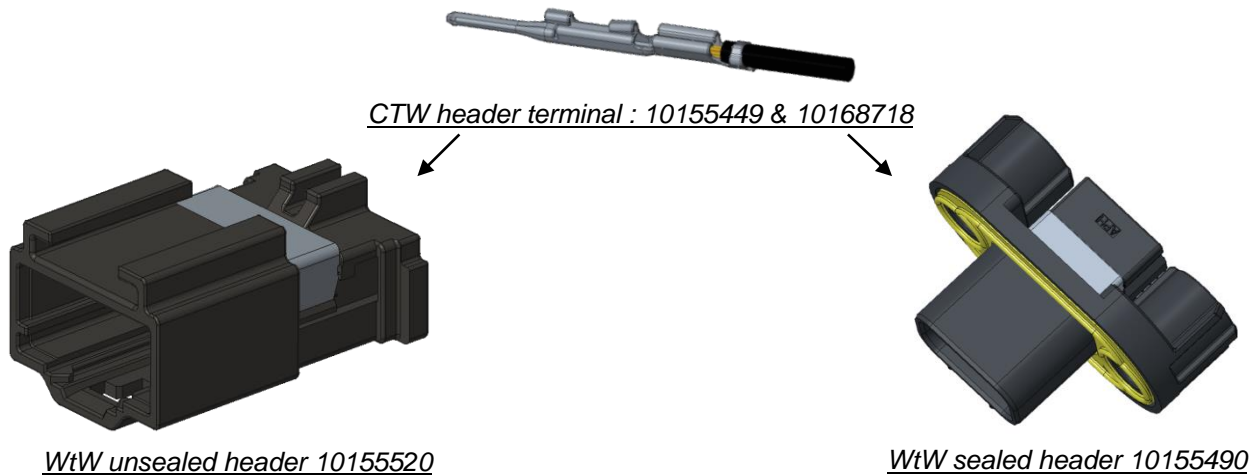
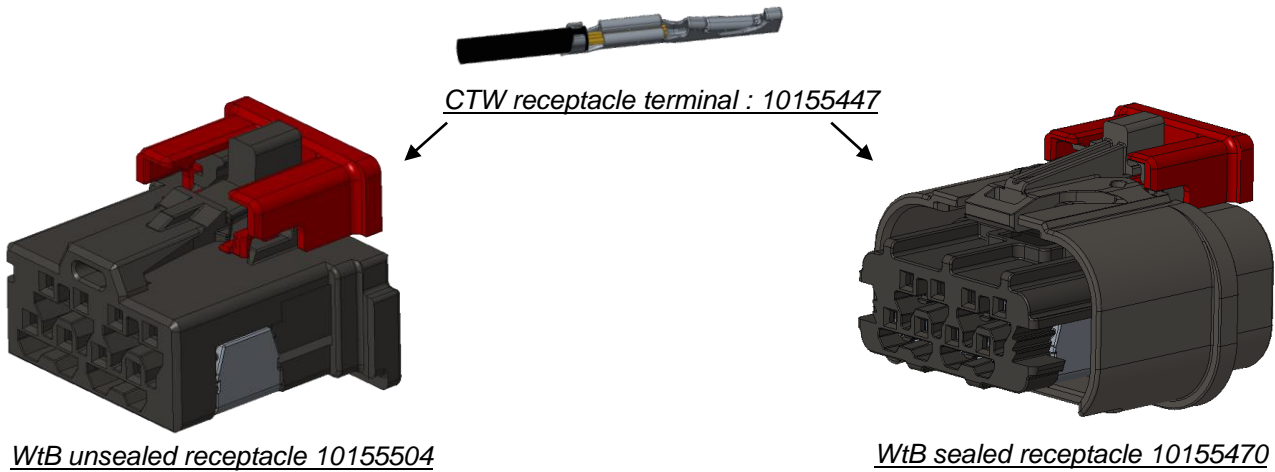
This specification provides information and requirements regarding customer application of MicroSpaceXS™ connectors. This specification is intended to provide general guidance for application process development. It is recognized that no single application process will work under all customer scenarios and that customers will develop their own application processes to meet their needs. However, if these application processes differ greatly from the one recommended, AFCI cannot guarantee results.


2.0 SCOPE

This specification provides information and requirements regarding customer application of MicroSpaceXS™ connector.

3.0 GENERAL

This document is meant to be an application guide. If there is a conflict between the product drawings and specifications, the drawings take precedence.



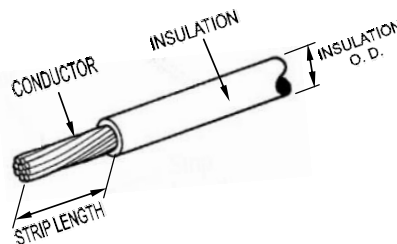
NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 2 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

4.0 DRAWINGS AND APPLICABLE DOCUMENTS

- AFCI PRODUCT SPECIFICATION GS-12-1634
- AFCI PRODUCT DRAWINGS
- APPLICATION MANUALS/INSTRUCTION SHEETS (IF NOT INCLUDED IN THIS DOCUMENT)

Product drawings and **AFCI's GS-12-1634** Product Specification are available at <http://www.amphenol-cs.com>. In the event of a conflict between this application specification and the drawing, the drawing will take precedence. Customers are advised to refer to the latest revision level of AFCI product drawings for appropriate details.


5.0 APPLICATION REQUIREMENTS



The wires in Table (1) are qualified for use with Terminal 10155447 / 10155449 / 10168718 :

Table (1)

Wire Manufacturers PN	# of Conductors	AWG	Unsealed connector Insulation diameter	Sealed connector Insulation diameter	Solid -or- Stranded	# of Strands Insulation	Insulation Material	Strip Length
-	7	AWG22	1.4 mm max	1.25 mm max	Stranded	-	TPE-E	4.1mm +/-0.2
-	7	AWG24	1.4 mm max	1.25 mm max	Stranded	-	TPE-E	
-	7	AWG26	1.1 mm max	NA	Stranded	-	TPE-E	
-	7	AWG28	0.9 mm max	NA	Stranded	-	TPE-E	


NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 3 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

6.0 AUTOMATIC APPLICATION TOOLING

Automatic Application Tooling needed for installation of Housing Terminal 10155447 & 10155449 is defined in Table (2):

Table (2)


TOOL SUPPLIER	DESIGNATION	TOOL P/N	PHOTO FOR INFORMATION ONLY
AMPHENOL FILEC rfq@filec.fr	Mini applicator MicroSpaceXS AWG22 10155447-Y11LF	T1011-22	 
	Mini applicator MicroSpaceXS AWG24 10155447-Y13LF	T1012-24	
	Mini applicator MicroSpaceXS AWG26 10155447-Y12LF	T1013-26	
	Mini applicator MicroSpaceXS AWG28 10155447-Y12LF	T1014-28	
	Mini applicator MicroSpaceXS AWG22 10155449-Y11LF & 10168718-Y11LF	T1031-22	
	Mini applicator MicroSpaceXS AWG24 10155449-Y13LF & 10168718-Y13LF	T1032-24	
	Mini applicator MicroSpaceXS AWG26 10155449-Y12LF & 10168718-Y12LF	T1033-26	
	Mini applicator MicroSpaceXS AWG28 10155449-Y12LF & 10168718-Y12LF	T1034-28	
	Spare parts for mini applicator MicroSpaceXS AWG22 10155447-Y11LF	T2011-22	 
	Spare parts for mini applicator MicroSpaceXS AWG24 10155447-Y13LF	T2012-24	
	Spare parts for mini applicator MicroSpaceXS AWG26 10155447-Y12LF	T2013-26	
	Spare parts for mini applicator MicroSpaceXS AWG28 10155447-Y12LF	T2014-28	
	Spare parts for mini applicator MicroSpaceXS AWG22 10155449-Y11LF & 10168718-Y11LF	T2031-22	
	Spare parts for mini applicator MicroSpaceXS AWG24 10155449-Y13LF & 10168718-Y13LF	T2032-24	
	Spare parts for mini applicator MicroSpaceXS AWG26 10155449-Y12LF & 10168718-Y12LF	T2033-26	
	Spare parts for mini applicator MicroSpaceXS AWG28 10155449-Y12LF & 10168718-Y12LF	T2034-28	

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 4 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

7.0 MANUAL APPLICATION TOOLING

Manual Application Tooling needed for installation of Housing Terminal 10155447 & 10155449 is defined in Table (3) :

Table (3)

TOOL SUPPLIER	DESIGNATION	TOOL P/N	PHOTO FOR INFORMATION ONLY
Contact us to have the partner's list for the tools in stock	Crimping hand tool MicroSpaceXS Receptacle terminal AWG22 - 10155447-Y11LF AWG24 - 10155447-Y13LF AWG26 - 10155447-Y12LF AWG28 - 10155447-Y12LF	10161117-002	
	Crimping hand tool MicroSpaceXS Header terminal AWG22 - 10155449-Y11LF & 10168718-Y11LF AWG24 - 10155449-Y13LF & 10168718-Y13LF AWG26 - 10155449-Y12LF & 10168718-Y12LF AWG28 - 10155449-Y12LF & 10168718-Y12LF	10161117-003	

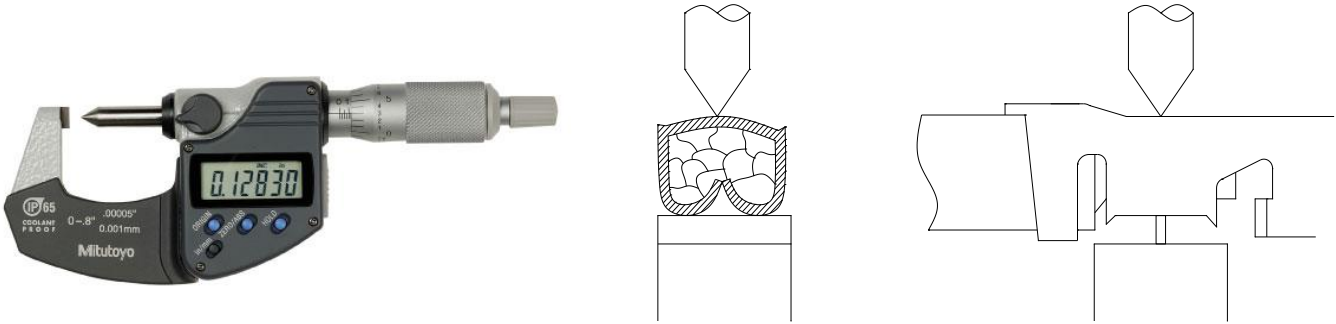
The crimp made by using the hand tool is not recommended to production or qualification use.

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 5 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

8.0 POST-APPLICATION INSPECTION PROCEDURES

8.1 Crimp height and width measurement :

8.1.1 Use Crimp Height Type Micrometers to measure crimping height.



8.2 Required crimping dimensions, crimp height and width for different wire AWG are defined in Table (4) & Table (5).

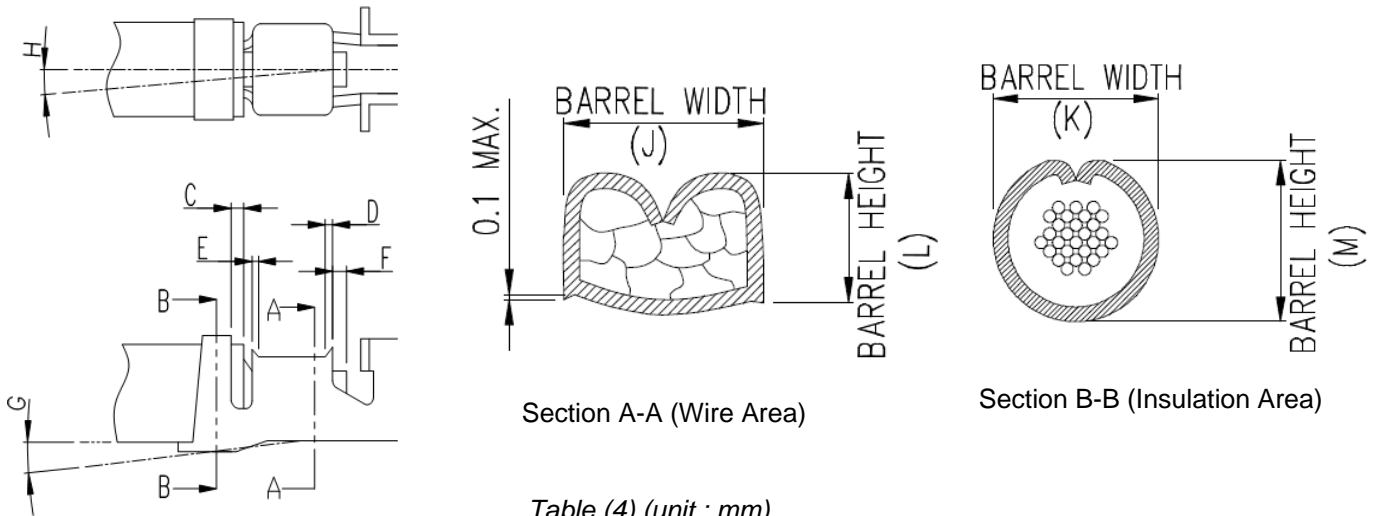


Table (4) (unit : mm)

Item	Requirement	Note	
Insulation position	C	0.5 mm	Insulation and wire should be both visual in this area
Front bell mouth	D	-	Not required
Rear bell mouth	E	0.2 - 0.4mm	
Extruded wire length	F	0.5mm max.	No wire brush accepted
Bend up / down	G	±3° max.	
Bend right / left	H	±3° max.	


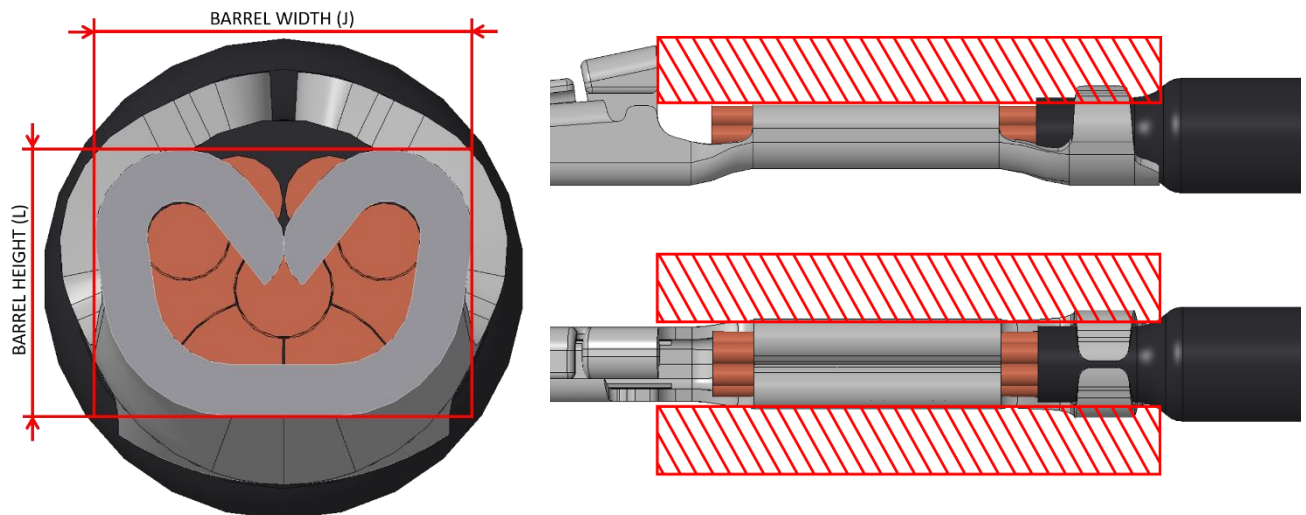
NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 6 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

Table (5) (unit : mm)

Crimping Width & Height (mm)		AWG 22 ≥1.25 / 1.40	AWG 22 <1.25	AWG 24	AWG 26	AWG 28
Crimping Width (Wire barrel)	J	1.1		1.1	0.9	0.9
Crimping Width (Insulation barrel)	K	1.50 max.	1.40 max.	1.35 max.	1.05 max.	0.95 max.
Crimping Height (Wire barrel)	L	0.78 ^{+/-0.03}		0.60 ^{+/-0.03}	0.62 ^{+/-0.03}	0.60 ^{+/-0.03}
Crimping Height (Insulation barrel)	M	1.50 ^{+/-0.1}	1.50 ^{0/-0.1}	1.35 ^{0/-0.1}	1.2 ^{0/-0.1}	1 ^{0/-0.1}


8.2.1 Crimping recommendations

To prevent any issue with assembling process, the crimp zone should not have any wire brush or any obstacle out of the area delimited by the Barrel Height and Width all along the hachured area.



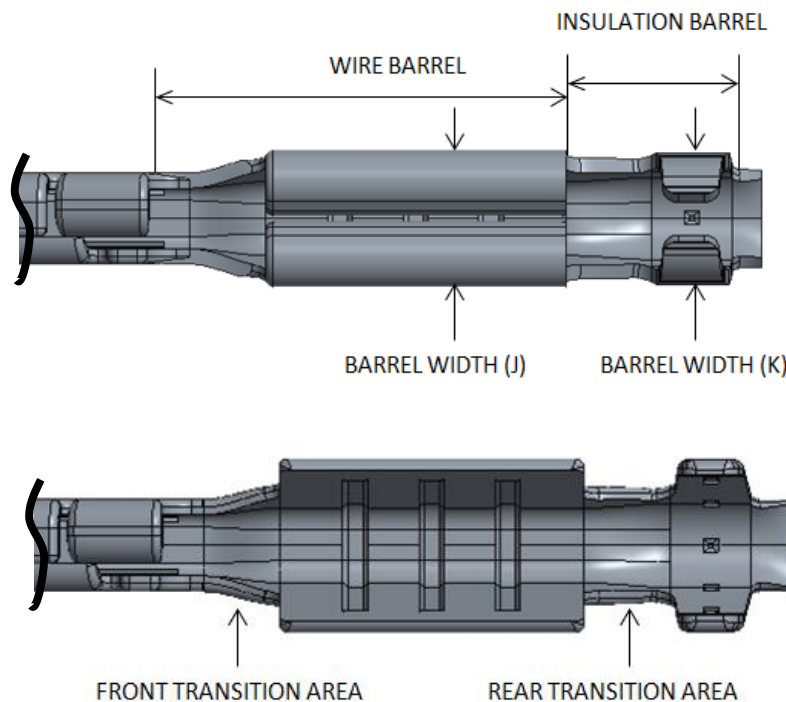
For a good quality and stability of the crimping, we recommend to maintain the tool regularly and to change the spare parts every 200kpcs.

The customer must use evanescent lubricant during the crimping for example the RENOFORM TD 2010.

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 7 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

8.3 Required width dimensions :

- 8.3.1 Width dimensions should be applied to ensure the good insertion of the terminal into the housing.
- 8.3.2 During the crimp operation, the front transition area should be managed to respect the crimping widths (J) all along the wire barrel area
- 8.3.3 During the crimp operation, the rear transition area should be managed to respect the crimping widths (K) all along the insulation barrel area



8.4 Pullout force measurement :

- 8.4.1 After crimping, pullout force measurement should be applied to ensure the performance.
- 8.4.2 Apply an axial pullout force on the wire at a rate of 25 ± 6 mm.
- 8.4.3 Pullout force should not be less the those listed in Table (6).

Table (6) (unit : N)

Wire AWG	AWG 22	AWG 24	AWG 26	AWG 28
Wire Pullout Force	50N min	35N min	25N min	15Nmin

8.5 Visual Inspection :

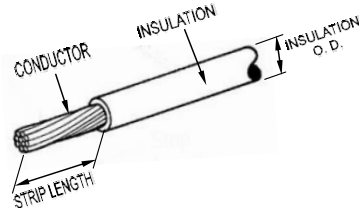
- 8.5.1 No damage, deformation on locking tabs, contact area or other portion of the terminals.
- 8.5.2 Insulation should not be crimped into wire barrel.
Wire should not be cut-off and insulation should not be broken after crimping process

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 8 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

9.0 APPLICATION PROCEDURE

9.1 Terminals into housing assembly

9.1.1 Strip the wire (see Table (1))



9.1.2 Crimp the terminal on the wire (see Table (4), (5), (6))

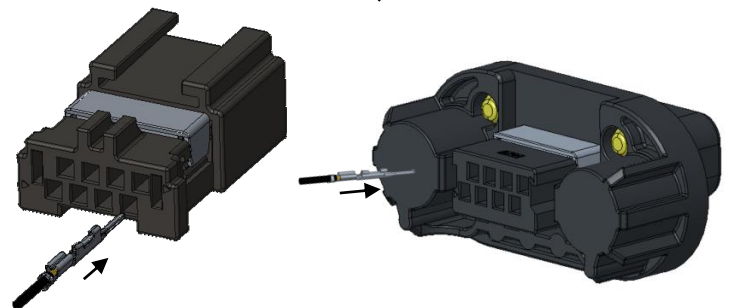
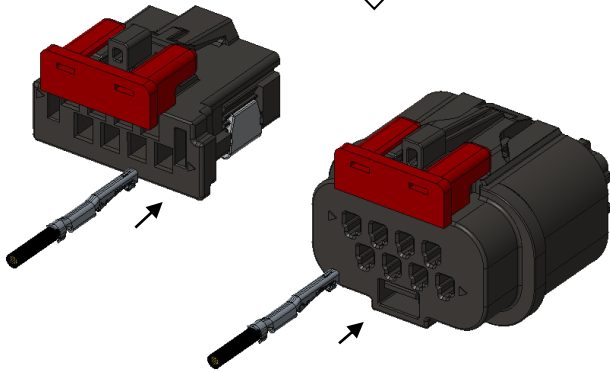


Receptacle terminal pin 10155447

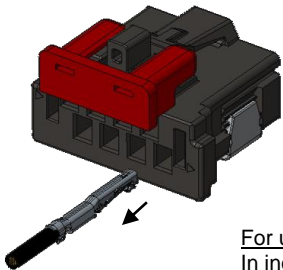


Header terminal pin 10155449 & 10168718

9.1.3 Insert terminals into the housing



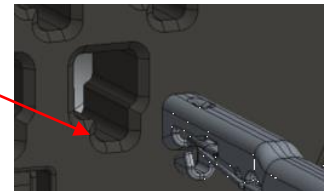
- Make sure that terminals are well oriented during insertion into the housing



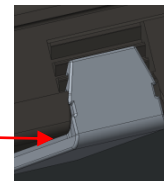
For unsealed version and header sealed version:
In incorrect orientation (180°) : Terminals can be fully inserted but freely pulled out from cavities


For receptacle sealed version:

A poka yoke shape in the entry of the sealed housing avoid to insert the receptacle terminal in a wrong way

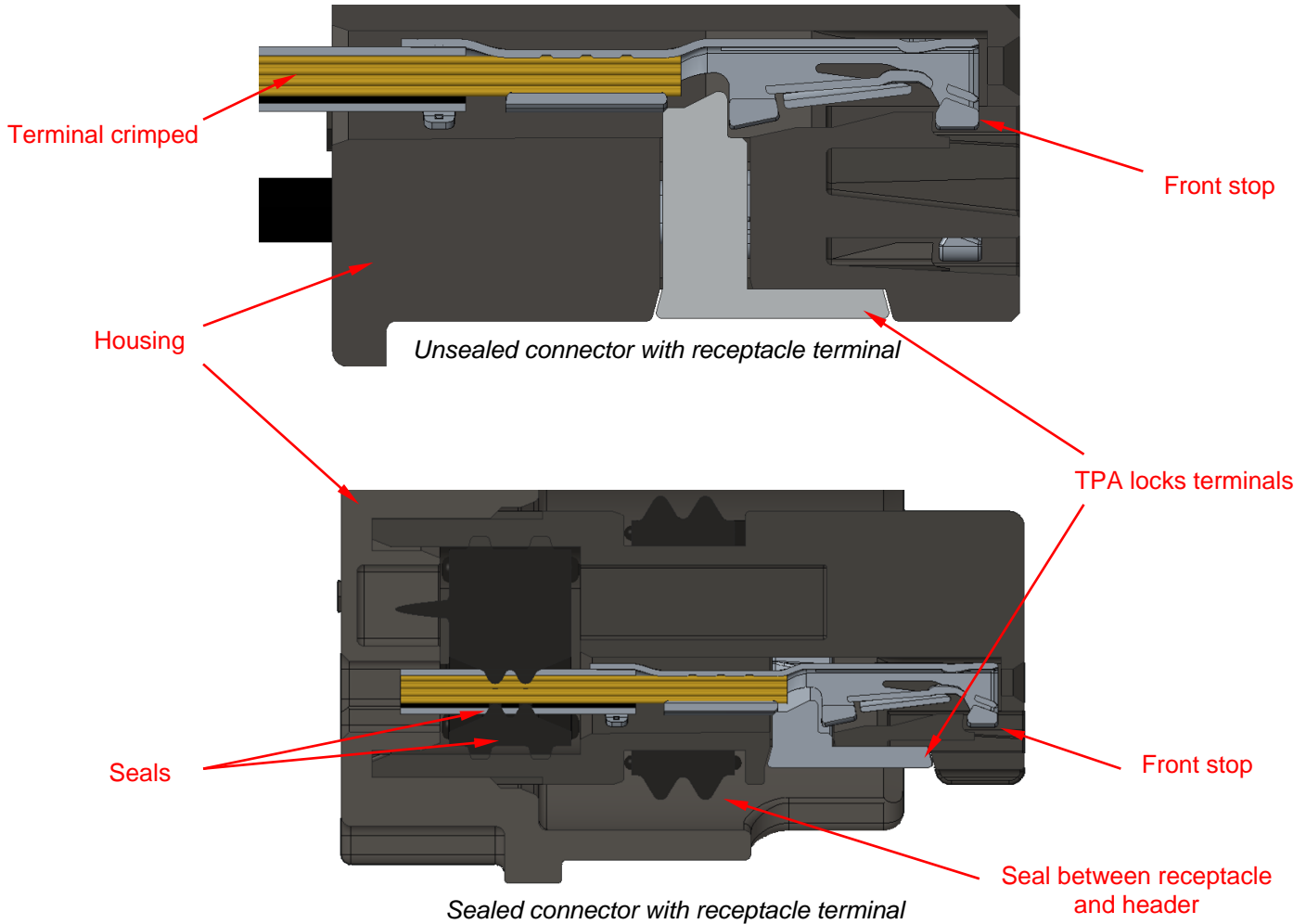


- Make sure that the TPA is in preload position before terminals insertion

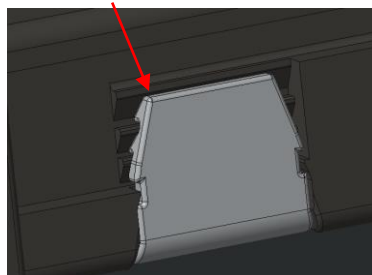


NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 9 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			


Insert the terminal into HSG until the front is stopped by HSG. Then locking tab will be engaged the retention shoulder and prevent back out during mating. Pull back on the wire lightly and ensure the terminal is fully seated:



9.1.4 Close the TPA to block terminals

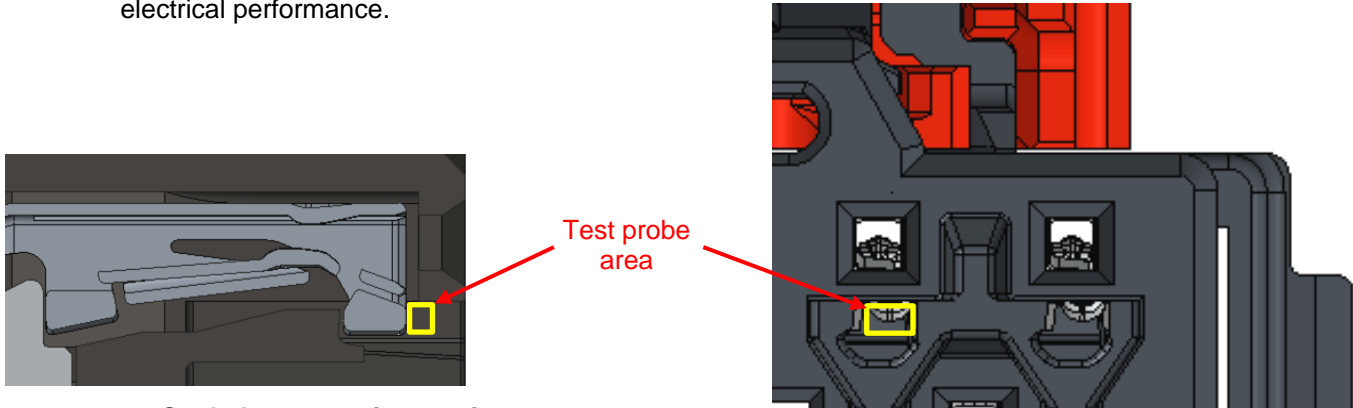


TPA in final position

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 10 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

9.2 Electrical testing, Probe test (Unsealed and Sealed)

To ensure the integrity of the terminal, spring and contact area, the probe test must be carried out on the first locking (see probe test area below). Failure to do so may result in damage that could affect the connector's electrical performance.



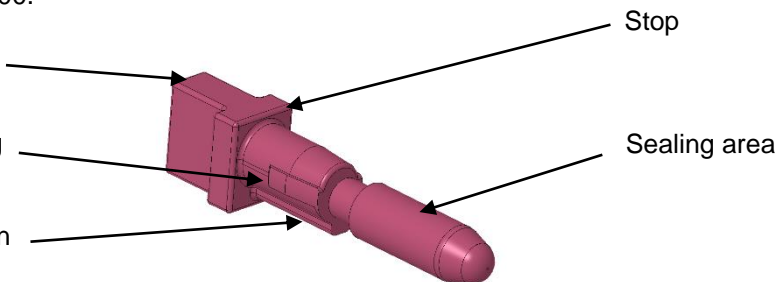
9.3 Seal plug usage instructions

Use of the seal plugs 10155475-000.

Handling head for insertion or removal from connector housing

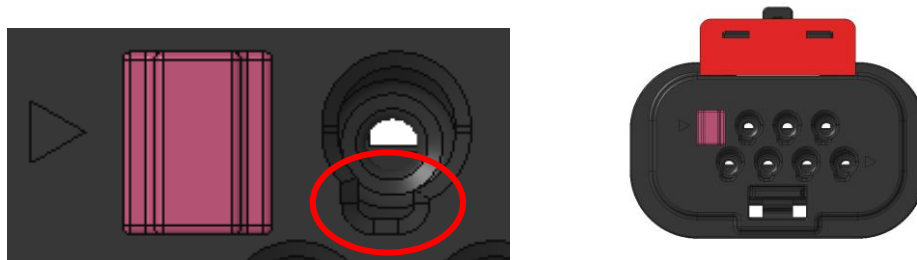
Retention to connector housing

Shape to prevent mis-orientation




Seal plug 10155475-000

PLEASE REMIND THE ORIENTATION OF THE BLIND PLUGS! Observe the orientation of the blind plugs!



- A.** Orient seal plug to the opening of the connector housing. Plug should not be installed when rotate 90° from proper orientation
- B.** Hold head of the sealed plug securely to prevent rotation during installation
- C.** Push seal plug until it lock into the connector housing
- D.** Verify that seal plug shoulder is flush with the rear end of connector housing

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 11 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
		CLASSIFICATION UNRESTRICTED	

9.4 Disassembly application for receptacle terminal

9.4.1 Introduction

This instruction sheet describes the use of the Extraction Tool 10172034. This tool is designed to remove MicrospaceXS receptacle terminal 10155447-[] from MicrospaceXS plug assemblies.

WHEN CONTACTS ARE DISMANTLED FROM SOCKET HOUSING, THE ENTIRE SOCKET HOUSING HAS TO BE REPLACED. THE CONTACT HAS TO BE VISUALLY CHECKED FOR CONTAMINATION AND DAMAGE.

9.4.2 Description

Each tool features a handle marked with the specific mention:

- “TPA extraction tool” to disassembly the TPA
- “Contact extraction tool” to unlock the 1st locking latch

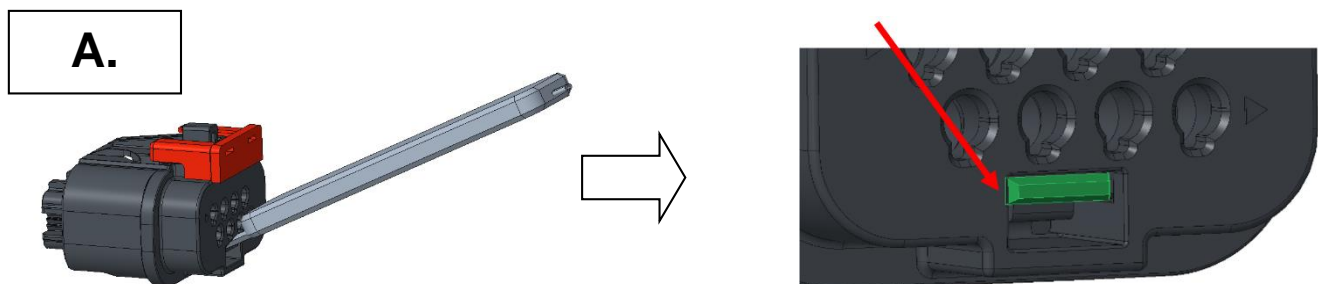
9.4.3 Extraction procedure


⚠ Each gesture must be done without excessive force. ⚠

- Insert the TPA extraction tool between the TPA and the Housing and totally disengaged the TPA on each side.
Optional: To be more comfortable, you can position the connector in a vise.
- Position the contact tool extraction parallel to the housing. Be careful the surface of the contact extraction tool must not reach the stop with the housing's surface.
- Push the CTW down to position the tool under the 1st locking latch.
- Push slightly the tool.
- Pull on the cable, and turn to the left: The plastic clip lifts up and the terminal is unlocked from the housing.
- Slightly pullout the CTW from the Housing.
- Once the CTW are dismantled from the socket housing, the entire socket housing has to be replaced. The contact has to be visually checked for contamination and damage (please see section 8.5).

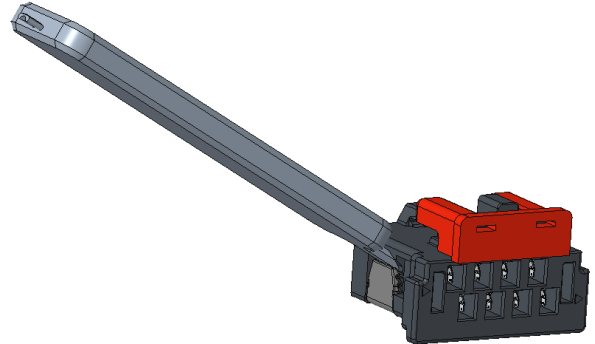
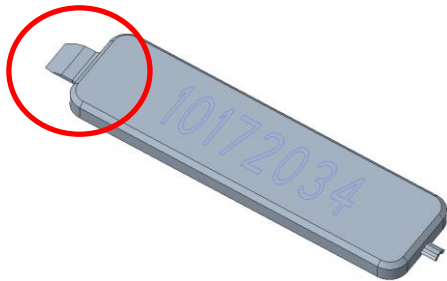
9.4.4 Tool inspection / Maintenance

It is recommended that each tool be inspected upon its arrival to be sure it has not been damaged in transit, and at regularly scheduled intervals to be sure it remains functional.

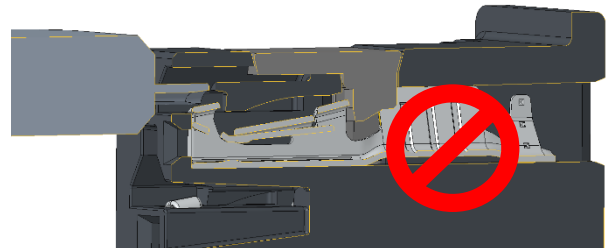
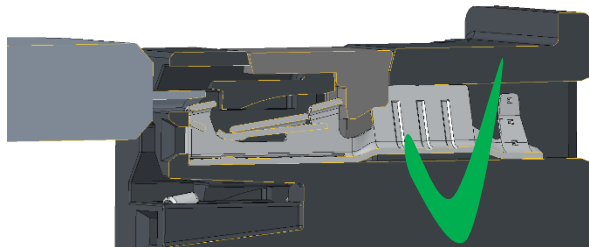
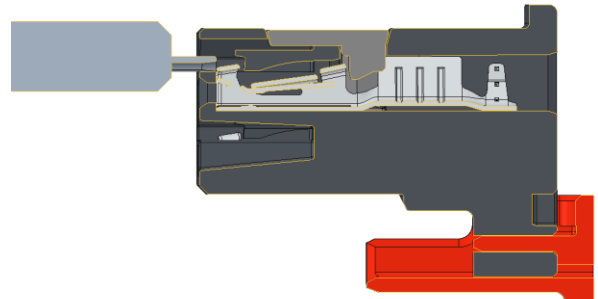
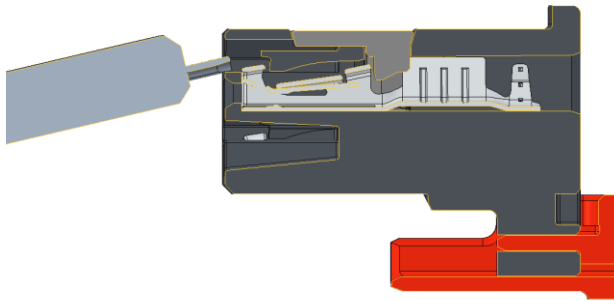



NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 12 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
		CLASSIFICATION UNRESTRICTED	

B. TPA extraction

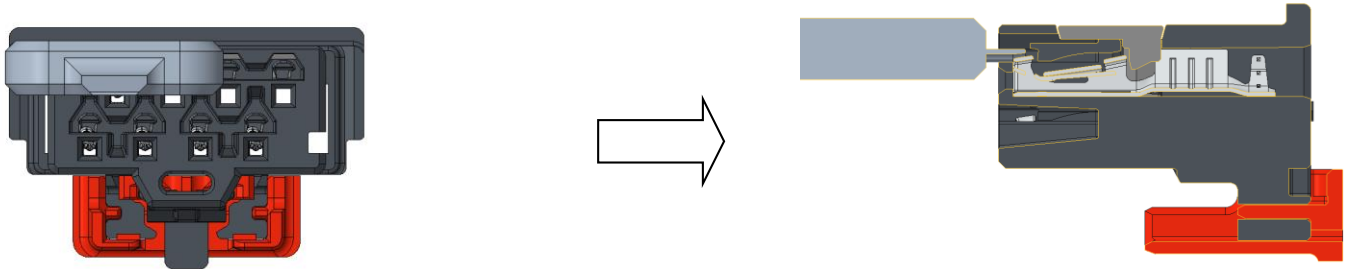


C. CTW extraction

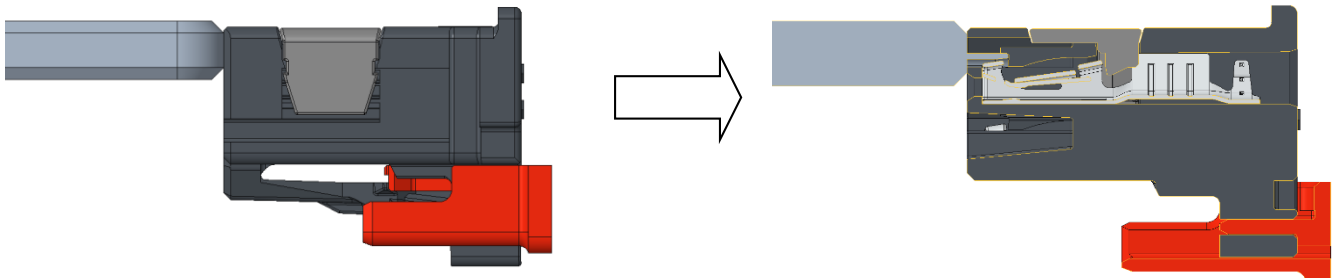


NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 13 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
		CLASSIFICATION UNRESTRICTED	

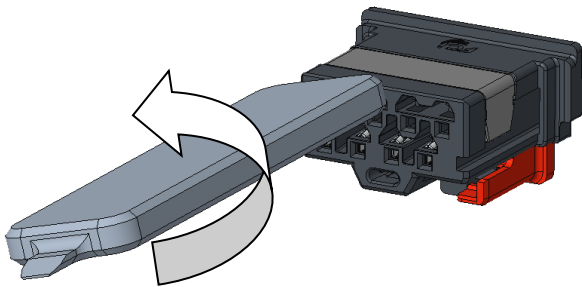
D.



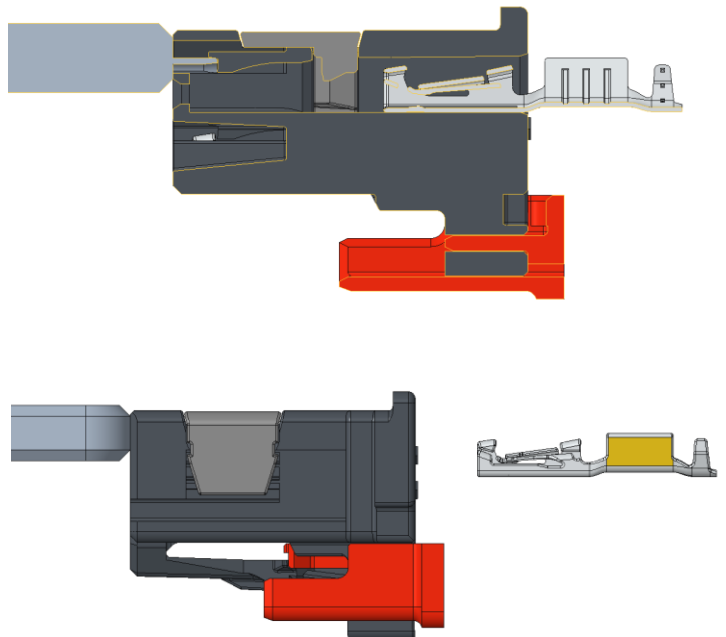
E.



F.



G.



NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 14 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

9.4.5 Terminal receptacle inspection

We always recommend changing the terminal if he is damaged. You can check the conformity of the terminal with the terminal drawing 10155447.

9.5 Disassembly application for header terminal

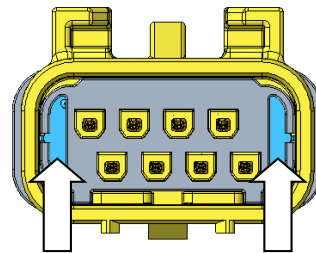
9.5.1 Introduction

This instruction sheet describes the use of the Retainer Extraction Tool 10173233. This tool is designed to remove MicrospaceXS retainer part from MicrospaceXS sealed flying connector assemblies 10155480-Y0XXLF. After that, how to remove the MicrospaceXS header terminals 10155449-[] & 10168718-[] crimped wire with a flat-bladed screwdriver.

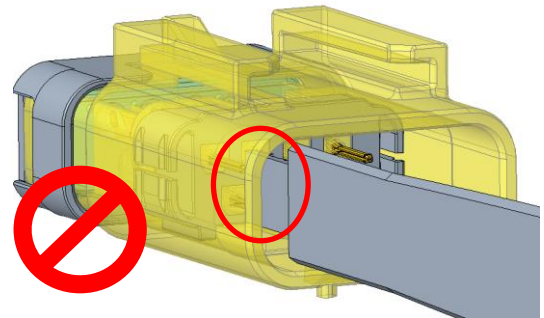
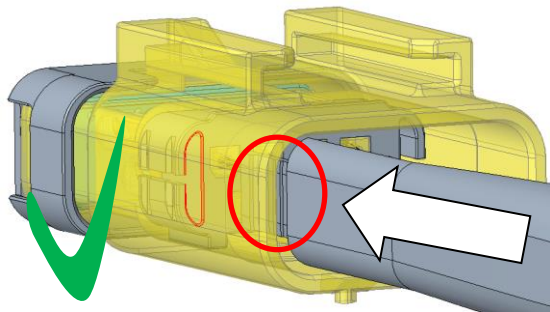
WHEN CONTACTS ARE DISMANTLED FROM SOCKET HOUSING, THE ENTIRE SOCKET HOUSING HAS TO BE REPLACED. THE CONTACT HAS TO BE VISUALLY CHECKED FOR CONTAMINATION AND DAMAGE.

9.5.2 Extraction procedure

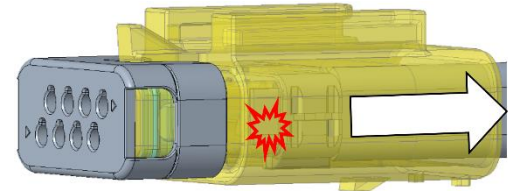
Each gesture must be done without excessive force.




- A. Position the retainer extraction tool's tip toward to either the left or right side of connector.
- B. Make sure the tool tip's hook is facing toward outside of connector, and flat side is facing toward center of connector.
- C. Aiming the hole of retainer and insert carefully the tool.

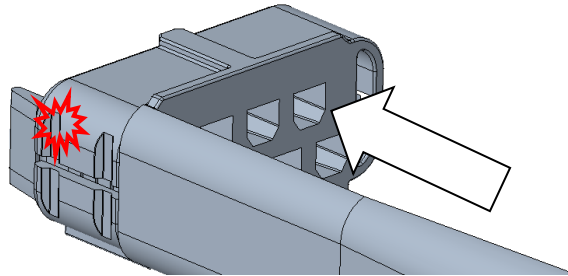


- D. Insert the tool until there is a clip sound, means the hook is correctly clasped the retainer.
- E. Gently pull out the tool to extract the retainer from the connector assembly.



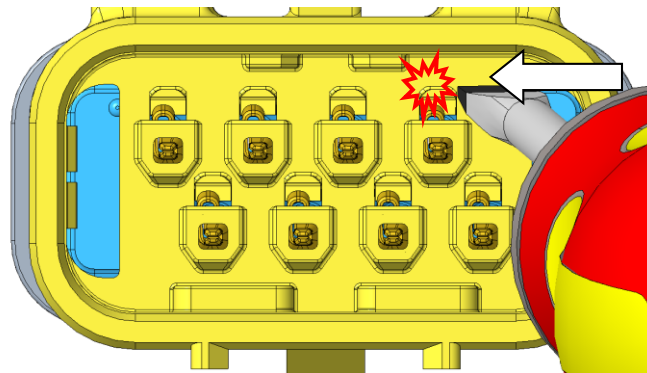
NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 15 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

F. Slightly applied some force on the other side of retainer to break the retainer from tool.

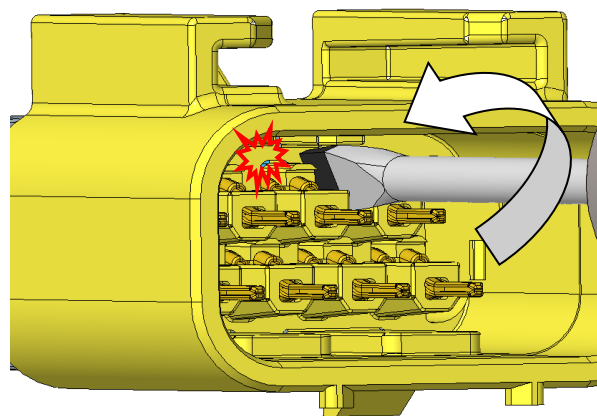


G. Take a flat-bladed screwdriver (size not bigger than 1.8mm) and position it as picture below.

H. Slightly apply some force to break the header terminal locking feature of housing. Then pull out the wire from rear of the connector.




I. For the middle contacts, insert the screwdriver in between and turn it counterclockwise in order to break the terminal locking features. Then pull out the wire from rear of the connector.

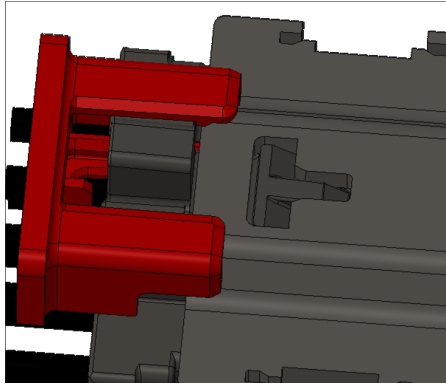


9.5.3 Terminal header inspection

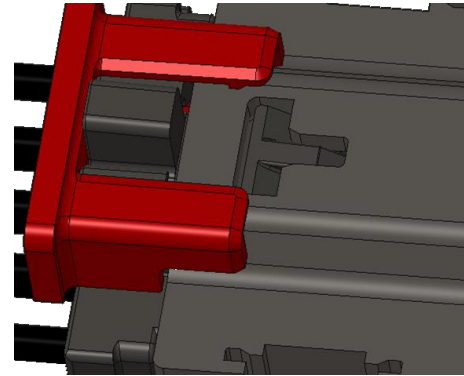
We always recommend changing the terminal if he is damaged. You can check the conformity of the terminal with the terminal drawings 10155449 & 10168718.

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 16 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

9.6 CPA actuation



Clip the header into the housing

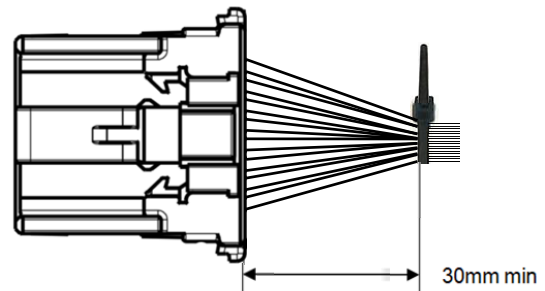
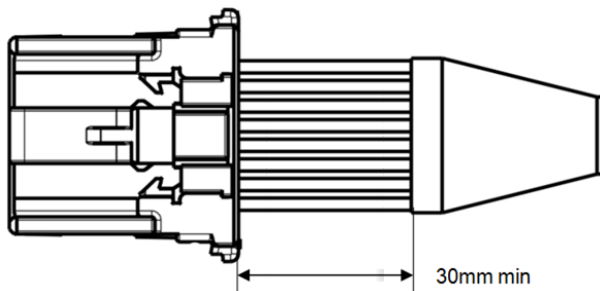


Actuate the CPA

9.7 Harness recommendations

9.7.1 Cable tie, twisting and taping

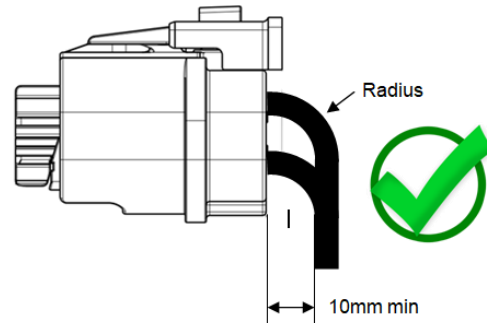
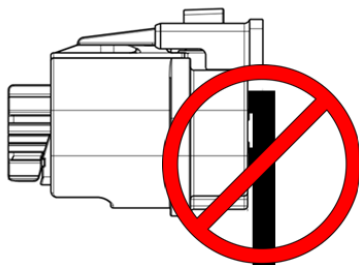
For harness assembly, it may be necessary to manage the cables at the rear of the connector receptacle by securing them through tying, twisting or taping. This helps protect the harness from vibration and friction, which could negatively affect electrical stability. For all these methods, we recommend maintaining a minimum distance of 30mm from the back of the connector before starting the process. This allows the terminal to move freely within the housing and ensures ease of serviceability. The wires must remain aligned straight with the connector.




9.7.2 Sharp 90-degree wire bends

Sharp 90-degree wire bends must be avoided on connector versions (Sealed and Unsealed). It may impact the sealing performance.

A minimum of 10mm distance from back of the connector and a radius bends must be respected.



NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 17 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

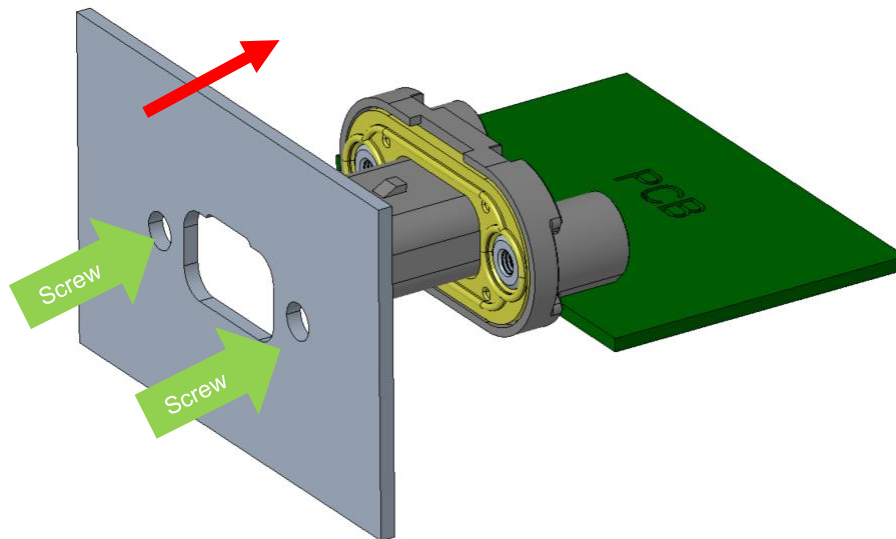
9.8 Panel Mount Assembly Instruction

9.8.1 Panel interface dimension

Recommended panel dimensions for connectors can refer to customer drawings, including panel thickness, panel cavity's dimensions fit for connector, holes dimensions for screws.

9.8.2 Mount panel on connector

Aim well the panel interface with connector, then slowly and carefully mount panel toward connector.



9.8.3 Fixation of connector on panel

Make sure to use recommended SPEC screws, flat washers and apply with recommended torque from customer drawing in order to avoid any fractures on connector plastic part. Tighten the screws until black plastic housing cover all sight of yellow flat seal.

9.8.4 Dismount panel from connector

Vice versa the procedure above to dismount the panel from connector.

10.0 LAYOUT

10.1 Solder Paste Thickness

Solder paste thickness for the connector contact on PCB pins side must be at least 0.15mm. For more details, see norm IPC-7525 (Stencil Design Guidelines).


10.2 Stencil

The stencil aperture is determined by the circuit pad size and stencil thickness. It may be any shape as long as it prevents solder bridging from one pad to another. Generally, a thinner stencil will need a larger aperture to maintain the given volume of solder paste. The stencil should be 0.15 mm thick minimum. The stencil layout must be designed using the dimensions provided on the customer drawing for the specific connector.

The coplanarity of the PCB circuits pads in the area of the layout must be 0.03 mm maxi.

For every through hole applications, please recalculate stencil aperture dimensions regarding to the thickness of PCB.

For more details, see norm IPC-7525 (Stencil Design Guidelines).

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 18 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

11.0 SOLDERING RECOMMENDATIONS

11.1 Reflow process

Reflow process must respect the standard temperature profile, see Figure 5-1 below.
 For more details, see norm IPC/ JEDEC J-STD-020C (Moisture/Reflow Sensitivity Classification for Nonhermetic Surface Mount Devices).

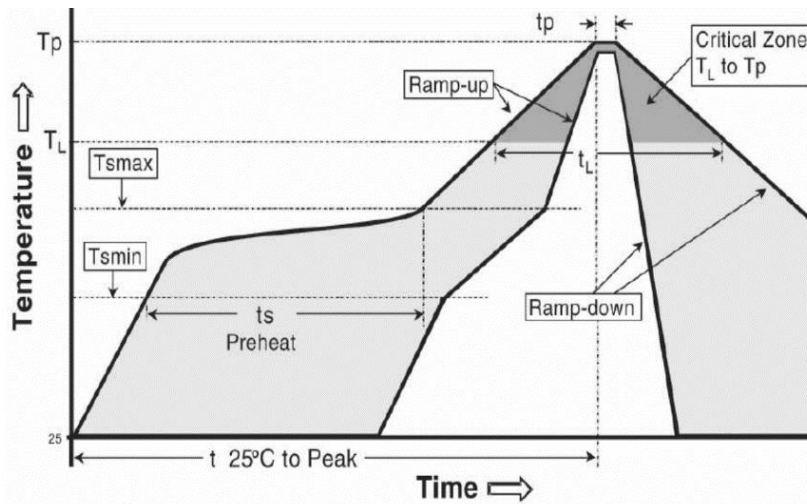



Figure 5-1 Classification Reflow Profile

NUMBER GS-20-0657	TYPE APPLICATION SPECIFICATION		
TITLE MicroSpaceXS™ connector		PAGE 19 of 18	REVISION L
		AUTHORIZED BY VALLIERE Jérôme	DATE 27/11/2024
CLASSIFICATION UNRESTRICTED			

REVISION RECORD

<u>REV</u>	<u>PAGE</u>	<u>DESCRIPTION</u>	<u>EC#</u>	<u>DATE</u>
A	ALL	RELEASE	-	26/06/2020
B	4,11	Change of manual application tooling Paragraph 9.4 (HARNES RECOMMANDATIONS) added	-	25/08/2021
C	1,5	Non polarized mention added for sealed version New Section for crimping recommendation	-	07/12/2021
D	12	Added chapter 10 layout	XXXXX	06/27/2022
E	6,10,11,12,13	<ul style="list-style-type: none"> - Modification of crimp height for AWG24 - Added recommendation for maintenance of tool spare parts - Modification of the disassembly application - Paragraph 9.4.2 available for sealed and unsealed versions 	F-46477	10/11/2022
F	ALL	<ul style="list-style-type: none"> - Section 3 updated - Table 3 updated - Table 5 updated - Paragraph 8.2.1 updated - Section 9.1 updated - Section 9.2 added - Section 9.3 updated - Section 9.4 added 	F-49630	31/10/2023
G	1 11	Non-polarized note suppressed for sealed version Section 9.3.1 Extraction tool PN update	F-50414	16/01/2024
H	14,15,16,17	Added paragraphs 9.3.5 Terminal receptacle inspection Added paragraphs 9.4.3 Terminal header inspection Added paragraphs 9.6.1 Cable tie, twisting and taping Added section 11 Soldering recommendations	F-52537	16/09/2024
J	14	P/N retainer deleted	F-53230	17/10/2024
K	10,17	Added section 9.2 Electrical testing, Probe test Added Panel Mount Added Stencil description for through hole application	F-53652	27/11/2024
L	1,3,4,8,14,15	Added terminal male P/N 10168718	F-54013	28/02/2025