

## CTX64 MAT SEAL RECEPTACLE CRIMP TERMINAL (7.0MM PITCH)

### 1.0 SCOPE

This specification details the crimping information and common practices of general crimps for the Molex CTX64 mat seal receptacle terminal. Please refer to the sales drawing SD-34803-002 for additional part information. The information in this document is for reference and benchmark purposes only. Customers are required to complete their own validation testing if tooling and/or wire is different than what is shown in this specification.

All measurements are in millimeters and Newtons unless specified otherwise.

Terminals shown in this document are generic representations. They are not intended to be an image of any terminal listed in the scope.

### 2.0 PRODUCT DESCRIPTION

#### DEFINITION OF TERMS:

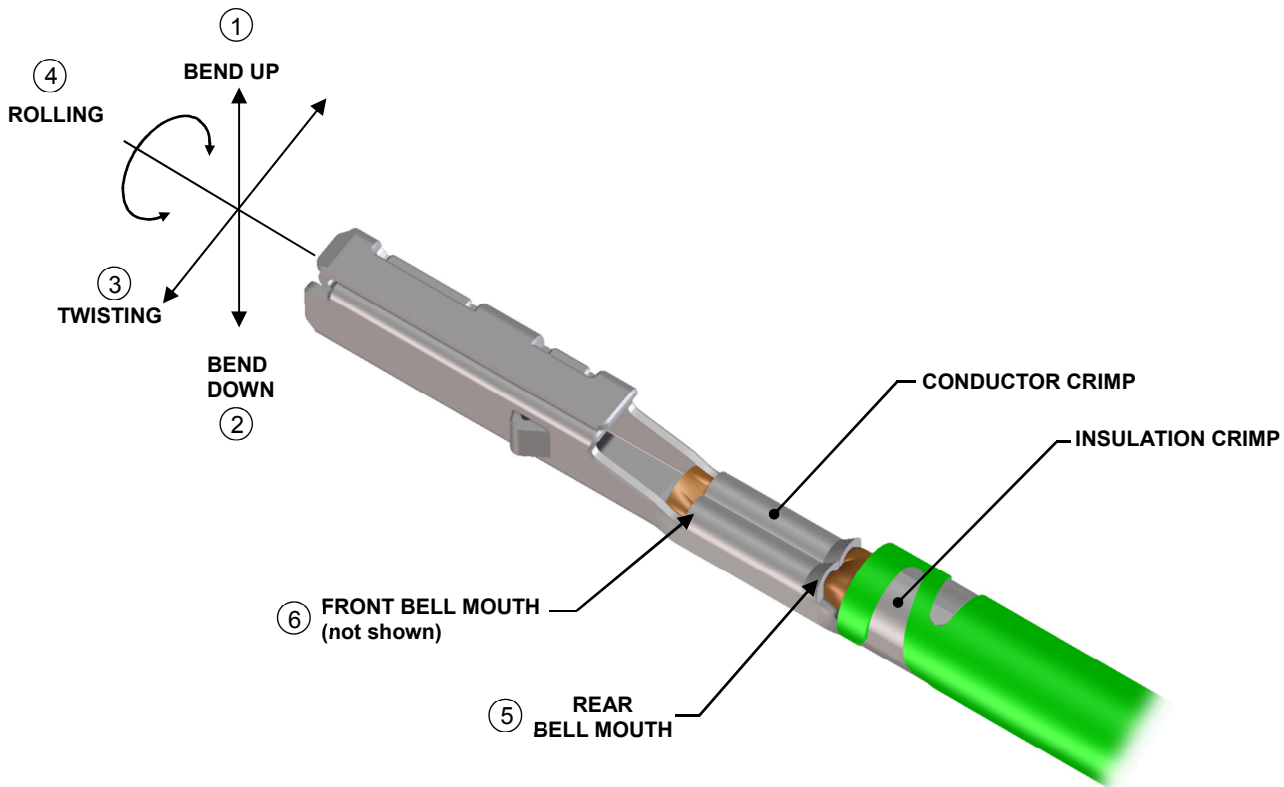
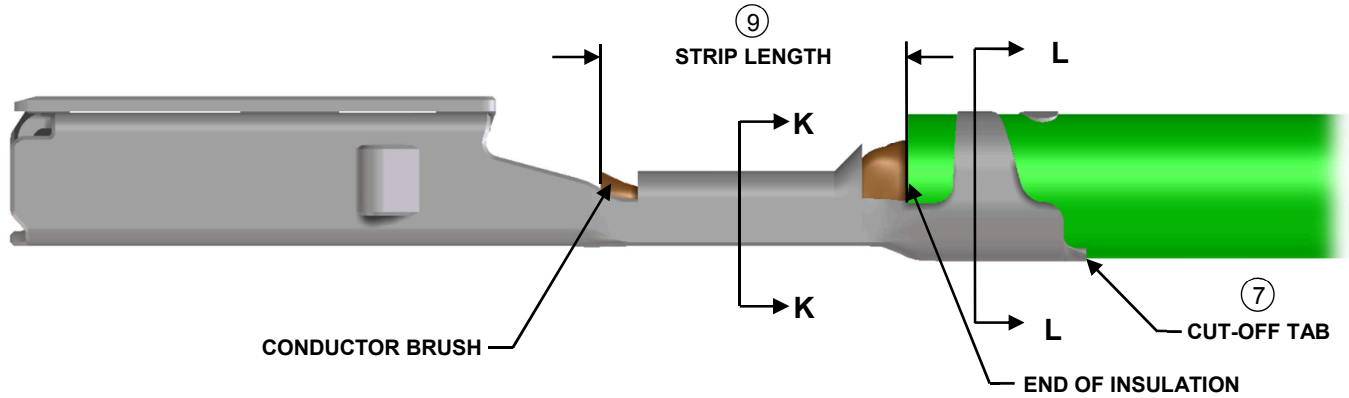


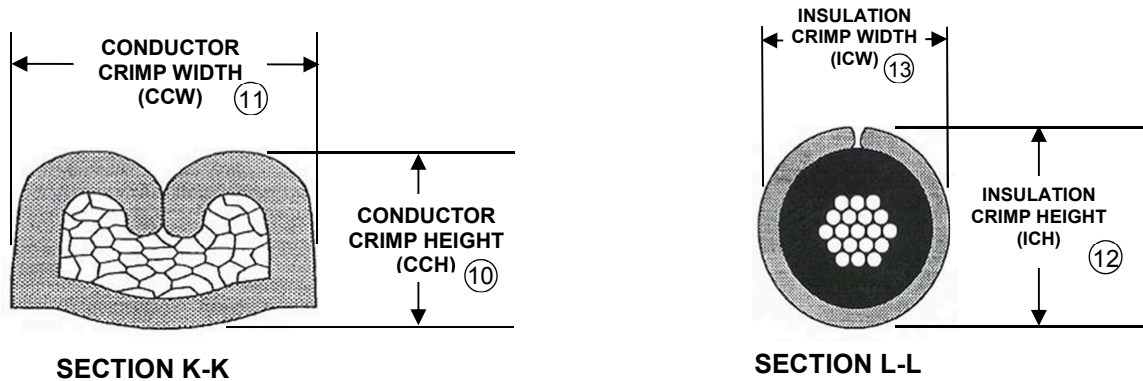
Figure 1

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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**DEFINITIONS OF TERMS (CONT.):**



**Figure 2**



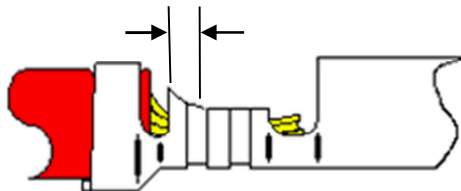
**Figure 3**

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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**BELLMOUTH (FLARE) ⑤ ⑥**

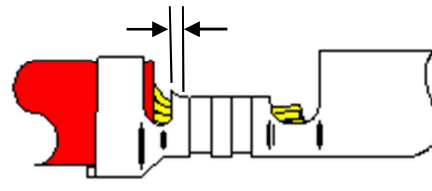
The flare that is formed on the edge of the conductor crimp acts as a funnel for the wire strands. This funnel reduces the possibility that a sharp edge on the conductor crimp will cut or nick the wire strands. A rear bellmouth is required on the conductor crimp. A front bellmouth is optional. Caution: Excessively large bellmouths will reduce crimp area and reduce pull forces. See Table 3 for bellmouth specifications.

**Bellmouth too large**  
**Reduced Crimp Area, Lower Pull Forces**



Bad Crimp

**Bellmouth per specification**

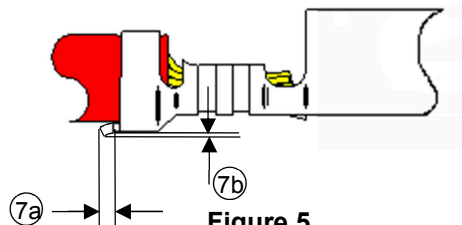


Good Crimp

**Figure 4**

**CUT-OFF TAB ⑦**

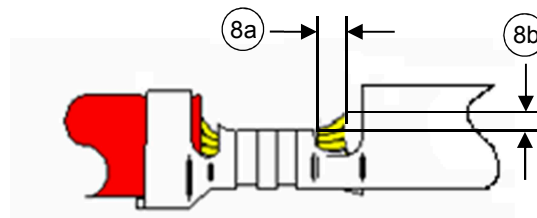
This is the material that protrudes outside the insulation crimp after the terminal is separated from the carrier strip. A cut-off tab that is too long may expose a terminal outside the housing; it may fail electrical spacing requirements. See Table 3 for cut-off tab length specifications. Caution: Burrs on the cut-off tab are not allowed as they have the potential to cut mat seals.



**Figure 5**

**CONDUCTOR BRUSH ⑧**

The conductor brush is made up of the wire strands that extend past the conductor crimp on the contact side of the terminal. This helps ensure that mechanical compression occurs over the full length of the conductor crimp. The conductor brush should not extend into the contact area or above the conductor crimp/transition wall height (whichever is tallest). CAUTION: Excessive conductor brush extended above the transition/crimp area can cause terminal retention issues inside plastic cavity and potentially could compromise/tear the glands of the mat seal.

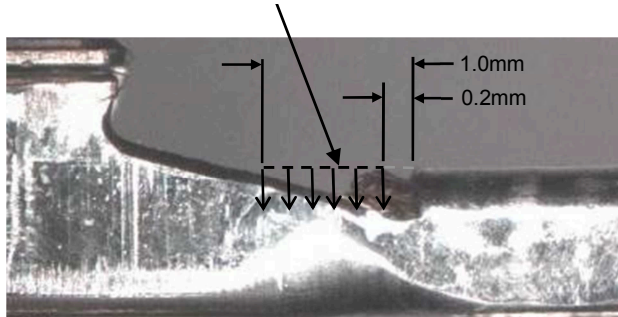


**Figure 6**

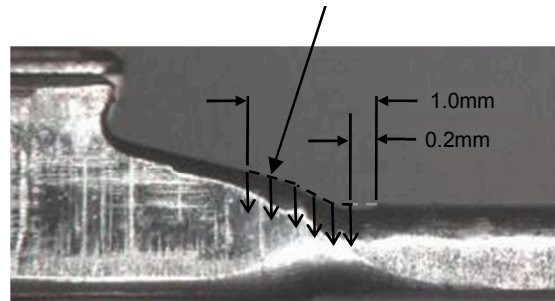
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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

For the CTX64 receptacle terminal, the conductor brush extension past the conductor crimp must be greater than 0.2mm and less than 1.0mm. And, depending on where the brush ends, it must be either below the conductor crimp height or transition wall; whichever is taller. See Figure 7 for an example of brush height boundary.

Crimp height taller than transition wall; end of brush to be below crimp height boundary



Crimp height shorter than transition wall; end of brush to be below crimp height/transition wall boundary



**Figure 7**

**CONDUCTOR STRIP LENGTH ⑨**

The strip length is determined by measuring the exposed conductor strands after the insulation is removed. The strip length determines the conductor brush length when the end-of-insulation position is centered in the transition area between conductor and insulation crimps. See Table 3 for the length requirement.

**CAUTION:** Care must be taken not to leave indentations on the wire strands during the strip and cut operation as this can compromise the effectiveness of the mat seal and can result in leaks.

**CONDUCTOR CRIMP**

This is the metallurgical compression of a terminal around the wire's conductor. This connection creates a common electrical path with low resistance and high current carrying capabilities.

**CONDUCTOR CRIMP HEIGHT ⑩**

The conductor crimp height is measured from the top surface of the formed crimp to the bottom most radial surface. Do not include the extrusion points in this measurement. Measuring crimp height is a quick, non-destructive way to help ensure the correct metallurgical compression of a terminal around the wire's conductor and is an excellent attribute for process control. The crimp height specification is typically set as a balance between electrical and mechanical performance over the complete range of wire stranding and coatings, and terminal materials and plating. Although it is possible to optimize a crimp height to individual wire strands and terminal plating, one crimp height specification is normally created. See Table 2 for crimp height specifications.

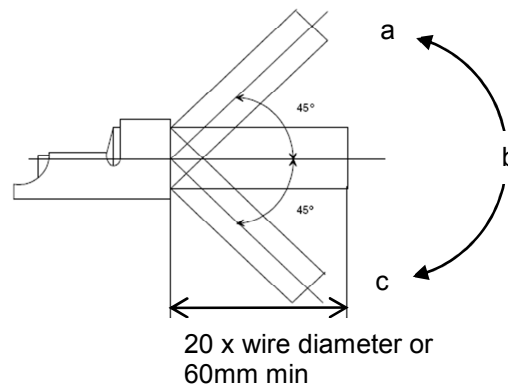
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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**INSULATION CRIMP HEIGHT ⑫**

Insulation crimp heights are specified in Table 2. CTX64 receptacle terminal insulation grips are designed to accommodate multiple wire sizes. Even though the insulation grip may completely surround a smaller wire and only partially surround a larger wire, an acceptable insulation crimp is still provided.

The insulation crimp should be visually evaluated to confirm it provides adequate compression on the wire. It should also be evaluated by sectioning through the center of the crimped insulation grip. The grip should compress the wire but not pierce it or otherwise damage the integrity of the insulation. The grip should not contact the conductors under any circumstance. Mechanically, the insulation grip should withstand repeated flexing of the wire as shown in Figure 8 without pulling out of the grip. The wire is flexed 5 times each in two perpendicular planes in the following sequence: b to a, a to b, b to c, c to b, then repeat (see Figure 8).

Once the optimum setting for an insulation crimp height is determined, it is important to document it. The operator can then check it as part of the setup procedure.

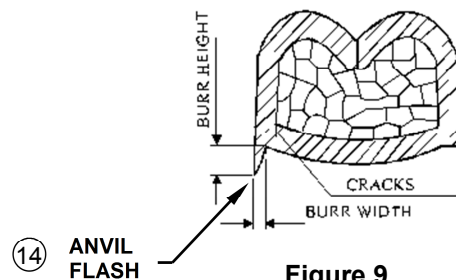


**Figure 8**

**EXTRUSIONS (ANVIL FLASH / BURR) ⑭**

These are the small flares that form on the bottom of the conductor crimp resulting from the clearance between the punch and anvil tooling. If the anvil is worn or the terminal is over-crimped, excessive extrusion can result.

An uneven extrusion may also result if the punch and anvil are misaligned, if the feed is misadjusted or if there is insufficient or excessive terminal drag. CAUTION: Anvil Flash has the potential to damage mat seals and should be maintained within specifications (see Figure 9 and Table 3).

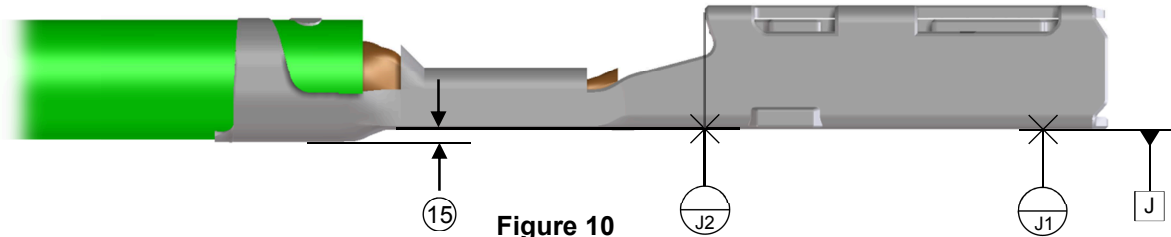


**Figure 9**

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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**INSULATION GRIP STEP ⑮**

The insulation grip step is the designed offset between the conductor grip and the insulation grip which must be met by the crimp process (see Figure 10 and Table 3).



**Figure 10**

**END-OF-INSULATION POSITION**

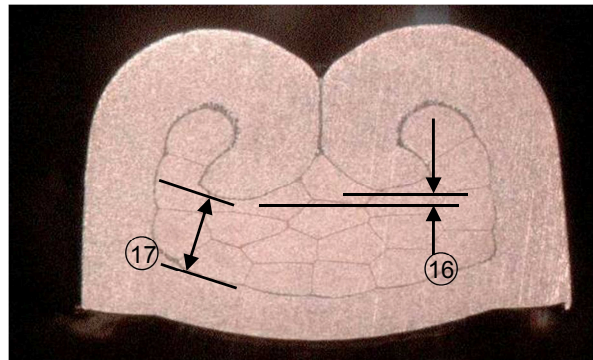
This is the location of the insulation in relation to the transition area between the conductor and insulation crimps. Equal amounts of the conductor strands and insulation needs to be visible in the transition area. The end-of-insulation position ensures that the insulation is crimped along the full length of the insulation crimp and that no insulation gets crimped under the conductor crimp. The end-of-insulation position is set by the wire stop and strip length for bench applications. For automatic wire processing applications the end-of-insulation position is set by the in/out press adjustment (see Figure 2).

**WING DISSYMMETRY ⑯**

Wing dissymmetry is the crimped offset between the ends of core wings (see Figure 11 and Table 3).

**SPACE BETWEEN WING TIPS AND CRIMP BOTTOM ⑰**

The space between the crimp wing tips and the bottom of the crimp is designed to assure no contact between wing tips and the crimp bottom (see Figure 11 and Table 3).

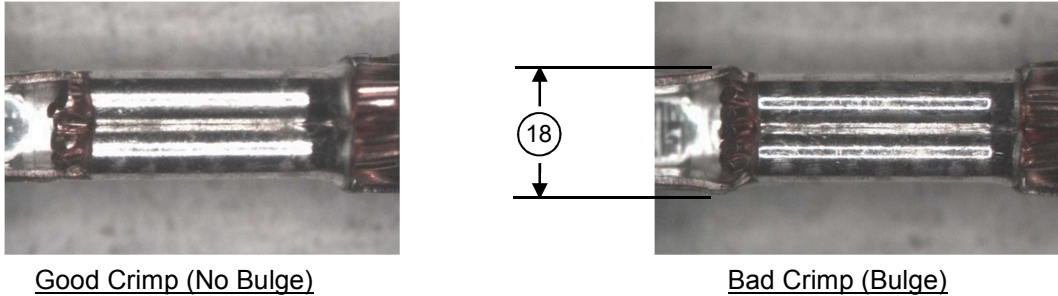


**Figure 11**

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>6 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**CRIMP BULGE ⑱**

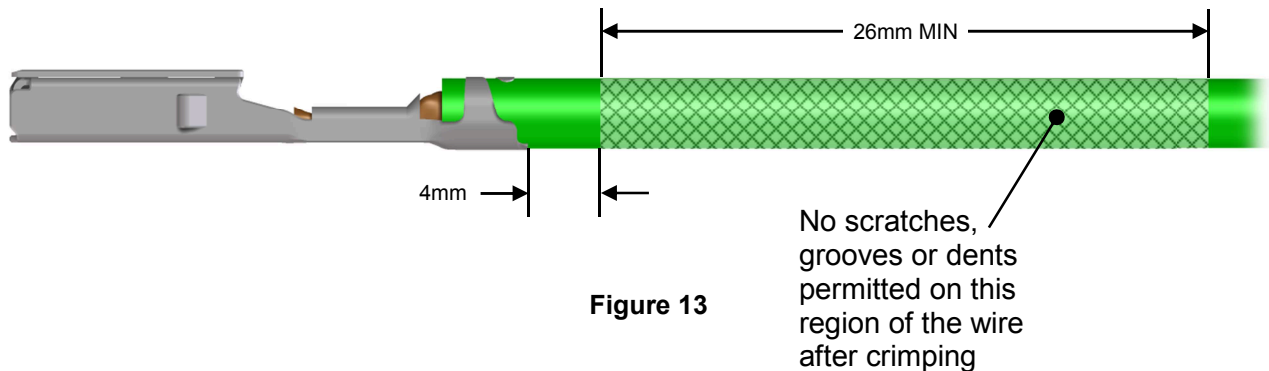
Caution needs to be taken with the crimp tooling to prevent a bulge in the transition area during crimping. The transition should generally flow smoothly from the conductor crimp to the terminal box. Any bulge must not exceed the width shown in Table 3. See Figure 12 for an example of crimp bulge.



**Figure 12**

**WIRE CONDITION AFTER CRIMP**

The wire, after crimping, should not have any scratches, grooves or dents. Such imperfections act as a leak path at the junction between the wire and the mat seal. At a minimum, check the condition of the wire on a sample length of 26mm as shown in Figure 13.



**Figure 13**

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>7 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>



# APPLICATION SPECIFICATION

## 3.0 PRODUCT SPECIFICATIONS

Table 1

Terminal Family	Gender	Sealing	Plating	Special Characteristics	Grip Size	Wire Range	Insulation Diameter Range (mm)
CTX64	Receptacle	Mat Seal	Sn	Standard Performance Tin (Std. Sn)	S	0.22 – 0.35 mm <sup>2</sup> 22 AWG	1.1 – 1.65
			Sn	High Performance Tin (HP Sn)			
			Sn	Standard Performance Tin (Std. Sn)	L	0.5 – 0.85 mm <sup>2</sup> 20 AWG	1.4 – 1.9
			Sn	High Performance Tin (HP Sn)			

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>8 of 16</b>
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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>
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# APPLICATION SPECIFICATION

Table 2

Molex Product Attribute		Validated Wire		Conductor Barrel		Insulation Barrel		Pull Out Force (N) MIN
Grip Size	Special Characteristics	Wire Type	Wire Size	CCH ± 0.05	CCW	ICH	ICW	
S	Standard Performance Tin	TXL <sup>3,c</sup>	22 AWG	0.69 ± 0.03	(1.3)	1.8 MAX	(1.45) [1.6 MAX <sup>4</sup> ]	60
	High Performance Tin			0.72 ± 0.03				
	Standard Performance Tin	FLRY-A <sup>1,3,e</sup>	0.22mm <sup>2</sup>	0.65 ± 0.03		1.46 ± 0.04		35
	Standard Performance Tin	AVSS <sup>2,b</sup>	0.30mm <sup>2</sup>	0.75 ± 0.03		1.8 MAX		
	Standard Performance Tin High Performance Tin	A3 <sup>d</sup>	0.35mm <sup>2</sup>	0.69 ± 0.03		1.90 ± 0.05		60
	T3ZHID <sup>1,3,a</sup>	0.35mm <sup>2</sup>	1.62 ± 0.04 [1.7 MAX <sup>4</sup> ]					
L	Standard Performance Tin High Performance Tin	TXL <sup>3,c</sup>	20 AWG	0.95	(1.4)	2.0 MAX	(1.75) [1.9 MAX <sup>4</sup> ]	90
	Standard Performance Tin High Performance Tin	T3ZHID <sup>1,3,a</sup>	0.50mm <sup>2</sup>	0.95		1.76 ± 0.04 [2.0 MAX <sup>4</sup> ]		70
	Standard Performance Tin	AVSS <sup>2,b</sup>				2.0 MAX		90
	Standard Performance Tin High Performance Tin	T3ZHID <sup>1,3,a</sup>	0.75mm <sup>2</sup>	1.05		2.0 MAX		90
	Standard Performance Tin High Performance Tin	CE3 <sup>1,f</sup>		1.07				
	Standard Performance Tin	AVSS <sup>2,b</sup>	0.85mm <sup>2</sup>	1.10				130

The above specifications are guidelines to an optimum crimp. Crimp heights/widths are applicable for punch/anvil tooling shown in Figures 15 – 18.

Pull force should be measured with no influence from the insulation crimp.

Customers are required to complete their own validation testing if tooling and/or wire is different than what is shown in this specification.

<sup>4</sup>Values in brackets are the maximum size permitted for insulation crimp height/width for terminals crimped to wires other than those shown in Table 2 above.

Terminal crimps were validated to following specifications:

- <sup>1</sup>PSA STE 96 341 150 99, B21 7050
- <sup>2</sup>RSA 36-05-019, 36-05-036 (Mechanicals and Visuals Only)
- <sup>3</sup>USCAR-21

Wires are in accordance with following specifications:

- <sup>a</sup>PSA B25 1110: NFS-Conventional electrical conductor
- <sup>b</sup>JASO D 6111: AVSS type
- <sup>c</sup>SAE J1128: TXL type
- <sup>d</sup>PSA B25 1110: Augmented Insulation (0.5mm<sup>2</sup> insulation on 0.35mm<sup>2</sup> conductor)
  - FTP: AEEV\_AREF08\_1035 for Nexans wire
  - FTP: AEEV\_AREF08\_0909 for Acome wire
- <sup>e</sup>ISO 6722: Thin wall type
- <sup>f</sup>PSA 96 904 053 99: electrical sealing wire and FTP: AEEV\_AREF07\_0821 (0.75mm<sup>2</sup>)

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>9 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

Table 3

Specifications			
Balloon #	Description	Requirement	
1	Bend Up	± 1° MAX	
2	Bend Down	± 2° MAX	
3	Twisting	± 4° MAX	
4	Rolling	± 6° MAX	
5	Rear Bell Mouth	0.20 – 0.55	
6	Front Bell Mouth	Not Required	
7	Cut-Off Tab	a	0.30 MAX
		b	No Burrs
8	Conductor Brush	a	0.2 – 1.0
		b	Not to extend above conductor crimp/transition height
9	Conductor Strip Length	4.0 – 4.5 for reference	
10	Conductor Crimp Height	See Table 2	
11	Conductor Crimp Width	See Table 2	
12	Insulation Crimp Height	See Table 2	
13	Insulation Crimp Width	See Table 2	
14	Conductor Anvil Flash	0.10 MAX	
15	Insulation Grip Step From J1-J2 (see Figure 9)	0.20 ± 0.05	
16	Wing Dissymmetry	0.20 MAX	
17	Space Between Wing Tips and Crimp Bottom	Wire Size ≤ 0.22mm <sup>2</sup>	No Contact
		Wire Size ≥ 0.35mm <sup>2</sup>	0.10 MIN
18	Crimp Bulge	Not to exceed conductor crimp width	

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>10 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**4.0 REFERENCE DOCUMENTS**

Reference documentation for general practices is located on the website per the below links:

1. Molex Quality Crimping Handbook [http://www.molex.com/images/products/apptool/qual\\_crimp.pdf](http://www.molex.com/images/products/apptool/qual_crimp.pdf)
2. Molex-Recognizing Good Crimps <http://www.molex.com>, search for Application Tooling

**5.0 PROCEDURE**

**5.1 GENERAL MEASUREMENT AND EVALUATION REQUIREMENTS**

**Crimp Height Measurement (Extrusion Evaluation)**

1. Complete tool set-up procedure.
2. Crimp a minimum of 5 samples.
3. Place the flat blade of the crimp micrometer across the center of the dual radii of the conductor crimp. Do not take the measurement near the conductor bell mouth (see Figure 14).
4. Rotate the micrometer dial until the point contacts the bottom most radial surface.

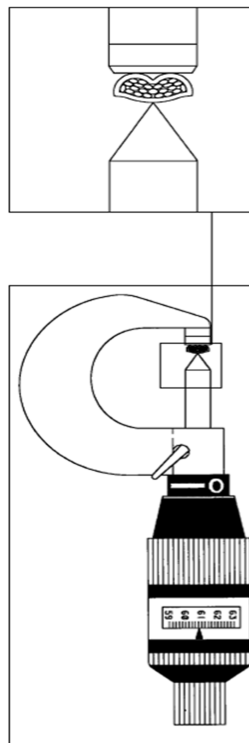


Figure 14

**6.0 CRIMP TOOLING GEOMETRY**

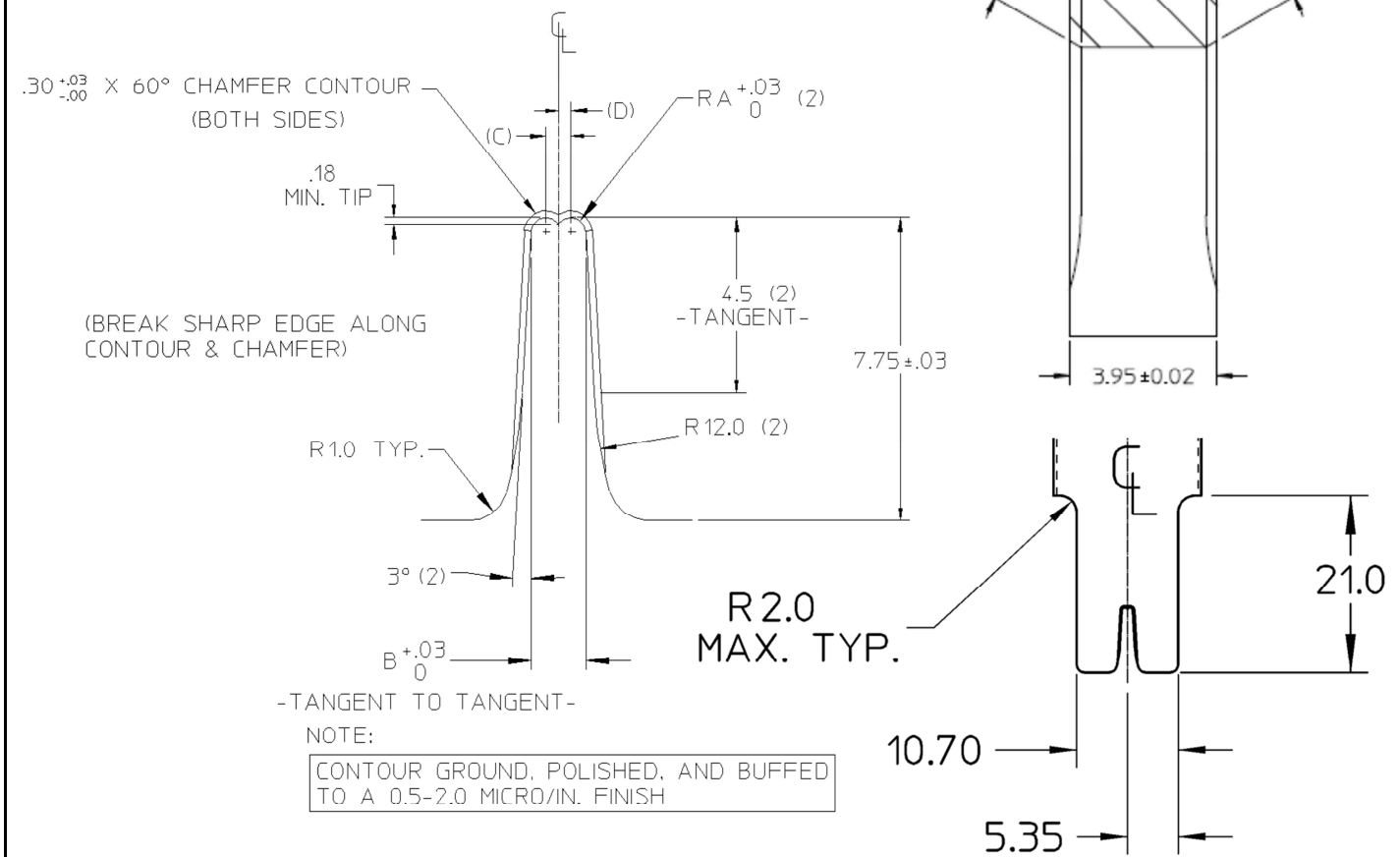
The crimp tooling information shown below is based on the tooling that Molex used to perform validation testing to establish recommended crimp height and widths. The user is responsible for validating crimp performance based on tooling, equipment and wire that is being used.

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>11 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**Table 4 (see Figure 15 for geometry)**

Wire Application		Conductor Punch			
Grip Size	Wire Size	A	B	C	D
S	22AWG	0.35	1.30	0.60	0.30
	0.22mm <sup>2</sup>				
	0.30mm <sup>2</sup>				
	0.35mm <sup>2</sup>				
L	20AWG	0.38	1.40	0.64	0.32
	0.50mm <sup>2</sup>				
	0.75mm <sup>2</sup>				
	0.85mm <sup>2</sup>				

General Tolerances (unless specified)	
2 PLACES	± 0.13
1 PLACE	± 0.25
ANGULAR	± 0.5°



**Figure 15**

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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

Table 5 (see Figure 16 for geometry)

Wire Application		Insulator Punch				
Grip Size	Wire Size	E	F	G	H	J
S	22AWG	1.45	0.725	2.40	2.00	1.12
	0.22mm <sup>2</sup>					
	0.30mm <sup>2</sup>					
	0.35mm <sup>2</sup>					
L	20AWG	1.75	0.875	2.50	2.50	0.79
	0.50mm <sup>2</sup>					
	0.75mm <sup>2</sup>					
	0.85mm <sup>2</sup>					

General Tolerances (unless specified)	
2 PLACES	± 0.13
1 PLACE	± 0.25
ANGULAR	± 0.5°

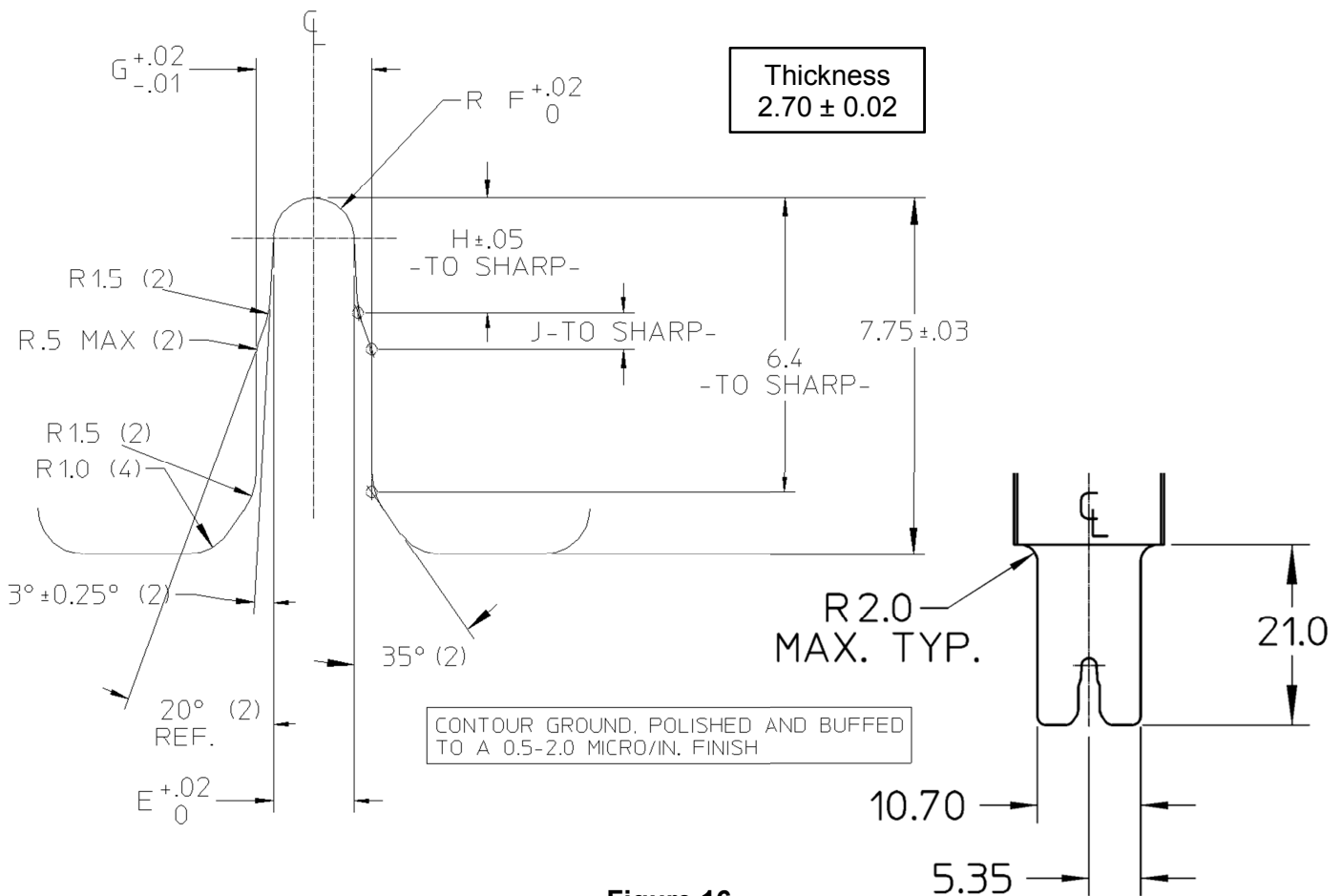


Figure 16

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>13 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

Table 6 (see Figure 17 for geometry)

Wire Application		Anvils						
Grip Size	Wire Size	L	M	N	P	R	U	W
S	22AWG	1.30	0.05	1.40	0.13	1.00	0.15	0.20
	0.22mm <sup>2</sup>							
	0.30mm <sup>2</sup>							
	0.35mm <sup>2</sup>							
L	20AWG	1.40	0.05	1.70	0.19	1.20	0.20	0.20
	0.50mm <sup>2</sup>							
	0.75mm <sup>2</sup>							
	0.85mm <sup>2</sup>							

General Tolerances (unless specified)	
2 PLACES	± 0.13
1 PLACE	± 0.25
ANGULAR	± 0.5°

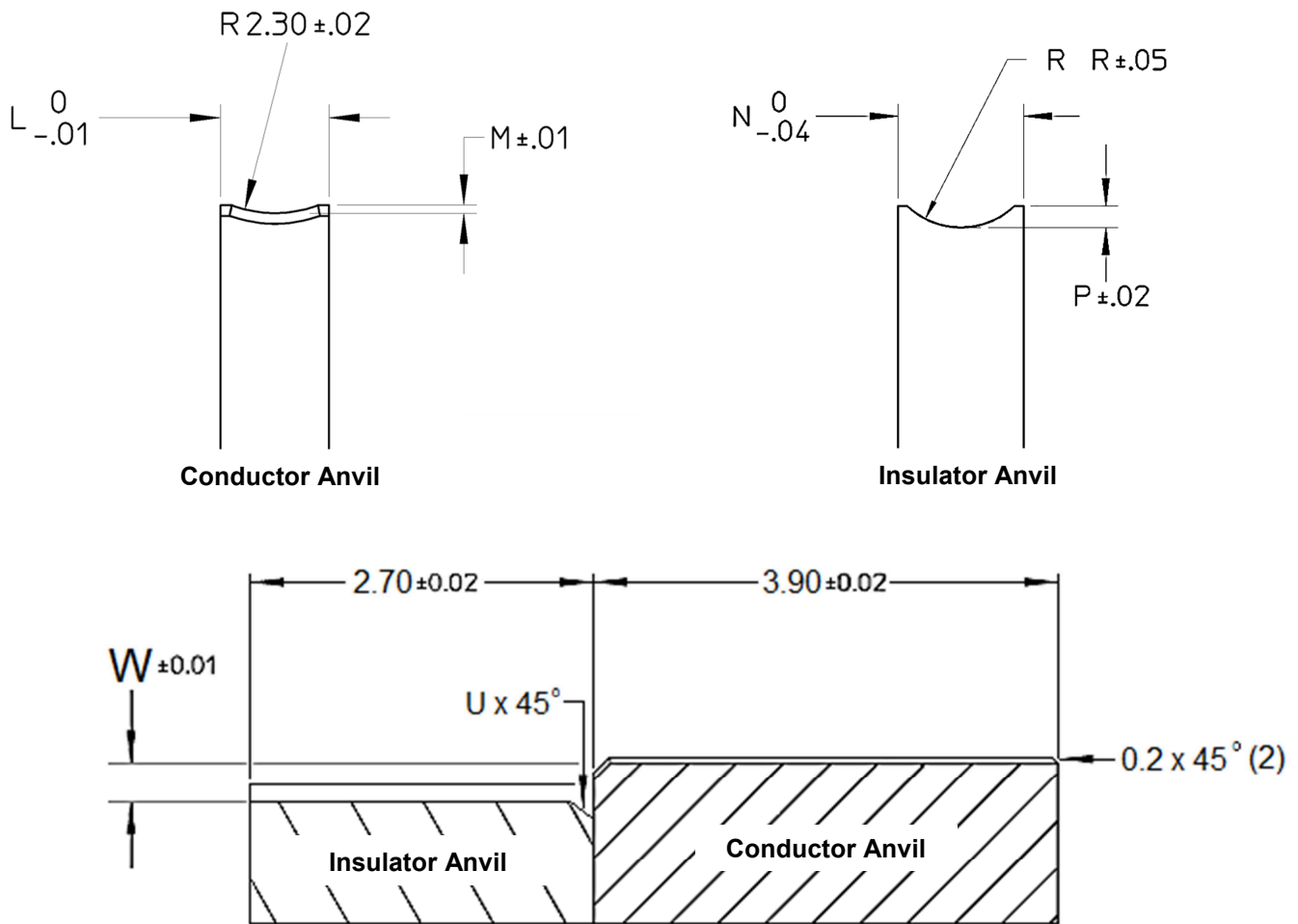
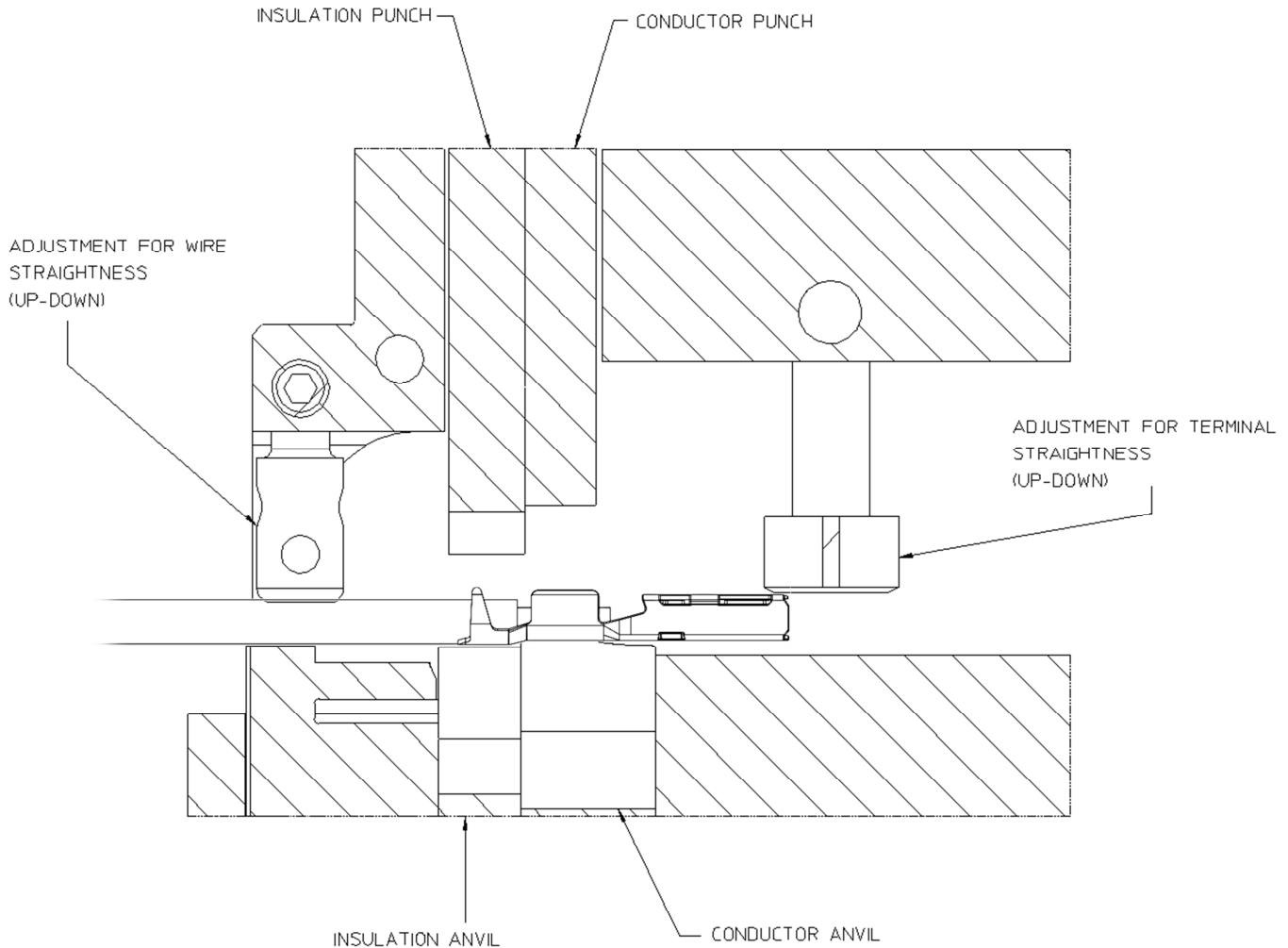


Figure 17

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL RECEPTACLE 7.0mm PITCH APPLICATION SPECIFICATION</b>	SHEET No. <b>14 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

**7.0 CRIMP STRAIGHTNESS**

A sample method for maintaining crimp straightness is shown in Figure 18 below.



**Figure 18**

REVISION: <b>A</b>	ECR/ECN INFORMATION: EC No: <b>UAU2014-1103</b> DATE: <b>2014 / 01 / 13</b>	TITLE: <b>CTX64 MAT SEAL          RECEPTACLE 7.0mm PITCH          APPLICATION SPECIFICATION</b>		SHEET No. <b>15 of 16</b>
DOCUMENT NUMBER: <b>AS-502306-002</b>		CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>

## 8.0 APPLICATION TOOLING

Application Tooling for the CTX64 Receptacle Terminal can be obtained directly from Molex.

To find the proper and latest Molex Application Tooling:

1. Go to <http://www.molex.com>
2. Enter the terminal / connector part number into the search box and select the “Go” button.
  - a. Molex part numbers can also be found by searching on the product description.
3. Review the Application Tooling available on the right side of the product window.
  - a. It may be necessary to scroll down on the right side of the terminal / connector product page to view all the tooling options.
  - b. Hand tools and manual type tools require the loose terminal / connector part number to be used in the search.
  - c. Applicator or semi-automatic type tools require the reeled terminal / connector part number to be used in the search.
4. Select the tool part number link
5. Review the tooling page for general tool information
6. Open the link for the Application Tooling Specification (ATS) (located on the left under *Specifications & Other Documents*) for additional details such as:
  - a. Termination specifications: crimp height, pull force, wire strip length, insulation diameter, etc.
  - b. Tool information: tool diagram, tool parts list, repair parts, perishable parts list.
7. Order Molex Application Tooling through your preferred distributor

Notes:

1. Hand crimp tooling can only be used with certain wires and terminal part numbers. Check the Application Tooling Specification Sheet on the Molex website for details.
2. Application Tooling product numbers are subject to change without prior notice. Customers are advised to check the Molex website for the most up-to-date information.
3. Molex FineAdjust™ and MiniMac™ Application Tooling requires the use of left payoff (“D” Wind) parts.

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DOCUMENT NUMBER: <b>AS-502306-002</b>	CREATED / REVISED BY: <b>B.Jennings</b>	CHECKED BY: <b>A.DHIR</b>	APPROVED BY: <b>B.Moser</b>