APPLICATION SPECIFICATION

MX150 BLADE ISO (M3) TERMINAL

1.0 SCOPE

This specification details the crimping information and common practices of general crimps for the Molex MX150 Blade ISO (M3) Terminal. Please refer to the product drawing for additional part information. The information in this document is for reference and benchmark purposes only. The user is responsible for validating crimp performance based on tooling, equipment and wire that is being used.

All measurements are in millimeters 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:

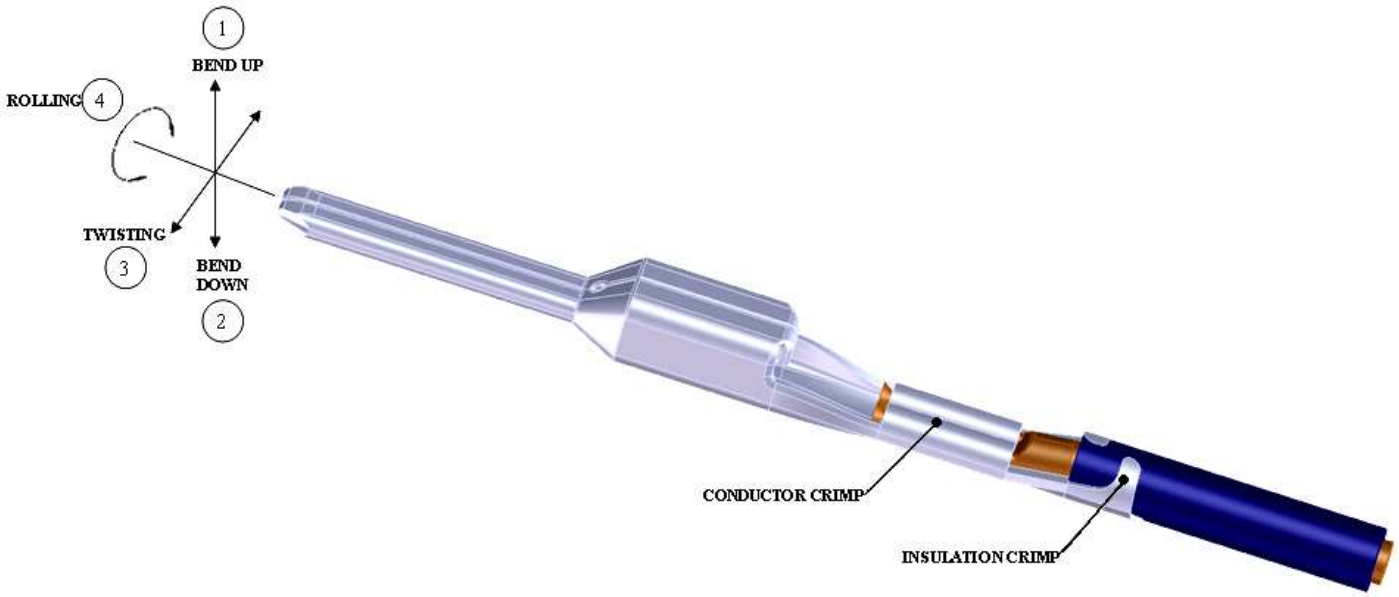
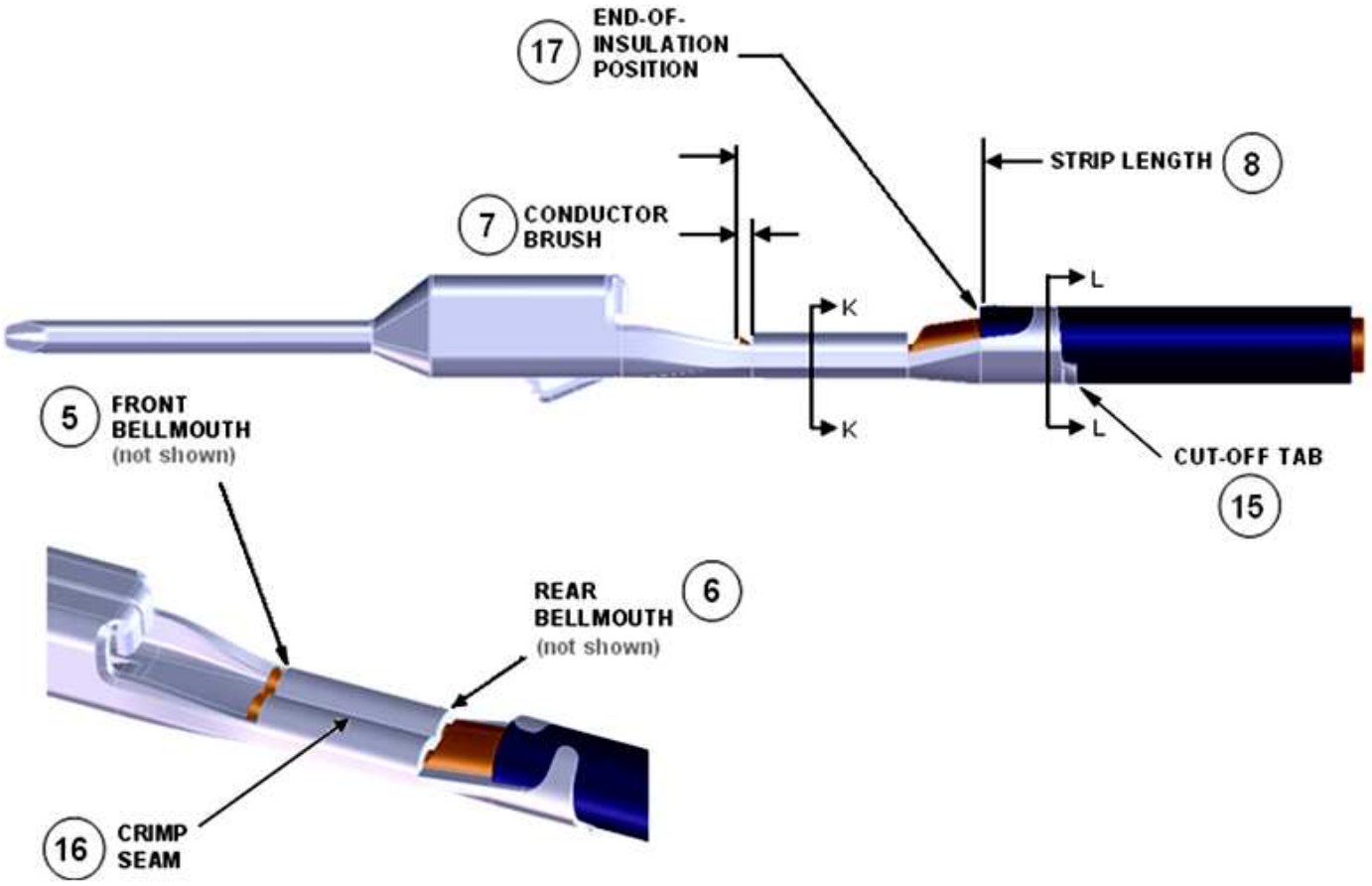


Figure 1

DEFINITIONS OF TERMS (CONT.):



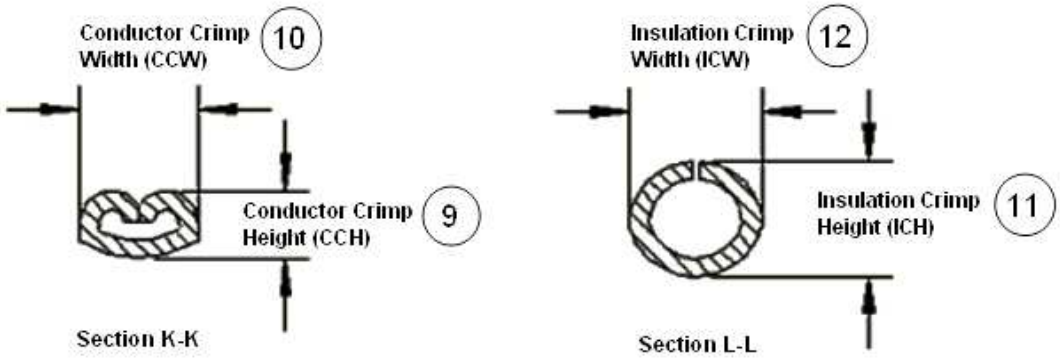
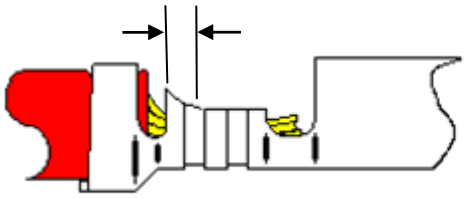


Figure 2

BELLMOUTH (FLARE) (5) (6)

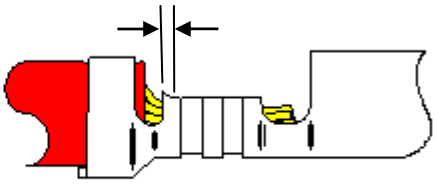
The flare that is formed on the edge of the conductor crimp acts as a funnel for the wire strands. This funnel reduces the possibility that a sharp edge on the conductor crimp will cut or nick the wire strands. A rear bellmouth is required on the conductor crimp. A front bellmouth is optional. Caution: 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



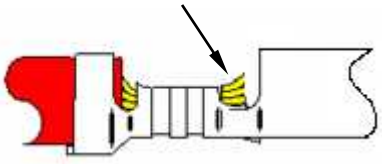
Good Crimp

Figure 3

CONDUCTOR BRUSH (7)

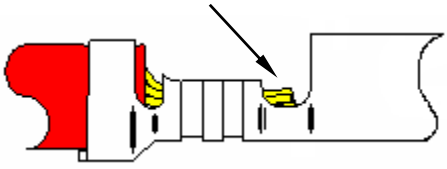
The conductor brush is made up of the wire strands that extend past the conductor crimp on the contact side of the terminal. This helps ensure that mechanical compression occurs over the full length of the conductor crimp. The conductor brush should not extend into the contact area or above the conductor crimp height. Caution: Excessive conductor brush that extends above the transition/crimp can cause terminal retention issues inside a plastic cavity and potentially tear matte seals.

EXCESSIVE CONDUCTOR BRUSH



Bad Crimp

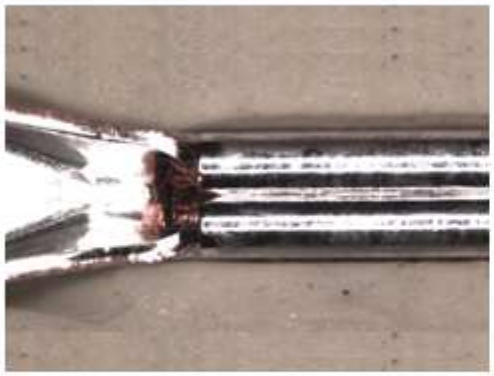
END OF BRUSH FLUSH TO OR BELOW CONDUCTOR CRIMP



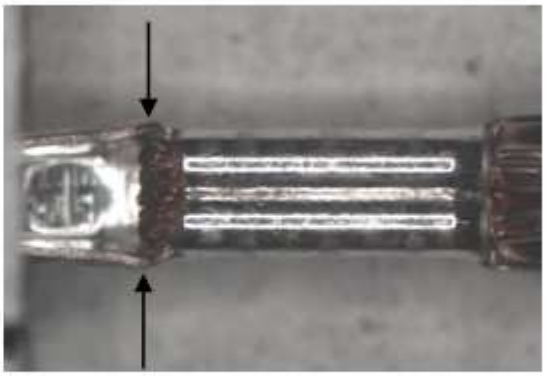
Good Crimp

Figure 4

CRIMP BULGE
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. Bulge must not exceed 2.55mm the maximum width of the terminal as it will impact the terminal to cavity function on the MX150 sealed plastic. See below for an example of crimp bulge.



Good Crimp (No Bulge)



Bad Crimp (Bulge)

Figure 5

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 (9)
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 Section 3.0, Table 2 for crimp height specifications.

CUT-OFF TAB LENGTH (15)
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 or could lead to excessive seal tears in matte sealed connectors. In most situations, a tool is setup to provide a cut-off tab that shall not exceed 0.50mm. See Section 3.0, 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 matte seals.

EXTRUSIONS (ANVIL FLASH) (13)

These are the burrs 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 and if there is insufficient or excessive terminal drag. The cross section should be examined for any resulting cracks in the material. Cracks can undermine the integrity of the crimp and are not allowed under any circumstance. Caution: Anvil flash has the potential to cut matte-seals and should be maintained with specifications.

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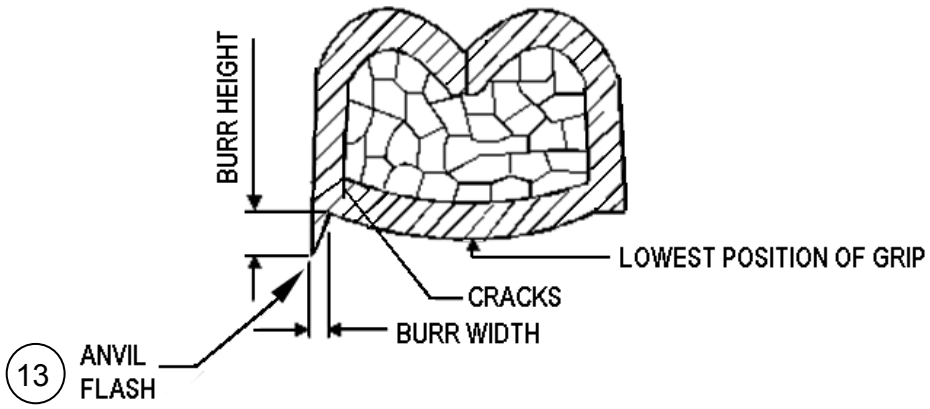


Figure 6

INSULATION CRIMP HEIGHT (11)

Insulation crimp heights are specified in Section 3.0, Table 2. MX150 blade terminal insulation grips are designed to accommodate multiple wire sizes. Although within the terminal range, an insulation grip may not completely surround the wire, an acceptable insulation crimp will still be provided. Evaluate the insulation section by cutting the wire flush with the back of the terminal. Once the optimum setting for the application is determined it is important to document the insulation crimp height. Then, as part of the setup procedure the operator can check the crimp height.

END-OF-INSULATION POSITION (17)

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.

STRIP LENGTH (8)

The strip length is the length of the exposed conductor strands after the insulation is removed. The strip length in conjunction with the end-of-insulation position will affect the brush length extension past the conductor crimp.

GRIP STEPS (14)

The designed offset between the conductor grip and the insulation grip. The grip step should not be altered during the crimping operation. See Section 3.0, Table 3 for grip step specification. Caution: Steps are designed to ensure seal performance in MX150 connection systems.

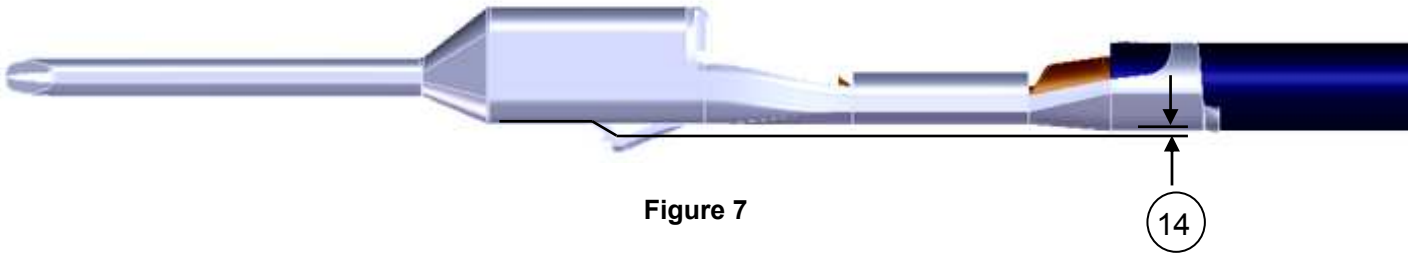


Figure 7

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 matte seal. At a minimum, check the condition of the wire on a sample length of 42mm as shown in Figure 8.

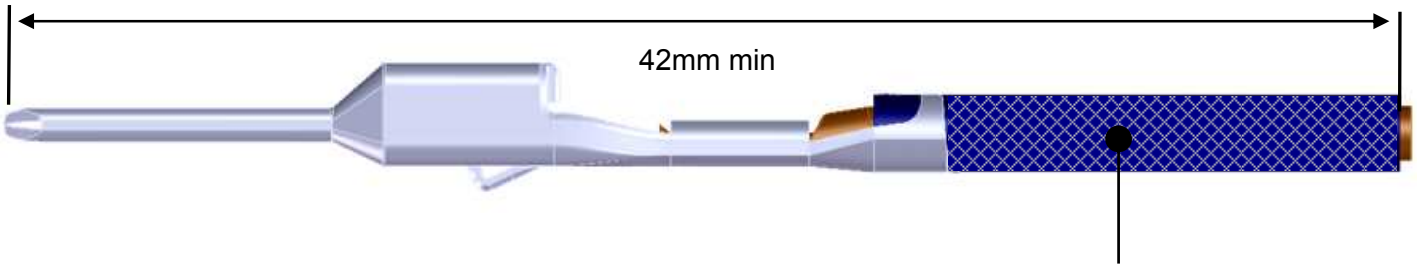


Figure 8

3.0 PRODUCT SPECIFICATIONS

TABLE 1

Terminal Order No.		Wire Range	Insulation Diameter Range (mm)	(8) Strip Length (mm)
Right Payoff "B" Wind	Left Payoff "D" Wind			
34781-0004	34781-1004	0.35 - 0.50 mm^2	1.2 – 1.70	4.70 – 5.60

TABLE 2

Terminal Order No.		Wire Size	Insulation Diameter Range (mm)	Conductor Crimp		Insulation Crimp	
Right Payoff "B" Wind	Left Payoff "D" Wind			CCH (mm)	CCW (mm) ±0.10	ICH (mm) ±0.10	ICW (mm) ±0.10
34781-0004	34781-1004	ISO 0.35mm	1.20-1.40	1.05 ± 0.03	1.60	1.75	2.00
		ISO 0.50mm	1.40-1.70	1.10 ±0.05		1.90	

Crimp heights/widths shown above are applicable for punch/anvil tooling shown in Figures 12 – 16.

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

Terminal crimps were validated to following specifications:
USCAR-21 Rev. 2 Oct. 2008

Wires are in accordance with following specifications:
ISO 6722 and ES-AU5T-1A348-AA
Thin Wall symmetrical conductor

TABLE 3

Specifications

Balloon #	Description	Requirement
1	Bend Up	1.5° REF
2	Bend Down	1.5° REF
3	Twisting	3° MAX
4	Rolling	3° MAX
5	Front Bell Mouth	Not Required
6	Rear Bell Mouth	0.30 – 0.70mm
7	Conductor Brush	0.40MAX Not to extend above conductor crimp height
8	Wire Strip Length	(4.70 – 5.60)
9	Conductor Crimp Height	See Table 2
10	Conductor Crimp Width	See Table 2
11	Insulation Crimp Height	See Table 2
12	Insulation Crimp Width	See Table 2
13	Conductor Anvil Flash	Burr Height = Does not exceed the lowest position on the grip Burr Width = 0.1 MAX
14	Insulation Grip Step	0.15 ± 0.30mm
15	Cut-off Tab Length	0.50 MAX No burrs
16	Crimp Seam	Seam shall not open and no wire is allowed out of the crimping area

INSULATION GRIP STEP (14)

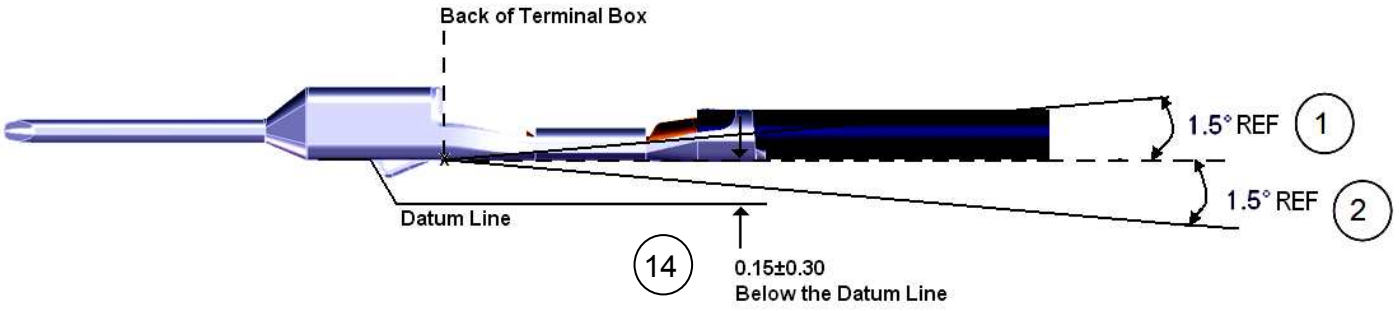


Figure 9

4.0 REFERENCE DOCUMENTS

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

1. Molex Quality Crimping Handbook 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

1. Complete tool set-up procedure.
2. Crimp a minimum of 5 samples.
3. Place the flat blade of the crimp micrometer (Figure 10) across the center of the dual radii of the conductor crimp. Do not take the measurement near the conductor bell mouth.
4. Rotate the micrometer dial until the point contacts the bottom most radial surface. If using a caliper, be certain not to measure the extrusion points (anvil flash) of the crimp.
5. To check for extrusion (anvil flash) use the caliper (Figure 11) to measure the crimp height. If the caliper measurement is greater than the crimp micrometer measurement the extrusion is not acceptable. CAUTION: Excessive extrusion can cause connector water leak.

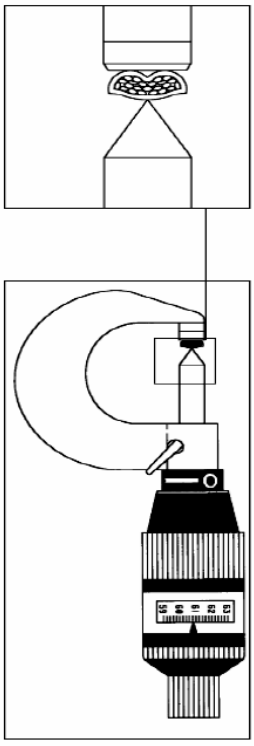


Figure 10

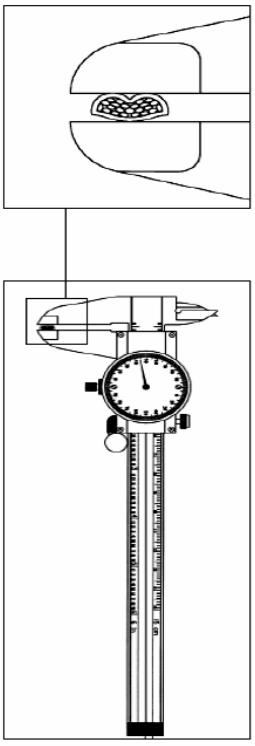
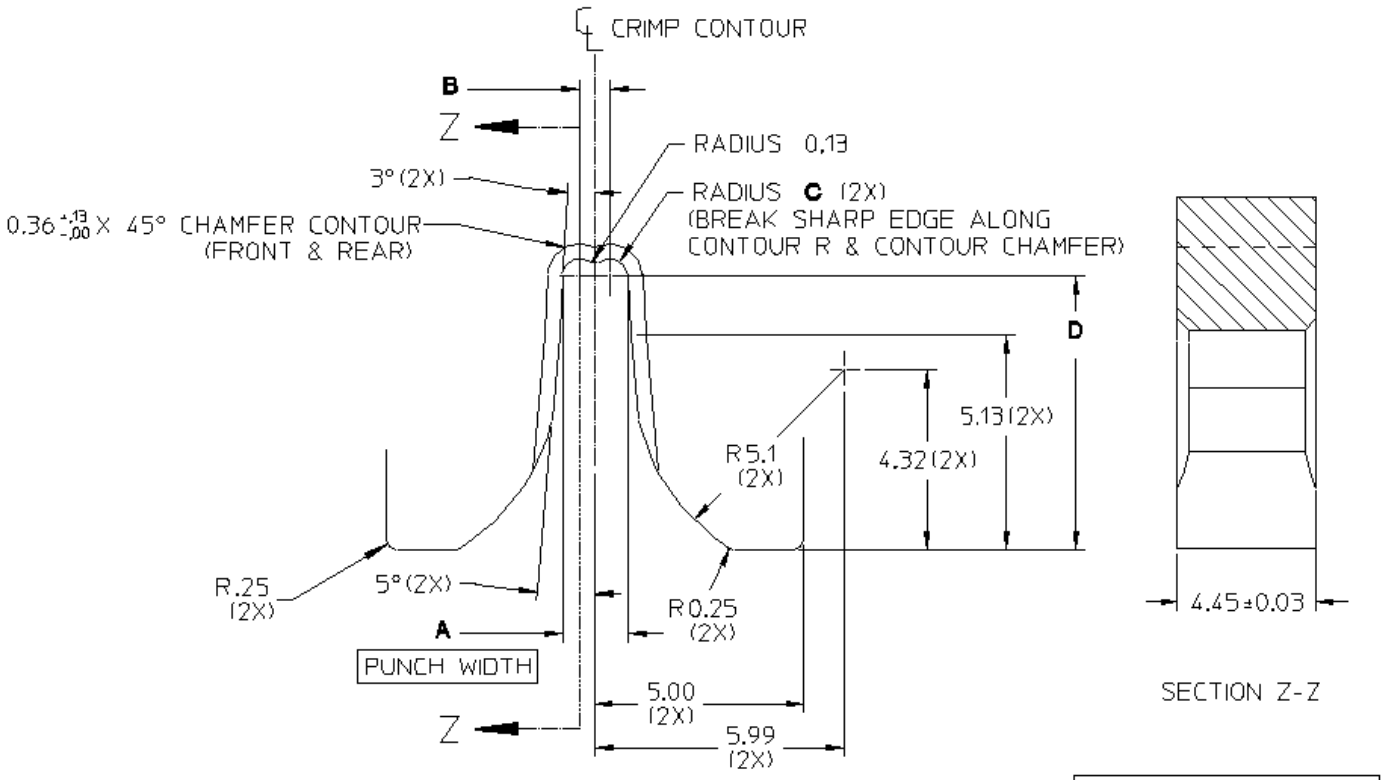


Figure11

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.

Figure 12: CONDUCTOR PUNCH



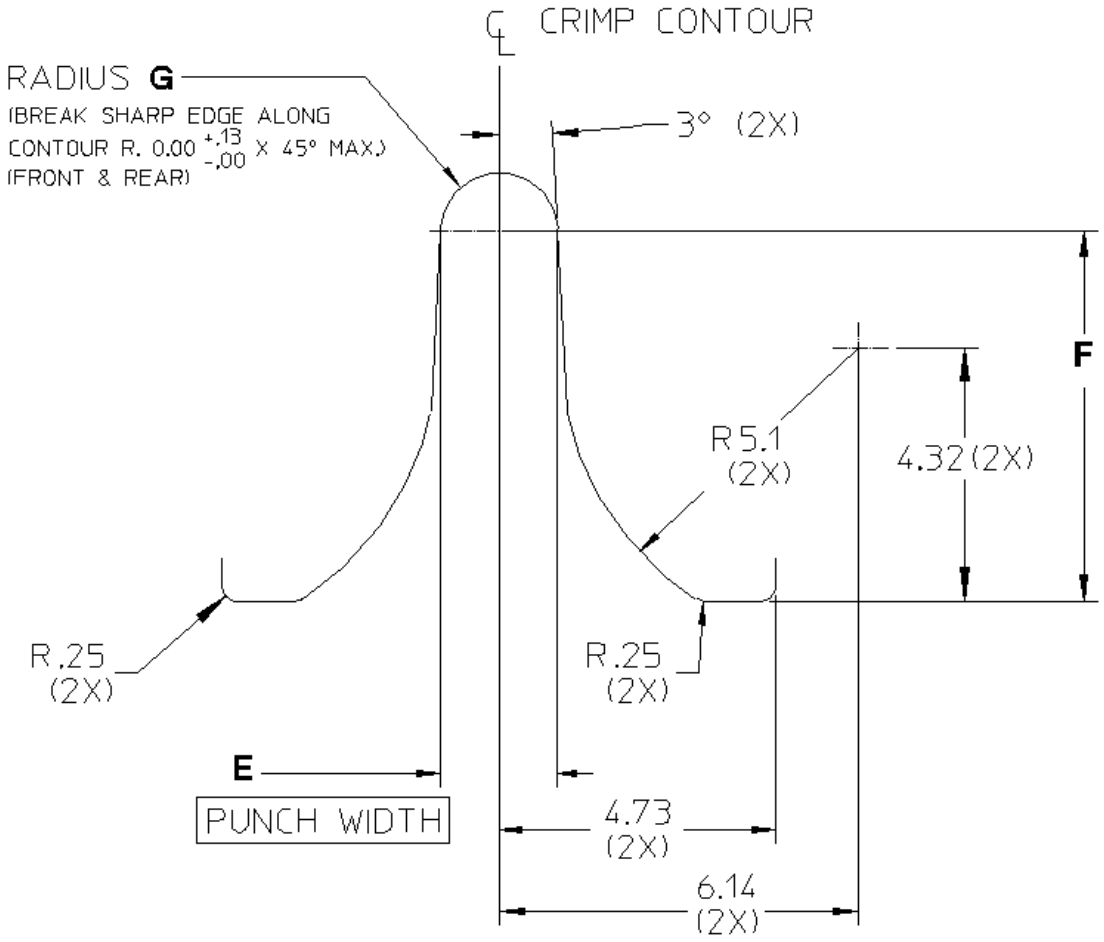
NOTE:

CONTOUR GROUND, POLISHED, AND BUFFED TO A 0.5-2.0 MICRO/IN. FINISH

GENERAL TOLERANCES (UNLESS SPECIFIED)		
	mm	INCH
4 PLACES	± ---	± ---
3 PLACES	± ---	± ---
2 PLACES	± 0.13	± ---
1 PLACE	± 0.25	± ---
ANGULAR ±1/2°		

Terminal Order No.	**A** +0.005/-0.00	**B** ±0.005	**C** ± 0.005	**D** ±0.005
34781-0004 34781-1004	1.56	0.72	0.42	6.57

Figure 13: INSULATION PUNCH



NOTE:

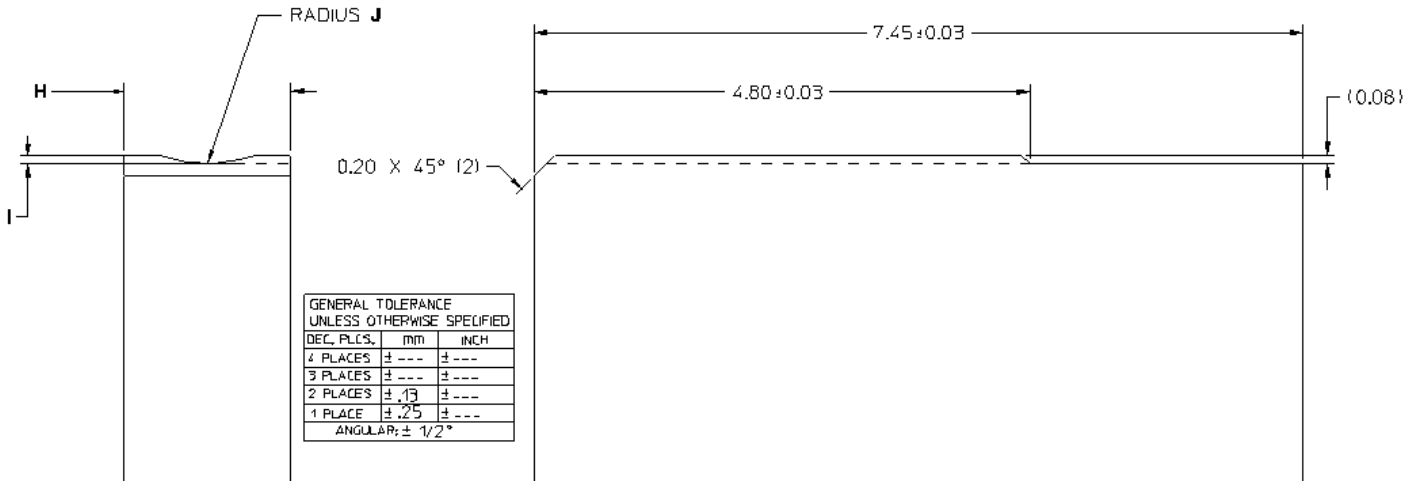
CONTOUR GROUND, POLISHED AND BUFFED TO A 0.5-2.0 MICRO/IN. FINISH

PUNCH THICKNESS: 3.75±0.03

GENERAL TOLERANCE UNLESS OTHERWISE SPECIFIED		
DEC. PLCS.	mm	INCH
4 PLACES	± ---	± ---
3 PLACES	± ---	± ---
2 PLACES	± 0,13	± ---
1 PLACE	± 0.25	± ---
ANGULAR: ± 1/2°		

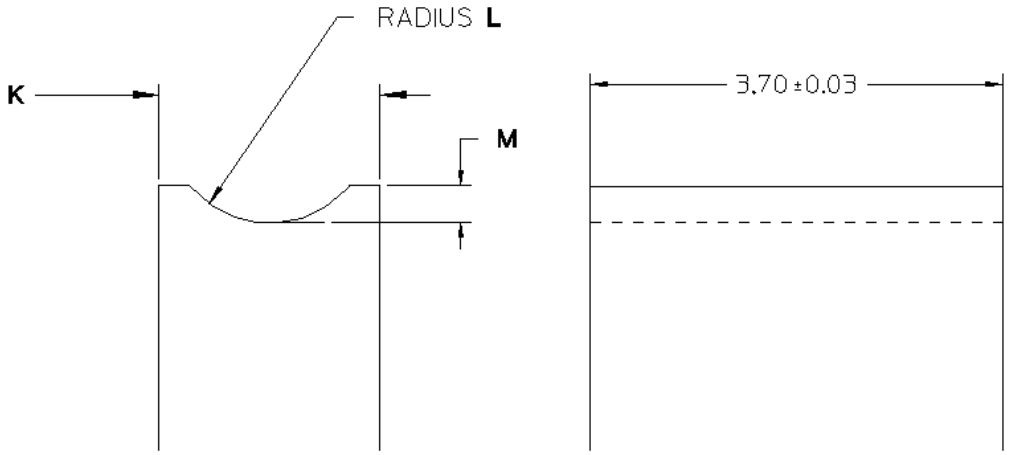
Terminal Order No.	**E** ±0.005	**F** ±0.03	**G** ±0.005
34781-0004 34781-1004	2.00	6.31	1.00

Figure 14: CONDUCTOR ANVIL



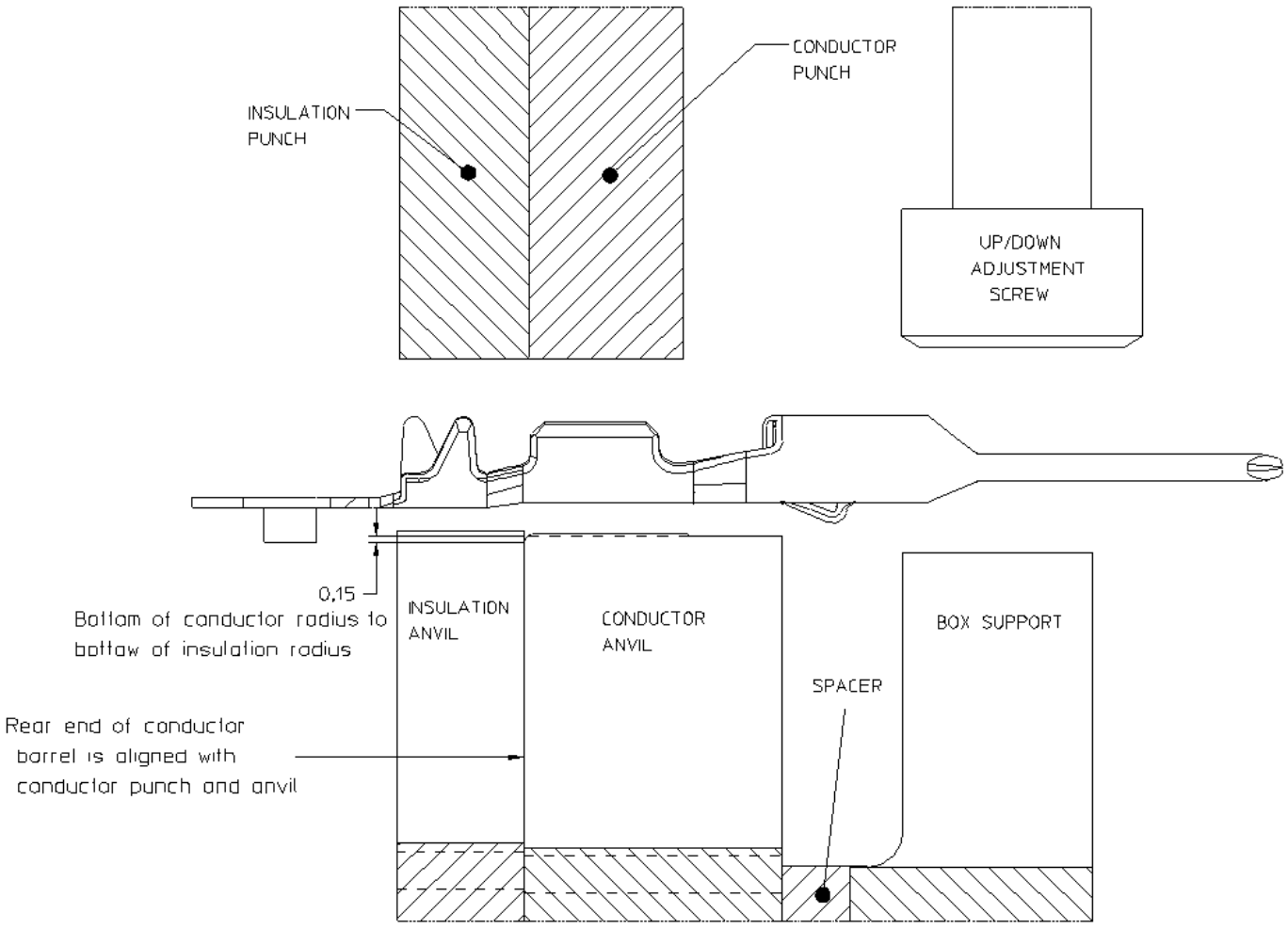
Terminal Order No.	**H** +0/-0.005	**I** ±0.005	**J** ±0.005
34781-0004 34781-1004	1.61	0.08	1.44

Figure 15: INSULATION ANVIL



Terminal Order No.	**K** ±0.005	**L** ±0.005	**M** ±0.005
34781-0004 34781-1004	1.98	0.95	0.33

Figure 16: TERMINAL POSITIONING WITH WIRE PRESS AND BOX SUPPORT TOOLING



The box support helps to control straightness of crimped lead during crimping.

7.0 APPLICATOR TOOLING

Applicator tooling for the MX150 blade terminal can be obtained directly from Molex. See table below for description and product numbers.

SUPPLIER APPLICATOR TOOLING TABLE	
Description	**Molex Applicator**
FineAdjust™ Applicator for MX150 Blade ISO (M3)Terminals 0.35mm² and 0.50mm²	TBD

FineAdjust™ Applicator tooling requires the use of left payoff (“D” Wind) parts.