APPLICATION SPECIFICATION **114-160066**

14 Oct 2020

Rev. A

XRC TERMINAL APPLICATION SPECIFICATION

1 SCOPE

This specification details the crimping information and common practices of general crimps for the XRC terminal to be used in conjunction with DT-XT and XRC sealed connector systems. Please refer to the XRC Pin & Socket terminal Customer drawings C-2600020 and C-2600021 for additional 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. This specification shows pin terminals, but the same specifications are to be followed for the socket terminals.

2 PRODUCT DESCRIPTION

DEFINITION OF TERMS

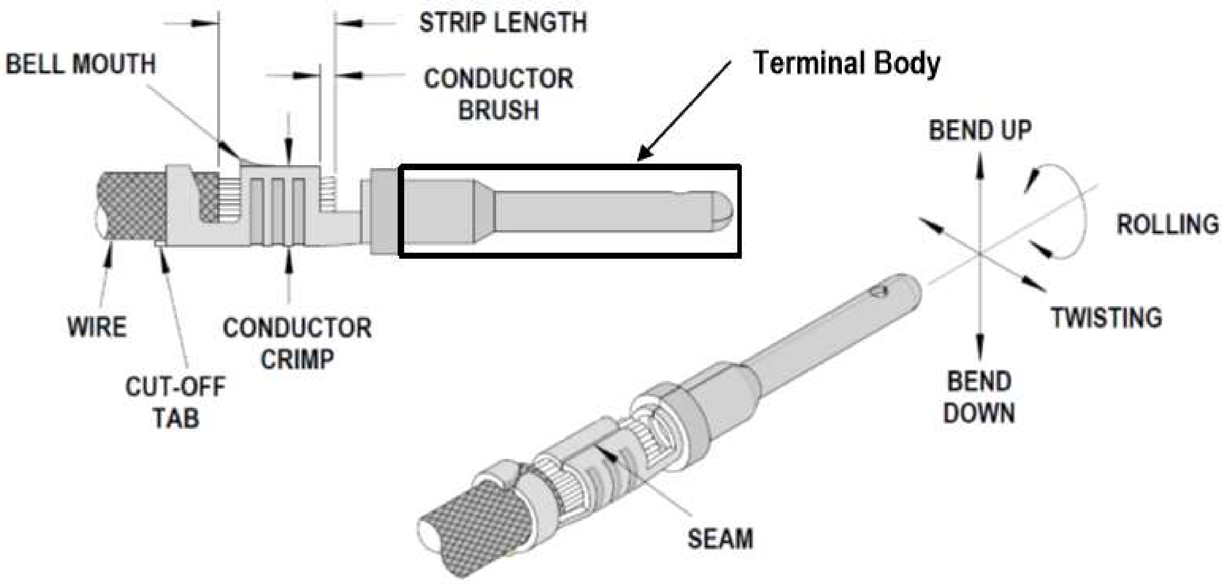

Figure 1

DEFINITIONS OF TERMS (CONT'D.):

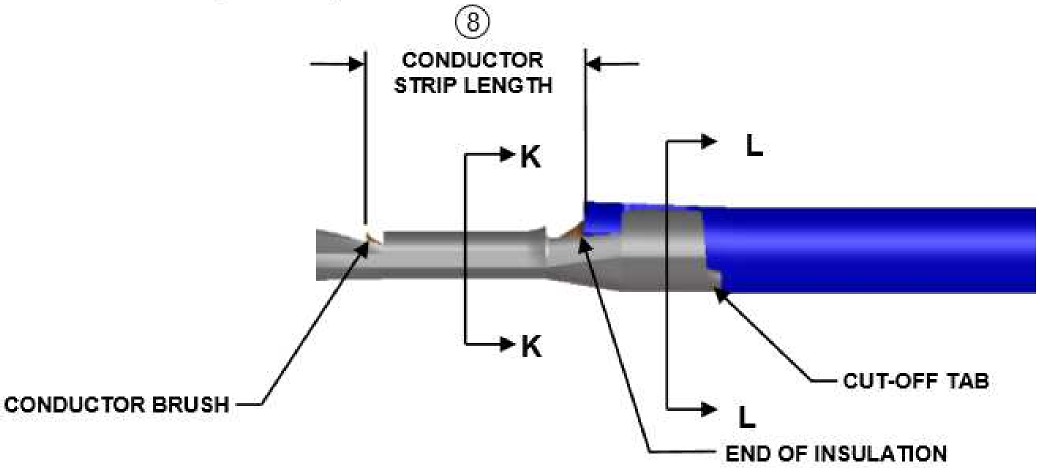

Figure 2

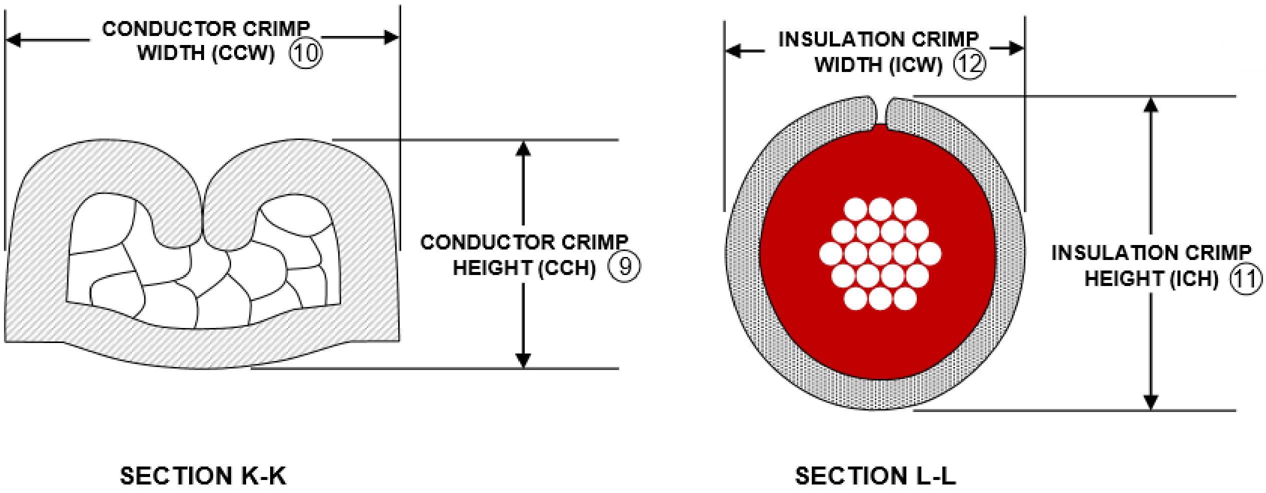

Figure 3

STRAIGHTNESS MEASUREMENTS

The crimping process may result in some bending between the conductor crimp and the terminal body. This bending must not exceed the limits shown in Table 3.

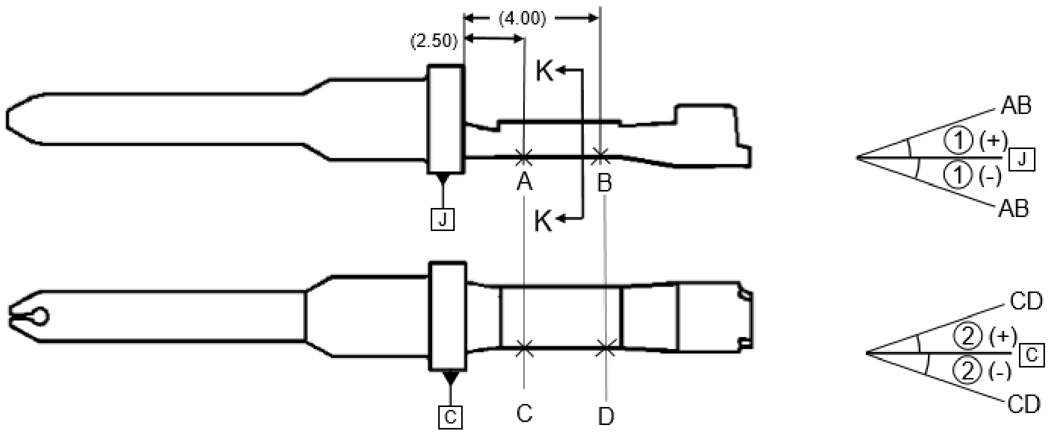

Figure 4

BEND UP/DOWN ①

To measure bend up/down, establish datum J as shown in Figure 4 then measure the angle of the line defined by points A and B with respect to the datum. Positive angles are defined as bend up and negative angles are defined as bend down

TWISTING ②

To measure twisting, establish datum C as shown in Figure 4, then measure the angle of the line defined by points C and D with respect to the datum.

ROLLING ③

To measure rolling, cross section the part at section K-K (see Figure 4), then clamp the part in a vice as shown in Figure 5. Using a shadowgraph, focus the graph to section H-H and establish line M-M as the top of the terminal body. With line M-M established, refocus the graph to section J-J. Measure the angle of the line defined by points E and F with respect to line M-M.

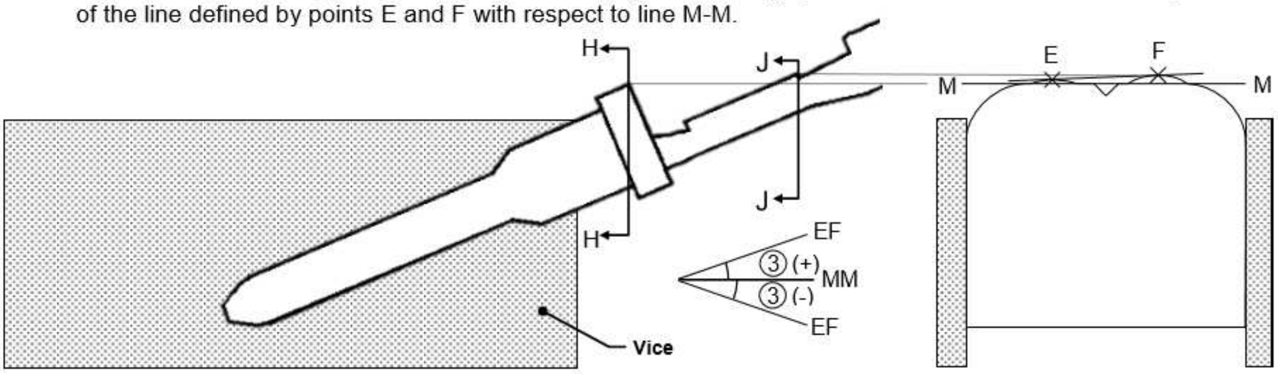

Figure 5

BELLMOUTH (FLARE) ④⑤*

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.

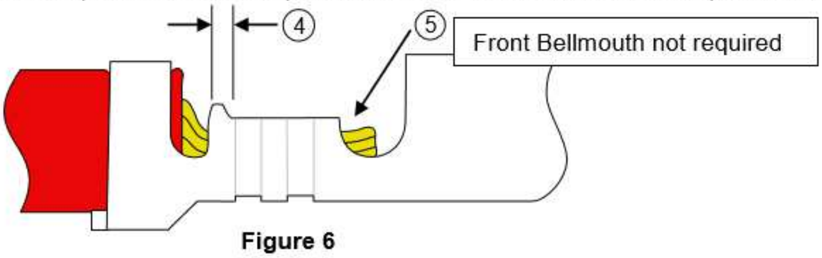

Figure 6

*NOTE: If front bell mouth is present, it should not be greater than rear bell mouth

CUT-OFF TAB ⑥a⑥b

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.

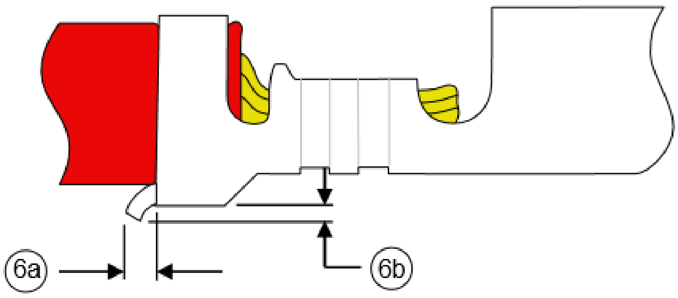

Figure 7

CONDUCTOR BRUSH (7a) (7b)

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), see Figure 8 and Table 3. 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.

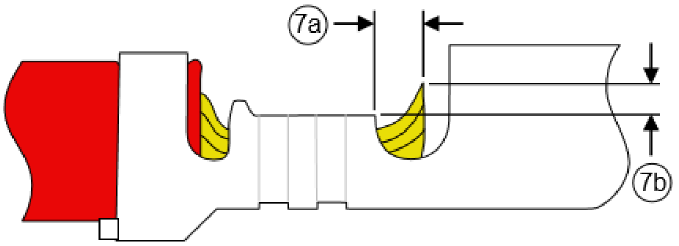

Figure 8

CONDUCTOR STRIP LENGTH (8)

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 back 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. The crimp seam shall not be open and all conductor strands must be contained within the conductor crimp.

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 optimise a crimp height to individual wire strands and terminal plating, one crimp height specification is normally created. See Table 2 for crimp height specifications.

INSULATION CRIMP HEIGHT (11)

Insulation crimp heights are specified in Table 2. XRC terminals 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. 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 insulation but not pierce it or otherwise damage the integrity of the insulation. The grip should not contact the conductors under any circumstance.

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.

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 need 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.

EXTRUSIONS (ANVIL FLASH / BURR) ⑬

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). Note: Anvil Flash (Burr) may not extend below the bottom of the crimp.

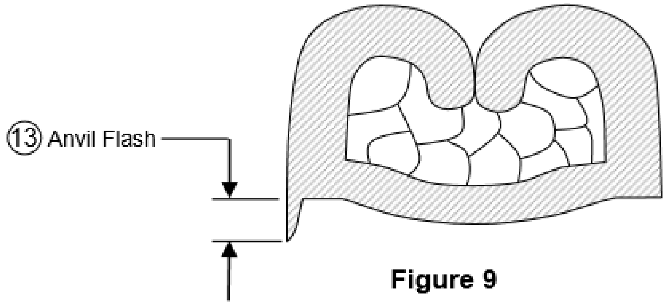

Figure 9

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 20mm.

TERMINAL BODY DEFORMATION

Care must be taken to ensure that the terminal body sections are not deformed during crimping and handling. Any deformation of the pin position relative to the terminal body must not exceed the tolerances specified in customer drawing C-2600020. Any deformation of the socket terminal body must not exceed the tolerances specified in customer drawing C-2600021.

INSULATION GRIP STEP ⑭

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 Figures 10 and Table 3). To measure the grip step, establish datum J as shown in Figure 10, and then measure the grip step as the distance from the lowest point of the insulation grip, excluding the cutoff tab and wire insulation.

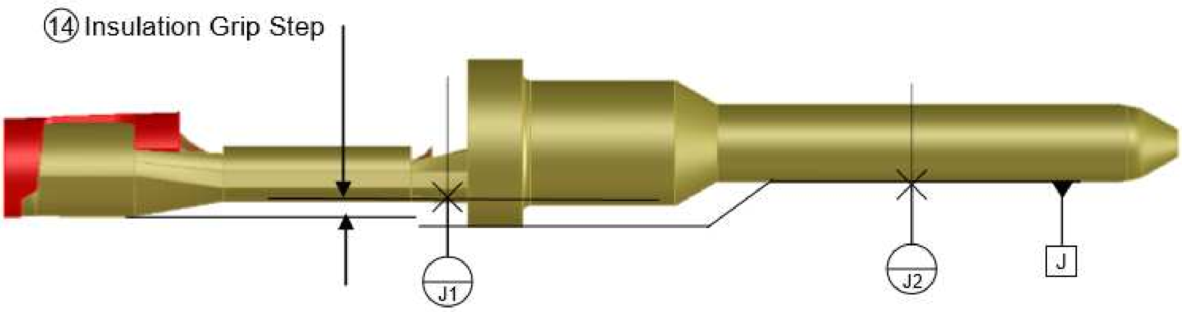

Figure 10

CRIMP BULGE ⑮

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 body. Any bulge must not exceed the width shown in Table 3. See Figure 11 for an example of crimp bulge.

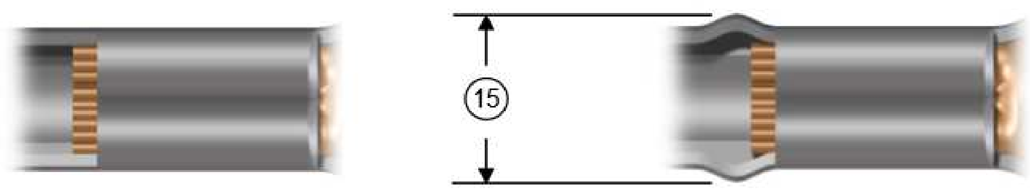

Figure 11

Good Crimp (No Bulge)   Bad Crimp (Bulge)

3 Product Specifications

Table 1

Terminal Family	Gender	Sealing	Plating	Special Characteristics	Grip Size	Wire Size	Insulation Diameter Range
XRC	Pin & Socket	Mat Seal	Ni or Au	Standard Performance	14-18 TW	0.82-2.08mm²	1.90-3.30
					14-18	0.82-2.08mm²	2.41-3.80
					16-18	0.82-1.31mm²	1.40-2.16
					0.5-1.0	0.50-1.0mm²	1.40-2.54
					20-24	0.22-0.50mm²	1.20-1.80

Table 2

TE Product Attribute		Validated Wire		Conductor Barrel		Insulation Barrel		MIN PULL OUT FORCE [N]
Grip Size	Special Characteristics	Wire Type	Wire Size	CCH ± 0.04	CCW ± 0.10	ICH REF	ICW REF	
14-18	Standard Performance Nickel (Ni)	SAE J1128 GXL (14 AWG)	2.08mm²	1.62	2.60	3.10	3.10	222
14-18 TW		SAE J1128 TXL (14 AWG)	2.08mm²	1.62	2.60	2.80	2.80	222
16-18		SAE J1128 TXL (16 AWG)	1.31mm²	1.50	2.40	2.50	2.50	111
0.5-1.0		ISO 67221/FLRYW	0.5mm²	1.21	2.01	1.60	1.60	67
20-24		UL 2517	24AWG	0.98	1.40	1.40	1.50	40
20-24		SAE J1128 TXL	22AWG	1.05	1.40	2.00	2.20	50
20-24		SAE J1128 TXL	20AWG	1.12	1.40	2.20	2.20	75

The above specifications are guidelines to an optimum crimp.

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 from what is shown in this specification.

Table 3

<table>
<tr><th colspan="4">Specifications</th></tr>
<tr><th>Balloon #</th><th>Feature</th><th colspan="2">Requirement</th></tr>
<tr><td>1</td><td>Bend Up/Down</td><td colspan="2">± 3° MAX</td></tr>
<tr><td>2</td><td>Twisting</td><td colspan="2">± 4° MAX</td></tr>
<tr><td>3</td><td>Rolling</td><td colspan="2">± 8° MAX</td></tr>
<tr><td>4</td><td>Rear Bell Mouth</td><td colspan="2">0.30mm-0.60mm</td></tr>
<tr><td>5</td><td>Front Bell Mouth</td><td colspan="2">Not Applicable (if present <0.4mm)</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Cut-Off Tab</td><td>a</td><td>0.50mm max</td></tr>
<tr><td>b</td><td>No Burr</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Conductor Brush</td><td>a</td><td>0.30mm-0.80mm</td></tr>
<tr><td>b</td><td>Not to extend above conductor crimp/transition height</td></tr>
<tr><td>8</td><td>Conductor Strip Length</td><td colspan="2">3.81mm-5.08mm for reference</td></tr>
<tr><td>9</td><td>Conductor Crimp Height</td><td colspan="2">See Table 2</td></tr>
<tr><td>10</td><td>Conductor Crimp Width</td><td colspan="2">See Table 2</td></tr>
<tr><td>11</td><td>Insulation Crimp Height</td><td colspan="2">See Table 2 (To be equal to Wire O.D.)</td></tr>
<tr><td>12</td><td>Insulation Crimp Width</td><td colspan="2">See Table 2 (To be equal to Wire O.D.)</td></tr>
<tr><td>13</td><td>Conductor Anvil Flash</td><td colspan="2">0.20mm MAX.</td></tr>
<tr><td rowspan="4">14</td><td rowspan="4">Insulation Grip Step</td><td>16-20</td><td>0.20mm ± 0.20</td></tr>
<tr><td>16-18</td><td>0.20mm ± 0.20</td></tr>
<tr><td>14-18</td><td>0.50mm ± 0.20</td></tr>
<tr><td>20-24</td><td>0.20mm ± 0.20</td></tr>
<tr><td rowspan="4">15</td><td rowspan="4">Crimp Bulge</td><td>16-20</td><td>2.30mm MAX</td></tr>
<tr><td>16-18</td><td>2.50mm MAX</td></tr>
<tr><td>14-18</td><td>2.70mm MAX</td></tr>
<tr><td>20-24</td><td>1.60mm MAX</td></tr>
</table>

4 Reference Documents

1. 108-160011 Product Specification for XRC system.
2. C-2600020, XRC Pin Terminal Customer Drawing
3. C-2600021, XRC Socket Terminal Customer Drawing

5 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 12).
4. Rotate the micrometer dial until the point contacts the bottom most radial surface. If using a caliper, be certain not to measure the conductor anvil flash (extrusions) of the crimp (see Figure 13).

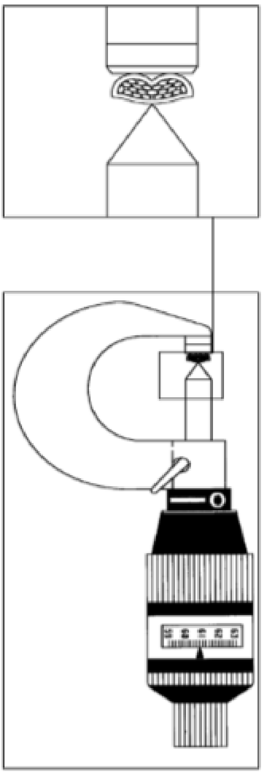

Figure 12

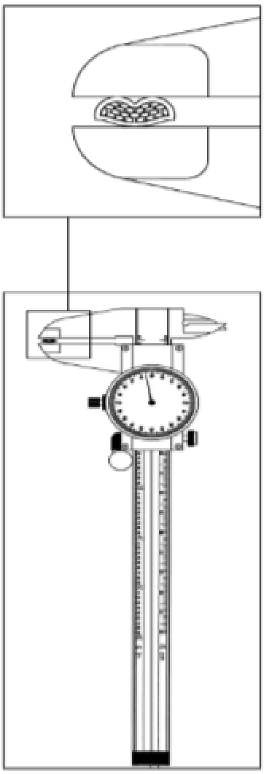

Figure 13

6 Application Tools

Application Tooling for the XRC Terminals can be obtained directly from TE.

Table4

Pin Terminal P/N	Socket Terminal P/N	Conductor crimp	Insulation Crimp Range	TE Applicator P/N
2-2600020-2 2-2600020-3	2-2600021-3 2-2600021-5	14-18TW AWG	1.90-2.41mm	2837880
2-2600020-2 2-2600020-3	2-2600021-3 2-2600021-5	14-18TW AWG	1.90-3.30mm	2837384
3-2600020-2 3-2600020-3	3-2600021-3 3-2600021-5	14-18 AWG	2.40-3.80mm	2837384
1-2600020-2 1-2600020-3	1-2600021-3 1-2600021-5	16-18 AWG	1.40-1.79mm	2837315
1-2600020-2 1-2600020-3	1-2600021-3 1-2600021-5	16-18 AWG	1.79-2.16mm	2837385
4-2600020-2 4-2600020-3	4-2600021-3 4-2600021-5	16-20 AWG or 0.5-1.0mm^2	1.40-2.54mm	2836770
5-2600020-2 5-2600020-3	5-2600021-3 5-2600021-5	24 or 0.5mm^2	1.55-1.80mm	2837879
5-2600020-2 5-2600020-3	5-2600021-3 5-2600021-5	22 or 0.35mm^2	1.30-1.60mm	2837878
5-2600020-2 5-2600020-3	5-2600021-3 5-2600021-5	20 or 0.22mm^2	1.20-1.50mm	2837877