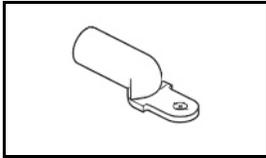


277155-1 Product Details

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277155-1

TE Internal Number:
277155-1
 Active

COPALUM Terminals

 Always EU RoHS/ELV Compliant (Statement of Compliance)

Product Highlights:

- Terminal Style = Straight
- Wire Type = Aluminum, Copper
- Stud Size = 1/4 [M6]
- 1 Holes
- Wire Size (AWG or CM) Aluminum = 2 [35.0²]

[View all Features](#)

Quick Links

- [Pricing & Availability](#)
- [Search for Tooling](#)
- [Product Feature Selector](#)
- [Contact Us About This Product](#)

[Add to My Part List](#)

[Request Sample](#)

[Find Similar Products](#)

[Buy Product](#)

Documentation & Additional Information

Product Drawings:

- None Available

Catalog Pages/Data Sheets:

- None Available

Product Specifications:

- None Available

Application Specifications:

- [COPALUM Sealed Terminals and Splices](#) (PDF, English)

Instruction Sheets:

- None Available

CAD Files:

- None Available

[List all Documents](#)

Additional Information:

- [Product Line Information](#)

Related Products:

- [Tooling](#)

Product Features (Please use the Product Drawing for all design activity)

Product Type Features:

- Stud Size = 1/4 [M6]
- Sealed = Yes

Dimensions:

- Insulation Diameter (mm [in]) = 8.64-9.65 [.340-.380]
- Tongue Material Thickness (mm [in]) = 2.36 [0.093]

Body Features:

- Wire Type = Aluminum, Copper
- Wire Size (AWG or CM) Aluminum = 2 [35.0²]
- Wire Size (AWG or CM) Copper = 4 [22.0²]
- Wire Range-Aluminum (CMA) = 67,872
- Wire Range-Copper (CMA) = 42,615
- Plating Material = Tin
- Weight (g [oz]) = 33.50 [1.183]

Contact Features:

- Terminal Style = Straight

Configuration Features:

- Number of Holes = 1

Industry Standards:

- [RoHS/ELV Compliance](#) = RoHS compliant, ELV compliant
- [Lead Free Solder Processes](#) = Not relevant for lead free process
- RoHS/ELV Compliance History = Always was RoHS compliant

Other:

- Brand = AMP
- Comment = Sheared Tongue

COPALUM* Sealed Terminals and Splices
NOTE


All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [± 0.005] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

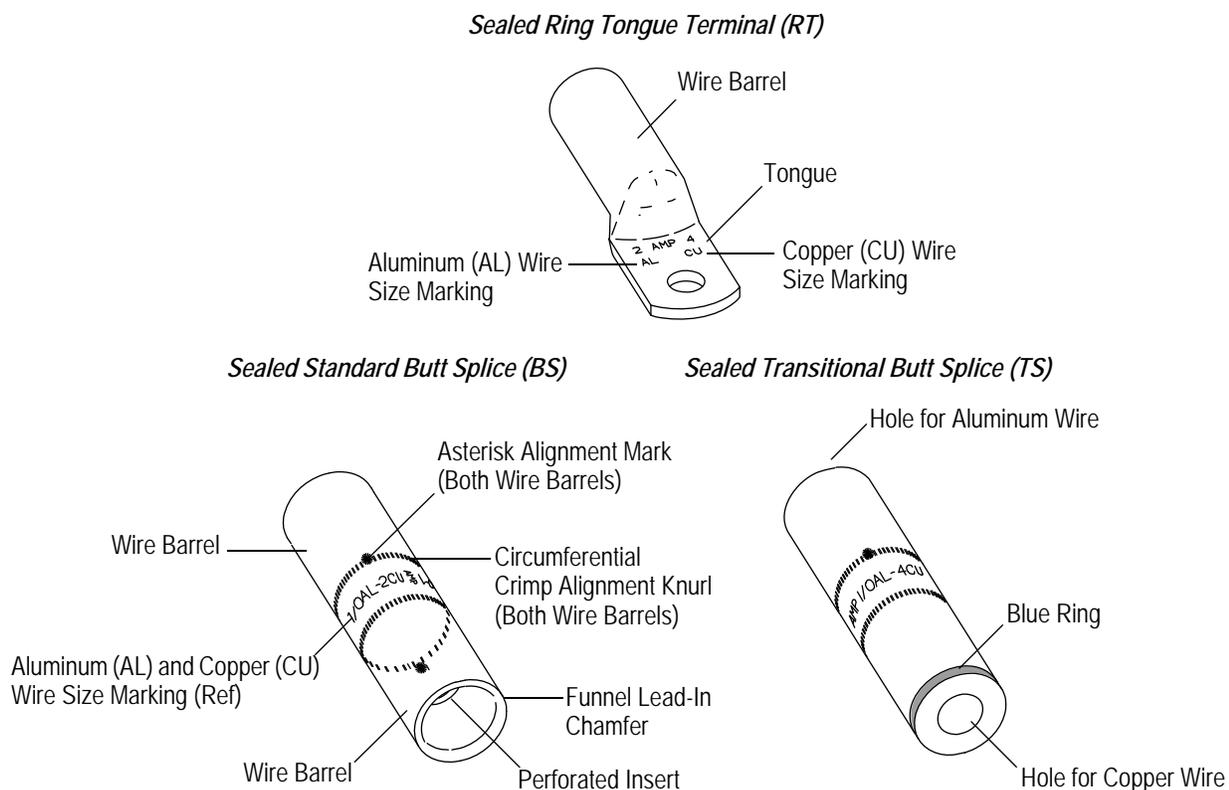
This specification covers the requirements for application of COPALUM sealed terminals and splices, which are especially suited for the aerospace industry. These terminals and splices are designed to be terminated to fine stranded aluminum (AL) wire sizes 8.6 to 110.9 mm² [8 to 4/0 AWG] and copper (Cu) wire sizes 4.8 to 85.9 mm² [10 to 3/0 AWG]. The terminals are available in a variety of ring tongue lengths, shapes, and stud hole sizes. Markings on the terminals and splices indicate the accepted wire sizes and types (AL for aluminum and CU for copper).

Each sealed terminal and splice has a barrier that helps locate and seal the wire barrel and a funnel lead-in chamfer in the wire barrel that helps guide the wire. A perforated insert in the wire barrel causes a wiping action on the wire during crimping, removing oxides and forming a solid electrical bond between the wire and terminal or splice.

Standard butt splices have a wire barrel at each end and are used for joining aluminum-to-aluminum, aluminum-to-"down size" copper, or copper-to-copper wires. Transitional butt splices have a wire barrel at each end and are used for joining aluminum and copper wires. A blue ring around one wire barrel (which has no perforated insert) indicates the copper wire end of the splice.

All sealed terminals and splices are designed to be crimped with precision dies and a power-assist unit, which perform a unique dry crimp that removes oxides to expose uncontaminated metal surfaces and seals the termination to prevent oxidation.

When corresponding with personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.


Figure 1

The circumferential crimp alignment knurl and asterisk alignment mark featured on each wire barrel of the splice indicates the direction that the splice should be placed in the dies when crimping the splice.

NOTE

Copper wire has a greater electrical conductivity, density, and weight than aluminum wire of the same size. Because of this differentiation, there is a down size difference from an aluminum to copper wire. Size differences are given in Figure 2.

2. REFERENCE MATERIAL

2.1. Revision Summary

- Changed company name and logo
- Updated application specification to corporate requirements
- Removed 13-60, 13-78, and BMS wire, and CRN terminal
- Removed large hole and small hole from Figure 1 and modified NOTE in Section 1
- Replaced longitudinal crimp alignment knurl with asterisk alignment mark
- Removed 108-2300 and added 108-11011-1, -2, and -3 to Paragraph 2.4
- Removed cancelled and replaced superseded military specifications in Paragraph 2.5
- Removed NOTE from Paragraph 3.1,C and 3.2 and “primary, secondary, and optional” and CAUTION from Paragraph 3.3
- Changed “or” to “to” in last column of Figure 2
- Combined Paragraphs 3.3 and 3.4, modified Paragraph 3.4,B, and removed crimp length from Paragraph 3.4,C
- Remove “as required for aircraft applications” from Paragraph 3.4
- Removed crimp height information from Paragraph 3.4 and Figure 4
- Removed Paragraph 3.8
- Flipped cross-section in Figure 5
- Changed “high-temperature” to “nickel-plated,” changed 68010-1 to 68010, and removed reference note and hydraulic crimping heads from Figure 6
- Removed splice crimp location from Paragraph 3.4, B and Figures 5 and 7

2.2. Customer Assistance

Reference Product Base Part Number 277147 and Product Code 3015 are representative of COPALUM sealed terminals and splices. Use of these numbers 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 Representative or, after purchase, by calling PRODUCT INFORMATION at the number at the bottom of page 1.

2.3. Drawings

Customer Drawings for product part numbers are available from the service network. The information contained in Customer Drawings takes priority if there is a conflict with this specification or with any technical documentation supplied.

2.4. Specifications

Product Specifications (108-series) provide product performance and test information. Product specifications that pertain to this product are:

- 108-11011 Sealed COPALUM Terminals and Splices, Aluminum Wire
- 108-11011-1 Sealed COPALUM Terminals and Splices, Copper Wire
- 108-11011-2 Sealed COPALUM 90-Degree Flag Terminal, Aluminum Wire
- 108-11011-3 Sealed COPALUM Transitional Butt Splices, Copper and Aluminum Wire

2.5. Publications

Publications developed by SAE International available for this product are:

- SAE AS70991, "Terminals: Lug and Splice, Crimp Style, Aluminum, For Aluminum Aircraft Wire"
- SAE AS22759, "Wire, Electrical, Fluoropolymer-Insulated, Copper or Copper Alloy"

2.6. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409-series) provide machine setup and operating procedures. Documents available that pertain to this product are:

- 408-2281 Crimping Die Assemblies for COPALUM Sealed Terminals and Splices
- 408-2453 Hydraulic Crimping Head 69066
- 408-7424 Checking Terminal Crimp Height or Gaging Die Closure
- 408-8909 Inspection and Servicing Hydraulic Crimping Heads 1752787-1 and 1752877-1
- 408-8914 Hydraulic Crimping Head 1752787-1
- 408-8956 Hydraulic Crimping Head 1752877-1
- 408-9535 Hydraulic Crimping Head 58422-1
- 409-1950 Heavy-Duty Electric Hydraulic Pumps 69120-1 and 69120-2
- 409-5860 Hydraulic Hand Pump 314979-1
- 409-10081 Electric Hydraulic Pumps 1804700-1 and -2

3. REQUIREMENTS

3.1. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

B. Shelf Life

The terminals and splices should remain in the shipping containers until ready for use to prevent deformations. The terminals and splices should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

3.2. Chemical Exposure

Do not store connectors near any chemical listed below as they may cause stress corrosion cracking in the terminals and splices.

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

3.3. Wire Selection and Preparation



To avoid personal injury, DO NOT use larger or smaller aluminum or copper wire sizes than those designated.

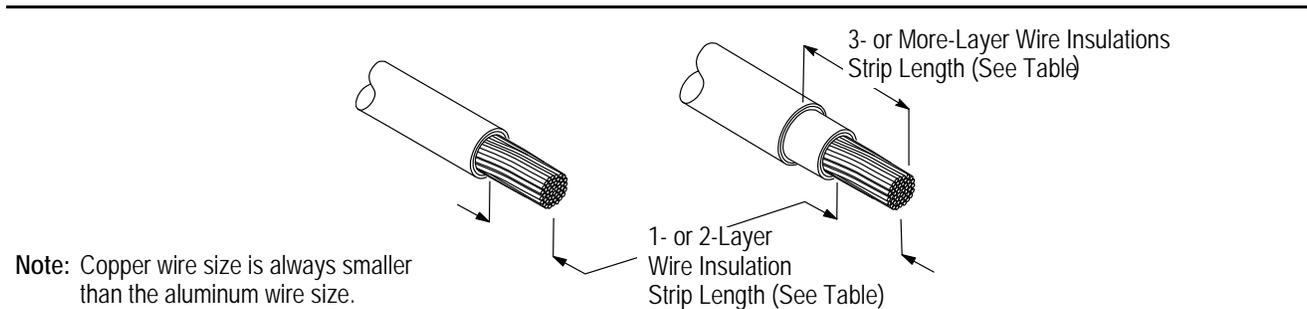
The terminal or splice selected will be determined by the wire size and type and wire insulation diameter. The wire size and type and wire insulation diameter is given on the customer drawing of each terminal and splice.

For standard butt splices, a cross-reference of wire size marking-to-use is given in Figure 2.

SPLICE WIRE SIZE MARKING	STANDARD BUTT SPLICE USE		
	Aluminum-to-Aluminum	Copper-to-Copper	Aluminum-to-Down Size Copper
4/0 AL-3/0 CU	4/0 to 4/0	3/0 to 3/0	4/0 to 3/0
3/0 AL-2/0 CU	3/0 to 3/0	2/0 to 2/0	3/0 to 2/0
2/0 AL-1/0 CU	2/0 to 2/0	1/0 to 1/0	2/0 to 1/0
1/0 AL-2 CU	1/0 to 1/0	2 to 2	1/0 to 20
2 AL-4 CU	2 to 2	4 to 4	2 to 4
4 AL-6 CU	4 to 4	6 to 6	4 to 6
6 AL-8 CU	6 to 6	8 to 8	6 to 8
8 AL-10 CU	8 to 8	10 to 10	08 to 10

Figure 2

The strip length for the wire will depend on the number of insulation layers covering the wire. Wire sizes in metric, AWG, and circular mil area (CMA) comparison and the wire strip length is given in Figure 3.



WIRE SIZE						INSULATION LAYER STRIP LENGTH (± 1.59 [1/16])	
ALUMINUM			COPPER			3 OR MORE	1 OR 2
mm ²	AWG	CMA	mm ²	AWG	CMA		
8.60	8	16,564	4.80	10	9,354	22.23 [7/8]	11.11 [7/16]
14.60	6	28,280	8.80	8	16,983	22.23 [7/8]	12.70 [1/2]
21.90	4	42,420	13.80	6	26,818	25.40 [1]	17.45 [11/16]
35.00	2	67,872	22.00	4	42,615	31.75 [1 1/4]	19.10 [3/4]
55.50	1/0	107,464	34.30	2	66,500	2.54 [1 9/32]	25.40 [1]
71.30	2/0	138,168	53.90	1/0	104,500	34.93 [1 3/8]	25.40 [1]
87.20	3/0	168,872	68.60	2/0	133,000		
110.94	4/0	214,928	85.94	3/0	166,500		

Figure 3

3.4. Crimp Criteria

The terminal or splice must be properly placed in the die assembly to achieve a quality crimp. Placement is described in the instruction sheet for the die assembly.

The crimp applied to the terminal or splice is accomplished in three stages during the crimping cycle: (1) primary, (2) transition, and (3) seal, as shown in Figure 4.

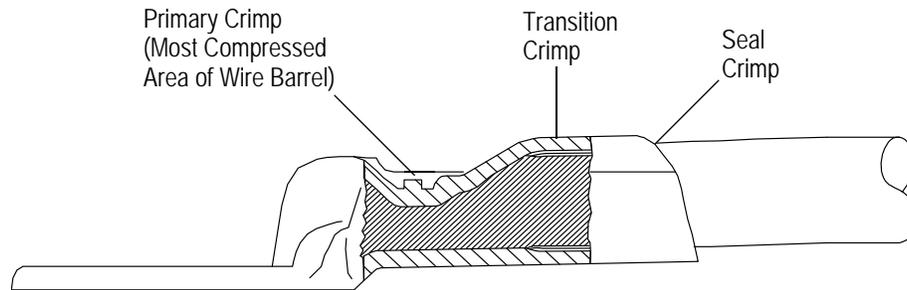


Figure 4

The following information must be used to check that the crimp is properly applied.

A. Crimp Inspection Mark

The crimp inspection mark (created by the die assembly) on the terminal or splice can be used as a visual indicator of an acceptable termination, but it does not indicate that the crimp is not acceptable. If the crimp inspection mark is centered in the crimp area and is evenly and distinctly formed, the crimp is considered properly applied; however, if it is not, and (1) the proper terminal or splice and die combination according to the wire size was used (2) the dies fully bottom during the crimping cycle, and (3) the die assembly conforms to a gage inspection, the crimp can be considered acceptable. Refer to Figure 5.

NOTE

Gage inspection is described in the instruction sheet for the die assembly.



B. Crimp Location

For terminals, the distance between the heel of the terminal and the crimp must be no more than the dimension given in Figure 5.

C. Straightness

The crimped terminal or splice must be within the degree of straightness provided in Figure 5.

D. Crimp Flash

Wire barrel flash that results from the crimping process must not exceed the limits provided in Figure 5.

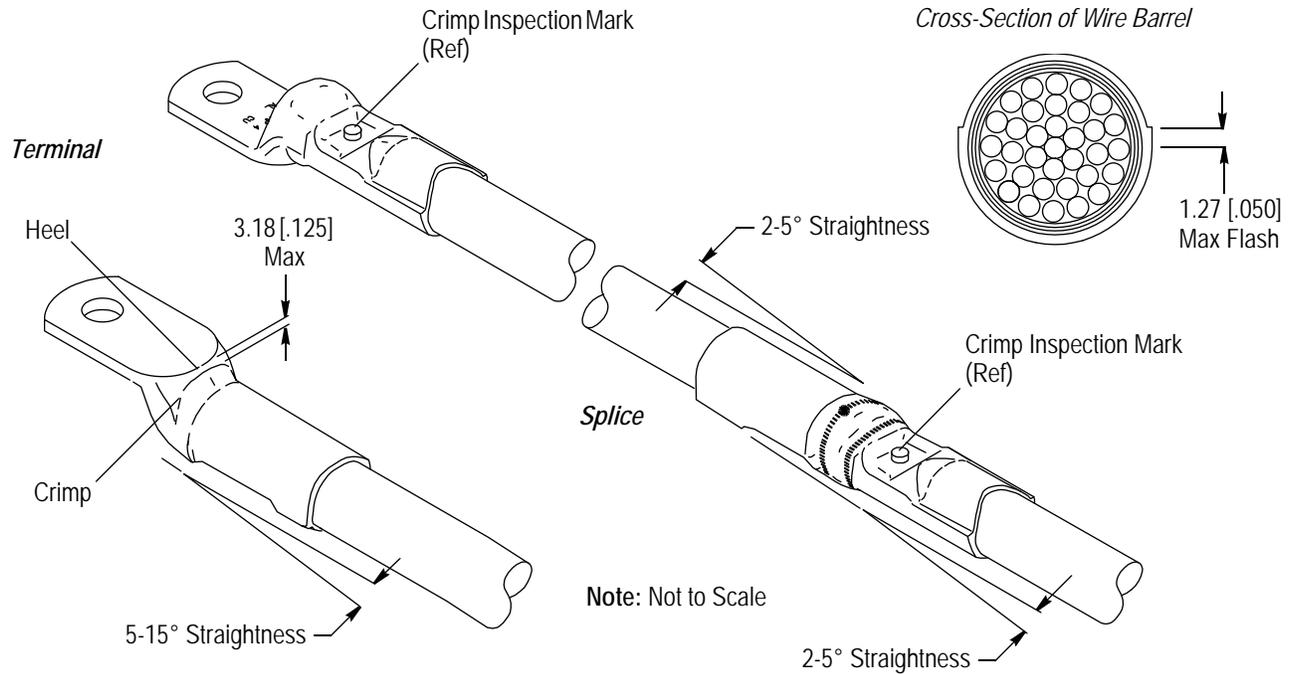


Figure 5

3.5. Strain Relief

A properly inserted wire will have a portion of the insulation inside the wire barrel of the terminal or splice. When the terminal or splice is crimped, the end of the wire barrel will form around the insulation to seal and provide strain relief for the terminated wire.

3.6. Mounting Hardware

The fasteners used to secure the ring tongue terminals must be in accordance with the user's specification.

3.7. Mating and Alignment

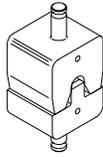
The copper tongue terminals should be mated to copper bus bars. They must not be mated to incompatible, dissimilar metals without appropriate interface treatment.

4. QUALIFICATION

No outside agency qualifying support was defined at the time of publication of this specification.

5. TOOLING

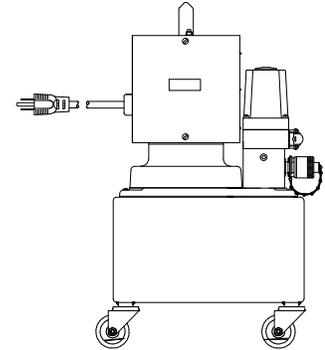
These terminals and splices are designed to be terminated using crimping dies, crimping heads, and hydraulic power units. The die assembly chosen will depend on the wire size and type. The crimping heads can be used for the small wire sizes. The largest wire sizes will require the use of the heavier crimping head. Hydraulic power can be provided by either an electric hydraulic pump or hydraulic pump. See Figure 6.



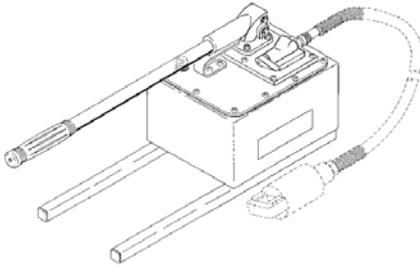
Crimping Die Assemblies for COPALUM Sealed Terminals and Splices (See Table) (408-2281)



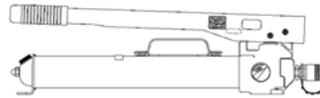
Hydraulic Crimping Heads
69066 (408-2453), 1752787-1 (408-8914),
1752877-1 (408-8956), or 58422-1 (408-9535)



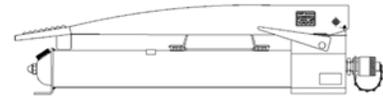
Heavy-Duty Electric Hydraulic Pumps
69120-1 and 69120-2 (409-1950)
1804700-1 and -2 (409-10081)



Hydraulic Hand Pump
314979-1 (409-5860)



Hydraulic Hand Pump 1583661-1
(No Document Available)



Hydraulic Foot Pump 1583659-1
(No Document Available)

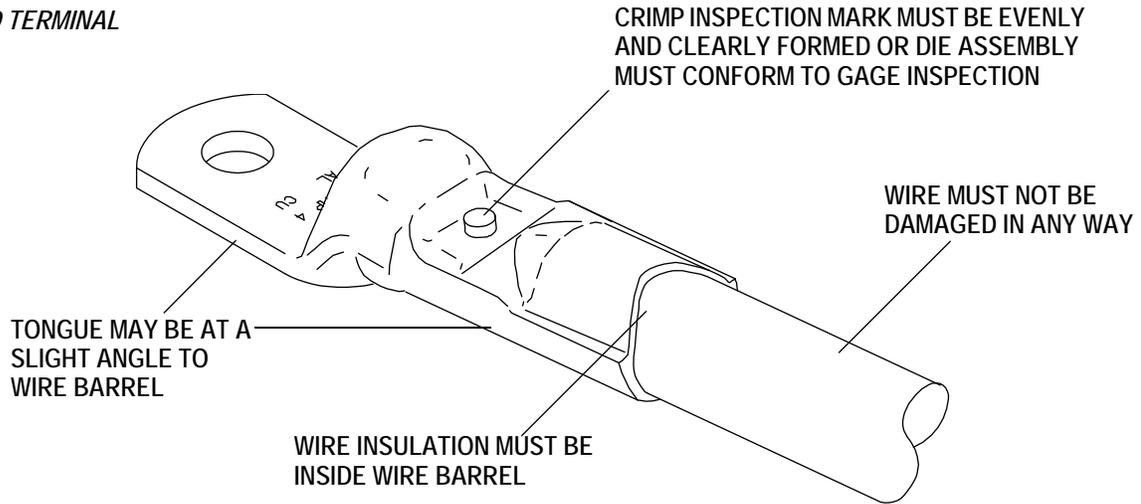
TERMINAL OR SPLICE	WIRE SIZE						TOOLING		
	ALUMINUM			COPPER			DIE ASSEMBLY	HEAD	POWER UNIT
	mm ²	AWG	CMA	mm ²	AWG	CMA			
Terminal and Standard Butt Splice	8.60	8	16,564	4.80	10	9,354	68006	58422-1 69066 1752787-1 1752877-1	1804700-1 1804700-2
	14.60	6	28,280	8.80	8	19,983	68007		
	21.90	4	42,420	13.80	6	26,818	68008		
	35.00	2	67,872	22.00	4	42,615	68009		
	55.50	1/0	107,464	34.30	2	66,500	68010	69120-1 69120-2 314979-1 1583661-1 1583659-1	
	71.30	2/0	138,168	53.90	1/0	104,500	68011-1		
	87.20	3/0	168,872	68.60	2/0	133,000	59877-1		
	110.94	4/0	214,928	85.94	3/0	166,500	314948-1		
Transitional Butt Splice	55.50	1/0	107,464	22.00	4	42,615	68010	58422-1 1752787-1	69120-1 69120-2 314979-1 1583661-1 1583659-1
	21.90	4	42,420	8.80	8	16,983	68008		
	21.90	4	42,420	22.00	4	42,615	68008		
	87.20	3/0	168,872	53.90	1/0	104,500	59877-1		
Nickel-Plated Terminal	71.30	2/0	138,168	—	—	—	1976441-1	58422-1 1752787-1	69120-1 69120-2 314979-1
	87.20	3/0	168,872	—	—	—	1976442-1		
	110.94	4/0	214,928	—	—	—	1976443-1		

Figure 6

6. VISUAL AID

The illustration below shows a typical application of this product. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

CRIMPED TERMINAL



CRIMPED SPLICE

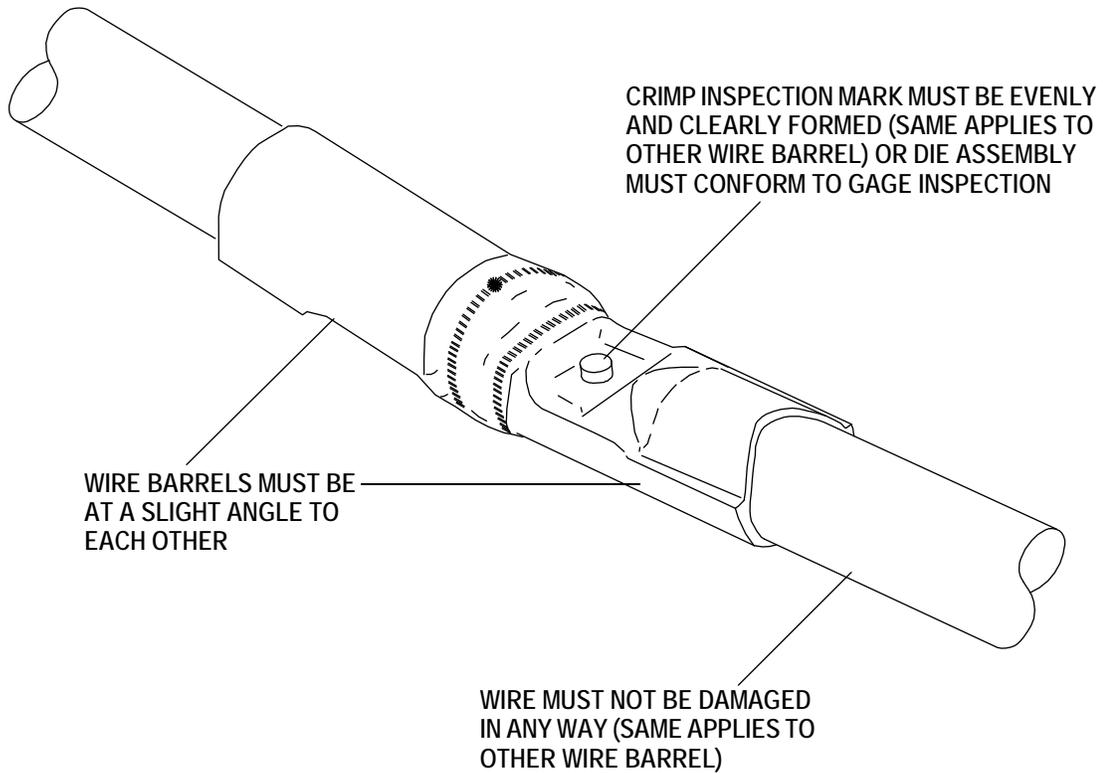


FIGURE 7. VISUAL AID