



**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  $\pm 0.13$  mm [ $\pm .005$  in.] and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not drawn to scale.

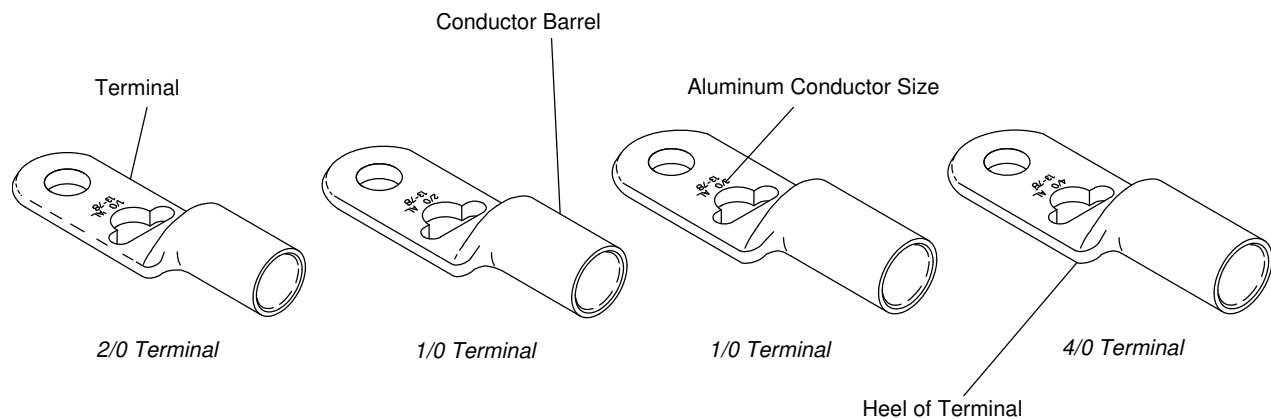
1. INTRODUCTION

This specification covers the requirements for application of COPALUM Sealed Breakaway Terminals designed to terminate fine stranded aluminum (AL) conductors. Each has a barrier that helps locate and seal the conductor barrel, and a lead-in chamfer in the conductor barrel that helps guide the conductor. A perforated insert in the conductor barrel causes a wiping action on the conductor during crimping, removing oxides and forming a solid electrical bond between the conductor and terminal.

There are designs for 110.9 mm<sup>2</sup> [1/0 to 4/0 AWG] aluminum conductors. All 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. COPALUM Sealed Breakaway Terminals are especially suited for the aerospace industry.

Terminals can be used to terminate fine stranded aluminum or conductors (the size of each is marked on the tongue portion).

When corresponding with TE Connectivity 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.



**NOTE:** Different markings on the breakaway terminals indicate which type and wire size they will accept. Breakaway terminals stamped with "1/0 AL" 13-78 are designed for use with 13-78 BMS aluminum wire only.

Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements and changed to new logo

2.2. Customer Assistance

Reference Product Base Part Number 1958110 and Product Code 3015 are representative of COPALUM Sealed Breakaway Terminal. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at [www.te.com](http://www.te.com), or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for each connector 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 by TE.

### 2.4. Specifications

Product Specifications 108-2300 and 108-11011 covers test and performance requirements. Refer to Military Specifications MIL-T-7099 and MIL-W-7072 for aluminum wire (AL), and Military Specification MIL-W-22759E for copper wire (CU).

### 2.5. Instructional Material

The following list includes available instruction sheets (408-series) that provide assembly procedures for product, operation, maintenance and repair of tooling; and customer manuals (409-series) that provide setup, operation, and maintenance of machines.

<u>Document</u>	<u>Document Title</u>
408-2281	Crimping Die Assemblies for COPALUM Sealed Terminals
408-2453	Hydraulic Crimping Head 69066
408-7424	Checking Terminal Crimp Height or Gaging Die Closure
408-8909	Inspection and Servicing of Hydraulic Crimping Heads 1673672-1, 1752787-1, 1752788-1, and 1752877-1
408-8914	Hydraulic Crimping Head 1752787-1
408-8956	Hydraulic Crimping Head 1752877-1
408-9535	Hydraulic Crimping Head 58422-1
408-9684	Crimping Heads 58422-1, 58445-1, 69051, 69065, 69066, 69067, and 69069
409-1950	Hydraulic Power Units 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 terminals.

#### B. Shelf Life

The terminals should remain in the shipping containers until ready for use to prevent deformation. The terminals should be used on a first in, first out basis to avoid storage contamination.

#### C. Chemical Exposure

Do not store terminals near any chemicals listed below as they may cause stress corrosion cracking.

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



#### NOTE

Where the above environmental conditions exist, phosphor-bronze contacts are recommended instead of brass if available.

### 3.2. Safety Limitations

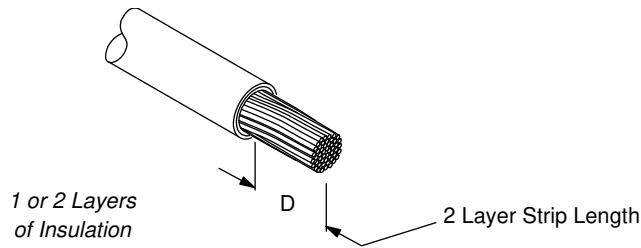


#### DANGER

Do not use larger or smaller wire sizes (aluminum) than those designated.

### 3.3. Special Characteristics

The conductor size and wire type for each ring tongue terminal are marked at the base of the tongue portion as indicated in Figure 1. Terminals marked with “13-78” AL are for 13-78 aluminum wire only. The terminal selected will depend on the size and type of conductor, and the stud size requirements. See Figure 2 for metric, AWG, and circular mil (CMA) area comparisons, and for wire strip lengths.



•See Military Specification MIL-W-7072 for aluminum wire.

PRODUCT DESCRIPTION	ALUMINUM CONDUCTOR			STRIP LENGTH (Insulation Layers)
	mm <sup>2</sup>	AWG*	CMA	1 or 2 (D)
13-78 Terminals	8.60	8	16,564	11.11 [7/16]
	14.60	6	28,280	12.70 [1/2]
	21.90	4	42,420	17.45 [11/16]
	35.00	2	67,872	19.10 [3/4]
	55.50	1/0	107,464	20.57 [.810]
	71.30	2/0	138,168	25.40 [1]
	87.20	3/0	168,872	25.40 [1]
	110.94	4/0	214,928	25.40 [1]

Figure 2

### 3.4. Cable Preparation

The terminal selected will be determined by the conductor type and size being used. The strip length for the conductor will depend on the number of insulation layers covering the conductor. See Figure 3.



**CAUTION**

*Flexing and bend radius requirements must be considered for the conductor material. Aluminum cannot be flexed or bent as frequently or as severely as copper.*

### 3.5. Crimp Criteria

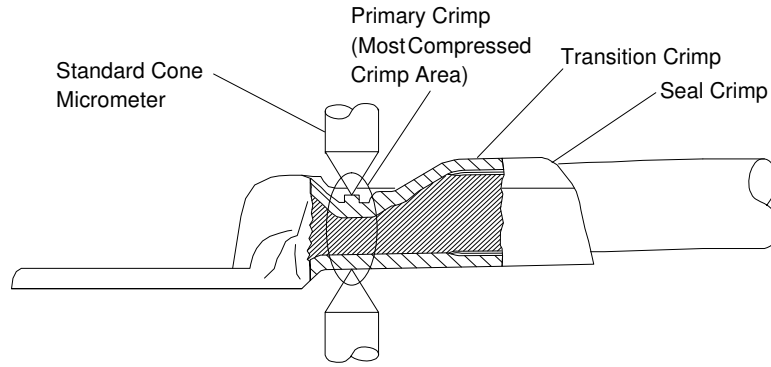
The crimp applied to the terminals is done in three stages during the crimp cycle, as required for aircraft applications: (1) primary, (2) transition, and (3) seal. Use the information provided in Figure 4 to check that the crimp was properly applied.

#### A. Crimp Height

There is a specific crimp height for each conductor size that will ensure optimum bonding between the terminal and conductor. The crimp can be measured with a micrometer over the most compressed area of the crimped conductor barrel. See Figure 3.

#### B. Crimp Inspection Marking

The crimp inspection mark should be in the center of the crimp area and it should be evenly and distinctly formed. See Figure 4.



ALUMINUM CONDUCTOR			PRIMARY CRIMP HEIGHT FOR ALUMINUM AND COPPER	
mm <sup>2</sup>	AWG	CMA	mm	in.
55.50	1/0	107,464	7.57	.298
71.30	2/0	138,168	9.55	.376
87.20	3/0	168,872	9.14	.360
110.94	4/0	214,928	11.18	.440

Figure 3

#### C. Crimp Location

The distance from the heel of the terminal and the beginning of the crimp marking must be within the dimension shown in Figure 4.

#### D. Straightness

The crimped terminal must be within the degree of straightness provided in Figure 4.

#### E. Crimp Flash

Wire barrel flash that results from the crimping process must not exceed the limits provided in Figure 4.

#### F. Pull-Test Value

The crimp should hold the conductor firmly and have a pull-test tensile strength value (over bare insulation - no tape, shrink tubing, etc.) meeting Product Specification 108-11011.

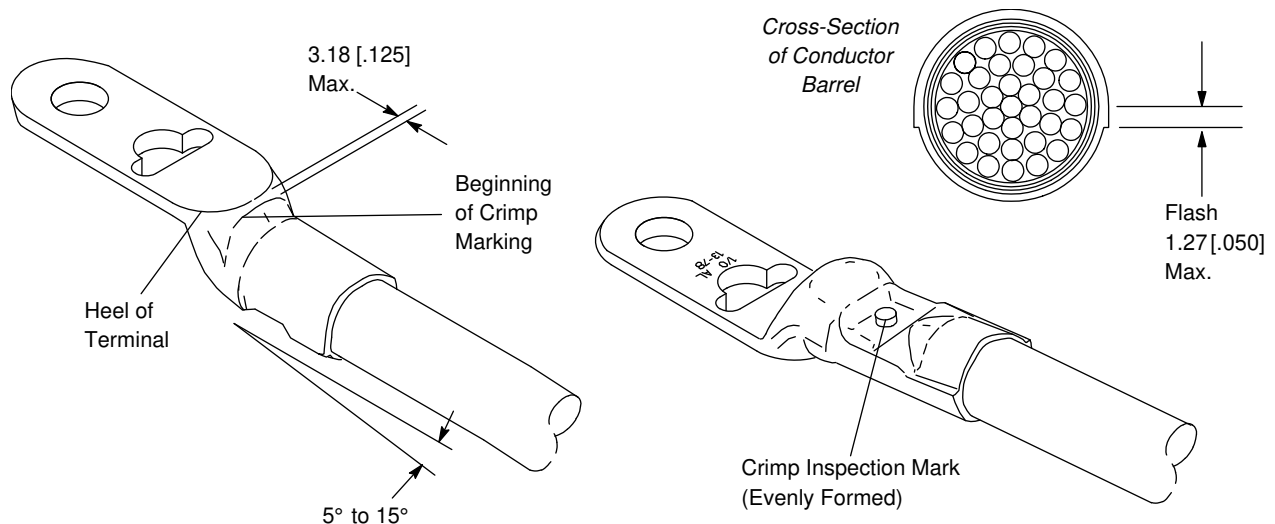


Figure 4

### 3.6. Strain Relief

A wire that is properly inserted into the wire barrel will have a portion of the insulation inside the terminal. When the crimp is made on the conductor, the end of the barrel will form around the insulation to seal and provide strain relief for the terminated conductor.

### 3.7. Mounting Hardware

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

### 3.8. 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.

### 3.9. Use of Ancillary Items

Tape, shrink tubing, or silicone gel-type sealant may be used to hold insulation layers in place when stripping multi-layered cable.



**CAUTION**

*The use of any of these items may lessen the tensile strength on the terminated product on the insulation of the wire.*

## 4. QUALIFICATIONS

COPALUM Sealed Breakaway Terminals are qualified to the specifications in Paragraph 2.4.

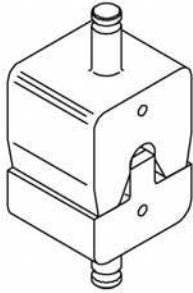
## 5. TOOLING

The COPALUM Sealed Breakaway Terminals are designed to be terminated with precision die sets, crimping heads, and hydraulic power units. The die set to use will depend on the conductor material and size to be terminated. Both crimping heads can be used for the smaller conductor sizes. The largest conductor sizes will require the use of the heavier head. Hydraulic power can be provided by either the Electric/Hydraulic Power Unit or the Hydraulic Foot Pump. See Figure 5.

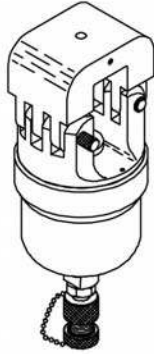
PRODUCT DESCRIPTION	ALUMINUM CONDUCTOR			CRIMPING TOOL COMPONENTS		
	mm <sup>2</sup>	AWG	CMA	DIE SETS	HEADS	POWER UNITS
Breakaway Terminals	55.50	1/0	107,464	68010-1	58422-1 69066 1752787-1 1752877-1	1804700-1 1804700-2
	71.30	2/0	138,168	68011-1	58422-1‡ 1752787-1	69120-1 69120-2
	87.20	3/0	168,872	59877-1		314979-1
	110.94	4/0	214,928	314948-1		1583661-1 1583659-1

‡For aluminum conductor range of 2/0 through 4/0.

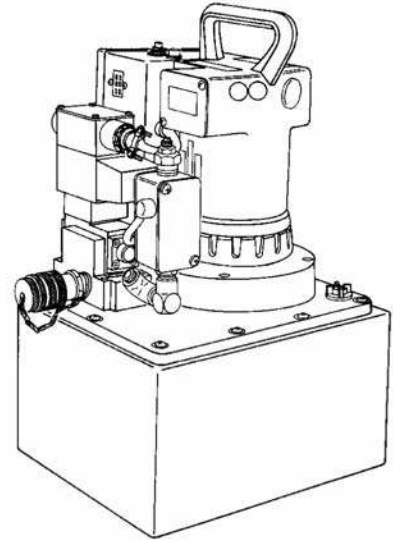
Figure 5 (Cont'd)



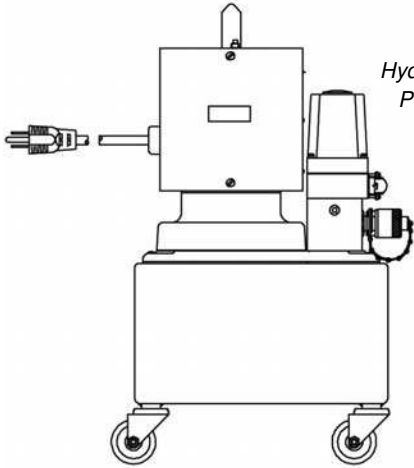
Typical Die Set  
(408-2281)



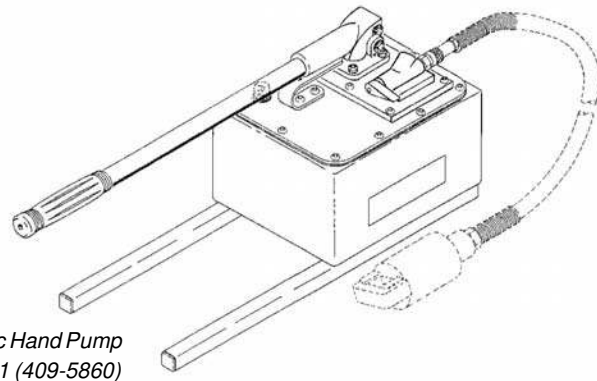
Typical  
Crimping Head



Electric/Hydraulic  
Power Unit 69120-1, -2  
(409-1950)

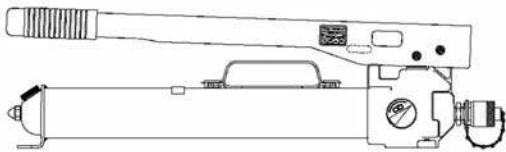


Hydraulic Heavy Duty  
Pump 1804700-[ ]  
(409-10081)



Hydraulic Hand Pump  
314979-1 (409-5860)

Hydraulic Hand Pump  
1583661-1



Hydraulic Foot Pump  
1583659-1

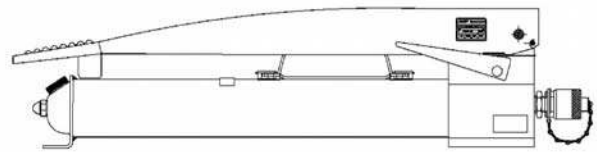
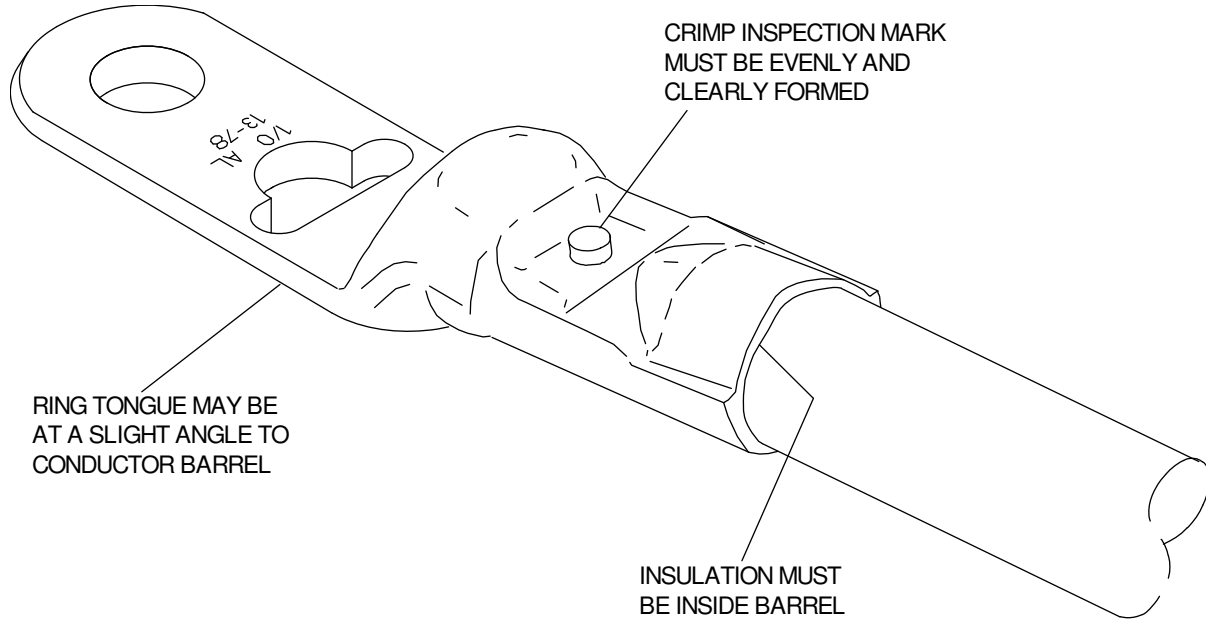


Figure 5 (End)

## 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.



**FIGURE 6. VISUAL AID**