

**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 [$\pm .005$] 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 AMPLIVAR* 2D Crimp Open Barrel Pigtail and Thru Splice with 2D crimp feature for copper and/or aluminum magnet wire splicing applications which may or may not include stranded or solid lead wires. These splice terminals feature a wire barrel which, when crimped, wraps around and terminates all the wires together. The wire barrel forms the 2D crimp which provides reliable electrical and mechanical performance. The wire barrel also features AMPLIVAR* serrations which eliminate the need to pre-strip the enamel coating from the magnet wire and help grip and retain the wire within the barrel after crimping.

Amplivar* 2D Crimp Pigtail splices will accept combinations of 27 – 14 AWG copper and/or aluminum magnet wire with the option to include 26 – 14 AWG stranded or solid lead wire. Amplivar* 2D Crimp Thru splices will only accept combinations of copper magnet wire with the option to include stranded or solid copper lead wire. Applications on aluminum magnet wire are not allowed. Total combined circular mil area (CMA) of wires must fall within a range of 600 to 7000 CMA. All are designed to be crimped with precision dies and various power assist units provided by TE Connectivity only.

Applications where total CMA falls between 600-1699 CMA will require inclusion of a short piece of 18 AWG stranded wire into the wire barrel via an automatic wire stuffer device supplied by TE. This builds the total CMA beyond a minimum of 1700 CMA required for accurate Crimp Quality Monitoring (CQM) to assure presence of all wires in the terminations. Applications where CMAs fall between 1700-7000 CMA will not require inclusion of the 18 AWG stuffer wire.

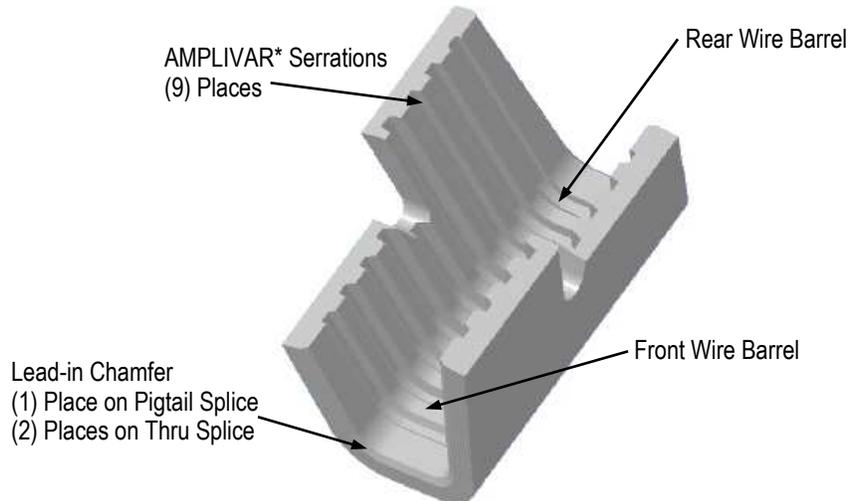


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

This paragraph is reserved for a revision summary of the most recent additions and changes made to this specification which include the following:

- Initial release of specification

2.2. Customer Assistance

Reference product base part number 2238235 and 2238236, and product code 1040 are representative of AMPLIVAR* 2D Crimp Open Barrel Pigtail and Thru Splice terminals. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting www.te.com or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority.

- [2238235](#) Customer Drawing – Splice, Pigtail, AMPLIVAR*, 9 Serration, 2D Crimp Feature
- [2238236](#) Customer Drawing – Splice, Thru, AMPLIVAR*, 9 Serration, 2D Crimp Feature

2.4. Product Specification

Product Specification [108-143147](#) provides product performance and test results.

2.5. 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. Instructional material that pertain to this product are:

- [408-8059](#) Suggested Preventative Maintenance Schedule for Applicators
- [408-9816](#) Handling Reeled Product
- [408-35030](#) 2D Terminal Crimp Measurement Fixture, PN 2844999-1
- [409-5842](#) AMP-O-LECTRIC Model “G” Terminating Machine 354500-[]
- [409-32022](#) AMPLIVAR Product Terminators APT-5A and APT-5E (All Models)
- [409-32035](#) AMP-O-LECTRIC Model G II and G II+ Terminators

3. REQUIREMENTS

3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

3.2. Storage

A. Ultraviolet Light

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

B. Shelf Life

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

C. Reeled Splices

Care must be taken to prevent twisting, bending, or other distortion that would prevent smooth feeding of the reeled product through automatic machine feed mechanisms. Store coil wound reels horizontally and traverse wound reels vertically. Review reel tag data to determine if breaks in the strip are present within the reel.

D. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

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



NOTE

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

3.3. Wire Size and Preparation

AMPLIVAR* 2D Crimp Open Barrel Pigtail and Thru Splices accept magnet wire (3 magnet wires max) and stranded or solid copper lead wire of various sizes and combinations. Lead wire strip length, as shown in Figure 2, shall be 1.14 – 2.16 [.045 – .085] longer than the splice or as needed to ensure that all conductors are laced completely through the splice without any insulation extending into the crimp area. **Magnet wire leads do not require pre-stripping of the insulation film.**



CAUTION

Reasonable care must be taken not to nick, scrape, or cut any strands during the stripping operation. All magnet wires must lay side-by-side in the bottom of the splice. Other wire, splice, and crimp parameters must be considered as specified in the General Application Guidelines listed in TE product catalog 82221, magnet wire terminals and termination systems.



NOTE

Do not twist multiple wires together prior to crimping.

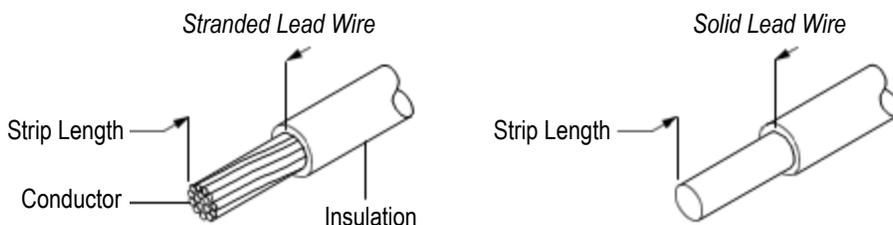


Figure 2

3.4. Crimped Splice Requirements

Figure 3 illustrates the crimp features required for typical pigtail and thru type splices after termination.

A. Wire Barrel Crimp

The crimp applied to the wire barrel portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The crimp must be centered on the closed wire barrel. The crimp must result in a 2D crimp. Voids between the two halves of the wire barrel crimp are acceptable. See Figure 3.

Optimum electrical and mechanical performance is achieved by reducing the cross-sectional area of the wires and splice by a predetermined percentage. Crimp width is fixed in the application tooling. Crimp height must be set and maintained as determined from the crimp height formula provided on the splice Customer Drawing. See Figure 3.

B. Crimp Bellmouths

Crimp bellmouths shall conform to the dimensions given in Figure 3. Crimp bellmouths contribute to crimp effectiveness and reduce the risk of nicked and/or broken conductor strands due to sharp material edges at the ends of the splice.

C. Cutoff Tabs

Cutoff tabs shall not exceed the dimension shown in Detail A, Figure 3.

D. Cutoff Burrs

Cutoff burrs shall not exceed the dimension shown in Detail A, Figure 3.

E. Wire Barrel Flash

Wire barrel flash, which can be caused by incorrect set up and/or worn and broken crimp tooling, shall not exceed the dimension shown in Section B-B, Figure 3.

F. Conductor Extension

Conductors must extend completely through the splice. Excess magnet wire and lead wire strands will be trimmed off by the application equipment as shown in Figure 3.

G. Splice Seam

The splice seam must be closed with no evidence of loose wire strands visible in the seam as shown in Figure 3. Single wire strand exposure may occur in seam beyond effective crimp length. See Figure 3.

H. Tensile Strength

Crimp quality shall be judged solely on proper crimp width, crimp height, and conformance to the requirements shown in Figure 3.



NOTE

When crimped as specified, crimp tensile strength will be approximately 70% of the tensile strength of the smallest wire in the splice.

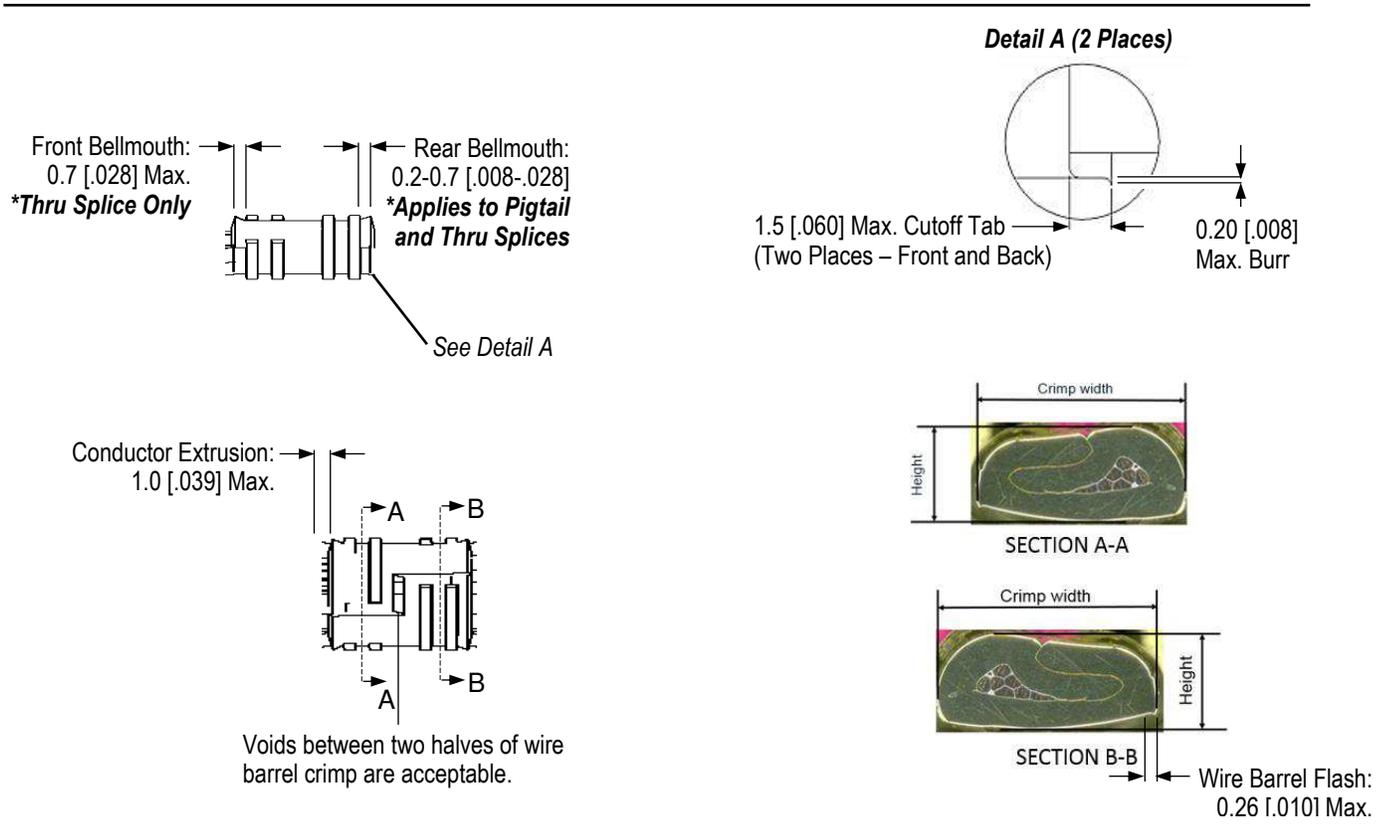


Figure 3

3.5. Inspecting

Due to the asymmetric shape of the 2D crimp, use of a micrometer with a measurement tool anvil assembly is highly recommended for accurate crimp height measurements. The measurement tool anvil assembly part (P/N 2844999-1) is available for order; this is a crimp micrometer adapter and does not include the digital crimp micrometer or mounting vise. It is highly recommended that the micrometer be placed in a fixturing vise for ease of use and accurate readings. See Figure 4. See

Crimp height may be measured across Section A-A or Section B-B (see Figure 3). The wire barrel crimp geometry should produce the same crimp height across both Section A-A and Section B-B; unequal crimp height may indicate damage to the crimper tooling. This verification of both Section A-A and Section B-B (Figure 3) should be conducted periodically to confirm that tooling is not damaged. Crimped terminals must meet the tensile strength requirements listed in Product Specification [108-143147](#).

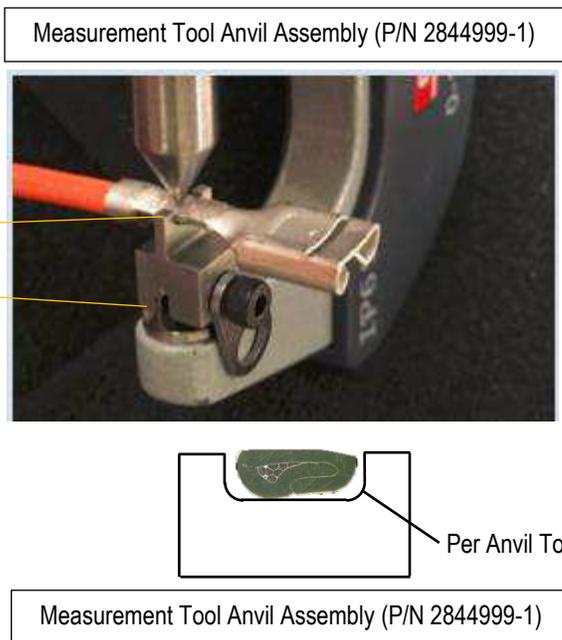


Figure 4

3.6. Splice Repair

If a splice is not crimped correctly or it has been damaged, it cannot be repaired or re-terminated. It must be cut from the wires and replaced with a new splice.

4. QUALIFICATION

Due to numerous wire sizes and combinations, Underwriters Laboratories Inc. (UL) and CSA International will not grant blanket approval for splice part numbers. Customers must submit their end product to these agencies for application evaluation.

5. TOOLING

This section provides a selection of tools for various application requirements. They include semi-automatic and automatic machines for power-assisted application of strip form contacts. Modified designs and additional tooling concepts may be available to meet other application requirements. See Figure 5.



NOTE

TE Connectivity's (TE) tool engineers have designed machines for a variety of application requirements. For assistance in setting up prototype and production line equipment or questions about tooling, contact TE tool engineering through your local TE representative or call the product information number at the bottom of page 1.

5.1. Applicator

Applicators are designed for the full wire size range of strip-fed, precision formed contacts, and provide for high volume, heavy duty, production requirements. The applicators can be used in bench or floor model power units.

5.2. Power Units

A power unit is an automatic or semi-automatic device used to assist in the application of a product. Power unit includes the power source used to supply the force or power to an applicator.

5.3. Bench Machines

A bench machine is a dedicated unit that applies a specific, strip-fed, formed contact. Bench machines incorporate the aspects of the applicator and power unit in a single machine and often provide advantages such as reduced footprint, excess wire trim, and ease of use when compared to applicator/power unit combinations. While it is possible to convert a bench machine to run various terminals, it is not practical in a high-volume production environment because the tooling is incorporated into the machine and requires a skilled technician to perform the conversion and subsequent set-up.

A separate model of the APT-5 machine is available to perform multiple bussed terminations. An “add-on” conversion kit is also available to upgrade existing APT-5 machines to the multiple bussed termination model.



Typical OCEAN
Applicator



AMP 5K Terminating Machine
 2161700-[] CE Machine (409-10204)
 2161300-[] CE Thru Splice Machine
 1725900-[] Non-CE Machine (409-32034)



AMPLIVAR* Product Terminator APT-5 Bench
Machine
 2161800-[] APT-5A
 2161900-[] APT-5E
 2161850-[] APT-5A DIRECT CONNECT
 2161950-[] APT-5E DIRECT CONNECT
 2217600-[] APT-5A HIGH FORCE
 2217700-[] APT-5E HIGH FORCE
 2326135-[] APT-5A MULTIPLE BUSSED
TERMINATION
 2326145-[] APT-5E MULTIPLE BUSSED
TERMINATION



AMP-O-ELECTRIC Model G II and G II+ Terminating
Machine
 2217000-[] Model G II Machine (409-10204)
 2844800-[] Model G II+ Machine (409-32034)

Figure 5

6. VISUAL AID

Figure 6 shows a typical application of an AMPLIVAR* 2D Crimp Open-Barrel Pigtail and Thru Splice Terminals. 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