

# BOTTOMING DIES

## A GUARANTEE OF PROPER CRIMP FORCE

### Introduction

Design, maintenance, and certification of crimp tooling are all essential elements in crimping production. Long-term consistency depends on these elements to confirm that proper crimp force is applied to the terminal, resulting in the specified tensile strength, mechanical stability, and electrical conductivity.

### Bottoming Dies and Handle Pressure - Keys to effective Crimping

Before being able to discuss the importance of crimp repeatability, it is critical to understand basic crimp theory. Engineers at AMP Incorporated (acquired by Tyco Electronics in 1999, now TE Connectivity) originally developed basic crimp theory and technology as we know it today.

The principal parameters for crimping are based on a terminal's stock thickness and the Circular Mil Area (cross sectional area) of the wire to be crimped. The compression and reduction of the cross sectional area (wire and terminal), when correctly calculated, will provide an optimum combination of tensile strength, mechanical stability, and electrical conductivity.

As long as a consistent "window" of compression is attained, a similarly consistent, repeatable level of performance can be predicted for the products being crimped. For this reason, the repeatability of the tooling being used is critical.

### Ensuring Consistent Crimp Results

The first critical component in ensuring consistency involves the crimp itself. Generally, two methods are utilized for verification of the crimp areas—by measuring the crimp or by gauging the tooling.

In the case of open barrel terminals, the method of verification is to measure the wire barrel of the crimped terminals (i.e., terminal crimp height), using a micrometer with suitably modified jaws. The method for closed barrel (insulated or uninsulated) or coaxial products utilizes gauges to check the crimp tool itself. The second critical requirement is the ability of the tool to consistently repeat the crimp profile. Hand tools must be capable of consistently repeating the cross sectional reduction of the wire and terminal.

The tool design and maintenance are both components of this consistency. Crimp performance is standardized in the tool by relating the crimp configuration to a fixed point (setting) of tool operation.

### Tool Considerations

To confirm the repeatability of a crimp configuration, the standardized fixed point are the bottoming surfaces of the wire crimp components of the tool. It is necessary that the tool's wire crimp components bottom, or close, within 0.025 mm [0.001 in]. Handle force is a key factor



to confirm that any specific combination of hand tool, terminal, and wire can be crimped. This requires considering the force required to achieve optimum compression over the entire range of terminals and wire applicable to a given tool. The wire crimp jaws will be calibrated to bottom at the maximum crimp force requirement for each specific tool.

**CERTI-CRIMP hand tools are set to the desired handle force for the tightest conformance with specifications. This is done at the factory and is not user-adjustable.**

### Ensuring Consistent Crimp Results

TE CERTI-CRIMP premium hand tools are set to a specific handle force at our factory, based on bottoming the dies at their maximum terminal and wire requirements. All CERTI-CRIMP tools include a Certificate of Certification without charge to the customer. This documents that the tool was certified at our plant on a given date. This allows the customer to track and predict requirements for future verification of tool performance.

The high crimping precision of CERTI-CRIMP tools is further enhanced with a ratchet which aids the operator by ensuring that the die bottoms before the tool can be opened. This ratchet mechanism, however, is an aid to operation and subsidiary in terms of crimp force to the actual tool and die design. In fact, with extended use, wear and friction throughout the tool mechanism can change the tool performance, calling for factory adjustment and recertification to ensure proper operation.

When specifications call for use of TE terminals, the repeatable handle pressure and bottoming dies of the CERTI-CRIMP tool ensure a repeatable crimp.

## Maintaining Consistent Crimp Performance

Proper crimp tooling design, based on bottoming dies, is essential to consistent crimping that meets specifications. A ratchet system helps the operator use the tool according to the terminal designer's intent. Regular maintenance and certification, on a cycle based on actual usage, ensure that the process continues to produce the crimp quality demanded in today's market.

**Hand Tool Certification**

The application tool listed below has been inspected to meet the certification requirements of the total tolerance zone for crimp and 70% of the tolerance zone for handle pressure requirements in accordance with Tyco Electronics specifications. The gage masters used to certify this application tooling are traceable to the National Institute of Standards and Technology.

Regular maintenance and inspection cycles should be established and followed as described in the instruction material supplied with this tooling. The recommended certification cycle is 6 months or 5,000 cycles, whichever comes first.\*

Tyco Electronics offers no warranties, expressed or implied, concerning the future performance of this tooling. Tyco Electronics responsibilities due to any inaccuracies shall in no event nor for any cause whatsoever exceed the purchase price of this certification.

91500-1 NEW TOOL  RECERTIFICATION

Part Number/Description: \_\_\_\_\_ Serial Number: \_\_\_\_\_ Instruction Sheet: 408-4168  
 Visual Inspection per TE Spec 102-1536: Passed Certification Date: 5/12/2012 Next Recommended Certification Date\*: \_\_\_\_\_

Handle Force (lbs)				Crimp Height				Gage Pins Used					
MIN	MAX	As Rec'd	After Calib.	Nest	MIN	MAX	As Rec'd	After Calib.	Nest	GO	NO-GO	As Rec'd	After Calib.
40	47	NA	45	10/18	.048	.052	NA	.049	NA	NA	NA	NA	NA

Add'l Equip Used: \_\_\_\_\_  
 Certified by: \_\_\_\_\_ Date Issued: \_\_\_\_\_  
 Customer: \_\_\_\_\_ Acct. # \_\_\_\_\_  
 Address: \_\_\_\_\_

**TE Connectivity**  
 Tooling Service Center  
 627 N. Grant Street • Weyershoe, PA 17268  
 Phone: 717-765-3607 • Fax: 717-810-2862  
 tooling@te.com • tooling.te.com

ISO 9001 Certified • Member National Conference of Standards Laboratories  
 \* Customer quality procedures may dictate a different certification interval.

CERTI-CRIMP tools are furnished with documentation of the critical crimp area dimensions and the handle pressure setting, reported on a Certificate of Certification.

# TE FIELD SERVICE

## SERVICES

### Standard Service

- Includes troubleshooting and making repairs

### Equipment Installation

- Providing installation, set-up and training at time of equipment delivery

### Training

- Basic Crimp Theory
- Hand tool, applicator and equipment set-up, operation and maintenance

## VALUE-ADDED SERVICES

### Preventive Maintenance and/or Inspection Certification

- Provides service for periodic visits to perform Preventive Maintenance and/or Inspection Certification Service on hand tools, applicators and bench equipment. Inspection of the finished product is made to confirm it meets TE application specifications. Documentation is available upon request for traceability to support your facilities' quality system requirements.

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- Board processing equipment: 888-782-3349 or 610-893-9680  
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- Web: [www.te.com/fieldservice](http://www.te.com/fieldservice)

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