

*Design, maintenance, and calibration of crimp tooling are all essential elements in crimping production. Long-term consistency depends on these elements to ensure that the 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) 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

It has long been the position of Tyco Electronics that for a user to ensure the repeatability of a crimp configuration, the fixed point should be the bottoming surface of the wire crimp components in the tool. Therefore, it is necessary for the tool's wire crimp jaws to bottom within 0.025 mm [0.001 in].

Handle force is key factor that ensures that any particular combination of hand tool, crimp die, terminal, and wire can be crimped. This requires taking into account the crimp force requirement of the terminal, the mechanical advantage of the tool's linkage, friction, and the additional handle force required to make sure that, in combination with the maximum crimp force requirement, the wire crimp jaws will bottom.



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

Tyco Electronics' CERTI-CRIMP premium hand tools are set to specific handle pressures at our factory, based on bottoming the dies with maximum wire and product. All CERTI-CRIMP tools include documentation of the critical crimp area dimensions and the handle pressure setting on a Certificate of Calibration, included with each tool without charge to the customer. This enables 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 recalibration to ensure proper operation.

When specifications call for use of Tyco Electronics 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 calibration, on a cycle based on actual usage, ensure that the process continues to produce the crimp quality required demanded in today's market.

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### Certificate of Calibration

The application and condition has been reported to meet the critical requirements of the manufacturer. For this and 75% of the balance of 100,000 units, the handle pressure requirement is as stated with Tyco Electronics Corporation specifications. The application and condition has been reported to meet the National Institute of Standards and Technology.

Repeat measurement and inspection cycles based on routine and defined as described in the routine manual supplied with the tool. The measurement calibration cycle is 4 weeks or 1000 cycles, whichever comes first.

Tyco Electronics Corporation offers no warranty, expressed or implied, concerning the final performance of this tooling. Tyco Electronics Corporation's responsibility does not extend to any use other than for any cause whatsoever and the purchase price of this calibration.

Part Number: 4800 (8/00) Quantity: 1000 Date: 10-22-04

Part Name: 4800 (8/00) Quantity: 1000 Date: 10-22-04

Next Recommended Calibration Date: 12-22-04

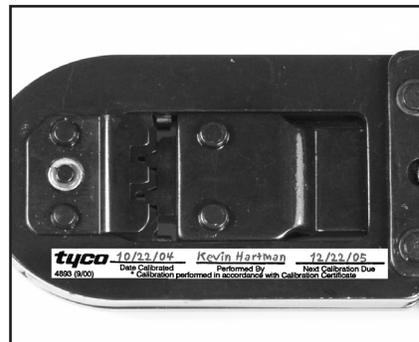
Crimp Force (lbs)				Crimp Height (mm)			
Min	Max	Avg	Std Dev	Min	Max	Avg	Std Dev
40	47	NA	45	20.11	24.8	22.4	0.200
46.14	56.1	50.5	NA	20.2	24.8	22.4	0.200

Customer: Army Center Date Issued: 10-22-04

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



A label conveniently located on the crimp head, which moves with the head from tool to tool, lets the operator see when calibration or inspection is due.