

## **1. Scope**

This assembly guide covers the recommended installation methods for Tinel-Lock braid termination rings. The performance of the system, as detailed in the specification, will be achieved only by using the recommended parts and methods.

## **2. Applicable Documents**

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified.

### **TE Customer Drawings**

- TR – Tinel-Lock Ring Customer Drawing (CD)
- MSG-101 – Tinel Lock Ring Selection Guide
- A-A-59569 Braid, Wire (Copper, Tin-Coated, Silver-Coated, or Nickel Coated, Tubular or Flat)

## **3. SAFETY PRECAUTIONS**

All personnel performing the procedures outlined in this document should have the following safety protection equipment.

- Provide Eye Protection and other personal protection equipment (PPE) as required.
- Provide High Temperature Safety Equipment as required.

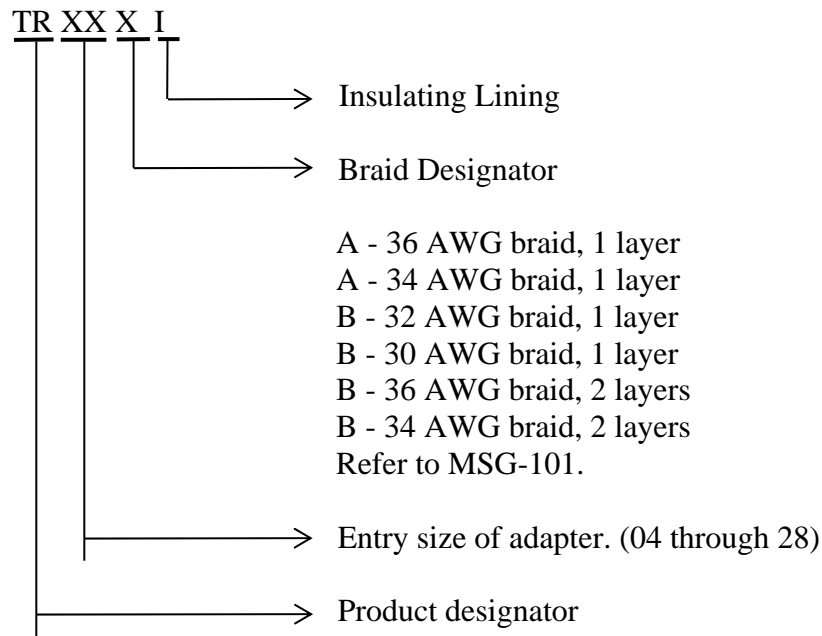
### **Storage Temperature**

Prior to installation, Tinel-Lock Rings have an upper temperature limit of 50 degrees C (122 degrees F). They must be stored out of direct sunlight. Take precautions in storage and handling to prevent such high temperature exposure.

#### 4. Part Description

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified.

Parts will be identified by a combination of digits and letters as follows:



#### 5. Preparation

##### 5.1 Ring Selection

Ensure that the rings are of the appropriate part number for the adapter entry size and braid type to be terminated. The Tinel-Lock Selection Guide, TE Connectivity document MSG-101, defines the combinations of entry sizes, braid types and rings that can be used together.

##### 5.2 Prior to Pinning the Connector

The connector, Tinel Ring, adapter and if necessary, the boot must be positioned on the harness. The braid should be folded back or “convoluted” to provide access to the rear of the connector.

### 5.3 After Pinning the Connector

Install the adapter (see Figure 1). In most shielded harnesses, to ensure adequate electrical properties, a specified torque will be used to mate the two components. Check your system specification for these values. A sealing compound may be required on the threads. Check the drawings for this requirement.

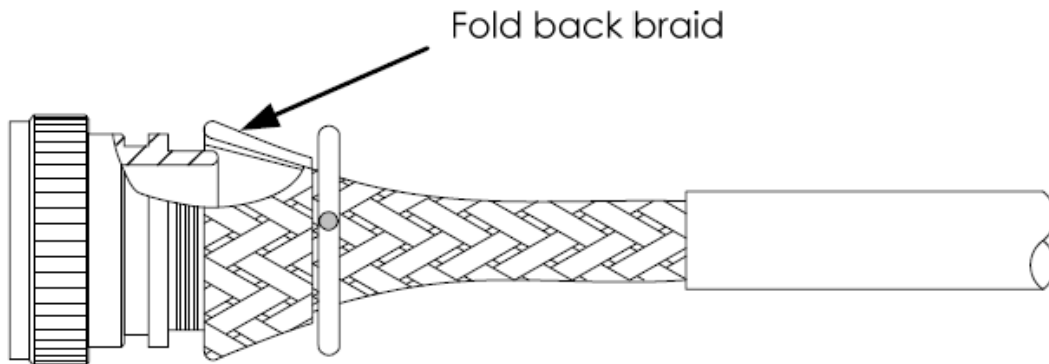


Figure 1

### 5.4 Braid

The braid should now be brought forward over the adapter and smoothed out where necessary, to make it reasonably uniform free from folds. Folding or creasing should be kept to a minimum as the quality of the termination at high frequencies will be related to the amount of “windowing” in the braid. Braids manufactured to Federal AA59569 are recommended as they withstand manipulation without losing their constructional integrity.

The braid must remain braided around the termination area. It must not be “combed out” into parallel strands because this reduces the diameter build-up of the braid beneath the ring, degrading the performance of the joint. To ensure this, it is best to have a little extra length in the braid that will either be trimmed or folded back later.

## 5.5 Ring Placement

Push the shield forward until it fully covers the Tinel-Lock profile and bottoms on the shoulder provided. Slide the Tinel-Lock ring along the shield and up onto the profile, stopping short of the shoulder provided and ensuring that it is perpendicular to the axis of the adapter. See Figure 2 and 3. Tinel rings may be eased into place in a rocking or walking motion. This helps nest the strands of shield neatly, do not use a brute force straight push. Slide the ring up over the braid onto the adapter. It should be positioned as detailed in Figures 2 and 3. Feel for the end shoulder of the adapter under the braid to ensure that the ring is away from the edge of the adapter.



Figure 2

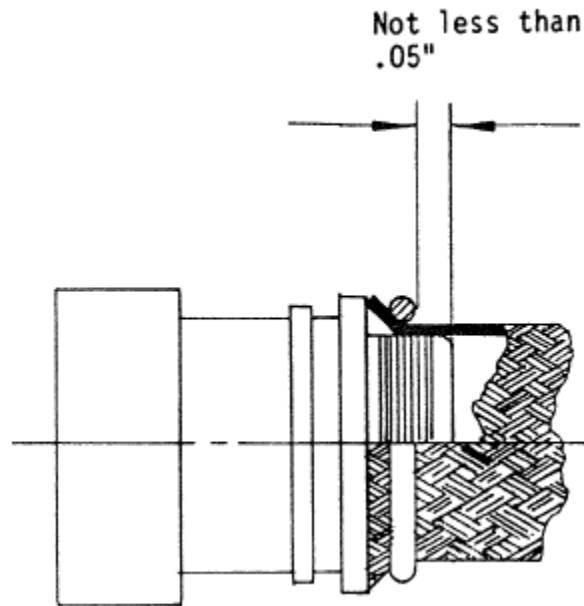


Figure 3

## 6.0 Ring Recovery

The ring is recovered by heating until the two patches of thermochromic paint on the ring change from green to black. This takes place when the ring reaches 165 degrees C. There are two practical ways of doing this – with a resistance heater or with a hot air gun. The resistance heater method is preferred, since it is fast and confines heating to the immediate vicinity of the ring. Heating times with a hot air gun are typically longer.

### 6.1.0 Ring Recovery - Resistance Heating Method

The recommended resistance heating system consists of the Raychem Tinel-Lock handpiece, a foot switch and a resistance soldering transformer.

Tinel Installation Tool Kit: RH-3960-1-TINEL-KIT-120V

Recommended Spares:

Hand Tool Assembly: AD-5000-TINEL-HAND-TOOL

### **6.1.1 Choosing the Right Transformer for your Application.**

The 250W Transformer (Figure 4) works for Tinel-Lock Rings TR28XX and smaller and all TCXXX rings using one voltage setting.

The transformers specified above are those recommended for this procedure. If another transformer is to be used, ensure that it meets the following requirements:

- A. The power output is 250W.
- B. The open circuit voltage can be varied between 1.5V and 3.5V.
- C. The power can be adjusted to produce heating times faster heating times which is measured by the thermochromic indicator color.

### **6.1.2 Setting the Transformer**

The key to proper heating is to set the transformer so that the patches of paint on the ring change color. When the voltage is too high, the ring recovers quicker and the heating is difficult to control. When the voltage is too low, the ring will take longer to recover; this wastes time and leads to greater hearing of other components.

To achieve the appropriate heating time using the transformers specified in Section 4.2.1 the voltage settings in Table 1 are recommended.

If a transformer other than either of those specified in Section 4.2.1 is used, make certain the power output is 250W. To find the proper voltage setting for a given ring size, start with low output, for example 1.5V. If the thermochromic paint does not change color after 10 seconds of heating, try again using a higher voltage. Do not increase the voltage by more than 0.25V between successive attempts.

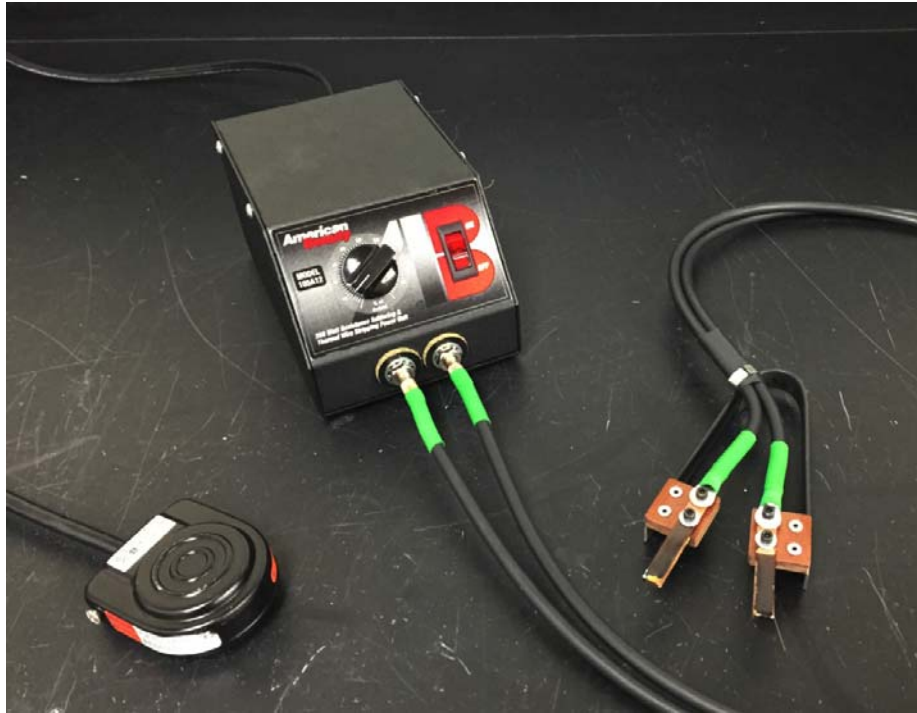


Figure 4

Table 1. Recommended Transformers and Transformer Settings for the Resistance Heating Method.

<u>Ring Size</u>	<u>Transformer Setting</u>
	American Beauty 250 W Transformer <u>Model 105-A12</u>
TCXXXI	100%
TR04XI-TR14XI	100%
TR16XI-TR20XI	100%
TR22XI, and up	(Not Recommended)

### 6.1.3 Heating The Ring

With the transformer at the appropriate setting, clamp the ring between the jaws of the tool (see Figure 5), making sure that at least one of the patches of thermochromic paint is visible. Never attempt heating with the tool touching the paint. The jaws should only come in contact with the ring. If the sides of the jaws are pushed up against the braid on the connector side of the ring, an undesirable short circuit can result.

Switch on the transformer, and when ready, depress the foot switch. The ring will start heating immediately. As soon as the paint turns black, release the foot switch. The ring is now recovered. Heating beyond the “change” point is unnecessary and could be detrimental to the termination.

**WARNING:** Discontinue heating immediately if the ring begins to glow; this is an indication of gross overheating. Failure to discontinue heating may result in localized melting of the ring and the splattering of molten material.

**CAUTION:** The ring, tool jaws and possibly other parts of the harness will be hot after the recovery process. Allow them to cool before handling. Insulated gloves may be required depending on your conditions.

For Tinel Lock Ring sizes 22 and up, heat the ring using the tip of the resistance heating tool at approximately 90 degrees with the thermochromic ink located about at the center of jaw tips. Heat until the ink changes color. Repeat at the other thermochromic ink.

If the thermochromic indicators have not changed color, turn off the transformer and check that the setting is appropriate for the ring size you are using. Verify that the hand piece leads are firmly engaged in the transformer. Also examine the ring and jaws to ensure that all surfaces are clean. Repeat the heating process.



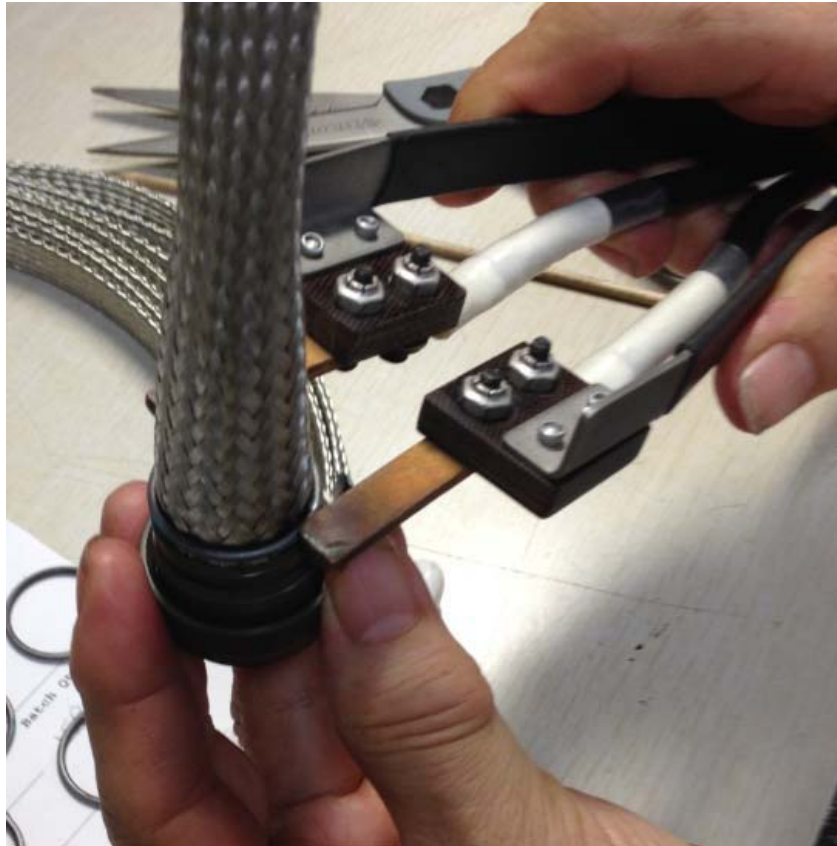


Figure 5  
Applying Hand-Tool for Electrical Heating

**WARNING**

THE HEATING SYSTEM IS CAPABLE OF PRODUCING HIGH CURRENTS. ACCIDENTAL CONTACT WITH METAL OBJECTS COULD RESULT IN BURNS. USE ONLY AS RECOMMENDED. UTILIZE APPROPRIATE PPE.

**6.2.0 Ring Recovery Using The Hot Air Method**

**6.2.1 Recommended Heating Tools**

Heating Gun: Raychem Thermogun 500A (green)

or

Raychem Thermogun 750 (yellow)

The 750W gun is a high temperature heat gun – CAUTION must be exercised with its use. It should not be used indiscriminately near heat sensitive harnessing components.

Reflector: Raychem TG-12 for TCXXXX, TR10XX and smaller  
or  
Raychem TG-13 for TR12XX and larger.

### **6.2.2 Procedure**

Place the appropriate reflector on the heat gun.

To minimize heating of components adjacent to the ring, allow the heat gun to warm up prior to using.

Position the reflector around the ring and continue heating until both patches of thermochromic paint change color (the installation is not complete if only one patch has changed).

**CAUTION:** The heat gun, reflector and harness will be hot. Allow them to cool before handling. Your conditions may require the use of insulated gloves.

## **7.0 Post Recovery**

### **7.1 Inspection of Finished Terminations**

The following may be inspected prior to the installation of a boot to ensure a quality termination:

Ring Placement – As per Figure 3.

Braid - Not combed out.

- Trapped under ring 360 degrees around.

Ring - Check ring marking to ensure that ring of proper braid designator was used.

Thermochromic - Both patches are dark in color (small amount of remaining green color is acceptable).

### **7.2 Preparation For Boot Installation (if required)**

After allowing the ring to cool, the braid may be trimmed as detailed in Figure 6. Care must be taken to ensure that no short strands of wire are allowed to stick up vertically, as these could puncture a boot on recovery. Alternatively, the braid can be folded back over the ring and tied down with a wrap of tape.

If the ring is to be used in association with a boot, the assembly should be solvent wiped before any adhesive is applied to the area. The adhesive should be applied liberally to the shoulder of the adapter and to the area around the ring; it should fill any “voids” between the ring and shoulder. A boot may be then recovered in the normal way.

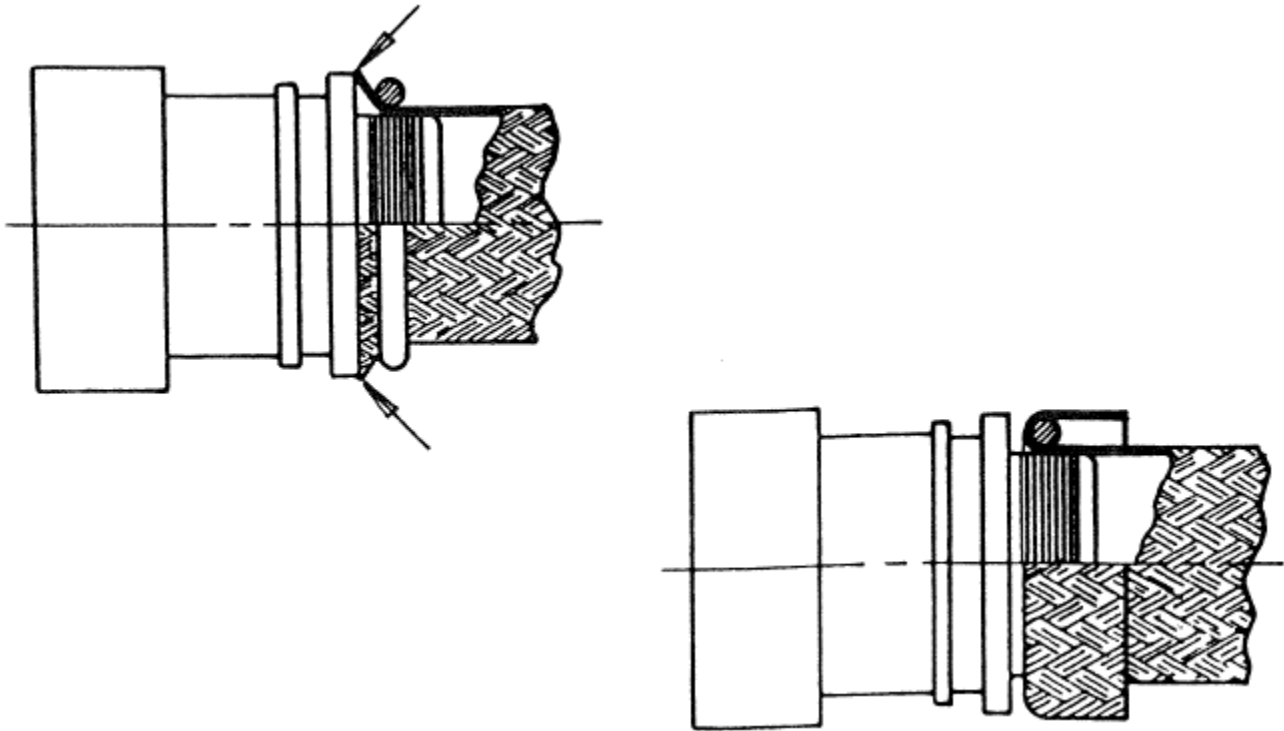


Figure 6

### BRAID TRIMMING

The braid may either be trimmed at the shoulder or folded back and tied down with tape.