1.0 Scope

1.1 This specification covers the qualification and acceptance requirements for heat recoverable metal braid-terminator rings, which provide a method of joining a gross cable or harness shield to a customer built connector backshell or other termination device.

1.2 Part Designation

1.2.1 Specification
MPS-101

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

TR XX X I

- I → Insulating Lining
- X → Braid Designator
  - A - 36 AWG braid, 1 layer
  - B - 36 AWG braid, 2 layers
  - B - 30 AWG braid, 1 layer
  - C – 32 AWG braid, 2 layers
  - Refer to MSG-101.
- XX → Entry size of adapter. (04 through 24)
- TR → Product designator

2.0 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.

2.1 Government Furnished Documents, Military

MIL-STD-120	Gage Inspection
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-45662	Calibration System Requirements
SAE-AMS-C-26074	Coatings, Electroless Nickel, Requirements For

2.2 Federal

SAE-AMS-QQ-A-225	Aluminum and Aluminum Alloy Bar, Rod, Wire, or Special Shapes, Rolled, Drawn or Cold Finished, General Specification For.
A-A-59569	Braid, Wire (Copper, Tin-Coated or Silver Coated, Tubular or Flat, superseding QQ-B-575C))

2.3 TE Connectivity

TR	Tinel-Lock Ring Customer Drawing (CD)
MSG-101	Tinel-Lock Ring Selection Guide
MIP-101	Tinel-Lock Ring Installation Procedure

3.0 Requirements

3.1 Specification Control Drawing
The requirements for the individual rings under this specification shall be as specified herein and in accordance with the applicable TE Connectivity CD. In the event of discrepancy between this specification and the requirements of the TE Connectivity CD, the requirements of the CD shall govern.

3.2 Material
The rings shall be manufactured from Alloy X, a heat recoverable metal.

3.3 Product Characteristics - (See Table 1 for Summary)

3.3.1 Dimensions
The rings shall meet the dimensions as given on the TE Connectivity Customer Drawing, when measured in accordance with 4.3.1.

3.3.2 Visual Examination
The rings shall be visually examined to ensure that the thermochromic paint is present in two locations 180 degrees apart and that the internal coating conforms to the CD.

3.3.3 Dimensional Stability
The rings shall meet the "As Supplied" dimensions of the CD after exposure to the dimensional stability test described in 4.3.3.

3.3.4 Free Recovery
The rings shall meet the "Free Recovered" dimensions of the CD after recovery by heating per 4.3.4.

3.3.5 Room Temperature DC Resistance
DC resistance between braid and adapter shall be less than 1 milliohm when tested in accordance with 4.3.5.

3.3.6 Room Temperature Pull-Off Force
Rings with an entry size of 08 and larger shall have a pull-off force of 200 pounds or greater and rings with an entry size of 07 and smaller shall have a pull-off force of 150 pounds or greater when tested in accordance with 4.3.6.

3.3.7 Low Temperature DC Resistance and Pull-Off Force
The rings shall meet the resistance requirement of 3.3.5 and the pull-off force requirements stated in 3.3.6 when tested in accordance with 4.3.7.

3.3.8 High Temperature DC Resistance and Pull-Off Force
The rings shall meet the resistance requirement of 3.3.5 and the pull-off force requirements stated in 3.3.6 when tested in accordance with 4.3.8.

3.3.9 Thermal Cycling
The termination shall meet the resistance requirement of 3.3.5 and the pull-off force requirements stated in 3.3.6 when tested in accordance with 4.3.9.

3.3.10 Salt Spray
The Tinel-Lock ring shall be visually examined and shall not have degraded in any way. The termination shall meet the resistance requirement of 3.3.5.

4.0 Quality Assurance Provisions

4.1 Classification of Tests

4.1.1 Qualification Tests
Qualification tests are those performed on samples submitted for qualification as satisfactory products and shall consist of all tests listed in this specification.

4.1.2 Responsibility for Inspection
The supplier is responsible for the performance of all the inspection tests specified herein. The supplier may utilize his own or any other inspection facility and services acceptable to the buyer. Inspection records of the examination and tests shall be kept complete and available to the buyer as required.

4.1.3 Size Range for Qualification Tests
The maximum number of lots, i.e., rings of one diameter, to be examined at qualification is 3. Generally, if a number of different lots are available, the largest and smallest ring size should be examined together with a size midway between the two selected.

4.1.4 Frequency of Qualification Tests
Qualification Tests will be performed following any major change in design, manufacturing methods or procedures.

4.1.5 Acceptance Tests

Acceptance tests are those performed on samples submitted for acceptance under contract. Acceptance tests shall consist of the following: Dimensions (3.3.1), Visual Examination (3.3.2), Dimensional Stability (3.3.3), and Free Recovery (3.3.4).

4.2 Sampling Instructions

4.2.1 Qualification Test Samples

Qualification test samples shall consist of samples selected at random from lots, as detailed in Paragraphs 4.1.3.

4.2.2 Acceptance Test Samples

Acceptance test samples shall consist of samples selected at random from each lot. A lot shall consist of all rings of the same size, from the same production run and offered for inspection at the same time.

4.3 Test Procedures

4.3.1 Dimensions

A minimum of three samples from each lot will be measured dimensionally against the sizes in the CD. Rings shall be measured with a 3-point internal micrometer. Measurements shall be made in accordance with MIL-STD-120 to verify conformance to 3.3.1.

4.3.2 Visual Examination

A minimum of three rings of each lot shall be visually examined at a magnification of 3X or greater to verify conformance to 3.3.2.

4.3.3 Dimensional Stability

A minimum of three rings from each lot shall be placed in a liquid isothermal bath maintained at 50 deg. C ± 0.5 deg. C (122 ± 1 deg. F) for 5 minutes. After removal from the bath, the inside diameter of the rings shall be measured in accordance with 4.3.1 to verify conformance to 3.3.3.

4.3.4 Free Recovery

Three samples from each lot shall be freely recovered either by placing in an oven at 170 deg. C ± 5 deg. C (338 deg. F ± 9 deg. F) for 15 minutes, or by heating with a hot air gun until the thermochromic paint changes color. The ring shall then be measured dimensionally in accordance with 4.3.1 to verify conformance to 3.3.4.

4.3.5 Room Temperature DC Resistance

Two rings from each lot shall be made into test specimens using production Tinel-Lock adapters. The braid shall conform to A-A-59569. The braid type chosen for the test shall be one compatible with the ring according to the Tinel-Lock Ring Selection Guide. The specimens shall conform to Figure 1. The rings shall be recovered as specified in 4.3.4. Resistance measurements shall be made between the adapter and the braid with a Kelvin Double Bridge or an equivalent 4-terminal bridge. Contact to the braid shall be made within one inch of the adapter. Test current: 1.0 Ampere. The measurements shall be made at a temperature of 25 ± 5 deg. C (77 ± 10 deg. F).

4.3.6 Room Temperature Pull-Off Force

Mount the specimens from 4.3.5 in a universal testing machine with one jaw holding the test adapter, the other jaw holding the braid not closer than 6 inches to the adapter. The load shall be applied to a rate of 0.2 inches per minute and continuously monitored. The maximum load attained shall be recorded. Failure of the braid before the ring moves will constitute conformance to the requirement of 3.3.5, even though the stated value is not reached.

4.3.7 Low Temperature DC Resistance and Pull-Off Force

Two specimens from each lot shall be prepared as described in 4.3.5 and tested at a temperature of –65 +3, -0 deg. C (-85 +5, -0 deg. F) using the procedures described in 4.3.5 and 4.3.6. If, during the performance of this test, the temperature of the specimen falls below -67 deg. C (-88 deg. F), the test is invalidated and another specimen shall be substituted.

4.3.8 High Temperature DC Resistance and Pull-Off Force

Two specimens from each lot shall be prepared as described in 4.3.5 and tested at a temperature of 150 ± 2 deg. C (302 ± 5 deg. F) using the procedure described in 4.3.5 and 4.3.6.

4.3.9 Thermal Cycling

Four specimens, 2 each of different lots or three specimens if only one lot is available for test, shall be prepared as described in 4.3.5 and subjected to the Thermal Shock Test of MIL-STD-202, Method 107, Test Condition F-2 except that the low temperature limit shall be -65 deg. C ± 0 deg. C. After the specimens have returned to room temperature and within a period not exceeding 24 hours, the specimens will be subjected to the Resistance Test of 4.3.5 and the Pull-Off Force Test of 4.3.6.

4.3.10 Salt Spray

Two specimens from each lot shall be prepared as described in 4.3.5 and tested in accordance with MIL-STD-1344, method 1001. Specimens prepared using electroless nickel plated aluminum production Tinel-Lock adapters shall be subjected to test condition B, 48 hour duration. Specimens prepared using cadmium olive drab plated aluminum production Tinel-Lock adapters shall be subjected to test condition C, 500 hour duration. The specimens shall be visually examined. The Tinel-Lock ring shall not have degraded in any way. The specimens will be subjected to the Resistance Test of 4.3.5.

4.4 Rejection and Re-test

Failure of any sample to conform to any one of the requirements of this specification shall be cause for the rejection of the lot represented. Before re-submitting, full particulars concerning the rejection and the action taken to correct the defect shall be furnished to the responsible quality authority.

5.0 Preparation

5.1 Packaging

Rings will be packaged in a sealed, transparent plastic bag.

5.2 Labeling

Marking on bags containing individual rings shall include the following information:

Raychem
Tinel-Lock™ Ring
Ring Size
Lot Number
Store Below 50° C

Table I

Requirements

Property **Test Method**	**Unit**	**Requirement**
Dimensions 4.3.1	Inches	Applicable TE Connectivity Customer Drawing
Visual Examination 4.3.2		
Thermochromic Paint Internal Coating		Installed. Applicable TE Connectivity Customer Drawing
Dimensional Stability 4.3.3	Inches	Applicable TE Connectivity Customer Drawing and 3.3.3
Free Recovery 4.3.4	Inches	Applicable TE Connectivity Customer Drawing and 3.3.4
DC Resistance 4.3.5	Ohms	1 Milliohm, max.
Pull-off Force 4.3.6	Pounds	200 minimum for size 08 and larger; 150 minimum for size 07 and smaller

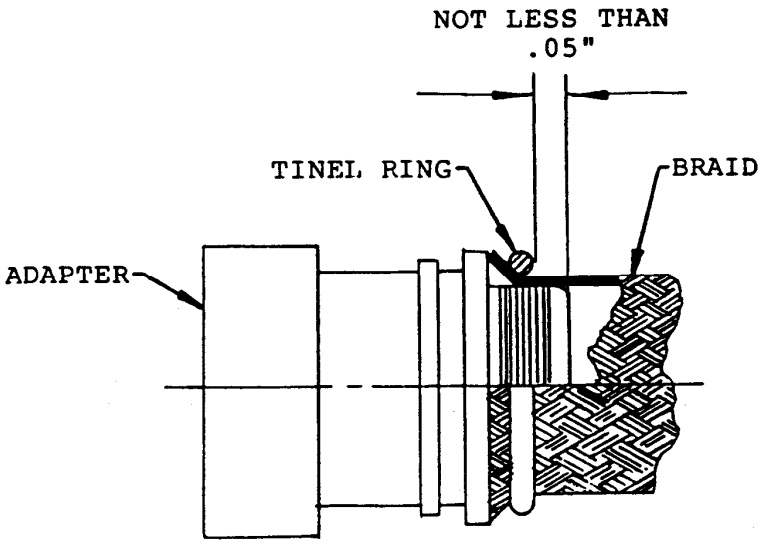

Figure 1. Specimen Preparation