| | | | |
|---|---|---|---|
| Project Number: Crimp Characterization Testing | Tracking Code: 278376 | | |
| Requested by: Bryon Saylor | Date: 9/25/2013 | Product Rev: | |
| Part #: C-393-02-CRIMP-30-DWC | Lot #: | Tech: Aaron McKim | Eng: Eric Mings |
| Part description: Individual Crimp Contacts with Wire Attached | | | Qty to test: |
| Test Start: 9/12/2013 | Test Completed: 9/16/2013 | | |

# CRIMP HEIGHT CHARACTERIZATION SUMMARY REPORT

## C-393-02-CRIMP-30-DWC
## Used In: MCR Series

# REVISION HISTORY

| DATE | REV. NUM. | DESCRIPTION | ENG |
|---|---|---|---|
| 9/25/2013 | 1 | Initial Issue | AM |
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# CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.



## SCOPE

To characterize initial mechanical and electrical crimp performance vs. crimp height.

## APPLICABLE DOCUMENTS

Standards: EIA Publication 364
USCAR2-5
USCAR FCLT

## TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) Test samples were not cleaned prior to testing.
4) Any additional preparation will be noted in the individual test sequences.
5) Two hundred and twenty (220) contacts with wires crimped were submitted for this evaluation. (see flow chart for sample distribution)

# FLOWCHARTS

## Wire Crimp Height Verification - LLCR / Pull Test

| TEST STEP | GROUPS A1 - A11 10 Crimps |
|---|---|
| 01 | Visual Inspection |
| 02 | Measure crimp height via crimp micrometers |
| 03 | LLCR |
| 04 | Pull-out force |

**Crimp Manufacturing Instructions:**

**Cable length to be 6" minimum**

**Insulation crimp to not constrain jacket**

**Pull-out Force: EIA-364-38C**

**LLCR: EIA-364-23**

**20 mV Max, 100 mA Max**

**Use Keithley 580 or 3706 in 4 wire dry circuit mode**

## Wire Crimp Height Verification - Cross Section

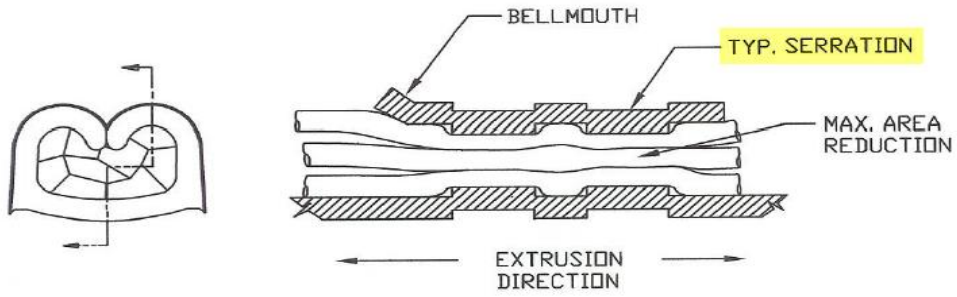
| TEST STEP | GROUPS A1 - A11 3 Crimps |
|---|---|
| 01 | Visual Inspection |
| 02 | Measure crimp height via crimp micrometers |
| 03 | ** Cross Section |
| 04 | Photos of Crimps |
| 05 | Count / Verify # of Strands |
| 06 | *** Examine for compliance with Pass/Fail criteria |

**Crimp Manufacturing Instructions:**

**Cable length to be 6" minimum**

**Insulation crimp to not constrain jacket**

*** Cross section to be performed through the serration area shown below**



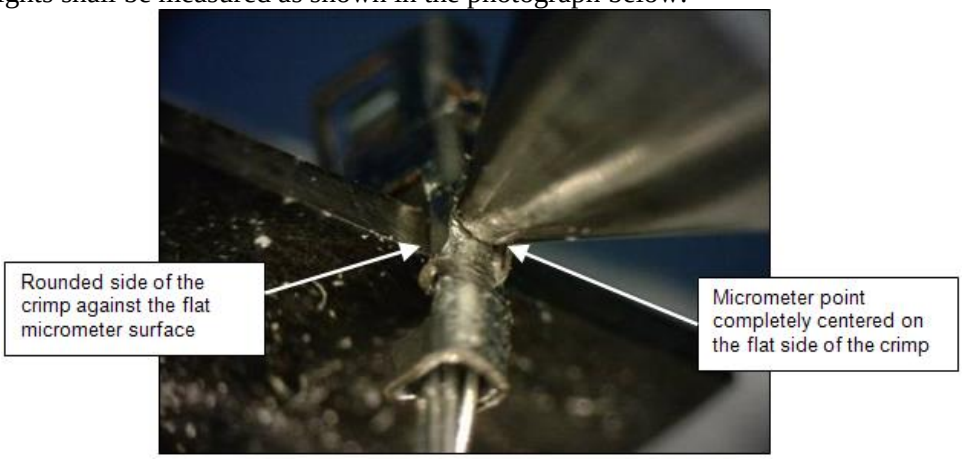

**** Examine for compliance with PASS/FAIL criteria: No broken/missed wires, voids, cracks in the contact material or other applicable defects shall be allowed.**

# ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

**CRIMP HEIGHT:**

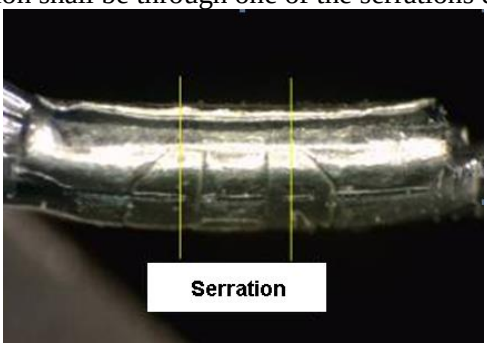
1) Crimp heights shall be measured as shown in the photograph below:



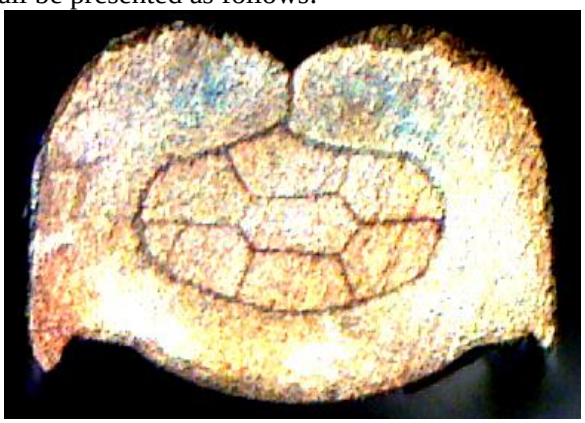

2) The crimp heights shall be measured on samples that have not been cross-sectioned. The above photograph was used to provide a clear view of the measurement point without the rest of the sample impeding the view.

**CROSS-SECTION:**

1) Contacts shall be cross-sectioned and polished without being potted.
2) The location of the cross-section shall be through one of the serrations designated in the below photograph.

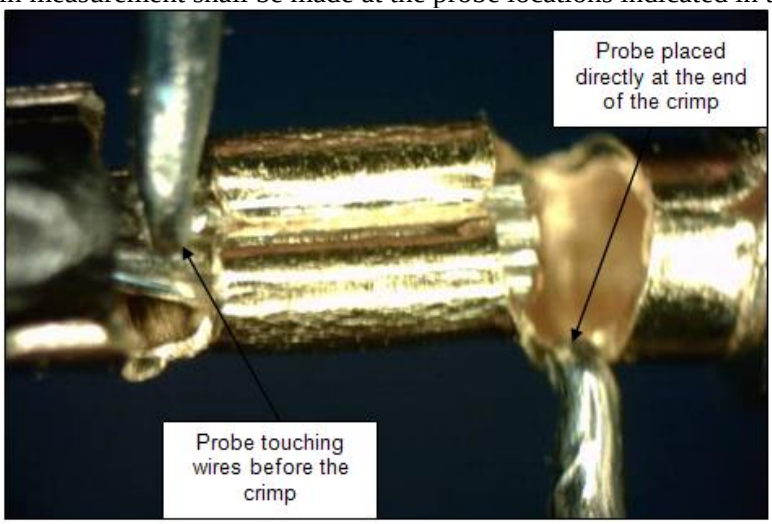



3) Polished crimp contact cross-sections shall be etched in a mild etchant to provide contrast for the microscopic examination.
4) Etched samples shall be examined under 40X magnification.
5) The final cross-section shall be presented as follows:



## LOW LEVEL CONTACT RESISTANCE (LLCR):

1) The LLCR shall be measured and recorded in accordance with EIA-364-23A, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) A four wire, Kelvin measurement shall be made at the probe locations indicated in the below photograph:




3) Test Conditions:
    a. Maximum Open Circuit Voltage: 20 mV
    b. Maximum Test Current: 100 mA

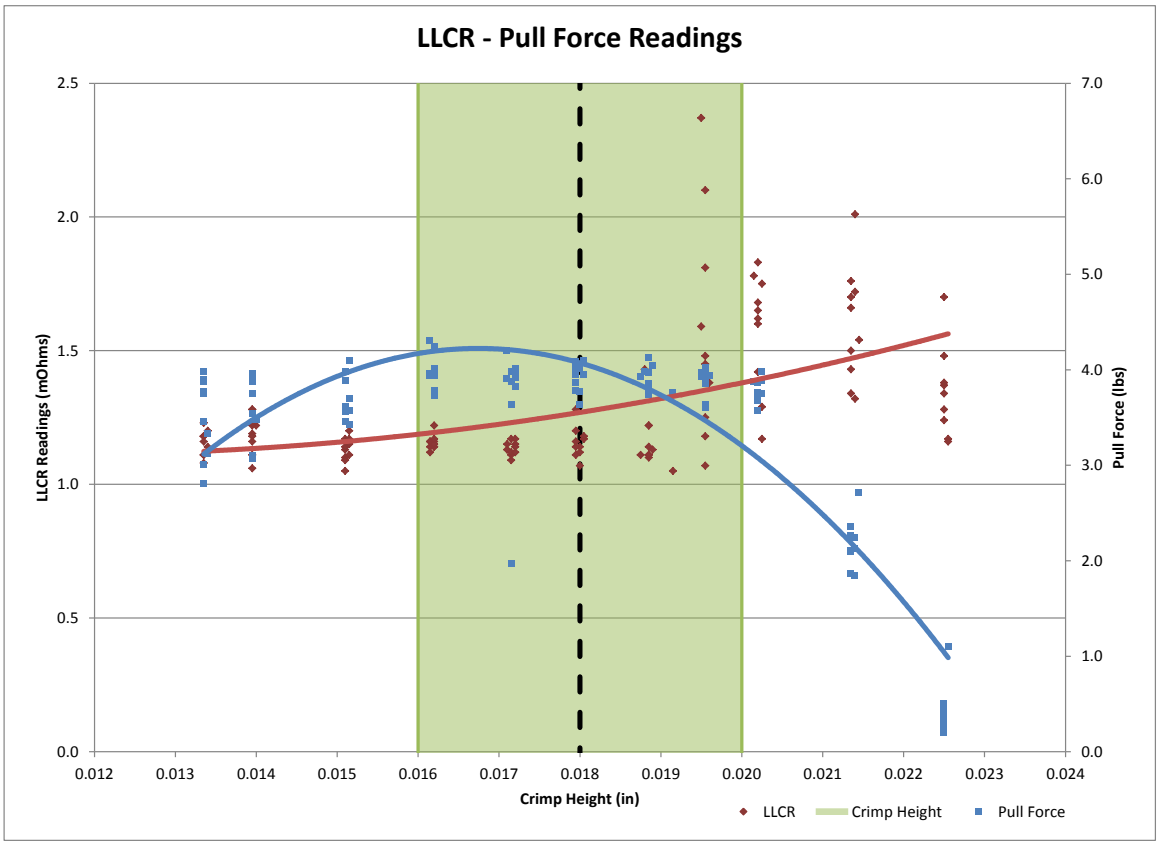
## CRIMP PULL FORCE:

1) The test was performed in accordance with EIA-364-08B.
2) Secure contact near center and pull wire at 0°, in-line with contact.
3) The test stand speed shall be 25 ±6 mm.

EIA-364-08B defines the types of separation resulting from this test as follows:

1) Slip (pull out).
2) Conductor broken in crimp area (some or all).
3) Contact broke in crimp area (some or all).
4) Conductor broken outside crimp area.
5) Contact broken outside crimp area.

# TEST RESULTS




**CROSS-SECTION PHOTO:**

Typical sample at nominal height

## EQUIPMENT AND CALIBRATION SCHEDULES

**Equipment #:** MC-41
**Description:** Crimp Micrometer
**Manufacturer:** Mitutoyo
**Model:** 342-371
**Serial #:** 05020827
**Accuracy:** See Manual
… Last Cal: 06/13-2013, Next Cal: 06/30/2014

**Equipment #:** MO-01
**Description:** Micro-Ohmmeter
**Manufacturer:** Keithley
**Model:** 580
**Serial #:** 0772740
**Accuracy:** See Manual
… Last Cal: 02/12/2013, Next Cal: 02/12/2014

**Equipment #:** TCT-04
**Description:** Dillon Quantrol TC21 25-1000 mm/min series test stand
**Manufacturer:** Dillon Quantrol
**Model:** TC2 I series test stand
**Serial #:** 04-1041-04
**Accuracy:** Speed Accuracy: +/- 5% of indicated speed
… Last Cal: 05/17/2013, Next Cal: 05/31/2014

**Equipment #:** LC-100N-2
**Description:** 100 Newton Load Cell
**Manufacturer:** Mecmesin
**Model:** ILC – Load Cell
**Serial #:** 07-0217-10
**Accuracy:** See Manual
… Last Cal: 7/09/2013, Next Cal: 1/9/2014