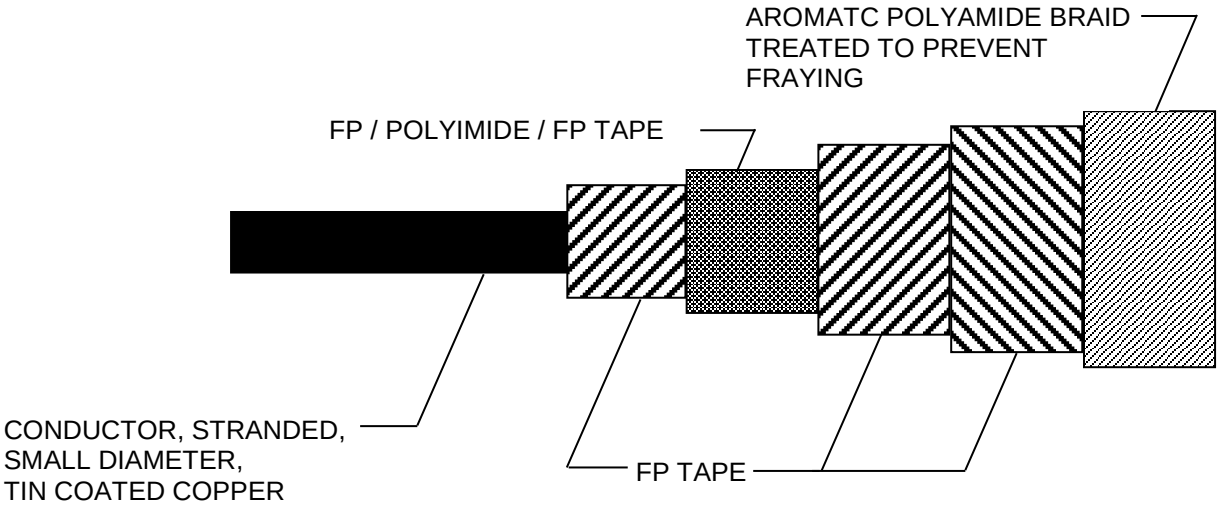
REVISIONS			
LTR	**DESCRIPTION**	**DATE**	**APPROVED**
A	Technical modifications to agree with SAE-AS22759/85. Editorial changes throughout. Update format.	7/19/2007	Lee Suroweic
B	Editorial changes throughout. Update format. Added approved supplier.	13 March 2009	Abdo Abdouni
C	Added approved supplier.	9 September 2010	Abdo Abdouni
D	Technical modifications to agree with SAE-AS22759. Add SAE-AS22759/185 and SAE-AS22759/188. Amended paragraph section 3.5.2. Increase 2 to 3 J/g. Updated Table I finish wire weight. Amended the government and non-government contact information. Removed ASME Y14.100 and selected item drawing. Vendor name change.	26 June 2015	Abdo Abdouni

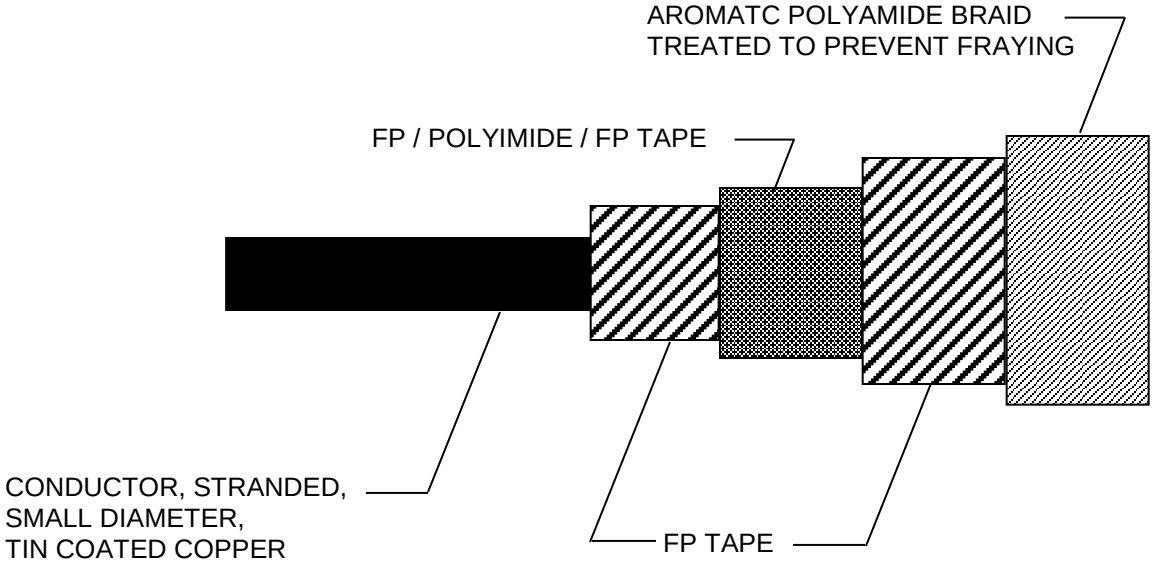
CURRENT DESIGN ACTIVITY CAGE CODE
037Z3 HAS CHANGED NAMES TO:
DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

REV																		
PAGE																		
REV STATUS OF PAGES	**REV**		D	B	D	D	D	D	D	D	D							
	PAGE		1	2	3	4	5	6	7	8	9							

PMIC	**PREPARED BY** William Carpenter	**DEFENSE SUPPLY CENTER, COLUMBUS** **COLUMBUS, OHIO 43218-3990**
Original date of drawing 12 July 2004	**CHECKED BY** Lee Surowiec **APPROVED BY** Richard L. Taylor	**TITLE** **WIRE, ELECTRICAL, COMPOSITE, POLYAMIDE BRAID, POLYTETRAFLUOROETHYLENE/POLYIMIDE INSULATED, SMOOTH SURFACE, NORMAL WEIGHT, TIN COATED, COPPER CONDUCTOR, 150°C, 600 VOLT**
	SIZE **A** / **CAGE CODE** **037Z3**	**DWG. NO.** **04039**
	REV **D**	**PAGE** **1** OF **9**



8 AWG through 6 AWG



4 AWG through 4/0 AWG

FP – Florocarbon Polymer, modified Polytetraflouroethylene (PTFE)

FIGURE 1. General configuration.

1 SCOPE

1.1 Scope. This drawing covers the performance characteristics for a composite wire using a seamless polytetrafluoroethylene/ hydrolysis resistant polyimide tape wrap insulation system, with a normal weight stranded conductor.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as specified as follows:

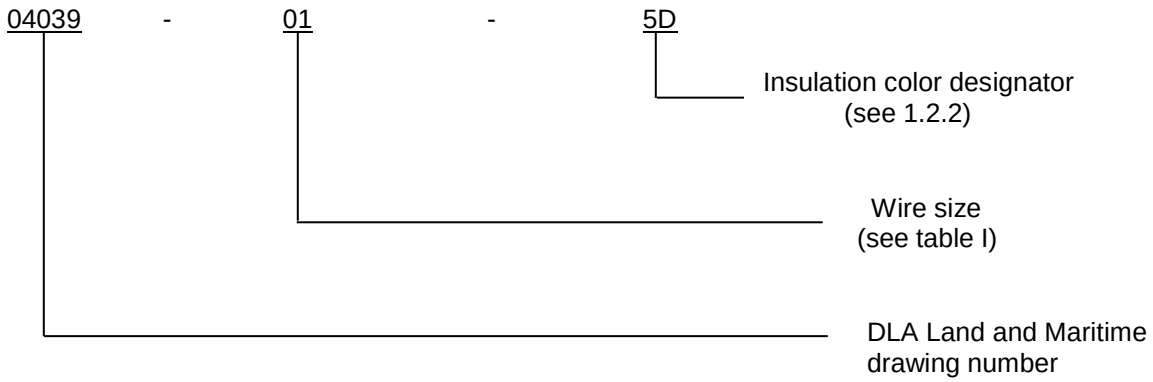


TABLE I. Details of construction.

1/ PIN	Wire size (AWG)	Conductor			Finished wire			
		Stranding (number of strands X gauge (AWG) of strands)	Diameter (inches)		Resistance At 20°C ohms/1000ft. (max)	Diameter (inches)		2/ Weight lb/1000ft. (max)
			Min	Max		Min	Max	
04039-8-*	8	133 X 29	.158	.169	.701	.196	.216	61.6/62.6
04039-6-*	6	133 X 27	.198	.212	.445	.235	.255	93.7/93.0
04039-4-*	4	133 X 25	.250	.268	.292	.292	.312	148/150
04039-2-*	2	665 X 30	.320	.340	.183	.360	.380	227/231
04039-1-*	1	817 X 30	.366	.380	.149	.400	.420	295/298
04039-01-*	0	1045 X 30	.395	.425	.116	.442	.462	351/357
04039-02-*	00	1330 X 30	.440	.475	.091	.498	.528	438/454
04039-03-*	000	1665 X 30	.500	.540	.071	.554	.584	554/550
04039-04-*	0000	2109 X 30	.565	.605	.056	.615	.655	689/696

1/ The asterisks in the PIN column of table I should be replaced by color code designator (see 1.2.1).
Example: 04039-26-5D is dark green.

2/ The first/second numbers are the wire weight lb/1000ft. maximum for the SAE-AS22759/85 or SAE-22759/88 / SAE-AS22759/185 or SAE-22759/188 respectively.

1.2.1 Color. The color of the finished wire should be as indicated by the insulation color designator (see 1.2) of the wire PIN and the color specified in the contract or order. The color designators should indicate the color of the braid. The preferred color is should be dark green with the Munsell color limits of 5Y 3/2 and 5B 2/0.5 color designator 5D. White is an acceptable alternative color, designator 9.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-104	-	Limits for Electrical Insulation Color
MIL-STD-681	-	Identification Coding and Application of Hookup and Lead Wire

(Copies of these documents are available online at http://quicksearch.dla.mil)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASTM INTERNATIONAL

ASTM B33	-	Standard Specification for Tin Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4591	-	Standard Test Method for Determining Temperatures and Heats of Transitions of Fluoropolymers by Differential Scanning Calorimetry

(Copies of these documents are available from http://www.astm.org)

NCSL INTERNATIONAL

NCSL - Z540.3	-	General Requirements for Calibration of Measuring and Test Equipment

(Copies of these documents are available online at http://www.ncsli.org)

SAE INTERNATIONAL

SAE-AS4373	-	Test Methods for Insulated Electric Wire
SAE-AS22759	-	Wire, Electrical, Fluoropolymer-Insulated, Copper or Copper Alloy
SAE-AS22759/85	-	Wire, Electrical, Polytetrafluoroethylene/Polyimide Insulated, Normal Weight, Tin Coated, Copper Conductor, 150°C, 600 Volt
SAE-AS22759/88	-	Wire, Electrical, Polytetrafluoroethylene/Polyimide Insulated, Normal Weight, Tin Coated, Copper Conductor, 150°C, 600 Volts
SAE-AS22759/185	-	Wire, Electrical, Polytetrafluoroethylene/Polyimide Insulated, Smooth Surface, Normal Weight, Tin Coated, Copper Conductor, 150°C, 600 Volt
SAE-AS22759/188	-	Wire, Electrical, Polytetrafluoroethylene/Polyimide Insulated, Smooth Surface, Normal Weight, Tin Coated, Copper Conductor, 150°C, 600 Volts ROHS

(Copies of these documents are available from http://www.sae.org)

3. REQUIREMENTS

3.1 DLA Land and Maritime requirements. Items described in this drawing shall meet the requirements of SAE-AS22759, SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 - 4 AWG) and SAE-AS22759/185 (2 - 4/0 AWG) or SAE-AS22759/188 (8 - 4 AWG) except as specified herein. Any requirements included in this drawing shall be in addition to, or supersede those requirements included in SAE-AS22759, SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 - 4 AWG) and SAE-AS22759/185 (2 - 4/0 AWG) or SAE-AS22759/188 (8 - 4 AWG). In case of conflict between the requirements in this drawing, SAE-AS22759, SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 - 4 AWG) and SAE-AS22759/185 (2 - 4/0 AWG) or SAE-AS22759/188 (8 - 4 AWG), the requirements of this drawing shall take precedence.

3.2 Design configuration. The design, construction, and physical dimensions shall be as specified in this drawing.

3.2.1 Design documentation. Design documentation shall be retained by the manufacturer and shall be available upon request for review by the contracting activity, DLA Land and Maritime, or contractor.

3.3 Material.

3.3.1 Conductor. Conductors shall be made of soft annealed copper in accordance with ASTM B33 and table I of this drawing. All strands shall be free from lumps, kinks, splits, scarred or corroded surfaces and skin impurities. Strands shall be tin coated in accordance with ASTM B33.

3.3.1.1 Pure tin. The use of pure tin is prohibited both internally and externally. Tin content of wire components, braids, jackets and solder shall not exceed 97 percent. Tin shall be alloyed with a minimum of 3 percent lead (see 6.9).

3.3.2 Braid. The braid shall be made of bright aromatic polyamide yarn, 200 Denier, 100 filaments, tightly formed. The braid shall be uniform in appearance and treated with a clear finisher coating. The finisher coating shall be compatible with the temperature rating and performance requirements of the insulated wire.

3.3.3 Insulation. Insulation shall be polytetrafluoroethylene and polytetrafluoroethylene/polyimide tape specified in tables II and III. The polyimide tape shall be hydrolysis resistant.

TABLE II. Wire insulation materials. 1/

Tape code	Thickness nominal (inches)	Material
1	.0020	.0005 FP/.0010 polyimide/.0005 FP
2	.0010	FP (Skived)
3	.0020	FP (Skived)
4	.0030	FP (Unsintered)

1/ Physical properties of PTFE unsintered tape shall be in accordance with SAE-AS22759.

TABLE III. Physical properties of FP/Polyimide/FP tapes.

Tensile strength	19,000 lb/in^2 (average min)
Tensile modulus	350,000 lb/in^2 (average min)
Elongation	40 percent (average min)
Dielectric strength	4,000 volts/mil (average min)
.0005 FP Layer	Distinguishable color (next to conductor)

3.4 Wire construction and physical dimensions. See figure 1 and tables I and IV.

TABLE IV. Tape overlap requirements. 1/

Wire size	Wrap 1			Wrap 2			Wrap 3			Wrap 4			Nominal wall thickness (mils) 2/
	Tape code	Percent overlap		Tape code	Percent overlap		Tape code	Percent overlap		Tape code	Percent overlap		
		Min	Max		Min	Max		Min	Max		Min	Max	
8	2	20.5	35	1	50.5	55.0	4	67.0	71.0	-	-	-	13.2
6	2	20.5	35	1	50.5	55.0	4	67.0	71.0	-	-	-	13.2
4	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
2	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
1	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
1/0	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
2/0	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
3/0	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2
4/0	3	20.5	35	1	50.5	55.0	4	50.5	54.0	4	50.5	54.0	16.2

1/ Wrap 1 is innermost tape which is in contact with the conductor.
2/ Nominal wall thickness does not include the polyamide braid thickness.

3.5 Performance testing. Wire supplied to this drawing shall be qualified in accordance with SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 - 4 AWG), SAE-AS22759/185 (2 - 4/0 AWG) or SAE-AS22759/188 (8 - 4 AWG), and shall meet any additional requirements of this drawing.

3.5.1 Solderability (conformance inspection test). Not required, this wire is intended for crimp terminations.

3.5.2 Insulation state of sinter (conformance inspection test). FP layers shall be evaluated with a Differential Scanning Calorimeter in accordance with ASTM D4591. This is performed on the sintered wire prior to braiding. The FP layers shall meet the following requirements:

a. Insulation state of sinter: 3 J/g maximum.
b. Bonding between FP layers shall be homogenous. No evidence of tape edges or seams shall be present on the outer FP layer when visually examined with the unaided eye. The outer surface will be smooth and free of tape edges at the overlap.

3.5.3 Lamination sealing (conformance inspection test). When tested in accordance with SAE-AS4373 method 809 at 200°C, there shall be no evidence of tape separation or lifting. There shall be no visible tape ridges that can contribute to tearing of the tape. This test is performed on the sintered wire prior to braiding.

3.5.4 Color. Conformity of color to the limits specified in MIL-STD-104 shall not be required after oven exposure.

3.6 Ratings.

3.6.1 Temperature rating. 150°C maximum continuous conductor temperature.

3.6.2 Voltage rating. 600 Vrms at sea level.

3.7 Marking. The finished wire shall be identified by a printed marking applied to the outer surface or the wire. The identification mark shall not be applied by hot stamp marking or other methods which significantly penetrate the insulation. The PIN shall be in accordance with 1.2 herein.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Conformance inspection (see 4.3).

4.1.1 Equipment calibration. All test equipment and inspection facilities shall be maintained in accordance with NCSL Z540.3 or equivalent.

4.2 Qualification inspection. The product manufactured under this drawing shall be currently listed on the qualified products list QPL-22759 for wire type SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 - 4 AWG) and SAE-AS22759/185 (2 – 4/0 AWG) or SAE-AS22759/188 (8 – 4 AWG). The requirements in paragraph 3.5 apply.

4.3 Conformance inspection. Conformance inspection inspection shall be in accordance with SAE-AS22759/85 (2 - 4/0 AWG) or SAE-AS22759/88 (8 – 4 AWG), SAE-AS22759/185 (2 – 4/0 AWG) or SAE-AS22759/188 (8 – 4 AWG), and 3.5 herein.

4.4 Certification. In order to be certified and listed as an approved source of supply for wire manufactured to this drawing, a manufacturer shall:

a. Agree to make available to DLA Land and Maritime, upon request, all pertinent test data indicating compliance to the tests outlined in SAE-AS22759, SAE-AS22759/85 (2 – 4/0 AWG) or SAE-AS22759/88 (8 – 4 AWG), SAE-AS22759/185 (2 – 4/0 AWG) or SAE-AS22759/188 (8 – 4 AWG), and this drawing.

b. Provide to DLA Land and Maritime -VAI, or its designated agent, upon request, free of change and without obligation, current production samples of the types and quantities requested.

c. Meet one of the following criteria:

(1) Currently be listed on QPL-22759 for at least one wire series (not necessarily the one for which this drawing applies).

(2) Be in current production of the subject part.

4.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply (see 6.7).

5 PACKAGING.

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6 NOTES

6.1 Intended use. Wires conforming to this drawing are intended for use when military specifications do not exist for wires that will perform the required function. This drawing is intended to prevent the proliferation of unnecessary duplicate specifications, drawings and stock catalog listings. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-22759, this drawing will be inactivated.

6.2 Acquisition data. The acquisition document should specify the following:

a. Complete PIN (see 1.2).

b. Requirements for delivery of a copy of the conformance inspection data for the lot being supplied, if applicable. This data should be supplied with each shipment.

c. Requirements for certificate of compliance, if applicable.

d. Requirements for packaging and packing.

6.3 Replaceability. Wires covered by this drawing will replace the same generic wires covered by a contractor-prepared specification or drawing.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime-VAI, Post Office Box 3990, Columbus, Ohio 43218-3990, or e-mail to WireCable@dla.mil, telephone (614) 692-0530, or facsimile (614) 692-6939.

6.5 Certificate of compliance. The certificate of compliance submitted to DLA Land and Maritime-VAI, prior to listing as an approved source of supply, should state that the manufacturer's product meets the requirements of this drawing.

6.6 Generic test data. Generic test data may be used to satisfy the requirements of 4.3. Generic test data should be on date coded wire no more than 1 year old when the wire is made of the same material, of the same design, and is made using the same manufacturing processes. The vendor is required to retain the generic data for a period of not less than 3 years from the date of shipment.

6.7 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed have agreed to the contents of this drawing and a certificate of compliance has been submitted to DLA Land and Maritime-VAI.

DLA Land and Maritime drawing PIN	Vendor CAGE number	Vendor similar PIN 1/	Vendor CAGE number	Vendor similar PIN 1/	Vendor CAGE number	Vendor similar PIN 1/
04039-8-*	12814	SMLF8-*	12515	HN3T8-*	F1868	DSM8508-*
04039-6-*	12814	SMLF6-*	12515	HN3T6-*	F1868	DSM8506-*
04039-4-*	12814	SMLF4-*	12515	HN3T4-*	F1868	DSM8504-*
04039-2-*	12814	SMLF2-*	12515	HN3T2-*	F1868	DSM8502-*
04039-1-*	12814	SMLF1-*	12515	HN3T1-*	F1868	DSM8501-*
04039-01-*	12814	SMLF01-*	12515	HN3T01-*	F1868	DSM85Z1-*
04039-02-*	12814	SMLF02-*	12515	HN3T02-*	F1868	DSM85Z2-*
04039-03-*	12814	SMLF03-*	12515	HN3T03-*	F1868	DSM85Z3-*
04039-04-*	12814	SMLF04-*	12515	HN3T04-*	F1868	DSM85Z4-*

1/ Caution: Parts must be purchased to this DLA Land and Maritime PIN to assure that all performance requirements and tests are met.

* Color code designators in accordance with MIL-STD-681 should replace the asterisks in the PIN column of table. Example: 04039-26-93 is white with an orange stripe.

Vendor CAGE number	Vendor name and address
12814	Thermax/CDT 235 North Freeport Drive Nogales, AZ 85621-2428
12515	Nexans Aerospace USA LLC 600 South Parker Street, P.O. Box 909 Elm City, NC 27822
F1868	Draka Fileca Route Nationale 1 60730 Sainte Genevieve France

6.8 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website http://www.epa.gov/osw/hazard/wastemin/priority.htm. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see Section 3).

6.9 Tin whisker growth. The use of alloys with tin content greater than 97 percent may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture, and can develop under typical operating conditions on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead have shown to inhibit the growth of tin whiskers (see 3.3.1.1).

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.