AEROSPACE REPORT NO.
TR-2020-01914

Tailoring of SMC-S-010 (2013), Technical Requirements for Electronic Parts, Materials, and Processes Used in Space Vehicles

August 14, 2020

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Prepared for:

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Contract No. FA8802-19-C-0001

Authorized by: Space Systems Group

This report was submitted by The Aerospace Corporation, El Segundo, CA 90245-4691, under Contract No. FA8802-14-C-0001 with the Space and Missile Systems Center, 483 N. Aviation Blvd., El Segundo, CA 90245. It was reviewed and approved for The Aerospace Corporation by Anthony T. Salvaggio, Jr., Principal Director. Franco R. Macchia was the project officer for the SMC Atlas Corps Directorate of Engineering.

This report has been reviewed by the Public Affairs Office (PAS) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nationals.

This technical report has been reviewed and is approved for publication. Publication of this report does not constitute Air Force approval of the report's findings or conclusions. It is published only for the exchange and stimulation of ideas until adopted or otherwise implemented by the government.

Thomas T. Pham, NH-03, DAF

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE (*DD-MM-YYYY*)	2. REPORT TYPE	3. DATES COVERED *(From - To)*
14-08-2020		

4. TITLE AND SUBTITLE

Tailoring of SMC-S-010 (2013), Technical Requirements for Electronic Parts, Materials, and Processes Used in Space Vehicles

5a. CONTRACT NUMBER
FA8802-19-C-0001

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Brandon N. Davis

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION REPORT NUMBER

TR-2020-01914

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

United States Space Force
483 N. Aviation Blvd.
El Segundo, CA 90245

10. SPONSOR/MONITOR'S ACRONYM(S)
SMC

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This document tailors USAF Space and Missile Systems Center (SMC) standard number SMC-S-010 (2013), entitled "Technical Requirements for Electronic Parts, Materials, and Processes Used in Space Vehicles", to provide an effective space vehicle (SV) program technical baseline for parts, materials, and processes (PM&P) and national security space mission success.

These documents, together, are intended for use in acquisition and study contracts for SVs.

This tailoring is based on a joint Aerospace-SMC assessment of test requirements currently on, or required for near-term future, SMC contracts. The goal was to streamline those requirements that are either commonly tailored or can be re-stated to facilitate more effective implementation.

15. SUBJECT TERMS

Parts, materials, and processes; PM&P; Standard; Tailoring

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
					Brandon N. Davis
a. REPORT	b. ABSTRACT	c. THIS PAGE		17	19b. TELEPHONE NUMBER *(include area code)*
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED			(310) 336-2836

CHANGE HISTORY

Rev No	Description of Change	Effective Date
-	Initial release Stakeholder review was documented in TOR-2019-00606-Rev A, *Stakeholder Review: Tailoring of SMC-S-010 (2013), Technical Requirements for Electronic Parts, Materials, and Processes Used in Space Vehicles*.	08-14-2020

Editorial note: To avoid ambiguity, the formatting, section title capitalization, and section numbering, including inconsistencies, of The Aerospace Corporation report number TOR-2006(8583)-2336-RevB (aka TR-RS-2013-00010), also published as SMC-S-010 (2013), has been preserved as originally published.

Contents

Foreword

ADD THE FOLLOWING:

This document is a tailoring of USAF Space and Missile Systems Center (SMC) standard number SMC-S-010 (2013), originally published as The Aerospace Corporation report number TOR-2006(8583)-5236 Revision A, entitled *Technical Requirements for Electronic Parts, Materials, and Processes Used in Space Vehicles*, to provide an effective space vehicle (SV) program technical baseline for parts, materials, and processes (PM&P) and national security space mission success.

These documents, together, are intended for use in acquisition and study contracts for SVs. The SMC standard tailored by this document (hereafter referred to as the "tailored SMC standard") is intended to be used as a compliance document to specify electronic PM&P requirements for SVs.

Tailoring Intent

This tailoring is based on a joint Aerospace-SMC assessment of PM&P requirements currently on, or required for near-term future, SMC contracts. The goal was to streamline those requirements that are either commonly tailored or can be re-stated to facilitate more effective implementation.

Formatting of this Tailoring Document

The outline organization in this tailoring document is consistent with SMC-S-008 (2013), originally published as The Aerospace Corporation report number TOR-2006(8583)-5236 Revision B (aka TR-RS-2013-00010). To avoid ambiguity, the formatting, section title capitalization, and section numbering, including inconsistencies, has been preserved as originally published.

Tailoring Definition

Tailoring is a process by which individual requirements from specifications, standards, or related documents are evaluated and applied to a specific program by deletion, modification, or addition of requirements. Tailoring of requirements must be undertaken with consultation and approval of the procuring authority and the Aerospace PM&P subject matter expert to align the standard with the acquisition authority's requirements and the mission needs. The diversity of missions, buses, payloads, environments, and unique approaches of contractors makes tailoring of standard requirements mandatory.

This tailored SMC Standard establishes a baseline for requirements, which in turn may be tailored or revised with rationale for specific project needs upon approval by the procuring authority.

Summary of Tailoring

The following is a comprehensive list of the changes that this document imposes on SMC-S-010 (2013).

Section	Title	Change Summary
n/a	Foreword	Added background for this tailoring.
4.1.2	Margin of Safety	Simplified and clarified requirement for derating to factor of safety of mechanical parts and materials.
4.4.4	Destructive Physical Analysis (DPA)	Specifies sample size as 3 pieces per lot unless otherwise specified by PMPCB.
Section 100 3.1b	Rigid Printed Wiring Boards	Tailored text is consistent with current industry standard practices.
Section 100 3.1p	Rigid Printed Wiring Boards	Removed redundant in-process cleanliness test.
Section 100 4.1	In Process Controls	The alternate method in item a. has been shown to be a reliable method of ensuring copper plating properties and is consistent with current industry standard practices. Removed inner layer inspection of rigid boards to be consistent with current industry practices.
Section 100 5	Registered (Reliability Suspect)	Addresses concerns for using lead-free solder.
Section 110 3.2j	All Flex and Rigid-Flex	Removed redundant in-process cleanliness test.
Section 110 3.2n	All Flex and Rigid-Flex	Stacking of flex PWBs when drilling is not standard practice, so this requirement is not necessary.
Section 110 3.3d	Multiple layer flex and rigid-flex boards with plated-through-holes	Tailored text to be consistent with current industry standard practices.
Section 110 4.1	PWBs In-process Control	Allows alternative to mechanical testing. Removed inner layer inspection of flex boards to be consistent with current industry practices.
Section 110 5	PWB: Registered (Reliability Suspect) PMP	Tailored text to be consistent with current standard practices and address concern of lead-free plating.
Section 120 3.1 b	RF (microwave) PWBs; PWBs Etch Back	Tailored text to be consistent with current industry standard practices.
Section 120 3.1 p	RF (Microwave) PWBs; PWBs; Hot Air Leveling	Removed redundant in-process cleanliness test.
Section 120 4.1	PWBs; In-process Controls	Tailored text to be consistent with current industry standard practices.
Section 120 5	PWBs; Registered (Reliability Suspect)	Tailored text to be consistent with current standard practices and address concern of lead-free plating.

Section 232 3.2	Insulator Washer	Removed requirements for obsolete capacitors.
Section 300 2.e	Application	Clarified requirement for mitigation of fatigue failure modes.
Section 300 2.f	Application	Updated to avoid potential for FOD.
Section 300 2.h	Application	Clarified requirements for connector savers.
Section 300 2.j	Application	Referenced MIL-C-39029 requirements for contacts.
Section 300 2.1.a	Application	Changed requirement to use nominal temperature as opposed to average temperature.
Section 300 3.1.2	Prohibited/Unacceptable Materials	Removed redundant verbiage to follow existing requirement in section 4.
Section 300 3.1.3.c. 3	Solder Type, Body Pre-Solder Coated	Removed requirements that are covered in soldering process specs.
Section 300 3.1.3.c.4	Solder Type, Cups	Removed requirements that are covered in soldering process specs.
Section 300 3.1.3.b	Connector and Accessory Plating	Updated to be consistent with current industry standards
Section 300 3.1.3.c (3) and (4)	Crimped contacts	Deleted requirements verbiage
Section 300 3.1.3.e	Crimp Tools	GPS requirements are more complete
Section 300 3.2.d	Physical Configurations	Removed reference to class, series, etc.
Section 300 3.2.e	Physical Configurations	Removed reference to class, series, etc.
Section 300 3.2.h	Physical Configurations	Removed reference to class, series, etc.
Section 300 3.2.i	Physical Configurations	Removed reference to class, series, etc.
Section 300 3.2.j	Physical Configurations	Removed reference to class, series, etc.
Section 800 3.3	Wire Size	Corrected to reference Table II of MIL-STD-981.
Section 900 7.1	Incoming Inspection DPA	Clarified requirement and responsibilities.
Section 1000 2.3	Coil Voltage	Incorporated latest cautions found in MIL-PRF-39016 and MIL-PRF-6106 specifications.
Section 1000 4.4	Qualification Tests	Updated specify applicable specification.

Section 1125 2.2	End of Life Design Limits (Resistance)	Tightened end-of-life requirement to reduce variability.
Section 1125 5	Registered (Reliability Suspect) PMP	Updated list to include fixed termination parts with a length exceeding 0.20 inch.
Section 1130 2.2	End of life Design Limits (Resistance)	Tightened end-of-life requirement to reduce variability
Section 1220 4.1.1	Switch Assembly	Updated to specify environmental cleanliness requirement for precap inspection.
Section 1700 5	Registered (Reliability Suspect) PMP shall include:	Clarified.
Section 2110 3.3	Stress Corrosion Cracking	Modified to allow the use of aluminum alloys if they are under 75% of their stress corrosion threshold.
Section 3500 2.1	Printed Circuit Assembly; Soldering	Removed requirements that exist in J-STD-001 and specified usage of space addendum.
Appendix A A.7	Radiation Hardness Assurance Requirements For Hybrid Microcircuits and Multichip Modules	Removed requirements that exist in A1 – A6.
Appendix B	RESCREENING/QUALITY CONFORMANCE INSPECTION REQUIREMENTS	Clarified requirements for using life test samples.
Appendix C	ALTERNATE QCI TEST/SAMPLING PLAN	Corrected referenced paragraph numbers.

1. Scope

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

2. Reference Documents

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

3. Definitions

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4. General Requirements

4.1 Application Requirements

4.1.2 Change to: Margin of Safety

CHANGE TO: Mechanical parts and materials shall meet the factor, or margin of safety as derived or specified in the application component, or structural assembly specification. Strength margins shall be based on mechanical property data from MIL-HDBK-5J (CANCELED) where applicable and shall delimit susceptibility to mechanical failure modes such as bending, deformation, fracture, rupture, excessive deflection, and fatigue. Functional margins shall be calculated based on the recommendation of MIL-A-83577B (CANCELED) wherever possible.

4.2 PMP Requirements

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4.3 PMP Design, Construction, and Procurement

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4.4 Part Quality Assurance Provisions

4.4.4 Destructive Physical Analysis (DPA).

CHANGE TO: Destructive Physical Analysis shall be performed in accordance with MIL-STD-1580 and the detailed sections herein. DPA sample size shall be 3 pieces per lot unless otherwise approved by PMPCB.

4.5 Material Quality Assurance Provisions

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4.6 Packaging

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4.7 Electrostatic-Sensitive Items

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

4.8 Data and Record Retention

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

5. Detailed Requirements

REVISE AS FOLLOWS. Otherwise use SMC-S-010 (2013) verbatim.

Section 100 BOARD, PRINTED WIRING

3.1 Rigid Printed Wiring Boards

b. CHANGE TO: Etchback or equivalent processes shall be used to ensure resin smear is completely removed from the holes of multilayer boards prior to plating. When etchback is used, the limits shall be 0.0002 inch minimum and 0.002 inch maximum.

p. Hot Air Leveling

CHANGE TO: PWBs shall only be hot air leveled once. The solder coating shall be homogeneous and completely cover the conductors with no pitting, no pinholes, or non-wet areas. Sidewalls of conductors need not be solder-coated. Touch-up is permitted but is limited to no more than 5 percent of lands or pads.

4.1 In Process Controls

a. Elongation and Tensile Strength

CHANGE TO: Elongation and tensile strength of as-plated copper shall be tested at least once a month. An alternative method is to statistically monitor the copper plating bath to maintain the level of bath organic compound composition.

b. Inner Layer Inspection. DELETE

5. REGISTERED (RELIABILITY SUSPECT)

CHANGE TO: Space systems are particularly vulnerable because of the severe environment and the impossibility of repairing fielded equipment. Lead-free tin platings/coatings and solders represent a significant reliability risk in space applications and shall not be used except as noted in Section 4.0.

Section 110 FLEX AND RIGID-FLEX PRINTED WIRING BOARDS

3.2 All Flex and Rigid–Flex

j. Hot Air Leveling

CHANGE TO: The PWBs shall only be hot air leveled once. The solder coating shall be homogenous and completely cover the conductors with no pitting, no pinholes, or non-wet areas. Sidewalls of conductors need not be solder-coated. Touch-up is permitted but is limited to no more than 5% of lands of pads.

n. Stacking of Panels When Drilling Plated Through Holes. DELETE

3.3 Multiple Layer Flex and Rigid-Flex Boards with Plated-Through-Holes

d. Etchback

CHANGE TO: Etchback or equivalent processes shall be used to ensure complete resin smear removal from the holes of multilayer boards prior to plating. When etchback is used, the limits shall between 0.0002 inch minimum and 0.002 inch maximum.

4.1 In Process Controls

a. CHANGE TO: Elongation and tensile strength of as-plated copper shall be tested at least once a month. An alternate method is to statistically monitor copper plating bath to maintain the level of bath organic compound composition.

b. Inner layer Inspection. DELETE

5. REGISTERED (RELIABILITY SUSPECT) PMP

b. CHANGE TO: Microvias.

c. CHANGE TO: Vias plated blind (i.e., not made by sequential lamination)

d. CHANGE TO: Space systems are particularly vulnerable because of the severe environment and the impossibility of repairing fielded equipment. Lead-free tin platings/coatings and solders represent a significant reliability risk in space applications and shall not be used except as noted in Section 4.

Section 120 RF (MICROWAVE) BOARDS, PRINTED WIRING

3.1 Printed Wiring Boards

b. CHANGE TO: Etchback shall be used to ensure resin smear is completely removed from the holes of the multilayer boards prior to plating. When etchback is used, the limits shall be between 0.0002 inch minimum and 0.002 inch maximum for non-PTFE material. For PTFE material, the etchback shall be between non-negative etchback and positive etchback of 0.002 inch.

p. CHANGE TO: Hot Air Leveling. PWB shall only be hot air leveled once. The solder coating shall be homogenous and completely cover the conductors with no pitting, no pinholes, or non-wet areas. Sidewalls of conductors need not be solder-coated. Touch-up shall be limited to no more than 5% of lands of pads

4.1 In-Process Controls

a. CHANGE TO: Elongation and tensile strength of as-plated copper shall be tested at least once a month. An alternate method is to statistically monitor the copper plating bath to maintain the level of organic compound composition within defined limits that shall directly correlate to assure requirements are met.

b. CHANGE TO: Inner layer Inspection. Prior to lamination, all inner layers shall be 100% inspected for continuity and shorts, and visually inspected for correct line width and spacing.

5. REGISTERED (RELIABILITY SUSPECT) PMP

c. CHANGE TO: Space Systems are particularly vulnerable because of the severe environment and the impossibility of repairing fielded equipment. Lead-free tin platings/coatings and solders represent a significant reliability risk in space applications and shall not be used except as noted in Section 4.

SECTION 200 CAPACITORS, GENERAL

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 210 MULTILAYER CERAMIC CAPACITORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 216 STACKED CERAMIC CAPACITORS (SM)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 217 CERAMIC CAPACITORS ARRAYS FOR FILTER CONNECTORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 230 METALLIZED FILM CAPACITORS (CRH)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 232 METALLIZED FILM CAPACITORS (CHS) (MIL-PRF-87217A) (OBSOLETE FOR NEW DESIGNS)

3.2 Insulator Washer

CHANGE TO: An insulator washer shall be added between the babbit end metallization and glass-to--metal end seal on both ends. The babbit material contains a high percentage of tin, and the process of applying the babbit creates a surface morphology that is susceptible to whisker formation. Tin whiskers can short circuit the end metallization and end seal.

SECTION 240 GLASS DIELECTRIC CAPACITORS (CYR) (MIL-PRF-23269) (OBSOLETE FOR NEW DESIGNS)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 250 FIXED MICA CAPACITORS (CMS) (MIL-PRF-87164A(3)) (OBSOLETE FOR NEW DESIGNS)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 255 FIXED, HIGH-VOLTAGE, RECONSTITUTED MICA CAPACITORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 260 FIXED TANTALUM FOIL CAPACITORS (CLR 25, 27, 35, AND 37) (MIL-PRF-39006) (OBSOLETE FOR NEW DESIGNS)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 270 SOLID TANTALUM CAPACITORS (CSS) (MIL-PRF-39003/10)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 275 SOLID TANTALUM CHIP CAPACITORS (CWR) (MIL-PRF-55365)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 280 FIXED TANTALUM-TANTALUM CAPACITOR, SINTERED WET SLUG, TANTALUM CASE (CLR79, CLR81, CLR90 & CLR91) (MIL-PRF-39006/22, /25, /30 & /31)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 300 CONNECTORS

2. APPLICATION

e. CHANGE TO: Strain relief for wires, harnesses, and cables shall be provided to mitigate fatigue failures from frequent mating and de-mating or severe shock and vibration.

f. CHANGE TO: Protective covers shall be installed at all times until connectors are mated.

h. CHANGE TO: When connector savers are used on flight equipment, they shall be installed prior to electrical test. If removal is required, each removal/reinstallation shall be recorded in the mate/de-mate log. Connector savers shall be of equivalent design and construction to the flight connectors and be constructed of flight quality materials and finishes. The connector savers shall be purchased from suppliers qualified per the section herein. Connector savers do not need to meet the additional requirements contained in Paragraph 4 herein. DPA is not required to be performed on connector savers. Connector savers shall be easily identifiable.

j. CHANGE TO: Insertion/removal tools shall be as specified in the applicable slash sheets of SAE AS39029 or per contact manufacturer guidance as appropriate.

l. CHANGE TO: All unused contact cavities shall be filled with Teflon cavity filling plugs.

2.1.a. CHANGE TO: The current shall be derated such that the nominal flight temperature of any connector will be less than the maximum rated temperature -25°C.

3. DESIGN AND CONSTRUCTION

3.1.3 b Connector and Accessory Plating

(2) CHANGE TO: Machined aluminum shells—gold plated per MIL-DTL-45204, Type II, Grade C, Class 1 (0.000050 inch minimum) over a nickel underplate of 0.000100 inch minimum in accordance with ASTM B7333, Class 1, shall have a double zincate coating preceding the nickel plating. Aluminum alloy parts—electroless nickel per the associated military connecter specification shall have a double zincate coating preceding the nickel plating.

3.1.3 c Contact Plating

(3) DELETE and designate "reserved"
(4) DELETE and designate "reserved"

3.1.3 d Crimped Contacts. CHANGE TO: Multi contact non-hermetic connectors should use crimp rear release contacts. Solder contacts shall be limited to potted and hermetic applications.

3.1.3 e Crimp Tools. CHANGE TO: As a minimum, crimping tools shall comply with the Class II requirements of MIL-C-22520 (CANCELED) and be tested and inspected for condition and performance before each use.

3.2 Physical Configurations.
d. CHANGE TO: MIL-DTL-26482 (Circular, Miniature, Quick Disconnect, Environment Resisting)

e. CHANGE TO: MIL-DTL-38999 (Circular, High Density)

h. CHANGE TO: MIL-DTL-83723, Series III (Circular, Environment Resisting)

i. CHANGE TO: MIL-DTL-83733 (Rack and panel, Rectangular)

j. CHANGE TO: MIL-DTL-83513 (Rectangular Microminiature)

4.3 Group B Tests CHANGE TO: Group B tests shall be in accordance with the requirements of the applicable military specification

4.5 Incoming Inspections. CHANGE TO: All metal surfaces shall be verified for the absence of prohibited materials (e.g., pure tin, zinc, or cadmium). Unless otherwise directed by the PMPCB, incoming inspection DPA in accordance with MIL-STD-1580 is only required for filter-pin connectors, connectors supplied with flying leads(e.g. MIL-PRF-83513/3,4,8,9), non-traditional styles (e.g., brush connectors, backplane connectors, nano connectors, mixed-contact type connectors or, others with <25-mil contact spacing), or connectors provided by commercial suppliers (i.e., manufacturers not Defense Logistics Agency approved). Incoming inspection DPA is not required for connectors that are Space Quality Baseline, NASA standard, QPL listed (except for those types identified above), or non-QPL listed parts (expect for those types identified above) produced at a QPL facility. Nor is DPA required for the connector contacts (except for filter pins).

6. PROHIBITED PMP

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 310 CONNECTORS, FILTERED

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 400 QUARTZ CRYSTALS (MIL-C-49468, CANCELED)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 410 CRYSTAL OSCILLATORS & CRYSTAL FILTERS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 500 DIODES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 510 RF DIODES (MIL-PRF-19500)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 600 EMI AND RFI FILTERS (FS) (MIL-PRF-28861, CLASS S)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 700 FUSES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 800 MAGNETIC DEVICES (MIL-STD-981)

3.3 Wire Size. CHANGE TO: Minimum magnetic wire size shall be as defined for Class S parts in Table II of MIL-STD-981. Except that for devices with smaller diameter gauge than #36 AWG, the wire shall be terminated within the coil housing and a wire larger than #36 AWG shall be used to connect to the terminal. Twisting smaller gauge wires (such as #36 AWG) and soldering to form a larger lead may fulfill the requirement for terminating with larger wires.

SECTION 900 MICROCIRCUITS

7.1 Incoming Inspection DPA. CHANGE TO: The procuring activity shall verify the workmanship and the internal design and construction through a destructive physical analysis (DPA) performed by the procurement activity or at an independent laboratory. The DPA shall meet MIL-STD-1580 unless otherwise approved by the program. DPA sampling should be relative to lot homogeneity as specified in paragraph 4.1.1. Residual Gas Analysis (RGA) samples may be used for DPA. Ensure RGA does not inadvertently damage part prior to DPA.

SECTION 910 INTEGRATED CIRCUITS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 960 HYBRIDS (MIL-PRF-38534, CLASS K)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1000 RELAYS (CURRENT RATINGS OF 25 AMPERES OR LESS)

2.3 Coil Voltage. CHANGE TO: The use of any coil voltage less than the rated voltage compromises the operation of the relay and will decrease the operating lifecycles for a given relay. Therefore, the coil operating voltage shall not be subject to a lesser value by derating; that is, shall not be less than the rated coil voltage nor more than the maximum rated coil voltage over the operating temperature range of the relay. When latching relays are installed in equipment, the latch and reset coils should not be pulsed simultaneously. Coils should not be pulsed with less than the nominal coil voltage and the pulse width should be a minimum of three times the specified operate time of relay. If these conditions are not followed, it is possible for the relay to be in the magnetically neutral position.

4.4 Qualification Tests. CHANGE TO: Qualification tests shall be in accordance with the applicable military specification.

SECTION 1100 RESISTORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1110 FIXED COMPOSITION, INSULATED, CARBON COMPOSITION (RCR) (MIL-R-39008)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1120 FIXED FILM RESISTORS (RLR) (MIL-PRF-39017)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1125 FIXED FILM RESISTOR CHIPS (RM) (MIL-PRF-55342, "V" AND "U" FAILURE RATES AND T-LEVEL, AND MIL-PRF-32159, T-LEVEL)

2.2 End-of-Life Design Limits (Resistance)

a. CHANGE TO: ±1 percent for nominal application
b. CHANGE TO: ±2 percent for worst-case application

5. REGISTERED (RELIABILITY SUSPECT)

ADD THE FOLLOWING:
d. Fixed termination parts with a length exceeding .20 inch. These parts can experience problems with attachment solder-joint cracking due to differential thermal expansion with the mounting PWB.

SECTION 1130 FIXED METAL FILM RESISTORS (RNC/RNR) (MIL-PRF-55182)

2.2 End-of-life Design Limits. (Resistance)

b. CHANGE TO: ±1.5 percent for worst-case application

SECTION 1140 VARIABLE, NON-WIREWOUND RESISTORS (RJR) (MIL-PRF-39035)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1150 VARIABLE, WIREWOUND RESISTORS (RTR) (MIL-PRF-39015)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1160 WIREWOUND, ACCURATE, RESISTORS (RBR) (MIL-PRF-39005))

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1170 WIREWOUND, POWER-TYPE RESISTORS (RWR) (MIL-PRF-39007)

3.1.1 Wire Diameter. CHANGE TO: DELETED

SECTION 1180 WIREWOUND, CHASSIS-MOUNTED RESISTORS (RER) (MIL-PRF-39009)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1190 FIXED FILM RESISTOR NETWORK (RZ) (MIL-PRF-83401)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1195 THERMISTORS (RTH) (MIL-PRF-23648 AND MIL-PRF-32192)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1200 SWITCHES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1210 SENSITIVE AND PUSH (SNAP ACTION) SWITCHES (MIL-PRF-8805)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1220 THERMAL SWITCHES (MIL-PRF-24236)

3.2 Recommended designs. ADD: c. Deadband +2.2ºC minimum

4.1.1 Switch Assembly.

d. CHANGE TO: Subsequent to final cleaning and assembly, all open switches shall be maintained in a controlled clean room environment with laminar flow hood, or similar measures, to eliminate particulate contamination. The environment shall be class 100, or better, as defined in FED-STD-209E (CANCELED).

4.1.2 CHANGE TO: Precap Visual Inspection (100 percent). Inspect at 30x magnification minimum in a controlled environment per 4.1.1.d.

SECTION 1230 PRESSURE SWITCHES (MIL-DTL-9395)

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1300 ACTIVE RF AND MICROWAVE DEVICES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1350 SURFACE ACOUSTICAL WAVE DEVICES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1360 COAXIAL CERAMIC RESONATORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1400 SEMICONDUCTORS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1500 WIRE AND CABLE

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1600 PHOTONICS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 1700 MECHANICAL PIECE PARTS

5. REGISTERED (RELIABILITY SUSPECT)

a. CHANGE TO: Uncleaned fasteners with lubricants and other materials that violate contamination control requirements.

SECTION 2000 MATERIALS REQUIREMENTS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2100 METALS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2110 ALUMINUM AND ALUMINUM ALLOYS

3.3 CHANGE TO: Stress Corrosion Cracking. Aluminum alloys shall not be used where analysis shows assembly or assembly-induced stresses are greater than 75% of the stress corrosion threshold for that alloy. The grain direction, launch, and mission environments shall be included in the analysis.

SECTION 2120 BERYLLIUM

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2130 MAGNESIUM

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2140 STEELS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2150 TITANIUM

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2160 OTHER METALS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2200 Polymeric Materials

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2210 ELASTOMERS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2220 FOAMED PLASTICS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2230 LUBRICANTS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2240 ADHESIVES, SEALANTS, COATINGS, & ENCAPSULANTS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2250 COMPOSITES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2260 CERAMICS

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 2270 SANDWICH ASSEMBLIES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3000 PROCESSES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3100 ADHESIVE BONDING

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3200 WELDING

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3300 BRAZING

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3400 FASTENER INSTALLATION

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

SECTION 3500 PRINTED CIRCUIT ASSEMBLY

2.7 Soldering. CHANGE TO: Soldering shall be per J-STD-001, and the space addendum, or NASA-STD-8739.3 (CANCELLED) for general soldering, and NASA STD-8739.2 (CANCELLED). Mounting and soldering configurations not addressed in these standards shall be qualified for the life and environments of the mission by testing with the end-product requirements document. Use of these configurations shall be approved by the PMPCB or customer. Heat sensitive components, such as fuses, shall be protected by heat sinks or other means.

APPENDIX A RADIATION HARDNESS ASSURANCE REQUIREMENTS

A.7 RADIATION HARDNESS ASSURANCE REQUIREMENTS FOR HYBRID MICR0CIRCUITS AND MULTICHIP MODULES

DELETE IN ENTIRETY

APPENDIX B RESCREENING/QUALITY CONFORMANCE INSPECTION REQUIREMENTS

Table B-2B. MIL-PRF-38534 Class H Hybrid Lot Acceptance Testing, (Sample as Specified), Test Methods of MIL-STD-883

Notes:
4/ CHANGE TO: Flight usage of life tests samples that are tested at temperatures below the maximum specified junction temperature, meeting all acceptance criteria, and not subjected to the destructive testing of subgroup 1, test (a) internal water vapor, and/or subgroup 3, test (b), temperature cycling shall only be used if requirements are documented in the contractor's approved PMP control plan.

APPENDIX C ALTERNATE QCI TEST/SAMPLING PLAN

C.2.1 Supplier. CHANGE TO: Use of the alternate QCI test/sampling plans specified in C3 and C4 of this section may be used under the following conditions:

C.2.2 Product. CHANGE TO: Use of the alternate QCI test/sampling plans specified in C 3 and C 4 of this section may be used under the following conditions:

C.2.3 Microcircuits per MIL-PRF-38535. CHANGE TO: C.3 Microcircuits per MIL-PRF-38535.

C.2.3.1 Reduced Group B Sample Size. CHANGE TO: C. 3.1 Reduced Group B Sample Size.

C.2.3.2 Reduced Group D Sample Size. CHANGE TO: C. 3.2 Reduced Group D Sample Size

C.2.4 Diodes and Transistors per MIL-PRF-19500. CHANGE TO: C.4 Diodes and Transistors per MIL-PRF-19500.

C.2.4.1 Reduced Group B Sample Size. CHANGE TO: C.4.1 Reduced Group B Sample Size.

C.2.4.2 Reduced Group C Sample Size. CHANGE TO: C.4.2 Reduced Group C Sample Size. For diodes and transistors, the requirements of MIL-PRF-19500, Table E-VII apply for reduced Group C sample size, (see Paragraph C.2.2).

APPENDIX D NOTES

There are no changes to this section. Use SMC-S-010 (2013) verbatim.

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