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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION GODDARD SPACE FLIGHT CENTER GREENBELT, MARYLAND 20771																				
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1.0. SCOPE

1.1 Purpose

This specification establishes the general requirements for thermostatic switches intend for use in space environments. The purpose of this document and the detail specification (paragraph 3.1) is to specify additional screening inspections (e.g., pre-cap visual, micro-particle inspection, run-in testing, vibration, PIND, 100% Group A inspections) which are not required by the MIL-PRF-24236 specification.

2.0 APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part this specification to the extent specified herein:

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-PRF-24236	Switches, Thermostatic (Metallic and Bimetallic), General Specifications for

3.0 REQUIREMENTS

3.1 GSFC Detail Specifications. The individual item requirements shall be in accordance with the applicable specification herein, and in accordance with the applicable detail specification sheets. In the event of any conflict between requirements of this specification and the detail specification sheets, the latter shall govern.

3.2 Workmanship. The switches shall be processed in such a manner as to be uniform in quality, and shall be free from cracked or displaced parts, sharp edges, burrs, and other defects which will affect life, serviceability, or appearance.

3.3 Particle Impact Noise Detection (PIND). Switches, thermostatic, shall be PIND tested in accordance with the manufacturer's standard PIND test procedure. A copy of the manufacturer's documented PIND test procedure shall be available for review by the procuring activity upon request.

3.4 Test Reporting and Data recording. A test results summary sheet shall be supplied along with the successfully screened parts. Records of actual test data on all screened parts shall be retained by the facility for a period of three years and shall be made available for inspection to the procuring activity within that duration if so requested.

3.5 Internal (Pre-cap) Visual Inspection. A 100% pre-seal visual inspection shall be performed. The internal visual inspection shall be performed using appropriate magnification (10X minimum). The purpose of this examination is to detect faulty workmanship and

extraneous particles or materials that are not a required functional part of the mechanism. This examination shall be made on the header assembly, disc, and case, and shall be made from all views necessary to ensure the absence of contamination from contacts and crevices. In addition, the following is required:

- There shall be no evidence of case distortion, which could impair operation of the switch. Any damage or indentation of the weld rim or disc seating surfaces shall be a cause for rejection. There shall be no evidence of blistering, or flaking of the nickel or gold plating from either the base or terminal posts.
- Transfer pins or insulators that have sharp peaks, cracks, or loose flaking shall be rejected.
- There shall be adequate clearance around moving parts, and adequate spacing or proper insulation of insulated electrical parts.

3.6 Micro-particle Cleaning and Inspection. Switches, thermostatic, shall be subjected to micro-particle cleaning and inspection prior to insertion into their enclosures. Micro-particle cleaning and inspection shall be in accordance with the manufacturer's standard procedures. A copy of the manufacturer's documented micro-particle cleaning and inspection procedures shall be available for review by the procuring activity upon request.

3.7 External Visual and Mechanical Examination. The switches shall be examined to verify that the workmanship, configuration and dimensions are in accordance with paragraphs 3.1 and 3.2 herein.

3.8 Run-in (pre-Acceptance conditioning). When the switches are tested as specified in paragraph 4.4, there shall be no evidence of intermittent contact operation. The monitored contact resistance during each cycle shall not exceed 100 milliohms.

3.9 Vibration (Random). When tested as specified in 4.5, switches shall be functional during testing, and there shall be no opening of closed contacts or closing of open contacts in excess of 10 microseconds. Afterwards, there shall be no evidence of mechanical damage.

3.10 Calibration. When switches are tested as specified in MIL-PRF-24236, quality conformance inspection calibration method for switches, the operating points for the opening and closing temperatures shall be within the tolerance specified (see 3.1).

3.11 Creepage. When tested as specified in 4.6, switches shall respond to specified temperature changes with immediate positive snap action. The arc duration shall not exceed 5 milliseconds. Contact bounce, when applicable, shall not exceed the limit in the detail specification.

3.12 Seal. The test method and requirements shall be in accordance with MIL-PRF-24236.

3.13 Dielectric withstanding voltage (DWV). The test method and requirements shall be in accordance with MIL-PRF-24236.

3.14 Insulation resistance. The test methods and requirements shall be in accordance with MIL-PRF-24236.

3.15 Contact resistance. The test methods and requirements shall be in accordance with MIL-PRF-24236. Unless otherwise specified in the detail specification, the contact resistance shall not exceed 25 milliohms.

3.16 Particle Impact Noise Detection (PIND). When the switches are tested in accordance with paragraph 3.3 herein, there shall be no evidence of particulate contamination.

3.17 Part Number. The part number shall be as specified in the detail specification.

3.18 Date Code Identification. Each thermostat shall be identified by a date code that shows the year and the week of manufacturer.

3.19 Part Marking. Each thermostat shall be marked with the part number and date code established under 3.17 and 3.18.

3.20 Plating. Platings which are known to sublime in a hard vacuum such as cadmium or zinc shall not be used. Use of tin plating is prohibited internally and externally. Use of tin-lead finishes is acceptable provided the minimum lead content is 3%. All finishes shall be free from breaks, scratches, and other defects which will reduce the serviceability of the parts.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspecting. Unless otherwise specified, the manufacture is responsible for the performance of all qualification and screening. GSFC reserves the right to reinspect the thermostatic switches and to designate representatives for in-plant surveillance and acceptance functions in connections with procurement of thermostatic switches to this and the detail specification.

4.2 Qualification. The switches supplied to this specification shall meet or exceed the qualification requirements of MIL-PRF-24236. GSFC will approve supplier qualification.

4.3 Group A Inspection. The switches shall be subjected to 100% Group A screening inspection per Table I in the order shown.

4.4 Run-in. The switches shall be operated for a minimum of 500 consecutive total cycles (one cycle constitutes one closure and one opening of the switch contacts). The switch shall be alternately heated and cooled to switch at the maximum actuating temperature and the minimum actuating temperature. The switch cycling rate shall not exceed three cycles per minute. The contacts shall switch a load of 6 ± 1 VDC @ 100 ± 25 mA. This test shall be monitored to verify the proper switch function and contact resistance.

Table I

Test No.	Test Description	Reference Documents	
		Requirement	Test Methods
1	Internal Visual (Pre-seal) Inspection	Para. 3.5	Para. 3.5
2	Micro-particle Cleaning and Inspection	Para. 3.6	Para. 3.6
3	External Visual and Mechanical Examination	Para. 3.7	Para. 3.7
4	Run-in <u>1/</u>	Para. 3.8	Para. 4.4
5	Vibration	Para. 3.9	Para. 4.5
6	Particle Impact Noise Detection (PIND)	Para. 3.16	Para.3.3
7	Calibration	Para. 3.10	MIL-PRF-24236
8	Creepage	Para. 3.11	MIL-PRF-24236
9	Seal	Para. 3.12	MIL-PRF-24236
10	Dielectric Withstanding Voltage (DWV)	Para. 3.13	MIL-PRF-24236
11	Insulation Resistance	Para. 3.14	MIL-PRF-24236
12	Contact Resistance	Para. 3.15	MIL-PRF-24236

Notes:

1/ Alternately, run-in may be performed after PIND.

4.5 Vibration (Random). Testing shall be performed per Method 214 of MIL-STD-202 with the following details and exceptions:

Frequency	Spectrum
20 Hz	0.01 g ² /Hz
20 - 90 Hz	Increase, 9dB /octave
90 - 350 Hz	0.9 g ² /Hz
350 - 2000Hz	Decrease, -6dB /octave
Overall G _{rms}	22.7

Switches are to be functioning during testing: contacts shall be connected to a power supply at the manufacturer's specified voltage and load current to monitor switching and contact chatter.

Perform for 1 minute per axis per contact position in each of 3 mutually perpendicular axes, 6 minutes total per device.

4.6 Creepage. Switches shall be heated and cooled as specified with a temperature rate of change of less than 1 degree Fahrenheit per minute for three complete cycles. Voltage to be switched shall be per Table II with sufficient load to limit current to 1 milliampere maximum.

Table II

Applicable Thermostat Series	Device Differential (°F)	Tester Voltage (VDC, minimum)	Maximum Arc Duration (mS)
S-311-641/01	>5	500	5
S-311-641/02	2-9	450	5
MIL-PRF-24236/1	>5	500	5
MIL-PRF-24236/13	30	300	5
MIL-PRF-24236/19	30	300	5
MIL-PRF-24236/20	2-9	450	5

5.0 PREPARATION FOR DELIVERY

5.1 Packaging. Each switch shall be individually packaged and sealed in a dust-free moisture proof container. Each switch shall be protected within the package to the extent that the normal handling will not cause damage to the switch.

6.0 NOTES

6.1 Data Address. When supplemental data, reports, or information requests are to be transmitted to GSFC, the following address shall be used, unless otherwise specified.

ATTN: QPLD Administrator
 Parts, Packaging, & Assembly Technologies Office, Code 562
 Goddard Space Flight center
 Greenbelt, Maryland 20771

6.2 Ordering Data. Acquisition documents should specify the following:

- a. Number, title and date of this specification.
- b. Goddard part number.
- c. Quantity.

6.3 Qualification Provisions. With respect to products requiring qualification, awards will be made only for products which have been approved by GSFC before the time set for opening of bids. The attention of the supplier is called to this requirement; manufacturers should arrange to have qualification test made on products which they propose to offer to GSFC to become eligible for awards contracts or orders for products covered by this specification. Information pertaining to qualification of products may be obtained from the activity whose address is listed in 6.1.

6.4 Notice. When GSFC drawings, specification, or other data are used for any purpose other than in connection with a definitely related GSFC procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; the fact that GSFC might have formulated, furnished or in any way supplied the said drawings, specification, or other data is not to be regarded by implication or otherwise in any manner licensing the holder or any person or corporation, or conveying any right or permission to manufacture, use or sell any patented invention that may in any way be related thereto.

6.5 Definitions. Definitions of terms shall be in accordance with DOD-C-24621 and EIA-455 specifications and procedures

Custodian: QPLD Administrator
Parts, Packaging, & Assembly Technologies Office, Code 562
Goddard Space Flight center
Greenbelt, Maryland 20771