INCH-POUND
MIL-PRF-24236D
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1 June 2010

SUPERSEDING
MIL-PRF-24236D
5 April 2006

PERFORMANCE SPECIFICATION

SWITCHES, THERMOSTATIC, (METALLIC AND BIMETALLIC), GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for metallic-element actuated, thermostatic switches intended primarily for use in electrical and electronic equipment, in alternating current (ac) and direct current (dc) applications, where temperature protection, overheat detection, or accurate temperature control is required. The operating temperatures and operating temperature ranges of switches are covered by this specification (see 3.1 and 6.2.2).

1.2 Classification. Switches covered by this specification are to be classified by type and class as indicated herein (see 3.1 and 6.2.2).

Type I	-	Snap action, make and break operation.
Type II	-	Slow make and break operation.
Class 1	-	Altitude - Sea level to 10,000 feet. Vibration - 10-55 Hertz (Hz), .06 double amplitude. Shock - 75g, 6 milliseconds (ms).
Class 2	-	Altitude - Sea level to 10,000 feet. Vibration - 10-55 Hz, .06 double amplitude. Shock-High impact.
Class 3	-	Altitude - Sea level to 70,000 feet. Vibration - 10-500 Hz, 10g. Shock - 75g, 6 ms.
Class 4	-	Altitude - Sea level to 70,000 feet. Vibration - 10-2,000 Hz, 20g. Shock - 100g, 6 ms.
Class 5	-	Altitude - Sea level to 100,000 feet. Vibration - 10-3,000 Hz, 50g. Shock - 500g, 1 ms.
Class 6	-	Altitude - Sea level to 100,000 feet. Vibration - 10-2,000 Hz, 30g. Shock - 100g, 6 ms.

Comments, suggestions or questions on this document should be addressed to Defense Supply Center Columbus, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990, or emailed to (switch@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dap.dla.mil.

AMSC N/A FSC 5930

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.1 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.

FEDERAL STANDARDS

FED-STD-H28 - Screw-Thread Standards for Federal Services.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-R-5757/10 - Relays, Electrical, Hermetically Sealed, DPDT, Low Level and 2 Amperes.
MIL-PRF-15160 - Fuses; Instrument, Power, and Telephone.

(See Supplement 1 for list of applicable specification sheets.)

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-1276 - Leads, Weldable, for Electronic Component Parts.
MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at https://assist.daps.dla.mil/quicksearch or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 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.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

NCSL Z540-1 - General Requirements for Calibration Laboratories and Measuring and Test Equipment.

(Copies of these documents are available online at http://www.ansi.org or from the American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036-8002, telephone 212-642-4900, fax 212-302-1286.)

INTERNATIONAL ORGANIZATION FOR STANDARDS (ISO)

ISO 10012-1 - Quality Assurance Requirements for Measuring Equipment - Part 1; Meteorological Confirmation System for Measuring Equipment.

(Copies of these documents are available online at http://www.ansi.org or from the American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036-8002, telephone 212-642-4900.)

SOCIETY OF AUTOMOTIVE ENGINEERS

SAE-AS25244	-	Circuit Breaker, Trip Free, Push-Pull, 5 thru 50 AMP, Type I
SAE-AS58091	-	Circuit Breakers, Trip-Free, Aircraft, General Specification for
SAE-AS7928	-	Terminal, Lug Splices, Conductor, Crimp Style, Copper

(Copies of these documents are available online at http://www.sae.org or from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pennsylvania, 15096-0001)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Requirements for individual switches. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. Where there is no specification sheet available, the individual part requirements shall be as specified in complementary documents or ordering information (see 6.2.2). In the event of any conflict between requirements of this specification and the specification sheet or complementary document, the latter shall govern (see 6.2).

3.2 Switch category. Switches furnished under this specification shall be category I, as defined herein.

3.2.1 Category I. Switches completely defined by a military specification sheet.

3.3 Qualification. Category I switches furnished under this specification shall be products which are qualified for listing on the applicable qualified products list prior to the award of a contract.

3.4 Material. Materials shall be used which enable the switches to meet the performance requirements of this specification

3.4.1 Plastic. Unless otherwise specified (see 3.1 and 6.2.2), Molded plastic material, when used, shall be selected to enable the switch to meet the performance requirements of this specification. For additional information and guidance on molded plastic material see 6.5.

3.4.2 Metals. All metal parts exposed to environmental conditions shall be of a corrosion-resistant material or shall be suitably plated to resist corrosion.

3.4.2.1 Dissimilar metals. When dissimilar metals are used in intimate contact with each other, protection against electrolysis and corrosion shall be provided. The use of dissimilar metals in contact, which tend toward active electrolytic corrosion (particularly brass, copper, or steel used in contact with aluminum or aluminum alloy) is not acceptable. However, metal-spraying or metal plating of dissimilar base metals to provide similar or suitable abutting surfaces is permitted. The use of dissimilar metals separated by a suitable insulating material is also permitted. For additional information and guidance on dissimilar metals see 6.4.

3.4.2.2 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of switch components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.4.1).

3.4.3 Rubber. Where rubber is used it shall be capable of meeting the environmental performance requirements of this specification.

3.4.4 Ceramic. Ceramic insulation shall be capable of meeting the environmental performance requirements of this specification.

3.4.5 Weldability. Leads designed for weldability shall conform to the requirements of MIL-STD-1276, composition K. or equivalent.

3.4.6 Screw terminals. Screw terminals shall be provided with hardware as specified (see 3.1 and 6.2.2). Lockwashers shall be captive to the screw. For direct Government orders, all terminal hardware shall be installed on the switch.

3.5 Interface and physical dimensions. Switches shall be constructed to insure proper operation when mounted in any position. The switches shall meet the interface and dimensions specified (see 3.1).

3.5.1 Hermetic enclosure (when applicable, see 3.1 and 6.2.2). A hermetic enclosure shall be constructed so as to be gas tight by complete sealing of glass or ceramic to metal on bonding metal to metal by fusion, and unless otherwise specified (see 3.1 and 6.2.2), hermetically sealed switches shall be sealed by soldering, welding, or brazing. Sealed switches shall be dried and backfilled with dry gas with a dew point less than -65 degrees C.

3.5.2 Tamperproof calibration. Unless otherwise specified (see 3.1 and 6.2.2), the switches shall be so sealed that any tampering with the calibration after final adjustment by the manufacturer shall require dismantling of the switch or the breaking of a seal. The seal shall not be easily broken by manual force or without the use of any device considered a tool, for example, screwdriver, pliers, soldering iron, and so forth.

3.5.3 Environmental test effect (unless otherwise specified, see 3.1). Exposure to any single environmental test shall not change the initial operation point by more than the initial tolerance and an additional ± 3°F. Exposure to two or more environmental tests, including endurance, shall not change the operation point by more than the initial tolerance and ± 5°F in the temperature range 0°F to 350°F and an additional 8°F outside this range.

3.5.4 Solder terminals. Solder terminals shall be treated to facilitate soldering. The terminal design shall be such that a mechanical connection can be made prior to soldering. Acceptable solder terminal designs are turret, hook, pierced, or post type.

3.5.5 Mounting. Mounting shall be as specified (see 3.1 and 6.2.2). Stud mounting shall have threads in accordance with FED-STD-H28.

3.5.6 Weight. Weight shall be as specified (see 3.1 and 6.2.2).

3.6 Electrical ratings. The electrical ratings shall be as specified (see 3.1 and 6.2.2).

3.7 Solderability. When switches are tested as specified in 4.6.2, 95 percent of the total length of fillet, which is between the standard wrap wire and the terminal, shall be tangent to the surface of the terminal being tested. There shall be no pinholes, voids, and so forth. A ragged or interrupted line at the point of tangency between the fillet and the terminal under test shall be considered a defect. After the test, there shall be no evidence of fracture, loosening of parts, or any other mechanical failure of the switches.

3.8 Calibration. When switches are tested as specified in 4.6.3, the operating points for the opening and closing temperature shall be within the tolerances specified (see 3.1 and 6.2.2). Switches that are rated for minimum current (see 3.31) or low level (see 3.30) shall be subjected to only these loads during qualification, group A, and group B testing.

3.9 Creepage (applicable to type I switches only, see 3.1 and 6.2.2). When switches are tested as specified in 4.6.4, the opening and closing of switch contacts shall occur simultaneously with, and as a result of, the disc snap.

3.10 Sensitivity response (when specified, see 3.1). When switches are tested as specified in 4.6.5.1, the time required for the switch to actuate and deactuate shall not exceed 10 seconds.

3.11 Temperature anticipation (when specified, see 3.1 and 6.2.2). When switches are tested as specified in 4.6.6, the switches shall not operate.

3.12 Seal (as applicable, see 3.1 and 6.2.2).

3.12.1 Hermetic. When switches are tested as specified in 4.6.7.1, the leakage rate shall not exceed 1 x 10^{-8} standard atmospheric cubic centimeters per second (atm cc/sec).

3.12.2 Watertight. When switches are tested as specified in 4.6.7.2, there shall be no leakage as evidenced by a continuous stream of bubbles.

3.13 Dielectric withstanding voltage. Unless otherwise specified (see 3.1 and 6.2.2), when switches are tested as specified in 4.6.8, there shall be no flashover, arcing, or current flow in excess of 500 microamperes.

3.14 Insulation resistance. When measured as specified in 4.6.9, the insulation resistance between all insulated terminals and enclosures shall be not less than 500 megohms.

3.15 Contact resistance. Unless otherwise specified (see 3.1 and 6.2.2), when measured as specified in 4.6.10, the initial contact resistance shall not exceed 25 milliohms. Following the endurance test, contact resistance shall not exceed 50 milliohms.

3.16 Thermal shock. When switches are tested as specified in 4.6.11, there shall be no mechanical or electrical damage. The temperature settings shall be within the opening and closing temperature tolerances as specified (see 3.1, 6.2.2, and 3.5.3).

3.17 Terminal strength. When switches are tested as specified in 4.6.12, the terminals shall not break, loosen, crack, or affect the operation of the switch.

3.18 Moisture resistance. When switches are tested as specified in 4.6.13, the insulation resistance, immediately after conclusion of the test, shall be greater than 2 megohms at 500 Vdc. At the end of the drying period, the insulation resistance shall be as specified in 3.14. At the conclusion of the test, there shall be no evidence of corrosion or mechanical damage.

3.19 Flame response (when specified, see 3.1). When switches are tested as specified in 4.6.14, the time required for the switch to operate shall not exceed 5 seconds.

3.20 Short circuit. When switches are tested as specified in 4.6.15, there shall be no welding or sticking of contacts, or damage. Switches shall be mechanically and electrically operative at the end of the test.

3.21 Vibration. Unless otherwise specified (see 3.1, 6.2.2, and 3.5.3), when switches are tested as specified in 4.6.16, closing of open contacts and opening of closed contacts shall not exceed 10 microseconds.

3.22 Shock. Unless otherwise specified (see 3.1, 6.2.2, and 3.5.3), when switches are tested as specified in 4.6.17, there shall be no change in operation or evidence of broken, deformed, displaced, or loose parts.

3.22.1 Method I (shock, specified pulse) (applicable to classes 1, 3, 4, 5, and 6) (see 3.1 and 6.2.2). When switches are tested as specified in 4.6.17.1, closing of open contacts and chatter of closed contacts shall not exceed 10 microseconds, unless otherwise specified (see 3.1 and 6.2.2).

3.22.2 Method II (high-impact shock) (applicable to class 2 only, see 3.1 and 6.2.2). When switches are tested as specified in 4.6.17.2, closing of open contacts and chatter of closed contacts shall not exceed 5 milliseconds, unless otherwise specified (see 3.1 and 6.2.2).

3.23 Overload cycling. When switches are tested as specified in 4.6.18, there shall be no mechanical or electrical failure.

3.24 Endurance. When tested as specified in 4.6.19, switches shall remain electrically operative.

3.25 Salt spray (corrosion). When switches are tested as specified in 4.6.20, switches shall show no evidence of destructive corrosion. After the test, any mounting hardware (if applicable) shall be readily removable. NOTE: Destructive corrosion shall be construed as being any type of corrosion which in any way interferes with the mechanical or electrical performance, or in the case of plated metals, corrosion which has passed through the plating and attacked the base metal.

3.26 Sand and dust (when specified, see 3.1). When switches are tested as specified in 4.6.21, the subsequent operating characteristics shall be as specified (see 3.1), and they shall be mechanically and electrically operative at the conclusion of the test.

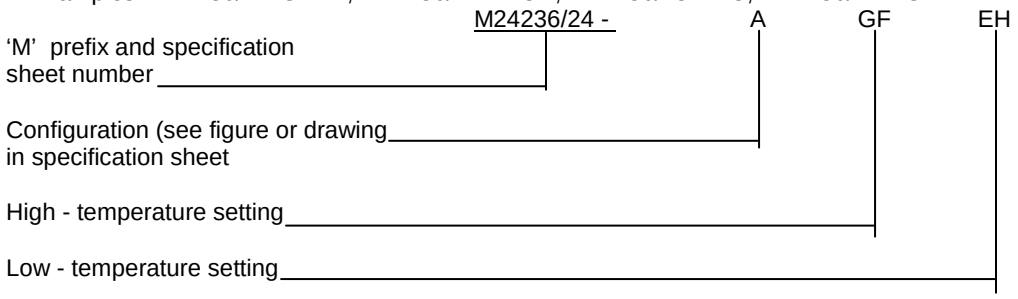
3.27 Explosion (when specified, see 3.1). When switches are tested as specified in 4.6.22, there shall be no explosion within the test chamber, whether or not explosion occurs within the switch, and the switches shall be electrically and mechanically operative after the test.

3.28 Marking. Switches shall be marked in accordance with MIL-STD-1285, with the military part number and/or the manufacturer's part number when specified (see 6.2.2), date code, and the manufacturer's trademark or cage code. Switches used in the manufacturer's next higher assemblies do not require marking. For polarized switches, the plus terminal shall be marked with a + sign.

3.28.1 Part or Identifying Number (PIN). The term Part or Identifying Number (PIN) is equivalent to the term part number which was previously used in this specification. The performance PIN (when applicable) shall consist of the 'M' prefix followed by the applicable specification sheet number, a dash (-), and one of the following (see 3.1):

a. Sequentially assigned number (i.e., -001, -01) - Examples: M24236/1-001; M24236/14-01.
b. Letter codes assigned to indicate applicable design features (i.e., configuration, contact action, high operating temperature, low operating temperature, probe length, etc.)

Examples: M24236/1-AGFEH; M24236/11-AACD; M24236/13-AHC; M24236/24-AGFEH.



3.29 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.30 Low level (when specified, see 3.1 and 6.2.2). When switches are tested as specified in 4.6.23, there shall be no failures. A failure shall be a contact resistance exceeding 100 milliohms either during or after the test. The allowable temperature tolerance during and after testing shall be the initial temperature tolerance and an additional ±5 degrees F.

3.31 Minimum current (intermediate current) (when specified, see 3.1 and 6.2.2). When switches are tested as specified in 4.6.24, there shall be no failures. A failure is defined as a cycle of operation during which any switch circuit under test fails to close or open in proper sequence as detected by the relay and monitoring device. The allowable temperature tolerance during and after testing shall be the initial temperature tolerance and an additional ±5 degrees F.

3.32 Resistance to solvents. When switches are tested as specified in 4.6.25, the markings shall be legible.

3.33 Workmanship. 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.

4. VERIFICATION.

4.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-1, ISO-10012-1, or equivalent system as approved by the qualifying activity.

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

a. Qualification inspection (see 4.4).
b. Conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202 with the following exception: Relative humidity shall be 20 to 75 percent.

4.4 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.4.1 Sample size. The number of switches to be subjected to qualification inspection shall be as specified (see 3.1 and table I).

4.4.2 Inspection routine. The sample shall be subjected to the inspections specified in table I in the order shown. All sample units shall be subjected to the inspections of group I in the order shown. The sample shall then be divided as specified in table I for groups II to VI inclusive, and subjected to the inspection for their particular group.

4.4.3 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.4.4 Extent of qualification.

4.4.4.1 Single submission. Qualification shall be restricted to the switch submitted.

4.4.4.2 Group submission. If samples satisfactorily pass the qualification inspection, other switches from the same manufacturer that have the same operation, or reverse operation, design, construction, switching characteristics, class, and physical dimensions will be considered qualified by the Government without further qualification inspection.

4.4.4.3 Qualification by classes. Qualified switches of class 5 shall provide qualification for classes 6, 4, 3, 2 1/, and 1. Class 3 shall provide qualification for classes 2 1/ and 1. Qualification will be granted for switches having tolerances and differentials greater than those qualified.

1/ For class 2 qualification, two additional sample units shall be subjected to calibration and high-impact shock tests specified in 4.6.3.1 and 4.6.17.2.

TABLE I. Qualification inspection.

Examination or test	Requirement paragraph	Method paragraph
Group I (all sample units) 1/		
Visual and mechanical examination		
Solderability (3 sample units)	3.1, 3.4, 3.5, 3.28 and 3.33	4.6.1
Calibration	3.7	4.6.2
Creepage (when applicable)	3.8	4.6.3
Sensitivity response	3.9	4.6.4
Temperature anticipation (when applicable)	3.10	4.6.5.1
Seal (as applicable)	3.11	4.6.6
Dielectric withstanding voltage	3.12	4.6.7
Insulation resistance	3.13	4.6.8
Contact resistance	3.14	4.6.9
Group II (3 sample units from group I)	3.15	4.6.10
Thermal shock		
Terminal strength	3.16	4.6.11
Low level (when applicable)	3.17	4.6.12
Moisture resistance	3.30	4.6.23
Flame response (when applicable)	3.18	4.6.13
Short circuit	3.19	4.6.14
Group III (4 sample units from group I)	3.20	4.6.15
Minimum current (when specified)		
Vibration	3.31	4.6.24
Shock	3.21	4.6.16
Group IV 1/ 2/	3.22	4.6.17
Overload cycling		
Endurance	3.23	4.6.18
Group V (all sample units from groups II, III and IV)	3.24	4.6.19
Visual and mechanical examination		
Calibration	3.1, 3.4, 3.5, 3.28 and 3.33	4.6.1
Creepage (when applicable)	3.8	4.6.3
Sensitivity response	3.9	4.6.4
Temperature anticipation (when applicable)	3.10	4.6.5.1
Seal (as applicable)	3.11	4.6.6
Dielectric withstanding voltage	3.12	4.6.7
Insulation resistance	3.13	4.6.8
Contact resistance	3.14	4.6.9
Resistance to solvents	3.15	4.6.10
Group VI (4 sample units from group I)	3.32	4.6.25
Salt spray (corrosion)		
Sand and dust (when applicable) (2 sample units)	3.25	4.6.20
Explosion (when applicable) (2 sample units)	3.26	4.6.21
	3.27	4.6.22

1/ Total number of sample units is dependent upon the number of loads specified (see 3.1).
2/ Three sample units shall be tested at the lowest temperature at the rated ac resistive load for which qualification is sought (see 3.1). Three sample units shall be tested at the midrange temperature at the rated ac resistive load for which qualification is sought (see 3.1). If no ac resistive loads are specified (see 3.1), test low and midrange temperatures at the highest specified dc load. Three sample units shall be tested at the highest temperature for which qualification is sought at each load specified (see 3.1).

4.4.5 Retention of qualification. Every 12 months, the manufacturer shall verify the retention of qualification to the qualifying activity. Retention is based on meeting the following requirements:

a. The manufacturer has not modified the design of the item.
b. The specification requirements for the item have not been amended so far as to affect the character of the item.
c. Lot rejection for group A inspection does not exceed the group A sampling plan.
d. The requirements for group B inspection are met every 36 months.

4.5 Conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection.

4.5.1.1 Inspection lot. An inspection lot shall consist of all switches of the same type produced under essentially the same conditions, and offered for inspection at one time.

4.5.1.2 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table II, sequence is uncontrolled.

4.5.1.2.1 Sampling plan. Statistical sampling and inspection shall be in accordance with table III. Separate, randomly selected groups of samples are required for subgroups 1 and 3. For acceptance there shall be zero occurrences of defects.

4.5.1.2.1.1 Subgroup 1. A sample of parts shall be randomly selected in accordance with table III

4.5.1.2.1.2 Subgroup 2. The lot shall be 100 percent inspected.

4.5.1.2.1.3 Subgroup 3. A sample of parts shall be randomly selected in accordance with table III.

TABLE II. Group A inspection.

Examination or test	Requirement paragraph	Method paragraph
Subgroup 1		
Visual and mechanical examination	3.1, 3.4, 3.5, 3.28 and 3.33	4.6.1
Subgroup 2 (100 percent inspection)		
Calibration 1/	3.8	4.6.3
Creepage (when applicable) 1/	3.9	4.6.4
Seal (as applicable) 1/	3.12	4.6.7
Subgroup 3		
Dielectric withstanding voltage	3.13	4.6.8.1
Contact resistance	3.15	4.6.10

1/ In process inspection may be used to satisfy these requirements.

TABLE III. Zero defect sampling plan.

Lot size	Number of switches to be tested	
	Subgroup 1	Subgroup 3
1 - 15	5	All
16 - 50	5	20
51 - 90	7	20
91 - 150	11	20
151 - 280	13	20
281 - 500	16	47
501 - 1,200	19	47
1,201 - 3,200	23	53
3,201 - 10,000	29	68
10,001 - 35,000	35	77

4.5.1.2.2 Rejected lots. If an inspection lot is rejected, the lot shall be 100 percent inspected for the defects noted. The contractor may correct the defects or remove the defective units from the lot. The lot shall then be sampled again in accordance with table III. For acceptance, there shall be zero occurrences of defects. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.5.1.2.3 Disposition of sample units. Sample units which have passed all the group A inspection may be delivered on the contract or purchase order, if the lot is accepted and the sample units are still within specified electrical tolerances.

4.5.2 Periodic inspection. Periodic inspection shall consist of group B, except where the results of these inspections show noncompliance with the applicable requirements (see 4.5.2.1.4), delivery of products which have passed group A shall not be delayed pending the results of this qualification verification inspection.

4.5.2.1 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table IV, in the order shown. Group B inspection shall be made on sample units selected from inspection lots which have passed the group A inspection.

4.5.2.1.1 Sampling plan. Six sample units shall be selected for each type of switch produced, within 36 months after the date of notification of qualification and within each subsequent 36-month period. A supplier's normal quality control tests, production tests, environmental tests, and so forth, may be used to fulfill all or part of group B inspection; however, all of the group B inspection shall be completed as specified.

4.5.2.1.2 Failures. If one or more sample units fail to pass group B inspection, the sample shall be considered to have failed.

4.5.2.1.3 Disposition of sample units. Sample units which have been subjected to group B inspection shall not be delivered on the contract or purchase order.

4.5.2.1.4 Noncompliance. If a sample fails to pass group B inspection, the supplier shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions with essentially the same materials, processes, and so forth, and which are considered subject to the same failures. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group B inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Group A inspection may be reinstituted, however, final acceptance shall be withheld until the group B reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and the corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

TABLE IV. Group B inspection.

Examination or test	Requirement paragraph	Method paragraph
Subgroup 1 (3 sample units)		
Thermal shock	3.16	4.6.11
Terminal strength	3.17	4.6.12
Low level (when specified)	3.30	4.6.23
Moisture resistance	3.18	4.6.13
Flame response (when applicable)	3.19	4.6.14
Short circuit	3.20	4.6.15
Overload cycling	3.23	4.6.18
Subgroup 2 (3 sample units)		
Vibration	3.21	4.6.16
Shock	3.22	4.6.17
Minimum current (intermediate current) (when specified)	3.31	4.6.24
Endurance 1/	3.24	4.6.19
Subgroup 3 (3 sample units from subgroup 2)		
Salt spray (corrosion)	3.25	4.6.20
Sand and dust (when applicable)	3.26	4.6.21
Explosion (2 sample units) (when applicable)	3.27	4.6.22
Subgroup 4 (all sample units)		
Visual and mechanical examination	3.1, 3.4, 3.5, 3.28 and 3.33	4.6.1
Calibration	3.7	4.6.3
Creepage (when applicable)	3.9	4.6.4
Sensitivity response (when applicable)	3.10	4.6.5.1
Temperature anticipation (when applicable)	3.11	4.6.6
Seal (as applicable)	3.12	4.6.7
Dielectric withstanding voltage	3.13	4.6.8.1
Insulation resistance	3.14	4.6.9
Contact resistance	3.15	4.6.10

1/ If no ac resistive loads are specified (see 3.1), test at the highest specified dc load.

4.6 Methods of examination and test.

4.6.1 Visual and mechanical examination. Switches shall be examined to determine that the materials, design, construction, physical dimensions, markings, and workmanship are in accordance with the applicable requirements (see 3.1, 3.4, 3.5, 3.28, and 3.33), and when specified, switches shall be X-rayed in two planes perpendicular to its axis to ascertain correct alignment of all internal actuating elements, the integrity of the unit, and any entrapped foreign matter.

4.6.2 Solderability (see 3.7). Switches shall be tested in accordance with method 208 of MIL-STD-202. The following details and exception shall apply:

(a). Number of terminations for each part to be tested - Two.
(b). Dipping device - Need not be used.
(c). Solder dip - Applicable.
(d). Examination of terminations - Method for evaluation of lugs and tabs shall apply.

4.6.3 Calibration (see 3.8). Switches shall be tested as specified in 4.6.3.1 for qualification and as specified in 4.6.3.2 for quality conformance inspection. When disputes arise or different readings are encountered in the circulated-air method versus the liquid-bath method, the latter shall govern. This does not apply to the surface block method.

4.6.3.1 Method for qualification inspection. Switches submitted for qualification inspection shall have their operating points determined by one of the following methods or other suitable method.

(a). Liquid bath method (preferred) - The switch shall be immersed in a well-agitated bath of a suitable liquid. In order to observe the operation of the contacts, the switch shall be connected to a suitable indicating circuit. When the temperature is within 5 degrees F of the operating range, the rate of change shall not exceed 1 degree F per minute. To minimize parallax error in reading temperatures, the switch shall be run through three cycles; however, each reading shall be within the tolerances specified (see 3.1 and 6.2.2) and the operating temperatures shall be recorded for each cycle. The average of the three readings shall be the operating temperature point.

(b). Circulating-air method - Use same procedure as in 4.6.3.1a, except that the switch shall be placed in a circulating-air chamber. The rate of temperature change shall not exceed 1 degree F per minute.

4.6.3.2 Method for conformance inspection. For conformance inspection, switches shall be tested by one of the following methods, or other suitable method. Throughout this test, X = upper operating temperature range, and Y = lower operating temperature range.

4.6.3.2.1 Air-calibration method. The switch shall be placed in a calibration chamber (see 4.6.3.1b). The switch shall be tested by a "go-no-go" method as used in inspection gages, or by recording individual temperatures of each switch.

4.6.3.2.1.1 Individual temperature method. The rate of temperature change shall not exceed 1°F per minute when the temperature is within 5°F of the operating range.

4.6.3.2.1.2 Go-no-go test procedure (for type I switches). The following tests may be entered at any step, but tests must be conducted in the sequence shown, with step 1 following step 4.

Step 1 - Adjust the temperature of the chamber to X degrees F minimum minus 3 degrees F. Hold this temperature for three minutes minimum. Adjust the chamber temperature to X degrees F minimum, and hold this temperature for a minimum of three minutes. After this period, no switch shall have operated.

Step 2 - Adjust the chamber temperature to X degrees F maximum, and hold this temperature for six minutes minimum. After this period, all switches shall have operated.

Step 3 - Lower the chamber temperature to Y degrees F maximum plus 3 degrees F and hold for three minutes minimum. Lower temperature to Y degrees F maximum and hold this temperature for three minutes minimum. After this period, no switch shall have operated.

Step 4 - Lower the chamber temperature to Y degrees F minimum and hold this temperature for six minutes minimum. After this period, all switches shall have operated.

4.6.3.2.2 Liquid calibration method. Switches shall be placed in a well-agitated bath (no stratification of the liquid) which is capable of holding a given set temperature point of ±.5 degrees F throughout the temperature range of the test. Switches shall be tested by a "go-no-go" method as used in inspection gages or by recording individual temperatures of each switch.

4.6.3.2.2.1 Individual temperature method. The rate of temperature change shall not exceed 1 degree F per minute when the temperature is within 5 degrees F of the operating temperature range.

4.6.3.2.2.2 Go-no-go test procedure (for type I switches). Four controlled baths (see 4.6.3.2.2) shall be used. The following tests may be entered at any step, but tests must be conducted in the sequence shown, with step 1 following step 4.

Step 1 - Stabilize a liquid bath (number 1) at X degrees F minimum. Place switches in bath and allow to stabilize for five minutes minimum. Monitor the switches' electrical circuit. At end of this period, switches shall not have operated.

Step 2 - Stabilize a liquid bath (number 2) at X degrees F maximum. Transfer switches from bath number 1 to bath number 2 and allow to stabilize for five minutes minimum. Monitor the switches' electrical circuit. At end of this period, switches shall have operated.

Step 3 - Stabilize a liquid bath (number 3) at Y degrees F maximum. Transfer switches from bath number 2 to bath number 3. Allow switches to stabilize for five minutes minimum. Monitor the switches' electrical circuit. At end of this period, switches shall not have operated.

Step 4 - Stabilize a liquid bath (number 4) at Y degrees F minimum. Transfer switches from bath number 3 to bath number 4. Allow switches to stabilize for five minutes. Monitor the switches' electrical circuit. At end of this period, switches shall have operated.

4.6.3.2.3 Surface block method. Switches shall be placed on a block and tested by a "go-no-go" method as used in inspection gages or by recording individual temperatures of each switch.

4.6.3.2.3.1 Individual temperature method. The rate of temperature change shall not exceed 1 degree F per minute when the temperature is within 5 degrees F of the operating temperature range.

4.6.3.2.3.2 Go-no-go test procedure (for type II switches). Set the temperature of one liquid bath (block or oven) to a temperature equal to the switch nominal setting MINUS the setting tolerance. Set a second liquid bath (block or oven) to a temperature equal to the switch nominal setting PLUS the switch tolerance. Place the switch in the first bath and note the position of the contacts as shown by the indicator light. Transfer the switch to the second bath. The contacts must operate within one minute. Return the switch to the first bath. The switch contacts must return to their original position within one minute. NOTE: When calibration block or oven is used, it may be more desirable to change the block or oven temperature instead of moving the switches. This method may be used provided the temperature is not changed faster than 1 degree F per minute, and the temperature variation does not exceed the bath temperatures defined above. The dwell time at maximum and minimum points may be two minutes.

4.6.4 Creepage (applicable to type I switches only, see 3.9). Snap action switches shall be tested through three complete cycles. Switches shall be heated or cooled as required to cause thermal actuation. Switch opening and closing functions shall both be checked for creepage. Acceptable instrumentation for this test shall consist of the following:

Arc duration measurement equipment capable of applying the VDC level as shown below. Arc duration shall be measured from 90% to 10% voltage and 10% to 90% voltage during switch transition. Arc duration shall be less than 5 milliseconds. The rate of change of temperature of the switch shall be the minimum practicable, consistent with normal production methods and reliable creepage detection.

MIL-PRF-24236/1	500 VDC mínimum
MIL-PRF-24236/13	300 VDC minimum
MIL-PRF-24236/19	300 VDC minimum
MIL-PRF-24236/20	450 VDC minimum

4.6.5 Temperature response.

4.6.5.1 Sensitivity response test (see 3.10) (when specified, see 3.1 and 6.2.2). The switch shall be placed in a sensitivity test facility. One channel of the facility shall be adjusted to a temperature of 70 degrees F ±5 degrees F below the temperature set point of the switch under test, while the other channel of the facility shall be adjusted to 70 degrees F ±5 degrees F above the temperature set point of the switch under test. The air shall be maintained at a velocity of 20 ±2 feet per second (ft/s) in both channels throughout the test. The switch shall be inserted into the channel operating at the lower temperature, allowed to heat for at least 10 minutes, and then moved, within 1 second into the channel operating at the higher temperature. The time required for operation of the switch after it has been moved into the high temperature channel shall not exceed 10 seconds. The switch shall be allowed to soak for at least 10 minutes, after which it shall be moved back into the channel operating at the lower temperature. The time required for the switch contacts to open after it has been moved into the lower temperature channel shall not exceed 10 seconds.

4.6.5.1.1 Sensitivity test facility. The sensitivity test facility shall be a gas-flow stove with two similar rectangular channels that can be operated separately at different temperatures. The channels shall be located side by side so that the switch can be moved, by a sliding mechanism, from one channel to the other within 1 second. During the tests, only the temperature sensing portion of the switch need be immersed in the gas flow. To prevent ambient air from being drawn into the channel where the switch goes through the channel wall, a slight overpressure on the test section may be maintained. The cross section of the channel test section shall have at least a 1-inch clearance around the sensing element, except on the mounting side where the mounting flange touches the wall. The velocity distribution in the test section shall correspond to that of normal turbulent flow in a straight channel. At a distance of 10 percent of the channel width from the channel wall, the flow velocity shall be at least 75 percent of the center velocity. The test section and the section upstream of the test section shall be insulated so that the wall temperature will not be more than 10 percent below the center temperature at the test section. The temperature measurement shall be made with a thermocouple, at least 1 inch of which is parallel to, and in contact with, the wall. Reference values for the test shall be the temperature and velocity, measured in the center of the channel. The temperature shall be measured 2-1/2 = 1/2 inch upstream from the switch. The measurement shall be made with a 28 AWG (0.0126 inch) thermocouple. The thermocouple shall be located at least two channel widths from the outlet end of the channel. The test section shall be protected from the radiant effect of any flame or surface having a higher temperature than the gas temperature.

4.6.6 Temperature anticipation (see 3.11) (when specified, see 3.1 and 6.2.2). The switches shall be stabilized at -65 degrees F for 1 hour. Within 1 minute, the switches shall be inserted in a channel of the sensitivity facility at a temperature of 70 degrees F ±5 degrees F below its actuating temperature with an air velocity of 20 ft/s, and allowed to remain for 3 minutes. Switches shall then meet the requirements of 3.11.

4.6.7 Seal (as applicable, see 3.12). Switches shall be tested in accordance with 4.6.7.1, or 4.6.7.2, as applicable.

4.6.7.1 Hermetic. Switches shall be tested in accordance with method 112 of MIL-STD-202. The following details shall apply:

(a) Test condition - C.
  (1) Procedure III or IV leakage-rate sensitivity - $1x10^{-8}$ atm cc/sec: for checking gross leaks, test condition B or D.
  (2) For procedure IV - Reduced pressure of the chamber and duration of pressurization - Determination made in accordance with the type of equipment used.
(b) Measurements after test - None.

4.6.7.2 Watertight (see 3.12.2). Switches shall be immersed to a depth of 6 ±2 inches in a container of water containing approximately 1/2 of 1 percent aerosol, and shall then be placed in a vacuum chamber. The absolute pressure shall be 1.3 inches of mercury and this pressure shall be maintained for a period of 1 minute, or until air bubbles cease to be given off by the water, whichever is longer. The absolute pressure shall then be increased to 2.5 inches of mercury and this pressure maintained for 2 minutes. During the 2-minute period, the switches shall be observed for evidence of a continuous stream of bubbles. Any bubbles coming from within the switches shall be considered as leakage. Bubbles, which are the result of entrapped air on the exterior of the switches, shall not be considered as an indication of leakage.

4.6.8 Dielectric withstanding voltage (see 3.13). Switches shall be tested in accordance with 4.6.8.1 and, when applicable (see 3.1 and 6.2.2), in accordance with 4.6.8.2. This test shall be performed with the switch in normal position, and shall then be repeated for other operating positions.

4.6.8.1 At atmospheric pressure. Switches shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

(a) Magnitude of test voltage - 1,000 volts plus twice the working voltage for initial test and 1,000 volts for subsequent tests.
(b) Nature of potential - AC.
(c) Duration of application of test voltage - 1 minute for qualification and group B tests: 5 seconds for all other tests, at 20 percent higher voltage.
(d) Points of application of test voltage - Between all terminals and ground.
(e) Maximum leakage current - 500 microamperes.
(f) Examination after test - Switches shall be examined for evidence of arcing and flashover.

4.6.8.2 At reduced barometric pressure. Switches designed for operation above 10,000 feet shall be tested as specified in 4.6.8.1, and in accordance with method 105 of MIL-STD-202. The following details and exception shall apply:

(a) Method of mounting - Normal mounting means.
(b) Test condition - C or D, as applicable.
(c) Test voltage - 500 volts, unless otherwise specified (see 3.1 and 6.2.2).

4.6.9 Insulation resistance (see 3.14). Switches shall be tested in accordance with method 302 of MIL-STD-202. The following details shall apply:

(a) Test condition - B.
(b) Points of measurement - Between all terminals and frame or ground.

4.6.10 Contact resistance (see 3.15). Switch contacts shall be tested in accordance with method 307 of MIL-STD-202. The following details and exception shall apply:

(a) Measurements - Between the terminals of the contacts of the same pole forming a switching circuit: for all poles in a switch at each of the temperature settings; between mated contacts for all poles.
(b) Test current - 0.1 ampere $\pm$.005.
(c) Test voltage - 6 $\pm$ 1/2 volts dc.
(d) Number of activations prior to measurement - Not applicable.
(e) Number of test activations - Three.
(f) Number of measurements per activation - One reading after each thermal actuation.

4.6.11 Thermal shock (see 3.16). Switches shall be tested in accordance with method 107 of MIL-STD-202. The following details and exception shall apply:

(a) Test condition - B.
(b) Measurement before and after cycling - Not applicable.
(c) Examination after test - The temperature settings shall be within the tolerances specified (see 3.1, 6.2.2, and 3.5.3).

4.6.12 Terminal strength (see 3.17). Switches shall be tested in accordance with method 211 of MIL-STD-202. The following details and exceptions shall apply:

(a) Test condition - A.
(b) Applied force - 4-1/2 pounds. For wire lead terminals, the applied force shall be 15 pounds.
(c) Direction of force - Force shall be applied along three mutually perpendicular axes of the terminal, one direction of which shall be the one most likely to cause failure.
(d) Time duration - One minute.
(e) Examinations after test - Switches shall be examined for evidence of breaking, loosening, cracking, and other damage affecting the operation of the switch. (Bending of terminals shall not be considered as damage to the switch.)

4.6.13 Moisture resistance (see 3.18). Switches shall be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

(a) Mounting - Switches shall be mounted on a corrosion-resistant metal panel with the terminal-header side and sensing element exposed to chamber ambient conditions.
(b) Polarization voltage - During steps 1 to 6 inclusive, a polarizing voltage of 100 volts dc shall be applied between all terminals tied together and the metal panel. The negative polarity shall be applied to the metal panel.
(c) Steps 7a and 7b - Not applicable.
(d) Loading voltage - Not applicable.
(e) Final measurements - Within 5 minutes after removal from the chamber, and while the switches are still wet, insulation resistance shall be measured as specified in 4.6.9. At the end of the drying period, insulation resistance shall again be measured as specified in 4.6.9.
(f) Examinations during final measurement and after test - Switches shall be examined for evidence of corrosion, breaking, cracking, and spalling.

4.6.14 Flame response (when specified, see 3.1 and 6.2.2) (see 3.19). The switches shall be subjected to a flame of 2,000 degrees F $\pm$50 degrees F that envelops the sensing element of the switch for 1 minute. This cycle shall be repeated 3 times and shall meet the requirements of 3.19 each time.

4.6.15 Short circuit (see 3.20). Switches shall be inserted in a circuit which has been calibrated using a dummy switch, and which will supply a current equal to 15 times the rated resistive load at the lowest dc voltage specified (see 3.1), when monitored through the switch contacts. Each switch shall be connected in series, by 1-foot lengths of wire, to a thermal-type circuit breaker or a fuse in accordance with figure 1 and table V. A circuit breaker shall be used for switches having a rated resistive load of 5 amperes or greater, and a fuse for switches having a rated resistive load less than 5 amperes. The wire shall be of a size for use in free air as listed in table V, determined by the rated resistive load of the switch (see 3.1). If the rated load of the switch does not coincide with a wire size, the next larger wire size shall be used. The terminals shall be in accordance with SAE-AS7928. The circuit breaker shall be in accordance with SAE-AS58091 and table V, and fuses shall be in accordance with MIL-PRF-15160 and table V, and of the same current rating as the resistive current rating of the switch. Calibration shall be made without the circuit breaker (or fuse), test switch, or switch leads in the circuit. With both the switch under test and the circuit breaker in a closed position, and with switch S_2 in the position shown on figure 1, the circuit breaker shall be closed manually by switch S_1. A minimum of 2 minutes shall elapse between the successive closings of the switch. The test shall be conducted five times.

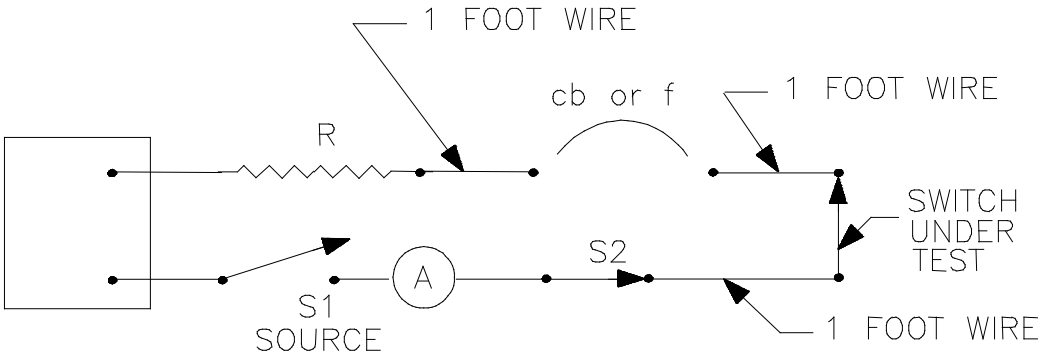


FIGURE 1. Circuit diagram for short circuit test.

TABLE V. Short circuit wire size and circuit breaker or fuse designations.

Resistive rating at lowest voltage, amperes	Specification wire size	Circuit breaker or fuse
Less than 5	AN-20	MIL-F-15160/2, characteristic A, rating, as applicable
5	AN-20	SAE-AS25244-5
7.5	AN-18	SAE-AS25244-7
10	AN-18	SAE-AS25244-10
15	AN-18	SAE-AS25244-15
18	AN-16	SAE-AS25244-20
20	AN-16	SAE-AS25244-20
25	AN-14	SAE-AS25244-25
30	AN-14	SAE-AS25244-30
40	AN-12	SAE-AS25244-50

NOTE: MS25017 circuit breakers may be used until existing supply is exhausted

4.6.16 Vibration (see 3.21). Switches shall be tested in accordance with the applicable test methods of MIL-STD-202, as follows:

(a) Method and test condition:
  (1) For switches of classes 1 and 2 - Method 201.
  (2) For switches of class 3 - Method 204 (vibration, high frequency), test condition - A.
  (3) For switches of classes 4 and 6 - Method 204, test condition - D.
  (4) For switches of class 5 - Method 204, 10 to 3,000 Hz, 50g.
(b) Tests and measurements prior to vibration - Not applicable.
(c) Mounting - The switches shall be rigidly mounted by their normal mounting means on a rigid metal panel. The mounting fixture shall be free from resonances over the test frequency range.
(d) Electrical load conditions - The switches shall be functioning with voltage and current specified (see 3.1 and 6.2.2) throughout resonance search and vibration tests. If no voltage or currents are specified, the test voltage shall be 28 volts dc.
(e) Tests and measurements during vibration:
  (1) Resonance search - With the switch exposed to a temperature 5°F minimum above the operate point, sweep slowly through frequency range and monitor for contact closure of more than 10 microseconds by use of an oscilloscope or recording oscillograph, which has a frequency response of at least 5,000 Hz, or method 310 of MIL-STD-202. Repeat with unit exposed to temperature 5°F minimum below the operate point.
  (2) Vibration endurance - With vibration frequency set to the critical resonant point or cycling frequency, if there is no resonance, and amplitude specified for the corresponding frequency, cycle switch temperature through the operating point at a rate not exceeding 5 degrees F per minute, with extremes not exceeding ±10 degrees F around the operate point. Contact transfers within 3 degrees F of the operate point will be disregarded and the cycling rate shall be a minimum of 5 cycles per hour.

4.6.17 Shock (see 3.22). Switches shall be tested in accordance with 4.6.17.1 or 4.6.17.2 as applicable (see 3.1 and 6.2.2).

4.6.17.1 Method I (shock, specified pulse) (applicable to classes 1, 3, 4, 5, and 6). Switches shall be tested in accordance with method 213 of MIL-STD-202. The following details and exceptions shall apply:

(a) Mounting method and accessories - Switches shall be mounted on a rigid metal panel by their normal mounting means.
(b) Test condition - H for classes 1 and 3; I for classes 4 and 6; D for class 5.
(c) Electrical-load and thermal conditions - Half of the units shall be tested with the contacts closed while the other half shall be tested with the contacts open. The electrical load shall consist of the monitor circuit only.
(d) Measurements during shock - Switch-contact stability shall be continuously monitored by means of method 310 of MIL-STD-202.
(e) Examination after test - Switches shall be examined for change in operation, and evidence of broken, deformed, displaced, and loose parts.

4.6.17.2 Method II (high-impact shock) (applicable to class 2 only). Switches shall be tested in accordance with method 207 of MIL-STD-202. The following details and exceptions shall apply:

(a) Mounting fixtures - As specified in 4.6.17.1a.
(b) Electrical-load conditions - As specified in 4.6.17.1c.
(c) Measurements during shock - Switch-contact stability shall be monitored for each blow by means of method 310 of MIL-STD-202. In the event of indication of contact opening greater than 5 milliseconds, the test shall be modified by applying successive identical blows in the same plane to monitor contacts, switch by switch, to determine if a switch is defective.
(d) Measurements after shock - Not applicable.
(e) Examinations after test - Switches shall be examined for change in operation, and evidence of broken, deformed, displaced, and loose parts.

4.6.18 Overload cycling (see 3.23). Each switch shall be tested for overload cycling using the same voltage, electrical frequency, and the same pair(s) of contacts that will subsequently be used for the electrical endurance test. The switches shall close and open the overload current of a resistive circuit equal to 150 percent of the resistive load rating and the particular voltage and electrical frequency. The cycling rate shall be less than 6 cycles of operation per minute. Fifty cycles of operation shall be performed. The duty cycle shall be approximately 50 percent on, 50 percent off.

4.6.19 Endurance (see 3.24). Switches shall be subjected to the specified number of cycles of make-and-break operations at a cycling rate of 6 cycles per minute maximum at the rated loads (see 3.1 and 6.2.2).

4.6.20 Salt spray (corrosion) (see 3.25). Switches and their mounting hardware and brackets (if applicable) shall be tested in accordance with method 101 of MIL-STD-202. The following details shall apply:

(a) Applicable salt solution - 5 percent.
(b) Test condition - B.
(c) Measurements after exposure - Following the drying period, the switches shall meet the requirements specified in 3.25. Mounting hardware shall be removed at the end of the test.

4.6.21 Sand and dust (see 3.26) (when specified, see 3.1 and 6.2.2). Switches shall be tested in accordance with method 110 of MIL-STD-202. This test shall be performed with the pressure port suitably capped or plugged. The following details shall apply:

(a) Test condition - B.
(b) Measurements - Switches shall be tested in accordance with 4.6.3.

4.6.22 Explosion (see 3.27) (when specified, see 3.1 and 6.2.2). Switches shall be tested in accordance with method 109 of MIL-STD-202. The following detail shall apply:

(a) Mechanical and electrical load - Switches shall be operated at their maximum rated dc inductive current (see 3.1 and 6.2.2).

4.6.23 Low level (see 3.30) (when specified, see 3.1). Switches shall be tested for the number of cycles specified (see 3.1) as follows:

(a) Contact load - Each switch contact shall make, carry, and break a resistive load of 10 milliamperes maximum at an open circuit voltage of 30 millivolts maximum dc or peak ac. Both normally open and normally closed contacts shall be loaded. Contacts shall be connected to individual loads.
(b) Operate cycles - Rate not to exceed 6 cycles per minute.
(c) Monitoring circuit - The monitoring equipment shall provide a record of the number of cycles and shall record failures, or discontinue the test, if a failure occurs. During each closure, the contact potential shall be monitored for at least 50 percent of the time the contacts are closed.

4.6.24 Minimum current (intermediate current) (see 3.31) (when specified, see 3.1). Switches shall be subjected to the number of cycles of make-and-break operations specified (see 3.1), in a circuit having a 27 +3 and -0 volt dc source and a load consisting of the coil of relay, part number M5757/10-033, or equivalent. The cycling rate shall not exceed 6 cycles per minute, and switches shall be monitored for make-and-break operations.

4.6.25 Resistance to solvents (see 3.32). Switches shall be tested in accordance with method 215 of MIL-STD-202. The following details and exception shall apply:

(a) Portion to be brushed - All marking areas.
(b) Number of specimen to be tested - Three.
(c) Extent of mechanical or electrical damage - Not applicable.

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
(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Switches covered by this specification are intended for use in low power dc applications. Also, these switches are intended for use on printed circuit boards, and leads may be soldered or inserted in plug-in sockets. When switches and plug-in sockets are used together, they should have similar or compatible contact finishes. These switches military unique due to the fact that these devices must be able to operate satisfactorily in military systems under the following demanding conditions: 15 gs of vibration, up to 500 gs of shock. In addition these military requirements are verified under a qualification system. Commercial components are not designed to withstand these military environmental conditions.

6.2 Ordering data.

6.2.1 For switches covered by specification sheets. Procurement documents should specify the following:
(a) Title, number, and date of this specification.
(b) Title, number, and date of the applicable specification sheet and the complete PIN.
(c) Packaging requirements (see 5.1).
(d) If required, the specific issue of individual documents referenced (see 2.1)

6.2.2 For switches not covered by specification sheets. Procurement documents should specify the following:
(a) Title, number, and date of this specification.
(b) Operating temperature and operating temperature ranges (see 1.1).
(c) Type and class required (see 1.2.1 and 1.2.2).
(d) Manufacturer's part number (see 3.28).
(e) Other type of plastic insulation, if required (see 3.4.1).
(f) Details of interface, physical dimensions, mounting means, and weight (see 3.5).
(g) Operating points and tolerances (see 3.8).
(h) Creepage, if applicable (see 3.9).
(i) Seal (as applicable) (see 3.12).
(j) Dielectric withstanding voltage:
  (1) If maximum leakage current is in excess of that specified (see 3.13).
  (2) Test method and, if required, magnitude of test voltage and test condition letter (see 4.6.8).
(k). Contact resistance, if other than as specified (see 3.15).
(l). Vibration:
  (1) If contact opening and closing is not as specified (see 3.21).
  (2) Electrical load conditions (see 4.6.16).
(m). Shock:
  (1) If contact opening and closing is not as specified (see 3.22).
  (2) Applicable method (see 4.6.17).
(n). Number of cycles for endurance test (see 4.6.19).
(o). Low level, if applicable (see 3.30).
(p). Minimum current (intermediate current), if applicable (see 3.31).
(q) Packaging Requirements (see 5.1)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 24236 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from vqp.chief@dla.mil or Defense Supply Center, Columbus, DSCC-VQP, 3990 East Broad Street, Columbus, OH 43216-5000.

6.4 Intermetallic contact. The finishing of metallic areas to be placed in intimate contact by assembly presents a special problem, since intermetallic contact of dissimilar metals results in electrolytic couples which promote corrosion through galvanic action. To provide the required corrosion protection, intermetallic couples should be restricted to those permitted by MIL-HDBK-889.

6.4.1 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, 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, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin).

6.5 Plastics. Type SDGF in accordance with ASTM 5948 is an acceptable flame retardant material.

6.6 Part or Identifying Number (PIN). This specification requires a PIN that is as described in the appropriate reference to associated documents (see 3.1).

6.7 Subject term (key word) listing.

Flame response
Hermetically sealed
Overheat detector
Temperature protection

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 at 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 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where modifications from this amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Custodians:
Army - CR
Navy - EC
Air Force - 85
DLA - CC

Review activities:
Army - AR, AT, AV, MI
Navy - AS, CG, MC, OS, SH
Air Force - 19, 99

Preparing activity:
DLA - CC

(Project 5930-2010-026)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.daps.dla.mil/ .