

METRIC

MIL-S-62742
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MILITARY SPECIFICATION

SWITCH, PRESSURE (METRIC)

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

1. SCOPE

1.1 Scope. This specification covers two types of automotive pressure switches (see 6.1 and 6.6). Type I switches operate when fluid pressures drop below predetermined values and type II switches operate when fluid pressures exceed predetermined values.

1.2 Classification. Switches furnished under this specification shall be of the following types and classes as specified (see 6.2). All switches shall be (waterproof).

Type I	- Sufficiently low pressure closes contacts.
Type II	- Sufficiently high pressure closes contacts.
Class 1	- High vibration (see 6.4).
Class 2	- Low vibration (see 6.4).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A

FSC 5930

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

STANDARDS

FEDERAL

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

MILITARY

MIL-STD-130 - Identification Marking of U.S. Military Property.

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.

MIL-STD-454 - Electronic Equipment, Standard General Requirements for.

MIL-STD-889 - Dissimilar Metals.

MIL-STD-1184 - Electrical Components for Automotive Vehicles; Waterproofness Tests.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Navy Publications and Printing Service Office, Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non- Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B117 - Salt Spray (Fog) Testing, Method of (DOD Adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA, 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 4.4).

3.2 Materials. Materials shall be as specified herein and in referenced specifications, standards and drawings. Material shall be free of defects which adversely affect performance or serviceability of the finished product (see 4.8.1).

3.2.1 Dissimilar metals. Dissimilar metals shall be protected from galvanic corrosion in accordance with requirements of MIL-STD-889 (see 4.8.1)

3.2.2 Recycled, virgin and reclaimed materials. There are no requirements for the exclusive use of virgin materials; however, all materials shall be new and unused. The use of recycled or reclaimed (recovered) materials is acceptable provided that all other requirements of this specification are met (see 6.5.3).

3.3 Design and construction. Switches shall conform to the applicable standards or drawings, as specified (see 4.8.1, 4.8.2 and 6.2).

3.3.1 Threaded parts. Unless otherwise specified in the applicable drawing or military standard, screw threads shall be in accordance with FED-STD-H28 (see 4.8.2).

3.3.2 Rating. The switch shall be operated in nominal 24 volts (V) direct current (dc) electrical systems and shall operate a nominal 6 watt (3 candlepower) lamp, or loads as specified on applicable standards or drawings (see 4.8.2).

3.4 Performance.

3.4.1 Calibration (see 4.8.3).

3.4.1.1 Type I switches. Type I switches shall close on decreasing pressure within the pressure range specified on the applicable standard or drawing, and shall remain closed while the pressure is below the lower value specified therein. Type I switches shall open on subsequently increasing pressure at not less than the lower value and not more than 14 kPa above the upper value (see 4.8.3.1).

3.4.1.2 Type II switches. Type II switches shall close on increasing pressure, within the actuation range specified on the applicable standard or drawing and shall remain closed while the pressure is above the upper value specified therein. Type II switches shall open on subsequently decreasing pressure at not more than the upper value and not less than 14 kPa below the lower value (see 4.8.3.2).

3.4.2 Terminal strength. Terminals shall withstand a force of 110 Newtons (N) without becoming deformed more than 1.6 mm or evidencing damage to the switch body. The switch shall subsequently meet the requirements of 3.4.1.1 or 3.4.1.2, as applicable (see 4.8.4).

3.4.3 Pressure overload. Switches shall withstand a pressure overload, as specified on the applicable standard or drawing for 1 minute. After overloading, the change in switch opening or closing pressure shall be not more than 8 percent (%). If no overload pressure is specified, pressure shall be 10 times actuating pressure (see 4.8.5).

3.4.4 High voltage. Switches shall withstand 220 V root mean square (rms) at 60 hertz (Hz) for 1 minute without evidence of sparking, arcing, burning, smoking, charring, or other insulation damage (see 4.8.6).

3.5 Environmental conditions.

3.5.1 Corrosion resistance. Switches shall withstand 200 hours of salt spray with no degradation in performance (see 4.9.1).

3.5.2 Fungus resistance. Materials used in the construction of pressure switches shall be fungus inert in accordance with requirement 4 of MIL-STD-454 (see 4.8.1).

3.5.3 Waterproofness. Switches shall meet the requirements specified for type II, class 2 components of MIL-STD-1184 and evidence no leakage (see 4.9.2).

3.5.4 Extreme temperature resistance. Switches shall open and close within the pressure ranges specified herein or on the applicable standard or drawing within a temperature range of minus (-) 54 to plus (+) 121 degrees Celsius (°C) (see 4.9.3).

3.5.5 Shock resistance. Switches shall withstand an acceleration force of 50 gravity units (g's) applied once in each direction of each axis of the switch. During shock application, switches shall be energized and a pressure of 70 kPa above the upper actuation pressure specified in the applicable standard or drawing, as applicable, shall be applied to type I switches. Similarly, a pressure of 70 kPa below the lower actuation pressure shall be applied to type II switches. Switches shall not actuate during shock application and shall evidence no loosened, distorted or broken parts (see 4.9.4).

3.5.6 Vibration resistance.

3.5.6.1 Class 1 switches. Class 1 switches shall withstand a high vibration amplitude of 0.08 cm or 50 g's, whichever is less, in a cycle range of 10 to 3500 Hz, applied in each direction of each axis of the switch. During vibration, switches shall be energized and pressure applied as specified in 3.5.5. Switches shall not actuate during vibration and shall evidence no loosened, distorted or broken parts (see 4.9.5.1).

3.5.6.2 Class 2 switches. Class 2 switches shall withstand a low vibration as specified in 3.5.6.1, except amplitude, frequency and conditions shall be as specified in test condition A, method 204 of MIL-STD-202 (see 4.9.5.2).

3.6 Endurance. Switches shall evidence no malfunction after being cycled 10,000 times from 0 kPa to twice the actuation pressure specified in the applicable standard or drawing, then back to 0 kPa. The changes in the pressure at which the switch contacts open and close shall be no more than 8% of the actuation pressure specified in the applicable standard or drawing. No contact shall fail to open or close its individual circuit in proper sequence (see 4.10).

3.7 Marking. The switch shall be marked in accordance with MIL-STD-130 and as specified in the applicable military drawing or standard. Marking shall include the following information, in the order shown (see 4.8.2):

Switch, pressure
 Military part number
 Type, grade and class
 Actuating pressure limits
 Manufacturer's part number.
 Manufacturer's name.
 U.S.

3.8 Workmanship. Workmanship shall be of a quality which will assure a product free of burrs, rust, scratches, chips, sharp edges, loose or defective connectors, cracked insulation, faulty soldering, or other defects which will affect serviceability or appearance. Crimping shall be performed in a workmanlike manner (see 4.8.2).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examination and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- a. First article inspection (see 4.4).
- b. Quality conformance inspections (QCI) (see 4.5).
 - 1. Examination (see 4.5.2).
 - 2. Tests (see 4.5.3).
- c. Control tests (see 4.6).

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be performed under the following conditions:

- a. Air temperature $25 \pm 8^{\circ}\text{C}$
- b. Barometric pressure 725 ± 50 mm Hg
- 75
- c. Relative humidity $50 \pm 30\%$

4.3.1 Voltage. Calibration and endurance tests shall be conducted at a source voltage of 28 ± 0.5 Vdc.

4.4 First article inspection. Unless otherwise specified (see 6.2), the Government shall select four switches produced under the production contract for first article inspection. First article samples shall be inspected as specified in table I. Approval of the first article sample by the Government shall not relieve the contractor of his obligation to supply switches that are fully representative of those inspected as a first article sample. Any changes or deviations of the production units from the first article sample shall be subject to the approval of the contracting officer.

TABLE I. Classification of inspections.

Title	Requirement	Inspection	First article	Quality conformance		Control
				Exam	Tests	
Material and construction	3.2 thru 3.3 and 3.5.2	4.8.1	X			
Defects	3.3.1, 3.3.2 3.7 and 3.8	4.8.2	X	X		X
Calibration:	3.4.1	4.8.3				
Type I switches	3.4.1.1	4.8.3.1	X		X	X
Type II switches	3.4.1.2	4.8.3.2	X		X	X
Terminal strength	3.4.2	4.8.4	X			
Pressure overload	3.4.3	4.8.5	X		X	
High voltage	3.4.4	4.8.6	X		X	
Environmental conditions	3.5	4.9				
Corrosion resistance	3.5.1	4.9.1	X			
Waterproofness:	3.5.3	4.9.2	X		X	
Extreme temperature	3.5.4	4.9.3	X			
Shock resistance	3.5.5	4.9.4	X			X
Vibration resistance:	3.5.6	4.9.5				
Class 1	3.5.6.1	4.9.5.1	X			X
Class 2	3.5.6.2	4.9.5.2	X			X
Endurance	3.6	4.10	X			X

TABLE II. Order of first article testing.

Specimen	Paragraph no.	Test
a	4.8.3	Calibration
	4.9.3	Extreme temperatures
	4.8.3	Calibration
	4.10	Endurance
	4.8.3	Calibration
b	4.8.3	Calibration
	4.8.4	Terminal strength
	4.9.2	Waterproofness
	4.9.1	Corrosion
	4.8.6	High voltage
	4.8.3	Calibration

TABLE II. Order of first article testing - Continued.

Specimen	Paragraph no.	Test
c	4.8.3	Calibration
	4.9.4	Shock
	4.9.5	Vibration
	4.8.3	Calibration
	4.8.6	High voltage
	4.8.3	Calibration
d	4.8.3	Calibration
	4.8.5	Pressure overload
	4.8.3	Calibration
	4.8.6	High voltage
	4.8.3	Calibration

4.4.1 Failure. Failure of any qualification sample to pass any of the qualification inspections specified herein may be cause, at the option of the Government, for refusal to conduct additional inspections until the faults revealed by the inspection have been corrected.

4.5 QCI. QCI shall include the examination of 4.5.2 and the tests of 4.5.3. Noncompliance with any of the specified requirements in sections 3 and 5 shall be cause for rejection of the sample and the inspection lot.

4.5.1 Sampling plan. Unless otherwise specified (see 6.2), the sampling plan specified herein shall be used. See 6.5.1 for definitions of sampling inspection terms.

4.5.1.1 Lot formation. An inspection lot shall consist of all the switches of one type and part number, from an identifiable production period, from one manufacturer, submitted at one time for acceptance.

4.5.1.2 Sample. A separate sample for each QCI examination major & minor defects and tests shall be randomly selected from the inspection lot in accordance with table III.

TABLE III. Sampling plan for QCI.

QCI sampling plan			
Inspection lot size	Sample size		
	Examination		Test
	Major	Minor	
2 to 8	*	5	2
9 to 15	13	5	2
16 to 25	13	5	2
26 to 50	13	5	2
51 to 90	13	7	8
91 to 150	13	11	8
151 to 280	20	13	8
281 to 500	29	16	8
501 to 1200	34	19	13
1201 to 3200	42	23	13
3,201 to 10,000	50	29	20
10,001 to 35,000	60	35	20
35,001 to 150,000	74	40	32
150,001 to 500,000	90	40	32
500,001 and over	102	40	50

* Indicates entire lot must be inspected (100% inspection).

4.5.2 Examination. The sample selected in accordance with 4.5.1.2 shall be examined and defects classified as specified in table IV (see 4.8.2). The acceptance number in all cases is zero.

TABLE IV. Classification of defects.

Category	Defect	Method of examination
Critical	None	
<u>Major</u>		
101	Dimensions not within tolerance affecting interchangeability (see 3.3).	SIE 1/
102	Improper threads (see 3.3.1).	Visual or gage
103	Rating not as specified (see 3.3.2).	SIE
104	Faulty workmanship affecting performance (see 3.8).	Visual

TABLE IV. Classification of defects - Continued.

Category	Defect	Method of examination
<u>Minor</u>		
201	Dimensions not within tolerance not affecting interchangeability (see 3.3).	SIE
202	Improper marking (see 3.7).	Visual
203	Faulty workmanship affecting appearance (see 3.8).	Visual

1/ SIE = Standard Inspection Equipment.

4.5.3 Tests. The sample selected in accordance with 4.5.1.2 shall be subjected to the tests specified in table I and in the sequence listed below. The acceptance number in all cases is zero.

- 4.8.3 Calibration
- 4.8.5 Pressure overload
- 4.8.3 Calibration
- 4.9.2 Waterproofness
- 4.8.6 High voltage

4.5.4 QCI failure. Any item that fails to conform to any specified requirement shall be rejected; any failure (one or more) of the selected sample in either the Major/Minor categories or test for the appropriate inspection lot size shall constitute a failure of the entire lot. The rejected item(s) may be repaired or corrected and resubmitted for inspection. If the contractor utilizes sampling inspection as an element of his inspection system, rejected inspection lots may be resubmitted for acceptance if the contractor performs 100 percent inspection on the lot for those characteristics which were defective and resulted in rejection of the lot and removes all defective units or obtains procuring activity approval to resample the lot due to the insignificance of the defects. Resubmitted lots shall be kept separate from new lots and shall be clearly identified as resubmitted lots.

4.6 Control tests. Control tests shall be conducted on four switches from each lot of 500 units consecutively produced, except that not less than 4 nor more than 8 units shall be selected in a 30-day period.

4.6.1 Testing. Switches selected in accordance with 4.6 shall be examined for the defects of table IV and then divided equally between the two sets of test of table V and subjected to the tests in the order specified.

TABLE V. Order of control tests.

Test set 1	Test set 2
4.8.3 Calibration	4.8.3 Calibration
4.10 Endurance	4.9.4 Shock
4.8.3 Calibration	4.9.5 Vibration
	4.8.3 Calibration

4.7 Failure. Failure of any switches to pass any of the specified inspections shall be cause for the Government to refuse acceptance of the production quantity represented, until action taken by the contractor to correct defects and prevent recurrence has been approved by the Government.

4.8 Methods of inspection.

4.8.1 Materials and construction. Conformance to 3.2 through 3.3, and 3.5.2 shall be determined by inspection of contractor records providing proof or certification that design, construction, processing, and materials conform to requirements. Applicable records shall include drawings, specifications, design data, receiving inspection records, processing and quality control standards, vendor catalogs and certifications, industry standards, test reports, and rating data.

4.8.2 Defects. Conformance to 3.3, 3.3.1, 3.3.2, 3.7 and 3.8 shall be determined by examination for the defects listed in table IV (see 4.5.2). Examination shall be visual, tactile, or by measurement with standard inspection equipment.

4.8.3 Calibration. To determine conformance to 3.4.1, the switch shall be connected to a variable pressure supply and electrically connected to the power source and load specified in 3.3.2. The switch shall then be tested in accordance with 4.8.3.1 or 4.8.3.2, as applicable.

4.8.3.1 Type I switches. To determine conformance to 3.4.1.1, type I switches shall be subjected to the following procedure: Starting at a pressure 70 kPa above the upper actuation pressure specified in the applicable standard or drawing, the pressure shall be gradually decreased to a point 70 kPa below the lower actuation pressure specified. For switches where the minimum operating pressure is 70 kPa or less, the lower test pressure shall be zero kPa. The pressure shall then be increased to a point 70 kPa above the upper pressure specified. During both phases of the operational cycle, a light tapping of the switch to cause actuation is permissible. The point at which the switch opens and closes shall be recorded.

4.8.3.2 Type II switches. To determine conformance to 3.4.1.2, type II switches shall subjected to the following procedure: Starting at a pressure 70 kPa below the lower actuation pressure specified in the applicable or drawing, the pressure shall be gradually increased to a pressure 70 kPa above the upper actuation pressure specified. For switches where the minimum

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actuation pressure is 70 kPa or less, the lower test pressure shall be zero kPa. During both phases of the operational cycle, a light tapping of the switch to cause actuation is permissible. The point at which the switch closes and opens shall be recorded.

4.8.4 Terminal strength. To determine conformance to 3.4.2, the switch shall be securely mounted. A cable with a suitable mating connection shall be attached to each switch terminal. The force specified in 3.4.2 shall be applied to each cable in a direction perpendicular to the terminal connector pin. Confirm that no damage to the switch body is evidenced and that there is not more than 1.6 mm deformation to the terminals. Subsequently the switch shall be subjected to the applicable test of 4.8.3 to verify performance.

4.8.5 Pressure overload. To determine conformance to 3.4.3, the switch shall be subjected to the specified overload for 1 minute. Subsequently, the switch opening and closing pressure shall be determined and shall be within 8% of the specified values.

4.8.6 High voltage. To determine conformance to 3.4.4 and with the switch contacts open, 220 V rms at 60 Hz shall be applied for 1 minute between each terminal and the switch body. If there are two terminals and with the switch contacts open, the same voltage shall be applied for 1 minute between each separate terminal and the non-current-carrying part of the switch. At the conclusion of this test, there shall be no evidence of failure as specified in 3.4.4.

4.9 Environmental conditions.

4.9.1 Corrosion resistance. To determine conformance to 3.5.1, the switch shall be subjected to 200 hours of salt spray in accordance with ASTM B117. Subsequently, the switch shall pass the tests of 4.8.6 and 4.8.3.

4.9.2 Waterproofness. To determine conformance to 3.5.3, switches shall be immersed in the salt water solution specified in MIL-STD-1184 and shall be subjected to an internal pressure of 41 kPa and observed for leakage. Leakage will be indicated by air bubbles escaping from the interior of the compartment. Bubbles which are the result of entrapped air on the various exterior surfaces of the component shall not be considered a leak. At the conclusion of this test, there shall be no evidence of leakage.

4.9.3 Extreme temperatures. To determine conformance to 3.5.4, the switch shall be subjected to the tests specified in a and b, below.

- a. Low temperature.** Switch shall be conditioned for 4 hours at $-51 \pm 3^{\circ}\text{C}$ and while still in ambient air at that temperature shall be operated for 100 cycles (see definition of 6.5.1) using the load current specified in 3.3.2. The switches shall open and close within the specified pressures.

- b. High temperature. Switch shall be conditioned for 4 hours at $+118 \pm 3^{\circ}\text{C}$ and while still in ambient air at that temperature shall be operated for 100 cycles (see definition of 6.5.2) using the load current specified in 3.3.2. The switches shall open and close within the specified pressures.

4.9.4 Shock. To determine conformance to 3.5.5, the switch shall be mounted as in intended operation, and subjected to the sawtooth waveform shock test described in test condition I, method 213 of MIL-STD-202. An acceleration force of 50 g's shall be applied once in each direction of three mutually perpendicular axes, one of which will be along the centerline of the switch. During the test, the following conditions shall apply: The electrical load shall be a lamp load, as specified in 3.3.2. A pressure of 70 kPa above the upper actuation pressure specified in the applicable standard or drawing shall be applied to type I switches. A pressure of 70 kPa below the lower actuation pressure specified in the applicable standard or drawing shall be applied to type II switches. During each impact the indicating lamp shall be observed for evidence of circuit closure. During and after the test, the switch shall show no evidence of failure as specified in 3.5.5.

4.9.5 Vibration resistance.

4.9.5.1 High vibration class 1 switch. To determine conformance to 3.5.6.1, the switch shall be mounted in a test fixture simulating actual mounting in use and shall be connected in a series circuit with a 24 V (nominal) power source and applicable indicating lamp. Care shall be taken to see that the mounting is free of resonances over the frequency range. While energized, the switch shall be subjected to a simple harmonic motion having an amplitude of 0.08 cm or 50 g's peak, whichever is less. Tolerance of $\pm 10\%$ is permissible for the amplitude. The vibrational frequency shall be varied over the range from 10 to 3500 Hz. Rate of frequency shall be logarithmic. When there is no provision for logarithmic cycling, other automatic cycling rates of frequency change may be used. The vibrational cycle from 10 to 3500 and back to 10 Hz shall be accomplished in 20 ± 2 minutes. This scanning cycle shall be repeated three times in order that critical frequencies may be identified, recorded, and checked. After the scanning cycles, the switch shall be vibrated at the critical frequency for 2 hours. If there is more than one critical frequency, the 2-hour period shall be divided equally between the critical frequencies. If there are more than three critical frequencies, the three most critical shall be selected and the switch vibrated for 40 minutes at each of the frequencies selected. If no critical frequency is identified, the sample shall be vibrated at 50 g's acceleration, with frequency cycled from 10 to 3500 and back to 10 Hz. Rate of change of frequency shall be logarithmic, or where there is no provision for logarithmic cycling, other automatic cycling rates of frequency change may be used. Time for each cycle shall be 20 ± 2 minutes. Duration of the test shall be 2 hours (6 complete cycles). The following test conditions shall apply: The load shall be that specified in 3.3.2. A pressure of 70 kPa above the upper actuation pressure specified in the applicable standard or drawing shall be applied to type I switches. A pressure 70 kPa below the lower actuation pressure specified in the applicable standard or drawing

shall be applied to type II switches. The indicating lamp shall be observed at the beginning and at the conclusion of the test and periodically during the test for evidence of circuit closure. During and after the test, switches shall show no evidence of failure as specified in 3.5.6.1. This test procedure shall be accomplished along each of three mutually perpendicular axes. Total vibrating time shall be 9 hours (3 hours along each axis).

4.9.5.2 Low vibration class 2 switch. To determine conformance to 3.5.6.2, the switch shall be mounted in a test fixture simulating actual mounting in use and shall be connected in a series circuit with a 24 V (nominal) power source and applicable indicator. Care shall be taken to see that the mounting is free of resonances over the frequency range. The switch shall then be subjected to the vibration test described in test condition A, method 204 of MIL-STD-202. The following test conditions shall apply: The load shall be that specified in 3.3.2. A pressure of 70 kPa above the upper actuation pressure specified in the applicable standard or drawing shall be applied to type I switches. A pressure of 70 kPa below the lower actuation pressure specified in the applicable standard or drawing shall be applied to type II switches. The indicating lamp shall be observed at the beginning and at the conclusion of the test and periodically during the test for evidence of circuit closure. During and after the test, switches shall show no evidence of failure as specified in 3.5.6.1.

4.10 Endurance. To determine conformance to 3.6, the switch shall be connected to the lamp load current specified in 3.3.2 and to a variable pressure fluid supply line. The switch shall then be cycled 10,000 times, from 0 kPa to twice the upper actuation pressure specified in the applicable standard or drawing, and back to 0 kPa. During the test, switches shall be continuously monitored and recorded to determine whether any contact has failed to open or close its individual circuit in the proper sequence.

5. PACKAGING

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking for the desired level shall be in accordance with the applicable packaging requirements specified by the contracting authority (see 6.2).

6. NOTES

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

6.1 Intended use. Pressure switches covered by this specification are intended primarily to actuate warning lamps or other warning devices to indicate abnormal oil pressures in internal combustion engines, changes of air pressure in brake systems and hydraulic brake stoplight switches. The switches may also be used with other fluids to monitor torque converters, lubricating systems, and control mechanism of automatic and semi-automatic transmissions.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and class of switch required (see 1.2).
- c. Applicable standard or drawing (see 3.3).
- d. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- e. If first article is required (see 3.1).
- f. If inspection conditions shall be other than as specified (see 4.3).
- g. If first article inspection is other than as specified (see 4.4).
- h. If sampling plan for QCI is other than as specified (see 4.5.1).
- i. Selection of applicable level and packaging requirements (see 5.1).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory and the number of items to be tested as specified in 4.4. The contracting officer should include specific instructions in acquisition document regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Classes. Class 1 switches are provided for high load vibration requirements (50 g's at 3400 Hz) most often encountered in tracked vehicles. Class 2 switches are provided for low vibration load environments (10 g's at 500 Hz) and are generally adequate for wheeled vehicles.

6.5 Definitions.

6.5.1 Definitions of terms used in sampling inspection.

a. **Classification of defects.** A classification of defects is the enumeration of possible defects of the unit of product classified according to their seriousness. A defect is any nonconformance of the unit of product with specified requirements. Defects will normally be grouped into one or more of the following classes: critical, major and minor defects. Also, defects may be grouped into other classes, or into subclasses within these classes.

b. **Critical defects.** A critical defect is a defect that judgement and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgement and experience indicate is likely to prevent performance of the tactical function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

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c. Critical defective. A critical defective is a unit of product which contains one or more critical defects and may also contain major and/or minor defects.

d. Defective. A defective is a unit of product which contains one or more defects.

e. Formation of lots or batches. The product shall be assembled into identifiable lots, sublots, batches, or in such other manner as may be prescribed (see 1). Each lot or batch shall, as far as is practicable, consist of units of product of a single type, grade, class, size, and composition, manufactured under essentially the same conditions, and at essentially the same time.

f. Lot or batch. The term lot or batch shall mean "inspection lot" or "inspection batch", i.e., a collection of units or product from which a sample is to be drawn and inspected and may differ from a collection of units designated as a lot or batch for other purposes (e.g., production, shipment, etc.).

g. Lot or batch size. The lot or batch size is the number of units of product in a lot or batch.

h. Major defect. A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

i. Major defective. A major defective is a unit of product which contains one or more major defects, and may also contain minor defects but contains no critical defect.

j. Minor defect. A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

k. Minor defective. A minor defective is a unit of product which contains one or more minor defects but contains no critical or major defect.

l. Presentation of lots or batches. The formation of the lots or batches, lot or batch size, and the manner in which each lot or batch is to be presented and identified by the supplier shall be designated or approved by the responsible authority. As necessary, the supplier shall provide adequate and suitable storage space for each lot or batch, equipment needed for proper identification and presentation, and personnel for all handling of product required for drawing of samples.

m. Representative sampling. When appropriate, the number of units in the sample shall be selected in proportion to the size of sublots or subbatches, or parts of the lot or batch, identified by some rational criterion. When representative sampling is used, the units from each part of the lot or batch shall be selected at random.

n. Sample A sample consists of one or more units of product drawn from a lot or batch, the units of the sample being selected at random without regard to their quality. The number of units or product in the sample is the sample size.

o. Sampling plan. A sampling plan indicates the number of units of product from each lot or batch which are to be inspected (sample size or series of sample sizes) and the criteria for determining the acceptability of the lot or batch (acceptance and rejection numbers).

p. Time of sampling. Samples may be drawn after all the units comprising the lot or batch have been assembled, or samples may be drawn during assembly of the lot or batch.

6.5.2 Cycling. Cycling, as used herein, means opening and subsequent closing of contacts. Switch cycling frequency should be the maximum which will allow the electrical contacts to open and close, with the contacts open during half of each cycle.

6.5.3 Recovered materials. "Recovered materials" means materials that have been collected or recovered from solid waste (see 6.5.4).

6.5.4 Solid waste. "Solid waste" means (a) any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and (b) other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. It does not include solid or dissolved material in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Clean Water Act, (33 U.S.C. 1342 et seq.), or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) (Source: Federal Acquisition Regulations, section 23.402).

6.6 Cross-reference. Items conforming to this specification are not interchangeable/substitutable with items conforming to MIL-S-12211E which is used to support existing design and equipment.

6.7 Subject term (key word) listing.

Calibration	Rating - 24 Vdc
Corrosion resistance	Recovered material
Endurance	Shock resistance
Extreme temperature resistance	Terminal strength
Fungus resistance	Vibration resistance
High voltage	Waterproofness
Pressure overload	

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6.8 AMC policy on AQLs/LTPDs. This specification is certified to be in compliance with current Army Materiel Command (AMC) policy for the elimination of AQLs/LTPDs (Acceptable Quality Levels/Lot Tolerance Percent Defectives) from military specifications.

6.9 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:

Army - AT
Air Force - 11

Preparing activity:

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