MILITARY SPECIFICATION

SWITCHES AND SWITCH ASSEMBLIES, SENSITIVE AND PUSH (SNAP ACTION), GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-S-8805D, dated 7 September 1984, and is approved for use by all Departments and Agencies of the Department of Defense

PAGE 1

Beneficial comments note, delete existing address and substitute:

"Commander, Defense Electronics Supply Center, ATTN DESC-EMM, 1507 Wilmington Pike, Dayton, OH 45444-5283" Make this same change to Form 1426 at end of document.

PAGE 3

* 2 1, add the following federal specification·

"QQ-S-365 - Silver Plating, Electrodeposited, General Requirements For "

2 1, title of military specification MIL-S-28786 Delete "Preparation for Delivery of" and substitute "Packaging of"

PAGE 4

2.2, add the following after the ASTM address

"ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

EIA RS-448 - Standard Test Methods for Electromechanical Switches

(Application for copies should be addressed to EIA Engineering Department, Standards Sales Office, 2001 Eye Street N.W., Washington, D.C. 20006.)"

PAGE 5

* 3 4 2 2, add the following at the end of the paragraph

"Unless otherwise specified (see 3 1), thermoplastic material shall meet the following requirements when tested in accordance with MIL-M-24519 These requirements apply regardless of whether the thermoplastic material used is procured to a military specification or not

a Have a minimum heat deflection temperature of 375°F

b Have a maximum water absorption of 0 30 percent

c Have a maximum dimensional stability (high temperature) of 0 12 percent

The use of regrind thermoplastic material is prohibited "

DISTRIBUTION STATEMENT A Approved for public release, distribution is unlimited

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

PAGE 6

* 3.5.2.1, delete and substitute the following.

"3.5.2.1 Solder terminals. Solder terminals shall be treated to facilitate soldering. Coatings such as hot solder or hot-tin dip are acceptable. Gold plating .000030 inch to .000100 inch may be used Gold plating is permitted only over a diffusion barrier such as nickel or palladium. Silver plating shall not be used as the external coating When plating is used, gold plating shall be in accordance with MIL-G-45204, nickel plating shall be in accordance with QQ-N-290, and silver plating shall be in accordance with QQ-S-365."

3.7.2, delete and substitute the following:

"3.7.2 Watertight (applicable to enclosure design 3). When switches are tested as specified in 4.8.3.2, there shall be no leakage as indicated by a continuous stream of the bubbles coming from within the switch enclosure At the conclusion of the test, switches shall meet the dielectric withstanding voltage requirements as specified in 3.8."

3 7 3, line 2 Delete "the leakage rate" and substitute "the equivalent standard leakage rate"

PAGE 7

3.7.4, line 2: Delete "the leakage rate" and substitute "the equivalent standard leakage rate".

* 3 14, delete and substitute the following

"3.14 Strength of actuating means When switches are tested as specified in 4.8 10, there shall be no opening of closed contacts during application of the static load There shall be no electrical or mechanical damage, and the operating characteristics shall be as specified (see 3 1 and 6.2) "

PAGE 8

3 22, add the following sentence at the end of the paragraph

"When mounting and terminal hardware is specified (see 3 1), it shall be removable at the end of the test without causing mechanical malfunction of the hardware or switch "

PAGE 9

After 3.39, add the following paragraph

"3 40 Logic level circuit (when specified, see 3 1). When switches are tested as specified in 4.8.34, there shall be no contact sticks or misses detected by the monitoring device. A voltage of 2.1 volts or greater across the switch terminal shall constitute a contact miss (failure to properly close the circuit) A voltage drop of less than 90 percent of the open-circuit voltage shall constitute a contact stick (failure to properly open the circuit) "

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

PAGE 13

TABLE VII, add Group XI inspection requirements as follows

TABLE VII. Qualification inspection - Continued

Inspection	Requirement paragraph	Test method paragraph	Number of sample units to be inspected
Group XI			
Logic level circuit (when specified)	3.40	4.8 34	2
Operating characteristics	3.10	4.8.6	

TABLE VII, add the following sentences to footnote 7/

"At the option of the qualifying activity, a reduced number of load conditions tested may be authorized for assemblies utilizing QPL-8805 listed basic sensitive switches with suitable electrical ratings and temperature characteristics As a minimum, however, all sealed assemblies, enclosure designs 2, 3, 4, and 5 shall be tested with loads as specified in table IX regardless of whether the basic switch is procured to a military specification or not (see 6 7 1) "

* TABLE VII, add footnote 9/ as follows, applicable to group VII electrical endurance, ac loads:

"9/ Unless otherwise specified (see 3 1), ac tests are to be 60 Hz Where different current ratings for 60 Hz and 400 Hz are shown (see 3.1), both 60 Hz and 400 Hz tests are to be performed."

4 5.5b, first line. Delete "a summary of".

PAGE 15

TABLE VIII, Inspection column. Delete "(when specified)" in two places and substitute "(when applicable)" in each place.

TABLE VIII, footnote 1/: Delete "precent" and substitute "percent".

* TABLE VIII. Add footnote "7/" in test method paragraph column next to 4.8.6, 4.8 6 1, and 4.8 24

* TABLE VIII, add footnote 7/ as follows:

"7/ Unless otherwise specified (see 3.1), the test current shall not exceed 100 milliamperes and the open circuit test voltage shall not exceed 6 V dc or peak ac for switches rated for low level life."

PAGE 16

TABLE IX, Inspection column Add "7/" next to Electrical endurance, Intermediate current, and Low level current

TABLE IX, add footnote 7/ as follows·

"7/ All electrical endurance tests shall be completed as specified in this table for sealed switch assemblies, enclosure designs 2, 3, 4, and 5, regardless of whether the basic switch used is procured to a military specification or not "

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

PAGE 17

4.8.3.2, delete and substitute

"4.8.3.2 Watertight (applicable to enclosure design 3). Switches shall be immersed in an enclosure to a depth of 2-3 inches in tap water. The resilient interfacial seal of a connector shall not be immersed in the water The enclosure shall be subjected to an absolute pressure of 2.0 ±0.5 inches of mercury for a period of 2 minutes minimum During this period the switches shall be observed for leakage as indicated by a continuous stream of bubbles coming from within the switch. A continuous stream of bubbles shall be two or more bubbles present in the water at the same time and originating from the same location on the switch. Bubbles which are the result of entrapped air on the exterior of the switches shall not be considered as leakage. During group A inspection only, switches shall be removed from the water before the pressure of the vacuum chamber is raised to atmospheric pressure.

"Final measurements: External moisture only shall be removed from the switches Within 24 hours after removal from the water, atmospheric pressure dielectric withstanding voltage shall be measured as specified in 4.8 4 1 Switches shall be thoroughly dried to remove residual moisture after inspection "

4.8.3 3b, at the end of sentence, add "under standard conditions"

4.8.3.4b, at the end of sentence, add· "under standard conditions"

PAGE 18

4 8 4.2b Delete "Test condition" and substitute "Test condition C"

4 8 5, last sentence Delete "perfomred" and substitute "performed"

PAGE 21

4 8 9 2b, add the following at the end of the subparagraph "Three pounds minimum pull for terminals designed for direct insertion into printed circuit boards "

* 4 8 10, delete last sentence in paragraph and substitute the following

"A circuit, such as a pilot light, shall be used to monitor the normally open switch contacts to assure that they do not open during the application of the static load "

PAGE 24

* 4 8 22, delete entire paragraph and substitute the following.

"4 8.22 Resistance to soldering heat (see 3.26) (applicable to switches with solderable terminals) (not applicable to switches with integral leadwire terminals) Switches with wire connection terminals shall be tested in accordance with 4 8.22 1 Switches with printed circuit (PC) terminal pins shall be tested in accordance with 4.8.22.2 Following completion of the procedure, a visual inspection for deformation or other damage shall be performed at 7X magnification. Subsequent to all applicable follow-on testing of tables VII and IX, the switches shall be opened and inspected at 7X magnification for deformation or other damage

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

"4 8 22 1 Resistance to soldering heat (for wire connection terminals) Switches shall be tested in accordance with EIA-448-22 as follows

a * A temperature controlled soldering iron capable of maintaining the idling tip temperature within ±10°F, rated for 25 watts with a wedge tip shall be used.

b. The solder shall be lead-tin alloy with a nominal tin content of 60 to 63 percent. It will be in the form of flux cored solder wire of no more than 0.062 inch nominal outside diameter, with an R or RMA flux core which occupies approximately 33 percent of the solder cross sectional area.

c. The test shall be performed on all of the solder terminations of the switch.

d. The applicable copper wire, of the size required for the electrical endurance test, properly prepared for the solder eye size, shall be inserted in the appropriate manner If the switch terminals are of the wraparound type, the wire shall be wound around the applicable portion of the terminal 1/2 to 3/4 turn.

e The soldering iron shall be heated to 360°C ±10°C The time of application shall be 4 to 5 seconds during which the solder shall also be applied in an amount commensurate with good soldering technique

f. The soldering iron and the solder shall be applied to that portion of the terminal that is intended to receive the connecting wire and is closest to the switch housing.

g. During application of the solder and soldering iron, a force of 3 to 4 ounces shall be applied to the terminal by the soldering iron in a direction perpendicular to the major flat or diameter portion of the terminal intended to receive the connecting wire.

"4 8.22 2 Resistance to soldering heat (applicable to switches with printed circuit (PC) terminal pins) Switches shall be tested in accordance with method 210 of MIL-STD-202 The following details shall apply

a Depth of immersion Terminals shall be immersed to within 2 mm to 2 5 mm (079 inch to 099 inch) of the switch body

b Test condition B

c Cooling time Not applicable.

d Inspections and measurements:

(1) Before: None

(2) After: See paragraph 4.8.22."

PAGE 26

* 4.8.26, delete and substitute the following:

"4 8.26 Mechanical endurance (see 3 30) Switches shall be subjected to mechanical operation cycling at a rate of 60 ±5 cycles per minute for momentary action units and 30 ±5 cycles per minute for alternate action units Unless otherwise specified (see 3 1), each stroke of the actuating means shall include the full range of travel from free position to full overtravel position and return to the fully released position The actuation force applied to the switch actuator shall not exceed the force required to reach the extreme position of travel Switch contacts shall be monitored for circuit continuity a minimum of one minute per hour for the duration of the test. Two switches shall be tested at each ambient temperature condition "

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

PAGE 31

* 4 8.31 1e, add the following at the end of the subparagraph

"Unless otherwise specified (see 3.1), each stroke of the actuating means shall include the full range of travel from free position to full overtravel position and return to the fully released position The actuation force applied to the switch actuator shall not exceed the force required to reach the extreme position of travel "

4 8.31 1f, delete and substitute

"f For double throw switches, one half of the switches shall be tested with the load circuit connected to one throw, and the remaining half of the switches shall be tested with the load circuit connected to the other throw."

After 4 8 31 1i, add the following new subparagraphs j and k·

"j The dc power source shall provide the rated or inrush current on resistive loads within 300 microseconds after closing the circuit with a bounceless contact device Oscillograms shall be provided with the test report documenting this characteristic

"k Electrical tolerances are as follows

Voltage ±5 percent for dc
±7 percent for ac

Frequency ±5 percent

Current· ±5 percent "

PAGE 33

After 4 8.33, add the following paragraph

"4 8 34 Logic level circuit (when specified, see 3 1) (see 3 40) Switches shall be tested in accordance with EIA RS-448, method 17 as follows.

a Contact load Each switch contact shall make, carry, and break a resistive load of 10 ±1 mA at an open circuit voltage of 5 0 ±0 5 V dc. Both normally open and normally closed contacts shall be loaded Contacts shall be connected to individual loads

b Cycles of operation The number of cycles of operation shall be 50,000 unless otherwise specified (see 3.1) The actuation rate shall be 120 cycles per minute maximum Unless otherwise specified (see 3 1), each stroke of the actuating means shall include the full range of travel from free position to full overtravel position and return to the fully released position The actuation force applied to the switch actuator shall not exceed the force required to reach the extreme position of travel unless so authorized by the manufacturer.

c Monitoring. During each closure of the contacts, the voltage drop across the switch terminals shall be monitored for a duration of no less than 50 percent of each contact static closure The switch contacts need not be monitored until 10 milliseconds after the initial contact closure to exclude any contact bounce During each opening of the contacts, the voltage drop across the switch terminals shall be monitored for a duration of no less than 50 percent of each contact opening The monitoring device shall either record the number of contact closures at which sticks or misses occur, or discontinue the test when sticks or misses occur "

After 6 2 1b, add the following subparagraph

"c Type and amount of hardware to be included with switch, if other than that specified on the applicable specification sheet "

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.

PAGE 36

After 6 4 15, add the following paragraphs

* "6 4 16 Gold contacts Contacts in which the mating surfaces are gold or gold alloy throughout the rated life of the switch (In some instances, gold plating may be used for shelf life or multi-rating capability and is fully expected to be destroyed during life.)

6 4.17 Silver contacts Contacts in which the mating surfaces are silver or silver alloy throughout the rated life of the switch

6 4.18 Bifurcated contacts A set of contacts in which the movable or stationary contact configuration is divided to provide two mating contact surfaces in parallel "

PAGE 37

* 6 7.1, add second paragraph as follows·

"The load handling capability of an unsealed basic sensitive switch may be affected when used in sealed switch assemblies Each contact rating and temperature characteristic must be evaluated on the sealed switch assembly "

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous 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 and relationship to the last previous issue

CONCLUDING MATERIAL

Custodians
Army - ER
Navy - EC
Air Force - 85
NASA - NA

Review activities
Army - AR, AV, MI
Navy - AS
Air Force - 99
DLA - ES

User activities
Navy - MC, OS, SH
Air Force - 19

Preparing activity
Navy - EC

Agent
DLA - ES

(Project 5930-1464)

Source: https://assist.dla.mil -- Downloaded: 2016-11-13T06:43Z
Check the source to verify that this is the current version before use.