

INCH-POUND

MIL-S-83731A
 AMENDMENT 3
 26 May 1995
 SUPERSEDING
 AMENDMENT 2
 18 September 1980

MILITARY SPECIFICATION
 SWITCHES, TOGGLE, UNSEALED AND SEALED TOGGLE,
 GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-S-83731A, dated 26 January 1976, and is approved for use by all Departments and Agencies of the Department of Defense.

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- * 2.1, delete the following military specifications:
 - "MIL-P-997 - Plastic Material, Laminated, Thermosetting, Electrical-Insulating; Sheets, Glass Cloth, Silicone Resin."
 - "MIL-E-9500 - Ethylene Glycol, Technical."
 - "MIL-P-15037 - Plastic Sheet, Laminated, Thermosetting, Glass Cloth, Melamine-resin."
 - "MIL-P-18177 - Plastic Sheet, Laminated, Thermosetting, Glass Fiber Base, Epoxy-resin."
 - "MIL-C-45662 - Calibration System Requirements."
- * 2.1, add the following military specification:
 - "MIL-C-47220 - Coolant Fluid, Dielectric."
- * 2.1, title of military specification MIL-M-14: delete and substitute "Molding Compounds, Thermosetting".
- * 2.1, title of military specification MIL-S-28786: delete and substitute "Switches, Electrical and Fiber Optic, Packaging of".
- * 2.1, delete the following federal standard:
 - "FED-STD-406 - Plastic, Methods of Testing."
- * 2.1, add the following federal standard:
 - "FED-STD-H28 - Screw Thread Standards for Federal Services."

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- * 2.1, delete the following military standard:
 - "MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes."
- * 2.1, add the following military standard:
 - "MIL-STD-454 - Standard General Requirements for Electronic Equipment."
- * 2.2, delete and substitute the following:

"2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issue 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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/NCSL 2540-1 - General Requirements for Calibration Laboratories and Measuring and Test Equipment.

(Application for copies should be addressed to the American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036-8002, telephone 212-642-4900, fax 212-302-1286.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 1119 - Glycol, Industrial Grade Ethylene, Standard Specification for.

(Application for copies of ASTM publications should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103-1187)

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INTERNATIONAL ORGANIZATION FOR STANDARDS (ISO)

ISO 10012-1 - Quality assurance requirements for measuring equipment - Part 1; Meteorological confirmation system for measuring equipment

(Application for copies should be addressed to the American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036-8002, telephone 212-642-4900, fax 212-302-1286.

UNDERWRITERS' LABORATORIES, INC. (UL)

UL94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2002.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)"

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- * 3.4.2, delete and substitute the following:

"3.4.2 Plastic materials. Unless otherwise specified (see 3.1), molded plastic material shall conform to MIL-M-14. Stacked lamination shall not be used for the switch body. Other types of plastic materials may be used provided the manufacturer submits acceptable evidence of performance to the qualifying activity during the qualification test program on the submitted product. The plastic material used shall pass the fungus test specified in MIL-STD-454, requirement 4. The plastic material used in all external switch parts and enclosures shall be tested in accordance with UL94 and classified as 94V-0; this requirement applies to all materials for external parts and enclosures regardless of whether the material used is procured to a military specification or not."

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- * 3.5.5, add the following at the end of the paragraph:

"Crimp pin contacts, for switches with integrated wire termination, are not supplied with the switch."

- * 3.5.7, second line, delete "Handbook H28" and substitute "FED-STD-H28".

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3.6.10, paragraph title, delete "low level life".

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3.7.2, delete and substitute:

"3.7.2 Terminal identification. When specified (see 3.1), terminals shall be marked in accordance with figure 1. Terminal positions not used need not be identified. Terminal marking on the side of the case is permissible."

- * 4.1.1, last line, delete "MIL-C-45662" and substitute "ANSI/NCSL Z540-1, ISO-10012-1, or equivalent system as approved by the qualifying activity."

- * After 4.1.1, add the following new paragraph:

"4.1.2 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspections 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."

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- * Table I, plastic material, third column, delete "MIL-P-997", "MIL-P-15037", "MIL-P-18177", and "FED-STD-406" and substitute "MIL-STD-454" and "UL94".

4.5.1, delete and substitute:

"4.5.1 Sample. For qualification inspection, the sample shall be as specified in table II and the appendix to this specification. The sample units which have been subjected to qualification inspection shall be forwarded to the preparing activity."

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TABLE II, column 1, delete "Electrical overload and endurance" and substitute "Electrical overload, electrical endurance, intermediate current, and temperature rise".

- * TABLE II, specimen number 5, remove solderability from the test sequence.
- * TABLE II, add new specimen number column 11, with test sequence as follows:

Examination or test	Specimen
	11
Examination of product -	1
Solderability- - - - -	2

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- * 4.7.1.2, delete and substitute the following:

"4.7.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table III. The inspections may be performed in any order.

4.7.1.2.1 Sampling plan. Statistical sampling shall be in accordance with tables III and IIIa. A randomly selected group(s) of samples is required for subgroups 1 and 2. For acceptance of the lot there shall be zero occurrences of defects.

4.7.1.2.1.1 Subgroup 1. A sample of parts shall be randomly selected in accordance with table IIIa, subgroup 1 sampling plan.

4.7.1.2.1.2 Subgroup 2. A sample of parts shall be randomly selected in accordance with table IIIa, subgroup 2 sampling plan."

- * TABLE III, delete and substitute the following:

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph	Sampling plan 1/
<u>Subgroup 1</u>			See 4.7.1.2.1.1
Examination of product	3.1	4.8.1	
Material	3.4	4.3 and 4.8.1	
Design and construction	3.5	4.8.1	
Marking	3.7	4.8.1	
Workmanship	3.8	4.8.1	
<u>Subgroup 2</u>			See 4.7.1.2.1.2
Switching characteristics	3.6.3	4.8.4	
Dielectric withstanding voltage	3.6.8	4.8.9	
Contact voltage drop	3.6.7	4.8.8	

1/ At the option of the contractor, documented in-process inspection may be used to satisfy the requirements provided that all of the contractor's in-process control data on these tests are made available to the Government upon request."

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- * After table III, add table IIIa as follows:

" TABLE IIIa Zero defect sampling plan.

Lot size	Minimum number of switches to be tested	
	Subgroup 1	Subgroup 2
1 - 8	5	All
9 - 15	5	13
16 - 25	5	13
26 - 50	5	13
51 - 90	7	13
91 - 150	11	13
151 - 280	13	20
281 - 500	16	29
501 - 1,200	19	34
1,201 - 3,200	23	42
3,201 - 10,000	29	50
10,001 - 35,000	35	60

- * 4.7.1.3, delete and substitute the following:

"4.7.1.3 Rejected lots. If an inspection lot is rejected, the lot shall be 100 percent inspected for the defects noted. The contractor may correct all of the defects or remove all of the defective units from the lot. The lot shall then be sampled again in accordance with tables III and IIIa. For acceptance, there shall be zero occurrences of defects. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots."

- * 4.7.2.1, delete and substitute the following:

"4.7.2.1 Group B inspection. Group B inspection shall be completed in accordance with table IIIb within each 3-year period after initial qualification. When a manufacturer has switches qualified under various MS military standards or military specification sheets, the qualifying activity may authorize group B tests that do not require redundant testing on similar features. Group B inspection shall be performed on sample units that have been produced, using the same manufacturing facilities and processes normally used in production and which have passed group A inspection. A manufacturer's normal quality control tests, production tests, and environmental tests may be used to fulfill all or part of group B inspection; however, all of group B inspection shall be completed as specified. Data used may be accumulated within the previous 24 months."

- 4.7.2.1.1, delete and substitute:

"4.7.2.1.1 Sampling plan. The sampling plan and test procedure shall be as specified in the appendix to this specification. The sample units shall be selected from current production. If switches are not in production, switches may be selected from stock. However, the switches shall be date coded within the past year. When there has been no production of a particular type of switch for a 3-year period, sample units shall be selected from the next production lot presented for acceptance and for each subsequent 3-year period."

- 4.7.2.1.2, delete "group C" and substitute "group B".

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- 4.7.2.1.3, line 1, 7, and 10, delete "group C" and substitute "group B".

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Following 4.7.2.1.3, add table IIIb as follows:

TABLE IIIb. Group B inspection.

Inspection	Requirement paragraph	Test paragraph	Specimen											
			1	2	3	4	5	6	7	8	9	10	11	12
* Solderability - - - - -	3.6.1	4.8.2									X	X		
Strength of mounting bushing - -	3.6.6	4.8.7 4/			X	X								
Mechanical endurance - - - - -	3.6.9	4.8.10	X	X										
Electrical overload, electrical endurance, intermediate current, and temperature rise - - - - -	3.6.10	4.8.11												
Overload circuit - - - - -		4.8.11.1					X	X	X	X				
Resistive load (ac) 1/ - -		4.8.11.2					X	X						
Inductive load (altitude) 2/		4.8.11.3							X	X				
Temperature rise - - - - -		4.8.11.6					X	X						
Contact voltage drop - - - - -	3.6.7	4.8.8	X	X										
Shock - - - - -	3.6.13	4.8.14			X	X								
Salt spray (corrosion) - - - -	3.6.14	4.8.15											X	X
Moisture resistance - - - - -	3.6.16	4.8.17			X	X								
Dielectric withstanding voltage -	3.6.8	4.8.9.1					X	X	X	X				
Examination of product - - - - -	3.1	4.8.1	X	X	X	X	X	X	X	X	X	X	X	X
Switching characteristics - - -	3.6.3	4.8.4	X	X	X	X	X	X	X	X	X	X		
Toggle seal 3/ - - - - -	3.6.19	4.8.20	X	X	X	X	X	X	X	X	X	X		

1/ Test at 115 volts, 60 Hz, 71°C.

2/ Test at 28 V dc, 65,000 feet.

3/ Only the odd-numbered specimens shall be opened by the manufacturer.

4/ Torque shall be applied to the switch body only."

* 4.7.3, line 2, delete "preparing activity" and substitute "qualifying activity".

4.7.3, lines 4, 7, and 8; delete "group C" and substitute "group B".

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4.8.9(a), delete "group C" and substitute "group B".

4.8.9(c)(1), delete "group C" and substitute "group B".

4.8.9(d)(2), add "(not applicable after electrical endurance test)".

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4.8.9.1(a), delete "group C" and substitute "group B".

4.8.11, paragraph title, delete "low level life".

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4.8.21(a), delete "group C" and substitute "group B"

- * 4.8.21(a)(2)c and 4.8.21(a)(2)d, delete and substitute the following.

- "c. MIL-C-47220 - dielectric coolant fluid, silicate ester (Coolanol) or equivalent.
 - d ASTM E 1119 - ethylene glycol."

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- * 6.3, lines 9 and 10, qualifying activity address, delete and substitute "DESC-ELS, 1507 Wilmington Pike, Dayton, OH 45444-5764".
- * 6.4, delete first sentence.
- * 6.5, delete "MS25196" and substitute "MIL-B-5423/16"

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10.1, line 2, delete "group C" and substitute "group B".

20 2, paragraph title, delete "Group C" and substitute "group B".

20.2.1, delete "table II" and substitute "table IIb".

20.2.2, lines 3 and 5, delete "table II" and substitute "table IIb".

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- * 30.1, Brass: Material, delete "QQ-B-626, alloy no. 360" and substitute "ASTM B16, alloy UNS C36000".
MIL hardware, delete "MS25082-B21" and substitute "MS25082-B8".
- * 30.1, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."
MIL hardware, delete "MS25082-21" and substitute "MS25082-8."
- * 30.1, Cres: MIL hardware, delete "MS25082-C21" and substitute "MS25082-C8."
- * 30.2, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."
MIL hardware, delete "None (.250 size)" and "MS35333-121 (.468 size)" and substitute "AA55609-125 (.250 size)" and "AA55609-126 (.468 size)", respectively.
- 30.2, Cres: MIL hardware, delete "None" and substitute "Can be replaced by AA55609-135 (.250 size), AA55609-136 (.468 size)".

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- * 30.3, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."
MIL hardware, delete "None (.250 size)" and substitute "MS25081-0 (.250 size)".
- 30.3, Cres: MIL hardware, delete "None (.250 size)" and substitute "MS25081-C0 (.250 size)".
- * 30.4, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion "

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- * 40.1, Brass: Material, delete "QQ-B-626, alloy no. 360" and substitute "ASTM B16, alloy UNS C36000".
- * 40.1, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."
- * 40.2, Screw: Material, delete "QQ-B-626, alloy no. 360" and substitute "ASTM B16, alloy UNS C36000".
- * 40.2, Lockwasher: Material, delete "QQ-B-750, comp A" and substitute "ASTM B139, alloy UNS C51000".

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- * 40.3, Steel: Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."
- * 40.3, Bronze: Material, delete "QQ-B-750, composition A" and substitute "ASTM B139, alloy UNS C51000".
Finish, delete "Cadmium plate QQ-P-416, type II, class 3" and substitute "Suitably protected to resist corrosion."

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- * DD Form 1426, preparing activity address, delete and substitute "DESC-ELD, 1507 Wilmington Pike, Dayton, OH 45444-5765".

NOTE: The margins of this amendment are marked with asterisks 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 amendment.

CONCLUDING MATERIAL

Custodians:

Army - ER
Navy - AS
Air Force - 85

Preparing activity:
DLA - ES

(Project 5930-1598)

Review activities:

Army - AR, AV, MI
Navy - EC, MC
Air Force - 99