

INCH-POUND

MIL-PRF-6106K
AMENDMENT 1
15 September 1999

PERFORMANCE SPECIFICATION

RELAYS, ELECTROMAGNETIC GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-PRF-6106K, dated 01 May 1997, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 1

Beneficial comments block, delete "88 LOG/LGME, Building 280, Door 4, 4170 Hebble Creek Rd., Wright Patterson AFB, OH 45433-5653" and substitute "Defense Supply Center, Columbus, Post Office Box 3990, Columbus, OH 43216-5000"

PAGE 3

3.1 Add after the last sentence "Specification sheets, MS sheets, and AN Aeronautical standards, issued prior to the release date of the K revision of this document, may specify requirements for minimum current or intermediate testing. The terminology concerning these tests has changed to the following: Group C1 Intermediate current testing is applicable when minimum current is specified. Mixed loads testing is applicable when intermediate current is specified."

Add as a new paragraph,

"3.2.1 Qualification by similarity. Relays furnished under this specification may be qualified by similarity with other relays in the generic family. Manufacturer's which desire to qualify products in this manner shall request this method from the qualifying activity. The qualifying activity shall determine any additional testing that may be required for relays qualified by similarity."

3.3 Add a new sentence after the last sentence in this paragraph. "Inactive for New Design" specification sheets, MS sheets, or AN standards do not require to be compliant with MIL-STD-790."

3.3.1 Add a new sentence after the last sentence in this paragraph. "Inactive for New Design" specification sheets, MS sheets, or AN standards do not require the implementation and use of a SPC program."

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3.5.3.2 Add "Hermetic" in front of "Sealing process."

3.5.3.2a. Delete "(not applicable to relays fully rated 25 amperes and above)."

3.5.3.2b. Add, "Trace color shall not obscure identification of contrasting glass color."

3.5.7 Add, "and 4.7.8.8" after "3.13.8."

PAGE 7

Table II, Thread size, delete "STET" and substitute "1/4-28."

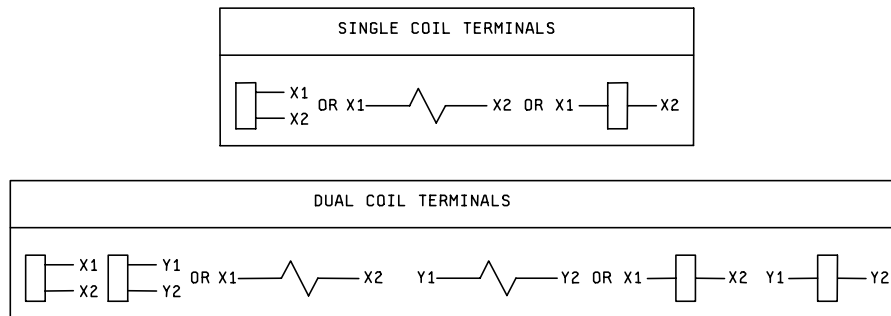
Table II, Thread size, add a space after ".438" and before "UNF"

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FIGURE 3. Delete and substitute the following

”



”

PAGE 13

Add a new paragraph

“3.5.13 Stabilization of permanent magnets. The residual induction (flux) in permanent magnetic assemblies shall be reduced to a level where it will not be affected by demagnetizing forces encountered in normal service, handling, and any tests specified herein. The retraceability characteristics shall be compatible with all performance requirements of the relays.”

3.6.1 Delete and substitute “3.6.1 Diode in-process screening (applicable to relays with diodes; see 3.1 and 4.6.1.1). Perform in process screening as specified. In-process inspection is not required when JANTX diodes or diodes screened to JANTX are used. Waiver of in-process screening requires qualifying activity approval.”

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Table IV, footnote 3, Delete “qualification inspection,” and substitute “qualification, group B, and group C inspections.”

3.13.3 Delete “Unless otherwise specified (see 3.1), the contact voltage drop shall not exceed 0.100 volt maximum for relays not fully rated at 25 amperes and below: for relays fully rated at 25 amperes and above, the contact voltage drop shall not exceed 0.125 volt” and substitute “Unless otherwise specified (see 3.1), the contact voltage drop shall not exceed 0.100 volt (after life tests 0.125 volt) maximum for relays not fully rated at 25 amperes and below. Contact voltage drop for relays fully rated at 25 amperes and above shall not exceed 0.125 volt maximum(after life tests 0.150 volt).”

PAGE 15

3.13.8 Add “(see 4.7.8.8)” to end of title.

3.14 Delete “4.7.23” and substitute “4.7.9.”

3.17 Delete “unless otherwise specified” and substitute “when specified.”

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PAGE 16

3.26 Add "rise" after "(Monitoring of terminal temperature)".

Delete "4.7.22.7" and substitute "4.7.28."

PAGE 17

3.32 Delete "25°C" and substitute "+20°C to +35°C."

3.34.1 Delete and substitute "3.34.1 JAN and J marking. The United States Government has adopted, and is exercising legitimate control over the certification marks "JAN" and "J", respectively, to indicate that items so marked or identified are manufactured to, and meet all the requirements of specifications. Accordingly, items acquired to and meeting all of the criteria specified herein and in applicable specification shall bear the certification mark "JAN" except that items too small to bear the certification mark "JAN" shall bear the letter "J". The "JAN" or "J" shall be placed immediately before the part number except that if such location would place a hardship on the manufacturer in connection with such marking, the "JAN" or "J" may be located on the first line above or below the part number. Items furnished under contracts or orders which either permit or require deviation from the conditions or requirements specified herein and in applicable specifications shall not bear "JAN" or "J". In the event an item fails to meet the requirements of this specification and applicable specification sheets or associated specifications, the manufacturer shall remove the military part number and the "JAN" or the "J" from the sample tested and also from all items represented by the sample. The "JAN" or "J" certification mark shall not be used on products acquired to contractor drawings or specifications. The United States Government has obtained Certificate of Registration No. 504,860 for the certification mark "JAN" and Registration Number 1,586,261 for the certification mark "J"."

PAGE 18

3.34.2a. Delete and substitute "3.34.2a. PIN (see 1.2.3 and 3.1). When the "JAN" or "J" marking is placed before the PIN, one blank space shall be between the "JAN" or "J" and the part number. No alphanumeric characters shall be between the "JAN" or "J" and the part number."

3.34.2b. Delete and substitute "3.34.2b. "JAN" or "J" brand. When the "JAN" or "J" is marked above or below the military "PIN," the first letter of "JAN" or "J" marking shall be directly above or below the first alphanumeric character of the military part number."

3.34.2c. Delete and substitute "3.34.2c Date code (When the "JAN" or "J" marking is placed before the date code, the designation shall be immediately preceding the first digit of the date code)."

3.35b. Add at the end of the last sentence "(see figure 5)."

PAGE 19

Add as a new paragraph after 3.36,

"3.37 Low temperature operation (see 4.7.29). Following the test and at the specified low temperature, the pickup voltage, dropout voltage, and contact voltage drop shall meet the requirements of 3.13.4 and 3.13.3 and shall continue to meet pickup and dropout voltage requirements until the relay returns to room temperature. Relays which contain permanent magnets in the magnetic circuit shall, in addition to the above test, be subjected to the demagnetizing effect of a sudden application of maximum coil voltage for one operation at the beginning of the second 24-hour period and the high temperature pickup voltage shall meet the requirements of 3.13.4."

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4.3.4 Delete "load the contacts" and substitute "cause the relays to make or break loads."

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Table V, align "1/ 00", "235", "145";
"1/ 000", "266", "162"; and
"1/ 0000", "303", "190".

PAGE 23

4.4.1.1 Delete ""for relays rated less than 25 amperes," and substitute "for relays not fully rated at 25 amperes," two places.

4.4.2 Delete "for relays rated less than 25 amperes," and substitute "for relays not fully rated at 25 amperes," two places.

4.4.2 Delete "group Q9 inclusive" and substitute "group Q9(table VI) or group Q8(table VII) inclusive."

PAGE 24

Table VI, title, delete (for relays rated less than 25 amperes," and substitute "for relays not fully rated at 25 amperes."

Table VI, group Q1, delete "Screening (when specified)" and substitute "Run-in screening (when specified)."

Table VI, group Q2, Acceleration, add, "(when specified)"

Table VI, Q4, delete, "table XI" and substitute "table XII."

PAGE 25

Table VI, title, delete (for relays rated less than 25 amperes," and substitute "for relays not fully rated at 25 amperes."

Table VI, group Q6, Test method paragraph, delete "4.7.22" and substitute "4.7.28."

Table VI, group Q6, delete "Visual inspection (external)"; "3.1; 3.35, 3.36"; and "4.7.1."

Table VI, group Q7, Inspection, Rupture delete "5/" and substitute "6."

Table VI, group Q9, delete "Visual inspection (external)"; "3.1; 3.35, 3.36"; and "4.7.1."

PAGE 26

Table VII, group Q3, Number of sample units to be inspected, delete: "1" and substitute "2."

PAGE 27

Table VII, group Q5, Test method paragraph, delete "4.7.22" and substitute "4.7.28."

PAGE 28

4.6.2.2.1 Add after "except as noted." "Group A1 testing is applicable when specified (see 3.1). The obsolete terms "type I ER" and "type I ER screening", in specification sheets MS sheets, or AN Aeronautical standards, invoke the requirement for group A1 performance."

4.6.2.2.1.2 Delete "heremtic" and substitute "hermetic."

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PAGE 29

Table VIII, delete and substitute the following:

TABLE VIII. Group A inspection. 1/

Inspection	Requirement paragraph	Test method	Inspection Requirements
<u>A1</u> (when specified) Vibration, sinusoidal Run-in screening	3.16 3.7	4.7.11.3 4.7.2	100 percent
<u>A2</u> <u>2/</u> Dielectric withstanding voltage Insulation resistance Electrical characteristics	3.12 3.11 3.13	4.7.7 4.7.6 4.7.8	100 percent
<u>A3</u> Solderability	3.8	4.7.3	2 samples
<u>A4</u> Visual and mechanical inspection (external) <u>3/</u> Seal <u>4/</u>	3.1, 3.34, 3.35, 3.36 3.10	4.7.1 4.7.5	100 percent

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Note 4 Delete "mat" and substitute "may."

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PAGE 32 and 33

Table X, delete and substitute the following:

"TABLE X. Group C inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of sample units for inspection
<u>C1 (monthly)</u>			
Internal moisture (when specified) <u>5/</u>	3.33	4.7.27	2
Intermediate current (when specified) <u>5/</u>	3.32	4.7.26	
Dielectric withstanding voltage	3.12	4.7.7	
Insulation resistance	3.11	4.7.6	
Electrical characteristics	3.13	4.7.8	
Visual inspection (external)	3.1,3.35,3.36	4.7.1	
<u>C2 (every 36 months)</u>			
Low temperature operation	3.37	4.7.29	2
Thermal shock	3.14	4.7.9	
Shock (specified pulse) <u>1/</u>	3.15	4.7.10	
Vibration <u>1/</u>	3.16	4.7.11	
Terminal strength	3.18	4.7.13	
Dielectric withstanding voltage <u>2/</u>	3.12	4.7.7	
Insulation resistance <u>2/</u>	3.11	4.7.6	
Electrical characteristics <u>2/</u>	3.13	4.7.8	
Visual inspection (external)	3.1,3.35,3.36	4.7.1	
Seal	3.10	4.7.5	
<u>C3 (every 36 months)</u>			
Continuous current	3.30	4.7.24	2
Mechanical Interlock (when specified)	3.31	4.7.25	
Overload (highest ac or dc resistive load) <u>3/</u>	3.24	4.7.19	
Life (highest rated dc, 50,000 cycles)	3.28	4.7.23	
Dielectric withstanding voltage <u>2/</u>	3.12	4.7.7	
Insulation resistance <u>2/</u>	3.11	4.7.6	
Electrical characteristics <u>2/</u>	3.13	4.7.8	
Visual inspection (external)	3.1,3.35,3.36	4.7.1	
<u>C4 (every 36 months)</u>			
Salt spray/corrosion	3.19	4.7.14	2
Acceleration (when specified)	3.17	4.7.12	
Resistance to soldering heat	3.9	4.7.4	
Resistance to solvents	3.29	4.7.23	
Dielectric withstanding voltage <u>2/</u>	3.12	4.7.7	
Insulation resistance <u>2/</u>	3.11	4.7.6	
Electrical characteristics <u>2/</u>	3.13	4.7.8	
Visual inspection (external)	3.1,3.35,3.36	4.7.1	
Seal	3.10	4.7.5	

See footnotes at end of table.

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Inspection	Requirement paragraph	Test method paragraph	Number of sample units for inspection
<u>C5(every 36 months)</u>			
Mechanical life	3.27	4.7.28	2
Moisture resistance	3.21	4.7.16	
Electrical characteristics	3.13	4.7.8	
Rupture <u>4/</u>	3.25	4.7.20	
Seal	3.10	4.7.5	
<u>C6(every 36 months)</u>			
Time current relay characteristics (when specified)	3.26	4.7.21	2
Dielectric withstanding voltage	3.12	4.7.7	
Insulation resistance	3.11	4.7.6	
Electrical characteristics	3.13	4.7.8	
Seal	3.10	4.7.5	
<u>C7(every 36 months)</u>			
Sand and dust	3.20	4.7.15	2
Dielectric withstanding voltage <u>2/</u>	3.12	4.7.7	
Insulation resistance <u>2/</u>	3.11	4.7.6	
Electrical characteristics <u>2/</u>	3.13	4.7.8	

“

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Footnote 2/ Delete and substitute “2/ Testing sequence is optional for insulation resistance and dielectric withstanding voltage prior to electrical characteristics.”

Add as a new footnote after footnote 4/, “5/ Applicable to MIL-R-6106/12, MIL-R-6106/13, MIL-R-6106/20, MIL-R-6106/38, MIL-R-6106/39, MIL-R-6106/40, and MS27742.”

4.7.1 Delete “and workmanship (3.37)” and substitute “workmanship (3.36) and header glass (3.35).”

4.7.2 Delete “Screening” and substitute “Run-in screening.”

PAGE 34

4.7.2a. Delete “The load current shall be 10 mA to 50 mA.” and substitute “The load current shall be 10 μ A to 50 μ A.”

4.7.3 Add to the last sentence “(not applicable to mounting stud or threaded terminals).”

PAGE 35

4.7.7 Delete “Testing in accordance with 4.7.7.2 is not applicable to group C3.” and substitute “Testing in accordance with 4.7.7.2 is not applicable to group A, group B, group C1, group C4, group C6, and group C7.”

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4.7.8.3b Delete "For group A testing, a lower test current (not less than 10 amperes) may be used." and substitute "For group A testing of relays rated above 10 amperes, a lower test current (not less than 10 amperes) may be used."

4.7.8.3d Delete and substitute "Ten activations for qualification. One activation per contact for group A and group B.

PAGE 37

4.7.8.4 Delete "Following group B and group C2 testing," and substitute, "Following group B and group C3 testing,."

PAGE 42

Add a new paragraph

"4.7.8.8 Neutral screen (applicable to latching relays only) (see 3.13.8). Relays shall be tested as follows:

- a. Apply rated coil voltage to both coils simultaneously for a period of 10 ms minimum. After voltage is removed, determine if the relay contacts are in the neutral position.
- b. If the relay contacts will not maintain a neutral position, repeat step 4.7.8.8a. twice. A relay which will not assume a neutral position for these three successive cycles is considered an acceptable part and does not require further testing. Relays which remain in a neutral position shall be tested as follows:
 - (1) Apply a 10 ms \pm 1 ms pulse of the maximum allowable (at +25°C) latch voltage to the latch coil. Verify that the relay has latched. Failure to latch shall be cause for rejection.
 - (2) Repeat step 4.7.8.8a. above.
 - (3) Apply a 10 ms \pm 1 ms pulse of the maximum allowable (at 25°C) reset voltage to the reset coil. Verify that the relay has reset. Failure to reset shall be cause for rejection.

PAGE 47

Add a new paragraph

"4.7.11.3 Group A inspection, vibration (sinusoidal). Unless otherwise specified (see 3.1), for group A testing, only one cycle shall be performed over the frequency range of 100 Hz to 3,000 Hz unless otherwise specified (see 3.1). The relay shall be vibrated in the direction of contact motion. At the option of the manufacturer, the relay production lot may be divided in three equal groups and each group shall be tested in one of three mutually perpendicular axes (x, y, and z). When relays are tested as specified in the optional procedure, a failure of any relay in any axis shall require 100 percent inspection of all relays in the production lot in each axis. The cycle shall consist of 3 minutes with the coil de-energized and 3 minutes with the coil energized. Latching relays shall remain in each latched position with no voltage applied to the coils 3 minutes in the latch position and 3 minutes in the reset position."

4.7.12 Delete "unless otherwise specified" and substitute "when specified".

PAGE 49

4.7.16 c. Add after last sentence "Steps 7.a. and 7.b. are not applicable."

PAGE 51

4.7.22.3.1 Delete "inductors." and substitute "inductors or equivalent as approved by the qualifying activity."

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Table XV, Initial millivolt drop (max), delete "(see 4.7.6)" and substitute "(see 4.7.8.3)."

1/ Delete reference to "4.7.7" and substitute "4.7.8.3."

4.7.22.7 Delete paragraph number "4.7.22.7" and substitute "4.7.28."

PAGE 55

4.7.24 Delete "the coils of type I and type shall" and substitute "the coils of type I, type II, and type IV shall."

PAGE 56

Add as a new paragraph after 4.7.28,

"4.7.29 Low temperature operation (see 3.37). The relay shall be subjected to the low temperature specified (see 3.1), for a period of 48 hours. At the end of this period, and with the relay at the low temperature, the pickup voltage, dropout voltage, and contact voltage drop shall be measured as specified in 4.7.8.4, and 4.7.8.3, except that a 30-minute pre-conditioning is not required. (These tests shall be accomplished in the sequence listed and in a minimum amount of time to prevent significant heating of the coil.) The relay shall then be tested intermittently for pickup and dropout voltage until it attains room temperature. Relays, which contain permanent magnets in the magnetic circuit, shall, in addition to the above tests, be subjected to the demagnetizing effect of the cold coil energized with maximum voltage specified. During the low temperature test, after approximately 24 hours, these relays shall be operated by the sudden application of maximum coil voltage for one operation. Latch relays and center off relays containing permanent magnets shall be operated in both directions with coil energized, for a period not exceeding 2 seconds, so no appreciable heating will occur. All units subjected to the demagnetizing effect shall be tested in accordance with high temperature pickup voltage (see 4.7.8), at the conclusion of this test."

PAGE 57

6.1.4 Delete "18 percent of the motor load rating of the relay." and substitute the motor load divided by 18 percent."

PAGE 58

6.3 Delete "88 LOG/LGME, Building 280 Door 4, 4170 Hebble Creek Road, Wright-Patterson AFB, OH 45433-5663; however, information pertaining to qualification of products may be obtained from the".

PAGE 61

Add as a new paragraphs after 6.10, Relay contactor paragraph,

"Relay, fully rated: Any relay whose lowest specified rating for any load is 25 amperes or higher.

Relay, not fully rated: Relays that have 25 ampere (AC or DC) resistive load ratings and all other load ratings (inductive, motor or lamp) less than 25 amperes. It allows these relays to function in the classification of power relays for the resistive load rating but the testing is conducted as specified for relays rated less than 25 amperes."

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Custodians:
Army - CR
Navy - AS
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC
(Project 5945-1045)

Review activities:
Navy - EC
Air Force - 99