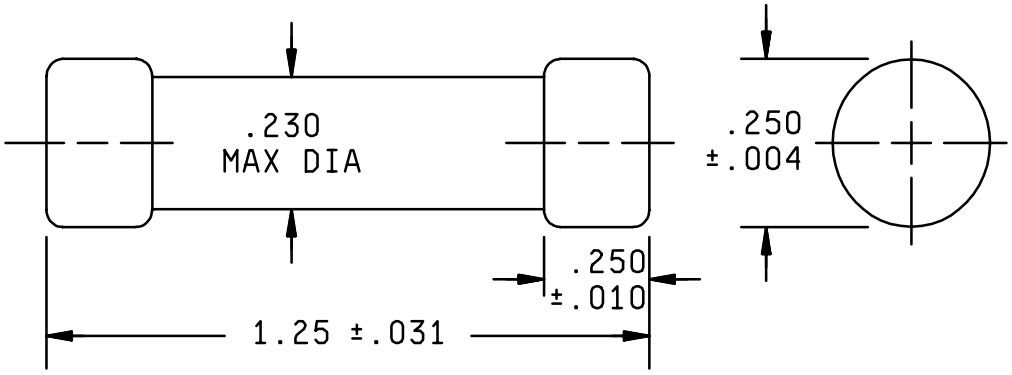
INCH-POUND
MIL-PRF-23419/9B
7 April 1998
SUPERSEDING
MIL-PRF-23419/9A
13 January 1988

PERFORMANCE SPECIFICATION SHEET

FUSE CARTRIDGE, INSTRUMENT TYPE, STYLE FM09, (NONINDICATING)

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

The requirements for acquiring the product described herein shall consist of this specification and MIL-PRF-23419.



Inches	mm
.004	0.10
.010	0.25
.031	0.79
.230	5.84
.250	6.35
1.25	31.75

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerances are ±.005 (0.13 mm) for three place decimals and ±.02 (0.5 mm) for two place decimals.

FIGURE 1. Style FM09 fuses.

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

REQUIREMENTS:

Interface and physical dimensions: See figure 1.

Applicable fuseholders (or equivalent):

MIL-PRF-19207/1, Style FHL10U
MIL-PRF-19207/2, Style FHL11U
MIL-PRF-19207/8, Style FHL17G
MIL-PRF-19207/9, Style FHL18G
MIL-PRF-19207/11, Style FHL20G
MIL-PRF-19207/16, Style FHL26G
MIL-PRF-19207/17, Style FHL28WB
MIL-PRF-19207/18, Style FHL29G
MIL-PRF-19207/19, Style FHL30G
MIL-PRF-19207/21, Style FHL32W
MIL-PRF-19207/22, Style FHL33W

Terminals: Ferrule type.

Material: Brass, copper, or copper alloy.

Finish: Nickel or bright alloy plate, silver plated when specified.

Terminal strength: Method 211 of MIL-STD-202, test condition E, 2 pound-inch torque between ferrules and fuse body.

Body material: Plastic or ceramic tube.

Current rating: See table I.

Characteristic: See table I.

Voltage rating: See table I.

Current-carrying capacity for 20 amperes or less:

110 percent at room ambient temperature:

Characteristic A: 112.5 percent at -55°C, 91.5 percent at +85°C.

Characteristic B: 119 percent at -55°C, 69.5 percent at +85°C.

Current-carrying capacity for 25 amperes or 30 amperes:

100 percent with a maximum temperature rise of +90°C for all temperatures between -55°C and +85°C.

Characteristic: See table I.

Overload interrupt: See table I (at all temperatures between -55°C and +85°C).

Resistance: See table I.

Short circuit interrupt: See table I.

Mechanical shock: Method I.

Thermal shock: Method 107 of MIL-STD-202, test condition A.

Vibration:

Characteristic A: All ratings, method 204 of MIL-STD-202.

Characteristic B: Fuses rated 0 ampere through 8/10 ampere shall meet the requirements of method 201 of MIL-STD-202.

TABLE I. Type designation and electrical ratings.

Type designation				Overload interrupt time 1/ 135 % of rating, maximum 1 hour		AC short circuit interrupt		Cold resistance 2/ (ohms)	
Style	Charac-teristic	Maximum voltage	Current rating (amperes)	200% of rating (seconds)	300 % of rating (seconds)	125 volts	250 volts	Minimum	Maximum
FM09	A	250 V	1/100A	0.0001-1.0	0.0001-0.003	10,000A	35 A	100.0	280.0
FM09	A	250 V	1/32 A	0.0008-1.0	0.0002-0.003	10,000A	35 A	20.0	50.0
FM09	A	250 V	1/16 A	0.009-2.0	0.001-0.050	10,000A	35 A	2.7	36.0
FM09	A	250 V	1/8 A	0.01-2.0	0.003-0.15	10,000A	35 A	0.96	11.0
FM09	A	250 V	1/4 A	0.02-2.0	0.01-0.20	10,000A	35 A	1.98	4.62
FM09	A	250 V	3/8 A	0.02-3.0	0.01-0.30	10,000A	35 A	.96	2.24
FM09	A	250 V	1/2 A	0.03-3.0	0.01-0.30	10,000A	35 A	.66	1.54
FM09	A	250 V	3/4 A	0.03-3.0	0.015-0.50	10,000A	35 A	.20	.95
FM09	A	250 V	1 A	0.05-3.0	0.015-0.50	10,000A	35 A	.114	.266
FM09	A	250 V	1-1/4 A	0.05-3.0	0.02-0.50	10,000A	35 A	.081	.200
FM09	A	250 V	1-1/2 A	0.05-3.0	0.02-0.50	10,000A	35 A	.061	.143
FM09	A	250 V	2 A	0.08-3.0	0.04-0.50	10,000A	35 A	.045	.106
FM09	A	250 V	3 A	0.08-3.0	0.04-0.70	10,000A	35 A	.023	.060
FM09	A	250 V	4 A	0.10-5.0	0.05-1.00	10,000A	35 A	.023	.055
FM09	A	250 V	5 A	.20-60.0	0.05-6.00	10,000A	100 A	.018	.042
FM09	A	250 V	6 A	.20-60.0	0.05-6.00	10,000A	100 A	.014	.032
FM09	A	250 V	8 A	.30-60.0	0.05-6.00	10,000A	100 A	.009	.021
FM09	A	250 V	10 A	.30-60.0	0.05-6.00	10,000A	100 A	.0068	.0158
FM09	A	250 V	12 A	.30-60.0	0.05-6.00	10,000A	200 A	.0045	.0114
FM09	A	250 V	15 A	0.5-60.0	0.05-6.00	10,000A	200 A	.0027	.0065
FM09	A	125 V	20 A	0.5-60.0	0.05-6.00	10,000A	Not rated	.0016	.0045
FM09	A	125 V	25 A	0.5-60.0	0.05-6.00	10,000A	Not rated	.0013	.0035
FM09	A	125 V	30 A	0.5-60.0	0.05-6.00	10,000A	Not rated	.0010	.0027

See footnotes at end of table.

TABLE I. Type designation and electrical ratings - Continued.

Type designation				Overload interrupt time 1/ 135 % of rating, maximum 1 hour		AC short circuit interrupt		Cold resistance 2/ (ohms)	
Style	Charac-teristic	Maximum voltage	Current rating (amperes)	200% of rating (seconds)	300 % of rating (seconds)	125 volts	250 volts	Minimum	Maximum
FM09	B	250 V	1/100A	4.0-250.0	2.0-40.0	10,000A	35 A	950.0	4620.0
FM09	B	250 V	1/32 A	4.0-80.0	2.0-25.0	10,000A	35 A	100.0	462.0
FM09	B	250 V	1/16 A	4.0-80.0	2.0-25.0	10,000A	35 A	49.0	120.0
FM09	B	250 V	1/10 A	4.0-80.0	2.0-25.0	10,000A	35 A	19.9	46.6
FM09	B	250 V	1/8 A	4.0-80.0	2.0-25.0	10,000A	35 A	12.0	28.0
FM09	B	250 V	15/100 A	4.0-80.0	2.0-25.0	10,000A	35 A	9.1	21.4
FM09	B	250 V	3/16 A	4.0-80.0	2.0-25.0	10,000A	35 A	5.52	13.0
FM09	B	250 V	1/4 A	4.0-80.0	2.0-25.0	10,000A	35 A	3.18	10.5
FM09	B	250 V	3/10 A	4.0-80.0	2.0-25.0	10,000A	35 A	2.22	7.10
FM09	B	250 V	3/8 A	4.0-80.0	2.0-25.0	10,000A	35 A	1.5	4.77
FM09	B	250 V	1/2 A	4.0-80.0	2.0-25.0	10,000A	35 A	1.2	2.83
FM09	B	250 V	6/10 A	4.0-80.0	2.0-25.0	10,000A	35 A	.60	2.10
FM09	B	250 V	3/4 A	4.0-80.0	2.0-25.0	10,000A	35 A	.45	1.43
FM09	B	250 V	8/10 A	4.0-80.0	2.0-25.0	10,000A	35 A	.35	1.26
FM09	B	250 V	1 A	4.0-80.0	2.0-25.0	10,000A	35 A	.21	.64
FM09	B	250 V	1-1/4 A	4.0-80.0	2.0-25.0	10,000A	35 A	.16	.38
FM09	B	250 V	1-1/2 A	4.0-80.0	2.0-25.0	10,000A	35 A	.102	.340
FM09	B	250 V	1-6/10 A	4.0-80.0	2.0-25.0	10,000A	35 A	.099	.270
FM09	B	250 V	2 A	4.0-80.0	2.0-25.0	10,000A	35 A	.072	.180
FM09	B	250 V	2-1/2 A	10.0-250.0	2.0-25.0	10,000A	35 A	.052	.154
FM09	B	250 V	2-8/10 A	10.0-250.0	2.0-25.0	10,000A	35 A	.032	.090
FM09	B	250 V	3 A	10.0-250.0	2.0-25.0	10,000A	35 A	.026	.090
FM09	B	250 V	3-2/10 A	10.0-250.0	2.0-25.0	10,000A	35 A	.025	.090
FM09	B	125 V	4 A	10.0-250.0	2.0-25.0	10,000A	Not rated	.0240	.0560
FM09	B	125 V	5 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0108	.0600
FM09	B	125 V	6-1/4 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0071	.0450
FM09	B	125 V	7 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0059	.0300
FM09	B	125 V	8 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0070	.0200
FM09	B	125 V	10 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0056	.0140
FM09	B	125 V	12 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0036	.0110
FM09	B	125 V	15 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0017	.0080
FM09	B	125 V	20 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0012	.0040
FM09	B	125 V	25 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0009	.0030
FM09	B	125 V	30 A	10.0-250.0	0.05-10.0	10,000A	Not rated	.0006	.0022

1/ The overload interrupt time ranges, as shown, cover the temperature range from -55°C to +85°C. For characteristic B, the overload interrupt time at room ambient temperature shall be 12 seconds minimum at 200 percent of rating.
2/ Cold resistance is measured at 10 percent or less of rated current.
3/ Add “S” suffix to the end of the type designation if optional silver plating is required.

VERIFICATION:

Inspection routine: The number of group II samples for qualification and subgroup 2 samples for group C inspection shall be as shown in table II.

TABLE II. Group II and subgroup 2 samples. 1/

Inspection	Number of sample fuses
Group II and subgroup 2	20
Terminal strength	20
Overload interrupt	
135% at room ambient	4
200% at -55°C	4
200% at +85°C	4
300% at -55°C	4
300% at +85°C	4
Insulation resistance	20

1/ For characteristic B fuses only, four additional fuses shall be tested at 200 percent of rating at room ambient temperature.

The number of group III samples for qualification and subgroup 1 for group C inspection, shall consist of four fuses of each of the types shown in table III. Short circuit interrupt tests shall be conducted at the alternating current voltage indicated, and the fuses shall be capable of withstanding a minimum short circuit current as shown in table III. Insulation resistance test shall be as specified in MIL-PRF-23419.

TABLE III. Short circuit tests.

Fuse type	Current rating	Short circuit current	AC type voltage
FM09A	4 A	35 A	250
FM09A	10 A	100 A	250
FM09A	15 A	200 A	250
FM09A	30 A	10,000 A	125
FM09B	3 2/10 A	35 A	250
FM09B	30 A	10,000 A	125

Fuse selection: The following steps should apply in the selection of a fuse for any application:

Step 1: Select a fuse with a voltage rating equal to or in excess of the circuit voltage.

Step 2: The short circuit interrupting rating of the fuse should be checked to determine that it is adequate to protect against the short circuit currents that the particular equipment or circuit can be exposed to.

Step 3: The ambient temperature in which the fuse is to be used should be compared to the curves shown on figure 1 or figure 2 to determine the effect the ambient will have on the current rating. For example, if a characteristic A fuse is to be used in a 60°C ambient, it will only carry 95 percent of its nominal rating. A fuse which is used in a -20°C ambient will carry 107 percent of its nominal rating.

Step 4: A fuse rating should be selected on the basis of equipment ampere load with compensation made for ambient temperature (see figure 2 and figure 3). Characteristic A and characteristic B fuses should not be loaded to more than 80 percent of the fuse rating (or 80 percent of the adjusted rating based on ambient temperature consideration) to avoid nuisance openings caused by inrush currents and other harmless overloads. Time lag (characteristic B) fuses can be loaded to a higher level because of the ability to override harmless overloads, transients, and inrush currents of short duration.

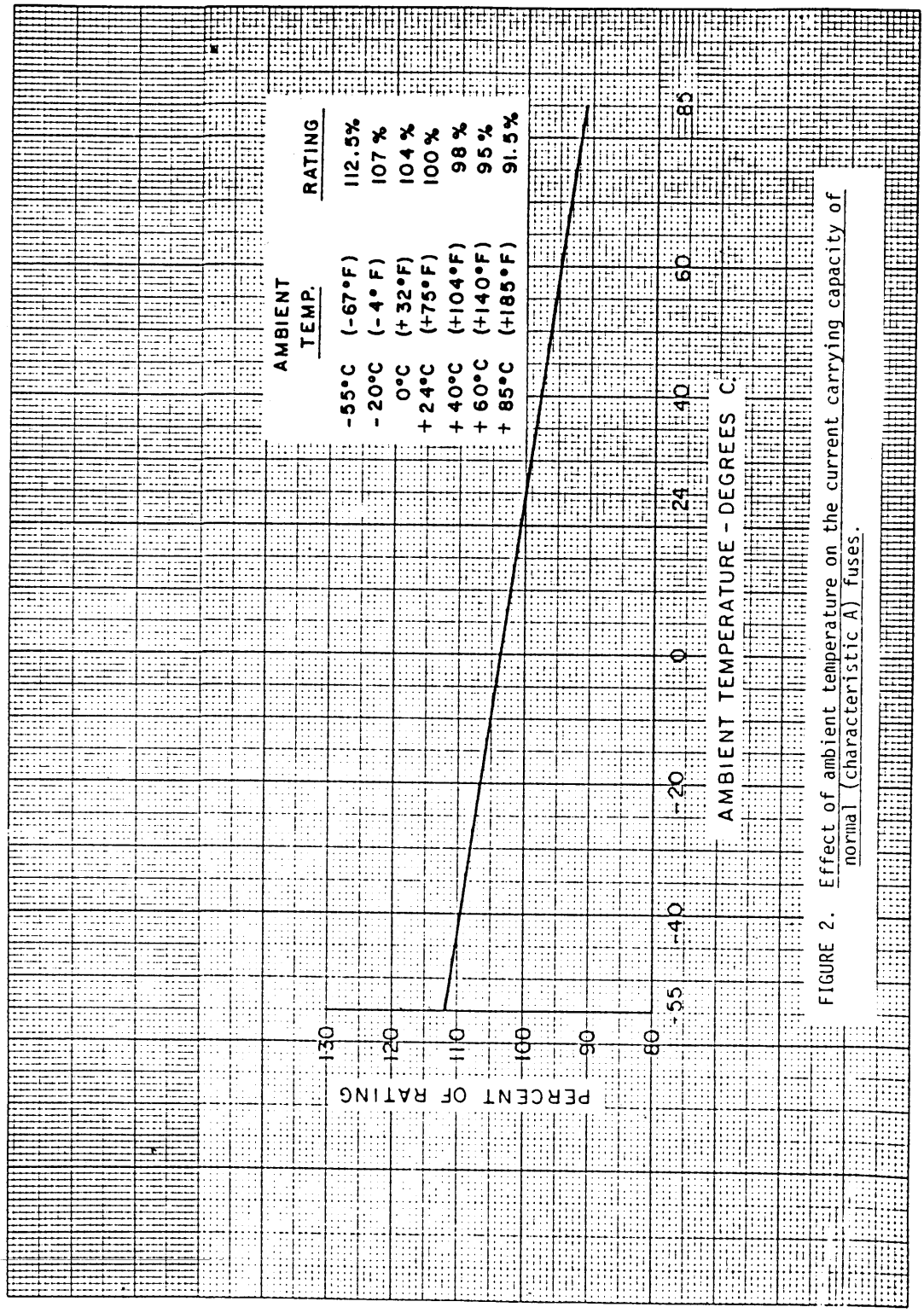


FIGURE 2. Effect of ambient temperature on the current carrying capacity of normal (characteristic A) fuses.

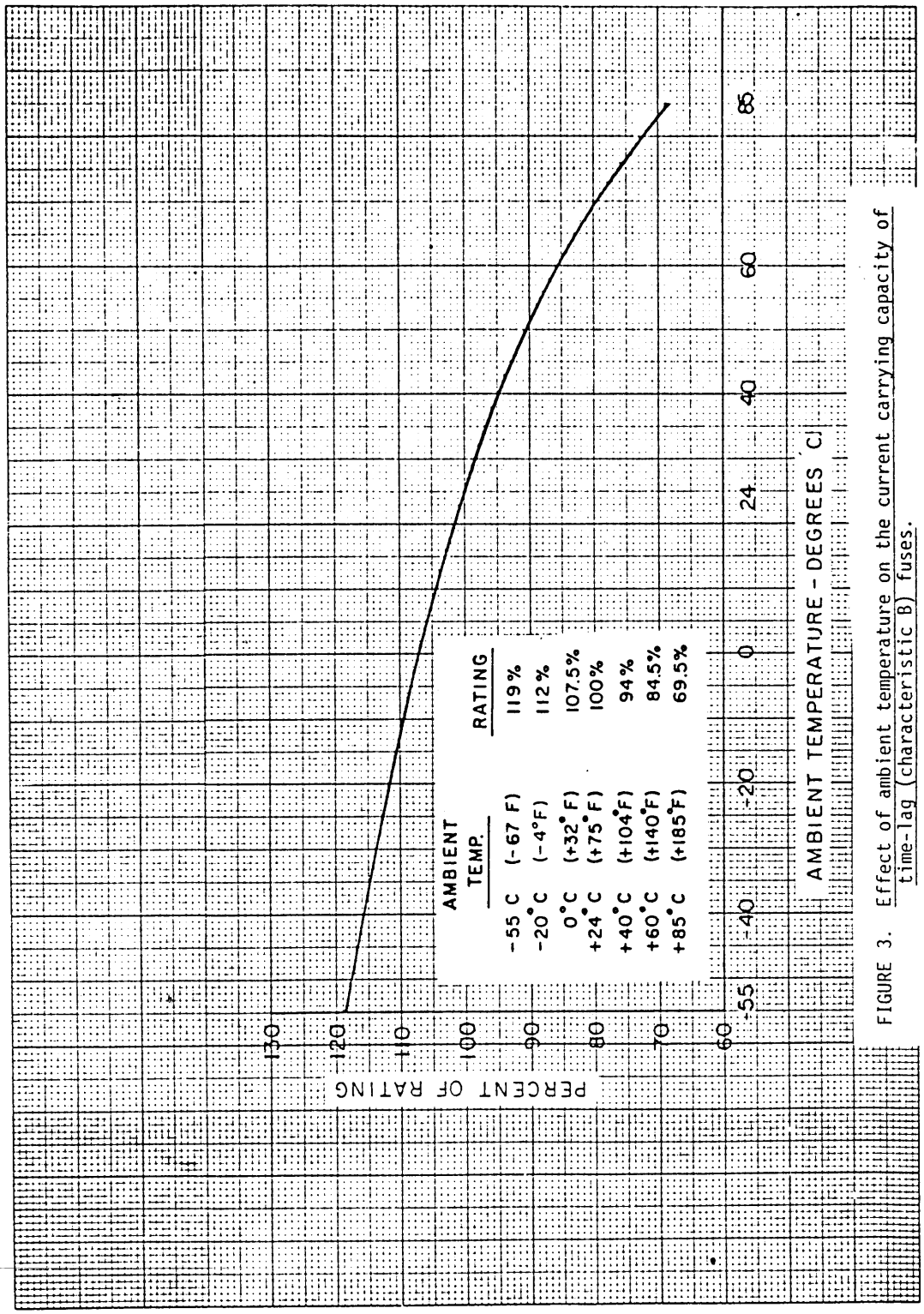


FIGURE 3. Effect of ambient temperature on the current carrying capacity of time-lag (characteristic B) fuses.

Cross reference: For applicable cross reference, see table IV. The existing stocks of superseded items may be used. When exhausted, the superseding parts shall be used.

TABLE IV. Cross-reference.

Superseding number MIL-PRF-23419/9	Superseded number MIL-F-23419/3	Superseding number MIL-PRF-23419/9	Superseded number MIL-F-23419/6
FM09A250V1/100A	FM03A 250V 1/100A	FM09B250V1/100A	FM06-250V 1/100A
FM09A250V1/32A	FM03A 250V 1/32A	FM09B250V1/32A	FM06-250V 1/32A
FM09A250V1/16A	FM03A 250V 1/16A	FM09B250V1/16A	FM06-250V 1/16A
FM09A250V1/8A	FM03A 250V 1/8A	FM09B250V1/10A	FM06-250V 1/10A
FM09A250V1/4A	FM03A 250V 1/4A	FM09B250V1/8A	FM06-250V 1/8A
FM09A250V3/8A	FM03A 250V 3/8A	FM09B250V15/100A	FM06-250V 15/100A
FM09A250V1/2A	FM03A 250V 1/2A	FM09B250V3/16A	FM06-250V 3/16A
FM09A250V3/4A	FM03A 250V 3/4A	FM09B250V2/10A	FM06-250V 2/10A
FM09A250V1A	FM03A 250V 1A	FM09B250V1/4A	FM06-250V 1/4A
FM09A250V1-1/2A	FM03A 250V 1-1/2A	FM09B250V3/10A	FM06-250V 3/10A
FM09A250V2A	FM03A 250V 2A	FM09B250V3/8A	FM06-250V 3/8A
FM09A250V3A	FM03A 250V 3A	FM09B250V4/10A	FM06-250V 4/10A
FM09A250V5A	FM03A 250V 4A	FM09B250V1/2A	FM06-250V 1/2A
FM09A250V6A	FM03A 250V 5A	FM09B250V6/10A	FM06-250V 6/10A
FM09A250V8A	FM03A 250V 6A	FM09B250V7/10A	FM06-250V 7/10A
FM09A250V10A	FM03A 250V 8A	FM09B250V3/4A	FM06-250V 3/4A
FM09A250V12A	FM03A 250V 10A	FM09B250V1A	FM06-250V 1A
FM09A250V15A	FM03A 250V 12A	FM09B250V1-1/4A	FM06-250V 1-1/4A
FM09A125V20A	FM03A 125V 15A	FM09B250V1-1/2A	FM06-250V 1-1/2A
FM09A125V25A	FM03A 125V 20A	FM09B250V1-6/10A	FM06-250V 1-6/10A
FM09A125V30A	FM03A 125V 25A	FM09B250V2A	FM06-250V 2A
N/A	N/A	FM09B250V2-1/2A	FM06-125V 2-1/2A
N/A	N/A	FM09B250V2-8/10A	FM06-125V 2-8/10A
N/A	N/A	FM09B250V3A	FM06-125V 3A
N/A	N/A	FM09B250V3-2/10A	FM06-125V 3-2/10A
N/A	N/A	FM09B250V4A	FM06-125V 4A
N/A	N/A	FM09B250V5A	FM06-125V 5A
N/A	N/A	FM09B250V6-1/4A	FM06-125V 6-1/4A
N/A	N/A	FM09B250V7A	FM06-125V 7A
N/A	N/A	FM09B250V8A	FM06-125V 8A
N/A	N/A	FM09B250V10A	FM06-125V 10A
N/A	N/A	FM09B250V12A	FM06-125V 12A
N/A	N/A	FM09B250V15A	FM06-125V 15A
N/A	N/A	FM09B250V20A	FM06-125V 20A
N/A	N/A	FM09B250V25A	FM06-125V 25A
N/A	N/A	FM09B250V30A	FM06-125V 30A

Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Navy - EC
Air Force - 85

Review activities:
Army - AR, CR4, MI
Navy - AS, MC, OS, SH
Air Force - 19, 99
NASA - NA

Preparing activity:
DLA - CC

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