INCH-POUND
MIL-PRF-39022/10B
5 November 2008
SUPERSEDING
MIL-PRF-39022/10A
25 May 2001

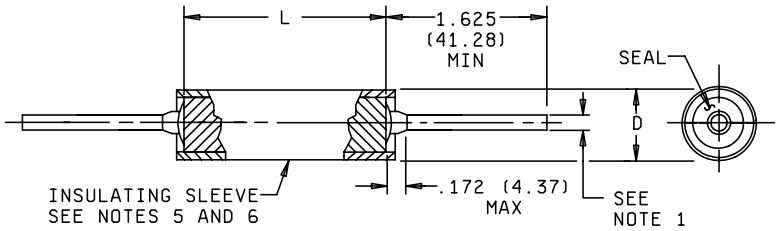
PERFORMANCE SPECIFICATION SHEET

CAPACITORS, FIXED, METALLIZED, PAPER-PLASTIC FILM DIELECTRIC, DIRECT CURRENT (HERMETICALLY SEALED IN METAL CASES) ESTABLISHED RELIABILITY, STYLE CHR10 (INSULATED)

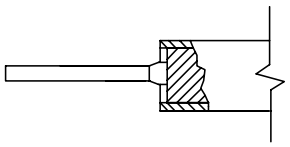
This specification sheet is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-39022.

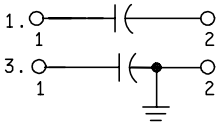
INACTIVE FOR NEW DESIGN
AFTER 25 MAY 2001



CASE FOR CIRCUIT 1



CASE FOR CIRCUIT 3



CIRCUIT DIAGRAM

NOTES:

1. Number 24 AWG wire (.020 ± .002 inch (0.51 ± 0.05 mm)) for case diameters of .175 inch (4.45 mm) and .195 (4.95 mm).
   Number 22 AWG wire (.025 ± .002 inch (0.64 ± 0.05 mm)) for case diameters of .235 inch (5.97 mm) and .312 (7.92 mm).
   Number 20 AWG wire (.032 inch ± .002 inch (0.81 ± 0.05 mm)) for case diameters of .400 inch (10.16 mm) and over (see table I for exceptions.)
   Number 18 AWG wire (.040 inches ± .002 inch): See table I.
2. See table I for additional dimensions.
3. Dimensions are in inches.
4. Metric equivalents (to the nearest 0.01 mm) are given for general information only.
5. Insulating sleeve shall extend beyond the capacitor body but shall not exceed .031 inch (0.79 mm) on either end. Insulating sleeve thickness shall not exceed .016 inch (0.41 mm).
6. Plastic insulating sleeve shall be transparent; marking shall be placed on the capacitor case.
7. Metric equivalents are in parentheses.
8. Lead length may be a minimum of one inch long for use in tape and reel packaging, when specified in the ordering data.

FIGURE 1. Dimensions and configuration.

REQUIREMENTS:

Dimensions and configuration: See figure 1 and table I.

Case material: Nonmagnetic (end seals may be of magnetic material).

Capacitance value: See table I.

Capacitance tolerance: F (±1 percent), G (±2 percent), J (±5 percent), and K (±10 percent).

Rated voltage: See table I for 85°C rating; derate to 60 percent of 85°C rating for operation at 125°C.

Dielectric material: Polycarbonate.

Operating temperature range: -55°C to +125°C.

Failure rate level: M (1.0 percent), P (0.1 percent), R (0.01 percent), and S (0.001 percent).

Thermal shock: Method 107 of MIL-STD-202, condition A, except step 3 shall be +125°C +4°C, -0°C.

Radiographic inspection (X-ray): Method 209 of MIL-STD-202. (Required for FR levels R and S only.)

DC burn-in: In accordance with MIL-PRF-39022, table VI, qualification inspection, group I and table VII, group A inspection, subgroup 1, except 140 percent minimum of dc rated voltage shall be applied for 48 hours minimum at +125°C +4°C, -0°C. 100 percent inspection required.

Seal: Method 112 of MIL-STD-202, condition A or test condition D with no evidence of leakage. For liquid impregnant capacitors, the alternative seal test in MIL-PRF-39022 may be used with a temperature of +125°C +4°C, -0°C and length of test of 1 hour.

Dielectric withstanding voltage (DWV): Method 301 of MIL-STD-202; 100 percent inspection required following dc burn-in.

Terminal to terminal:

AC: 100 ± 10 Hz square wave, peak-to-peak voltage, three times dc rated voltage for 60 seconds minimum, but need not exceed 800 V peak-to-peak. Square wave signal shall have a rise time of 10 to 100 microseconds and a maximum overshoot of 20 percent of rated peak voltage.

DC: 200 percent of dc rated voltage for 60 seconds, minimum.

Terminals to case (when case is not a terminal): Same requirements as specified for terminal to terminal dc DWV test.

Insulation resistance (IR): Method 302 of MIL-STD-202.

Terminal to terminal: See table III.

Terminal to case (when case is not a terminal): 50,000 megohms, minimum.

Capacitance: Method 305 of MIL-STD-202.

Dissipation factor (DF):

At 25°C: 0.25 percent maximum.

At 85°C: 0.40 percent maximum.

At 125°C: 0.60 percent maximum.

TABLE I. Capacitor characteristics and dimensions.

Part or Identifying Number (PIN) 1/	DC rated voltage	Capacitance value in μF	Dimensions, nominal 3/ 4/ 5/	
			D +.015, -.005	L ±.031
M39022/10-473--	50	.047	.174	.531
M39022/10-563--	50	.056	.174	.531
M39022/10-683--	50	.068	.174	.625
M39022/10-823--	50	.082	.174	.625
M39022/10-104--	50	.10	.174	.625
M39022/10-124--	50	.12	.174	.625
M39022/10-154--	50	.15	.193	.625
M39022/10-184--	50	.18	.193	.625
M39022/10-224--	50	.22	.235	.625
M39022/10-274--	50	.27	.235	.625
M39022/10-334--	50	.33	.312	.625
M39022/10-394--	50	.39	.312	.625
M39022/10-474--	50	.47	.312	.625
M39022/10-564--	50	.56	.312	.625
M39022/10-684--	50	.68	.312	.843
M39022/10-824--	50	.82	.312	.843
M39022/10-105--	50	1.0	.312	.843
M39022/10-125--	50	1.2	.400	.843
M39022/10-155--	50	1.5	.400	.843
M39022/10-185--	50	1.8	.400	.843
M39022/10-205--	50	2.0	.400	.843
M39022/10-225--	50	2.2	.400	1.125
M39022/10-275--	50	2.7	.400	1.125
M39022/10-305--	50	3.0	.400	1.125
M39022/10-335--	50	3.3	.400	1.125
M39022/10-395--	50	3.9	.500	1.125
M39022/10-475--	50	4.7	.500	1.125
M39022/10-505--	50	5.0	.500	1.125
M39022/10-565--	50	5.6	.500	1.125
M39022/10-685--	50	6.8	.562	1.125
M39022/10-825--	50	8.2	.562	1.312
M39022/10-106--	50	10.0	.670	1.312
M39022/10-126--	50	12.0	.670	1.312
M39022/10-156--	50	15.0	.750	1.375
M39022/10-186--	50	18.0	.750	1.375
M39022/10-206--	50	20.0	.750	1.625
M39022/10-226--	50	22.0	.750	1.625
M39022/10-103--	100	.01	.174	.625
M39022/10-123--	100	.012	.174	.625
M39022/10-153--	100	.015	.174	.625
M39022/10-183--	100	.018	.174	.625
M39022/10-223--	100	.022	.174	.625
M39022/10-273--	100	.027	.174	.625
M39022/10-333--	100	.033	.174	.625
M39022/10-393--	100	.039	.174	.625
M39022/10-473--	100	.047	.193	.625
M39022/10-563--	100	.056	.193	.625
M39022/10-683--	100	.068	.235	.625
M39022/10-823--	100	.082	.235	.625
M39022/10-104--	100	.10	.235	.688
M39022/10-124--	100	.12	.235	.688

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions. – Continued.

Part or Identifying Number (PIN) 1/	DC rated voltage	Capacitance value in μF	Dimensions, nominal 3/ 4/ 5/	
			D +.015, -.005	L ±.031
M39022/10-154--	100	.15	.312	.625
M39022/10-184--	100	.18	.312	.625
M39022/10-224--	100	.22	.312	.688
M39022/10-274--	100	.27	.312	.688
M39022/10-334--	100	.33	.312	.812
M39022/10-394--	100	.39	.312	.812
M39022/10-474--	100	.47	.400	.688
M39022/10-564--	100	.56	.400	.812
M39022/10-684--	100	.68	.400	.812
M39022/10-824--	100	.82	.400	.938
M39022/10-105--	100	1.0	.400	.938
M39022/10-125--	100	1.2	.500	.938
M39022/10-155--	100	1.5	.500	.938
M39022/10-185--	100	1.8	.500	1.125
M39022/10-205--	100	2.0	.500	1.125
M39022/10-225--	100	2.2	.500	1.125
M39022/10-275--	100	2.7	.562	1.312
M39022/10-305--	100	3.0	.562	1.312
M39022/10-335--	100	3.3	.562	1.312
M39022/10-405--	100	4.0	.562	1.562
M39022/10-475--	100	4.7	.670	1.312
M39022/10-505--	100	5.0	.670	1.312
M39022/10-565--	100	5.6	.670	1.312
M39022/10-685--	100	6.8	.670	1.562
M39022/10-825--	100	8.2	.670	1.812
M39022/10-106--	100	10.0	.750	1.812
M39022/10-126--	100	12.0	.750	1.812
M39022/10-156--	100	15.0	1.000 2/	1.875
M39022/10-186--	100	18.0	1.000 2/	1.875
M39022/10-206--	100	20.0	1.000 2/	1.875
M39022/10-226--	100	22.0	1.000 2/	1.875
M39022/10-103--	200	.01	.174	.625
M39022/10-123--	200	.012	.174	.625
M39022/10-153--	200	.015	.174	.625
M39022/10-183--	200	.018	.193	.625
M39022/10-223--	200	.022	.193	.625
M39022/10-273--	200	.027	.235	.625
M39022/10-333--	200	.033	.235	.625
M39022/10-393--	200	.039	.235	.688
M39022/10-473--	200	.047	.235	.688
M39022/10-563--	200	.056	.312	.625
M39022/10-683--	200	.068	.312	.625
M39022/10-823--	200	.082	.312	.688
M39022/10-104--	200	.10	.312	.688
M39022/10-124--	200	.12	.312	.812
M39022/10-154--	200	.15	.312	.812
M39022/10-184--	200	.18	.400	.688
M39022/10-224--	200	.22	.400	.812
M39022/10-274--	200	.27	.400	.812
M39022/10-334--	200	.33	.400	.938

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions. – Continued.

Part or Identifying Number (PIN) 1/	DC rated voltage	Capacitance value in μF	Dimensions, nominal 3/ 4/ 5/	
			D +.015, -.005	L ±.031
M39022/10-394--	200	.39	.400	.938
M39022/10-474--	200	.47	.400	1.125
M39022/10-564--	200	.56	.400	1.312
M39022/10-684--	200	.68	.500	1.125
M39022/10-824--	200	.82	.500	1.125
M39022/10-105--	200	1.0	.562	1.125
M39022/10-125--	200	1.2	.562	1.312
M39022/10-155--	200	1.5	.562	1.312
M39022/10-185--	200	1.8	.562	1.812
M39022/10-205--	200	2.0	.562	1.812
M39022/10-225--	200	2.2	.562	1.812
M39022/10-275--	200	2.7	.670	1.562
M39022/10-305--	200	3.0	.750	1.562
M39022/10-335--	200	3.3	.750	1.812
M39022/10-405--	200	4.0	.750	1.812
M39022/10-475--	200	4.7	.750	2.062
M39022/10-505--	200	5.0	.750	2.062
M39022/10-565--	200	5.6	.750	2.312
M39022/10-605--	200	6.0	.750	2.312
M39022/10-705--	200	7.0	1.000	1.812
M39022/10-825--	200	8.2	1.000 2/	2.062
M39022/10-106--	200	10.0	1.000 2/	2.312
M39022/10-103--	300	.01	.193	.688
M39022/10-123--	300	.012	.235	.688
M39022/10-153--	300	.015	.235	.688
M39022/10-183--	300	.018	.235	.812
M39022/10-223--	300	.022	.235	.812
M39022/10-273--	300	.027	.312	.688
M39022/10-333--	300	.033	.312	.688
M39022/10-393--	300	.039	.312	.812
M39022/10-473--	300	.047	.312	.812
M39022/10-563--	300	.056	.312	.938
M39022/10-683--	300	.068	.312	.938
M39022/10-823--	300	.082	.400	.812
M39022/10-104--	300	.10	.400	.938
M39022/10-124--	300	.12	.400	.938
M39022/10-154--	300	.15	.400	1.125
M39022/10-184--	300	.18	.400	1.312
M39022/10-224--	300	.22	.400	1.312
M39022/10-274--	300	.27	.562	1.125
M39022/10-334--	300	.33	.562	1.125
M39022/10-394--	300	.39	.562	1.125
M39022/10-474--	300	.47	.562	1.562
M39022/10-564--	300	.56	.562	1.562
M39022/10-684--	300	.68	.670	1.312
M39022/10-824--	300	.82	.670	1.562
M39022/10-105--	300	1.0	.670	1.812
M39022/10-125--	300	1.2	.670	1.812
M39022/10-155--	300	1.5	.750	2.062
M39022/10-185--	300	1.8	.750	2.062

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions. – Continued.

Part or Identifying Number (PIN) 1/	DC rated voltage	Capacitance value in μF	Dimensions, nominal 3/ 4/ 5/	
			D +.015, -.005	L ±.031
M39022/10-205--	300	2.0	.750	2.312
M39022/10-225--	300	2.2	1.000	1.812
M39022/10-255--	300	2.5	1.000	1.812
M39022/10-275--	300	2.7	1.000	1.812
M39022/10-305--	300	3.0	1.000	2.062
M39022/10-335--	300	3.3	1.000	2.312
M39022/10-395--	300	3.9	1.000	2.562
M39022/10-103--	400	.01	.235	.688
M39022/10-123--	400	.012	.235	.812
M39022/10-153--	400	.015	.235	.812
M39022/10-183--	400	.018	.235	.812
M39022/10-223--	400	.022	.312	.688
M39022/10-273--	400	.027	.312	.812
M39022/10-333--	400	.033	.312	.812
M39022/10-393--	400	.039	.312	.938
M39022/10-473--	400	.047	.400	.812
M39022/10-563--	400	.056	.400	.812
M39022/10-683--	400	.068	.400	.938
M39022/10-823--	400	.082	.400	.938
M39022/10-104--	400	.10	.400	1.125
M39022/10-124--	400	.12	.400	1.312
M39022/10-154--	400	.15	.400	1.312
M39022/10-184--	400	.18	.562	1.125
M39022/10-224--	400	.22	.562	1.125
M39022/10-274--	400	.27	.562	1.312
M39022/10-334--	400	.33	.562	1.562
M39022/10-394--	400	.39	.562	1.562
M39022/10-474--	400	.47	.562	1.812
M39022/10-564--	400	.56	.670	1.562
M39022/10-684--	400	.68	.670	1.812
M39022/10-824--	400	.82	.750	1.812
M39022/10-105--	400	1.0	.750	2.062
M39022/10-125--	400	1.2	1.000	1.812
M39022/10-155--	400	1.5	1.000	1.812
M39022/10-185--	400	1.8	1.000	2.062
M39022/10-205--	400	2.0	1.000	2.062
M39022/10-225--	400	2.2	1.000	2.312
M39022/10-255--	400	2.5	1.000	2.562
M39022/10-275--	400	2.7	1.000	2.562
M39022/10-103--	600	.01	.312	.812
M39022/10-123--	600	.012	.312	.812
M39022/10-153--	600	.015	.400	.812
M39022/10-183--	600	.018	.400	.812
M39022/10-223--	600	.022	.400	.812
M39022/10-273--	600	.027	.400	.937
M39022/10-333--	600	.033	.400	.937
M39022/10-393--	600	.039	.400	1.125
M39022/10-473--	600	.047	.400	1.125
M39022/10-563--	600	.056	.400	1.312
M39022/10-683--	600	.068	.400	1.312

See footnotes at end of table.

TABLE I. Capacitor characteristics and dimensions. – Continued.

Part or Identifying Number (PIN) 1/	DC rated voltage	Capacitance value in μF	Dimensions, nominal 3/ 4/ 5/	
			D +.015, -.005	L ±.031
M39022/10-823--	600	.082	.562	1.125
M39022/10-104--	600	.10	.562	1.125
M39022/10-124--	600	.12	.562	1.312
M39022/10-154--	600	.15	.562	1.312
M39022/10-184--	600	.18	.562	1.562
M39022/10-224--	600	.22	.562	1.812
M39022/10-274--	600	.27	.670	1.562
M39022/10-334--	600	.33	.670	1.812
M39022/10-394--	600	.39	.670	1.812
M39022/10-474--	600	.47	.750	1.812
M39022/10-564--	600	.56	.750	2.062
M39022/10-684--	600	.68	.750	2.312
M39022/10-824--	600	.82	1.000	1.812
M39022/10-105--	600	1.0	1.000	2.062

1/ The complete PIN will include additional symbols to indicate circuit and voltage code (see table IV), capacitance tolerance (K, J, G, or F), and FRL (M, P, R, or S).
2/ Uses #18 AWG leads.
3/ Dimensions are for bare case sizes (see figure 1).
4/ Dimensions are for circuit 1. For circuit 3, deduct .062 inches (1.57 mm) from length (see figure 1).
5/ See table II for metric equivalents.

TABLE II. Metric equivalents of decimal inches. 1/

Inches	mm	Inches	mm	Inches	mm
.005	0.13	.625	15.88	1.125	28.58
.015	0.38	.670	17.02	1.312	33.32
.031	0.79	.688	17.48	1.375	34.93
.174	4.42	.750	19.05	1.562	39.67
.193	4.90	.812	20.62	1.625	41.28
.235	5.97	.843	21.41	1.812	46.02
.312	7.92	.874	22.20	1.875	47.63
.400	10.16	.937	23.80	2,062	52.37
.500	12.70	.938	23.83	2.124	53.95
.531	13.49	1.000	25.40	2.312	58.72
.562	14.27	1.062	26.97	2.562	65.07

1/ Metric equivalents (to the nearest 0.01 millimeter) are given for general information only.

TABLE III. Insulation resistance.

In megohms:	
At 25°C ±3°C (need not exceed)	250,000
At 85°C +4°C, -0°C (need not exceed)	25,000
At 125°C +4°C, -0°C (need not exceed)	15,000
In megohms x microfarads (minimum):	
At 25°C ±3°C	100,000
At 85°C +4°C, -0°C	6,000
At 125°C +4°C, -0°C	1,000

Barometric pressure (reduced): Method 105 of MIL-STD-202, condition D (100,000 feet). 125 percent of rated voltage applied. See MIL-PRF-39022 for voltage limitations.

Vibration, high frequency: Method 204 of MIL-STD-202, condition D (20 G).

50 percent of rated voltage applied.

Salt atmosphere (corrosion): Method 101 of MIL-STD-202, condition B (48 hours).

Salt solution: 5 percent.

Immersion: Method 104 of MIL-STD-202, condition C.

DWV:

Insulating sleeves: 4,000 V dc, minimum.

Terminal to terminal: 150 percent of rated voltage.

Terminals to case (when case is not a terminal): 200 percent of dc rated voltage.

IR:

Insulating sleeves: 100 megohms, minimum.

Terminal to terminal: 60 percent of value specified in table III.

Terminals to case (when case is not a terminal): 30,000 megohms, minimum.

Capacitance: Within ±3 percent of initial value.

DF: Not more than 110 percent of initial limit.

Solderability: Method 208 of MIL-STD-202.

Shock (specified pulse): Method 213 of MIL-STD-202, condition I.

50 percent of rated voltage applied.

Resistance to soldering heat: Method 210 of MIL-STD-202, condition C, except the time shall be 10 seconds ± 1 second.

IR: See table III.

Capacitance: Within ± 3 percent of initial value.

DF: Not more than initial limit.

Moisture resistance: Method 106 of MIL-STD-202.

DWV, IR, Capacitance, and DF: Same as for immersion.

Terminal strength: Method 211 of MIL-STD-202, conditions A and D.

Condition A: Applied force 5 pounds.

Condition D: 3 rotations of 360 degrees.

Low temperature and capacitance change with temperature:

Low temperature: -55°C +0°C, -3°C for 48 ±4 hours with rated voltage applied.

Capacitance change with temperature:

At -55°C +0°C, -3°C, +0, -2 percent.

At +85°C +4°C, -0: ±1 percent.

At +125°C +4°C, -0°C: ±2 percent.

Fault count: Not applicable.

Fungus: Method 508 of MIL-STD-810.

Life: Method 108 of MIL-STD-202.

Qualification:

Accelerated conditions: 140 percent of rated voltage for 2,000 +72, -0 hours at 85°C. End of life requirements as specified for rated conditions.

Rated conditions: 100 percent of rated voltage for 10,000 +96, -0 hours at 85°C.
DF (at +85°C +4°C -0°C) between first 24 and 48 hours of test:

Not greater than initial limit.

DF (at +85°C +4°C -0°C) during last 48 hours of test:

0.8 percent, maximum.

IR:

Insulating sleeves: 100 megohms, minimum.

Terminal to terminal: Not less than 30,000 megohm-microfarads or 75,000 megohms.

Terminals to case (when case is not a terminal): 30,000 megohms, minimum.

Capacitance: Within ± 5 percent of initial value.

DF (at +25°C ±3°C) after life: 0.5 percent maximum.

Extended life:

Accelerated conditions: 2,000 +75, -0 hours.

Rated conditions: 10,000 +96, -0 hours.

IR, Capacitance, and DF: Same requirements as for qualification life test.

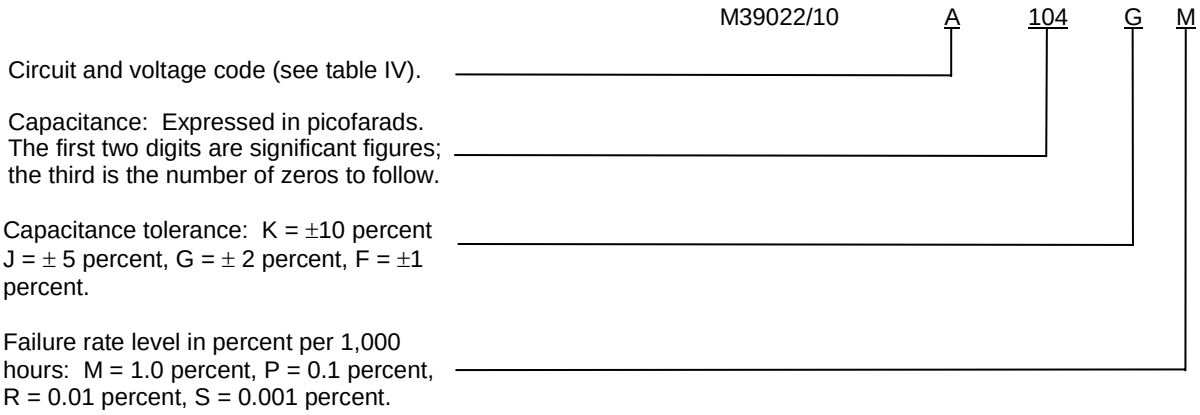
125°C verification life test: 85°C rated voltage for 2,000 +75, -0 hours at 125°C. 25 pieces representative of production shall be tested every six months.

IR, Capacitance, and DF: Same requirements as for qualification life test.

Marking: In accordance with MIL-PRF-39022.

Part or Identifying Number (PIN): M39022/10 (type designation as detailed below).

Explanation of type designation:



Packaging: Capacitors will be furnished in tape and reel packaging when so specified in the ordering data.

TABLE IV. Circuit and voltage codes.

Code	Circuit	Voltage
A	1	50
B	3	50
C	1	100
D	3	100
E	1	200
F	3	200
G	1	400
H	3	400
J	1	600
K	3	600
L	1	300
M	3	300

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue 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.

Referenced documents: In addition to MIL-PRF-39022, this document also references MIL-STD-202 and MIL-STD-810.

Custodians:
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC

(Project 5910-2008-008)

Review Activities:
Air Force - 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil.