

INCH-POUND

MIL-PRF-83536/21C
8 March 2016
SUPERSEDING
MIL-PRF-83536/21B
16 August 2010

PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, 3PDT,
LOW LEVEL TO 10 AMPERES, PERMANENT MAGNETIC DRIVE, HERMETICALLY SEALED,
ALL WELDED, DC COIL

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 sheet and [MIL-PRF-83536](#).

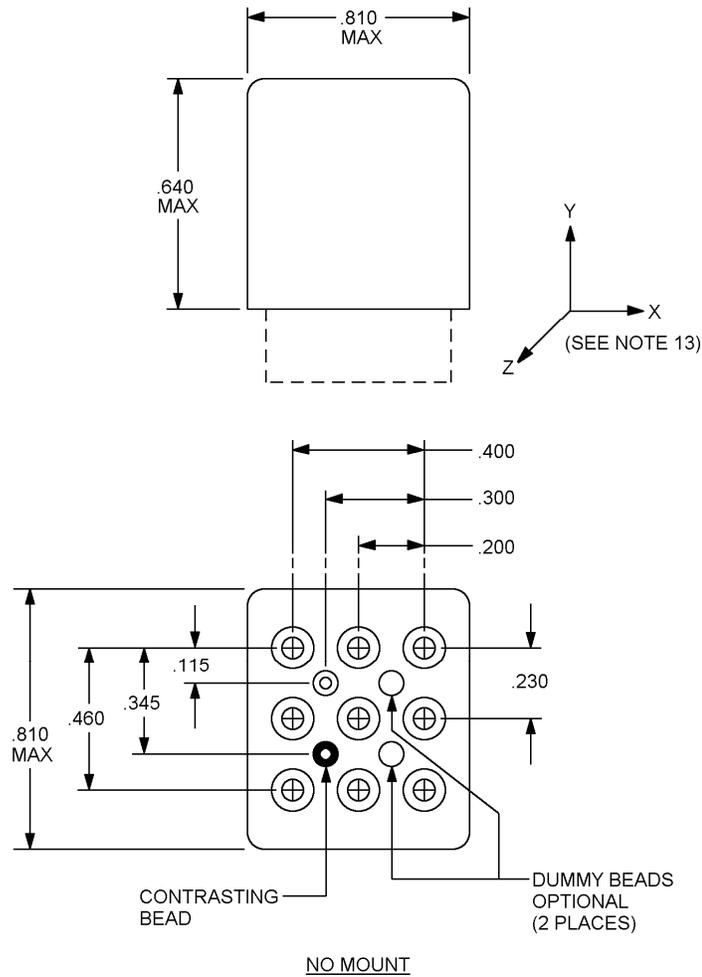


FIGURE 1. Dimensions and configurations.



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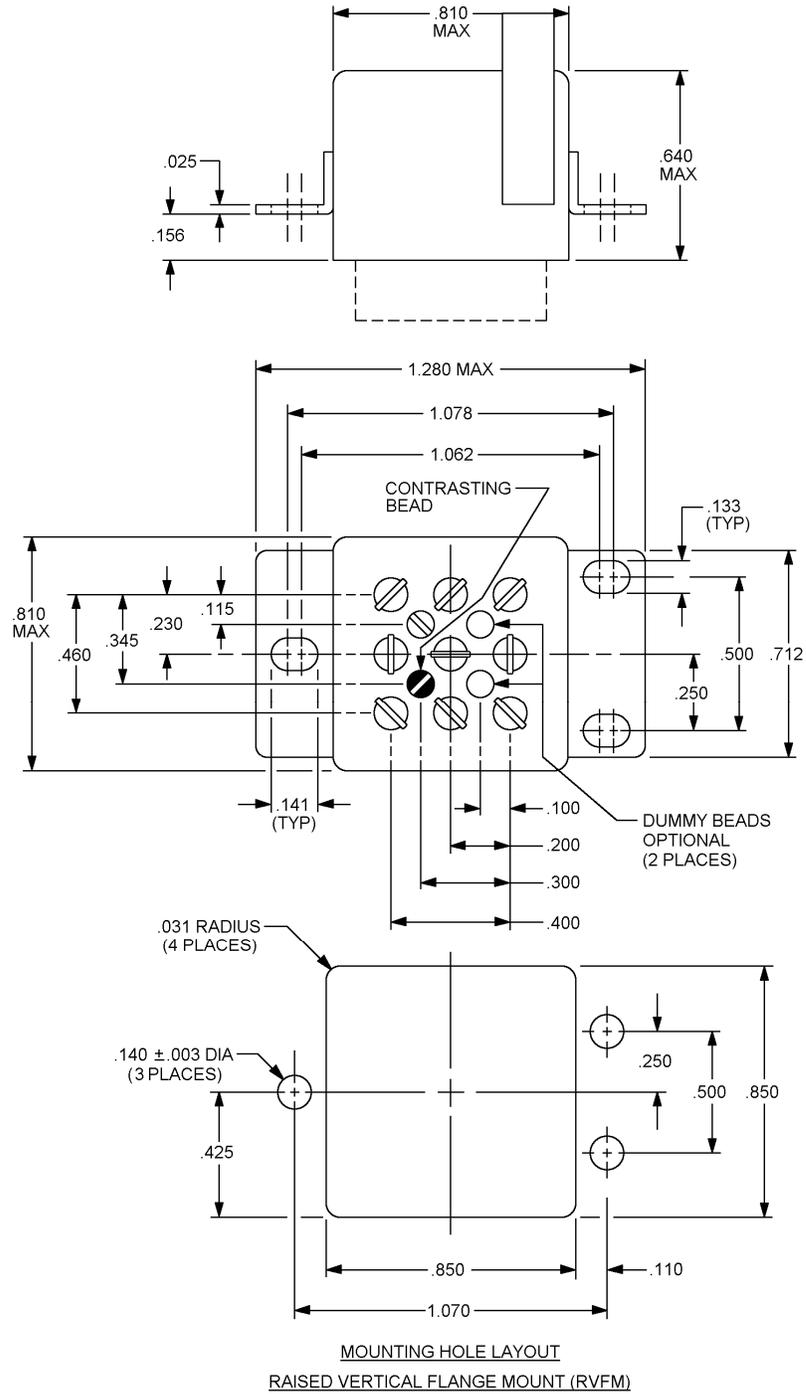


FIGURE 1. Dimensions and configurations - Continued.

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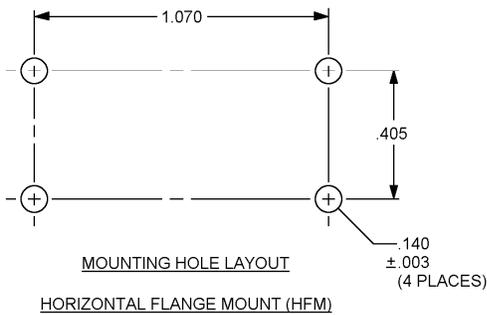
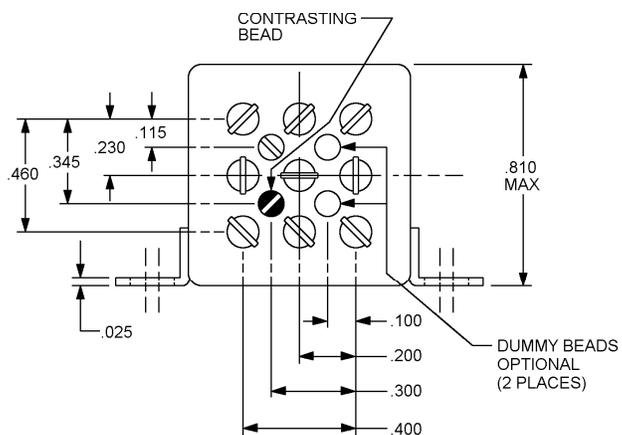
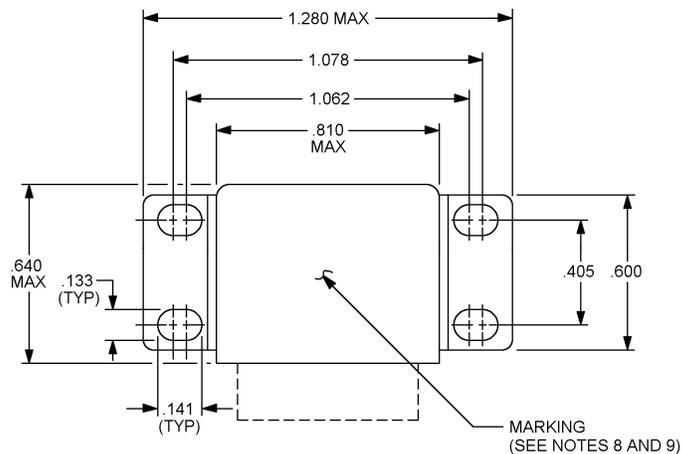


FIGURE 1. Dimensions and configurations - Continued.

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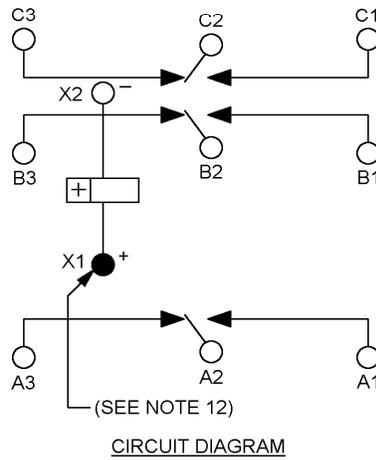
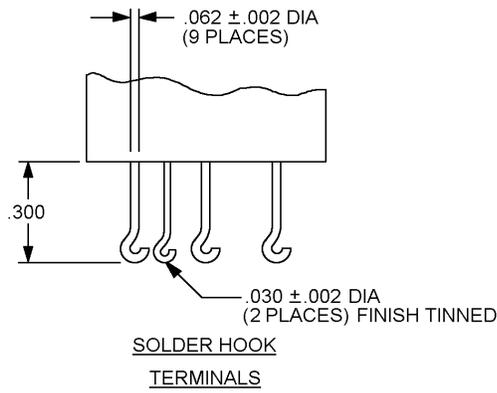
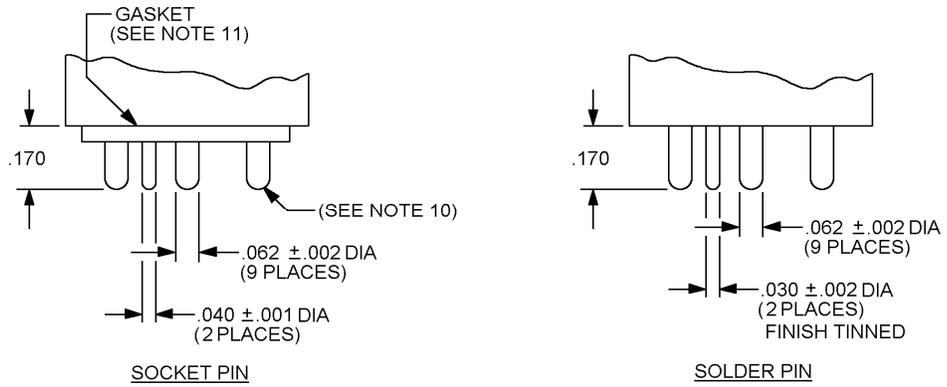


FIGURE 1. Dimensions and configurations - Continued.

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Inches	mm	Inches	mm	Inches	mm
.001	0.03	.141	3.58	.460	11.68
.002	0.05	.156	3.98	.500	12.70
.003	0.08	.170	4.32	.600	15.24
.025	0.64	.200	5.08	.640	16.26
.030	0.76	.230	5.84	.712	18.08
.031	0.79	.250	6.35	.810	20.57
.040	1.02	.300	7.62	.850	21.59
.062	1.57	.345	8.76	1.062	26.97
.110	2.79	.400	10.16	1.070	27.18
.115	2.92	.405	10.29	1.078	27.38
.133	3.38	.425	10.80	1.280	32.51
.140	3.56				

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .010$ (0.25 mm).
4. There shall be affixed to the relay a suitable legible circuit diagram that identifies each terminal location specified.
5. These relays are polarized monostable.
6. This relay shall not operate or be damaged by reverse polarity.
7. Permanent magnet drive consists of a permanent magnet with its flux path switched and combined with the electro-magnet flux.
8. Applicable to horizontal flange mount only. The circuit diagram, manufacturer's PIN, and the military PIN shall be marked on the near side. The remaining portion of the nameplate data shall be marked on the far side.
9. Applicable to horizontal flange mount only. Relays shall be marked with the manufacturer's name or CAGE code and date code. Marking shall be with the bottom of the print adjacent to the near side.
10. Socket pin terminals shall provide the operational, environmental, and interface characteristics to provide a reliable interconnect to gold-plated contacts. Terminals shall be gold plated. One system for gold plating that may be used is [ASTM-B488](#), type 3, class 1.25 with a nickel underplate of 50 to 150 microinches thick. The gold plating system shall enable the product to meet the performance requirements of this specification and shall be approved by the qualifying activity.
11. Gasket shall provide a reliable seal between the relay and mating socket that will meet the environmental, operational, and interface requirements of the relay with the mating socket. The gasket shall have shore hardness 15 to 35, thickness $.050 \pm .005$. Gasket material according to [SAE-AMS3332](#) has been considered acceptable.
12. Indicated terminals shall be identified by a contrasting bead.
13. Plane of critical motion for vibration and shock is Y-axis.

FIGURE 1. Dimensions and configurations - Continued.

REQUIREMENTS:

Contact data:

Load ratings: See [table I](#).

Low level: 10 to 50 μ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Mixed loads: Applicable.

TABLE I. Rated contact load and cycles (amperes per pole).

Type of load (high level)	Cycles x 10 ³	28 V dc	115 V ac 1 phase 400 Hz	115/200 V ac 3 phase 400 Hz
Resistive	50	10	10	10
Inductive	10	6	N/A	N/A
Inductive	20	N/A	8	8
Motor	50	4	4	4
Lamp	50	2	2	N/A

Life: Unless otherwise specified (see [table I](#)), 50,000 cycles,

Contact voltage drop or resistance:

Initial contact voltage drop: 0.100 volt maximum. Rated resistive current at 6 V dc or peak ac. Relays shall not make or break this load.

Initial contact resistance: 0.010 ohm maximum. 50 mA max at 6 V dc or peak ac.

High level life (contact voltage drop):

During life: 10 percent open circuit voltage maximum.

After life: 0.125 volt maximum.

Intermediate current (contact resistance):

During intermediate current: 3 ohms maximum.

After intermediate current: 0.150 ohm maximum.

Low level (contact resistance):

During low level: 100 ohms maximum.

After low level: 0.150 ohm maximum at 100 mA and 28 V dc.

Contact bounce: 1.0 millisecond maximum.

Contact stabilization time: 2.5 milliseconds maximum.

Overload current: 30 amperes dc, 60 amperes ac.

Rupture current: 40 amperes dc, 80 amperes ac.

Time current relay characteristics: See [table II](#).

TABLE II. Time current relay characteristics. [1/](#)

Successive application	Amperes	Time
1	20	1 hour
2	30	20 seconds
3	75	2 seconds
4	150	0.53 second

[1/](#) All relays shall withstand overload and fault currents. Relays must be able to sustain five applications (make and carry only) of power concurrently on adjacent poles at each of four different current levels in the sequence listed in table II. Separate relays shall be tested at 28 V dc and 115/200 V ac, 400 Hz 3-phase. Cooling time between successive applications shall be 30 minutes. Tests shall be performed on both normally open and normally closed contacts. There shall be no failures or evidence of welding or sticking and relays shall pass contact voltage drop at the conclusion.

Coil data [1/](#): See [table III](#).

Operate time: 6 milliseconds maximum with rated coil voltage at 25°C. 7 milliseconds maximum with rated coil voltage over the temperature range.

Release time: 6 milliseconds maximum from rated coil voltage at 25°C. 7 milliseconds maximum from rated coil voltage over the temperature range.

Duty rating: Continuous.

Coil transient suppression: Not applicable.

Neutral screen: Not applicable.

Electrical data:

Insulation resistance:

Initial: 100 megohms minimum at 500 V dc.

After life or environmental tests: 50 megohms minimum at 500 V dc.

[1/](#) CAUTION: Due to possible interaction of relay magnetic fields, the following spacing requirements, as a minimum, shall be considered in dense packaging situations:

- a. Row to row assisting fields: .125 (3.18 mm).
- b. Row to row opposing fields: .1875 (4.763 mm).
- c. Side to side alternating fields: .0625 (1.588 mm).
- d. Side to side like fields: .125 (3.18 mm).

TABLE III. Dash numbers and characteristics. 1/

Dash number 2/			Mount	Coil data										
Solder pin	Solder hook	Socket pin		At 25°C						Over temperature range			Maximum pickup voltage	
				Coil voltage (V dc) 3/		Coil resistance (ohms) (minimum)	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (V dc) 4/	Specified pickup voltage (V dc) 4/	Specified hold voltage (V dc) 4/	Specified dropout voltage (V dc) 4/	High temperature test	Continuous current test
Rated	Max													
001	002	003	No mount	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
004	005	006	RVFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
007	008	---	HFM	6	7.3	15	3.3	1.6	0.4	4.5	2.3	0.25	5.0	5.7
009	010	011	No mount	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
012	013	014	RVFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
015	016	---	HFM	12	14.5	70	6.6	3.3	0.75	9.0	4.5	0.5	9.9	11.25
017	018	019	No mount	28	29 ^{5/}	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
020	021	022	RVFM	28	29 ^{5/}	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
023	024	---	HFM	28	29 ^{5/}	360	13.5	5.5	2.3	18.0	7.0	1.5	19.8	22.5
025	026	027	No mount	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
028	029	030	RVFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0
031	032	---	HFM	48	50	1125	24.0	10.0	3.0	36.0	12.0	2.4	40.0	44.0

1/ Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits are not recommended for subsequent use in low level applications.

2/ The suffix letter L, M, P, or R to designate the applicable failure rate level shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example: 001L, 002R.

3/ CAUTION: The use of any coil voltages less than the rated coil voltage will compromise the operation of the relay.

4/ Pickup, hold, and dropout voltages as shown are for test purposes only and are not to be used for design criteria.

5/ When maximum ambient temperature does not exceed +85°C, the maximum coil voltage shall be 32 V dc.

Dielectric withstanding voltage ^{2/}

	Coil to case	All other points
Sea level:		
Initial:	1,000	1,250
After life:	750	1,000
Altitude:		
At 80,000 feet:	250	250
At 300,000 feet:	500	500

Environmental characteristics:

Temperature range: -70°C to +125°C.

Maximum altitude rating: 300,000 feet.

Shock (specified pulse): Applicable, MIL-STD-202, method 213, test condition C 200 g's for 6 ±1 ms, except horizontal flange mount peak g value shall be 100 g's for 6 ±1 ms. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (sinusoidal): Applicable, MIL-STD-202, method 204, 30 g's, except frequency range shall be 70 to 3,000 Hz. Horizontal flange mount shall be 20 g's, 57 to 3,000 Hz. Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Vibration (random): Applicable to qualification and group C inspection. Test in accordance with MIL-STD-202, method 214, test condition IG (0.4 g²/Hz, 50 to 2,000 Hz), for horizontal flange mount test condition IE (0.2 g²/Hz). Contact chatter shall not exceed 10 microseconds maximum for closed contacts and 1 microsecond maximum closure for open contacts.

Acceleration: Applicable, except 15 g's.

Physical data:

Dimensions and configurations: See figure 1.

Weight: 0.062 pound (28.15 grams).

Terminal strength:

Solder hook terminals:

Pull force: 5 pounds ±0.5 pound.

Bend: Not applicable.

Twist: Not applicable.

Socket pin terminals:

Pull force:

For .030 diameter terminals: 3 pounds ±0.3 pound.

For .062 diameter terminals: 10 pounds ±1.0 pound.

^{2/} Dielectric may be improved by suitable insulation of terminals and wiring after installation.

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Bend: Not applicable.

Twist: Not applicable.

Socket pin terminals:

Pull force:

For .040 diameter terminals: 5 pounds ±0.5 pound.

For .062 diameter terminals: 10 pounds ±0.5 pound.

Bend: Not applicable.

Twist: Not applicable.

Terminal solderability: Applicable to solder pin and solder hook terminals only.

Seal: Hermetic.

Marking: Applicable.

Part or Identifying Number (PIN): M83536/21 (dash number from table III and suffix letter designating failure rate level).

Qualification inspection:

Qualification inspection and sample size: See [table IV](#).

TABLE IV. [Qualification inspection and sample size.](#) ^{1/}

Single submission	Group submission	
18 units plus 1 open unit for level L at C = 0 ^{2/}	M83536/21-022	18 units plus 1 open unit for level L at C = 0 ^{2/}
33 units plus 1 open unit for level M at C = 0 ^{2/}	M83536/21-022	33 units plus 1 open unit for level M at C = 0 ^{2/}
Qualification inspection as applicable	M83536/21-022	Qualification inspection as applicable
	M83536/21-018	2 units, qualification inspection table, Q2, shock, vibration, acceleration, terminal strength, and seal
	M83536/21-023	2 units, qualification inspection table, Q1
	M83536/21-002	
	M83536/21-014	
	M83536/21-031	

^{1/} For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on [MIL-PRF-83536/22](#) may be used in addition to MIL-PRF-83536/21 data. Prior to performance of retention of qualification testing, the relay manufacturer shall preselect the sampling plan.

^{2/} The number of units required for qualification testing shall be increased as required in Q5, table II of [MIL-PRF-83536](#), if the contractor elects to test the number of units permitting one or more failures. Prior to performance of qualification testing, the relay manufacturer shall preselect the sampling plan.

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Qualification inspection (reduced testing) (sample size: 2 units each coil voltage and 1 unsealed unit). See [table V](#).

If the relays produced for MIL-PRF-83536/21 are similar in construction and design except for the suppression network to the relays produced for [MIL-PRF-83536/22](#), then reduced testing for qualification of MIL-PRF-83536/21 relays may be performed concurrent with or subsequent to successful qualification of [MIL-PRF-83536/22](#) relays. For reduced testing, see [table V](#).

TABLE V. Qualification inspection (reduced testing).

Inspection
2 units each coil voltage Q1 of qualification inspection table 1 unsealed sample unit for internal inspection

Supersession data: See [table VI](#).

TABLE VI. Supersession data.

Superseded PIN M6106/29-	Replacement PIN M83536/21-
001	017
002	017
005	018
006	018
009	019
010	019
013	020
014	020
017	021
018	021
021	022
022	022
025	023
026	023
029	024
030	024

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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 previous issue.

Referenced documents. In addition to [MIL-PRF-83536](#), this document references the following:

[MIL-PRF-83536/22](#) [MIL-STD-202-204](#) [MIL-STD-202-213](#) [MIL-STD-202-214](#) [ASTM-B488](#)
[SAE-AMS3332](#)

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC

(Project 5945-2016-017)

Review activity:

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 <https://assist.dla.mil/>.