INCH-POUND

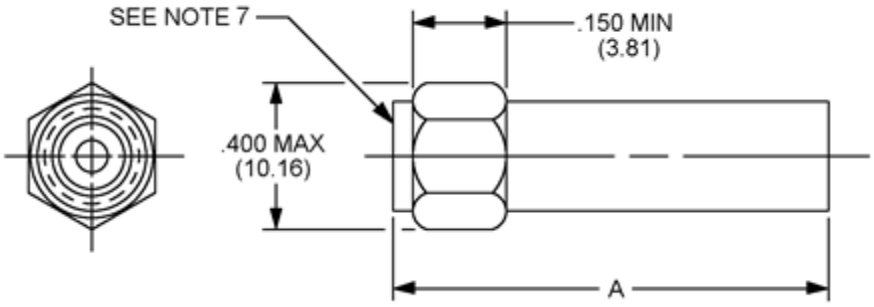
MIL-PRF-39012/55H
w/AMENDMENT 2
02 September 2017
SUPERSEDING
MIL-PRF-39012/55H
w/AMENDMENT 1
10 December 2016

PERFORMANCE SPECIFICATION SHEET

CONNECTORS, PLUGS, ELECTRICAL, COAXIAL, RADIO FREQUENCY (SERIES SMA (CABLED) - PLUG, PIN CONTACT, CLASS 2)

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

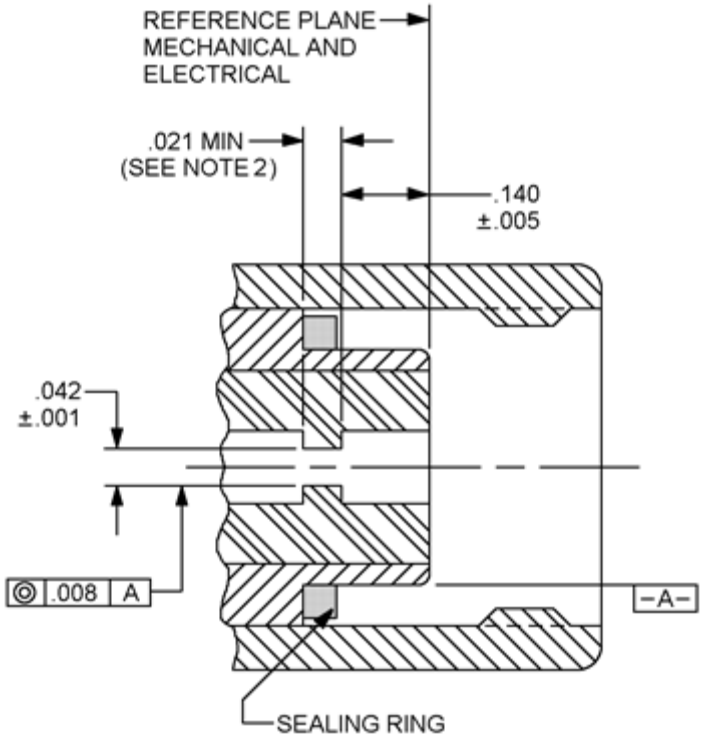
The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-39012.



MARKING IMPLEMENTATION DATE, CATEGORY B, SEE TABLE VII

NOTES:
1. Dimensions are in inches. Metric equivalents are in parentheses and given for information only.
2. For dimension A, see tables I and V.
3. Dimension .400 (10.16 mm) is the largest overall diameter of the connector.
4. Width across flats are to accommodate wrench, nominal size of .3125 (7.938 mm) minimum in accordance with FED-STD-H28.
5. Dimension A defines the overall length of the connector when assembled to the cable.
6. All undimensioned pictorial configurations are for reference purposes only.
7. Series SMA, pin contact interface in accordance with MIL-STD-348.

FIGURE 1. General configuration.



CATEGORY D

Insulator dimensions for category D only

Inches	mm
.001	0.03
.005	0.13
.008	0.20
.021	0.53
.042	1.07
.140	3.56

NOTES:
1. Dimensions are in inches. Metric equivalents are given for information only.
2. Chamfer is optional, if chamfer is used put chamfer on a 30º maximum.
3. Three holes .016 (0.41 mm) minimum diameter, equally spaced, are required for safety wiring after mating. Location on coupling nut optional.

FIGURE 2. Category D captivation detail.

TABLE I. Dash number, cross reference and dimensions.

Dash number 1/ 2/ 3/	# Applicable cable group from MIL-PRF-39012, appendix B	Dimensions	Inches (millimeters) Maximum 4/
Category A - Field serviceable (no special tools required) 5/			
3006 3106 6/ 4006 4106 6/	CABLE GROUP I M17/93-RG178 8/ 9/	A	1.030 (26.16)
3007 3107 6/ 4007 4107 6/	CABLE GROUP II M17/113-RG316 8/ 9/		
3008 3108 6/ 4008 4108 6/	CABLE GROUP IV M17/54-RG122 8/ 9/		
3009 3109 6/ 4009 4109 6/	CABLE GROUP VI M17/60-RG142 10/ M17/128-RG400 9/ M17/84-RG223 8/		
3010 7/ 3110 6/ 7/ 4010 7/ 4110 6/ 7/	CABLE GROUP VI M17/111-RG303 8/ 9/		
3030 3130 6/ 4030 4130 6/	CABLE GROUP III M17/152-00001 8/ 9/		
Category C - Field replaceable (MIL-DTL-22520 crimp tool) 11/			
3025 3125 6/ 4025 4125 6/	CABLE GROUP I 12/ M17/93-RG178 8/ 9/	A	1.250 (31.75)
3026 3126 6/ 4026 4126 6/	CABLE GROUP IIa 13/ M17/113-RG316 8/ 9/		
3027 3127 6/ 4027 4127 6/	CABLE GROUP IV 14/ M17/54-RG122 8/ 9/		
3028 3128 6/ 4028 4128 6/	CABLE GROUP VIb 15/ M17/60-RG142 10/ M17/128-RG400 9/ M17/84-RG223 8/		
3029 3129 6/ 4029 4129 6/	CABLE GROUP VIa 15/ M17/111-RG303 9/ M17/28-RG058 8/		

See notes at end of table.

TABLE I. Dash number, cross reference and dimensions – Continued.

Dash number 1/ 2/ 3/	# Applicable cable group from MIL-PRF-39012, appendix B	Dimensions	Inches-millimeters maximum 4/
Category D - Filed replaceable - Defined piece parts 11/ 16/			
3502 3602 6/ 4502 4602 6/	CABLE GROUP VIb M17/60-RG142 8/ 10/ M17/128-RG400 9/	A	1.250 (31.75)

1/ These connectors have captivated contacts.
2/ For logistics purposes, only connectors with safety wire holes will be stocked.
3/ Coupling nuts shall be corrosion resistant steel with a passivated finish in accordance with SAE-AMS2700, type 2 (applies only to -3XXX series connectors).
4/ Dimensions are in inches, millimeters are in parentheses.
5/ All corrosion resistant steel bodied connectors which are designed to be assembled to the cable outer conductor using solder shall be gold plated to a minimum thickness of 50 microinches (1.27 μm) in accordance with ASTM B488, type II, code C, class 1.27 at least in the area of solder attachment.
6/ No safety wire holes.
7/ These parts are inactive for new design, new designs should procure to dash numbers -*009 and -*109. These dash numbers use the same cable group (VI).
8/ Cable to be used when performing tests except in 10/.
9/ Preferred cable.
10/ Cable to be used for the +200°C temperature cycling test. Connectors mate with connectors of the same material; i.e., "3XXX" series dash numbers mate only with other "3XXX" series connectors and "4XXX" series connectors with other "4XXX" series connectors. This cable may be used for test purposes with the approval of the Qualifying Activity.
11/ These connectors are assembled, using the applicable crimp tool, to the specified cables stripped as shown on figure 4.
12/ Preferred die M22520/5-33 closure B, alternate die M22520/5-03 closure B.
13/ Preferred die M22520/5-35 closure B, alternate die M22520/5-03 closure A.
14/ Preferred die M22520/5-41 closure B, alternate die M22520/5-05 closure B, or -09 closure A.
15/ Preferred die M22520/5-19 closure B, alternate die M22520/5-05 closure A, or -11, 57, closure A.
16/ Complete connector assembly shall consist of a body, center contact, ferrule and assembly instructions.
The latest version of each cable shall be applicable.

ENGINEERING DATA:

Nominal impedance: 50 ohms.

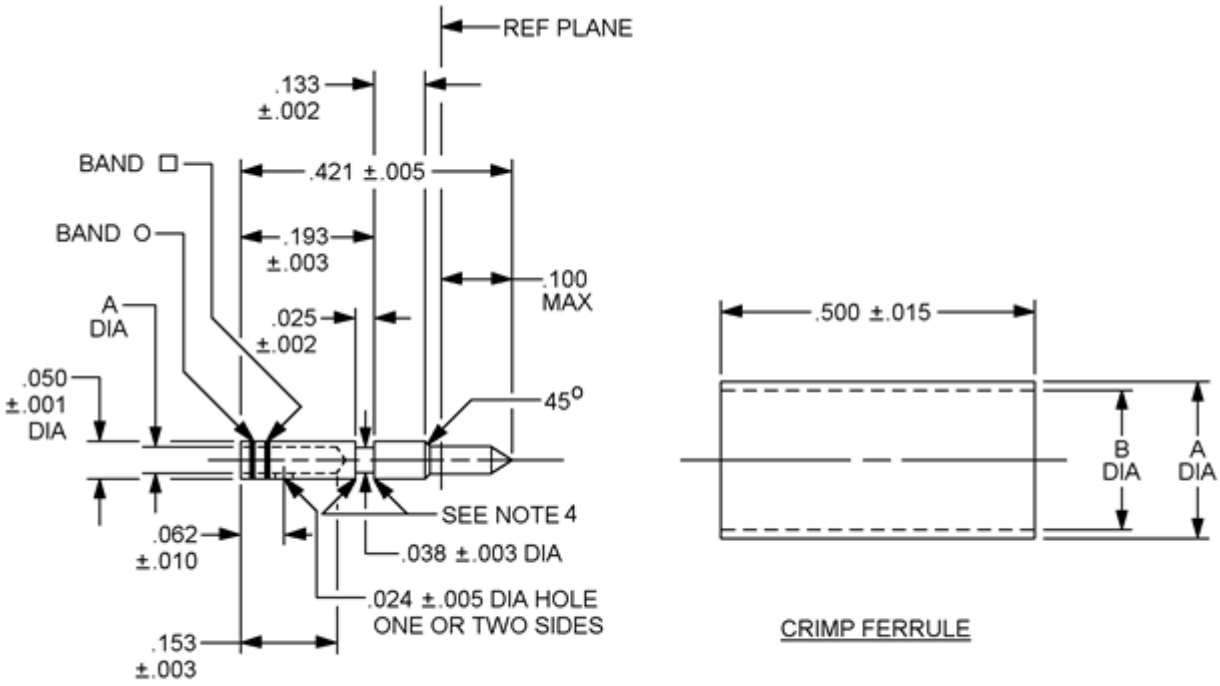
Frequency range: 0 to 12.4 GHz.

Voltage rating: The voltage rating shall be specified in table II.

Temperature range: -65°C to +165°C.

TABLE II. Voltage rating.

Cables	Voltage max. (at sea level) (V rms)	Voltage max. (V rms) at 70,000 feet (4.437 kPa)
Cable group I	170	45
Cable group II, IIa, III, IV	250	65
Cable group VI, VIa, VIb	335	85



Dash no.	Contact no. 1/	A ±.001	Basic crimp tool 2/	Crimp die or positioner	Crimp tensile minimum	Color band □	Color band ○
3502 4502	55-10	.041	M22520/1-01	Solder or M22520/1-15	6 pounds	Red	Silver

Dash no.	Ferrule no. 1/	A ±.003	B ±.003	Basic crimp tool 2/	Crimp die or positioner M22520/5-
3502 4502	55-50	.250	.220	M22520/5-01	-05, -11, -57 Closure A or -19 Closure B

1/ Contact numbers and ferrule numbers are for identification only.
2/ Class 2 tool may be used by OEM (see MIL-DTL-22520).

FIGURE 3. Contact and ferrule dimensions for category D only.

Inches	mm	Inches	mm
.001	0.03	.050	1.27
.002	0.05	.062	1.57
.003	0.08	.100	2.54
.005	0.13	.133	3.38
.010	0.25	.153	3.89
.015	0.38	.193	4.90
.024	0.61	.220	5.59
.025	0.64	.250	6.35
.038	0.97	.421	10.69
.041	1.04	.500	12.70

NOTES :
1. Dimensions are in inches. Metric equivalents are given for information only.
2. Crimp tensile test shall be in accordance with SAE-AS39029.
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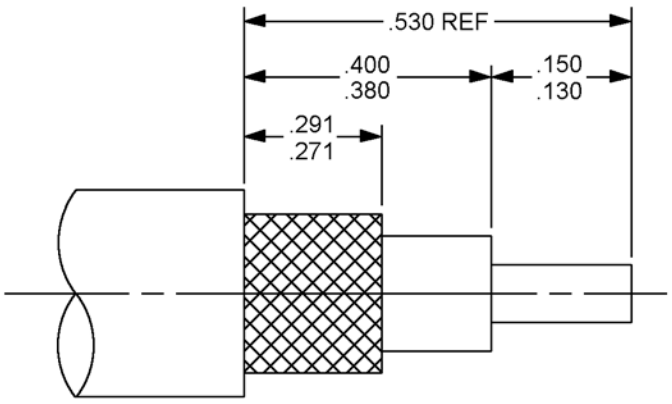
4. .003 inch maximum break.
5. Color bands shall be positioned so that no coloring material enters the inspection hole.

FIGURE 3. Contact and ferrule dimensions for category D only – Continued.



Inches	mm
.130	3.30
.150	3.81
.271	6.88
.291	7.39
.380	9.65
.400	10.16
.530	13.46

NOTES :
1. Dimensions are in inches. Metric equivalents are given for information only.

FIGURE 4. Cable stripping dimensions for field replaceable connectors.

REQUIREMENTS:

Dimensions and configuration: See figures 1, 2, 3, and 4.

Force to engage and disengage:

Longitudinal force: Not applicable.
Torque: 2 inch-pounds, maximum.

Coupling proof torque: 15 inch-pounds, minimum.

Inspection conditions: For each test of threaded coupling connectors where the test is performed on mated pairs, the pairs shall be torqued to 7 to 10 inch-pounds.

Mating characteristics: See MIL-STD-348 for dimensions.

Hermetic seal: Not applicable.

Leakage (pressurized connectors): Not applicable.

Insulation resistance: In accordance with MIL-STD-202-302: 5,000 megohms, minimum.

Center contact retention: 6 pounds minimum axial force. Applicable to captivated center contacts only.

Radial torque: Not applicable.

Corrosion (salt spray): In accordance with MIL-STD-202-101, test condition B.

Voltage standing wave ratio (VSWR): From 0.5 to 12.4GHz, or approximately 80 percent of the cutoff frequency of the test cable, whichever is lower.

Cable group	VSWR
I	1.20 +0.025F (F in GHz)
II, IIa, III, IV	1.15 +0.02F (F in GHz)
VI, VIa, VIb	1.15 +0.01F (F in GHz)

Swept frequency VSWR test setup:

Item 6: VSWR shall be less than 1.025 +.002F (F in GHz).

Item 16: VSWR shall be less than 1.025 +.002F (F in GHz).

Second step of VSWR checkout procedure: VSWR shall be less than 1.080 +.005F (F in GHz).

Group B inspection: Use step 5, long cable method.

Qualification and group C inspection: Use step 5, long cable method.

Connector durability: 500 cycles minimum, at 12 cycles per minute, maximum. The connector shall meet the mating characteristics and force to engage and disengage requirements.

Conductor resistance: In milliohms, maximum.

	Initial	After environment
Center conductor:	3.0	4.0
Outer contact:	2.0	N/A
Braid to body:	0.5	N/A

NOTE: 5 milliohms is permissible (braid to body) on passivated steel bodied connectors.

Dielectric withstanding voltage at sea level: MIL-STD-202-301.

Cable group	V rms
I	500
II, IIa, III, IV	750
VI, VIa, VIb	1,000

Vibration, high frequency: In accordance with MIL-STD-202-204, test condition D.

Shock: In accordance with MIL-STD-202-213, test condition I.

Thermal shock: In accordance with MIL-STD-202-107, test condition B, except high temperature shall be +85°C. High temperature shall be +200°C for connectors using +200°C cables (see tables I and V).

Moisture resistance: In accordance with MIL-STD-202-106.

No measurements at high humidity. Insulation resistance shall be at least 200 mega ohms within 5 minutes after removal from humidity.

Corona level:

Altitude: 70,000 feet.

Cable group	V rms min.
I	125
II, IIa, III, IV	190
VI, VIa, VIb	250

RF high potential withstanding voltage:

Frequency: 5 to 7.5 MHz.
Leakage current: Not applicable.

Cable group	V rms min.
I	335
II, IIa, III, IV	500
VI, VIa, VIb	670

Cable retention force shall be as specified in table III.

TABLE III. Cable retention force.

Cable dielectric outer diameter	Pounds (min.)	
	Single braid	Double braid
Inches (max.)		
.036	10	N/A
.067	20	N/A
.110	30	N/A
.122	40	45

Coupling mechanism retention force: 60 pounds minimum.

Safety wire hold pullout: Applicable.

RF leakage: -60 dB minimum tested at a frequency between 2 and 3 GHz.

RF insertion loss: dB maximum = $.06\sqrt{F\ (GHz)}$. Test frequency, 6 GHz.

Part or Identifying Number (PIN): M39012/55- (dash number from table I or "B" number from table V).

Group qualification: See table IV.

TABLE IV. Group qualification and retention testing.

Group	Submission and qualification of any of the following connectors 1/ 2/	Qualifies the following connectors 3/
I	M39012/55-*009	M39012/55-*006 M39012/55-*007 M39012/55-*008 M39012/55-*009 M39012/55-*010 M39012/55-*030
II	M39012/55B*015	M39012/55B*011 M39012/55B*012 M39012/55B*013 M39012/55B*014 M39012/55B*015 M39012/55B*016 M39012/55B*017
III	M39012/55B*022	M39012/55B*018 M39012/55B*019 M39012/55B*020 M39012/55B*021 M39012/55B*022 M39012/55B*023 M39012/55B*024

See notes at end of table.

TABLE IV. Group qualification and retention testing – Continued.

Group	Submission and qualification of any of the following connectors 1/ 2/	Qualifies the following connectors 3/
IV	M39012/55-*028	M39012/55-*025 M39012/55-*026 M39012/55-*027 M39012/55-*028 M39012/55-*029
V	M39012/55-*502	M39012/55-*502

1/ Individual connectors other than listed in the middle column, are self qualifying. Retention of qualification of connectors of equal or lower frequency is granted by similarity.
2/ Qualification of connectors qualifies connectors of the same material only.
3/ Connectors qualified with safety wire holes automatically qualifies connectors without safety wire holes.
* Denotes material.

NOTES:

1. For qualification retention, where more than one part is listed in a group in the middle column, data may be supplied on any of those parts in order to retain qualification for those parts in the corresponding right hand column. The part does not necessarily have to be the part initially qualified. This note does not apply if there is only one port listed in the middle column.

2. If a connector manufacturer produces a connector which meets all the requirements for two or more connector PINs (within the same series), the manufacturer may receive qualification approval for two or more connector PINs by qualifying the one connector. It is not necessary that such connectors be in the same group. Each connector, however, must be marked with its own appropriate PIN. For group qualification, the connectors must be of similar design.

TABLE V. Category B – nonfield replaceable (special tools may be required).

Not for Air Force, Navy or Army Use. For OEM Use Only.

M39012/55B ^	Applicable cable # M17/	Dimensions	Inches 1/ 2/ 3/ 4/ (millimeters) maximum
3011 5/ 3111 5/ 6/ 4011 5/ 4111 5/ 6/	M17/93-RG178 M17/169-00001∅	A	1.250 (31.75)
3012 5/ 3112 5/ 6/ 4012 5/ 4112 5/ 6/	M17/119-RG174 M17/113-RG316 M17/173-00001∅ M17/172-00001∅		
3013 5/ 3113 5/ 6/ 4013 5/ 4113 5/ 6/	M17/54-RG122* M17/157-00001∅		
3014 5/ 3114 5/ 6/ 4014 5/ 4114 5/ 6/	M17/28-RG058* M17/155-00001∅		
3015 5/ 3115 5/ 6/ 4015 5/ 4115 5/ 6/	M17/60-RG142*@ M17/158-00001∅		
3016 5/ 3116 5/ 6/ 4016 5/ 4116 5/ 6/	M17/84-RG223* M17/167-00001∅		
3017 5/ 3117 5/ 6/ 4017 5/ 4117 5/ 6/	M17/111-RG303* M17/170-00001∅		

See notes at end of table.

TABLE V. Category B – Non-field replaceable (special tools may be required) – Continued.

M39012/55B ^	Applicable cable # M17/	Dimensions	Inches 1/ 2/ 3/ 4/ (millimeters) maximum
3018 7/ 3118 6/ 7/ 4018 7/ 4118 6/ 7/	M17/93-RG178 M17/169-00001∅	A	1.375 (34.93)
3019 7/ 3119 6/ 7/ 4019 7/ 4019 6/ 7/	M17/119-RG174 M17/173-00001∅ M17/113-RG316 M17/172-00001∅		
3020 7/ 3120 6/ 7/ 4020 7/ 4120 6/ 7/	M17/54-RG122* M17/157-00001∅		
3021 7/ 3121 6/ 7/ 4021 7/ 4121 6/ 7/	M17/28-RG058* M17/155-00001∅		
3022 7/ 3122 6/ 7/ 4022 7/ 4122 6/ 7/	M17/60-RG142*@ M17/158-00001∅		
3023 7/ 3123 6/ 7/ 4023 7/ 4123 6/ 7/	M17/84-RG223* M17/167-00001∅		
3024 7/ 3124 6/ 7/ 4024 7/ 4124 6/ 7/	M17/111-RG303 M17/170-00001∅		

1/ Dimensions are in inches, millimeters are in parentheses.
2/ Coupling nuts shall be corrosion resistant steel with a passivated finish in accordance with SAE-AMS2700 type 2 (applies only to "-3XXX" series connectors).
3/ For logistics purposes, only connectors with safety wire holes will be stocked.
4/ All corrosion resistant steel bodied connectors which are designed to be assembled to the cable outer conductor using solder shall be gold plated to a minimum thickness of 50 microinches (1.27 μm) in accordance with ASTM B488, type II, code C, class 1.27 at least in the area of solder attachment.
5/ Inactive for new design.
6/ No safety wire holes.
7/ These connectors have captivated center contacts.
^ Connectors mate with connectors of the same material; i.e., M39012/59-3001 mates with M39012/55-3001, and M39012/59-4001 mates with M39012/55-4001.
# The latest version of each cable shall be applicable,
∅ Caution is directed to the application of this cable above 400 MHz. Attenuation is tested only at 400 MHz. SRL and power handling capabilities are not stipulated herein.
* Cable to be used when performing tests requiring cable except as in note @.
@ Cable to be used for the +200°C temperature cycling test and may be used for testing purposes with the approval of the Qualifying Activity.

Maintenance replacements for category B: See table VI.

TABLE VI. Maintenance replacements for category B.

Category B Dash number *	Category C Dash number	Category A Dash number	Category D Dash number
B^011	^025	^006	
B^012	^026	^007	
B^013	^027	^008	
B^014	^029	^009	
B^015	^028	^009	^502
B^016	^028	^009	
B^017	^029	^010	
B^018	^025	^006	
B^019	^026	^007	
B^020	^027	^008	
B^021	^029	^009	
B^022	^028	^009	^502
B^023	^028	^009	
B^024	^029	^010	

* Category B connectors are for original installation only. They will not be stocked or acquired by the Government.
^ The material of the item shall be the same material as the item being replaced. Example: 55B3011 (corrosion resistant steel) replaces 55-3025.

Cross reference of PIN's: See table VII.

TABLE VII. Supersession data.

Preferred PIN M39012/55B 1/	Superseded PIN M39012/55-		Preferred PIN M39012/55B 1/	Superseded PIN M39012/55-
^011	^011		^018	^018
^111	^111		^118	^118
^012	^012		^019	^019
^112	^112		^119	^119
^013	^013		^020	^020
^113	^113		^120	^120
^014	^014		^021	^021
^114	^114		^121	^121
^015	^015		^022	^022
^115	^115		^122	^122
^016	^016		^023	^023
^116	^116		^123	^123
^017	^017		^024	^024
^117	^117		^124	^124

1/ The "B" PIN is required marking. The connectors manufactured prior to 3 April 1987 that are in stock or distribution and were previously qualified and marked with the old PIN shall also be considered acceptable for Government use until stock is purged.
^ The material of the item shall be the same material as the item being replaced. Example: 55B3011 replaces 55-3011.

Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. 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.

Referenced documents. In addition to MIL-PRF-39012, this document references the following:

ASTM B488
MIL-STD-202-101
MIL-STD-202-106
MIL-STD-202-107
MIL-STD-202-204
MIL-STD-202-213
MIL-STD-202-301
MIL-STD-202-302
MIL-STD-348
SAE-AMS2700
SAE-AS39029
MIL-DTL-22520
FED-STD-H28

CONCLUDING MATERIAL

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

Preparing activity:
DLA - CC

(Project 5935-2017-110)

Review activities:
Army - AR, AT, EA, MI
Navy - AS, MC, OS, SH
Air Force – 99

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