

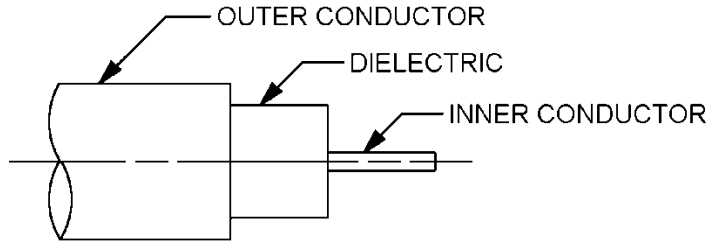
MIL-DTL-17/133F
w/AMENDMENT 1
10 April 2015
SUPERSEDING
MIL-DTL-17/133F
11 October 2013

DETAIL SPECIFICATION SHEET

CABLES, RADIO FREQUENCY, COAXIAL, 0.0865 INCH (2.20 mm)
DIAMETER, SEMIRIGID, 50 OHMS

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-DTL-17.



NOTES:

- 1. Dimensions are in inches.
- 2. Metric equivalents are given for information only.

FIGURE 1. Configuration.



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TABLE I. Description.

Part or Identifying Number (PIN)	Inner conductor	Dielectric core	Outer conductor <u>1/</u>	Weight, per 1,000 feet (maximum)
M17/133-RG405	Solid, silver-coated, copper-clad steel, .0201 ±.0005 inch	Type F-I diameter, .066 ±.002 inch	Copper tubing, diameter, .0865 ±.0010 inch <u>2/</u>	15.3
M17/133-00001			Copper tubing, tin plated in accordance with ASTM B545, .0003 inch, minimum thick, diameter, .0865 +.002, -.001 inch <u>2/ 3/</u>	15.8
M17/133-00002	Solid, silver-coated, copper wire, diameter, .0201 ±.0005 inch	Type F-I diameter, .066 ±.002 inch	Copper tubing, diameter, .0865 ± .0010 inch <u>2/</u>	15.2
M17/133-00003			Copper tubing, tin plated in accordance with ASTM B545, .0003 inch, minimum thick, diameter, .0865 +.002, -.001 inch <u>2/ 3/</u>	15.7
M17/133-00004	.0201 ±.0005 inch diameter <u>4/</u>	Type F-I diameter, .066 ±.002 inch	Copper tubing, diameter, .086 ±.0010 inch <u>2/</u>	15.4
M17/133-00005			Copper tubing, diameter, .086 +.002, -.001 inch, tin plated in accordance with ASTM B545, .0003 inch minimum thick <u>2/ 3/</u>	15.9
M17/133-00006 <u>5/ 6/</u>	Solid, silver-coated, copper-clad steel, .0201 ±.0005 inch	Type F-I diameter, .066 ±.002 inch	Copper tubing, diameter, .0865 ±.0010 inch	15.3
M17/133-00007 <u>5/ 6/</u>			Copper tubing, tin plated in accordance with ASTM B545, .0003 inch minimum thick. diameter, .0865 +.002, -.001 inch <u>3/</u>	15.8

See notes at end of table.

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TABLE I. Description – Continued.

PIN	Inner conductor	Dielectric core	Outer conductor <u>1/</u>	Weight, per 1,000 feet (maximum)
M17/133-00008 <u>5/ 6/</u>	Solid, silver-coated, copper wire, diameter, .0201 ±.0005 inch	Type F-1 diameter, .066 ±.002 inch	Copper tubing, diameter, .0865 ±.0010 inch	15.2
M17/133-00009 <u>5/ 6/</u>			Copper tubing, tin plated in accordance with ASTM B545, .0003 inch minimum thick, diameter, .0865 +.002, -.001 inch <u>3/</u>	15.7
M17/133-00010 <u>5/ 6/</u>	.0201 ±.0005 inch diameter <u>4/</u>		Copper tubing, diameter, .086 ±.001 inch	15.4
M17/133-00011 <u>5/ 6/</u>	.0201 ±.0005 inch diameter <u>4/</u>		Copper tubing, tin plated in accordance with ASTM B545, .0003 inch minimum thick, diameter, .086 +.002, -.001 inch <u>3/</u>	15.9
M17/133-00012	Solid, silver-coated, copper-clad steel, .0201 ±.0005 inch	Type F-1 diameter, .066 ±.002 inch	Aluminum tubing, diameter, .0865 ±.0010 inch <u>7/</u>	7.5
M17/133-00013			Aluminum tubing, diameter, .0865 +.002, -.001 inch, tin plated in accordance with ASTM B545, .0003 inch minimum thick <u>3/ 7/</u>	8.0
M17/133-00014	.0201 ±.0005 inch diameter <u>4/</u>		Aluminum tubing, diameter, .0865 ±.0010 inch <u>7/</u>	7.5

See notes at end of table.

TABLE I. Description – Continued.

PIN	Inner conductor	Dielectric core	Outer conductor <u>1/</u>	Weight, per 1,000 feet (maximum)
M17/133-00015	.0201 ±.0005 inch diameter <u>4/</u>	Type F-1 diameter, .066 ±.002 inch	Aluminum tubing, diameter, .0865 +.002, -.001 inch, tin plated in accordance with ASTM B545, .0003 inch minimum thick <u>3/ 7/</u>	8.0
M17/133-00016	Solid, silver-coated, copper-clad steel, .0201 ±.0005 inch		Copper tubing, diameter, .0865 +.002, -.001 inch, silver plated in accordance with ASTM B700, Type 2, Grade A or Grade D, 300μ inches, minimum <u>3/</u>	15.8
M17/133-00017	.0201 ±.0005 inch diameter <u>4/</u>			15.8
M17/133-00018	Solid, silver-coated, copper wire, diameter, .0201 ±.0005 inch		Copper tubing, diameter, .0865 +.002, -.001 inch, 90/10 tin-plated in accordance with SAE AMS-P-81728, .0003 inch thick, minimum <u>2/ 3/</u>	15.7

1/ Welded outer conductor in accordance with ASTM B447 and MIL-DTL-17 is optional.

2/ Hard outer conductor required (outer conductor after sinking on dielectric).

Tensile strength 33,000 PSI, minimum, 30 percent elongation, maximum measured over 2 inches.

3/ The outer diameter dimension is after plating.

4/ Nickel - coated, copper-clad steel wire, conforming to ASTM B559, class N 40 HS two percent with uniform and continuous silver coating, 40 microinches minimum thick. Wire shall be drawn to final size after plating.

5/ Tensile strength (outer conductor prior to sinking on dielectric): 35,000 PSI, maximum, 40 percent elongation minimum measured over two inches.

6/ These PIN's are for soft outer conductor cables only.

7/ The tensile strength (outer conductor prior to sinking on dielectric) 15,000 PSI, maximum, 40 percent elongation minimum, measured over 2 inches.

ENGINEERING INFORMATION:

Continuous working voltage: 1,500 V rms, maximum.

Operating frequency: 20 GHz, maximum.

Velocity of propagation: 69.5 percent, nominal.

Power rating: See figure 2.

Operating temperature range: - 40°C to +125°C.

Inner conductor properties:

DC resistance (maximum at 20°C): 2.57 ohms per 100 feet for class A wire.
6.57 ohms per 100 feet for class HS wire.

Elongation: 15 percent minimum for class 40 A wire.
1.0 percent minimum for class 40 HS wire.

Tensile strength: 90,000 Lb/in² minimum for class 40 HS wire.

Tensile strength (outer - conductor): 35,000 pounds per inch², maximum, 40 percent elongation minimum measured over two inches (not applicable to M17/133-RG405 through -00005) in accordance with ASTM E8/E8M.

Engineering notes: This cable is useful in critical RF performance applications (see connector series SMA in accordance with MIL-PRF-39012). This cable is generally manufactured in 20 - foot length. Different lengths are available.

REQUIREMENTS:

Dimensions, configuration, and descriptions: See figure 1 and table I.

Environmental and mechanical:

Eccentricity: 8 percent, maximum.

Adhesion of conductors:

Inner conductor to core: 4 pounds minimum, 25 pounds maximum.

Outer conductor to core: 4 pounds minimum.

Aging stability: Not applicable.

Stress crack resistance: Not applicable.

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Outer conductor integrity: Four specimens, approximately 2 feet long, shall be cut from the sample unit. The specimens shall be suspended in a heat chamber without touching one another or the walls of the chamber and conditioned for 1 hour 30 minutes minimum at the specified maximum operating temperature $\pm 5^{\circ}\text{C}$. Heated air shall be circulated so as to maintain a uniform test temperature. After the conditioning period, the specimens shall be removed from the heat chamber and conditioned at room ambient temperature for 4 hours minimum. The specimen shall then have one end immersed into molten solder to a depth of 0.5 inch minimum for 15 seconds minimum. The molten solder temperature shall be $+230^{\circ}\text{C}$ minimum. After the conditioning period, the specimens shall be removed from the molten solder and conditioned at room ambient temperature for 1 hour minimum. Examine the specimens for cracks, flaws, or other damage in the outer conductor material.

Cold bend: Not applicable.

Dimensional stability: $+125^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

Core to jacket: .015 inch, maximum.

Contamination: Not applicable.

Bendability: Mandrel diameter: .25 inch, maximum (except dash numbers - 00006 through -00011, mandrel diameter shall be .100 inch, maximum). Mandrel diameter .140 inch maximum for -00012 through -00015. Performance may degrade after being subjected to the mandrel test.

Flammability: Not applicable.

Weight: See table I.

Electrical:

Test frequency: 500 MHz to 20 GHz.

Spark test: Not applicable.

Voltage withstanding: 5,000 V rms.

Insulation resistance: Not applicable.

Corona extinction voltage: 1,500 V rms, minimum.

Characteristic impedance: 50.0 ± 1.5 ohms.

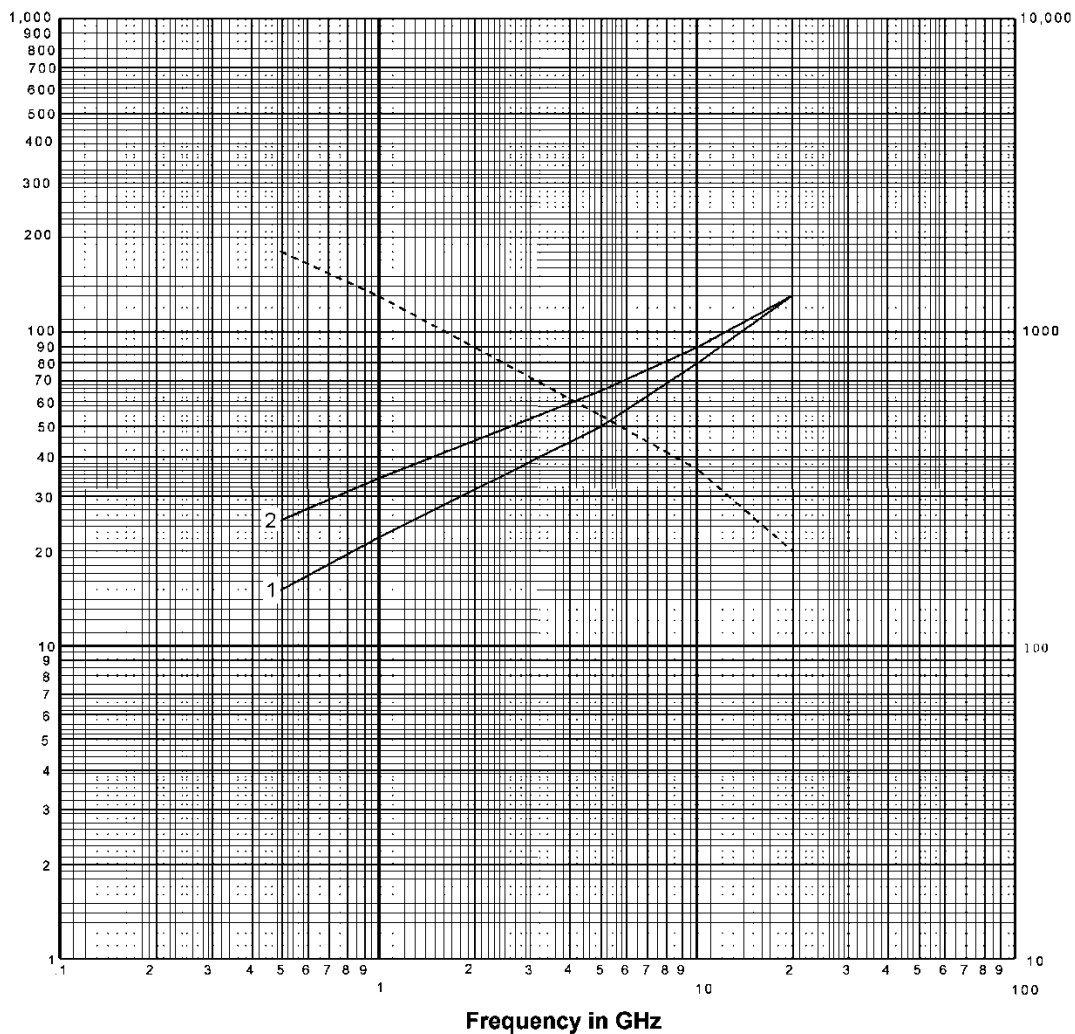
Attenuation: See figure 2.

Structural return loss: See figure 3.

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Attenuation
dB/100 Ft

Power in Watts

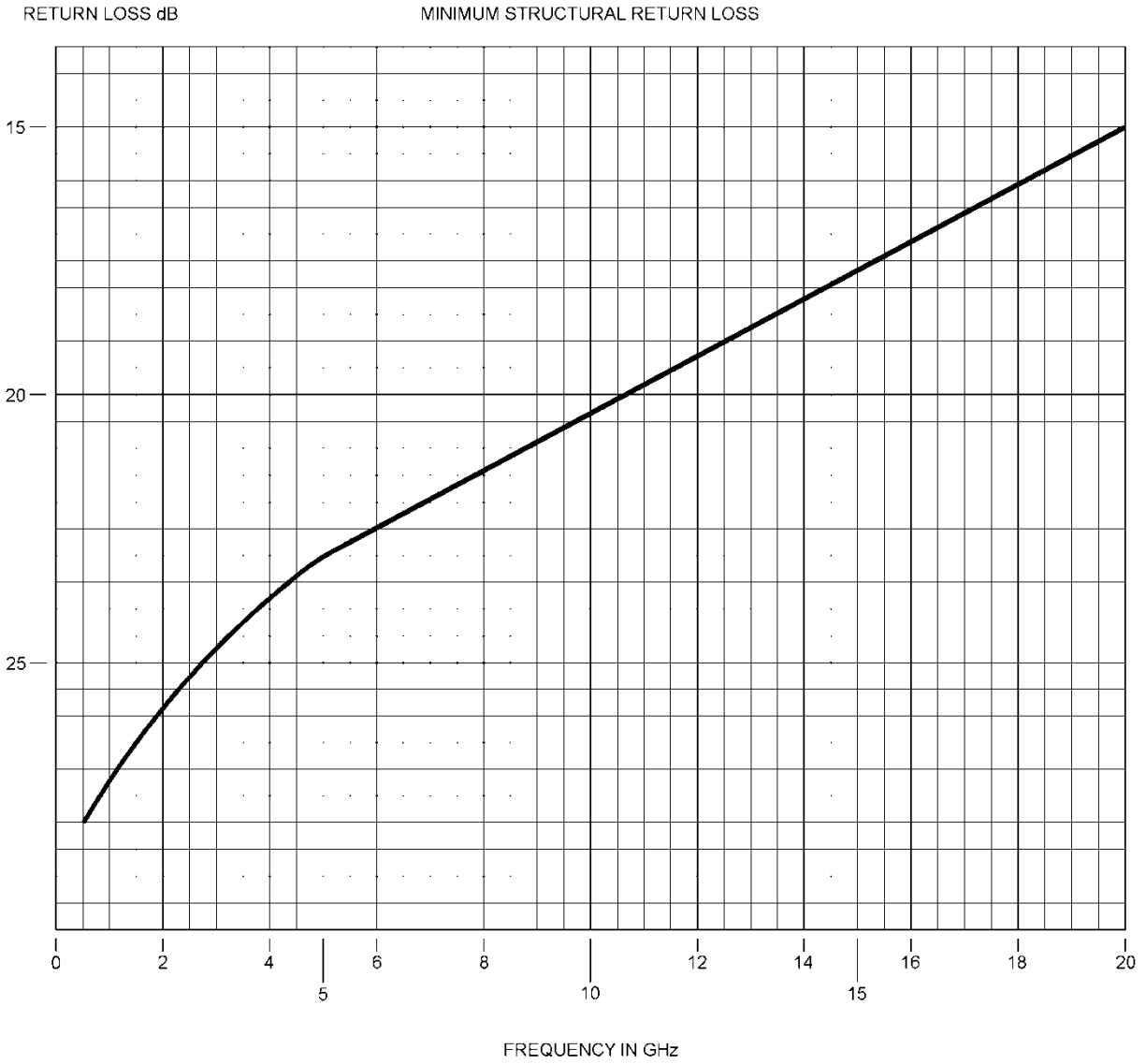


Maximum attenuation ————— (Test requirements shall be as noted as line indicated on graph.)
Maximum power ----- At 25°C at sea level.

M17/133-00004, -00005, -00010, -00011, -00014, -00015 and -00017.		
Attenuation		Power
MHz	dB	Watts
500	25	180
1000	34	130
5000	65	54
10000	90	35
20000	130	20

M17/133-RG405, -00001, -00002, -00003, -00006 through -00009, -00012, -00013, -00016 and -00018.		
Attenuation		Power
MHz	dB	Watts
500	15	180
1000	22	130
5000	50	54
10000	80	35
20000	130	20

FIGURE 2. Power rating and attenuation.



Structural Return Loss	
MHz	dB
500	28
5000	23
20000	15

FIGURE 3. Minimum structural return loss cable.

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Standing Wave Ratio	Reflection coefficient	Return loss dB
17.3910	.8913	1
8.7242	.7943	2
5.8480	.7079	3
4.4194	.6310	4
3.5698	.5623	5
3.0095	.5012	6
2.6146	.4467	7
2.3229	.3981	8
2.0998	.3548	9
1.9250	.3162	10
1.7849	.2818	11
1.6709	.2512	12
1.5769	.2239	13
1.4985	.1995	14
1.4326	.1778	15
1.3767	.1585	16
1.3290	.1413	17
1.2000	.1259	18
1.2528	.1122	19
1.2222	.1000	20
1.1957	.0891	21
1.1726	.0794	22
1.1524	.0708	23
1.1347	.0631	24
1.1192	.0562	25
1.1065	.0501	26
1.0725	.0447	27
1.0829	.0398	28
1.0738	.0356	29
1.0653	.0316	30

FIGURE 3. Minimum structural return loss cable – Continued.

Capacitance: 32 pF per foot, maximum.

Capacitance stability: Not applicable.

Capacitance unbalance: Not applicable.

Transmission unbalance: Not applicable.

Phase stability: Not applicable.

Mechanically induced noise voltage: Not applicable.

Time delay: Not applicable.

PIN: See table II.

Supersession data: See table II.

TABLE II. Cross - reference of PIN.

PIN	Superseded PIN or type designation
M17/133-RG405	RG-405/U

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-DTL-17, this document references the following:

ASTM B447
ASTM B545
ASTM B559
ASTM B700
ASTM E8/E8M
MIL-PRF-39012
SAE AMS-P-81728

CONCLUDING MATERIAL

Custodians:

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

Preparing activity:
DLA - CC

(Project 6145-2015-009)

Review activities:

Army – AT, CR4, MI
Navy – AS, MC, OS, SH
Air Force – 19, 99

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