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Interface Practices Subcommittee

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Specification for Trunk, Feeder and Distribution Coaxial Cable

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140 Philips Road
Exton, PA 19341

Document Types and Tags

Document Type: Specification

Document Tags:

☒ Test or Measurement	☐ Checklist	☐ Facility
☐ Architecture or Framework	☐ Metric	☐ Access Network
☒ Procedure, Process or Method	☐ Cloud	☐ Customer Premises

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SCTE 15 2001	*7/18/2001*
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Note: Standards that are released multiple times in the same year use: a, b, c, etc. to indicate normative balloted updates and/or r1, r2, r3, etc. to indicate editorial changes to a released document after the year.

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1. Introduction

1.1. Executive Summary

This specification applies to general purpose trunk, feeder and distribution coaxial cables. Currently there are two distinctive designs of dielectric available: gas injected foam dielectric and disc and air dielectric. This document will cover both designs. Specialty cables will not be included in this document.

References to the National Electrical Code, National Electrical Safety Code, ASTM and other regulations or specifications should adhere to the latest document and should keep current with each document.

This specification in no way should limit or restrict any manufacture's innovations and improvement. Innovation and improvements are encouraged, and this specification may be adjusted when beneficial.

1.2. Scope

This specification applies to material, electrical and mechanical properties of seventy-five-ohm coaxial cables as defined herein. Seventy-five-ohm coaxial cables are used to distribute radio frequency (RF), digital signals and power as applicable.

1.3. Benefits

This standard allows for interface between multiple vendors of coax, connectors, tools, equipment and accessories.

Without this specification the end user would have to pair hardline cable & parts due to lack of standardization.

1.4. Intended Audience

The intended audiences are mainly manufacturers. System operators should also find use in this specification as reference to their products and capabilities.

1.5. Areas for Further Investigation or to be Added in Future Versions

DOCSIS 3.1 specifications include operation at frequencies up to 1218 MHz, and optionally, to 1794 MHz. This document includes specifications up to 3000 MHz.

2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this document. At the time of Subcommittee approval, the editions indicated were valid. All documents are subject to revision; and while parties to any agreement based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below, they are reminded that newer editions of those documents might not be compatible with the referenced version.

2.1. SCTE References

[SCTE 03] ANSI/SCTE 03 2016 – Test Method for Coaxial Cable Structural Return Loss

[SCTE 11] ANSI/SCTE 11 2018 – Test Method for Aerial Cable Corrosion Protection Flow

[SCTE 12] ANSI/SCTE 12 2018 – Test Method for Center Conductor Bond to Dielectric for Trunk Feeder and Distribution Coaxial Cables

[SCTE 13] ANSI/SCTE 13 2018 – Dielectric Air Leak Test Method For Trunk, Feeder and Distribution Coaxial Cable

[SCTE 39] ANSI/SCTE 39 2013 (R2021) – Test Method for Static Minimum Bending Radius for Coaxial Trunk, Feeder and Distribution Cables

[SCTE 44] ANSI/SCTE 44 2018 – Test Method for DC Loop Resistance

[SCTE 47] ANSI/SCTE 47 2007 – Test Method for Coaxial Cable Attenuation

[SCTE 49] ANSI/SCTE 49 2011 (R2021) – Test Method for Velocity of Propagation

[SCTE 66] ANSI/SCTE 66 2016 – Test Method for Coaxial Cable Impedance

[SCTE 69] ANSI/SCTE 69 2007 – Test Method for Moisture Inhibitor Corrosion Resistance

[SCTE 88] ANSI/SCTE 88 2012 (R2021) – Test Methods for Polyethylene Jacket Longitudinal Shrinkage

[SCTE 251] ANSI/SCTE 251 2018 – Test Procedure for Determining the Thermal Oxidative Stability of Foamed Polyethylene

2.2. Standards from Other Organizations

[ASTM A] ASTM A 641-92 Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

[H35.1] ANSI H35.1 American Aluminum Association Alloy and temper Designation Systems or Aluminum 1XXX

[ASTM B 566] ASTM B 566-93 Specification for Copper-Clad Aluminum Wire

[ASTM B 694] ASTM B 694-86 Specification for Copper, Copper Alloy, and Copper Clad Stainless-Steel Sheet and Strip for Electrical Cable Shielding

[ASTM D 573] ASTM D 573-88 Test Method for Rubber-Deterioration in an Air Oven

[ASTM D 638] ASTM D 638-91 Test Method for Tensile Properties of Plastics

[ASTM D 746] ASTM D 746-79 Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

[D 1248] ASTM D 1248-84 Specification for Polyethylene Plastics Molding and Extrusion Materials

[D 1505] ASTM D 1505-90 Test Method for Density of Plastics by the Density-Gradient Technique

[D 1603] ASTM D 1603-76 Test Method for Carbon Black in Olefin Plastics

[D 3349] ASTM D 3349-93 Test Method for Absorption coefficient of Ethylene Polymer Material Pigmented with Carbon Black

[D 4565] ASTM D 4565-90a Test Method of Physical Environmental Performance Properties of Insulation's and Jackets for Telecommunications Wire and Cable

[SAE] SAE/AISI - 1010

2.3. Published Materials

No normative references are applicable.

3. Informative References

The following documents might provide valuable information to the reader but are not required when complying with this document.

3.1. SCTE References

No informative references are applicable.

3.2. Standards from Other Organizations

[ASQC] ANSI/ASQC Q9000-1 and Q9004-1

[B 211] ASTM B 211-93 Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire

[B 221] ASTM B 221-93 Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes

[B 233] ASTM B 233-92 Specification for Aluminum 1350 Drawing Stock for Electrical Purposes

[B 557] ASTM B 557-94 Test Methods of Tension Testing Wrought and Cast Aluminum– and Magnesium-Alloy Products

[E 8-94A] ASTM E 8-94a Test Methods for Tension Testing of Metallic Materials

[NEC] NEC-2011 National Electrical Code

[NFPA] NFPA 70 National Fire Protection Association

3.3. Published Materials

No informative references are applicable.

4. Compliance Notation

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shall not	This phrase means that the item is an absolute prohibition of this document.
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deprecated	Use is permissible for legacy purposes only. Deprecated features may be removed from future versions of this document. Implementations should avoid use of deprecated features.

5. Abbreviations

CCA	copper clad aluminum
DOJ	diameter over jacket
OIT	oxidative induction time
PE	polyethylene
RF	radio frequency
SCTE	Society of Cable Telecommunications Engineers
SRL	structural return loss
TOS	thermal oxidative stability
UV	ultraviolet light stability
VOP	velocity of propagation

6. Center Conductor

6.1. Material

The center conductor ***shall*** be copper clad aluminum (CCA). The outer layer of copper ***shall*** be metallurgically bonded and continually cover the aluminum core prior to processing, the composite conductor ***shall*** meet the requirements of ASTM B 566- Class 10A or 10H.

Solid copper center conductor *may* also be available, if required by the user. Low DC resistance is the only advantage to using solid copper; therefore, this document will only cover the copper clad aluminum.

6.2. Joints

Factory joints in the finished product ***shall*** be allowed. The ultimate tensile strength in the joint area when tested per ASTM E-8 ***shall*** be 90% of the original unspliced wire.

6.3. Dimensions

- Center conductor dimensions ***shall*** meet the requirements of Table 1.
- All center conductor tolerances ***shall*** be ± 0.001 in. (0.03mm).

Table 1 - Center Conductor Dimensions [Inch (mm)]

Product Type	Diameter of Center Conductor
412-F	0.088 (2.24)
500-F	0.109 (2.77)
500-D	0.123 (3.12)
540-F	0.124 (3.15)
565-F	0.129 (3.28)
625-F	0.136 (3.45)
650-D	0.156 (3.96)
700-F	0.163 (4.14)
715-F	0.166 (4.22)
750-F	0.166 (4.22)
750-D	0.185 (4.20)
840-F	0.194 (4.93)
860-F	0.203 (5.16)
875-F	0.194 (4.93)

F=FOAM, D=DISC and AIR

6.4. DC Resistance

DC resistance of the center conductor ***shall*** be measured per [SCTE 44] and meet the requirements of Table 7.

7. Foam Dielectric

7.1. Foam Dielectric Material

Dielectric material extruded over the center conductor ***shall*** be an insulating grade virgin polyethylene and ***shall not*** contain reground, reprocessed or recycled materials. The insulation ***shall*** consist of gas injected foamed polyethylene with a closed cell structure. It ***shall*** be applied concentrically and bonded to the center conductor. The dielectric ***shall*** also contain a stabilization package to meet the requirements of section 14.5 Thermal Oxidative Stability (TOS) when measured per [SCTE 251].

Unless otherwise specified, polyethylene materials for the dielectric ***shall*** meet all applicable requirements of ASTM D 1248 and requirements of this document. The test utilizes insulation removed from the completed cable and tested at 180 °C ± 0.3 °C. Care *should* be taken not to include any adhesive or precoat on the dielectric specimen. Requirements for OIT – Initial: 20 minutes minimum, after aging: 70 percent of initial value.

7.2. Patching

Discontinuities in the conductor insulation due to process malfunction or damage ***shall not*** be patched.

8. Disc And Air Dielectric

8.1. Disc and Air Dielectric Material

The dielectric core consists of polyethylene disc molded onto the center conductor. A polyethylene sleeve is then extruded over the disc to hermetically seal the compartments. The base resins for the disc and sleeve dielectric ***shall*** be virgin polyethylene and ***shall not*** contain reground, reprocessed or recycled materials. The disc and sleeve ***shall*** contain a stabilization package to meet the requirements of section 13.5 Thermal Oxidative Stability (TOS).

Unless otherwise specified, polyethylene materials for the dielectric ***shall*** meet all applicable requirements of ASTM D 1248 and requirements of this document.

8.2. Patching

Discontinuities in the conductor insulation due to process malfunction or damage ***shall not*** be patched.

9. Outer Conductor (Shield)

9.1. Material

The outer conductor will consist of a continuous extruded or welded tube of aluminum. It ***shall*** be made from an aluminum alloy of the 1XXX series as described in ANSI H35.1. The alloy used by the manufacturer must produce a finished product that meets all the electrical and mechanical properties specified elsewhere in this document.

9.2. Outer Conductor Dimensions

The inside diameter, outside diameter and thickness of the outer conductor ***shall*** meet the requirements of Table 2

Table 2 - Outer Conductor Dimensions [Inch (mm)]

Product Type	* Diameter Over Outer Conductor	Nominal Inside Diameter of Outer Conductor	Nominal Thickness of Outer Conductor
412-F	0.412 (10.46)	0.362 (9.19)	0.025 (0.64)
500-F	0.500 (12.70)	0.452 (11.48)	0.024 (0.61)
500-D	0.510 (12.95)	0.471 (11.96)	0.0195 (0.49)
540-F	0.540 (13.72)	0.513 (13.03)	0.0135 (0.34)
565-F	0.565 (14.35)	0.519 (13.18)	0.023 (0.58)
625-F	0.625 (15.88)	0.563 (14.30)	0.030 (0.76)
650-D	0.642 (16.31)	0.603 (15.32)	0.195 (0.49)
700-F	0.703 (17.86)	0.653 (16.59)	0.025 (0.64)
715-F	0.715 (18.16)	0.686 (17.42)	0.0145 (0.37)
750-F	0.750 (19.05)	0.678 (17.22)	0.034 (0.86)
750-D	0.762 (19.35)	0.714 (18.14)	0.024 (0.61)
840-F	0.840 (21.34)	0.780 (19.81)	0.030 (0.76)
860-F	0.860 (21.84)	0.828 (21.03)	0.016 (0.41)
875-F	0.875 (22.23)	0.797 (20.24)	0.035 (0.89)

F=FOAM, D=DISC and AIR

Note: * = Tolerance on (F) type diameter over outer conductor is ± 0.002 in. (± 0.05 mm).
* = Tolerance on (D) type diameter over outer conductor is ± 0.008 in. (± 0.10 mm).

9.3. Dielectric Adhesion to Outer Conductor

A polymer adhesive coating *may* be used to bond the dielectric to the outer conductor. The adhesive coating ***shall*** be compatible with all cable components in contact and ***shall not*** degrade either electrical or mechanical properties of the product.

10. Outer Conductor Flooding Compound

10.1. Material

Cables intended for below grade use shall have a flooding compound applied over the outer conductor to block moisture ingress and help prevent corrosion. The finished product ***shall*** meet requirements of [SCTE 69] for corrosion resistance.

If a flooding compound is used for aerial cable, it ***shall*** meet the requirements of [SCTE 11] for a non-flowing compound.

11. Cable Jacket

11.1. Material

The outer jacket ***shall*** be polyethylene (PE). The jacket ***shall*** be free of pinholes, cracks and blisters. The PE jacket ***shall*** contain carbon black to ensure ultraviolet light stability (UV). The cable jacket ***shall*** meet the requirements of Table 3.

Table 3 - Jacket Material Requirements

Property	Requirement
Yield Strength (PSI), minimum ASTM D 638	1,200
Elongation (%), minimum ASTM D 638	400
Retention of Elongation (%), minimum after 48 hours at 100 °C (212 °F) ASTM D 573	75
Low Temperature Brittleness, °C (°F) ASTM D 746 Procedure A	-76 (-105)
Carbon Black Content (%), minimum ASTM D 1603	2.35
Density (g/cc) ASTM D 1505	0.900 – 0.955
UV Stability @ 375 nm/ASTM D 3349 PE minimum absorption coefficient	400

11.2. Diameter Over Jacket (DOJ)

The DOJ of the various types of cables ***shall*** meet the requirements of Table 4.

Table 4 - Nominal Diameter over Jacket [Inch (mm)]

Product Type	Non-Flooded	Flooded	Armored Corrugated	Armored Helical
412-F	0.472 (11.99)	0.482 (12.24)	0.640 (17.02)	0.600 (15.24)
500-F	0.560 (14.22)	0.570 (14.48	0.715 (18.16)	0.690 (17.53)
500-D	0.582 (14.78)	0.595 (15.11)	0.751 (19.07)	N/A
540-F	0.610 (15.49)	0.610 (15.49)	0.765 (19.43)	N/A
565-F	0.625 (15.88)	0.635 (16.13)	N/A	0.755 (19.18)
625-F	0.685 (17.40)	0.695 (17.65)	0.835 (21.21)	0.815 (20.70)
650-D	0.712 (18.09)	0.725 (18.42)	0.901 (22.89)	N/A
700-F	0.765 (19.43)	0.775 (19.69)	N/A	0.885 (22.50)
715-F	0.785 (19.94)	0.785 (19.94)	0.935 (23.75)	N/A
750-F	0.820 (20.83)	0.830 (21.08)	1.000 (25.40)	0.950 (24.13)
750-D	0.832 (21.13)	0.845 (21.46)	0.941 (23.90)	N/A
840-F	0.910 (23.11)	0.920 (23.37)	N/A	1.040 (26.42)
860-F	0.960 (24.38)	0.960 (24.38)	1.110 (28.19)	N/A
875-F	0.945 (24.00)	0.955 (24.26)	1.097 (27.86)	1.075 (27.31)

F=FOAM, D=DISC and AIR

11.3. Jacket Thickness

The minimum thickness at any point of the overall jacket ***shall*** meet the requirements of Table 5.

Table 5 - Minimum Jacket Thickness [Inch (mm)]

Product Type	Aerial	Underground
412-F	0.020 (0.51)	0.020 (0.51)
500-F	0.021 (0.53)	0.021 (0.53)
500-D	0.021 (0.53)	0.025 (0.63)
540-F	0.021 (0.53)	0.021 (0.53)
565-F	0.021 (0.53)	0.021 (0.53)
625-F	0.021 (0.53)	0.021 (0.53)
650-D	0.021 (0.53)	0.021 (0.53)
700-F	0.021 (0.53)	0.021 (0.53)
715-F	0.025 (0.64)	0.025 (0.64)
750-F	0.025 (0.64)	0.025 (0.64)
750-D	0.025 (0.63)	0.025 (0.63)
840-F	0.025 (0.64)	0.030 (0.76)
860-F	0.035 (0.89)	0.035 (0.89)
875-F	0.025 (0.64)	0.025 (0.64)

F=FOAM, D=DISC and AIR

The minimum thickness at any point ***shall*** be determined by exploratory measurement.

11.4. Jacket Eccentricity

The eccentricity of the jacket ***shall not*** exceed 43 percent and ***shall*** be calculated as follows:

$$\frac{\text{(Maximum thickness – minimum thickness)}}{\text{(Average thickness)}} \times 100$$

The average thickness at any cross section ***shall*** be determined from four readings, including the minimum spot taken approximately 90° apart. The maximum thickness at any cross section ***shall not*** be greater than 155 percent of the minimum spot thickness.

12. Integral Messenger

12.1. Material

An integral messenger (support) joined to the coaxial cable by an overall extruded PE jacket ***shall*** be galvanized steel. The steel wire ***shall*** meet minimum requirements of ASTM A 641, Class 1, Hard Temper. The diameter of the wire is dependent upon the application and ***shall*** be agreed upon by the user.

12.2. Joints

Factory joints in the messenger ***shall not*** be allowed in a shipping length of cable.

13. Armor

13.1. Material

The armor ***shall*** be any of the following materials:

1. A steel tape 0.010 in. (0.25 mm) thick, conforming to SAE/AISI 1010.
2. A steel tape 0.006 in. (0.15 mm) thick.
3. A copper clad stainless-steel tape 0.006 in. (0.15 mm) thick per ASTM B 694.
4. A steel tape with an adhesive coating on one side and corrosion protection plating on the other side, the tape thickness without plating or adhesives ***shall*** be 0.008 in. (0.20 mm).

The armor is applied to protect the finished product from mechanical and rodent damage.

13.2. Armor Construction

The armor tape can be applied either as a smooth helical tape with no overlap or corrugated and longitudinally applied. If an adhesive coated tape is used the armor must bond at the overlap.

13.3. Outer Jacket

An outer PE jacket ***shall*** be extruded over the armor and meet requirements of section 11.1, Table 5, Table 4 and Section Jacket Eccentricity11.4 Jacket Eccentricity.

14. Finished Product Mechanical Tests

14.1. PE Jacket Longitudinal Shrinkage

There ***shall*** be no more than 0.375 in. (9.53 mm) shrinkage along a six-inch length of finished product. The test ***shall*** comply with [SCTE 88].

14.2. Dielectric Shrinkback

Dielectric shrink back on the conductor ***shall*** be no more than 0.250 inch (6.35 mm) from both ends. All change in length from the time the specimens are cut ***shall*** be included. Samples ***shall*** be placed in an air circulating oven for four hours at 239 ± 2 °F (115 ± 1 °C). Test ***shall*** be according to ASTM D 4565.

14.3. Dielectric Shear Adhesion

The force that is required to strip the dielectric from the center conductor in the finished product as specified in [SCTE 12] *should* meet the requirements of Table 6.

Table 6 - Foam Dielectric and Disc Adhesion to Center Conductor

Product Type	Bond Strength, Minimum Pound Force, lbf (N)
412-F	31 (138)
500-F	60 (267)
500-D	NA
540-F	68 (302)
565-F	71 (316)
625-F	80 (356)
650-D	NA
700-F	85 (378)
715-F	90 (400)
750-F	90 (400)
750-D	NA
840-F	86 (382)
860-F	86 (382)
875-F	86 (382)

F=FOAM, D=DISC and AIR

14.4. Air Leakage Test

The foam dielectric ***shall*** prohibit the flow of 5 psi of air for a minimum of 15 seconds in a 12-inch (304.80 mm) sample. Solid PE discs ***shall*** prohibit the flow of 40 psi of air for 60 seconds in a 6-inch (152.40 mm) sample. The test ***shall*** be performed in accordance with [SCTE 13].

14.5. Thermal Oxidative Stability

To ensure the desired life expectancy of the dielectric insulation, determine its Oxidative Induction Time (OIT) before and after aging by the following test method. Insulation ***shall*** be tested by measuring OIT according to [SCTE 251]. The test utilizes insulation removed from the completed cable. The test utilizes insulation removed from the completed cable and tested at 180 °C ± 0.3 C°. Care *should* be taken not to

include any adhesive or precoat on the dielectric specimen. Requirements for OIT – Initial: 20 minutes minimum, after aging: 70 percent of initial value.

14.6. Cable Static Minimum Bend

The minimum bend diameter ***shall*** be observed at all times as stated and specified by the manufacture. The test ***shall*** be performed in accordance with [SCTE 39].

14.7. Cable Static Pull Force

The maximum pulling force for coaxial cable ***shall*** be determined by a calculation based on the measurement of tensile yield strength of the finished cable or outer conductor only. The maximum pull force (pounds) for a coaxial cable was determined by reducing the measured tensile strength (pounds) by a percentage as a safety factor. This safety factor (percentage reduction from yield) was determined by the manufacturer. By implementing this safety factor, the cable and/or the outer conductor yield is at a point well below permanent deformation. Reference manufacturer catalog specifications for maximum pulling tension.

15. Finished Product Electrical Tests

15.1. Spark Test

The overall cable jacket integrity ***shall*** be subject to a spark test with a minimum 5 kV rms to ensure the absence of faults in the jacket during manufacturing.

15.2. Characteristic Impedance

The Impedance ***shall*** be 75 ± 2 ohms. The measurement method ***shall*** be performed according to [SCTE 66] or equivalent.

15.3. Conductor Resistance

The DC conductor resistance of the inner and outer conductor ***shall*** be measured per [SCTE 44] and the loop resistance calculated from the inner and outer conductor. The maximum resistance values ***shall*** comply with Table 7.

Table 7 - Maximum DC Resistance at 68 °F (20 °C), Ohms/kft (Ohms/km)

Product Type	Inner Conductor	Outer Conductor	Loop
412-F	2.17 (7.12)	0.50 (1.77)	2.67 (8.89)
500-F	1.42 (4.66)	0.37 (1.21)	1.79 (5.87)
500-D	1.09 (4.10)	0.46 (1.31)	1.55 (5.41)
540-F	1.06 (3.48)	0.60 (1.97)	1.66 (5.45)
565-F	1.01 (3.31)	0.36 (1.18)	1.37 (4.49)
625-F	0.90 (2.95)	0.25 (0.82)	1.15 (3.77)
650-D	0.66 (2.56)	0.34 (0.92)	1.00 (3.48)
700-F	0.62 (2.03)	0.26 (0.85)	0.88 (2.89)
715-F	0.61 (2.00)	0.45 (1.48)	1.06 (3.48)
750-F	0.58 (1.90)	0.19 (0.62)	0.77 (2.52)
750-D	0.47 (1.84)	0.24 (0.69)	0.71 (2.53)
840-F	0.45 (1.48)	0.18 (0.59)	0.63 (2.07)
860-F	0.41 (1.34)	0.32 (1.05)	0.73 (2.39)
875-F	0.42 (1.38)	0.13 (0.43)	0.55 (1.81)

15.4. Velocity of Propagation (VOP)

The VOP ***shall*** be nominal 87 percent for gas injected foam dielectric and 93 percent for air and disc dielectric as measured per [SCTE 49].

15.5. Structural Return Loss (SRL)

The SRL ***shall*** meet the requirements of Table 8 as measured per [SCTE 03] or equivalent.

Table 8 - Structural Return Loss (SRL)

Frequency (MHz)	Return Loss (dB)
5 - 1002	≥ 30
1002 - 1218	≥ 24
1218 - 1794	≥ 20
1794 - 2250	≥ 20
2250 - 3000	≥ 20

15.6. Attenuation

The attenuation ***shall*** be measured per [SCTE 47]or equivalent and the maximum values ***shall*** meet the requirements of the following tables.

Table 9 - Maximum Attenuation at 68 °F (20 °C), dB/100 ft. (dB/100m)

Frequency MHz	412-F	500-F	500-D	540-F	565-F
5	0.20 (0.66)	0.16 (0.52)	0.15 (0.48)	0.14 (0.46)	0.14 (0.46)
55	0.68 (2.23)	0.55 (1.80)	0.49 (1.62)	0.47 (1.54)	0.47 (1.54)
211	1.35 (4.43)	1.09 (3.58)	0.98 (3.20)	0.95 (3.12)	0.95 (3.12)
250	1.49 (4.89)	1.20 (3.94)	1.06 (3.48)	1.03 (3.38)	1.03 (3.38)
270	1.55 (5.09)	1.24 (4.06)	1.11 (3.65)	1.08 (3.54)	1.07 (3.51)
300	1.64 (5.38)	1.31 (4.30)	1.18 (3.86)	1.14 (3.74)	1.13 (3.71)
330	1.73 (5.67)	1.38 (4.53)	1.22 4.00)	1.20 (3.93)	1.19 (3.91)
350	1.78 (5.84)	1.43 (4.69)	1.27 (4.17)	1.23 (4.04)	1.23 (4.03)
400	1.91 (6.27)	1.53 (5.02)	1.35 (4.44)	1.33 (4.36)	1.32 (4.33)
450	2.05 (6.72)	1.63 (5.35)	1.44 (4.72)	1.41 (4.63)	1.40 (4.59)
500	2.16 (7.08)	1.73 (5.67)	1.52 (5.00)	1.50 (4.92)	1.49 (4.89)
550	2.26 (7.41)	1.82 (5.97)	1. 60 (524)	1.58 (5.18)	1.56 (5.12)
600	2.37 (7.76)	1.92 (6.30)	1.68 (5.51)	1.66 (5.44)	1.64 (5.38)
750	2.68 (8.79)	2.17 (7.12)	1.88 (6.17)	1.86 (6.10)	1.85 (6.07)
870	2.91 (9.54)	2.35 (7.69)	2.00 (6.56)	2.00 (6.56)	2.01 (6.59
1002	3.13 (10.27)	2.54 (8.32)	2.20 (7.19)	2.17 (7.12)	2.17 (7.12)
1218	NA	2.83 (9.28)	2.45 (7.98)	2.41 (7.89)	2.42 (7.94)
1500	NA	3.26 (10.68)	2.75 (9.01)	2.76 (9.07)	2.72 (8.92)
1794	NA	3.62 (11.88)	3.03 (9.96)	3.08 (10.11)	3.01 (9.87)
1800	NA	3.63 (11.91)	3.07 (9.97	3.09 (10.13)	3.01 (9.89)
2000	NA	3.87 (12.68)	3.22 (10.58	3.29 (10.81)	3.20 (10.50)
2200	NA	4.10 (13.44)	3.40 (9.97)	3.49 (11.46)	3.38 (11.09)
2500	NA	4.43 (14.52)	3.66 (12.00)	3.78 (12.41)	3.64 (11.93)
2700	NA	4.64 (15.22)	3.82 (12.54)	3.97 (13.03)	3.80 (12.48)
3000	NA	4.95 (16.25)	4.06 (13.32	4.24 (13.93)	4.04 (13.26)

F=FOAM, D=DISC and AIR

Table 10 - Maximum Attenuation at 68 °F (20 °C), dB/100 ft. (dB/100 m)

Frequency MHz	625-F	650-D	700-F	715-F	750-F	750-D
5	0.13 (0.43)	0.12 (0.38)	0.11 (0.36)	0.11 (0.36)	0.11 (0.36)	0.11 (0.34)
55	0.46 (1.51)	0.39 (1.27)	0.37 (1.21)	0.36 (1.18)	0.37 (1.21)	0.36 (1.17)
211	0.92 (3.02)	0.78 (2.55)	0.75 (2.46)	0.74 (2.43)	0.74 (2.43)	0.68 (2.24)
250	1.00 (3.28)	0.85 (2.79)	0.82 (2.69)	0.81 (2.66)	0.81 (2.66)	0.75 (2.45)
270	1.04 (3.41)	0.88 (2.89)	0.85 (2.79)	0.84 (2.76)	0.85 (2.79)	0.77 (2.53)
300	1.08 (3.54)	0.93 (3.07)	0.90 (2.95)	0.89 (2.92)	0.90 (2.95)	0.81 (2.65)
330	1.16 (3.80)	0.98 (3.20)	0.95 (3.12)	0.95 (3.12)	0.95 (3.12)	0.87 (2.84)
350	1.19 (3.90)	1.02 (3.34)	0.98 (3.21)	0.97 (3.18)	0.97 (3.18)	0.88 (2.89)
400	1.28 (4.20)	1.09 (3.58)	1.05 (3.44)	1.05 (3.44)	1.05 (3.44)	0.94 (3.08)
450	1.35 (4.43)	1.17 (3.82)	1.12 (3.67)	1.12 (3.67)	1.12 (3.67)	1.00 (3.27)
500	1.43 (4.69)	1.23 (4.03)	1.19 (3.90)	1.19 (3.90)	1.19 (3.90)	1.06 (3.48)
550	1.51 (4.95)	1.29 (4.24)	1.25 (4.10)	1.25 (4.10)	1.25 (4.10)	1.11 (3.65)
600	1.58 (5.18)	1.38 (4.51)	1.32 (4.33)	1.31 (4.30)	1.33 (4.36)	1.16 (3.79)
750	1.79 (5.87)	1.54 (5.06)	1.49 (4.89)	1.49 (4.89)	1.52 (5.02)	1.29 (4.24)
870	1.95 (6.40)	1.67 (5.49)	1.62 (5.31)	1.64 (5.38)	1.65 (5.41)	1.39 (4.54)
1002	2.11 (6.92)	1.81 (5.95)	1.76 (5.77)	1.75 (5.76)	1.74 (5.72)	1.51 (4.95)
1218	2.32 (7.62)	2.02 (6.69)	1.96 (6.43)	1.96 (6.43)	1.95 (6.41)	1.68 (5.51)
1500	2.66 (8.74)	2.28 (7.47)	2.20 (7.21)	2.27 (7.44)	2.23 (7.30)	1.89 (6.19)
1794	2.96 (9.70	2.52 (8.28)	2.43 (7.98)	2.53 (8.30)	2.46 (8.07)	2.08 (6.84)
1800	2.96 (9.72	2.53 (8.29)	2.44 (8.00)	2.54 (8.32)	2.46 (8.08)	2.09 (6.85)
2000	3.15 (10.34)	2.69 (8.82)	2.59 (8.50)	2.71 (8.88)	2.61 (8.57)	2.22 (7.67)
2200	3.34 (10.95)	2.84 (9.32)	2.74 (8.98)	2.87 (9.42)	2.76 (9.05)	2.46 (8.06)
2500	3.60 (11.81)	3.06 (10.25)	2.95 (9.67)	3.11 (10.21)	2.96 (9.73)	2.51 (8.25)
2700	3.77 (12.37)	3.21 (10.52)	3.08 (10.11)	3.27 (10.72)	3.10 (10.16)	2.63 (8.62)
3000	4.02 (13.19)	3.41 (11.20)	3.28 (10.76)	3.49 (11.46)	3.29 (10.80)	2.79 (9.16)

F=FOAM, D=DISC and AIR

Table 11 - Maximum Attenuation at 68 °F (20 °C), dB/100 ft. (dB/100 m)

Frequency MHz	840-F	860-F	875-F
5	0.09 (0.30)	0.09 (0.30)	0.09 (0.30)
55	0.32 (1.04)	0.32 (1.05)	0.33 (1.08)
211	0.64 (2.10)	0.64 (2.10)	0.66 (2.17)
250	0.70 (2.30)	0.70 (2.30)	0.72 (2.36)
270	0.73 (2.40)	0.72 (2.36)	0.75 (2.46)
300	0.77 (2.53)	0.76 (2.49)	0.79 (2.59)
330	0.82 (2.69)	0.80 (2.62)	0.83 (2.72)
350	0.84 (2.76)	0.83 (2.72)	0.85 (2.79)
400	0.91 (2.99)	0.88 (2.89)	0.91 (2.99)
450	0.97 (3.18)	0.95 (3.12)	0.98 (3.22)
500	1.03 (3.38)	1.00 (3.28)	1.03 (3.38)
550	1.09 (3.58)	1.06 (3.48)	1.09 (3.58)
600	1.15 (3.77)	1.10 (3.61)	1.15 (3.77)
750	1.30 (4.27)	1.24 (4.07)	1.30 (4.26)
870	1.41 (4.62)	1.33 (4.36)	1.41 (4.63)
1000	1.53 (5.02)	1.44 (4.72)	1.53 (5.02)
1002	1.54 (5.05)	1.45 (4.75)	1.53 (5.02)
1218	1.73 (5.68)	1.61 (5.28)	1.70 (5.57)
1500	1.95 (6.39)	1.87 (6.12)	1.95 (6.39)
1794	2.17 (7.13)	2.09 (6.86)	2.17 (7.13)
1800	2.18 (7.14)	2.10 (6.87)	2.18 (7.14)
2000	2.32 (7.62)	2.24 (7.36)	2.32 (7.62)
2200	2.46 (8.09)	2.39 (7.83)	2.46 (8.09)
2500	2.67 (8.76)	2.59 (8.51)	2.67 (8.76)
2700	2.80 (9.19)	2.73 (8.96)	2.80 (9.19)
3000	3.00 (9.83)	2.93 (9.61)	3.00 (9.83)

F=FOAM, D=DISC and AIR