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Interface Practices Subcommittee

AMERICAN NATIONAL STANDARD

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Test Method for Coaxial Cable Attenuation

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Document Types and Tags

Document Type: Specification

Document Tags:

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| <input checked="" type="checkbox"/> Test or Measurement | <input type="checkbox"/> Checklist | <input type="checkbox"/> Facility |
| <input type="checkbox"/> Architecture or Framework | <input type="checkbox"/> Metric | <input type="checkbox"/> Access Network |
| <input type="checkbox"/> Procedure, Process or Method | <input type="checkbox"/> Cloud | <input type="checkbox"/> Customer Premises |

Document Release History

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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 test procedure applies to coaxial cables. Currently there are many sizes and designs of coax available. This document will cover how to measure the attenuation or insertion loss.

1.2. Scope

The purpose of this standard is to provide a measurement technique for determining attenuation of coaxial cable at various selected frequencies.

1.3. Benefits

This standard defines a consistent method to measure attenuation of coaxial cable.

1.4. Intended Audience

The intended audiences are mainly manufactures. System operators could use this document as a reference to their products and capabilities.

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

None.

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 15] ANSI/SCTE 15 2022, Specification for Trunk, Feeder and Distribution Coaxial Cable

[SCTE 71] ANSI/SCTE 71 2018, Specification for Series 15, Braided, 75 Ω , Coaxial, Multi-Purpose Cable

[SCTE 74] ANSI/SCTE 74 2011, Specification for Braided 75 Ohm Flexible RF Coaxial Drop Cable

2.2. Standards from Other Organizations

No normative references are applicable.

2.3. Published Materials

No normative references are applicable.

3. Informative References

3.1. SCTE References

No informative references are applicable.

3.2. Standards from Other Organizations

No informative references are applicable.

3.3. Published Materials

No informative references are applicable.

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5. Abbreviations and Definitions

5.1. Abbreviations

VNA	vector network analyzer
CUT	cable under test
CW	continuous wave
dB	decibel
HFC	hybrid fiber-coax
Hz	hertz
SCTE	Society of Cable Telecommunications Engineers

5.2. Definitions

Attenuation	Attenuation or insertion loss is a decrease in the power of a signal or signals, usually measured in decibels. As radio frequency (RF) signals pass through coaxial cable, connectors, attenuators (pads), etc. RF signals experience attenuation. The attenuation through coaxial cable is much greater at higher frequencies than it is at lower frequencies.
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6. Required Equipment

- **VNA Network Analyzer:** 75 ohm or 50 ohm network analyzer having 1601 or greater points. Minimum loss matching pads *may* be used when necessary. The VNA *should* have sufficient dynamic range to have a noise floor at least 10 dB below the measured values.
- **Network analyzer calibration kit:** Appropriate for the connector type being used. Standard F-type or N-type calibration kits *shall* be specified to 3 GHz.
- **Environmental chamber or room** capable of maintaining 68°F (20°C) and large enough to accommodate cable sample to be tested.
- **Thermometer** consisting of a digital multimeter and thermal probe or any device capable of accurately measuring the temperature inside the environmental chamber.
- **Cable preparation** and connector installation tools as required.
- **Drop Cable Test:** Proper “F” connector for size drop cable or the appropriate size laboratory connector.
- **Hardline Cable Test:** Push-on type test connectors cable to “N” for the proper size of hardline cable or the appropriate size field connector with pin to N-type adapters.

7. Test Sample Preparation

- Prepare known lengths of cable. Samples *should* exhibit at least 0.5 dB loss at the lowest frequency tested.
- Cut the ends of the cable and prepare them to accept the appropriate connector.
- Install test connectors on the cable sample per the manufacturer’s recommendations.
- Cable under test (CUT) samples *may* be placed in an environmental chamber set to 68°F (20°C) and allow the test samples to stabilize at that ambient temperature. A minimum of 4 hours is recommended but time *may* be adjusted depending on the mass and initial temperature of the CUT.

8. Test Procedure

1. Prior to calibration and testing, allow the network analyzer to warm up as described in the operations manual.
2. Incorporate the desired frequency points in question to be measured within the analyzers register.
3. Set List Frequency to “Stepped” to utilize stepped list mode.

Note: When using “Stepped” all the listed frequency points are sorted as continuous wave (CW) points in ascending order. The network analyzer measures each point and builds a single trace from the composite of all data. With the stepped CW sweep the sweep time is slower than when using a continuous sweep for the same number of points.

4. Attach test leads to the two ports of the analyzer.
5. Connect the test leads together using an adaptor from the appropriate calibration kit.
6. Select Calibration menu on analyzer and perform a “Thru” calibration.

Note: If minimum loss matching pads are required, they *should* be part of the transmission path during calibration setup. If the matching pads are not included in the calibration, then the attenuation they contribute *shall* be measured separately and subtracted from the overall attenuation of the cable + minimum loss pad combination on a point-by-point basis.

7. Connect the cable ends to the test leads or test ports from the network analyzer (see Figure 1).and allow at least one full sweep across the entire frequency range.

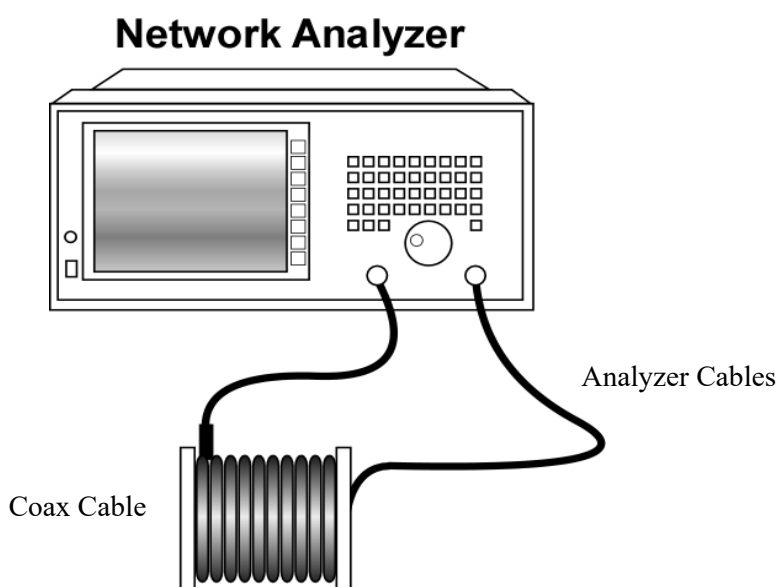


Figure 1 – Network Analyzer Attenuation Test Setup

8. Record signal loss at each frequency listed in the register or run an automated program to store the results. An example report is shown in Figure 2.

Inspection Report Form

Cable Type:		Sample Number:
Date:		
FREQUENCY MHz	ATTENUATION dB/100 ft.	ATTENUATION (dB/100m)

Figure 2 – Example of Coaxial Cable Attenuation Inspection Report Form