SCTE · ISBE

STANDARDS

Interface Practices Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 93 2020

Test Method For Connector/Cable Twist

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1. Introduction

1.1. Executive Summary

This document provides procedures for evaluation of 2 and 3-piece pin type connectors. While this method can determine the relative degree of twisting imparted to a given cable by the connector under test (CUT), it does not take into consideration those factors that tend to influence cable twist during field installation. Results obtained using this procedure should not be construed to imply that cable twisting would occur similarly in the field. Some of those mitigating factors are:

- Connector design
- Connector/cable alignment
- Cable construction variations
- Cable size
- Plant architecture- aerial or underground.
- Cable lashing tension
- Cable clamping hardware

1.2. Scope

This document details the equipment and procedures required to measure the relative degree of twisting imparted to a coaxial cables when installed into mainline plug connectors specifically.

Trunk and distribution cables meeting ANSI/SCTE 15 2019 and connectors meeting ANSI/SCTE 92 2017 are addressed.

1.3. Benefits

This test procedure provides a common method that can be used by both manufacturers and end users to test the connector to cable interface. Without such a common test procedure, the testing used to measure can vary and lead to added uncertainty.

1.4. Intended Audience

Manufacturers, test laboratories, and end-users.

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

- No normative references are applicable.

2.2. Standards from Other Organizations

- No normative references are applicable.

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

- ANSI/SCTE 15 2019: Specification for Trunk, Feeder and Distribution Coaxial Cable
- ANSI/SCTE 92 2017: Specification for 5/8-24 Plug (Male), Trunk and Distribution Connectors

3.2. Standards from Other Organizations

- No informative references are applicable.

3.3. Published Materials

- No informative references are applicable.

4. Compliance Notation

shall	This word or the adjective "***required***" means that the item is an absolute requirement of this document.
shall not	This phrase means that the item is an absolute prohibition of this document.
forbidden	This word means the value specified shall never be used.
should	This word or the adjective "*recommended*" means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighted before choosing a different course.
should not	This phrase means that there may exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
may	This word or the adjective "*optional*" means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same item.
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 and Definitions

5.1. Abbreviations

lb-in	pound inch
lb-ft	pound foot
CUT	connector under test
KS	5/8 male interface
°C	degree celsius
°F	degree fahrenheit
ISBE	International Society of Broadband Experts
SCTE	Society of Cable Telecommunications Engineers

5.2. Definitions

- None

6. Fixtures And Tools

6.1. A vise or other holding fixture capable of securing the body subassembly of the CUT in a horizontal orientation. The body subassembly is that section of the connector including the pin and male 5/8-24 threads.

6.2. A vise or other holding fixture capable of securing the cable at the end of the test sample opposite the CUT.

6.3. Hand tools recommended by connector manufacturer for cable preparation and connector installation.

6.4. Torque wrench(es) or other torque device(s) capable of the following:

6.4.1. Pre-torquing main nut and/or back nut subassemblies to 18-22 lb-ins. Example: Utica click type torque sensing adjustable wrench, 10-50 lb-ins., Part #CHA6

6.4.2. Torquing main nut and/or back nut subassemblies to meet the connector manufacturer's tightening torque or other tightening conditions as specified. Example: Utica click type torque sensing adjustable wrench, 15-75 lb-ft, Part #CH75F

Crow's foot wrenches can be used for this operation. If a ratchet or dial type wrench with a 90 degree square drive is used, be sure to install the crows foot wrench head at 90 degrees to the axis of the torque wrench to ensure proper readings.

6.5. Twist indicator- this accessory can be made from commonly available materials or items that can be readily purchased in most hardware stores. In its simplest configuration it is a "pointer" and a "degree wheel". Figure 1 of Paragraph 10 is a drawing of a typical test setup.

6.5.1. The pointer should be a flexible wire-type construction capable of being rigidly affixed to the body (the section of the connector containing the male KS port) of the connector under test. Figures 2a, 2b, 2c, and 2d of Paragraph 10 are photos of a typical pointer and KS retaining nut and show their position on the KS male port of a connector body.

6.5.2. The degree wheel is a circular configuration, typically 6-12 inches in diameter, capable of being rigidly affixed to the cable under test. The wheel should be marked in 1-degree increments. Figures 3a and 3b of Paragraph 10 are photos of a typical degree wheel. Alternatively, a degree wheel can be obtained from the following source:

Oregon Rule Company

1610 Red Soils Ct, Suite C

Oregon City, OR. 97045

(ph) 503-657-8330 www.oregonruleco.com

Part # 8GD-W360CW

7. Sample Preparation

7.1. 5 connector samples shall be tested unless specified otherwise.

7.2. Prepare one cable sample for each connector sample to be tested.

7.3. The overall length of the cable sample shall be 48" ± 1".

7.4. Prepare one end of each cable sample in accordance with the connector manufacturer's instructions.

7.5. All cable sections and respective connector assemblies should be marked for purposes of identification.

8. Test Procedure

8.1. Conditioning

8.1.1. Unless stated otherwise by the specifying authority, no conditioning is required.

8.2. Environmental Conditions

8.2.1. Unless stated otherwise by the specifying authority, testing is to be conducted at a room ambient temperature of 20-26 ºC (68-79 ºF)

8.3. Cable Twist Procedure for 2-Piece Connector Assemblies. Refer to Figure 1.

8.3.1. Install the pointer assembly onto the KS male port of the CUT. Refer to *Figure 4*.

8.3.2. Firmly secure the body subassembly of the CUT in the vise or holding fixture. Refer to Figure 5

8.3.3. Slide the degree wheel onto the prepared end of the cable. It is not necessary to firmly affix the degree wheel to the cable at this time.

8.3.4. Install the back nut subassembly onto the prepared cable end.

8.3.5. Loosely thread the back nut/cable combination onto the body subassembly.

8.3.6. While holding the cable in position with one hand, "pre-torque" the back nut subassembly to 18-20 lb-ins. This part of the procedure simulates the hand tightening performed in normal field installations to retain the cable prior to final tightening.

8.3.7. Affix the degree wheel securely to the cable. The wheel should be as close as possible to the back nut subassembly without interfering with the final connector tightening operation. Refer to Figure 8.

8.3.8. Position the pointer in close proximity to the degree wheel and note the pointer starting position on the wheel. This position is the "zero" degree or starting position from which subsequent cable rotation will be referenced.

8.3.9. Secure the far end of the cable. (Opposite the CUT)

8.3.10. Using a torque wrench or other tool as recommended, tighten the connector back nut subassembly as detailed by the connector manufacturer's instructions. Refer to Figure 9.

8.3.11. Note the amount of cable twist on the data sheet provided.

8.4. Test Procedure for 3-Piece Connector Assemblies. Refer to Figure 1.

8.4.1. Install the pointer onto the KS male port of the CUT.

8.4.2. Firmly secure the body subassembly of the CUT in the vise or holding fixture.

8.4.3. Slide the degree wheel onto the prepared end of the cable. It is not necessary to firmly affix the degree wheel to the cable at this time.

8.4.4. Loosely install the back nut and main nut subassemblies onto the prepared cable end.

8.4.5. Loosely thread the main nut onto the body subassembly.

8.4.6. While holding the cable in position with one hand torque the main nut subassembly to 18-22 lb-ins. This part of the procedure simulates the hand tightening performed in normal field installations to retaining the cable prior to final tightening using 2 wrenches. Do not yet thread the back nut onto the main nut!

8.4.7. Affix the degree wheel securely to the cable. The wheel should be as close as possible to the back nut subassembly without interfering with the final connector tightening operation.

8.4.8. Position the pointer in close proximity to the degree wheel and note the pointer starting position on the wheel. This position is the "zero" degree or starting position from which subsequent cable rotation will be referenced.

8.4.9. Using a torque wrench or other tool as recommended, tighten the connector main nut subassembly as detailed by the connector manufacturer's instructions.

8.4.10. Note the amount of cable rotation on the data sheet provided. Reference Figure 8.

8.4.11. Thread the back nut subassembly onto the main nut by hand. Using two wrenches or other tools as recommended, tighten the connector back nut subassembly as detailed by the connector manufacturer's instructions. Note: Do not allow the main nut to rotate! If main nut rotation is a problem during this step, special fixturing may be needed. Another option would be to secure the main nut into a holding fixturing, and then completing the installation and rotation measurement of the back nut.

8.4.12. Note the total amount of cable rotation on the data sheet provided. Refer to Figure 8.

9. Documentation

9.1. Note the following information on the data sheet provided.

9.1.1. Date of test.

9.1.2. Name of technician performing test.

9.1.3. Catalog number of connector under test (where applicable).

9.1.4. Cable manufacturer and part or catalog number.

9.1.5. Sample ID numbers.

9.1.6. Measured cable twist in degrees.

9.1.7. Equipment used including Model No., Serial No., and calibration due date.

9.1.8. Note any special assembly conditions or recommended torque.

9.1.9. Provide copy of connector manufacturer's instructions if available.

10. Table 1- Data Sheet

CABLE TWIST DURING CONNECTOR INSTALLATION		
Date:	**Technician:**	
Connector Mfr:	**Cat #:**	**Mfr's Recommended Torque:**
Cable Mfr:	**Cat #:**	
Special Conditions:		
Equipment:		

Sample #	**Twist, Degs.**	**Comments**
1		
2		
3		
4		
5		

11. Drawings And Photos

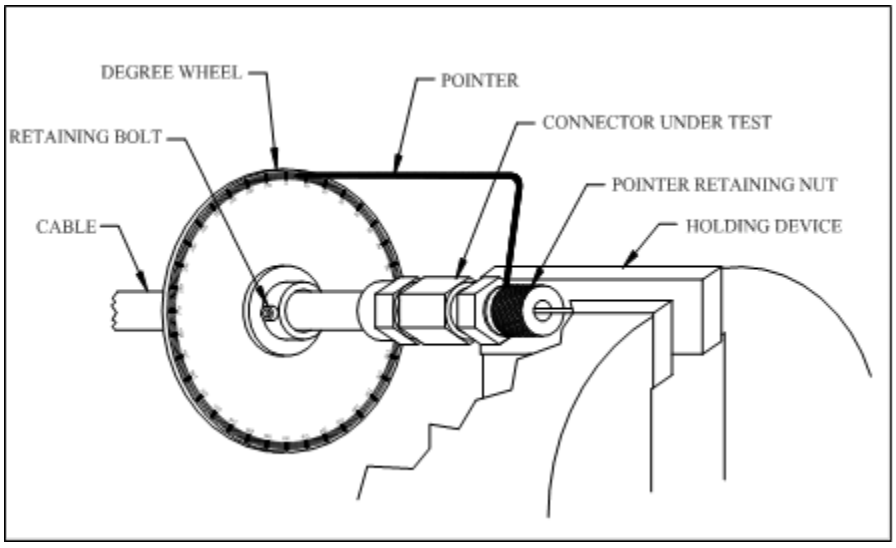

Figure 1 - Typical Test Setup

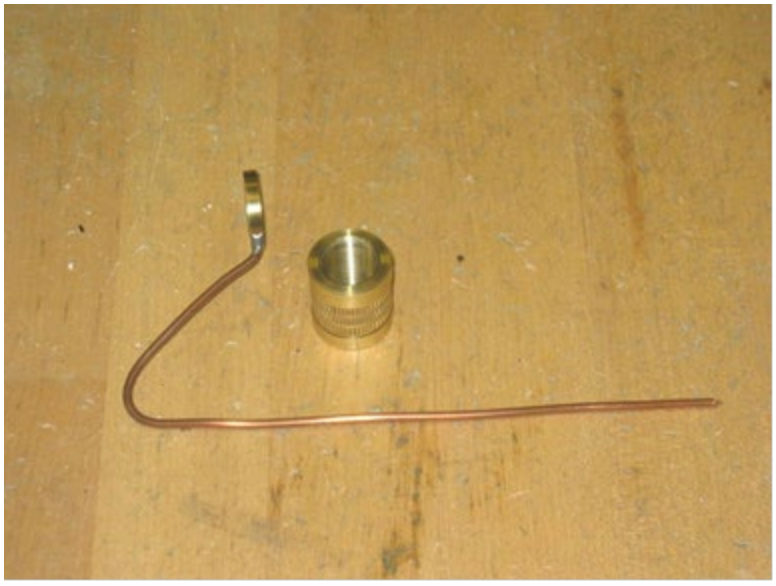

Figure 2 - Pointer and Retaining Nut

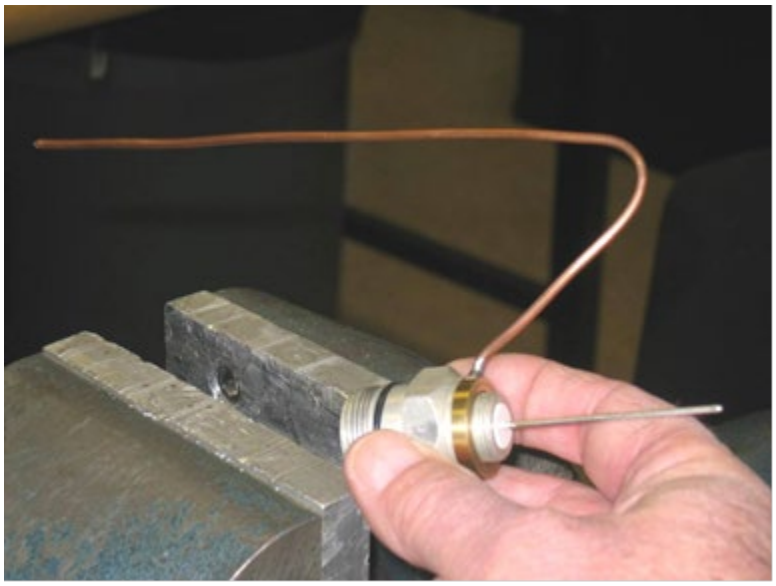

Figure 3 - Pointer on KS Port Of Connector Body

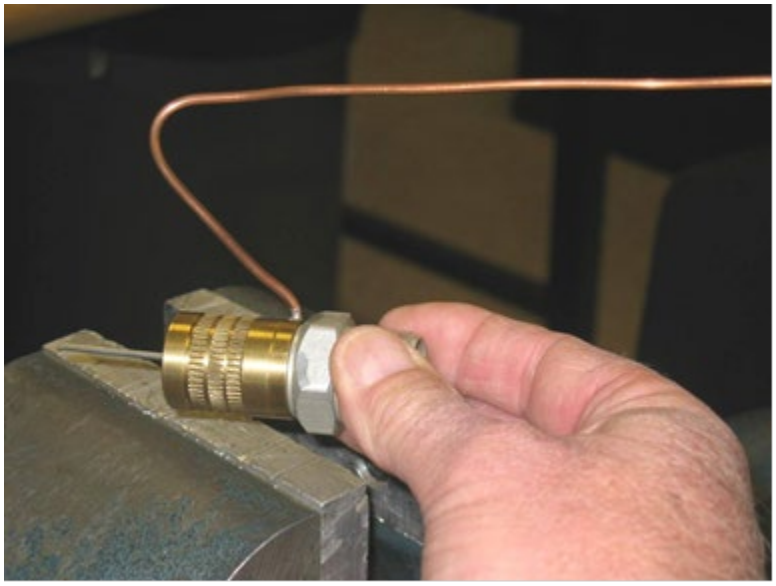

Figure 4 - Pointer and Retaining Nut On KS Port Of Connector Body

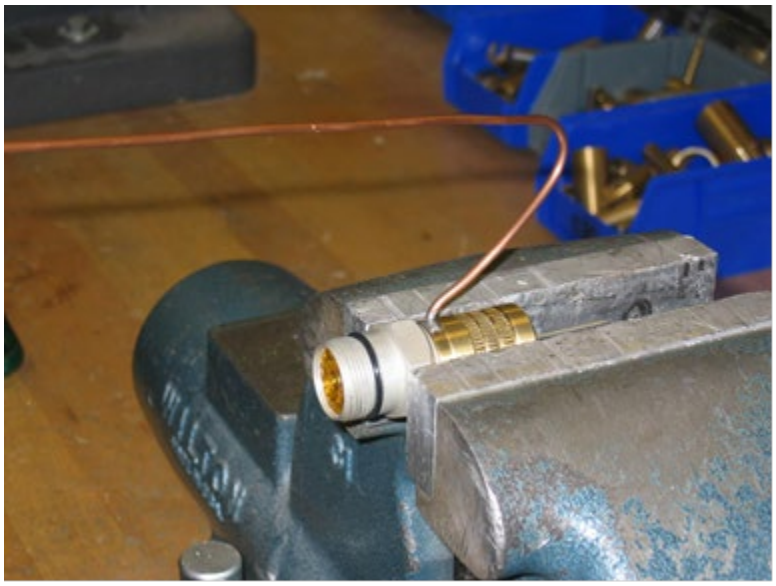

Figure 5 - Connector Body With Pointer And Retaining Nut In Vice

Figure 6 - Rear View Of Degree Wheel And Related Parts

Note the “slide-in” cable bushing sized to fit cable O.D.

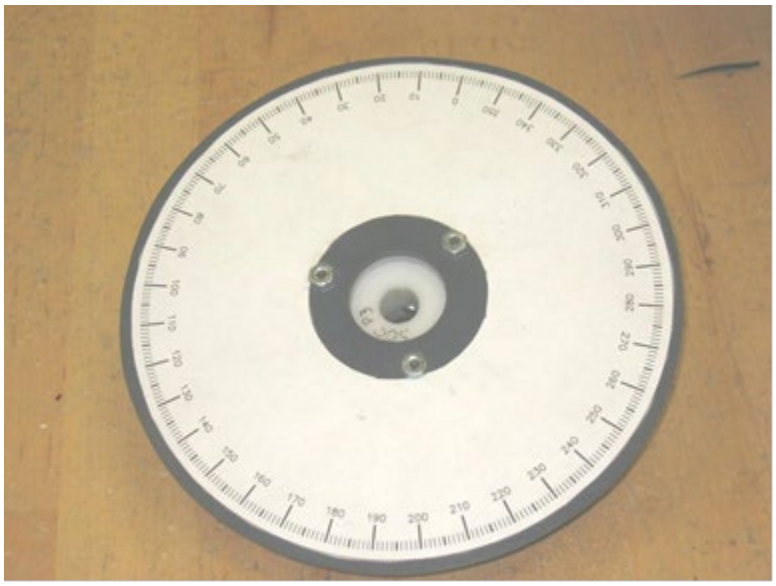

Figure 7 - Front View Of Degree Wheel

With cable bushing inserted

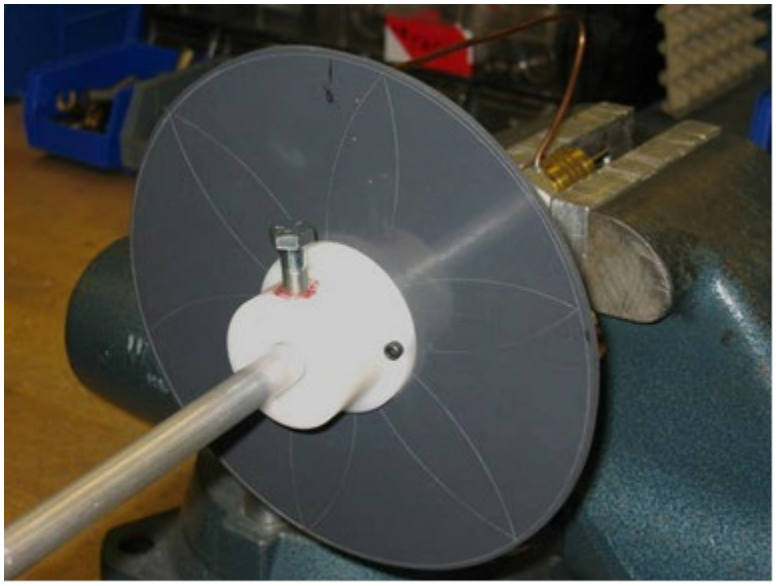

Figure 8 - Rear View Of Degree Wheel Attached To Cable

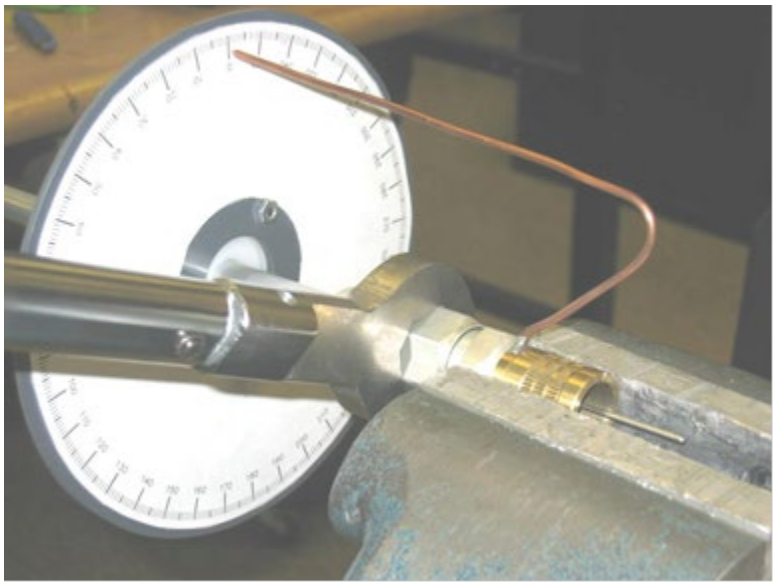

Figure 9 - Torque Connector Back Nut And Note Rotation