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EIA STANDARD

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Cable Flexing Test Procedure for Electrical Connectors

EIA-364-41C

(Revision of EIA-364-41B)

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ELECTRONIC INDUSTRIES ALLIANCE

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(From Standards Proposal No. 4142, formulated under the cognizance of the CE-2.0 National Connector Standards Committee.)

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CONTENTS

Clause		Page
1	Introduction	1
1.1	Scope	1
1.2	Potential failure modes	1
2	Test resources	1
2.1	Equipment	1
3	Test specimen	2
3.1	Description	2
3.2	Preparation	2
4	Test procedure	3
4.1	Test condition I, circular jacket cable	3
4.2	Test condition II, flat cable	3
4.3	Final measurement	4
5	Details to be specified	4
6	Test documentation	5

Table

1	Test voltage at sea level	5

Figure

1	Circular cable flexing test setup	6
2	Flat cable flexing methods	7

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TEST PROCEDURE No. 41C

CABLE FLEXING TEST PROCEDURE FOR ELECTRICAL CONNECTORS

(From EIA Standards Proposal No. 4142, formulated under the cognizance EIA CE-2.0 Committee on National Connector Standards, and previously published in EIA-364-41B.)

1 Introduction

1.1 Scope

This standard establishes a method to determine the effectiveness of circular jacketed cable to plug seal, or flat cable to plug seal or interface to withstand strain under repeated alternating cable-flexing stresses as experienced in use with cable strain-relief design electrical connectors.

1.2 Potential failure modes

1.2.1 Damage to the cable to plug seal (including molded boots and strain reliefs) or cable jacket that could allow undesired substances (air, water, etc.) to enter, and to further deteriorate the seal or jacket, ultimately impairing the effectiveness of either or both.

1.2.2 Weakening or destruction of conductor to contact joint(s) resulting in improper or defective electrical performance.

1.2.3 Intermittent or complete shorting between conductors during and after test.

1.2.4 Evidence of discontinuity between conductors during and after test.

2 Test resources

2.1 Equipment

2.1.1 Test condition I, circular jacket cable

2.1.1.1 Apparatus cable of applying forces to a molded plug assembly, so as to cause such assembly to be flexed in a plane, through 180° arc, alternately from a position 90° from the vertical on one side to a position 90° from the vertical on the other side, at an adjustable frequency that includes a frequency of 12 to 14 complete cycles (of 360° total traverse) per minute; see figure 1.

2.1.1.2 Roller (or rolls): Two smooth, cylindrical, equal-diameter steel, fixed position. Diameter of the rollers shall be approximately but not less than 2-1/2 times the maximum diameter of the cable for diameters less than 20 mm (0.8 in) or as specified in the referencing document.

2.1.1.3 Equipment for checking the electrical continuity of the conductor-to-contact joints, prior to, during, and subsequent to testing.

2.1.1.4 Equipment, such as magnifiers (approximately 3X) for examining cable-to-plug seal or cable jacket prior to and subsequent to testing.

2.1.2 Test condition II, flat cable

2.1.2.1 A fixture capable of gripping the cable 305 mm (12 in) from the connector with uniform tension of 350 N/m ± 20 N/m (2.0 lb/in ± 0.1 lb/in) of cable width and capable of moving either the cable or connector through an arc of 140° ± 10°; see figure 2, method 2.

2.1.2.2 Equipment capable of monitoring current of 100 mA and to indicate a discontinuity of 1 microsecond or longer interruption of current flow.

3 Test specimen

3.1 Description

The test specimen shall consist of a cable terminated to a plug or receptacle.

3.2 Preparation

3.2.1 Test condition I, circular jacket cable

The test specimen shall be mounted as show in figure 1 with the following conditions:

3.2.1.1 Its cable is loosely but almost tangentially situated between the two rollers that are spaced farther apart than the maximum diameter of the cable, see 2.1.1.2.

3.2.1.2 The bonded joint at the junction of the molded boot and the cable jacket shall be located approximately at 45° above the center line through the two rolls as shown in figure 1, in the case in that there is no cable clamp within the molded boot. If the molded boot contains a cable clamp, the dimension X (see figure 1) in the referencing document shall be used to determine the position of the bonded joint (at the junction of the molded boot and the cable jacket). This is necessary to prevent damage to the internal clamp during flexing over the rollers.

3.2.1.3 The non-free section of the cable shall be clamped by a fixed cable holding fixture capable of applying uniform radial pressure to the cable core, so that slippage is minimized. Care should also be exercised that clamping pressure is not excessive.

3.2.2 Test condition II, flat cable

The test specimen shall be mounted as shown in figure 2.

3.2.2.1 The assembled wired connector shall be installed in the fixture described in 2.1.2.1.

3.2.2.2 Connector mounting and cable tension fixture shall be clamped so slippage is minimal.. Care shall be taken that applied clamping pressure is not so great as to damage connector or cable.

4 Test procedure

4.1 Test condition I, circular jacket cable

4.1.1 Check the electrical continuity of the conductor to contact joints.

4.1.2 With the test specimen mounted as in 3.2.1 and figure 1, forces are applied so as to cause the molded boot to be repeatedly flexed 180° in opposite directions in the plane, over the rollers. A traverse of 180° in one direction plus 180° in the opposite direction shall be called one cycle. Unless otherwise specified, the cycling rate shall be 12 to 14 cycles per minute.

4.1.3 At the completion of 100 cycles, examination of seal, jacket and cable holding fixture shall be made to determine the presence or absence of failure modes; see 1.2.1. Electrical continuity shall then be checked to determine presence or absence of failure mode; see 1.2.2 through 1.2.4.

4.1.4 The cable holding fixture shall then be sufficiently loosened to allow rotation of the cable 90°, and retightened as in 3.2.1.3. Repeat the procedures of 4.1.2 and 4.1.3.

4.2 Test condition II, flat cable

4.2.1 With test specimen mounted as in 3.3.2 each cable shall be individually loaded with specified weight.

4.2.2 The cable or the connector shall be moved through an arc of 140° ± 10° for 500 cycles using either method 1 or 2 of figure 2.

4.2.3 One complete cycle shall consist of the rotation of the cable or connector from the neutral position to 70° ± 5° in both directions. Unless otherwise specified, the cycling rate shall be 10 ± 1 cycles per minute.

4.2.4 A monitoring current of 100 mA maximum shall be applied through the conductor of the test cables and the contracts of the connector in series. Either a dummy plug or receptacle or the actual test counterpart connector may be mated to the connector under test to facilitate making the series circuit.

4.3 Final measurement

4.3.1 Visual

The specimens shall be visually inspected for the failure modes indicated in 1.2.

4.3.2 Electrical

Electrical continuity, insulation resistance and dielectric withstanding voltage shall be measured.

5 Details to be specified

The following details shall be specified in the referencing document:

5.1 Dimension “X” in figure 1

5.2 Roller diameter for cables larger than 20 mm (0.8 in)

5.3 Test procedure, condition and method, as applicable

5.4 Total cycles, if other than specified herein

5.5 Cable to be used

5.6 Dielectric withstanding voltage

5.7 Insulation resistance

5.8 Allowable electrical discontinuity

5.9 Cycling rate, if other than specified herein

5.10 Special environmental conditions

5.11 Cable to be used

5.12 Magnitude and nature of test voltage, if other than specified in table 1

Table 1 - Test voltage at sea level

Contact center spacing	Voltage at 60 cycles rms
1.27 mm (0.050 in)	800
1.90 mm (0.075 in)	1,500
2.54 mm (0.100 in)	2,000

6 Test documentation

Documentation shall contain the details specified in clause 5, with any exceptions, and the following:

6.1 Title of test

6.2 Specimen description including fixturing

6.3 Test equipment used, and date of last and next calibration

6.4 Test procedure

6.5 Values and observations

6.5.1 Test conditions and environments

6.5.2 Electrical continuity checks

6.6 Name of operator and date of test

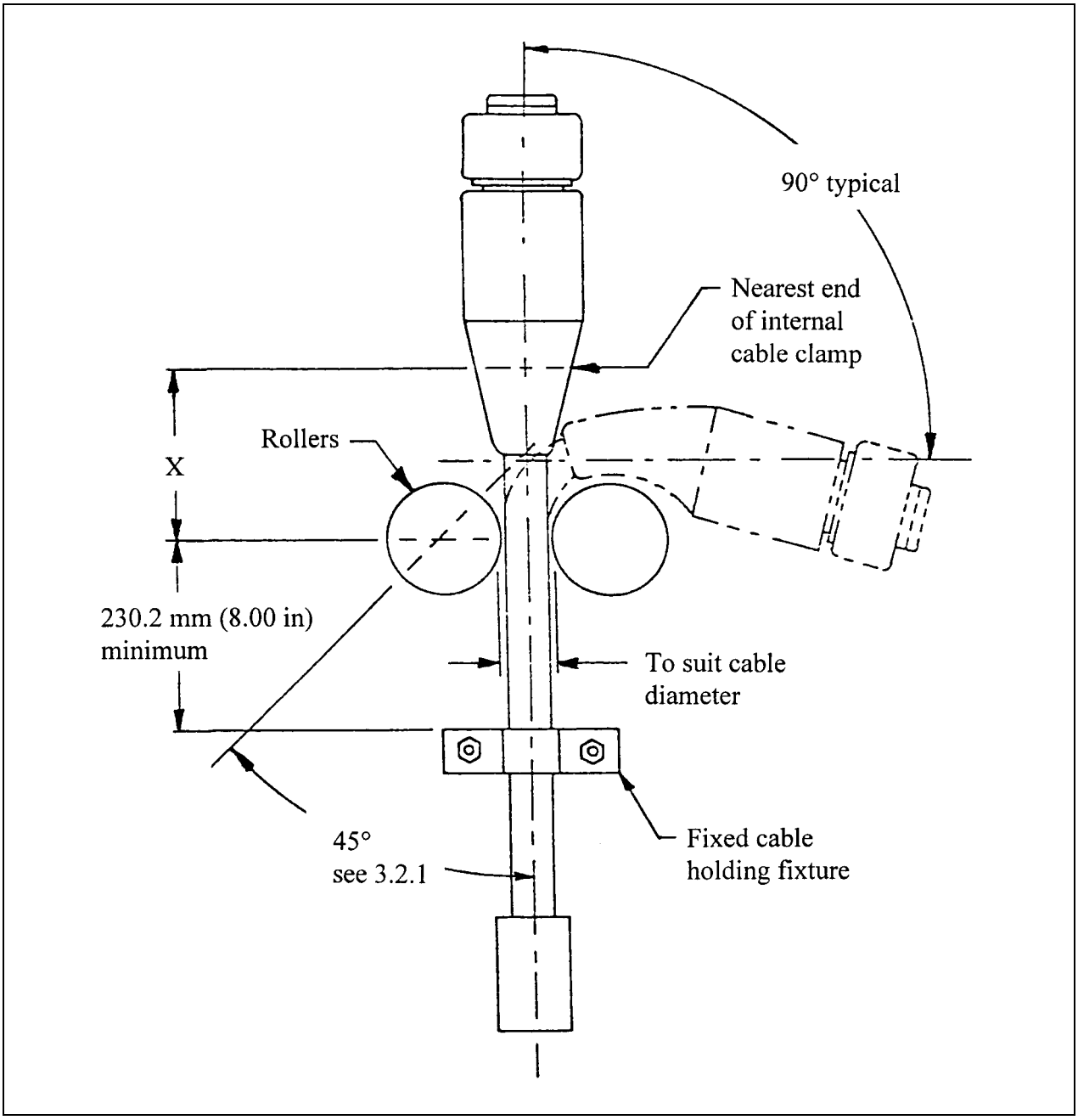
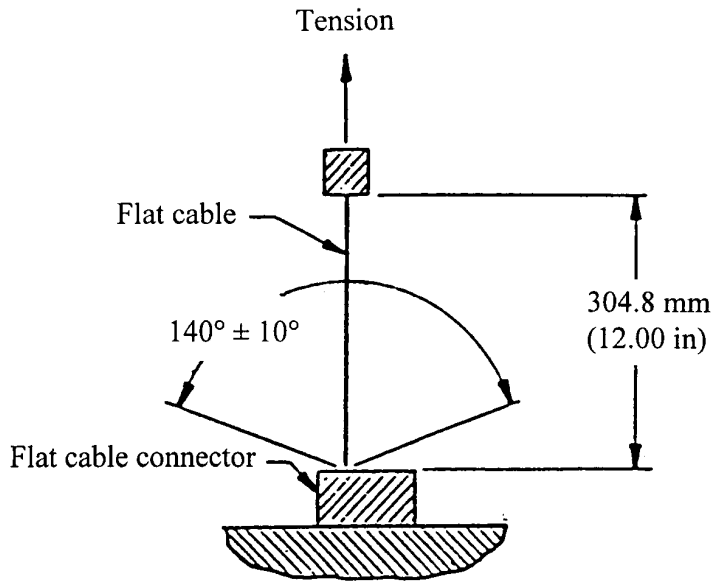
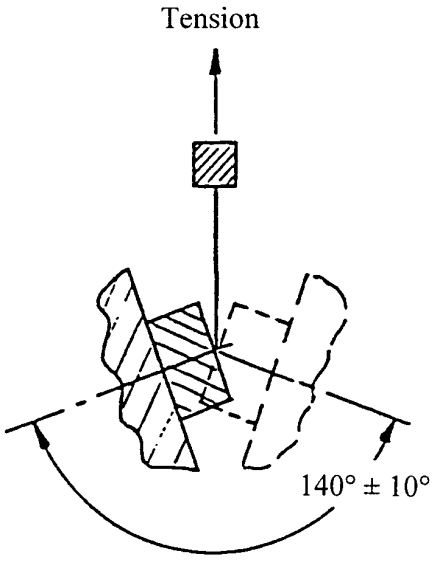


Figure 1 - Circular cable flexing test setup



Method 1



Method 2

Figure 2 - Flat cable flexing methods

EIA Document Improvement Proposal

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