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Test Method for Static Minimum Bending Radius for Coaxial Trunk, Feeder, and Distribution Cables

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1.0 SCOPE

This test procedure is to be used for initially establishing or alternatively verifying the minimum static bend radius for coaxial distribution cable products. This procedure establishes the methodology to be used in the determination of a minimum bend radius as well as establishing acceptance criteria by which products can be tested or compared.

2.0 EQUIPMENT

2.1. Set of metal, wooden, or alternate material mandrels that have fixed radii covering the anticipated range of bending radii based on the product(s) being tested. The mandrels shall have a minimum of 180 degrees of curved surface on which cable samples may be placed and bent.

2.2. Appropriate tools to include but not be limited to:

- Digital caliper or equivalent
- Cable cutters
- Cable marking pen

2.3. Data recording sheets, logbooks, or other suitable data retention media.

3.0 TEST SAMPLES

3.1. Obtain four (4) reels of the product to be tested. Each reel shall be manufactured from different core lines or on different dates, if possible, to assure product sampling is random.

3.2. Cut samples from each of the cable reels of interest. Each sample shall be a minimum of three (3) feet (0.9144 m) in length. Samples obtained from random locations within the reel provide additional degree of assuring random sampling.

3.3. Obtain a minimum of five (5) samples from each reel. Straighten and identify each sample as to the reel from which it came as well as the location in the reel (i.e., top, middle, bottom).

4.0 TEST METHOD

4.1. After obtaining and identifying the desired quantity of cable samples as described in 3.0 above, each sample shall be individually tested as described within to determine its minimum bend radius. If the minimum bend radius is unknown, use step 4.2 to determine a starting radius. If the minimum bend radius is known, such as when verifying a minimum bend radius or when the cable is similar in construction to a known cable, this radius may be used as the starting radius for the test and step 4.2 may be omitted.

4.2. Determine the hub size of the reel from which the samples were obtained. Use this dimension as the starting point for testing. For example, if testing a ½" (12.7 mm) product and it comes on the standard 16" (406.4 mm) reel hub, use the 16" diameter hub measurement (8" or 203.2 mm radius) for the initial mandrel test size.

4.3. Mark each cable sample at its center with a cable marking device.

4.4. After each test specimen has been marked as indicated above, measure the maximum and minimum outside diameter (OD) dimensions at the point previously marked. Record this data as the initial dimensions.

4.5. Calculate and record the ovality of the cable sample from the measured OD's:

Ovality = (OD max.) – (OD min.)

4.6. Place the center of the sample against the mandrel and, with a steady pressure on each end of the sample, bend it 180 degrees around the mandrel. (See Figure 1.)

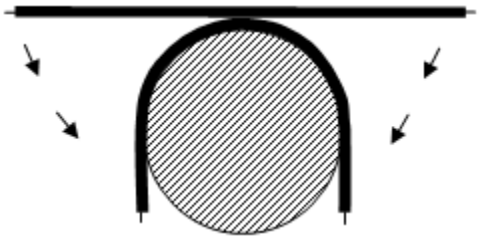

Figure 1 – Sample Bend against Mandrel

4.7. Remeasure the maximum and minimum OD's of the specimen at the same marked location as initially measured. Calculate ovality again and record all data.

4.8. Calculate and record the change in ovality from the previous calculation.

Change in Ovality = New Calculation – Initial Calculation

4.9. Record all measurements, ovality calculations, radius values, and the change in ovality from the initial measurement for each new sample, ensuring that all measurements are made at the same marked point on the cable sample.

4.10. Repeat the forward bending and radius reductions with each new sample until such time that the change in ovality from each initial sample measurement meets or exceeds 0.010 inches ($\geq$ 0.010" or 0.254 mm) or a ripple in the outer conductor is observed.

5.0 ACCEPTANCE CRITERIA

A change in ovality from a given sample's initial measured value of 0.010 inches or more ($\geq$ 0.010 or 0.254 mm) represents the point of non-acceptable bending performance. The minimum bending radius for the cable under test would be the radius tested immediately before the ovality reached or exceeded its maximum deviation point. Consistency across all test samples is required to establish a minimum bending radius value. It should be noted that secondary failures in the aluminum outer conductor may also be grounds for failure in addition to or instead of the change in ovality measurements. A sample exhibiting failure in the tubing such as rippling (even though the ovality has not exceeded 10 mils or 0.254 mm) should be regarded as having exceeded the minimum bend radius. Testing to radius values between the last two values may be performed to establish a true minimum value if desired.

6.0 DATA RECORDING / ANALYSIS

All data shall be recorded as each bend test is performed. The data shall be recorded on data sheets, data logbooks, or other data retention media for future retrieval or reference as appropriate. Observations shall be recorded on any characteristics such as rippling, cracking, folding, or other noticeable characteristics of the aluminum, jacket, or sample as a whole. The radius at which the rippling, etc. appears shall also be recorded.