



Standard Test Methods for Determining the Full Section Flexural Modulus and Bending Strength of Fiber Reinforced Polymer Crossarms Assembled with Center Mount Brackets¹

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1. Scope

1.1 These test methods cover the determination of the flexural modulus and bending strength of both tangent and deadend arms bent about their minor and major axes. One method covers testing of assembled tangent crossarms including the tangent bracket and relative hardware. The other method covers testing of assembled deadend crossarms with a deadend bracket and relative phase loading hardware. The failure modes and associated stresses can be used for predicting the phase load capacities of pultruded crossarms specific to certain conductor loading scenarios.

1.2 The test methods described in this standard can be used for predicting the vertical and horizontal component loads of deadend and tangent arms. Both deadend and tangent crossarms shall be tested in the two configurations described in Figures 1 and 2. This will permit the manufactures to publish both vertical and horizontal design capacities for deadend crossarm configurations so that two way bending stresses, caused by catenary effects, can be considered when developing the capacity of the deadend crossarms by utility design engineers and manufacturers.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4 This standard will not address all factors that affect the phase loading capacity.

1.5 This standard does not address the use of core materials that are added to increase the structural capacity of the crossarms. Core material shall not be considered in the calculations provided in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 ASTM Standards:²

D4968 Practice for Annual Review of Test Methods and Specifications for Plastics

E4 Practices for Force Verification of Testing Machines

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 Definitions of variables used in the calculations as shown in Section 11 are as follows:

a	= distance from phase hardware to the center mount bolt through the crossarm, in. (m),
A_w	= area of the webs in shear in. ² [m ²],
E	= flexural modulus, psi (Pa),
I	= moment of inertia about the neutral axis of the crossarm, in. ⁴ [m ⁴],
L	= support span, in. [m],
M	= moment at failure, lbf-in [N•m],
P	= ultimate or failure load acting through a single center mount bolt, lbf [N],
S_x	= section modulus about the neutral axis of the crossarm, in. ³ [m ³],
V	= in-plane shear force, lbf [N],
σ	= bending stress at failure, psi [Pa],
δ	= deflection relative to the applied load, in. [m],
τ_{max}	= maximum transverse shear stress, psi [Pa],

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.18 on Reinforced Thermosetting Plastics.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.