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# Standard Guide for Conducting Flexural Tests on Beams and Girders for Building Construction<sup>1</sup>

This standard is issued under the fixed designation E529; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This guide covers the flexural testing of beams and girders under simulated service conditions to determine their structural performance characteristics. Methods following this guide are intended primarily for constructions that may not conform with the relatively simple assumptions upon which well-known flexural theories are based. In some cases, they are also suitable for determining the structural adequacy of the design, materials, connections, and fabrication techniques. The methods are not intended for use in routine quality control tests.

1.2 *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.* For specific precautionary statement, see 7.1.

## 2. Referenced Document

2.1 *ASTM Standards:*<sup>2</sup>

E575 Practice for Reporting Data from Structural Tests of Building Constructions, Elements, Connections, and Assemblies

E631 Terminology of Building Constructions

## 3. Terminology

3.1 For definitions of terms used in this standard, refer to Terminology E631.

## 4. Significance

4.1 This guide provides a general procedure for conducting flexural load tests on beams and girders of all types. Strength,

stiffness, creep, or other useful properties may be obtained. When round-robin tests are to be conducted, a standardized set of procedures conforming to this guide should be agreed upon by the participants prior to testing to ensure a uniform basis for comparison.

## 5. Types of Tests

5.1 The flexural test is categorized as either a proof test or an ultimate load test. A proof test is intended to give assurance that the member will support a certain minimum short-term load, or to determine the deflection and recovery resulting from the application and removal of such a load. In carrying on a test to failure (ultimate load), more detailed information can be obtained, such as the proportional limit, yield point, ultimate capacity, mode of failure, load-deflection characteristics, and the adequacy of connectors and connections.

5.2 Both laboratory and field tests are acceptable.

5.3 The types of tests described above apply to beams subjected to short-term static loads. If cyclic, dynamic, or long-term sustained load tests are undertaken, care should be taken to ensure that procedures are consistent, that the test setup is reliable, and that load points cannot shift between cycles or impacts.

## 6. Apparatus

6.1 Loading method, type of test equipment, type of instrumentation, and so forth, are not specified, but are discussed in general terms, with the final choices being left to the discretion of the testing agency or controlling regulatory body.

## 7. Safety Precautions

7.1 Tests of this type can be dangerous. Equipment and facilities must be designed with ample safety factors to assure that it is the specimen that fails and not the test apparatus or facilities. Observers and sensitive instrumentation must be kept away from beams when loading to failure or in a range where performance is unknown. Gravity loading with concrete blocks, metal bars, sand, or similar materials can be very hazardous at failure as collapse may be sudden and complete.

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.11 on Horizontal and Vertical Structures/Structural Performance of Completed Structures.

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<sup>2</sup> 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.