ASTM D7264 Flexural Properties of Polymer Matrix Composite Materials

MTS Landmark®
Servohydraulic Test Systems

MTS Criterion®
Electromechanical Universal Test Systems

TEST METHOD SUMMARY

Three- and four-point flexure testing of polymer matrix composites per ASTM D7264 is done to determine the relevant property data for material screening or quality control.

The flexure test is performed by placing the rectangular specimen symmetrically on the support fixture that is mounted either to a servohydraulic or an electromechanical testing machine. The load is applied to the specimen at mid-span for three-point and equally on both loading members for four-point testing until either failure occurs on either one of the outer surfaces or it reaches a predetermined value of deformation.

The specimen deflection should be measured at the common center of the loading span with a deflection measuring device. Properties that are measured include flexural strength, flexural modulus, and other aspects of the flexural load/deflection behavior. This standard addresses continuous-fiber-reinforced polymer matrix composite materials.

Testing solutions for ASTM D7264 typically include these types of components:

LOAD FRAME OPTIONS*

The MTS Landmark® servohydraulic test systems and MTS Criterion® electromechanical test systems are ideal for performing accurate and repeatable monotonic testing of polymer matrix composite materials per ASTM D7264.

The innovative frame design of the MTS Landmark system exhibits superior stiffness and alignment capabilities. The test system integrates the latest servohydraulic technology, including precision-machined columns for consistently tight alignment; fatigue-rated MTS actuators with low friction bearings for long service life; and smooth-ramping hydraulic service manifolds for bumpless starts. With the addition of an energy-efficient SilentFlo™ hydraulic power unit, the MTS Landmark system can provide optimum performance and efficiency.

The MTS Criterion test system features high-resolution MTS digital controls, linear motion guides for superior alignment, high-speed, low vibration MTS electromechanical drives, optional Dual Zone test space for maximizing efficiency and anti-rotation grip/fixture mounting to minimize fixture misalignment.

CHAMBER OPTIONS*

MTS Series 651 Environmental Chamber

» Temperature range -150°C to 540°C (-240°F to 1000°F)
» Designed for MTS Landmark systems
» Compatible with video extensometers

MTS Advantage™ Environmental Chamber

» Temperature range of -129°C to 315°C (-200°F to 600°F)
» Designed for MTS Criterion systems
» Compatible with video extensometers

EXTENSOMETRY OPTIONS*

MTS Advantage Video Extensometer (AVX)

» Delivers high quality non-contact deflection measurement
» Supports multiple measurement points

MTS Displacement Gage (Model 632.06)

» Versatile displacement gage designed for accurate measurement of small deformations
» Easy installation via an adjustable mounting block
» Gage arm releases in either a positive or negative over-travel situation to help prevent damage
» Temperature range of -100°C to 175°C (-150°F to 350°F)

FIXTURE OPTIONS*

Model 642 Three- & Four-Point Bend Fixtures

» Flexible configurations that provide either a line of maximum stress for the three-point setup or a region of constant stress for the four-point setup
» Available in a range sizes with force capacities of 10 kN and 100 kN
» Flexible configurations provide either a region of constant stress for the four-point setup or a line of maximum stress for the three-point setup
» Loading noses and supports can be fixed or free to rotate
» Precision-machined rollers are made from corrosion-resistant hardened steel for long service life
» Adjustable spans feature US Customary and metric scales
» Temperature range of -130°C to 150°C (-200°F to 302°F)

MTS Three-Point Bend Fixtures

» Value-priced fixtures for a wide range of flexural tests
» Provides a line of maximum stress
» Available in a range sizes with force capacities of 10 kN and 20 kN
» Fixed loading noses and supports
» Fast and accurate specimen positioning with centering device
» Precision-machined rollers are made from corrosion-resistant hardened steel for long service life
» Adjustable lower spans feature metric scales
» Temperature range of -50°C to 150°C (-58°F to 302°F)

SOFTWARE OPTIONS*

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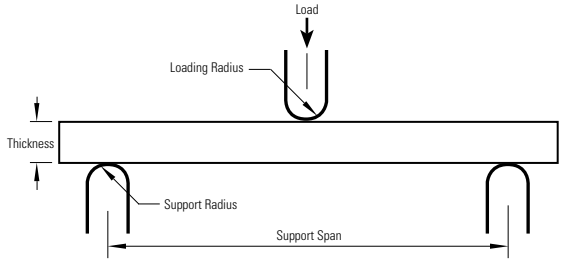
MTS has developed generic composite flexure TestSuite™ TW test templates that can easily be modified to be in compliance with ASTM D7264 requirements. The templates can support the use of a displacement gage or video extensometer for deflection measurement. Reports can display all of the required calculations including flexural strength, flexural modulus and other aspects of the flexural load/deflection behavior.

MTS consultants are also available to support your composite applications, test method set-up, data collection and system integration requirements.

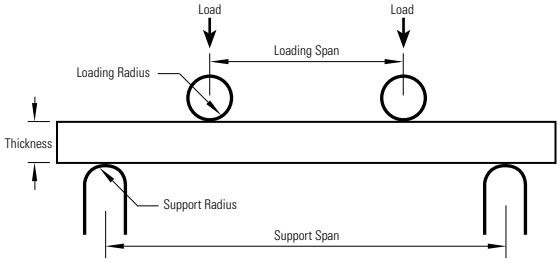
*NOTE: This technical note is intended to show some of the popular and more common solutions used for this particular application. Most often, additional options are available and necessary to accomplish your more comprehensive test objectives.

APPENDIX - TEST SPECIMEN DETAIL

Three-point Setup



Four-point Setup



Thickness in mm	Width in mm	Support Span in mm	4-Point Loading Span in mm	Support Radius in mm	Loading Radius in mm
4	13	128 Optional Support Span-to-Thickness Ratio 16:1 ; 32:1, 40:1 or 60:1	½ Support Span	5	5

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