

ASTM D6272 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

TEST METHOD SUMMARY

Four-point flexure testing of fiber-reinforced composites per ASTM D6272 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 equally on both loading members for four-point testing until rupture occurs in the outer fibers of the specimen or it reaches 5% fiber strain. 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 stress/strain relationship. This standard addresses unreinforced and reinforced plastics, including high modulus composites and electrical insulating materials.

Testing solutions for ASTM D6272 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 unreinforced and reinforced plastics and electrical insulating materials per ASTM D6272.

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 manifold for bumpless starts. With the addition of an energy-efficient MTS 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.



MTS Landmark®
 Servohydraulic Test Systems



MTS Criterion®
 Electromechanical Universal Test Systems

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) » Magnetic-return support arm for easy specimen access and precise positioning » Sixteen quick-attach measurement heads supporting a wide array of gage lengths and strain rangess	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

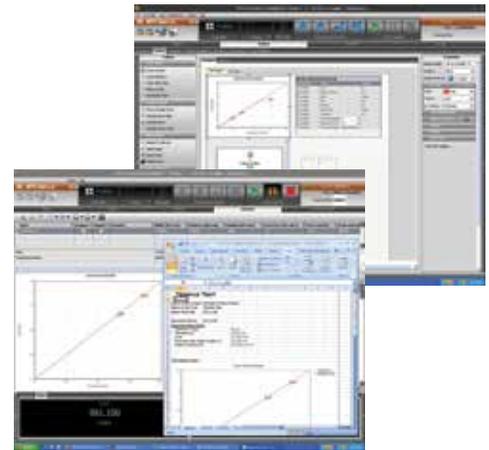
- » Flexible configurations that provide either a line of maximum stress for the three-point setup or a region of constant stress for the four-point setup
- » 30 kN static force capacity
- » Fixed loading noses and supports
- » Precision-machined rollers are made from corrosion-resistant hardened steel for long service life
- » Adjustable spans feature US Customary and metric scales
- » Temperature range of -129°C to 177°C (-200°F to 350°F)

SOFTWARE OPTIONS*

ASTM D6272 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials by Four-Point Bending

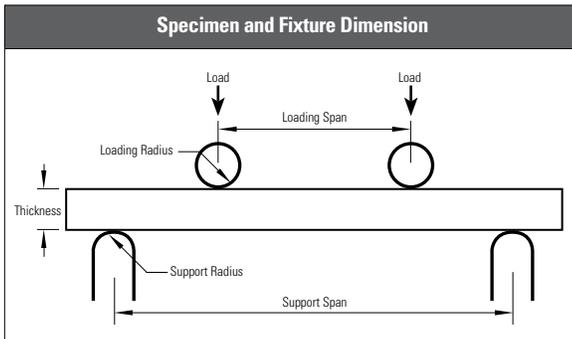
MTS has developed generic composite flexure TestSuite™ TW test templates that can easily be modified to be in compliance with ASTM D6272 requirements. The templates can support the use of a displacement gage or video extensometer for deflection measurement. Reports can display all of the required calculations including flexural strength, flexural modulus, and other aspects of the flexural stress/strain relationship.

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



Thickness in mm	Width in mm	Support Span in mm	4-Point Loading Span in mm	Support Radius in mm	Loading Radius in mm
< 1.6	12.7	Support Span-to-Thickness Ratio 16:1 ; 32:1, 40:1 or 60:1	1/3 or 1/2 Support Span	5	5
≤ 3.2	12.7				
> 3.2	≤ ¼ Support Span				

Flexural test specimens may be cut from sheets, plates, or molded shapes, or may be molded to the desired finished dimensions. ASTM D6272 segments these materials and provides significant specimen size guidance according to following categories:

- » Laminated Thermosetting Materials and Sheet and Plate
- » Materials Used for Electrical Insulation
- » Molding Materials (Thermoplastics and Thermosets)
- » High-Strength Reinforced Composites, including Highly Orthotropic Laminates
- » Sheet Materials Not Listed Above



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