

ISO 14125 Flexure Properties of Fibre-Reinforced Plastic Composites



MTS Landmark®
Servohydraulic Test Systems

TEST METHOD SUMMARY

Three- or four-point flexure testing of fibre-reinforced composites per ISO 14125 is done to determine the relevant property data for material screening or quality control.

The flexure test is performed by placing the 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 the specimen fractures or until it reaches a predetermined value of deformation. The specimen deflection can be measured with a strain gage, extensometer or the load frame's displacement transducer. Properties that are measured include flexural strength, flexural modulus, and other aspects of the flexural stress/strain relationship. This standard addresses fibre-reinforced thermosetting and thermoplastic composite materials.

Testing solutions for ISO 14125 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 fibre-reinforced plastics per ISO 14125.

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 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 Criterion®
Electromechanical Universal Test Systems


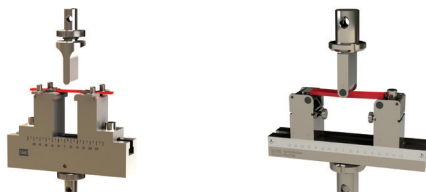
CHAMBER OPTIONS*

| | |
|--|---|
| | |
| <p>MTS Series 651 Environmental Chamber</p> | <p>MTS Advantage™ Environmental Chamber</p> |
| <ul style="list-style-type: none"> » Temperature range -150°C to 540°C (-240°F to 1000°F) » Designed for MTS Landmark systems » Compatible with video extensometers | <ul style="list-style-type: none"> » Temperature range of -129°C to 315°C (-200°F to 600°F) » Designed for MTS Criterion systems » Compatible with video extensometers |

EXTENSOMETRY OPTIONS*

| | |
|--|--|
| | |
| <p>MTS Advantage Video Extensometer (AVX)</p> | <p>MTS Displacement Gage (Model 632.06)</p> |
| <ul style="list-style-type: none"> » Delivers high quality non-contact deflection measurement » Supports multiple measurement points | <ul style="list-style-type: none"> » 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*

| | |
|---|---|
|  |  |
| <p align="center">Model 642 Three- & Four-Point Bend Fixtures</p> | <p align="center">MTS 3-Point Bend Fixtures</p> |
| <ul style="list-style-type: none"> » 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) | <ul style="list-style-type: none"> » Value-priced fixtures for a wide range of flexural tests » Provides a line of maximum stress » Available in a range of sizes with force capacities of 10 kN and 20 kN » Fixed loading nose 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 -70°C to 350°C (-94° F to 662° F) |

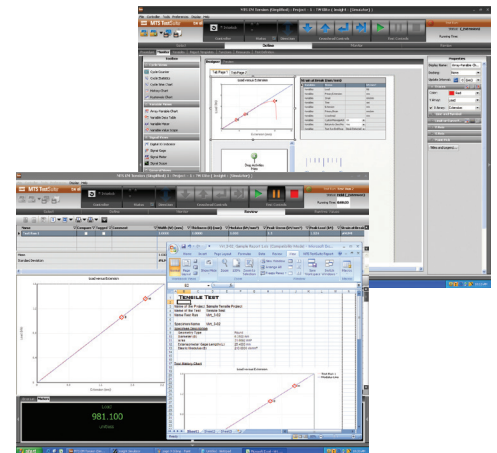
SOFTWARE OPTIONS*

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To simplify testing to ISO 14125, MTS has developed TestSuite™ TW test templates that will set up and run the recommended three-point or four-point flexure tests

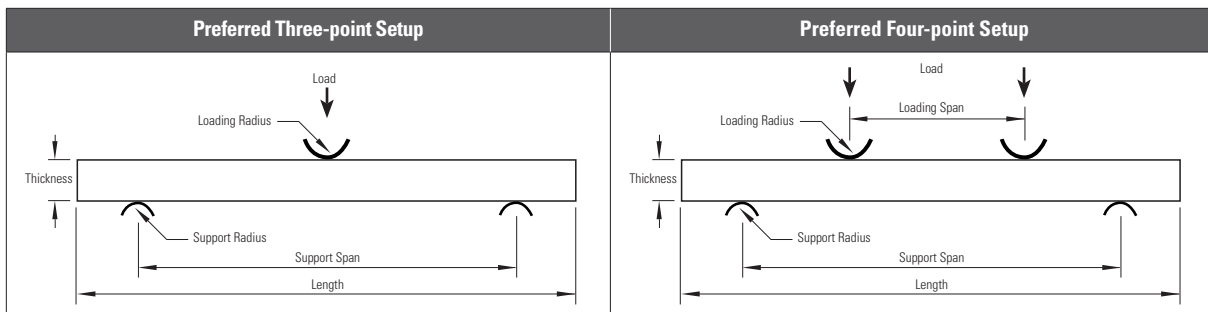
The templates can support the use of a displacement gage, video extensometer or the load frame's displacement transducer for deflection measurement. Reports can display all of the required calculations including flexural strength, flexural modulus, and other aspects of the flexural stress/strain relationship.

MTS consultants are also available to support your composite applications, test method setup, 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 | Length in mm | Support Span in mm | 4-Point Loading Span in mm | Support Radius in mm | Loading Radius in mm |
|-----------------|-------------|--------------|--------------------|----------------------------|----------------------|----------------------|
| 2 | 15 | 60 or 100 | 40 to 81 | 15 to 27 | 2 | 5 |
| 4 | 10 or 15 | 80 | | | 5 | |

ISO 14125 provides specimen size guidance for three-point and four-point setup according to Class I to IV categories.



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