

ASTM E190 Guided Bend Testing for Ductility of Welds

TEST METHOD SUMMARY

This standard covers guided bend testing of welds for the determination of reliability and ductility in ferrous and nonferrous products.

The guided bend test is performed by placing a rectangular specimen symmetrically on the support fixture that is mounted to the testing machine. The load is applied to the weldment of the flat specimen at mid-span until the specimen conforms to a U-shape, or until failure occurs. After the bending test is completed, the curved surface of the bend is examined for evidence of a crack or surface irregularities to determine if the material has failed.

Solutions for ASTM E190 guided-bend test typically include these types of components:

LOAD FRAME OPTIONS*

MTS offers electromechanical Criterion® and Exceed® universal test systems and dynamic servohydraulic Landmark® test systems that are ideal for performing accurate and repeatable monotonic bend testing of metallic materials per ASTM E190.

MTS Criterion universal testing systems are engineered to support the needs of advanced Research & Development. MTS Exceed universal testing systems are best suited for Quality Control testing by delivering the reliable performance needed to meet the uptime demands of high-volume production environments. Due to the large variety of ferrous and nonferrous metals and specimen dimensions that can be tested per ASTM E190, the required force capacities can differ significantly. MTS offers frame models that address the smaller force requirements of thinner specimens up to high-force requirements for testing thick plate type specimens.

The MTS Criterion and the MTS Exceed universal testing machines range from tabletop to floor-standing electromechanical models with force ratings of up to 600 kN / 135 kip. Many of the models have dual-zone test spaces to reduce set-up times if you frequently change test requirements.

The MTS Landmark dynamic servohydraulic test system with its superior stiffness and alignment capabilities, is an ideal choice if additional fatigue and fracture testing capabilities are required. Systems are available in highly configurable floor-standing and tabletop models with force ratings from 5 kN / 1 kip to 500 kN / 110 kip.

As an alternative to a new load frame, you can replace outdated controls / hydraulics of existing MTS or another manufacturer's electromechanical, servohydraulic or custom test systems, including:

**Instron®, **Zwick®, **Tinius Olsen™, **SATEC®, **Baldwin® and more with an MTS ReNew™ Upgrade.

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MTS Criterion® & MTS Exceed®
Electromechanical Universal Test Systems




MTS Landmark®
Servohydraulic Test Systems



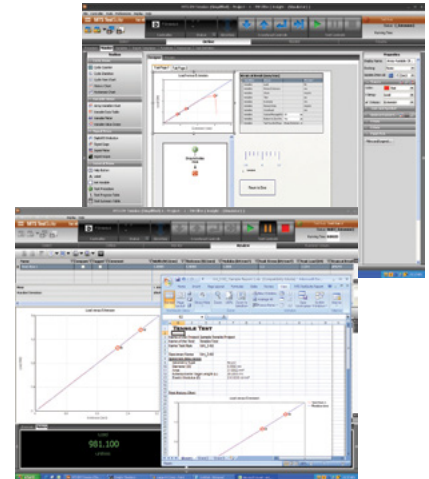
MTS ReNew™
Upgrade for Hydraulic & Electromechanical Test Systems

FIXTURE OPTIONS*

Adjustable Guided-Bend Test Fixture	
	<ul style="list-style-type: none"> » Fixture consists of a plunger to be attached to the cross head and an adjustable bearing jig to attach to the bottom of the test machine » Bearing jig can be adjusted and the plunger can be replaced to accommodate test setup requirements for different specimen dimensions

SOFTWARE & CONSULTING OPTIONS*

About MTS TestSuite™ TW	ASTM E190 Guided Bend Testing for Ductility of Welds Test Method Template
<p>The efficient MTS TestSuite TW software provides the versatility required to address unique and complex testing requirements.</p> <p>twe TestSuite TW Elite includes all the test definition capacity and flexibility test designers need to create and edit custom test sequences while accommodating the specific runtime needs of lab personnel.</p> <p>twx TW Express is designed for the test operator and is used to run tests created with TW Elite and can be used without fear of inadvertently modifying the Test Method. This application allows the operator to easily execute even the most complex tests and monitor data or calculated values in runtime views that can be tailored by both test designers and operators.</p>	<p>MTS has developed a generic TestSuite TW test method template that will set-up and run the recommended guided-bend test. The templates can easily be modified to be in compliance with ASTM E190 requirements.</p> <ul style="list-style-type: none"> » Crosshead/actuator can be used for displacement measurement and control » Post-test review tab and reports show data in load-displacement plots and highlight values such as angle of bend, maximum load, and more » Raw data can be exported in many formats including CSV and TXT » Test methods, calculations, review displays, and report layouts can be customized by the user



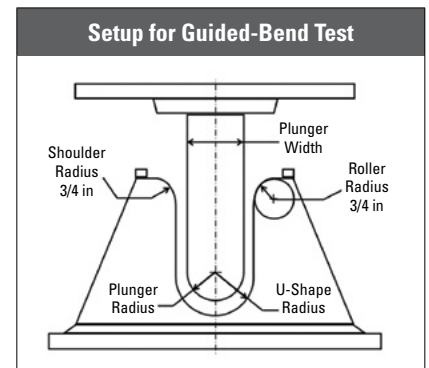
MTS Consulting Can Enable LIMS Integration & Other Lab Efficiency Enhancements
<p>MTS consultants are available to support seamless data integration from your TestSuite test templates to your laboratory information management system (LIMS). Lab Efficiency Enhancements could include:</p> <ul style="list-style-type: none"> » Integrating bar code scanners, reading data from micrometers and calipers, capturing video via webcam » Automating the interface of two-way communications between TestSuite and virtually any LIMS system

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

APPENDIX - TEST SPECIMEN DETAIL

Commonly rectangular specimens, with a minimum length of 6 inch and different thicknesses, machined from plates and pipes are used for the guided bend testing. Please consult ASTM E190 for more detailed information about the supported specimen geometries for ferrous and nonferrous materials, for transverse side, face and root bend test setups, and for longitudinal face and root bend test setups.

Specimen Thickness in (mm)	Plunger Width in (mm)	Plunger Radius in (mm)	U-Shape Radius in (mm)
3/8 (9.5)	1 1/2 (38)	3/4 (19)	1 3/16 (30)
1/8 (3.2)	2 1/8 (54)	1 1/16 (27)	1 3/16 (30)
t	4t	2t	3t + 3/16 (+ 1.6)



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