

Torsion Testing Machine



1, General introduction

Torsion tests twist a material or test component to a specified degree, with a specified force, or until the material fails in torsion. The twisting force of a torsion test is applied to the test sample by anchoring one end so that it cannot move or rotate and applying a moment to the other end so that the sample is rotated about its axis. The rotating moment may also be applied to both ends of the sample but the ends must be rotated in opposite directions. The forces and mechanics found in this test are similar to those found in a piece of string that has one end held in a hand and the other end twisted by the other.

Purpose of torsion testing:

The purpose of a torsion test is to determine the behavior a material or test sample exhibits when twisted or under torsional forces as a result of applied moments that cause shear stress about the axis. Measurable values include: the modulus of elasticity in shear, yield shear strength, torsional fatigue life, ductility, ultimate shear strength, and modulus of rupture in shear. These values are similar but not the same as those measured by a tensile test and are important in manufacturing as they may be used to simulate the service conditions, check the product's quality and design, and ensure that it was manufactured correctly.

Types of torsion tests:

The three common forms that torsion testing take include failure, proof and operational. A torsion test for failure requires that the test sample be twisted until it breaks and is designed to measure the strength of the sample. A proof test is designed to observe the material under a specified torque load over a set period of time. Finally, operational testing is measures the material's performance under the expected service conditions of its application. All of these forms of tests may be performed with either

torsion only loading or a combination of torsion and axial (tension or compression) loading depending upon the characteristics to be measured.

Types of materials:

Many materials experience torques or torsional forces in their applications and so will benefit from or require torsion testing. Materials used in structural, biomedical and automotive applications are among the more common materials to experience torsion in their applications. These materials may be composed of metals, plastics, woods, polymers, composites, or ceramics among others and commonly take the forms of fasteners, rods, beams, tubes and wires.

2, Reference

ISO 7800: Metallic materials -- Wire -- Simple torsion test

ISO 6475: Implants for surgery -- Metal bone screws with asymmetrical thread and spherical under-surface -- Mechanical requirements and test methods.

ASTM F543: Standard Specification and Test Methods for Metallic Medical Bone Screws

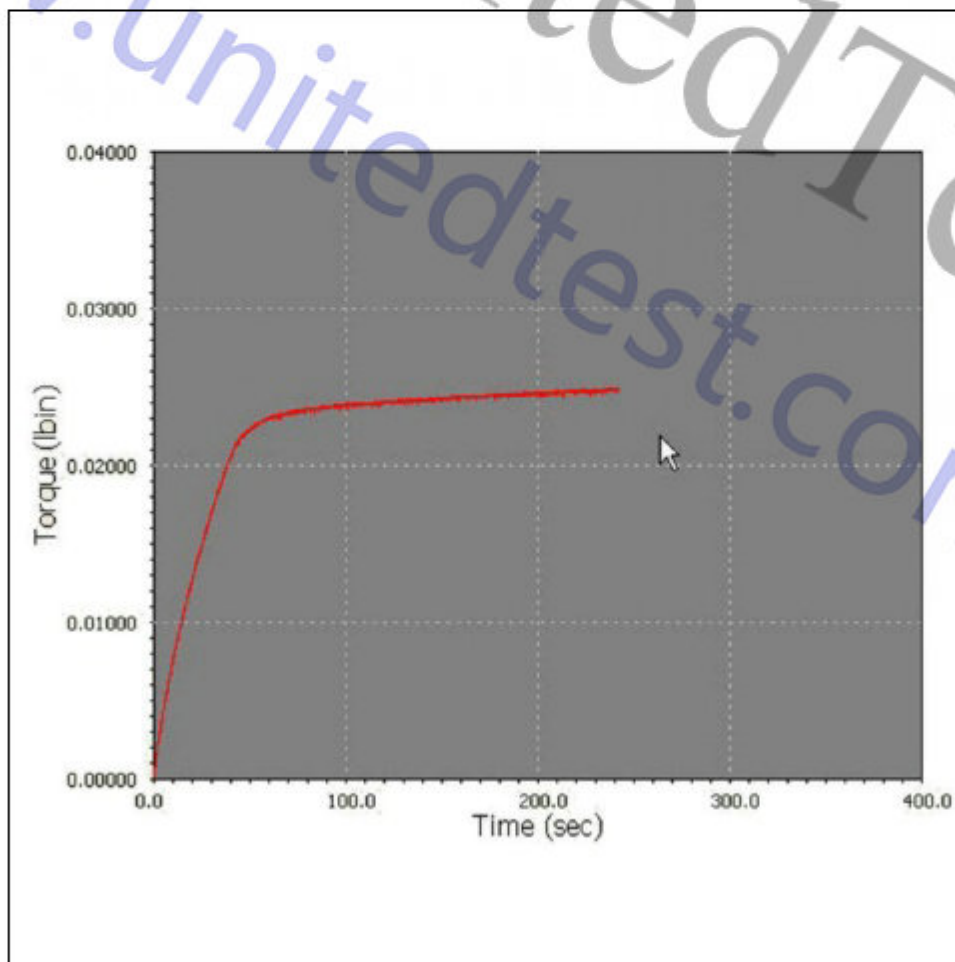
ASTM F383 Static Bend and Torsion Testing of Intramedullary Rods

ASTM E2207 Axial-Torsional Fatigue Thin-Walled Tubular Materials Test Equipment

ASTM D5279 Thermoset & Thermoplastic Dynamic Torsion Testing Machine

ASTM D1043 Torsion Plastics Test Equipment

ASTM A938 Torsional Test of Wire



Typical steel wire torsion test diagram

Digital Display Manual Torsion Tester

NJS-S Series



Key Features

- 1), Manual loading;
- 2), High precision torque sensor to measure torque, photoelectric encoder to measure torsion angle, digital display test result,
- 3), Simple structure, convenient operation, budgetary cost etc. features.
- 4), Mainly used in research institute, engineering colleague and university etc.

Main technical specification

Model	NJS-5S NJS-10S NJS-20S	NJS-50S NJS-100S NJS-200S
Max. torque	5N.m 10N.m 20N.m	50N.m 100N.m 200N.m
Torque measuring range	2%---100% F.S	
Torque indication accuracy	±1%	
Torque resolution	0.01N.m	0.1N.m
Torsion angle Min. reading	0.1°	
Max. torque angle	9999.9°	
Effective test space	0~260mm (customized available)	
Dimensions	920*300*300mm	950*330*400mm
Power supply	50Hz, 220V, Single phase	
Weight	90Kg	120Kg

Digital Display Motorized Torsion Tester

NJS Series



Key Features

- 1), Adopt servo control system, through the servo to control motor, cycloidal pin gear speed reducer drive the active chuck rotate;
- 2), High precision torsion sensor to measure the sample torque;
- 3), Photoelectric encoder to measure torsion angle;
- 4), Through microcomputer to collect test data, analysis, calculate, real-time display torque and torsion angle, loading rate, torque peak value etc.,
- 5), Can also measure the torsion angle under certain torque, or the torque under certain torsion angle.
- 6), Test parameter and be set in one time, then automatically start test.
- 7), Stop or according set stop the machine after test finish.
- 8), Test result can save and print by the micro printer.
- 9), With two directions rotation function.

Main technical specification

Model	NJS-5 NJS-10 NJS-20	NJS-50 NJS-100 NJS-200
Max. torque	5N.m 10N.m 20N.m	50N.m 100N.m 200N.m
Torque measuring range	2%---100% F.S	
Torque indication accuracy	±1%	
Torque resolution	0.01N.m	0.1N.m
Torsion angle Min. reading	0.1°	
Max. torque angle	9999.9°	
Effective test space	0~260mm (customized available)	
Dimensions	920*300*300mm	950*330*400mm
Power supply	50Hz, 220V, Single phase	
Weight	100Kg	130Kg

Model	NJS-500	NJS-1000	NJS-2000	NJS-3000	NJS-5000
Max. torque	500N.m	1000N.m	2000N.m	3000N.m	5000N.m
Torque measuring range	2%---100% F.S				
Torque indication accuracy	±1%				
Torque resolution	0.1N.m				
Torsion speed	1 °/min ~ 720 °/min			1 °/min ~ 360 °/min	
Speed accuracy	±1%				
Torsion angle measuring error	±1%				
Torsion angle Min. reading	0.1°				
Effective test space	0~500mm (customized available)				
Dimensions	1650*450*1120mm			1750*550*1250mm	
Power supply	50Hz, 220V, Single phase				
Weight	600Kg	800Kg		1000Kg	

Computer Controlled Torsion Testing Machine

NJW Series



Key Features

- 1), Adopt servo control system, through the servo to control motor, cycloidal pin gear speed reducer drive the active chuck rotate;
- 2), High precision torsion sensor to measure the sample torque;
- 3), Photoelectric encoder to measure torsion angle;
- 4), Computer display test result,
- 5), With high stiffness and high endurance straight guide rail.
- 6), Controller can adjust sampling rate, at material yield stage can use high sampling rate;
- 7), Software can divide three level management, different level has different limit of authority;
- 8), Main test software operation, function, curve, data real time display on the main window, easy operation, can display torque-torsion angle, torque-corner, torque-time, torsion angle-time etc. curve;
- 9), Software can calculate and analysis shear modulus G , provision non-proportional torsion strength $\tau_{P0.015}$ and $\tau_{P0.3}$, upper torsion yield strength τ_{Su} , lower torsion yield strength τ_{Sl} , torsion strength τ_b , max. non-proportional shearing strain γ_{max} ;
- 10), Can turn positive and negative two directions, after test finish, automatically or manually return to test original position.

Main technical specification

Model	NJW-5 NJW-10 NJW-20	NJW-50 NJW-100 NJW-200
Max. torque	5N.m 10N.m 20N.m	50N.m 100N.m 200N.m
Torque measuring range	2%---100% F.S	
Torque indication accuracy	±1%	
Torque resolution	0.01N.m	
Torsion angle Min. reading	0.1°	
Max. torque angle	9999.9°	
Effective test space	0~260mm (customized available)	
Dimensions	920*300*300mm	950*330*400mm
Power supply	50Hz, 220V, Single phase	
Weight	100Kg	130Kg

Model	NJW-500	NJW-1000	NJW-2000	NJW-3000	NJW-5000
Max. torque	500N.m	1000N.m	2000N.m	3000N.m	5000N.m
Torque measuring range	2%---100% F.S				
Torque indication accuracy	±1%				
Torque resolution	±1/300000				
Torsion angle measuring error	±1%				
Torsion angle Min. reading	0.01°				
Effective test space	0~500mm (customized available)				
Dimensions	1650*450*1120mm			1750*550*1250mm	
Power supply	50Hz, 220V, Single phase				
Weight	600Kg	800Kg		1000Kg	

Metal Reverse Wire Torsion Tester

NJS-X Series



Introduction

NJS-10X series Metal Wire Torsion Tester is used to execute metal wire torsion test, measure the metal wire endure of plastic distortion ability in single or double direction torsion condition; check the surface or internal defect.

Standard:

ISO 9649 Metallic materials -- Wire -- Reverse torsion test,
GB/T 239

Application

Steel: steel wire, steel rod, steel rebar;
Copper: copper wire, copper rod, copper alloy
Aluminum: Aluminum wire, aluminum rod, aluminum alloy;
Other metal: Rod, glass steel, alloy steel etc.

Main technical specification

Model	NJS-1X	NJS-3X	NJS-10X	NJS-20X	NJS-30X
Metal wire diameter	0.3-1mm	1-3mm	3-10mm	10-20mm	20-30mm
Movable guide rail parallelism	<0.2				
Two clamber distance	300mm			500mm	
Torsion speed	180, 300±10% rpm		60, 120±10% Rpm		30, 60±10% Rpm
Working noise	<70dB				
Jaw hardness	55~65				
Power supply	50Hz, 380V				

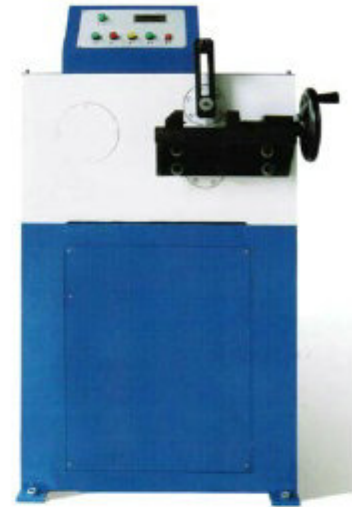
Metal Wire Reverse Bend Testing Machine

JWJ Series

Introduction

JWJ series metallic materials wire reverse bend testing machine mainly used to measure metal wire material, like steel wire, steel bar, steel wire rope, steel strand, nude electrical wire, copper alloy wire etc., rotate the provision radius jaws $\pm 90^\circ$ repeat the reverse bending test; add suitable device, can do 0.3 to 3mm wire.

Also can be used to do sheet plate repeating bending test.



Main technical specification

Model	JWJ-10	JWJ-15
Bending diameter	3-10mm	3-15mm
Sample length	300mm	
Bending degree	$\pm 90^\circ$	
Bending speed	Less than 60 times/min.	
Torsion angle Min. reading	0.1°	
Power	1.1kw, 380V, 50HZ, 3 phase	3kw, 380V, 50HZ, 3 phase
Dimensions	700*460*1150mm	
Weight	260Kg	280Kg

Wire Nominal diameter or thickness d (a)	Jaws base radius r	Distance h	Guide sleeve hole diameter d (g)
$0.3 \leq d(a) \leq 0.5$	1.25 ± 0.05	15	2.0
$0.5 < d(a) \leq 0.7$	1.75 ± 0.05	15	2.0
$0.7 < d(a) \leq 1.0$	2.5 ± 0.1	15	2.0
$1.0 < d(a) \leq 1.5$	3.75 ± 0.1	20	2.0
$1.5 < d(a) \leq 2.0$	5.0 ± 0.1	20	2.0 & 2.5
$2.0 < d(a) \leq 3.0$	7.5 ± 0.1	25	2.5 & 3.5
$3.0 < d(a) \leq 4.0$	10 ± 0.1	35	3.5 & 4.5
$4.0 < d(a) \leq 6.0$	15 ± 0.1	50	4.5 & 7.0
$6.0 < d(a) \leq 8.0$	20 ± 0.1	75	7.0 & 9.0
$8.0 < d(a) \leq 10.0$	25 ± 0.1	100	9.0 & 11.0