

ASTM F519

CREEP TESTING MACHINE

The Vector Dead-Weight Lever Arm Creep Testing Machine is a system engineered to perform a variety of advanced creep and hydrogen embrittlement tests. Designed in compliance with international standards such as **ASTM F519**, **ISO 204**, **ASTM E139**, **EN 2002-005**, **ASTM E1457**, this versatile system is tailored for long-term reliability and precision, making it a crucial tool for industries ranging from aerospace to oil and gas



VTR-13-050

Vector Creep Testing Machine

Advanced Design and Functionality

Key Features

- **Wide Test Load Range:** Operates within 50-200 kN, suitable for various testing applications from small to large-scale specimens.
- **Mechanical Precision:** Incorporates a dead-weight and pre-tensioned spring system for accurate and motor-free load application.
- **Versatile Testing Capabilities:** Performs creep, relaxation, crack growth, hydrogen embrittlement, and long-term testing up to 100,000 hours.
- **High-Temperature Compatibility:** Optional furnace supports testing at temperatures from -100 to +1,500°C with uniform distribution and automated control.
- **Compliance with Standards:** Adheres to ASTM F519, ISO 204, ASTM E139, EN 2002-005, and ASTM E1457, ensuring globally recognized results.
- **Smart Software Integration:** Features integrated HMI for data logging, automated parameter control, and streamlined workflow.
- **Advanced Safety Features:** Fully enclosed cabinet with interlocked mechanisms ensures operator protection during testing.
- **Modular Design:** Supports optional upgrades, including additional grips, load cells, and high-temperature chambers.

Wide Test Load Range

The tester operates within a force range of **50 - 200 kN**, catering to both small and large-scale applications. Its **dead-weight mechanism**, combined with a pre-tensioned spring, ensures smooth and accurate force application.

Compliance with Industry Standards

This system meets multiple standards, including ASTM F519 for hydrogen embrittlement testing and ISO 204 for creep testing. By adhering to these stringent guidelines, the machine guarantees global compatibility and reproducibility of results.

Versatile Testing Applications

The Vector Creep Tester supports a range of test types, including:

- Crack growth and widening tests
- Hydrogen embrittlement determination
- Relaxation tests
- Creep rupture and stress rupture testing
- Classic and stepped force creep tests
- Long-term testing for up to 50,000 hours

Vector Creep Testing Machine

Advanced Design and Functionality

Mechanical Precision

The tester integrates a dead-weight and mechanical spring system, eliminating the need for motorization. Its wear-resistant flexible joints maintain optimal lever arm alignment, ensuring accurate force application. The automatic end-of-test detection stops the system when the specimen fails, enhancing safety and efficiency.

High-Temperature Capabilities

An optional Vector high-temperature furnace expands testing conditions, supporting temperatures from -100 to +1,500°C. The furnace features:

- **Uniform Temperature Distribution:** Ensures consistent heating along the specimen.
- **Automated Temperature Control:** Operator-independent settings with automated parameter adjustments.
- **Integrated High-Temperature Controller:** Space-saving integration within the machine's base.

Smart Electronics and Software

- **Workflow-Oriented Operation:** Simplifies training and reduces operator intervention.
- **Integrated Temperature Control:** Allows precise pre-test heating phase documentation.
- **Robust Data Security:** Logs load and time data directly within the system's HMI.
- **User-Friendly Interface:** Enables seamless navigation, ensuring efficiency during test configuration and result evaluation.

Overview of ASTM F519

Hydrogen embrittlement testing evaluates the susceptibility of high-strength steels, aluminum alloys, and titanium to hydrogen exposure. This test identifies the effects of plating, coating, and environmental conditions on material ductility. Industries such as transportation, aerospace, and oil and gas frequently require this testing to ensure the structural integrity of critical components.

Test Summary

The sustained load (SLT) method involves applying uniaxial tension at ambient temperature for 200 hours to specimens loaded at 75% of their yield strength. Cracks, if present, indicate susceptibility to hydrogen embrittlement. The system supports simultaneous testing of multiple specimens, optimizing laboratory throughput.

Applications

- **Plating and Post-Plating Quality Assurance:** Evaluates the impact of manufacturing processes on material integrity.
- **High-Strength Steels and Alloys:** Verifies resistance to hydrogen-induced ductility loss.
- **Pipeline and Structural Testing:** Ensures durability under service environments.

Vector Creep Testing Machine

Intelligent Safety and Design

Enhanced User Safety

The fully enclosed cabinet ensures operator protection while maintaining accessibility for easy specimen loading and unloading. Interlocked safety mechanisms prevent operation when the enclosure is open, and calibrated weights ensure accurate load applications.

Modular Configurations

The tester’s modular design supports upgrades such as high-temperature chambers, additional specimen grips, and enhanced load cells, ensuring adaptability to evolving testing needs.

Built for Durability

Constructed from high-strength materials, the system delivers long-lasting, maintenance-free operation. Its base is designed for floor mounting, effectively absorbing impact forces and enhancing stability during extended tests.

Built for Durability

- Aerospace: Testing high-strength materials under creep and embrittlement conditions.
- Oil and Gas: Ensures the integrity of pipelines and structural components under extreme environments.
- Automotive and Transportation: Evaluates the durability and performance of critical parts exposed to stress and hydrogen.
- Material Science: Long-term testing for material properties like creep and hydrogen susceptibility.
- Quality Assurance and Research: Ensures compliance with standards and supports the development of advanced materials.
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TECHNICAL SPECIFICATION

Parameter	Details
Test Load Range	50 – 200 kN
Standards	ASTM F519, ISO 204, ASTM E139, EN 2002-005, ASTM E1457
Test Types	Creep, Relaxation, Crack Growth, Hydrogen Embrittlement
Temperature Range (Optional)	-100 to +1,500°C
Maximum Test Duration	Up to 100,000 hours
Load Control Mechanism	Dead-weight and mechanical spring
Safety Features	Fully enclosed cabinet, interlocked doors
Software Features	Integrated HMI, data logging, automated temperature control