



## Slow Strain Rate (Stress Corrosion) Test Machine



### Description:

Established in 1997, Advance Instrument Inc (AI) strives to develop, maintain, and produce highly specialized and technically advanced measuring instruments and systems for the expanding needs of the measurement industry. As a company, AI provides the highest levels of customer support, emphasizing the ability to react quickly to customer's needs and requirements from the beginning of a project until final completion.

AI is today one of the leading developer and provider of loading devices for research and studies of materials under Slow Strain Rate (Stress Corrosion) tests. This device is design for studies of materials' corrosion, fatigue, tensile, load and creep test under normal temperature, atmospheric pressure, high temperature and pressure condition.

Corrosive test cntainers used by AI includes AISA316 stainless steel, HASTELLOY C-276 ALLOY, Inconel Alloy, PTFE or PVDF. These containers' do support high strength or supercritical H<sub>2</sub>S corrosive environmental experiment.



By integrating ACPD or DCPD measurement system, corrosion cracking growth rate is measured automatically.

- International standards use in performing SCC-SSRT:
  - ISO7539
  - ASTM G129
  - NACE TM-0198/TM-0177
- AI's SCC-SSRT machine features:
  - High rigid overloading framework
  - Micro-step control, high-resolution and precision speed control
  - Dual displacement sensors, high-precision measurement of specimen's variable
  - Pressure balancing device
  - Water cooling system
  - Integrated computer controlled system
- Test experiments capabilities:
  - High temperature and pressure slow strain rate tensile test
  - High temperature and pressure constant load creep test
  - High Temperature and pressure corrosion fatigue test
  - CT crack growth rate measurement test
- Load capacity options:
  - 10KN
  - 30KN
  - 50KN
- Speed range:
  - $1 \times 10^{-3} \sim 1 \times 10^{-8}$  mm / s
- High temperature, normal pressure / high-pressure test container material options:
  - PTFE
  - PVDF
  - AISA 316 (stainless steel)
  - C276 (Hastelloy) / INCONEL
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**Description:**

AI's slow strain rate stress corrosion testing systems is capable of meeting wide array of test experiments. Its system components include - main host machine, environmental vessel, control and auxiliary equipment. These devices utilize mechanical and electrochemical corrosion testing technology, thus is applicable for various load variations, temperature, pressure, tensile rate and environmental conditions.

AI have many years of experience in the design and manufacture of SSRT slow tensile stress corrosion testing system and corrosion fatigue testing systems.

Test Machine:

Slow strain rate stress corrosion test machine ensures test accuracy of slow strain velocity and flexibility effect. Design constructed in two type: Floor stand and Desktop. Load speed range is in between  $1 \times 10^{-1} \sim 5 \times 10^{-9}$  mm / s, with maximum load capacity up to 50kN.

To assure the highest degree of accuracy on test results, the system is designed with a heavy-duty test stand for reducing system distortion, while ensuring accurate load and drive mechanism, thereby providing a constant tensile rate. Floor stand designed with an environmental vessel provides optimum workspace flexibility and has good permeability.

Displacement control:

Driven by high performance and accurate displacement control motor, AI displacement control system is comes with an easy-to-use software and displacement unit providing users with all the required functions.

Measurement and control system: Simple measurement procedure which coordinates displacement movement and measurement together. Advanced software and hardware features make the system capable of completing a variety of unique displacement movement and simultaneous measuring.

Micro-displacement system stepper motor: AI none gap micro-step drive mechanism enhance the level of the test system resolution. Each full step is divided into micro-steps to produce precise magnetic balance through adjustment coil's electric current. Through micro-displacement of each test cycle producing a multiple number of steps increases, thus greatly enhancing the displacement of the resolution.



3-3

Stress Corrosion Cracking (SCC) Test Equipment



## Description:

### Environmental chamber

AI offers an environment chamber for testing on normal room temperature-normal pressure to high temperature-high pressure at 30MPa, 600 °C . This high temperature-high pressure vessels are designed by AI for tensile test at high temperature and high pressure conditions requirements.



High temperature-high pressure vessels is comparable for use with AI stress ring, slow strain stress corrosion and corrosion fatigue testing machine.

Unique high temperature-high pressure vessels and pressure balancing devices provides users with a dynamic seal system, allowing stress and fatigue tests be carried out in a fully simulated corrosive environment.

Standard high-temperature chambers are made of 316 stainless steel. In application for more severe corrosive environments, AI also provides vessels made of C-276 Hastelloy, Inconel, Monel, and titanium, and other materials. Test conditions can make up 30MPa, 600 °C . For security, the chamber is designed with a metal locking ring and bolts.

Alloy tube is used to connect the environment chamber to the control panel, it can precisely control the feed-in and clearing of the test gas. The experimental temperature control system is controlled by an external heater through the computer.

Under normal environment application, the container may use heat-resistant glass, acid PTFE or PVDF, it is suitable from room temperature to 100 °C corrosion test temperature range.



**Description:**

All containers have electrochemical test system installation port, allowing simultaneous electrochemical and strain or fatigue test.

WINDOWS9X / NT / XP / 7 supported measuring and control system.

Measurement and control computing system developed by the AI. We offer the most advanced closed-loop control software of corrosion laboratories, test frame and high-temperature pressure vessel measurement and control systems around the world.

AI's instrument interface comes with a micro-step-motor drive control unit, load cell / LVDT signal modulator, the autoclave temperature control, surveillance systems and ACPD / DCPD measurement system.

Innovative and new technology on SSRT slow strain rate and CF corrosion fatigue testing machine have already put AI into the leading player in the field of corrosion test equipment manufacturer.



3-3

Stress Corrosion Cracking (SCC) Test Equipment



## Description:

### ACPD / DCPD Crack Growth Rate Automatic Measuring System

Upon test on slow tensile stress corrosion and corrosive fatigue tests, constant measurement of the crack growth rate is very important.

A-ACPD / DCPD provide AC and / or DC potentiometer method steering crack measuring system to provide accurate and convenient solution for the slow stretching and corrosion fatigue tests.

The potential amount of the host system, feedback coupling device, IEEE communications card and measurement software and other components.

Automatic measurement of crack growth rate at the maximum operating temperature and pressure conditions of the test machine environment chamber allowed, the maximum measurement accuracy can reach 0.1mm. Built-in typical measurement interval with open free setting, users can set up according to the actual application requirements.



**Test System Auxiliaries:** In order to accurately achieve a variety of corrosive environments, and extend test machine functionality, the test machine can be equipped with following auxiliaries:

**Cycle Loop Test:** Upon doing cycle loop test, constant supplement of additional and fresh medium into the environmental vessel will maintain the corrosion experiment consistency. This is carried out by a precise feeding pump, thus, the effect to the test would be very low and stable. Thereby, it will not destroy the environmental vessel.

Due to configurations with dissolved oxygen, conductivity and pH measurement systems, test personnel may use corrosive chemical indicators of the precise quantitative measurements, to achieve corrosion medium on the corrosion properties of accurate quantification.

High temperature-high pressure electrochemical system

Electrode reference of high temperature-high pressure: Patent through electrode chamber and electrode.

Depending on different experiment conditions, electrode chamber made of stainless steel, C276, and other materials can be be use. While chamber that is equipped with water cooling system is capable of doing more stable experiments on high temperature electrochemical test. Electrodes are made of Ag-AgCl, or insulated Zr-ZrO<sub>2</sub>. Electrode highest operating temperature, 300 °C ; maximum pressure 15MPa