

Test facility for crack growth measurement utilizing large size specimen

Purpose:

Nuclear power plants have suffered from stress corrosion cracking (SCC) on reactor core internals and piping. Existing cracks can be managed applying fitness for service code such as the maintenance code of the Japan society of mechanical engineers. The code utilizes a curve of crack growth rate and stress intensity factor for various combinations of material and environment. In order to obtain crack growth rate especially at high stress intensity factor, crack tip stress conditions must be same as those of thick actual components. A large size specimen should be used for this requirement. We made a new facility that is capable of using large size crack growth specimen in simulated BWR or PWR primary water condition.

Outline:

The facility is able to measure crack growth rate using 3 inches thickness compact tension specimen in simulated light water reactor coolant condition. The facility consists of an autoclave, a hydraulic loading system, a high temperature water recirculation system and a high precision crack length measurement system.

Specifications:

Maximum temperature of water: 360°C

Maximum pressure of water: 20MPa

Water flow rate: 240L/h for usual, 300L/h for maximum

Loading system: hydraulic actuator with 250kN of maximum

Maximum stress intensity factor: 80MPa.m^{0.5}/ 3 inches CT

Water chemistry measurement: Dissolved oxygen, Dissolved hydrogen, Conductivity, pH

Location and Date of Installation:

Yokosuka area, September 2010

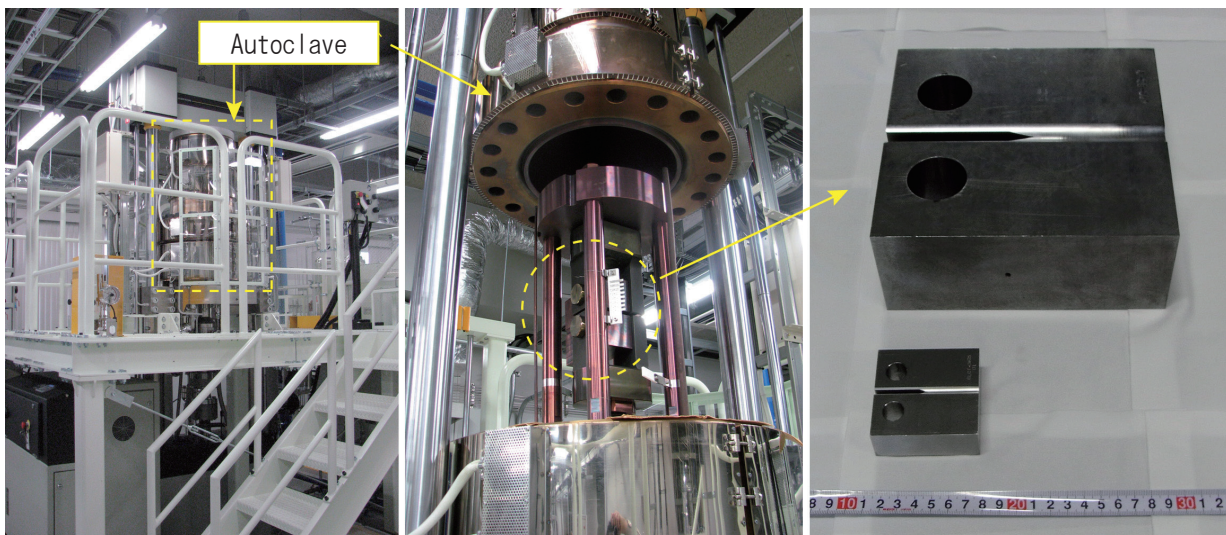


Photo 1 External view of the test facility

An autoclave is in the center of photo.

Photo 2 Internal view of the autoclave

A CT specimen is seen in the center of photo.

Photo 3 CT Specimen

Upper: 3 inches thickness,
Lower: 1 inch thickness