KNF-EQUIPSERV-04

Spacer Grid Impact Test

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The spacer grid impact test measures the impact load on the fixed spacer grid specimen by having it to collide with either a hammer or an weight that will freefall by pendulum swing.

Description

● Background

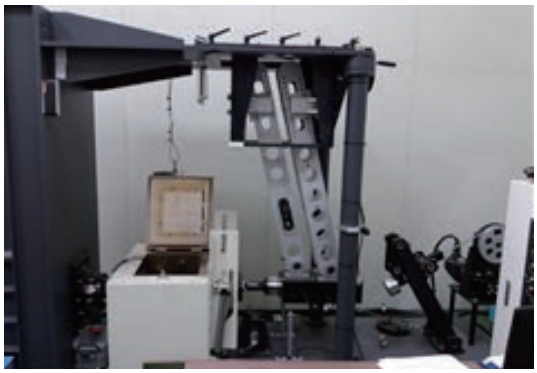
- The nuclear fuel assemblies in reactor core undergo the impact loads to each other due to vibration and/or collision in the event of accident such as SSE(Safe Shutdown Earthquake) and LOCA(Loss Of Coolant Accident). These impact loads are transferred to the guide tubes and the fuel rods through the spacer grids. In the worst case scenario, inserting the control rod may not be assured if spacer grids are crushed. Hence, the impact test is performed to verify the structural integrity of the spacer grid.

● Purpose and Necessity

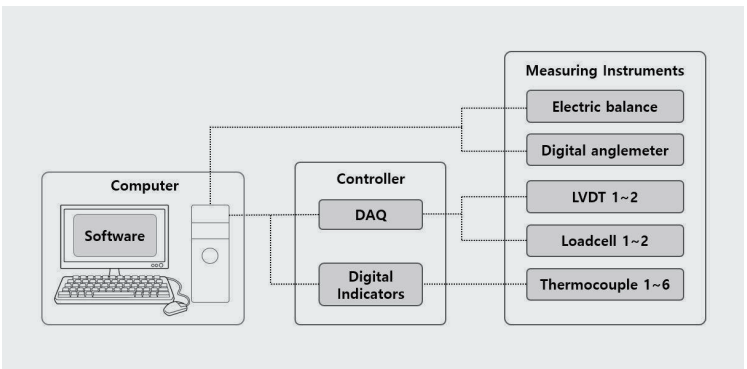
- The spacer grid impact test is performed in order to obtain and evaluate the dynamic characteristics of the spacer grid which is commercially in use or under development.

● Composition of Equipment

- The spacer grid impact tester is a pendulum-type tester, it impacts the specimen with the hammer dropped by rotation of pendulum.



< Spacer Grid Impact Test Equipment >

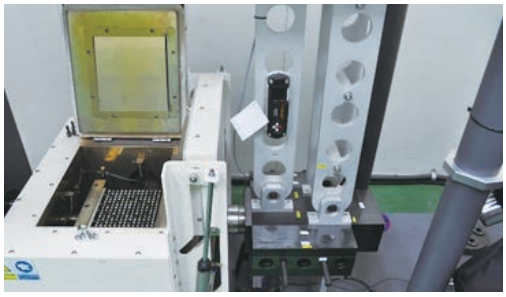


< Spacer Grid Impact Test Equipment Signal Tree >

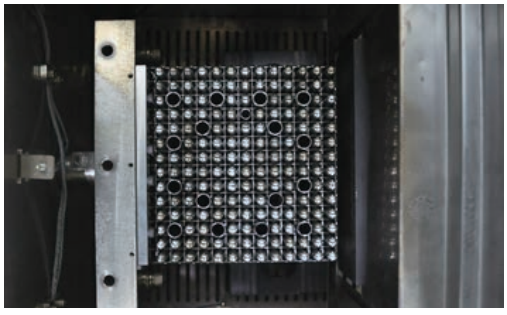
It consists of three parts; an weight includes hammer and pendulum, a furnace to provide a high temperature environment, and a control system to operate and control the tester.

- Weight to impact
  - The hammer is directly connected to the pendulum, and the pendulum angle is adjustable by rotating to change the initial position of the hammer. The hammer directly impacts the specimen by free drop.

- Furnace
  - To provide the high temperature environment up to 400 ℃. The impact test is performed with the spacer grid specimen inserting mock fuel rods and guide tubes installed inside the furnace.



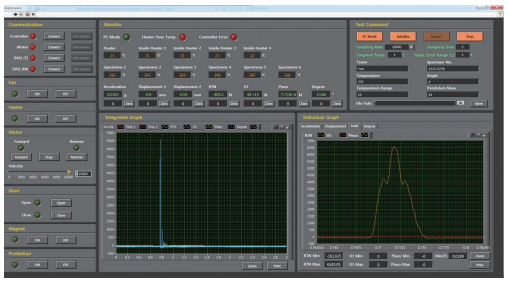
< Weight to Impact and Furnace-1 >



< Weight to Impact and Furnace-2 >

- Control system
  - The control system consists of a computer with a program to operate and control the hardware and to store the test data, a data acquisition system, and a digital indicator.

< Control System Equipment >



< Control System Configuration >

Distinctiveness

● Characteristics

- To perform the spacer grid impact test at room temperature, as well as at high temperature
- To perform the spacer grid impact test with a full-sized specimen, and also with a partial specimen.

● Benefits

- To evaluate the dynamic characteristics of the spacer grid and to get feedback for enhancing its impact performance

Experience

- To evaluate and verify the dynamic characteristics of the spacer grid which is commercially in use or under development.

Deliverables

- Impact test report on spacer grid