Testing system for structural performance of deteriorated reinforced concrete members

Purpose:

To be able to help the maintenance and the life diagnosis of aging concrete structures at electric power plants, we aim to elucidate interaction between materials deterioration by environmental actions and structural damages by mechanical load of the reinforced concrete members, and also effects on materials / structural performance of the reinforced concrete members by these interactions.

Outlines:

This system imparts materials deterioration by environmental action and structural damage by mechanical load in turn to reinforced concrete members. It is composed of three facilities: the placing and curing room, the environmental load simulator, and the loading equipment.

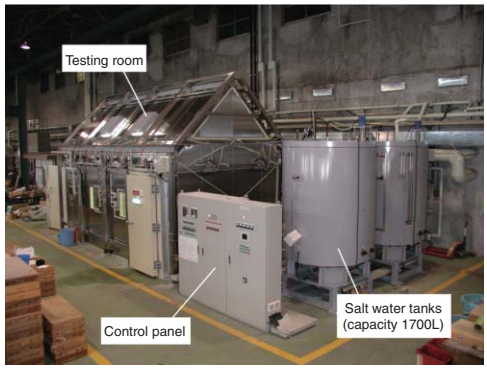
a) It is a unique facility that can give deterioration by environmental action and structural damages by mechanical load repeatedly.
b) Experiments on large-sized reinforced concrete specimens such as beams, pillars and walls are possible.
c) Specimens can be made under conditions simulated to the on-site conditions, which have an effect on concrete strength and initial defects, in the placing room.
d) The environmental load simulator can simulate seashore, mountains and, high temperature environments, etc.
e) The loading equipment can impart various structural damages such as earthquake load on underground concrete structures, etc.

Specifications:

a) Environmental load simulator
Room size: 6.0m(W), 4.0m(H), 3.0m(D)
Temperature range: − 20℃～65℃ (control precision; ± 1℃)
Humidity range: relative humidity 30%～100% (control precision; ± relative humidity 5%)
Salt water mist method: two fluids (salt water and air) nozzle method
Carbon dioxide density range: 0.03% (density of the atmosphere) ～ 15%
b) Loading equipment
Hydraulic jacks: one maximum load capacity 3,000kN jack, four 1,000kN jacks and eight 200kN jacks
Hydraulic pump: one four-line systems electric hydraulic pump
Measurement devices: one data logger and one switch box
c) Placing and curing room
Room size of placing room: 17.0m(W), 6.9m(D), 3.5m(H)
Room size of curing room: 8.0m(W), 7.2m(D), 3.0m(H)
Temperature range: 10℃～30℃ (control precision; ± 2℃)
Humidity range: 40%～80% (control precision; ± relative humidity 10%)

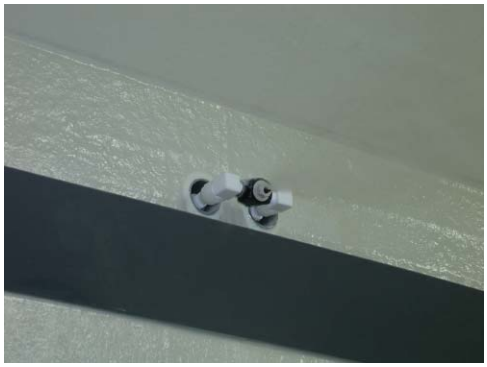
Location and Date of Installation:

Abiko Area, September 2007



Entire view of the environmental load simulator

An inside view of the environmental load simulator s during salt water spraying



Salt water mist nozzle of the environmental load simulator