

Shake and Table Tests at KOERI and Needs of the Industry

Erdal Şafak and Ayşe Edinçliler

Kandilli Observatory and Earthquake Research Institute Bogazici University, Istanbul, Turkey

E-mail : erdal.safak@boun.edu.tr, aedinc@boun.edu.tr

Abstract

Shake table tests are one of the best tools for investigating the seismic performance of structures, components, and equipment. The Department of Earthquake Engineering of Kandilli Observatory and Earthquake Research Institute of Bogazici University in Istanbul has three shake tables in different sizes that are used for research and industrial applications. The largest of them is a servo-hydraulic, 3m x 3m, uniaxial shake table that can simulate seismic motions within a frequency band of 0-50 Hz for payloads up to 10 tons. This is the only shake table of this capacity in Turkey. The medium size shake table is a tri-axial servo-electric shake table with dimensions of 0.7m x 0.7m. It can simulate ground motions in 0-40 Hz for payloads up to 100 kg. The more precise small shake table is also uniaxial with a payload capacity of 23 kg, which is mostly used for sensor calibration and equipment qualification.

The tests that have been done on these shake tables include scaled structural systems, various retrofit schemes for seismic damage, soil strengthening schemes, various full-scale external cladding systems, base-isolation systems, museum artifacts, mechanical equipments of different sizes (e.g., natural gas pressure regulators, bus bars, cable trays, piping systems, hangers, etc.), and mechanical and electrical natural gas shut-off systems. Equipment tests are typically required to meet the contractual requirements and the performance standards specified by current codes.

The new seismic and earthquake design codes for tall buildings just completed by KOERI for the Istanbul Municipality require certain performance tests be completed for all cladding elements in tall buildings. Also, most equipment manufacturers are now requiring international test certificates to be able to export their products. It is clear that the need for shake table tests in Turkey will increase in the future, requiring bigger, tri-axial, and more precise shake tables.