Many large, multi-storey buildings, particularly residential and office spaces, are built using precast concrete components and then assembled on-site. While generally rapid and economic to build, the performance and stability of such buildings in earthquake zones is poorly understood. The European Union (EU)-funded project SAFECAST has investigated how to make them safer and developed new construction guidelines which are expected to be implemented in the regions at risk in Europe.

The SAFECAST team focused on better understanding the performance of precast concrete buildings in earthquake zones. This issue is important in Europe as many of the most destructive earthquakes have occurred in its seismically active regions, including Italy, Romania and Greece. Most casualties are a result of the collapse and damage of poorly designed buildings.

During the project, different elements of precast buildings, particularly the connecting sections, were examined and various possibilities for anti-seismic and structural configurations were explored.

The most promising configurations were tested ‘live’ using a full-scale three-storey precast building at the European Commission’s Laboratory for Structural Assessment (ELSA) in Ispra, Italy. Through a series of tests, simulating conditions during an earthquake, the researchers were able to analyse the seismic response of complex precast structures, connection devices, joints and subassemblies. The results of this extensive ‘live’ testing were used to develop state-of-the-art design recommendations for the construction sector.
The project brought together an international team of precast concrete manufacturers and building research bodies from the most seismically active European countries (Greece, Italy, Portugal, Slovenia, Spain and Turkey). The team was led by Italy’s Concrete Manufacturers’ Association, Assobeton, which was supported by its international partner, the Turkish Precast Concrete Association.

The Turkish Precast Concrete Association played a key role in the dissemination of the resulting construction guidelines to the precast industry. “The SAFECAST project helped develop cost-effective and universal solutions which can improve the safety of the people living or working in precast building structures in seismic areas. These guidelines can be used as a reference for designing structures for use in earthquake zones where no specific norms or mandatory provisions exist,” says the Turkish Precast Concrete Association’s Secretary General, Bülent Tokman.

The guidelines developed under SAFECAST were published as a universally recommended model in a document called ‘Design Guidelines for Connections of Precast Structures under Seismic Actions’. “Our recommendations are expected to help improve the standards for construction in Europe's seismic regions,” comments project leader, Dr Antonella Colombo of Assobeton.


See also:
CORDIS [4]

Project:
Perfomance of innovative mechanical connections in precast buildings structures under seismic conditions

Project Acronym:
SAFECAST

Project website:

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