Design, Full-scale Testing and CE Certification of Seismic Isolators According to the European Norm EN 15129

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Summary

The increasing need for safer bridges and buildings in Europe has stimulated the development of the first European specifications for the design, manufacturing, and testing of anti-seismic devices, the European norm EN 15129. Among the great variety of anti-seismic devices, seismic isolators such as lead rubber bearings (LRB) and curved surface sliders (CSS) have found wide application in bridge and building structures. In order to reach the CE Certification according to EN 15129, a complete testing campaign has been carried out as specified by the European norm. Despite the demanding testing requirements in the new European norm, the results proved that the proposed design of the isolators successfully fulfilled the performance required for the CE Certification.

Keywords: seismic isolation; lead rubber bearings; pendulum isolators; full-scale testing; EN15129.

1. Introduction

Although Europe is not as seismically active as other parts of the world, the design of critical structures to withstand the effects of earthquakes continues to gain importance on the continent. This was underlined by the publication of the new European Norm for Anti-seismic Devices, EN 15129 on August 2010. This norm regulates the design, production and testing of most existing types of anti-seismic devices, and crucially, also allows the development of new devices, as long as they fulfill the established performance criteria. From August 2011, only manufacturers certified to supply seismic devices with the CE label will be able to provide these devices in Europe [1].

This is a significant development for the bridge industry in Europe, due to the critical role bridges play as lifelines in the aftermath of an earthquake – enabling access for emergency services and the evacuation of the affected population. The cost associated with repair or replacement of damaged bridges is likely to be small compared with the economic impact caused by disruption to traffic after an earthquake and during the long reconstruction phase.

In order to assure functionality of bridges, they must be designed to safely withstand the devastating forces of seismic ground movements. Past earthquakes have served as full-scale tests and the often tragic results have forced engineers to reconsider design principles and philosophies. Recent earthquakes have repeatedly demonstrated, for example, that during an earthquake, adjacent spans of multi-span bridges often vibrate out-of-phase, causing significant damage to the structures [2].

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