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Testing of key bridge components to ensure good life-cycle performance

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Abstract

The proper long-term performance of key bridge components such as bearings, expansion joints, dampers and seismic isolators is an important factor in the life-cycle quality control of new and existing bridge infrastructure. Laboratory testing of these components in accordance with national and international standards can very helpful in ensuring good performance, but the testing that can find application is very varied, as demonstrated with reference to sample completed testing procedures – illustrating the benefit of consulting with an experienced practitioner as required.

Keywords: Testing; bridge; bearings; expansion joints; dampers; seismic isolators; durability.

1. Introduction

The proper long-term performance of critical structural components such as bearings, expansion joints, dampers and seismic isolators is vitally important in maximising long-term performance of bridges and other structures in which they are used. It thus plays a significant role in minimising the life-cycle costs of such structures, not only in terms of direct and indirect financial costs resulting from repair and replacement work, but also with respect to the disruption caused to the structure's users during the work [1] [2]. In the case of a bridge's expansion joints, for instance, the initial cost of supply and installation is considered by some authorities to be "insignificant" relative to the future costs of maintenance and replacement should the joints perform poorly [1].

A good way of ensuring that these key components will perform well throughout a long bridge service life is to conduct laboratory testing prior to use, in accordance with national or international standards. It should be noted that, although testing of anti-seismic devices is focused on performance during an earthquake rather than on durability, it is relevant for the life-cycle performance of the bridge infrastructure in which the devices are used as they will help ensure the bridge's survival of such an event, extending its life cycle in this way.

The wide range of testing that may be applied to key structural components is illustrated below with reference to important internationally recognised testing procedures for components of various types.

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