

## Expansion joints for urban bridges – quiet, reliable and low-maintenance

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## Summary

The bridges that a city needs, and in particular its expansion joints, must be designed and fabricated to consider and satisfy a variety of other needs of the city and its inhabitants in addition to providing a simple trafficable route. In an urban setting, issues such as noise, reliability and ease of maintenance take on special significance, due to the increased importance of the structure and sensitivity of adjacent communities to noise, compared with a similar bridge in a rural setting.

Solutions to the challenges facing the suppliers of expansion joints for urban bridges are presented, including descriptions of the various types of "quiet" expansion joint available, and of ways in which existing or new joints can be made quieter. The importance of using high-quality and innovative materials, in particular for sliding components which are particularly susceptible to wear, is discussed. Use of such materials, in expansion joints which have been designed and tested for long life in demanding conditions, will minimise the need for maintenance and replacement work, thus reducing not only the cost of such works but also the effect of traffic disruption on the local population. Other design factors, such as consideration of seismic events, which if neglected could result in a city's lifelines being cut at a time of great need, are also considered.

**Keywords:** bridges; expansion joints; low-noise; reliable; low-maintenance

## 1. Introduction

Bridges play a vital role in the life and economy of any city, especially where they create essential links across obstacles such as rivers and canals, as is particularly true in Venice. However they also have potential to impact on the life of the city in negative ways, and therefore must be designed and constructed to minimise such impacts. This is especially true in relation to the expansion joints which facilitate the movements of the bridge while always providing a continuous driving surface, as these components can be the most significant sources of noise from a bridge, and also tend to be more susceptible to damage and wear than the main structure, thus more frequently leading to traffic disruption during repair or replacement works.

## 2. Expansion joint types which offer particular benefits for urban bridges

The following types of expansion joint are particularly suitable for use on urban bridges, due to their low noise characteristics and high durability:

1. Cantilever finger joints
2. Sliding finger joints
3. Modular expansion joints with noise-reducing surface plates
4. Single gap expansion joints with noise-reducing surface plates