

BRIDGE POLICY CIRCULAR

BPC2003/04

SUBJECT: Use of Proprietary Expanded Metal Construction Joints and Shear Keys

No. Drawings Following	0	No. Appendix Sheets Following	0
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Background

Construction joints are an integral feature of reinforced and prestressed concrete construction for bridgeworks.

The requirements for construction joints are specified in Clause 7.8 of RTA B80, as follows:

“The surface of concrete at construction joints shall be deliberately roughened to a pronounced profile with a surface roughness not less than 3 mm. Loose aggregate particles and laitance shall be removed. Prior to placing the adjoining concrete, the surface of the construction joint and the projecting reinforcement shall be washed clean, and the concrete surface saturated with water conforming to the requirements of this Specification for water used in concrete, following which all excess water and loose material shall be removed.

Salt or other contamination of the joint surface and reinforcement in marine or aggressive environments, shall be removed by using high pressure water. Temporary openings in formwork shall be provided to allow contaminated water to be removed.”

These requirements ensure that:

1. the fresh concrete will have aggregate interlock with the old concrete;
2. the fresh concrete will develop a good chemical bond with the old concrete;
3. the cover to reinforcement and embedments is maintained; and
4. there is no contamination of the concrete that might induce corrosion.

Recently, two Contractors, one in a Design, Construct and Maintain contract and the other in a Lump Sum contract, used a proprietary expanded metal product to form construction joints. Whilst this type of construction joint has a number of advantages for the contractor, there is significant potential for adverse long term effects to the structure. There is also a need for the installation to be properly controlled.

These devices were designed for the building industry, where design life is nominally 50 years, where much of the concrete is in Exposure Classification A with little moisture present and where loading is essentially static. However, they are not suitable for use under more severe exposure conditions, greater design lives nor for high cyclic live loadings.

An expanded metal product, such as that depicted in the photograph below, may induce corrosion failures and shear failures if not properly used. **There is concern that the concrete behind the expanded metal sheet may be left in a honeycombed state due to the escape of cement slurry through the mesh of the expanded metal.** In this case, the designer would need to be satisfied that the available aggregate interlock is sufficient for shear transfer. The designer would also need to be satisfied that the expanded metal products are suitable for the exposure conditions on site.



Expanded metal mesh construction joint.

The use of such devices in construction joints does not eliminate the need for proper preparation of the concrete surface in accordance with RTA B80. In particular, the cover concrete still must have laitance removed so that the bond of the new concrete to the old is achieved in the cover zone. Any mortar slurry that passes through the device must also be fully removed, so that the shear capacity of the joint is not impaired.

Shear key devices raise similar durability issues to the expanded metal construction joint devices. They have, in general, been developed for the building industry and are detailed on the assumption that the environment is benign and that loading is essentially static.

It is false economy to risk the failure of a bridge deck costing a hundred thousand dollars due to poor shear transfer or corrosion at a construction joint to save a few hundred dollars during construction.

Current RTA Position

The use of proprietary products, such as expanded metal construction joints and proprietary shear key systems require careful consideration of all aspects of the system installation and long term performance.

Expanded metal construction joints are not suitable for use in RTA bridge and structural works because of the long term durability risks.

Other proprietary construction joint systems need careful evaluation by technical experts before use.

Proprietary shear key systems may only be used where it can be demonstrated that they will have satisfactory long term performance, taking into consideration the durability requirements of the structure.

Action Required

Project designers, design reviewers, project managers, Contract Superintendents, Quality Verifiers and Project Managers are to ensure that:

1. Any proposal to use expanded metal mesh to form construction joints in RTA Bridge and Structural works is rejected;
2. Any proposal to use any other proprietary form of construction joint shall be referred to the Manager, Road and Bridge Technology for consideration;
3. Any proposal to use proprietary shear key systems shall be referred to the Manager, Road and Bridge Technology for consideration.

Evaluation of submissions to use proprietary systems for construction joints and shear keys will take some time. A period of 20 working days needs to be allowed for evaluation of any proposal, and the cost of the evaluation shall be met by the Contractor.



Gordon Chirgwin
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Date 15/11/03

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