

BRIDGE TECHNICAL DIRECTION BTD2011/03

SKID-RESISTANT TREATMENTS FOR BRIDGE DECK JOINTS

Background

Clause 17.3.1 of AS 5100.4 *Bridge design – Bearings and deck joints*, requires that “metal surfaces wider than 200 mm, which are exposed to vehicular traffic, shall be provided with an anti-skid treatment.”

Information

Treatment of the trafficked surfaces of bridge deck joints may be required to minimise the risk of drivers losing control of vehicles traversing the joints in adverse weather conditions of heavy rain.

The RTA has specified, for many years, the application of criss-cross weld beads on its steel fingerplate joints followed by hot-dipped galvanising after fabrication, with no specific problems reported. This treatment addresses the aquaplaning situation, by providing a macro-texture to the steel surface that, in conjunction with the tyre treads, allows the stormwater to be expelled from between the tyre and treated deck joint surface.

Vehicle tyres in contact with metal surfaces, typically steel or aluminium, in normal dry or wet weather conditions will usually have sufficient frictional resistance between the rubber tyres and the metal surfaces to prevent skidding or slipping, except if contaminants such as oil are present on the surface.

Skidding or slipping will occur when frictional resistance is overcome, such as when the vehicle is braked whilst travelling at excessive speeds or when travelling a tight radius bend at excessive speed, or if oil is present on the surface. Where oil is present on the surface, it presents a road hazard and must be removed as soon as possible. This risk cannot be accounted for in the design of the bridge deck joint, and must be dealt with by road maintenance crews.

The coefficient of friction between the vehicle tyres and the metal surfaces of bridge deck joints has a wide range of possible values, and is affected by factors such as:

- (i) whether the metal surface is wet or dry;
- (ii) condition of the surface being rough or smooth, and
- (iii) the type of rubber and the age and extent of wear of the tyres.

To reduce the risk of vehicles skidding or slipping on the bridge deck joint, the coefficient of friction can be increased by applying a coating to the surface that provides an additional micro-texture, the effectiveness of which depends on the type of coating and its durability.

Application of the additional micro-texture to the metal surface of the bridge deck joint may be required to give additional frictional resistance, but shall be applied only when deemed necessary following a risk assessment, as detailed below. RTA approved proprietary slip-resistant coatings are available for this purpose. However, such coatings wear under traffic, and may need to be regularly inspected and, if necessary, reapplied periodically.

Details of RTA approved proprietary slip-resistant coatings can be found in the *Lists of RTA Approved Bridge Components and Systems*, refer to BTD2008/11.

Longitudinal metal bridge deck joints parallel to the direction of traffic are sometimes required e.g., when an existing structure is widened. With time, such longitudinal deck joints can become proud of the wearing course of the bridge deck as the adjacent asphalt wears away under traffic. The subsequent issues that occur cannot usually be addressed by the addition of any treatments to the metal surfaces of such joints. They can only be addressed by milling and replacing the worn asphalt with new fully compacted dense grade asphalt level with the joint following compaction during placement and from traffic. However, to minimise risks to traffic that arise from the presence of such joints in the trafficked part of the roadway, their top surfaces should be given a skid-resistant treatment as detailed below.

Bridge Technical Direction

All deck joints on new bridges, and replacements for existing joints, exposed to vehicular road traffic with metal surfaces more than 200 mm wide or long measured in the direction of traffic shall have a skid-resistant treatment on those surfaces as follows:

- (i) For all traffic situations, a grid at 45 degrees to the direction of traffic of intermittent orthogonal weld beads 3 mm high x 55 mm long spaced at 110 mm in both directions.
- (ii) For high-risk traffic situations, see below, weld beads as in Item (i) above together with an RTA approved proprietary slip-resistant coating.

For the purpose of this Bridge Technical Direction, to assess whether a bridge deck joint requires an RTA approved proprietary slip-resistant coating, a risk assessment shall be carried out, with following situations deemed to be high-risk:

- (a) Bridges on horizontal alignments with curves less than:
 - a. 150 m radius with traffic speeds greater than 60 km/hr; or
 - b. 230 m radius with traffic speeds greater than 80 km/hr; or
 - c. 450 m radius with traffic speeds greater than 100 km/hr.
- (b) Bridges on curves with negative (adverse) crossfall.
- (c) Bridges on curves with crossfall less than that specified in the RTA Road Design Guide for the posted travel speed.
- (d) Bridges on vertical alignments with gradients greater than 9%.
- (e) Bridges on urban arterial roads at locations with annual average daily traffic (AADT) exceeding 80,000 vehicles.

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