

Noise and Vibration No.5 Version 2

To All suppliers

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Subject High performance low-noise road surfaces

Introduction

This is the second version of this technical memorandum and replaces the first version (dated 22 July 2014). The first version is no longer valid and is withdrawn.

This technical memorandum sets out a recommended approach for assessing high performance low-noise road surfaces, for an interim period until a comprehensive update is made to the adjustments published in:

- Waka Kotahi. Guide to state highway road surface noise. 2014
<https://nzta.govt.nz/resources/road-surface-noise/>
- Waka Kotahi. Guide to state highway noise mapping. 2013
<https://nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Noise-and-vibration/Standards/Guides/DRAFT-NZTA-guide-to-state-highway-noise-mapping-v1.0.pdf>

This interim guidance primarily relates to the acoustics performance of the following surfaces (with or without epoxy):

- Porous asphalt (PA/EPA)
- High voids porous asphalt (PA-HV/EPA-HV)
- Twin layer porous asphalt (PA-TL/EPA-TL)

This technical memorandum is based on recent research into New Zealand road surface noise. This work is ongoing, and the current research programme is scheduled to confirm updated road surface noise adjustments by July 2021.

Road surface noise research

Since the publication of the *Guide to state highway road surface noise* in 2014, Waka Kotahi has run an active research programme furthering understanding of road surface noise in New Zealand. This has included noise measurements of hundreds of kilometres of porous asphalt surfaces. This work is documented in a series of reports available on the Highways Information Portal:

<https://nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/noise-and-vibration/research-and-information/>

From this work it has become apparent that published adjustments for New Zealand road surface noise need to be revised and updated. Work is in hand to make this update. This second version of Technical Memorandum NV5 provides interim information primarily for the high performance (porous asphalt) road surfaces that appear to be most affected by discrepancies between recent research and published adjustments.

Chipseal surfaces

Initial findings from recent research indicates that published adjustments for road surface noise from chipseal surfaces are either appropriate or are slightly conservative (i.e. some surfaces may be slightly quieter in reality than indicated by the adjustments). Therefore, it is recommended that the published adjustments continue to be used for all chipseal surfaces until a comprehensive update is made in mid-2021.

Porous asphalt surfaces

Recent research has shown substantial variability in the road surface noise from porous asphalt in New Zealand. It appears this variability was not adequately addressed by the published adjustments (Table 2.1 in the *Guide to state highway road surface noise*). Key issues are:

- Road surface noise is critically dependent on porous asphalt surface thickness, but this was not addressed in the published adjustments.
- The published adjustments for PA–HV are primarily based on what now appears to be an unrepresentative or non-comparable example. Recent research has shown that the increased macrotexture of a high voids mix causes an increase in road surface noise, rather than the increased porosity causing a decrease as represented by the published adjustments.
- The published adjustments for PA–TL are based on limited trial sites and current research shows that PA–TL does not appear to provide a benefit over a thick single layer of porous asphalt.

To address these issues, until updated adjustments are published, for all work associated with state highways:

- All types of porous asphalt surface should be assumed to have the published adjustments for a PA10 surface in Table 2.1 of the *Guide to state highway road surface noise* (Rc 0dB; Rt –2dB).
- All porous asphalt surfaces should be 30mm minimum thickness and EPA10/PA 10 or finer for this data to remain valid.

High performance (noise reduction) surfaces

Research has shown that improved performance can be achieved from porous asphalt surfaces. For state highway projects, if a high-performance (noise reduction) porous asphalt surface is required, an EPA7/PA7 at least 50mm minimum thickness should be used. Interim adjustments are currently available for EPA7 but shall only be provided for design and assessment on a case-by-case basis as approved by Waka Kotahi. The application of these adjustments is limited to certain road geometries and requires appropriate sensitivity analysis and risk assessment. For further information contact Greg Haldane (greg.haldane@nzta.govt.nz).

Unless required for purposes other than noise mitigation, at this time new PA–TL and PA–HV surfaces should not be used on state highways.