

TECHNICAL
MEMORANDUM

Noise and Vibration No.4

To All suppliers

Prepared by Stephen Chiles

Endorsed by Rob Hannaby

Date 24 February 2014

Subject Road/surface noise data for a two-coat and a racked-in chipseal

1. Introduction

Road/surface noise measurements have been conducted for a Grade 3/5 two-coat chipseal and a Grade 3/5 racked-in chipseal, using the Statistical Pass-By (SPB) method from ISO 11819-1^{1,2}. The results show minor differences, which may be primarily due to the ages of the surfaces rather than the surface types. Differences between racked-in and other chipseals have also been observed previously³.

Measurements were made in June 2013 at two locations by SH60 in the Tasman region:

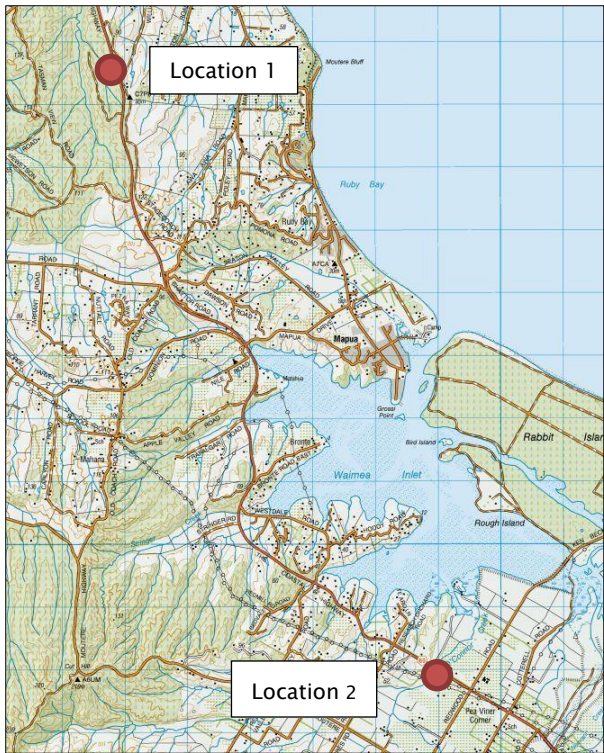
- Location 1 – Grade 3/5 racked-in seal – SH 60 southbound approximately 1 km north of Dicker Road (NZTM 1603654 5438238 – 060-0000/7.478); and
- Location 2 – Grade 3/5 two-coat seal – SH 60 northbound approximately 100 m south of Blackbyre Road (NZTM 1611572 5425844 – 060-0000/4.990).

The two locations were selected to have similar characteristics, other than the surface types. At Location 1 the racked-in seal was laid in April 2012 (one year old) and at Location 2 the two-coat seal was laid in 2009/2010 (three years old).

¹ ISO 11819-1 1997 – Acoustics – Measurement of the influence of road surfaces on traffic noise – Part 1: Statistical Pass-by method

² Previously, measurements of different road surfaces for the Transport Agency have used a modified form of the SPB method: *Opus International consultants, Low-noise road surfaces Performance monitoring, 2013.*

³ *Opus International consultants, Drive-by vehicle noise, Report 00-2U5011.00, 2000. (www.acoustics.nzta.govt.nz)*



● Measurement locations

Both road locations are classified as being medium speed roads according to ISO 11819. The roads have a posted speed limit of 100 km/h, with average measured speeds during the survey less than 99 km/h but greater than 65 km/h.

2. Survey details

Parameter	Details
Personnel	Darran Humpheson, URS
Dates and times	Location 1 – 31 June 2013, 0745h – 0945h Location 2 – 31 June 2013, 1010h – 1145h
Instrumentation	Brüel and Kjær 2250 sound analyser, serial number 2638850 Brüel and Kjær 4231 calibrator, serial number 2635932 MPH Industries Target Z35 radar gun
Microphone locations	1.2 m above local ground level and 7.5m from middle of the relevant carriageway. Microphone perpendicular to the road direction.
Field checks	Prior to noise measurements a field calibration was performed. At the end of measurements a conformance check was performed. The difference in the reference levels was 0.1 dB.



Location 1 – Racked-in chipseal

Location 2 – Two-coat chipseal

4. Results

The following table summarises the measurement results at each location. The mean, standard deviation (σ), 95th percentile and number of vehicles (n) in each category are listed.

Metric	Racked-in chipseal				Two-coat chipseal			
	Cat 1 dB	Cat2a dB	Cat2b dB	Speed km/h	Cat 1 dB	Cat2a dB	Cat2b dB	Speed km/h
Mean	84.2	85.0	87.6	89.5	83.0	82.8	86.8	85.6
σ	1.62	1.39	2.03	6.71	1.58	2.10	1.92	7.61
95 th %	86.8	87.5	90.6	100.4	85.1	85.7	89.5	95.2
number	131	10	13	–	100	6	11	–

Note: Cat 1 – Cars/light vehicles, Cat 2a – heavy, Cat 2b – dual-axle heavy

The calculated SPBI for each measurement location is provided below:

- Grade 3/5 raked-in chipseal – 84.2 dB
- Grade 3/5 two-coat chipseal – 82.5 dB

The resulting difference is 1.7 dB.

In total, there were only 23 Category 2 vehicles measured at Location 1 within a 2 hour period. To have recorded at least 80 Category 2 vehicles, as required by ISO 11819 would have taken approximately 8 hours. Similarly at Location 2, only 17 Category 2 vehicles were measured. Therefore, the Category 2 results and SPBI data given above does not comply with the requirements of ISO 11819.

For the cars alone (Category 1), which did comply with the ISO 11819 data requirements, the resulting values are:

- Grade 3/5 racked-in chipseal – 82.2 dB
- Grade 3/5 two-coat chipseal – 81.3 dB

The resulting difference is 0.9 dB.

According to Annex C of ISO 11819-1:1997, a difference of this magnitude is normal of the difference over time or location that can occur for the same surface type.

For a normalised sample of 10 car pass-bys on each surface the third octave frequency band noise levels are shown on the following graph.

