

# Navigating the British Standards for road traffic noise barriers

By Giles Parker

## Overview

Historically the acoustic performance of noise barriers for highways would invariably be specified by their surface density (e.g. minimum 10kg/sqm) and little else. However, this idealised approach that ignored product durability and the potential of leakage at fixings often led to under-specified barriers being built, giving short term acoustic performance and negligible attenuation at low frequency.

## Impact of CPR

Since 1 July 2013, under the Construction Products Regulation 2011 (CPR), it is mandatory for road traffic noise barrier manufacturers to provide a declaration of performance (DoP) and a CE mark for their products because they are covered by the harmonised product standard BSEN 14388:2005.

## Harmonised product standard

(BS)EN 14388, 'Road traffic noise reducing devices - Specifications', is the harmonised European Product Standard focussed on devices designed to reduce the propagation of traffic noise away from the road environment. As such it addresses noise barriers (devices that are a combination of acoustic and structural elements, which obstruct the direct transmission of airborne sound emanating from road traffic, as well as claddings, road covers and added devices (see the standard for the respective definitions).

BSEN 14388 identifies relevant performance characteristics together with corresponding methods of evaluation. It specifies provisions on evaluation of conformity and CE marking. It covers acoustic, non-acoustic and long term performance, but not aspects such as resistance to vandalism or requirements for visual appearance. Annex ZA of EN 14388:2005 define the essential characteristics set out within Mandate M/111<sup>1</sup>.

## The current version: 2005

A product standard is harmonised when it has been accepted by the European Commission and published in *The Official Journal of the European Union*. (BS)EN 14388:2005 is accepted, published and in current use in the UK and throughout the European Union. Although a new edition was published last year (BSEN 14388:2015), this has not yet been harmonised and cannot be legally applied at this time.

## Test standards for noise barriers

BSEN 14388 contains the following test standards for noise barrier performance:

- **Acoustic performance: BSEN 1793**  
BSEN 1793-1 for Airborne Sound Insulation:  $DL_R$   
BSEN 1793-2 for Sound Absorption:  $DL_V$
- **Non-acoustic performance: BSEN 1794**  
BSEN 1794-1 for Mechanical and Stability Performance  
BSEN 1794-2 for Environmental and Safety Performance
- **Durability (long term performance: BSEN 14389)**  
BSEN 14389-1 for Acoustic Performance Durability  
BSEN 14389-2 for Non-Acoustic Performance Durability

This article will be confined to the acoustic performance standards alone.

## Acoustic test standards for noise barriers

EN 1793 Test standards all test a complete noise barrier "system" in the test laboratory, which in the majority of cases comprises both acoustic elements (panels) and "structural elements" (posts and fixings; although the posts may be hidden within the structure).

It is wholly accepted that laboratory testing a panel sample alone ignores the potential for leakage at the posts and fixings and can therefore over-predict a barrier's insulating performance. Below are the acoustic test standards referenced in the current harmonised product standard: BSEN 14388:2005.

## Airborne sound insulation: BSEN 1793-2

The current harmonised product standard refers to BSEN 1793-2:1997 as the test method for airborne sound insulation. This is required for all road noise barriers (reflective and absorptive). It categorises the airborne sound insulation using the following single number rating system:

Category	$DL_R$ dB
B0	Not determined
B1	$DL_R < 15$
B2	15 to 24
B3	> 24

In normal conditions, a rating of B3 for airborne sound insulation would be considered a good performance in almost all road noise barrier scenarios.

A later version of the test standard has been published as BSEN 1793-2:2012 (but not yet included in the harmonised product standard). This includes for a higher rating of B4 for  $DL_R > 34$  dB for high diffraction applications such as tall barriers where high insulation levels might be required.

## Sound absorption: BSEN 1793-1

The current harmonised product standard refers to BSEN 1793-1:1997 as the test method for sound absorption. This is required for absorptive road noise barriers. It categorises the sound absorption using the following single number rating system:

Category	$DL_V$ dB
A0	Not determined
A1	$DL_V < 4$
A2	4 to 7
A3	8 to 11
A4	> 11

In normal conditions, a rating of at least A3 for sound absorption would be considered a good performance for almost all absorptive road noise barrier scenarios.

A later version of the test standard has been published as BSEN 1793-1:2012 (but not yet included in the harmonised product standard). This includes for a higher rating of A5 for  $DL_V > 15$  dB for very reverberant environments (cuttings, tunnels, high-sided barriers).

## Coming soon to a noise barrier near you

The standards referred to above may already be very familiar to acoustic design engineers and specifiers of road traffic noise barriers. Precisely when a new version of the harmonised product standard will emerge is hard to gauge, however future versions will bring significant changes to the way that barriers are acoustically tested and specified:

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### Airborne sound insulation: BSEN 1793-6

An external test method for determining the in-situ airborne sound insulation of a noise barrier has already been published – BSEN 1793-6:2012. Once this standard is included in a future version of the harmonised product standard it will replace BSEN 1793-2 for almost all road noise barrier schemes (apart from the most reverberant applications such as for high sided noise barriers, canopies or tunnels). In-situ airborne sound insulation is still an intrinsic characteristic of the barrier product and is determined as a single number rating:  $DL_{SI}$ .

### Sound reflection: BSEN 1793-5

An external test method for determining the in-situ sound reflection of a noise barrier has already been published – BSEN 1793-5:2016. Once this standard is included in a future version of the harmonised product standard it will replace BSEN 1793-1 for almost all road noise barrier schemes (apart from the most reverberant applications such as for high-sided noise barriers, canopies or tunnels). In-situ sound reflection is still an intrinsic characteristic of the barrier product and is determined as a single number rating:  $DL_{RI}$ .

### Acoustic durability: BSEN 14389-1

The method for assessing the long term acoustic performance or acoustic durability of a noise barrier is provided in the published standard BSEN 14389-1:2015. Once this standard is included in a future version of the harmonised product standard, a manufacturer will declare the durability of his product in accordance with BSEN 1793-5 for in-situ sound reflection and BSEN 1793-6 for in-situ airborne sound insulation.

### Removal of rating categories

In future versions of the harmonised product standard, the performance rating categories (A1, A2, A3... B1, B2, B3 etc) will be removed completely. Barrier performance will be specified on the basis of the single number rating values. This will include an estimated level of uncertainty. A manufacturer might therefore also specify the performance of a barrier product in a particular frequency range which will be useful for example where strong low frequency performance is required for a road barrier application.

### CE marking of road traffic noise barriers

For noise barrier products to be CE marked, testing of performance characteristics shall be carried out by an accredited laboratory or test house (for example UKAS accredited). The test house/laboratory will be required to provide test report, certificates documenting the tests.

### Notified Bodies

A Notified Body will then carry out a review of the test report/ results. In some case they may have also been the test house. Once the Notified Body is satisfied that everything is in order, the manufacturer (or his agent) can then produce a DoP for the product. This entitles the manufacturer to affix a CE marking to their product. Typically this takes the form of a certificate supplied with the product.

The Notified Bodies throughout Europe for EN 14388:2005 are listed in a document prepared by the European Commission<sup>2</sup>. That document lists BSI Testing as the sole Notified Body in the UK for EN 14388:2005. However it is understood that BSI do not currently provide testing or certification for BSEN 14388:2005.

Since there is currently no Notified Body in the UK who can carry out the review of test reports/results as required by the Construction Products Regulation (AVCP System 3). UK manufacturers must therefore use a Notified Body in mainland Europe.

In order for a product to be CE-Marked, CPR theoretically allows a manufacturer to only meet the requirements of one of the essential characteristics in the M111 mandated list. Logic would tell any manufacturer that such a product might be unmarketable if the declaration of performance only referred to a single characteristic. He/she will therefore ensure that his noise barrier product is tested comprehensively and a procurer of noise barrier for road traffic applications will full assess the DoP to see that it fully complies with his project and not just accept the CE Mark on face value. □

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### References

1. Mandate M/111. Mandate to CEN/CENELEC concerning the execution of standardisation work for harmonised standards on circulation fixtures related to the following end uses – 30/33: Circulation fixtures. 28 August 1996. Brussels, Belgium: European Commission.
2. List of bodies notified under Directive: Regulation (EU) No 305/2011 - Construction products', 07 August 2016;