

## NEW BSEN STANDARDS FOR HIGHWAY NOISE BARRIER DESIGN

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### 1. INTRODUCTION

This paper introduces the new BSEN standards for highway noise barriers that have emerged over the last two years. The latest standards to be issued deal with the acoustic and non-acoustic performance specification and were produced by the CEN TC226 Working Group 6.

### 2. BSEN 1793 Parts 1,2 and 3: Test method for determining the acoustic performance

Until recently, noise barrier specification relied on the testing of products to the standard test method for building elements (ISO 354 : 1985 for sound absorption and ISO 140-3 : 1995 for airborne sound insulation). Whilst these were the recognised methods they had long been considered limited as a representative way of determining the intrinsic properties of a noise barrier. BSEN 1793 was issued in 1997 for the specification of road traffic noise reducing devices.

To help in the circulation of products across the continent, the test method allows for products to be specified using a single number rating for absorption and airborne sound insulation.

#### 2.1. BSEN 1793 part 1 : Intrinsic characteristics of sound absorption

The primary change to the test arrangement of ISO 354 is the inclusion of a post element in the sample assembly. Most barriers are supported by posts once they are installed. Where the posts are visible they will therefore influence the performance of the barrier in absorbing noise.

The objective is to assemble the test specimen in the same manner as the manufactured device, with the same connections and seals between component parts.

The individual sound absorption coefficients are measured at each one-third octave band in the range 100 Hz to 5 kHz and weighted according to the normalized traffic noise spectrum defined in BSEN 1793 part 3. From this the single number rating  $DL_n$  is calculated in decibels. It must be stressed that this value will differ from that obtained through previous methods.

The single number rating  $DL_n$  is then categorized for absorptive performance using the following table.

Categories of absorptive performance	
Category	$DL_n$ dB
A0	Not determined
A1	< 4
A2	4 to 7
A3	8 to 11
A4	> 11

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In more complex situations where multiple reflections occur the original spectrum of the traffic noise will be altered so that the low frequency components may be emphasised at the receiver positions. In these latter conditions it is important to consider the performance of absorptive materials as a function of frequency.

### 2.2. BSEN 1793 part 2 : Intrinsic characteristics of airborne sound insulation

As above, the primary change to the test arrangement of ISO 140 is the inclusion of a post element. The objective being to assemble the test specimen in the same manner as the manufactured device, with the same connections and seals between component parts.

The individual airborne sound insulation coefficients are measured at each one-third octave band in the range 100 Hz to 5 kHz and again weighted according to the normalized traffic noise spectrum defined in BSEN 1793 part 3. From this the single number rating  $DL_R$  is calculated in decibels. Again, this will differ from that obtained through previous methods since the inclusion of the post may have a marked effect on the barrier performance.

The single number rating  $DL_R$  is then categorized for airborne sound insulation performance using the following table.

Categories of absorptive performance	
Category	$DL_R$ dB
B0	Not determined
B1	< 15
B2	15 to 24
B3	> 24

As with absorption, the same comments apply where low frequency noise components are emphasised at the barrier surface.

## 3. BSEN 1794 Parts 1 and 2: Test method for determining the non-acoustic performance

### 3.1. BSEN 1794 part 1 : Mechanical performance and stability requirements

In 1998, the specification of the non-acoustic performance of noise barriers was also standardised to take into account. BSEN 1794 part 1 deals with the mechanical performance and stability requirements of the barrier. Barrier durability will be covered in a later standard for long term performance.

This standard requires the assessment of the following characteristics. The assessments should be carried out either by test or calculation as directed in the standard:

- Wind load and static load
- Self Weight
- Impact of stones
- Safety in Collision
- Dynamic forces for snow clearance

This standard does permit specifying authorities to indicate that there is no requirement for a specific characteristic, however this must be indicated.

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## **3.2 BSEN 1794 part 2 : General safety and environmental requirements**

Part 2 of BSEN 1794 was also issued in 1998 for the specification of general safety and environmental requirements. These included the following:

- Resistance to brushwood fire
- Secondary safety: danger of falling debris
- Environmental protection
- Means of escape in emergency
- Light reflection
- Transparency

## **4. FUTURE BSEN STANDARDS**

Although still in the process of writing, further standards will soon follow for the specification of noise reducing devices. These include a harmonised product standards and a standard for durability or long term performance. At the same time, further work is being done to develop an entirely new test method for noise barriers that would allow for in situ testing of installed barriers. Whilst this is still probably five years away, the durability and product standards should be issued in the next one to 2 years.

