Developments in standards for noise barriers

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Introduction

- Road authorities need to
  - Maintain the integrity of existing assets
  - Ensure new assets are cost-effective and long-lasting
  - Balance asset management against disruption

- Noise barriers are primary assets

- Older barriers may well require repair, upgrade or even complete replacement

- Design specifications need to ensure barriers are
  - High performing, durable and low maintenance
What do we require from noise barrier standards?

- Specification based on certified, tested performance
- Common, standardised assessment methods
- Characterise new condition & over working life
- EU standards developed over the last 15 years
- Recent on-going improvements to standards allow
  - Higher acoustic performances at the design stage
  - Improved assessment techniques
  - Allow management of asset value over working life
European (CEN) standards for noise barriers

Road Traffic Noise Reducing Devices
(Product) Specifications
EN 14388

Acoustic performance
EN 1793 suite
- EN 1793-1: Sound absorption
- EN 1793-2: Airborne sound insulation
- EN 1793-3: Normalised traffic spectrum
- CEN/TS 1793-4: Sound diffraction
- CEN/TS 1793-5: In-situ sound reflection & airborne sound insulation
- EN 1793-6: In-situ airborne sound insulation

Non-acoustic performance
EN 1794 suite
- EN 1794-1: Mechanical performance & stability
- EN 1794-2: General safety & environmental stability

Long-term performance
EN 14389 suite
- EN 14389-1: Acoustical characteristics
- EN 14389-2: Non-acoustic characteristics

CEN/TC226/WG6 (Noise Protection Barriers) is responsible for these standards
Noise Reducing Devices (NRDs) as defined in EN 14388

- Acoustic element
- Noise barrier
- Added Device
- Post or Structural Element
- Cladding
- Acoustic element

Post or Structural Element

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Overview of acoustic standards (EN 1793)

- EN 1793-1 (Laboratory)
- CEN/TS 1793-5 (In-situ)
- CEN/TS 1793-4 (In-situ)
- EN 1793-2 (Laboratory)
- EN 1793-6 (In-situ)
Use of European standards

**European Standards DO**

- Specify how an NRD should be assessed
- How its performance should be reported
- Focus on **intrinsic** characteristics, i.e. how the product performs, not on how it is used.

**European Standards DO NOT**

- Specify minimum performance requirements
- Address characteristics such as appearance, resistance to vandalism or installation quality
- These issues are the responsibility of national specifications, contract documents, etc.
### EU (CEN) Standards for noise barriers: Timeline

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Construction Products Regulations (No. 305/2011)

- Replaced Construction Products Directive (CPD) on 01 July 2013
- CPR harmonises
  - Methods of assessment & testing
  - Means of declaration of product performance
  - System of conformity assessment
- Requires **mandatory CE marking** for all NRDs
- CE marking enables a product to be placed legally on the market in ANY EU Member State
- It does not necessarily mean that it is suitable for use in all Member States.
Research projects connected to EU standards

**ADRIENNE**
- Developed in-situ tests (CEN/TS 1793-6 and CEN/TS 1793-5)

**QUIESST:** *Quietening the environment for a sustainable surface transport* ([www.quiesst.eu](http://www.quiesst.eu))
- Refinement of in-situ test methods,
- Sustainability, barrier optimisation, etc.
- Handbook on optimisation of NRDs

**QUESTIM:** *Quietness & Economics Stimulate Infrastructure Management* ([www.questim.org](http://www.questim.org))
- Acoustic durability of noise barriers (if data available)
- Guidelines on methods/procedures for initial assessment
- Guidelines on methods/procedures for in-service monitoring
Focus on acoustic standards: Initial performance

- Traditionally using laboratory-based techniques
  - EN 1793-2: Airborne sound insulation
  - EN 1793-1: Sound reflection

2012 Revision of EN 1793-1:
- New sound absorption class (A5, $DL_\alpha > 15$ dB)

2012 Revision of EN 1793-2:
- New sound insulation class (B4, $DL_R > 34$ dB)
- Change in scope – Restrict to products used in diffuse sound field conditions
- No longer suitable for assessing noise barriers on highways – use more representative EN 1793-6
Why is EN 1793-6:2012 such a useful tool

- **In-situ/‘outdoor laboratory’** test method for assessing airborne sound insulation performance.

- **Representative:** Determines performance under conditions representative of actual use.

- **Product design:** Valuable for design & formulation of installation manuals.

- **Conformity of production assessment:** Compare design specifications with actual performance data on newly installed barriers.

- **Long term performance:** Asset management tool via repeated measurements over time.

- **Suitable for use at the roadside:** But may need traffic management & need access to rear of barrier.
Focus on acoustic standards: Long-term performance

- Currently declare reduction in screening performance after 5, 10, 15 and 20 years in given exposure classes
- Based on measurements (specifies CEN/TS 1793-5) or expert judgement
- **2014/15 revision of EN 14389-1:**
  - Introduction of EN 1793-6 for measurements
  - Declare working lifetime in **years** in given exposure classes and the corresponding acoustic performance at the **end of working life only**
  - Requirement for installation & maintenance manuals to allow working lifetimes to be achieved
Specifications standard

- **2014/15 revision of EN 14388:**
  - Introduction of all available new/updated test methods (EN 1793-4 and EN 1793-5 to be introduced later)
  - Elimination of laboratory testing for the acoustic performance of noise barriers used in non-reverberant conditions
  - Requirements for installation/maintenance manuals
  - Amendments related to introduction of CPR.
Standards as tools for Road Authorities

- **Barrier Manufacturers:**
  - EN 14388
  - (Previously EN1793, EN1794 & EN 14389 as required)

- **Road Authorities:**
  - NRA Series 300 & EN14388
  - (Previously NRA Series 300, EN1793 & EN1794)

Road Authorities:
- EN 1793-6
- Visual inspection

New installations

Specification and Procurement

Monitoring and Maintenance

Design and Development
Summary of expected future developments

2013:

- CEN/TC226/WG6/TG4 (NRD sustainability)
- Development of standards for NRDs
- Building on work in the QUIESST

2014-2015:

- Revised EN 14388 specifications standard
- Revised acoustic standards (EN 1793-4 & -5)
- Revised long-term performance standards (EN 14389-1 & -2)
- Issue of EN 1794-3 (Reaction to fire. Burning behaviour of noise reducing devices)
Do You Have Any Questions?