



Developments in standards for noise barriers

Dr Phil Morgan

Senior Consultant, TRL

Convener, CEN/TC226/WG6/TG1



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

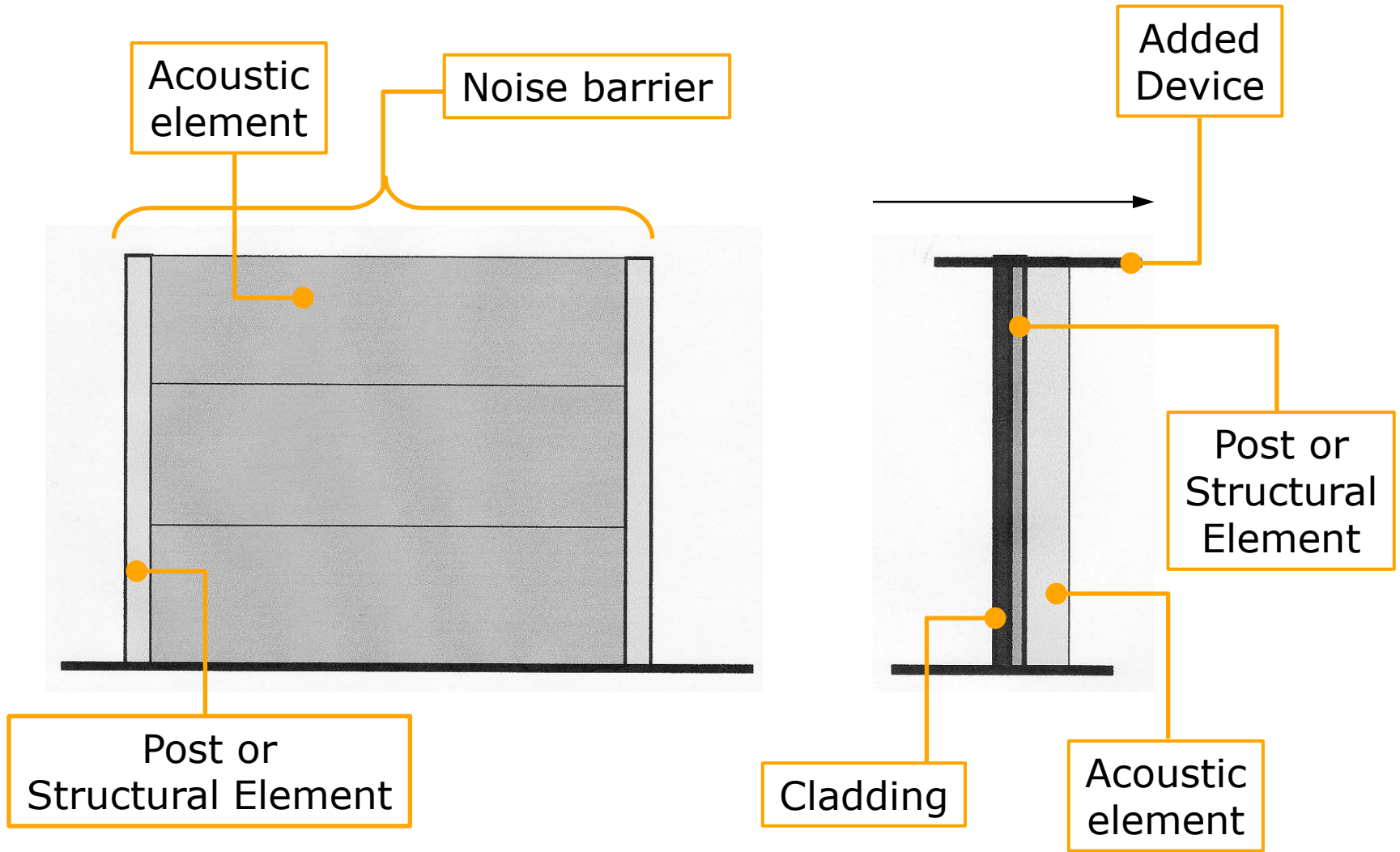
- *EN 1794-1: Mechanical performance & stability*
- *EN 1794-2: General safety & environmental stability*

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



Overview of acoustic standards (EN 1793)

- EN 1793-1 (Laboratory)
- CEN/TS 1793-5 (In-situ)

Reflection

- CEN/TS 1793-4 (In-situ)

Diffraction

Source

Receiver

Transmission

- 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.

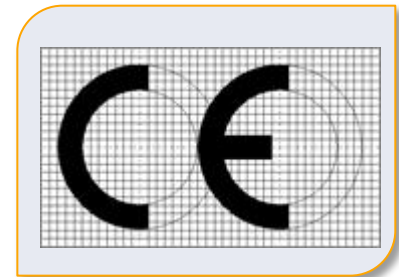


EU (CEN) Standards for noise barriers: Timeline

Year	EN 14388	EN 1793						EN 1794		EN 14389	
		Pt 1	Pt 2	Pt 3	Pt 4	Pt 5	Pt 6	Pt 1	Pt 2	Pt 1	Pt 2
<i>1995-1997: ADRIENNE European-funded research project</i>											
1997		Issue	Issue	Issue				Issue	Issue		
2003					Issue	Issue		Issue	Issue		
2004											Issue
2005	Issue										
2007										Issue	
<i>2009-2012: QUIESST European FP7-funded research project</i>											
2011								Revise	Revise		
2012		Revise	Revise				Issue				
2013: Introduction of Construction Products Regulations 2011											
<i>2013-2014: QUESTIM CEDR-funded research project</i>											
2014-2015	Revise				Revise	Revise				Revise	Revise

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)

- Refinement of in-situ test methods,
- Sustainability, barrier optimisation, etc.
- Handbook on optimisation of NRDs



QUESTIM: *Quietness & Economics Stimulate Infrastructure Management* (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



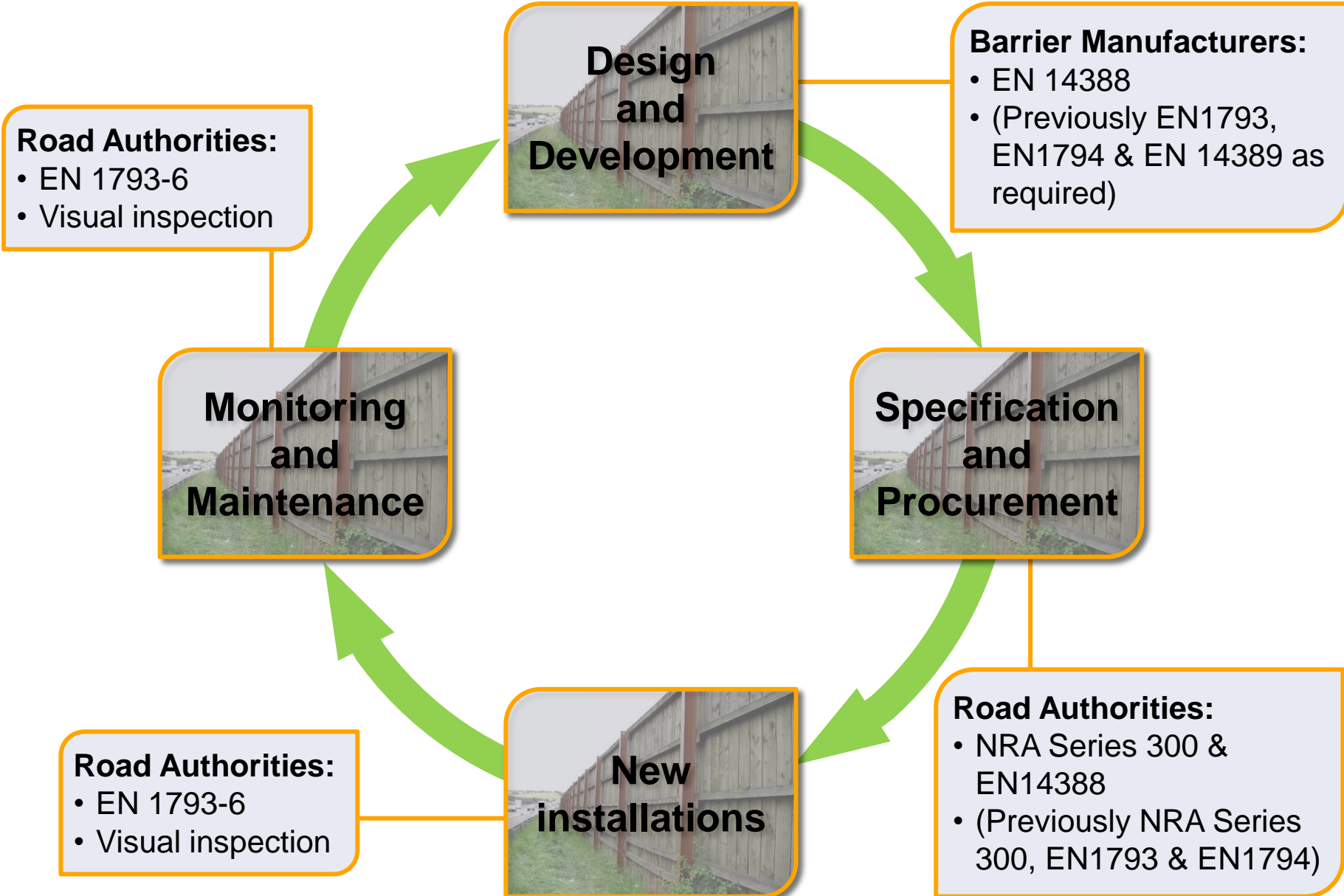
Specifications standard

■ 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



Summary of expected future developments

2013:

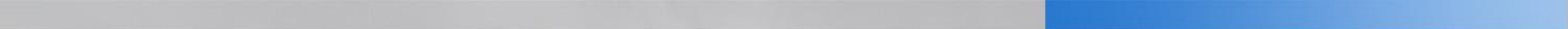
- CEN/TC226/WG6/TG4 (NRD sustainability)
- Development of standards for NRDs
- Building on work in the QUIESST



■ 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?**