

European Noise Barrier Federation



*Introduction lecture
about EU noise policy and product standard*

Giovanni Brero – ENBF President

ENBF gathers the main national associations and single companies manufacturing noise barriers for transport infrastructures



A few big companies producing raw materials.
Mainly SMEs placing the complete product on the market
and subcontractors involved in installation activities.
**Small medium companies cannot afford investments given
the uncertainties in the application of EU noise policy.
ENBF can provide a common voice in Europe**

legislation: noise mapping for existing infrastructures

Areas divided in
classes by
Municipalities:

(yellow area)
CLASS 3 - residential
Limits
Lday 60 dB(A)
Lnight 50 dB(A)

(red area)
CLASS 4 - mix
residential/commercial
Limits
Lday 65 dB(A) Lnight
55 dB(A)



A corridor on both
sides of the
infrastructure is
then overlapping
defined areas.

More tolerant noise
limits are
established within
the corridor

legislation: noise calculation models



To reduce transport noise various actions may be required



Action on the source (low noise asphalts, rail dampers, speed limits): low noise reduction for almost all residential

Action on the building (insulated windows): high noise reduction for few residential

Action on the propagation paths (essentially **noise barriers**): up to 15 dB noise reduction for many residential

Noise policy should **promote cost / benefit analysis** for the correct mix of actions to be taken

Existing infrastructures: action plans implemented by Infrastructure Managers

In some Member States budgets are yearly allocated for noise reduction but are often diverted for other purposes

Or funds allocated for road asphalt maintenance are also counted for noise protection.

Strategic maps, action plans, overlap between EU Directive and National Legislation, new limit values ... **may divert Infrastructure Managers from being focused on actions to be taken for effective noise reduction.**

Products to be used: different approaches are taken for noise barriers within various countries in EU

- In northern EU countries earth beams and timber barriers are mainly used: **landscape approach**
- In central EU (i.e. Germany): functionality and durability are taken into account: **technical approach**
- In France mainly: **architectural approach**
- Southern EU low price criterium is dominating noise barrier choice: **cost wise approach**

Examples of different approaches in Europe

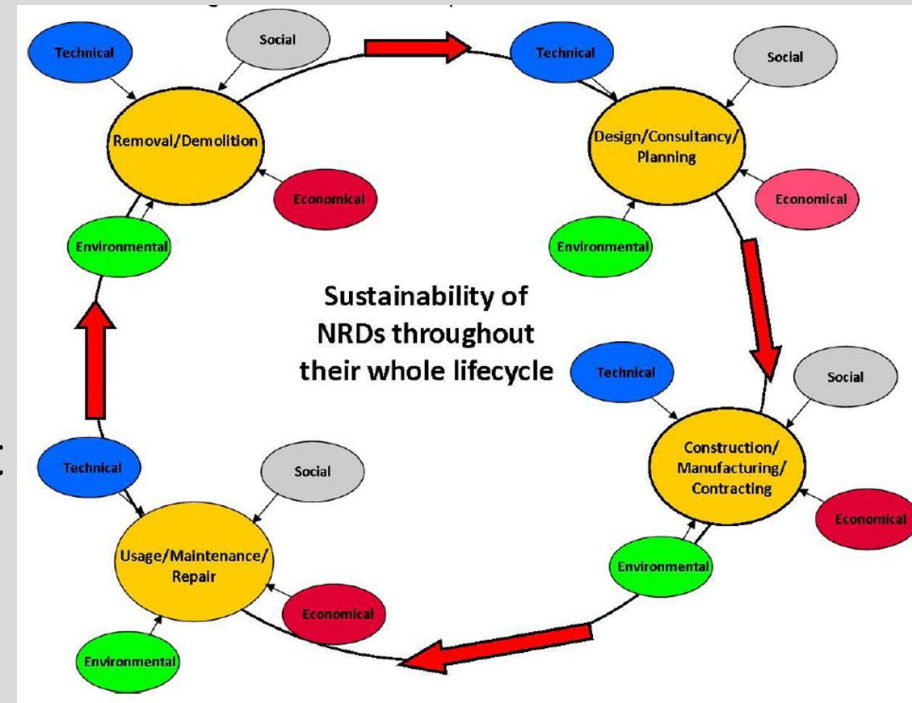


Noise barriers require a sustainable approach in design and procurement

Noise barriers are built for a green scope.

A green approach is required for design activities, material used, construction maintenance and dismantling procedures.

Life cycle sustainability assessment is then recommended and a new standard is now being implemented



Green criteria need to be implemented in the evaluation grid for public procurement procedures

New Infrastructures: noise barriers are part of negotiation with local authorities

Within EIA procedures of new infrastructures Noise Barriers are used to get the acceptance of local authorities. Main Contractors and Consortium are generally responsible of design activities: noise barrier item is often considered on the basis of the total quantity and low cost criterium.

Result: poor quality, short durability, low noise protection, negative feedback from residentials.



Road traffic noise barriers are regulated by harmonized standards

Noise Barriers are Construction Products regulated in EU by CPR 305/2011: CE marking must then be provided with reference to the existing harmonized standard, EN 14388:2015.

In fact CE marking **only consists** of an harmonized way to declare product performance:

No third party are involved in the assessment of constancy of performance

No minimum quality standards are set at EU level

Risk: to globally lower quality levels across EU countries

Rail noise barriers are not regulated by harmonized standards

For Rail application Noise Barriers are regulated by rules established Rail Authorities at national level.

A few countries (Germany, France, Italy) has implemented specific homologation procedure for noise barrier to be used along rail track



A common CEN standard is now being prepared but not yet implemented by national Rail Authorities



Cost for noise protection:

In Germany
yearly DeutscheBahn
budget > 100 mill. Euro





Cost for noise protection:
Total amount of noise barrier for the
new high speed network: 450.000 sqm

Thanks for the attention

For other infos about ENBF activities
please refer to
www.enbf.org



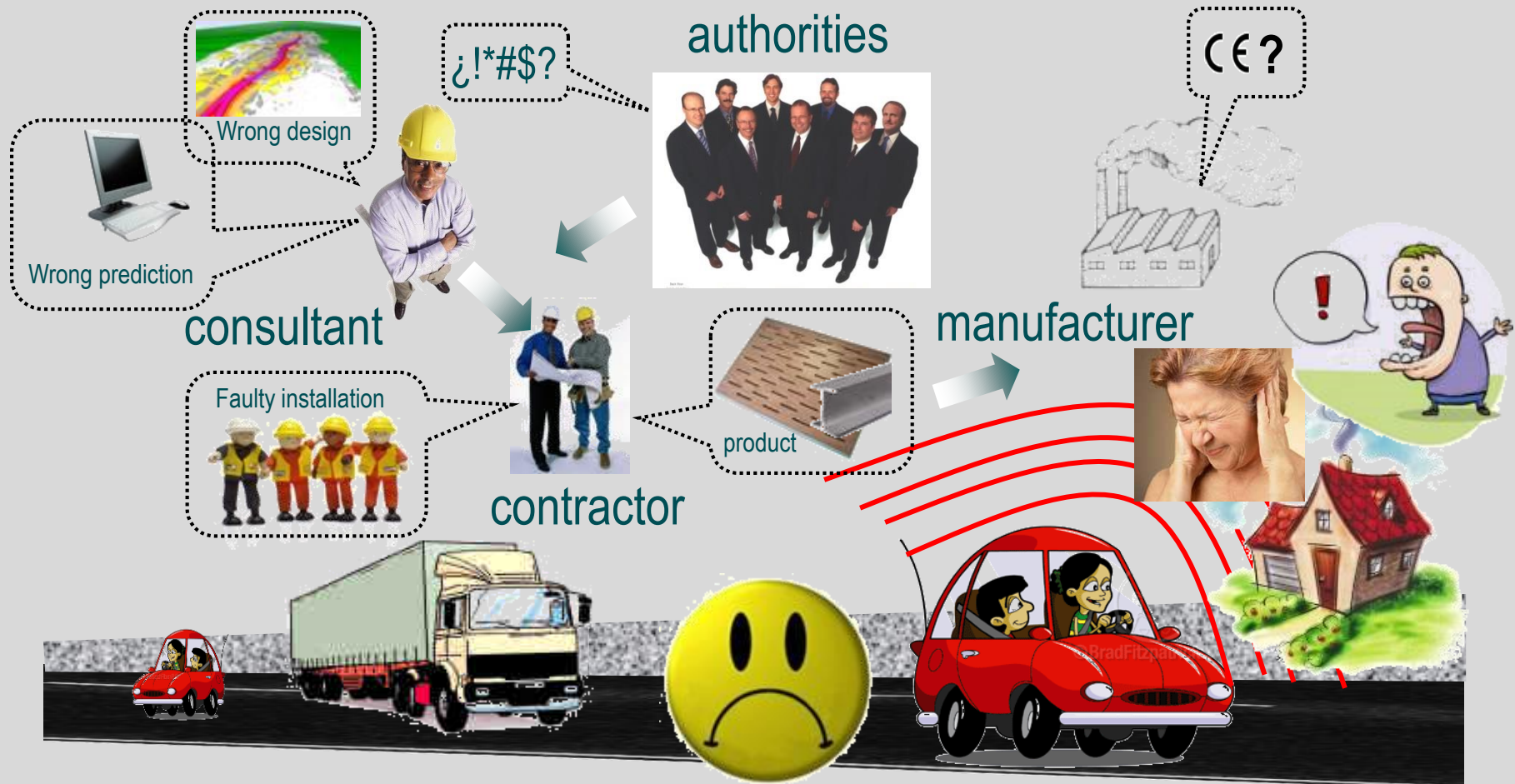
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2nd part
noise barrier design

Giovanni Brero – ENBF President

Often may happen that:



It should be like that:



DoP (Declaration of Performance)

Noise barrier (NOT a part of it) is the product to be incorporated into a road infrastructure and its performance has to be declared for the essential characteristics:

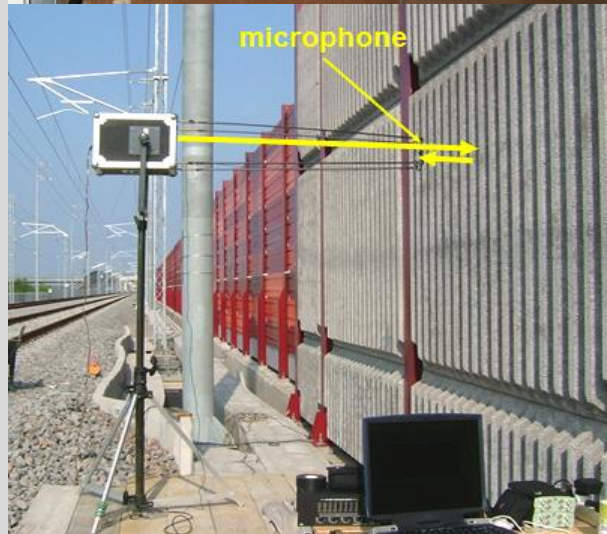
CE marking for Noise Barriers to be installed alongside Road Infrastructures

ENBF – Guidelines & Recommendations
(<http://www.enbf.org/outcomes.htm>)

| CPR |
|---|
| 1- Mechanical resistance and stability |
| 2- Safety in case of fire |
| 3- Hygiene, health and the environment <i>throughout the life cycle + safety of workers</i> |
| 4- Safety and <i>accessibility</i> in use |
| 5- Protection against noise |
| 6- Energy economy and heat retention <i>Energy efficiency of construction work during construction and dismantling</i> |
| 7- Sustainable use of natural resources |

CE marking >> DoP of the noise barrier system

Acoustic performance: insulation + absorption



Reverberant chamber method (EN 1793.1 and 2)

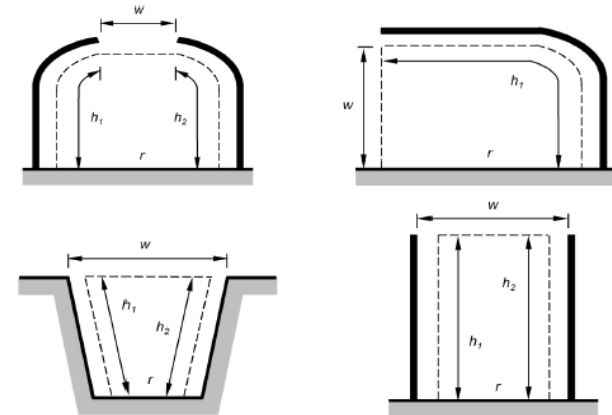


Figure 3 – EN1793 defining reverberant field conditions

Conditions are defined as being reverberant when the percentage of open space in the envelope is less than or equal to 25%, i.e.:

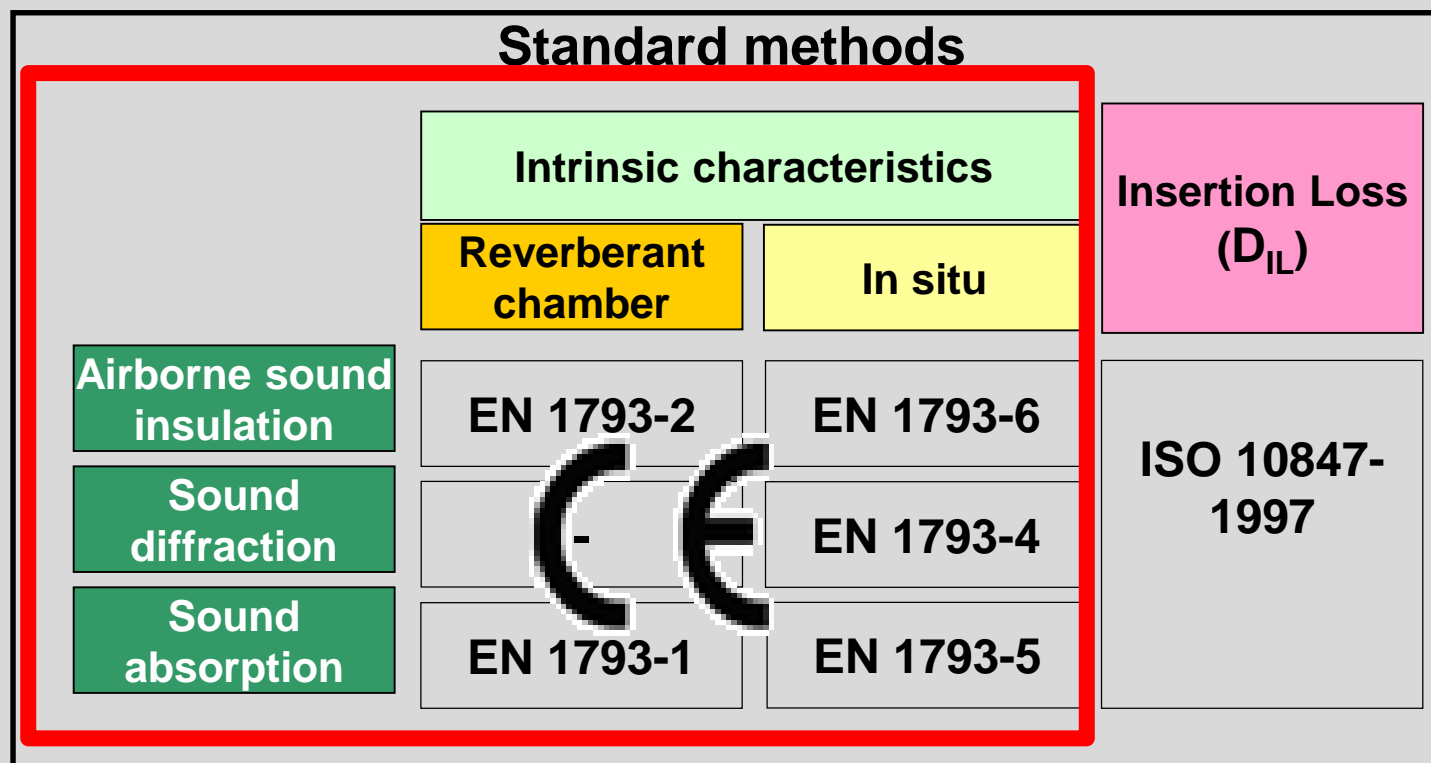
$$w/e \leq 0.25 \quad (1)$$

$$e = (w + h_1 + h_2) \quad (2)$$

In situ method
(CEN EN 1793.5 - EN 1793.6)
Evaluation to be performed on
the noise barrier system

ACOUSTIC PERFORMANCE

Present State of the Art on Methods for CE marking



CE marking >> DoP of the noise barrier system

Structural performance (EN 1794-1)



- ✓ Manufacturers shall declare maximum loads noise barrier are able to withstand provided maximum deflection of post and panels are not exceeded.
- ✓ Loads to be considered are wind load and variable loads due to passing vehicles.
- ✓ Structural calculation is currently performed on the supporting posts.
- ✓ Laboratory tests are recommended for the noise panels and will be prescribed like mandatory in the next revision of the standard.

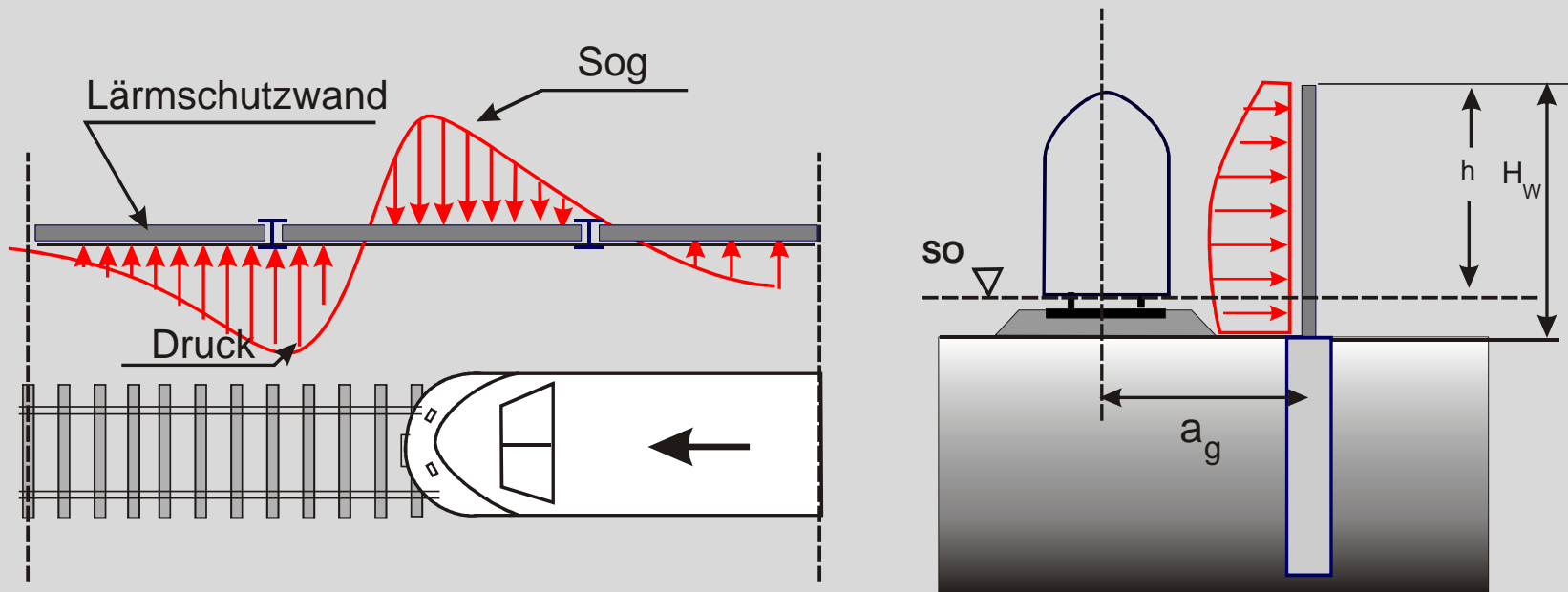
CE marking >> DoP of the noise barrier system Structural performance (EN 1794-1)

- ✓ A problem identified, having serious economic consequences, as well as for the road safety, is the evaluation of the resistance to wind loads of products through calculations, which is permissible according to EN 1794-1. Practical experience shows that the calculation procedures applied, usually considerably overestimate, by 2 to 4 times, the resistance of the panels.



Noise barrier system - Structural performance

RAIL APPLICATION

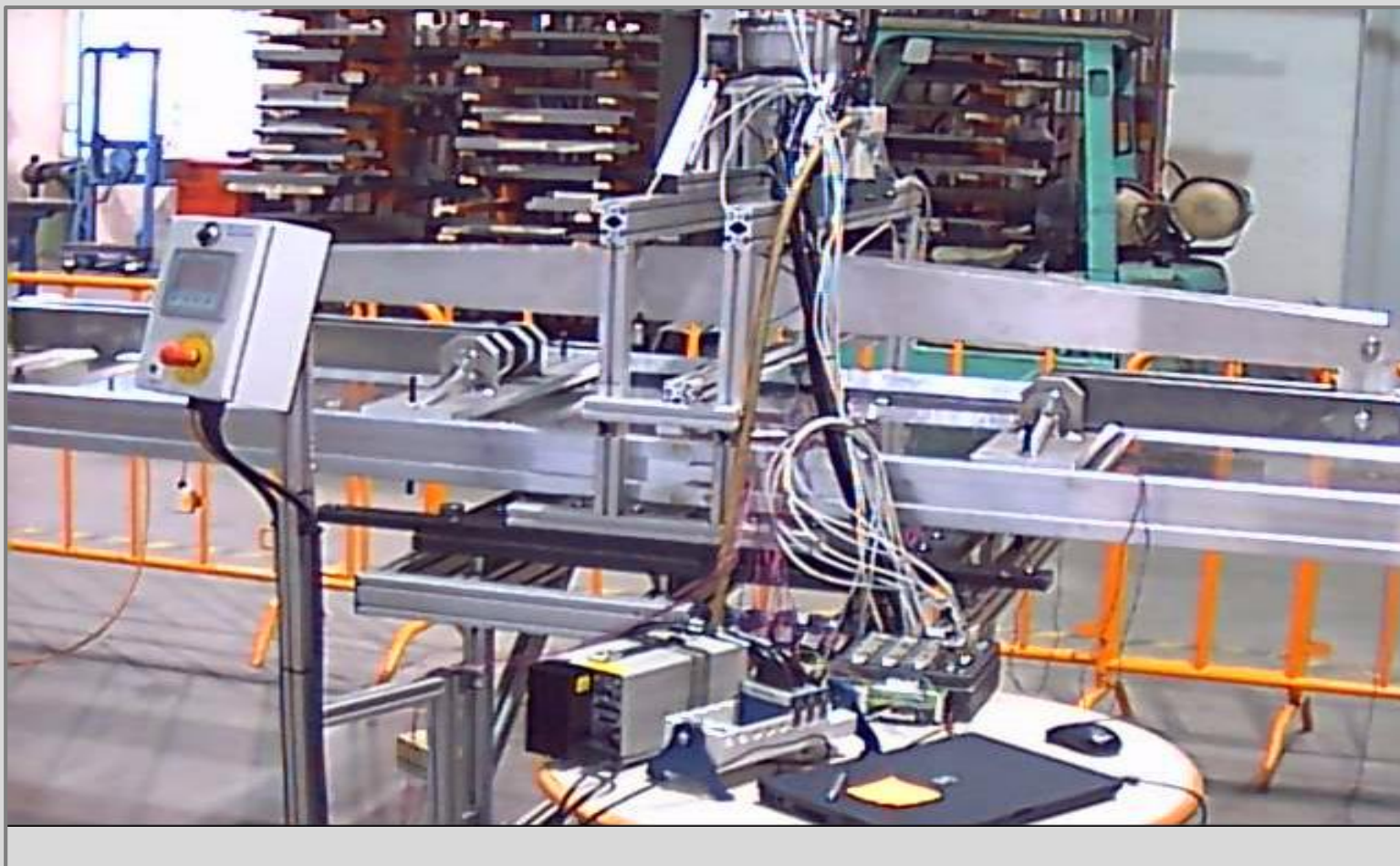


Alternating pressure and suction forces due to passing train main cause fatigue effect

Noise barrier system - Structural performance RAIL APPLICATION

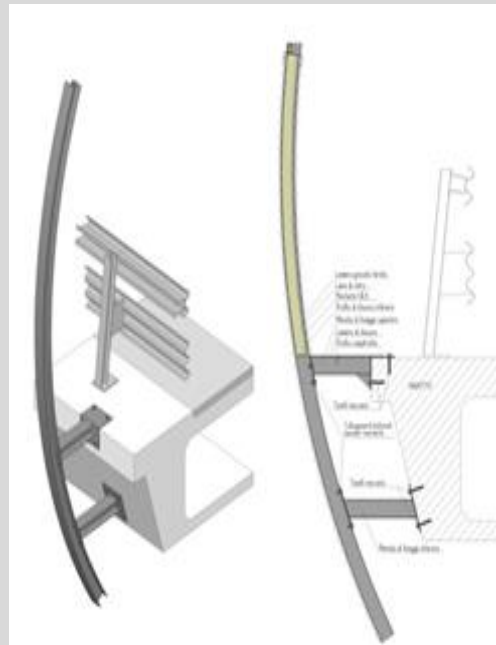


Noise barrier system - Structural performance - FATIGUE TESTING



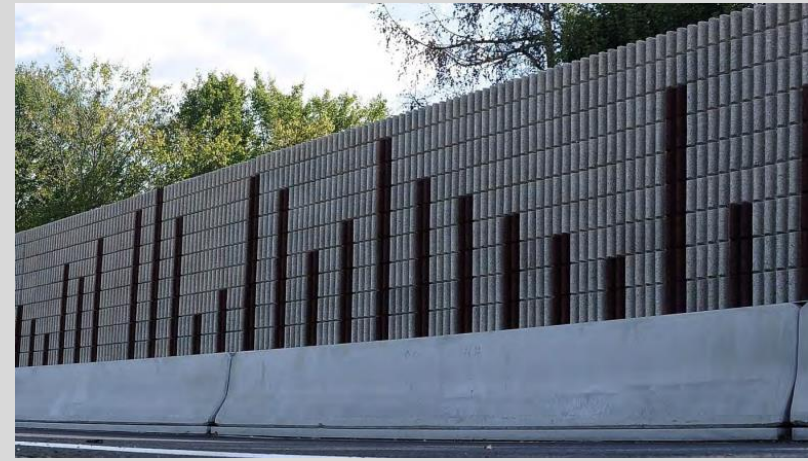
CE marking >> DoP of the noise barrier system

Structural performance: errant vehicles impact



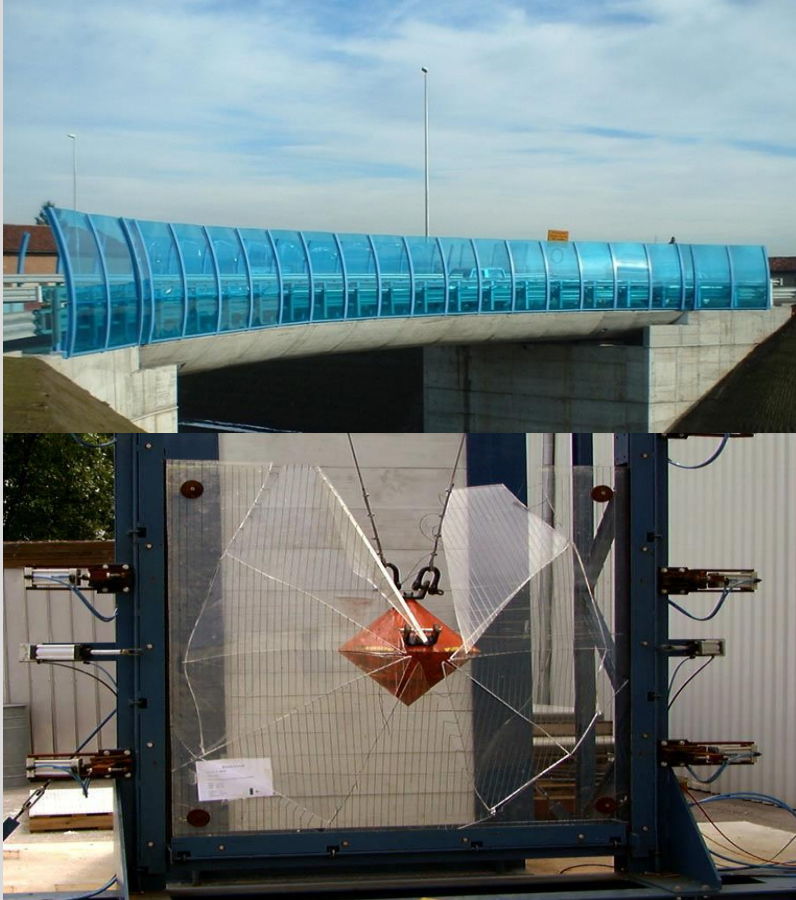
Crash test to be performed according to EN 1317 in case of integrated noise and safety barrier

Integrated noise and safety barriers examples



DoP of the noise barrier system

Safety in use: risk from falling debris



- ✓ Risk from falling debris may occur in case of noise barrier installed on bridges or critical positions:
(EN 1794-2).

- ✓ Use of intrinsic resistant materials is essential as the evaluation of performance is to be made on the whole barrier (use of safety cables, secure posts etc).

DoP of the noise barrier system

Safety in use: transparency

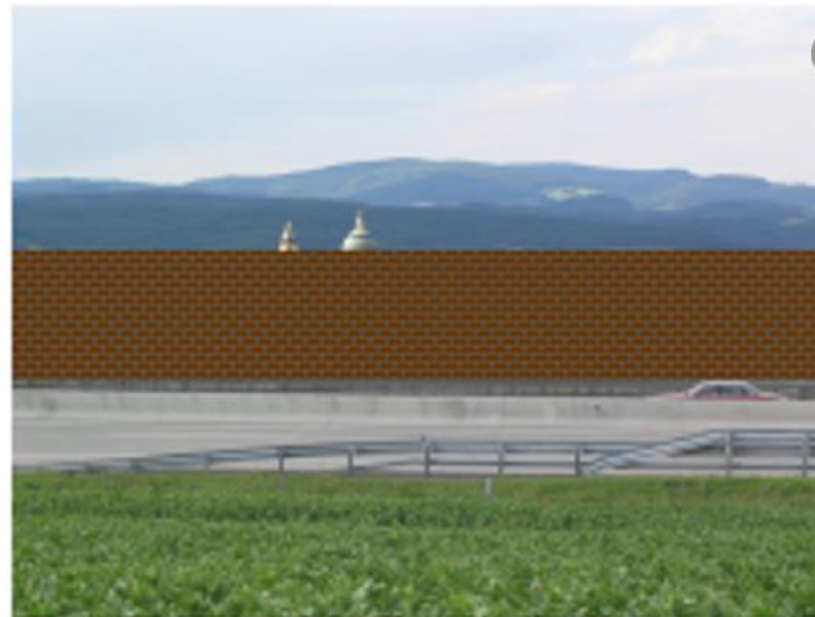
Traffic safety

- Early visibility of incoming traffic
- „dissolves“ monotony of closed walls along roads
- driver is not losing attention/ concentration because of „tunnel effect“

Desire of residents and communities

- Avoids high walls close to buildings
→ light access to garden and home
→ maintains own view
- Segmentation / borders between parts of cities
(maintain visibility of neighborhood)

Visibility of historic buildings / points of interest



DoP of the noise barrier system

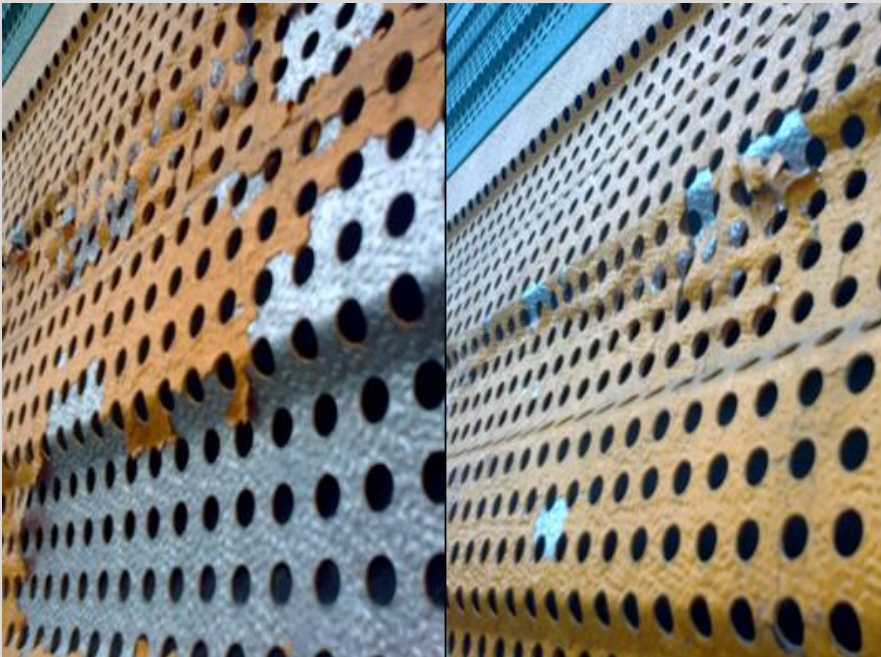
Safety in use : Behaviour in case of fire

- ✓ Noise barrier performance are currently evaluated by testing the system against brush fire EN 1794-3 Annex A.



DoP of the noise barrier system Long term durability EN 14389.1,2

- ✓ Material specification (corrosion protective layers, wood treatment) are essential for long term durability. Also to be considered assembling system, water drainage..



Toward a protocol for Sustainability Assessment

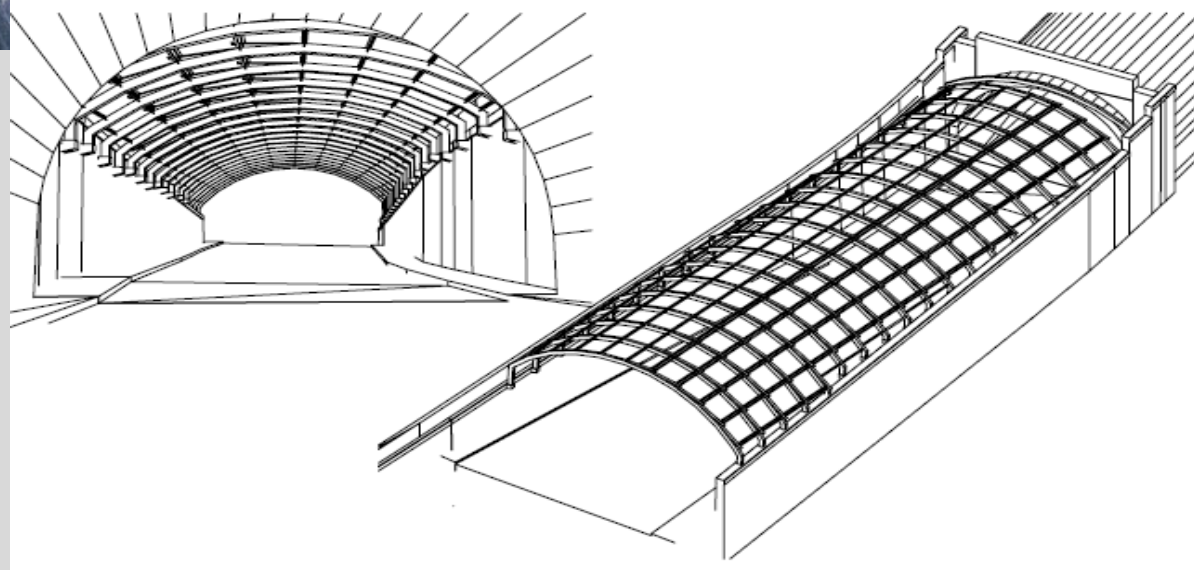
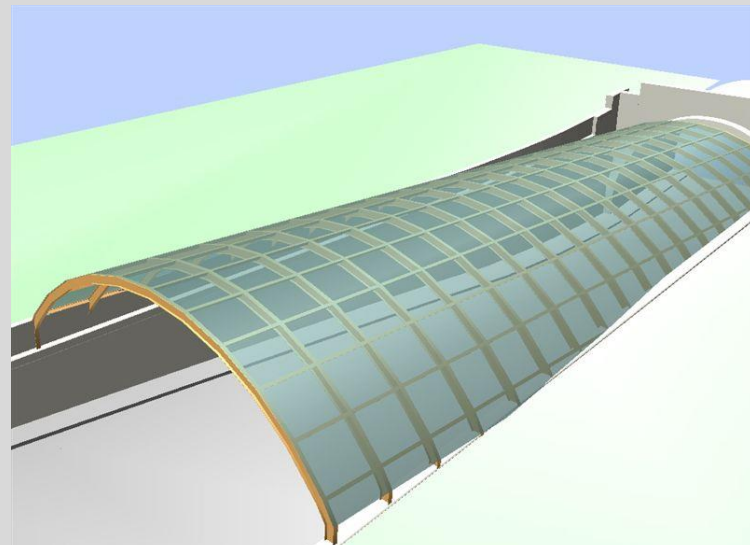


Noise barriers are almost always paid by public funding.

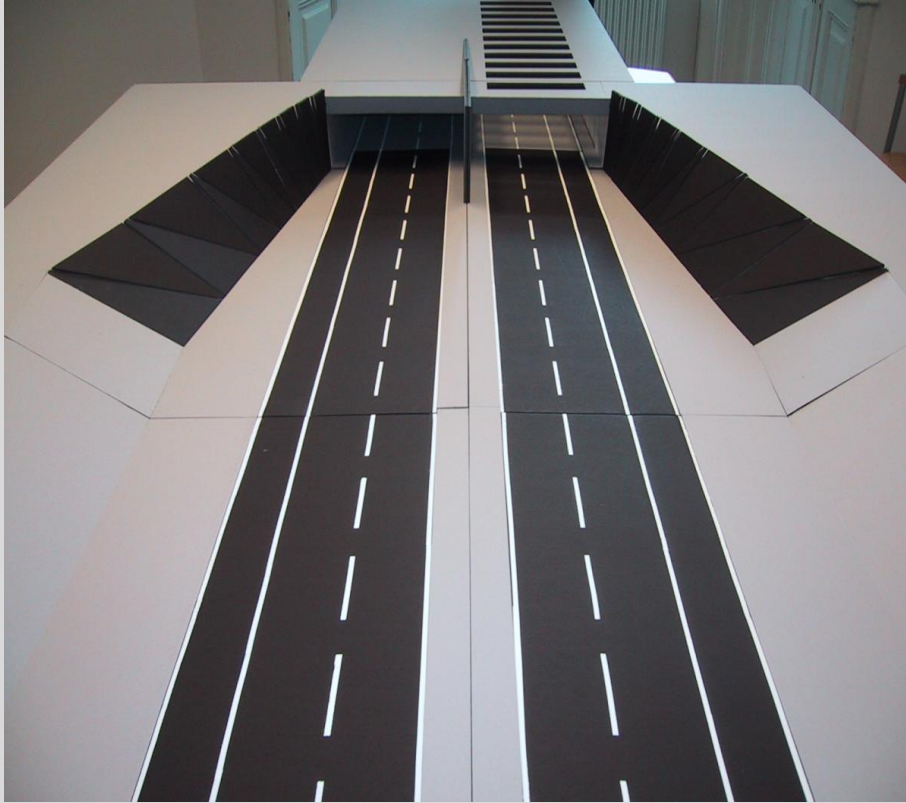
Are there possible income funds to cover costs ?



PV application at tunnel entrance



PV application at tunnel entrance



PV application at tunnel entrance



Thanks for the attention

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