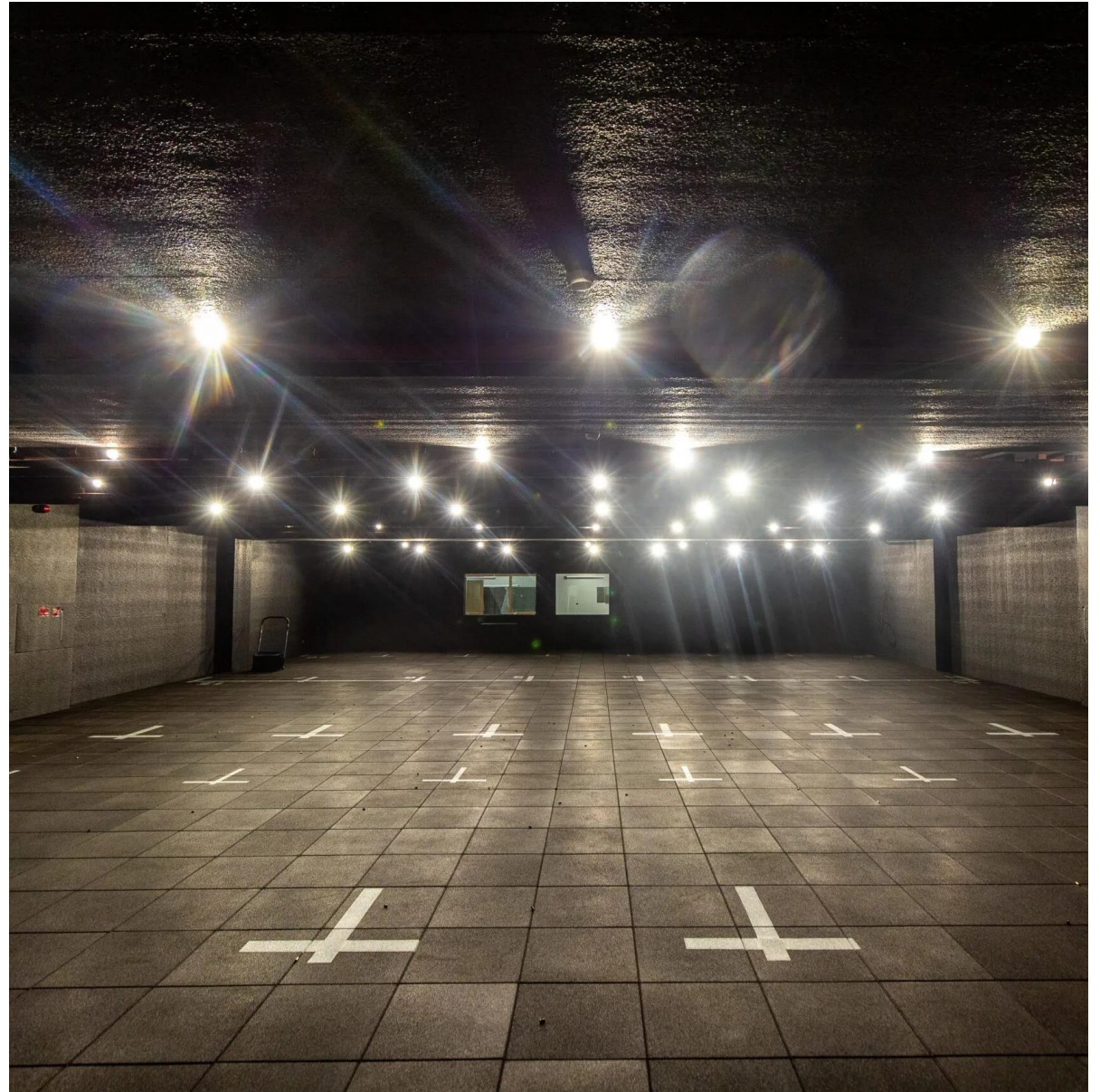


An aerial, long-exposure photograph of a highway interchange at night. The image shows multiple levels of elevated roads and ramps. Light trails from vehicles are visible, creating streaks of white and yellow. A central structure, possibly a rest area or service station, is visible in the middle of the interchange. The surrounding area includes some buildings and streetlights, all illuminated against the dark night sky.

Whisper NB

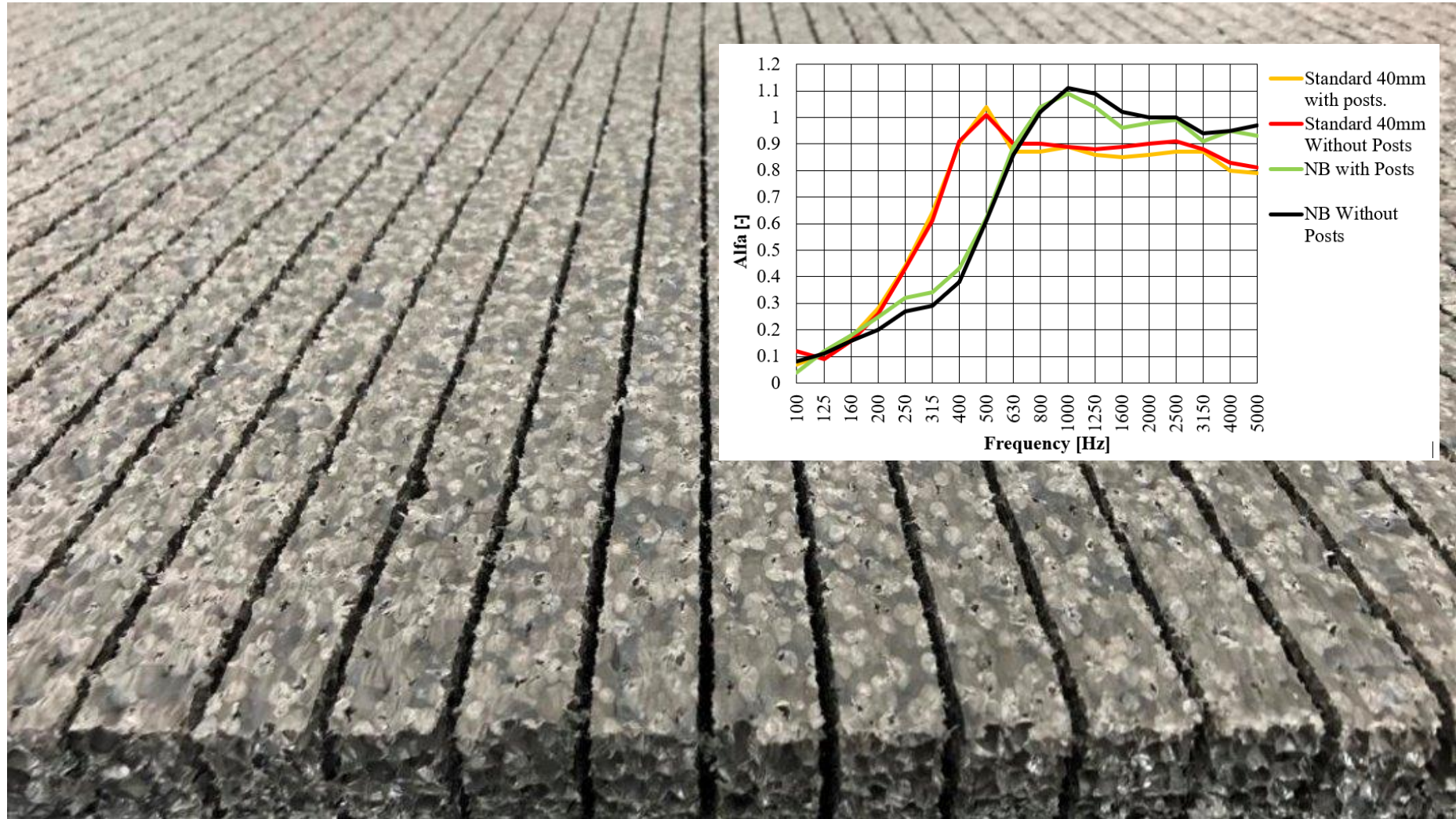
Training Session 2



Recap What does Whisper NB Look Like?

WHISPER®
polyethylene foam
(PE) with grooved
texture

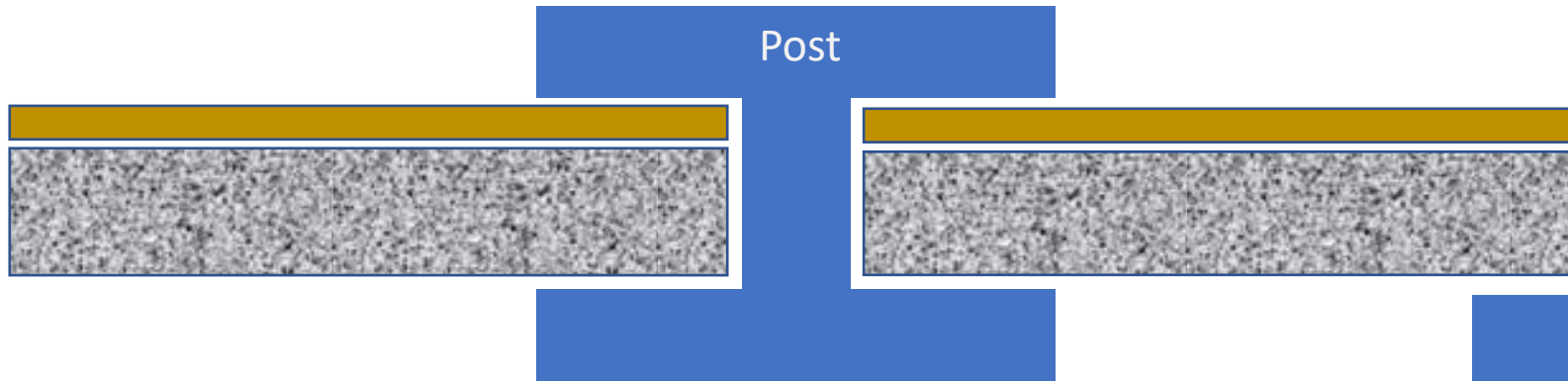
Honeycomb-like
structure, with flat
parallel slots
which boost
absorption at
rail/road
frequencies.



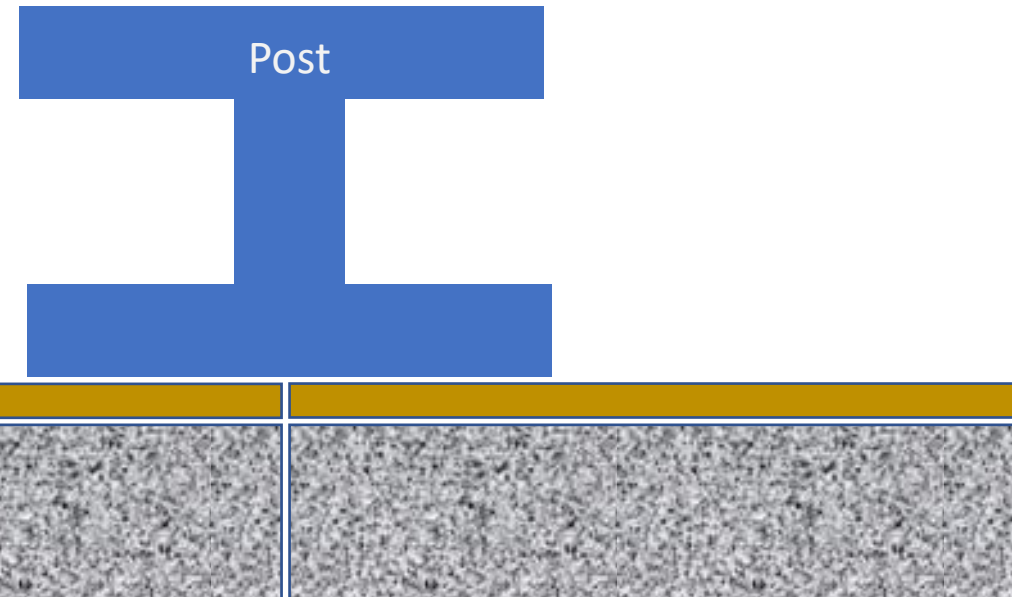
What does post cladding mean?

Acoustic Properties

Sound absorption street DL_{σ}	EN 1793-1	dB	9 dB without steel post cladding; 9 dB with steel post cladding
Sound absorption rail DL_{σ}	EN 16272-1	dB	11 dB without steel post cladding; 12 dB with steel post cladding

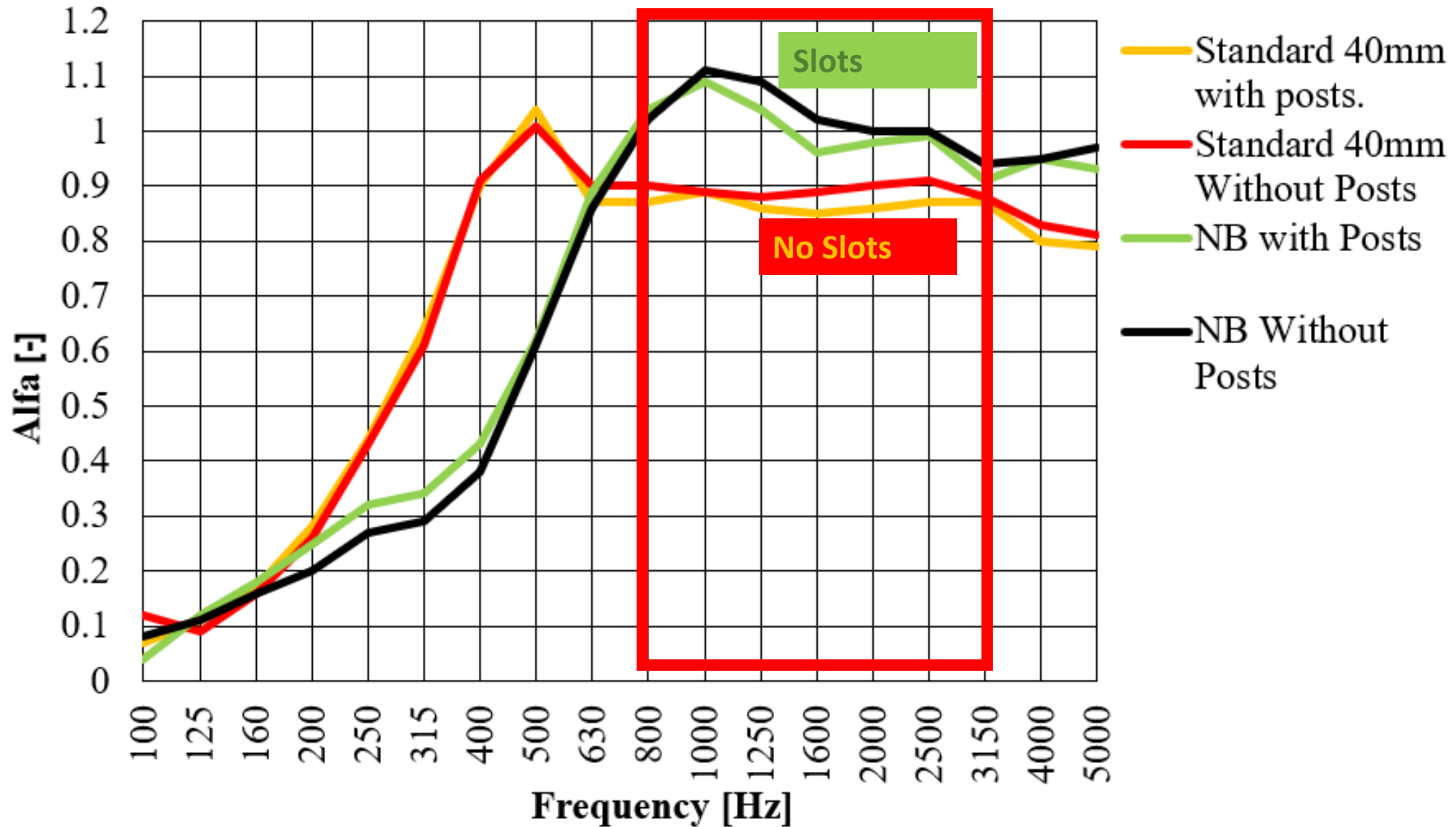


Without post cladding the reflective post is exposed to the noise.



With post cladding, the cladding covers the reflective post.

Why Slots?



Street vs Rail

Acoustic Properties

Sound absorption street DL_{α}	EN 1793-1	dB	9 dB without steel post cladding; 9 dB with steel post cladding
Sound absorption rail DL_{α}	EN 16272-1	dB	11 dB without steel post cladding; 12 dB with steel post cladding
Sound reflection DL_{RI} in-situ street	EN 1793-5	dB	5
Sound reflection DL_{RI} in-situ rail	EN 16272-3-2	dB	6

Road: Cars and trucks, emit different frequencies to freight and high speed passenger rail. 1793-X is for street, 16272-X is for rail



Whisper NB: Noise Barrier Wall Absorption

Whisper NBI – Acoustic Absorption Fill

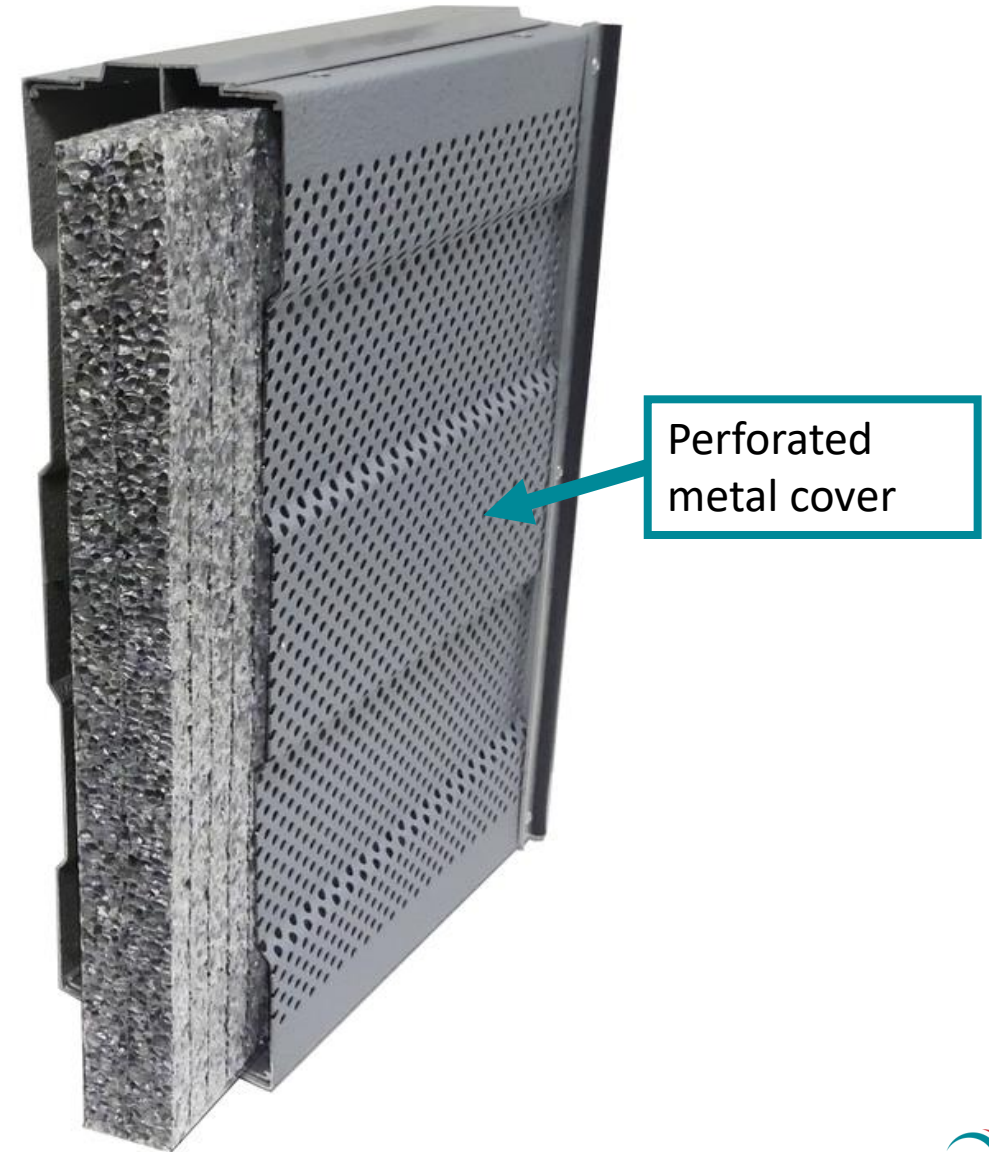
- ✓ Replaces mineral wool in existing cassettes
- ✓ Used in new cassettes.
- ✓ Attains absorption category A3
- ✓ Recyclable in LDPE recovery streams
- ✓ Grey

Whisper NBO – Acoustic Absorption Panels

- ✓ Intended for cassettes and walls with no perforated cover.
- ✓ Retrofit – surface mounting outdoors to existing walls
- ✓ Attains absorption category A3
- ✓ 50 year outdoor life
- ✓ Recyclable in LDPE recovery streams
- ✓ Black

Whisper NB Eco – Acoustic Absorption Panels (in R&D)

- ✓ Intended for cassettes and walls with no perforated cover.
- ✓ Can be retrofitted outdoors
- ✓ Attains absorption category A3
- ✓ 50 year outdoor life
- ✓ Recyclable in LDPE recovery streams
- ✓ Ecological fire retardants
- ✓ Colours Grey and others are possible



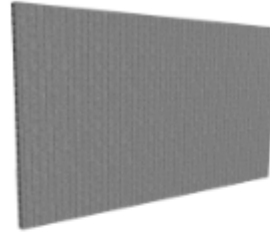
Whisper NB Absorber Series

NBI= Noise Barrier INSIDE

Filler material for inside wooden or aluminium panels.

Category B – UV resistant inside a **cassette**.

Sealed Air®



Whisper® NB

Sound Absorption Material for Noise Barriers
NBI-40-A3

APPLICATION DATA SHEET



Physical Properties	Test Method	Unit	Typical Physical Properties
System series	-	-	WHISPER® Absorber Series
Mode of operation	-	-	Highly absorbent
Dimensions	-	cm	100 x 120 x 4 240 x 120 x 4
Area of application (sound absorbent)	-	-	Filler material e.g. for inside aluminium or wood panels
Absorber material	-	-	WHISPER® polyethylene foam (PE) with grooved texture
Dry weight	-	kg/m²	1,0
Acoustic Properties			
Sound absorption street DL_{s}	EN 1793-1	dB	8
Sound absorption rail DL_{r}	EN 16272-1	dB	8
Sound reflection DL_{s} in-situ street	EN 1793-5	dB	5
Sound reflection DL_{r} in-situ rail	EN 16272-3-2	dB	5
Mechanical Properties			
Fire resistance	EN 1794-2	-	Class 1
Notch test	EN 1794-2	-	Fulfilled
Impact of stones	EN 1794-1	-	Fulfilled
Evidence of water absorption / release	-	-	Checked
Sustainability	EN 14389-1-2	-	Acoustic and non-acoustic properties 50 years
Other Properties			
Sound insulation	EN 1793-2(6) / EN 16272-3-2	-	Effect not through absorber, but through carrier material (e.g. carrier plate)
Structural analysis	-	-	Evidence for each application through corresponding statics (eg panel statics)
Material and Surface Characteristics			
Material properties	Sound absorbent, extremely light, UV-resistant, hydrolysis resistant.		
Other material properties	Water absorption up to 300% of its own weight Up to 90% evaporation within 14 days		
Dimensional tolerances	Product thickness up to +5 mm		
Surface texture	Honeycomb-like structure, with flat parallel grooves		
Colours	Grey		
UV resistancy	Category B: UV resistant inside cassette.		
Installation and cutting	In aluminium or wooden panels, cut to size using a stanley knife, circular saw or hand-held circular saw		
Recycling	Classification in low density polyethylene (LDPE) fully recyclable in LDPE recycling systems		

Whisper NB Absorber Series

NBO= Noise Barrier OUTSIDE

Surface mounted cladding for noise barriers and outdoor walls.

Category A – Highest UV resistance, suitable for direct fixing to outdoor vertical surfaces.

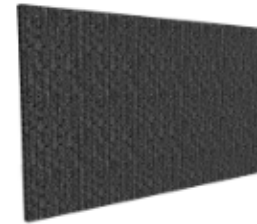
Acoustic properties maintained for 50 years.

Sealed Air®

Whisper® NB

Sound Absorption Material for Noise Barriers
NBO-40-A3

APPLICATION DATA SHEET



Physical Properties	Test Method	Unit	Typical Physical Properties
System series	-	-	WHISPER® Absorber Series
Mode of operation	-	-	Highly absorbent
Dimensions	-	cm	100 x 120 x 4 240 x 120 x 4
Area of application (sound absorbent)	-	-	Surface mounted cladding for noise barriers and outdoor walls
Absorber material	-	-	WHISPER® polyethylene foam (PE) with grooved texture
Dry weight	-	kg/m²	1,0
Acoustic Properties			
Sound absorption street DL_{s}	EN 1793-1	dB	9 dB without steel post cladding; 9 dB with steel post cladding
Sound absorption rail DL_{r}	EN 16272-1	dB	11 dB without steel post cladding; 12 dB with steel post cladding
Sound reflection DL_{m} in-situ street	EN 1793-5	dB	5
Sound reflection DL_{m} in-situ rail	EN 16272-3-2	dB	6
Mechanical Properties			
Resistance to frost and de-icing salt	EN 14474	-	Fulfilled
Fire resistance	EN 1794-2	-	Class 1
Notch test	EN 1794-2	-	Class 2
Impact of stones	EN 1794-1	-	Fulfilled
Evidence of water absorption / release	-	-	Checked
Sustainability	EN 14389-1-2	-	Acoustic and non-acoustic properties 50 years
Other Properties			
Sound insulation	EN 1793-2(6) EN 16272-3-2	-	Effect not through absorber, but through carrier material (e.g. carrier plate)
Structural analysis	-	-	Evidence for each application through corresponding statics (e.g. panel statics)
Material and Surface Characteristics			
Material properties	Sound absorbent, extremely light, UV-resistant, hydrolysis resistant		
Other material properties	Water absorption up to 300% of its own weight Up to 90% evaporation within 14 days Simple adaptation of shape to the ground		
Dimensional tolerances	Product thickness up to +5 mm		
Surface texture	Honeycomb-like structure, with flat parallel grooves		
Colours	Black		
UV resistancy	Category A: highest UV resistance, suitable for direct fixing to vertical outdoor surfaces		
Installation and cutting	Depending on the application e. g. glue / screw on carrier materials, cut to size using a Stanley knife, circular saw or hand-held circular saw		
Recycling	Classification in low density polyethylene (LDPE) fully recyclable in LDPE recycling systems		

Whisper NBO
EN 1793-1
Street
9dB
EN 16272-1
Rail
11dB/12dB

A) Laboratory based test methods:

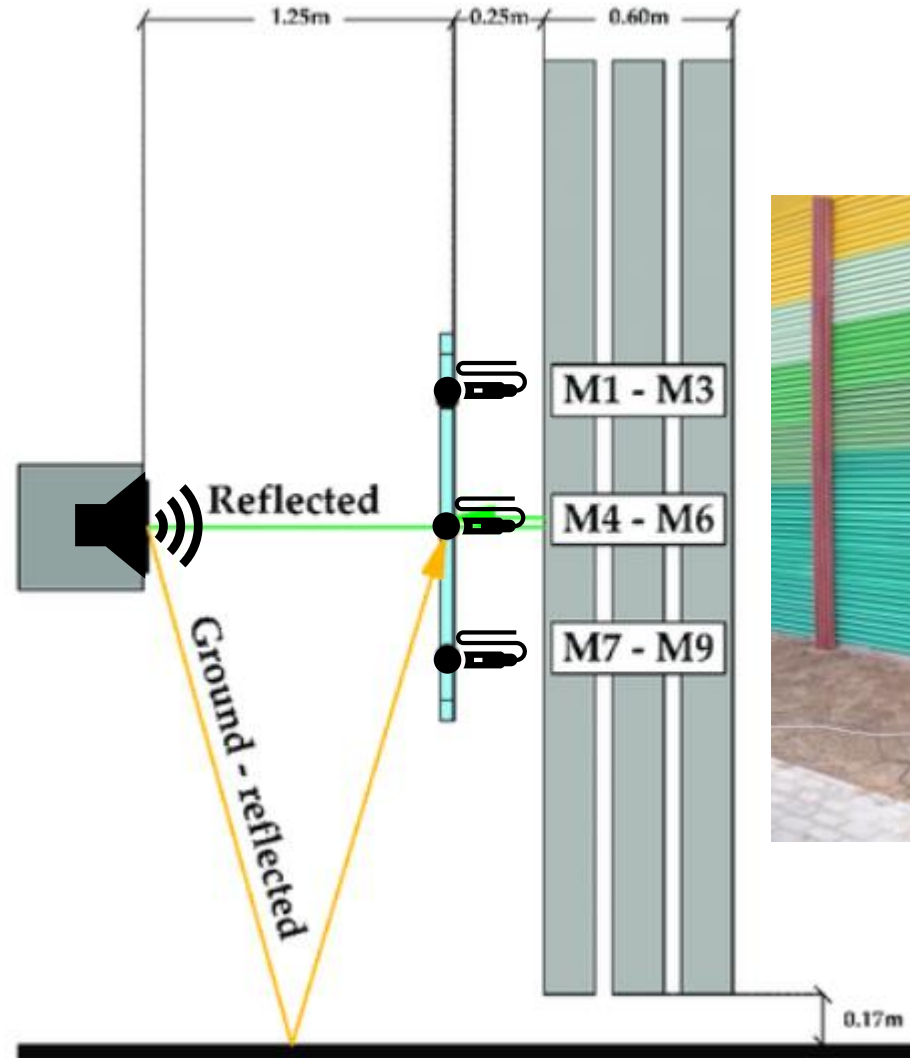
EN 1793-1 (CEN, 2012) sets out a test method for the determination of sound reflection characteristics. Measurements are performed under laboratory conditions using a reverberation chamber; Figure 9 illustrates the mounting conditions for the test specimen. The performance is expressed in terms of the single-number rating of sound absorption, DL_{α} . The scope and title of this standard will be similarly revised in the future to restrict the applicability of the test method to the assessment of devices used only '*under reverberant conditions*', as has already been done with EN 1793-2 (see below). The revised standard is expected to be published in 2016. From that point, the method will no longer be considered applicable for the assessment of noise barriers along roads in non-reverberant conditions, but along roads in reverberant conditions, e.g. inside tunnels or deep trenches or under covers. In case of direct sound field conditions, the sound absorption properties shall be declared based on the in-situ test in EN 1793-5 (see section 4.4.2 of this report).



Figure 9: Sound reflection measurement according to EN 1793-1 (QUIESST, 2012)

This is the raw component of sound reflection & absorption.

EN1793-5
Road 5dB
EN16272-3/-2
Rail 6dB



In situ values of sound reflection and airborne sound insulation

EN 1793-2
Effect not
through
absorber but
through carrier
material

EN 1793-2 (CEN, 2012, currently under revision) sets out a test method for the determination of airborne sound insulation characteristics. Measurements are performed under laboratory conditions using a reverberation chamber. Figure 10 illustrates the mounting conditions for the test specimen. The performance is expressed in terms of the single-number rating of airborne sound insulation, DL_R . It is noted that the 2012 edition of the standard has a revised scope and a revised title which restricts the applicability of the test method to the assessment of devices used only '*under reverberant conditions*'. This means that the method is no longer considered applicable for the assessment of noise barriers along roads in non-reverberant conditions, but along roads in reverberant conditions, e.g. inside tunnels or deep trenches or under covers. In practice, this change is unlikely to be enforced until the publication of the revision of EN 14388 in 2015, from which point the airborne sound insulation characteristics of noise barriers under direct sound field conditions shall be declared based on the in-situ test in EN 1793-6 (see section 4.4.3 of this report).

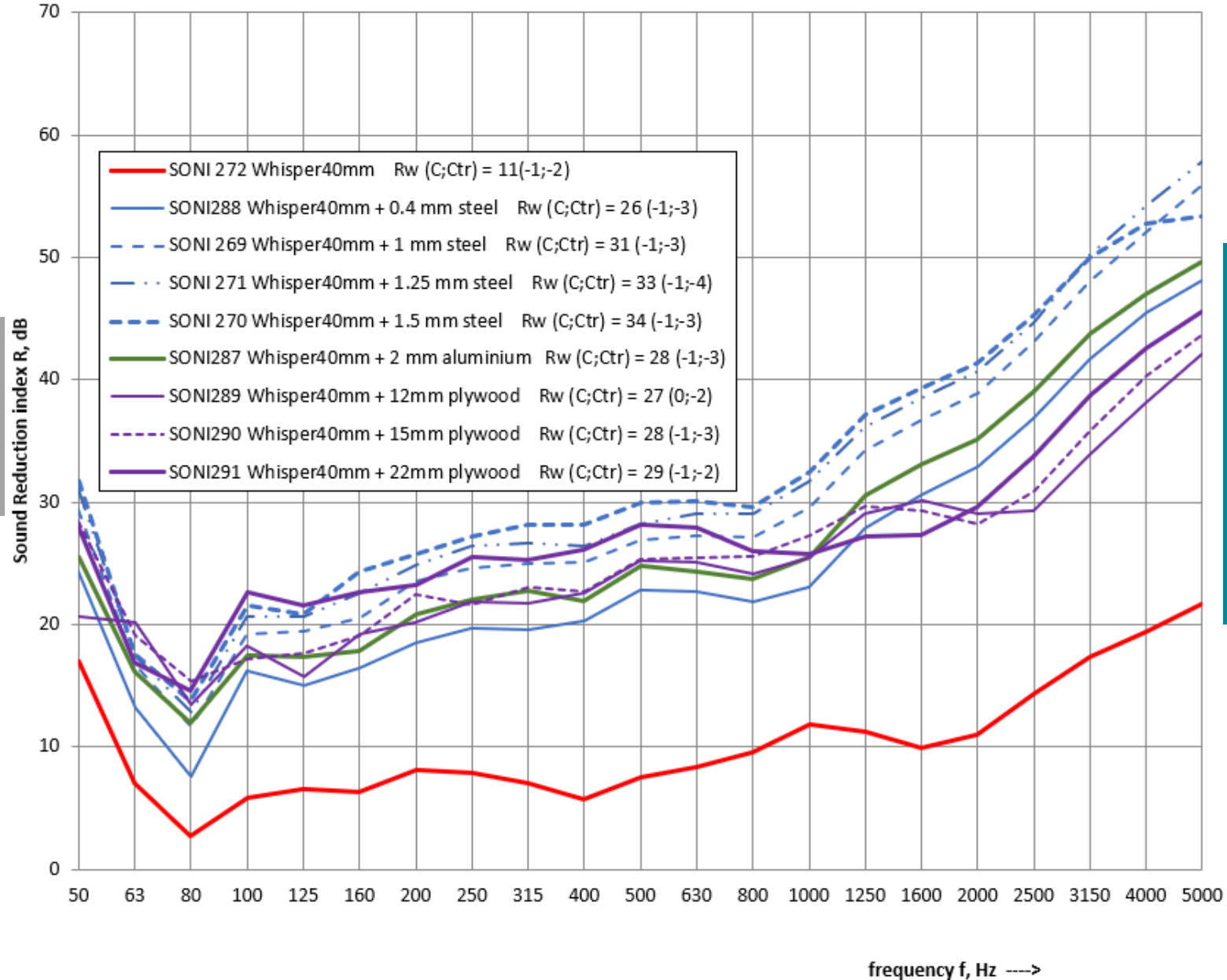


Figure 10: Sound insulation measurement according to EN 1793-2 (QUIESST, 2012)

What we know as transmission loss
The slots remove transmission loss,
reducing airflow resistance

We can give a rough idea of TL

Whisper NBO
40mm glued to
stated barrier in
test aperture.



We can't
guarantee it
because the
final result
depends on the
TOTAL design.

For each noise barrier, a loudspeaker was placed on the road side of the barrier, with a grid of nine microphones then placed on the resident side. Several measurements were made with the loudspeaker and microphones centred on both the barrier panels and posts. A special type of noise signal is played through the loudspeaker that allows any background noise to be filtered out from the sound recorded by the microphones. The recorded signals are then processed to provide information on the overall performance of the noise barrier. This data can also be used to look at the effects of specific gaps on noise barrier performance

This is not essential for Whisper, because we are not talking about Transmission loss, but it is good to know!



Advantages of in-situ testing

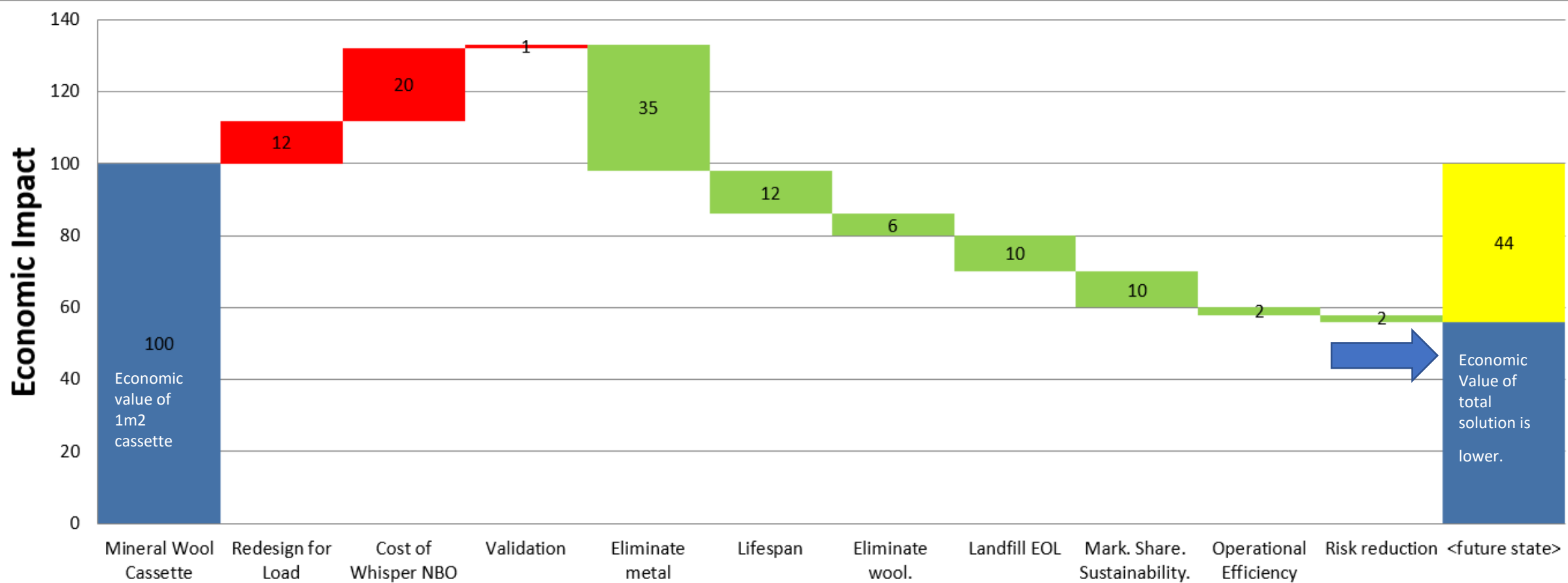
- Ability to perform measurements in the presence of background traffic noise.
- Compliance with specifications can be verified for new noise barrier installations.
- Periodic testing can quantify effects of ageing materials.
- Reduced costs compared with the laboratory test method.

Remember – open structured materials change mass, and acoustic absorption over time. Whisper does not.



Is it worth paying more?

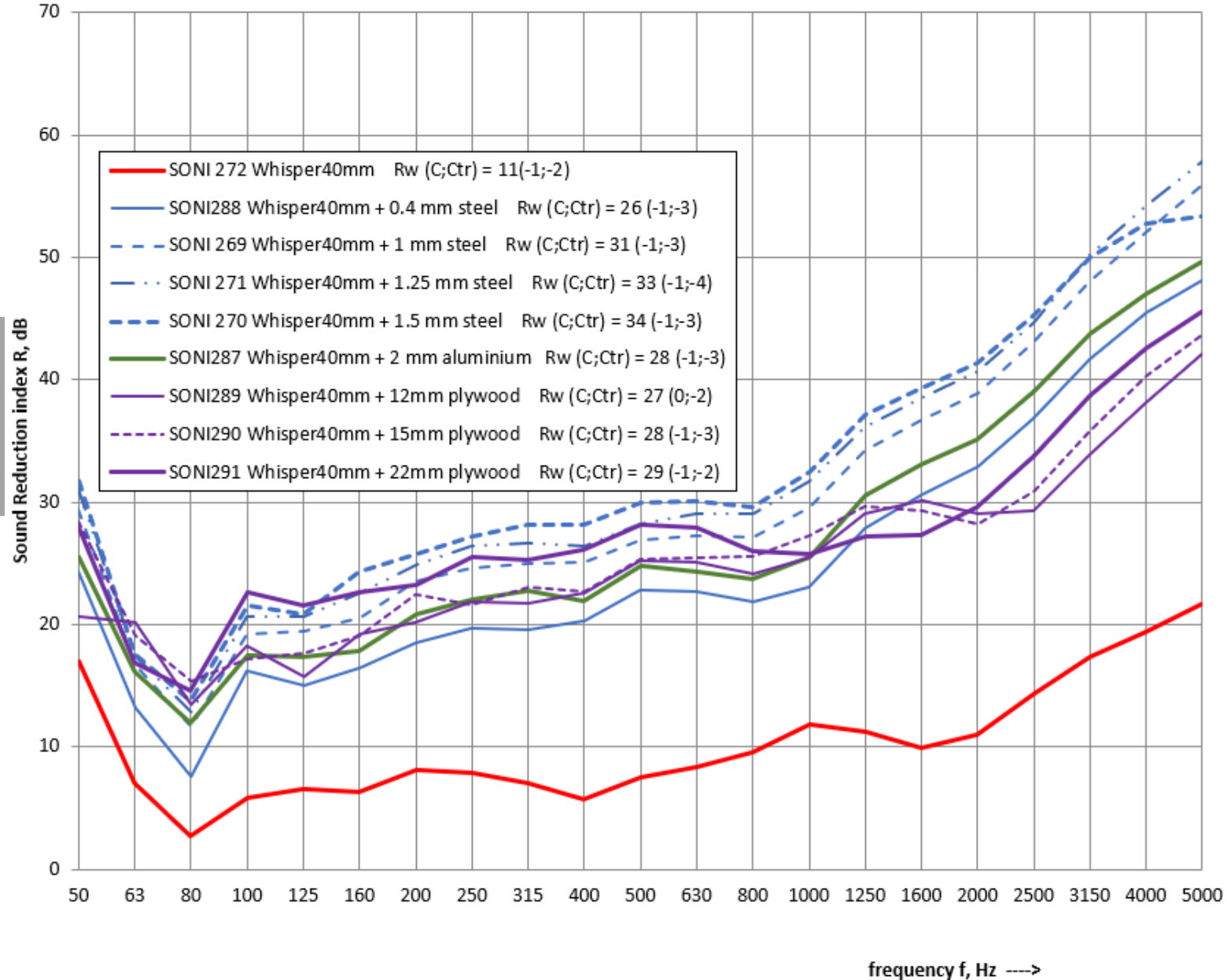
Economic Value Waterfall



Yes – the economic value in using NBO vs Mineral wool and eliminating perf metal is better.

Transmission Loss ISO 717-1

Whisper NBO
40mm glued to
stated barrier in
test aperture.



50 Year UV Cert. for Acoustic Absorption

Tab. 8: Results of the acoustical measurement of the sound reflection on Whisper® NBO-40-A3 absorber plates

	Model	Austrian Standard EN 1793-5 (16m²) 1,22 kg	NEW	Ageing of a 1m² test surface				Note:
				10 J 2,01 kg 1 Day	30 J 1,31 kg 5 Days	40 J 1,82 kg 6 Days	50 J 1,53 kg 6 Days	
ROAD	WHISPER PERFORATED	5,25 [3,92 - 6,58]	4,42	4,02	4,22	4,37 ¹⁾	3,87 ¹⁾	1) Salt/Limescale deposits on the absorbant material
RAIL	WHISPER PERFORATED	6,14 [4,81 - 7,47]	5,19	4,62	4,78	4,73 ¹⁾	4,45 ¹⁾	1) Salt/Limescale deposits on the absorbant material
ROAD	WHISPER VERTICALLY-MILLED	5,37 [4,04 - 6,70]	4,78	4,45	4,66	4,24 ¹⁾	4,17 ¹⁾	1) Salt/Limescale deposits on the absorbant material
RAIL	WHISPER VERTICALLY-MILLED	5,91 [4,58 - 7,24]	5,56	5,42	5,39	4,82 ¹⁾	4,95 ¹⁾	1) Salt/Limescale deposits on the absorbant material

Eliminates the need for expensive metal covers!

BTI Bautechnisches Institut GmbH

Director:



DI(FH) Dr. René Eckmann

Tester:

DI Edgar Klammer

The acoustical characteristics did not get significantly worse over the 50 simulated years

GHG Emissions (A1-A3 cradle to gate)

Panel Type	Kg/m3	GWP-GHG for 1m2 of panel (kg CO2eq)	Please note for finished panel design savings may be possible due to:
NB-Eco 40mm	22	5.15	Designed for recycling. Suited to outdoor use with no perforated cover or moisture barrier.
NBO 40mm	22	5.14	Designed for recycling. Suited to outdoor use with no perforated cover or moisture barrier.
NBI 40mm	22	5.13	Designed for recycling. Suited to use inside a cassette, with no moisture barrier.





Recycling in Europe

At end of life, where can LDPE be recycled?

<https://www.enfreycling.com/plastic>



39

German Recyclers
Post industrial LDPE.

86

Million Kilograms
LDPE recycled per year



85

Million Kilograms
Of available capacity

10

French Recyclers

38

UK Recyclers



52

Italian Recyclers

And many more!

UK secondary aluminium prices reach record-highs on unprecedented scrap costs

Prices for secondary aluminium ingot in the UK reached new all-time highs in the week to Wednesday March 9 on increased demand and unprecedented prices for scrap grades across the

Home > News > Business > **ECONOMY**

Builders to be worst hit by commodity price increases; steel, aluminium makers to reap export bonanza

The construction industry has to bear the brunt of the increase in steel and aluminium price. With steel prices up by 65% and aluminium and copper prices by 30% in the country in the last 18 months, the cost of construction has already risen.

LME Aluminium Jumped Over 5% as Sky-rocketing Natural Gas Prices Fuel Supply Concerns

Mar 24, 2022 03:35 CST Source: SMM



SHANGHAI, Mar 24 (SMM) - Overnight, the most-traded SHFE 2205 aluminium contract opened at 23,260 yuan/mt, with the highest and lowest prices at 23,435 yuan/mt and 23,130 yuan/mt before closing at 23,365 yuan/mt, up 385 yuan/mt or 1.68%.

SHANGHAI, Mar 24 (SMM) - Overnight, the most-traded SHFE 2205 aluminium contract opened at 23,260 yuan/mt, with the highest and lowest prices at 23,435 yuan/mt and 23,130 yuan/mt before closing at 23,365 yuan/mt, up 385 yuan/mt or 1.68%. LME aluminium opened at \$3,417/mt on Wednesday and closed at \$3,685/mt, an increase of \$179/mt or 5.12%.

Aluminium pushes past \$4,000/t on Ukraine conflict

Published date: 07 March 2022

Share:



London Metal Exchange (LME) aluminium prices breached \$4,000/t for the first time this morning, as fears over supply disruption caused by Russia's invasion of Ukraine intensified sharply in the aluminium metal and energy markets.

The three-month aluminium contract set record official highs every day last week, rising to \$3,820/t in the official session on 4 March after first setting record highs earlier in February at around \$3,340/t.

METALS

Aluminium heads for biggest quarterly gain since 1988

LME nickel was up 0.6%

Peter Hobson, Reuters News
March 31, 2022

LONDON- Aluminium prices were on track to register their biggest quarterly gain since 1988 on Thursday, driven up by supply disruptions and increased production costs resulting from Russia's invasion of Ukraine.

Aluminium prices jump after Australia bans alumina and bauxite exports to Russia

UK secondary aluminium prices reach record-highs on unprecedented scrap costs

Prices for secondary aluminium have reached time highs in the UK on demand for scrap.

Builder's prices increase export

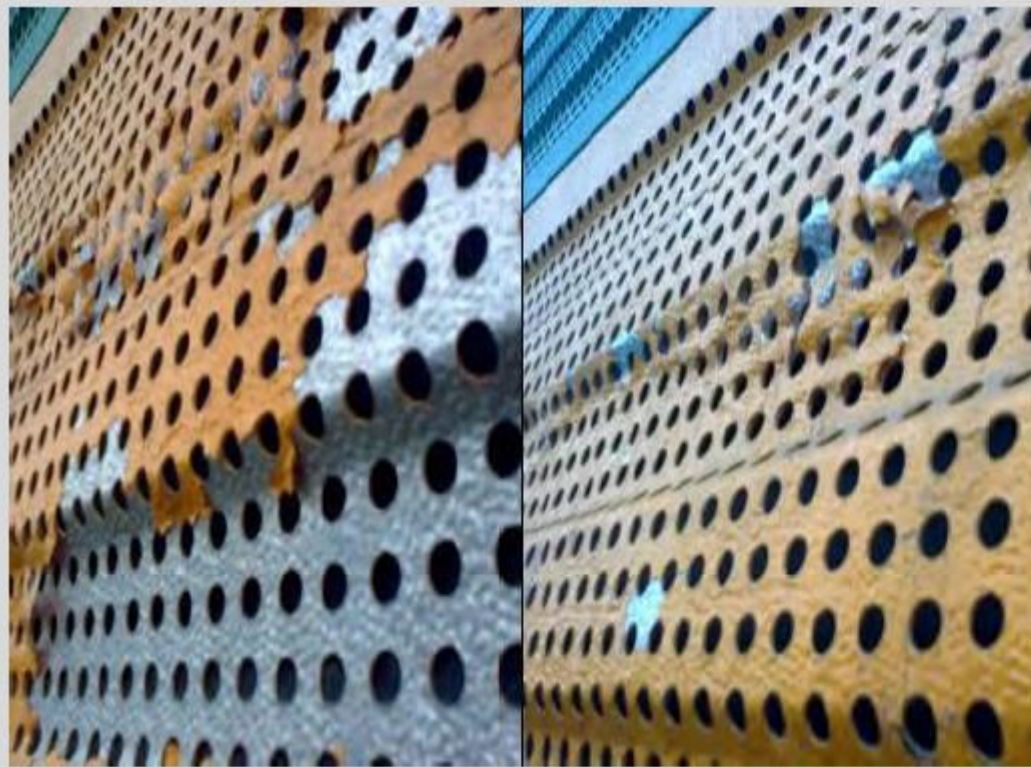
The construction prices up by 65% of construction

LME Aluminium Gas Price

Mar 24, 2022

SHANGHAI, Mar 24 (SMM) - Overnight, the most-traded SHFE 2205 aluminium contract opened at 23,260 yuan/mt, with the highest and lowest prices at 23,435 yuan/mt and 23,130 yuan/mt before closing at 23,365 yuan/mt, up 385 yuan/mt or 1.68%.

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Aluminium pushes past \$4,000/t on Ukraine conflict

Published date: 07 March 2022

London Metal Exchange (LME) aluminium prices breached \$4,000/t for the first time this morning, as fears over supply disruption caused by the conflict in the aluminium metal.



Official highs every day last 4 March after first setting /t.

gain since

gain since 1988 on sulting from Russia's

Aluminium prices jump after Australia bans alumina and bauxite exports to Russia

UK secondary aluminium prices reach record-highs on unprecedented scrap costs

Prices for secondary aluminium have reached time highs in London on the back of demand for scrap.

Builder's prices increase as export demand grows

The construction industry has seen prices up by 65% in the last 12 months of construction materials.

LME Aluminium and Gas Prices

Mar 24, 2022

SHANGHAI, Mar 24 (SMM) - Overnight, the most-traded SHFE 2205 aluminium contract opened at 23,260 yuan/mt, with the highest and lowest prices at 23,435 yuan/mt and 23,130 yuan/mt before closing at 23,365 yuan/mt, up 385 yuan/mt or 1.68%.

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Official highs every day last week, 4 March after first setting of \$4,000/t.

gain since 1988 on

gaining since 1988 on sulting from Russia's



Eliminate Metals
Save the planet
Save money
Save labour
Reduce CO2



Aluminium prices jump after Australia bans alumina and bauxite exports to Russia

Road Salt?

Metal salts

In the following table the resistance of polyethylene is evaluated to the action of various chemicals. Salts (and their solutions) whose chemical names can be composed out of the diagram are not included in the tables. These metal salts, nor solid nor in an aqueous solution, have no influence on polyethylene.

Metals		Salts	
Aluminium	Nickel	acetate	hydrosulphate
Ammonium	Potassium	arsenate	iodate, iodite
Antimony	Silver	benzoate	metaphosphate
Barium	Sodium	borate	molybdate
Bismuth	Strontium	bromate	nitrate
Cadmium	Thallium	bromide	nitrite
Calcium	Tin	carbonate	oxalate
Chromium	Zinc	chlorate	perborate
Cobalt		chloride	persulphate
Copper		chromate	phosphate, phosphite
Iron		dicarbonate	rhodanide
Lead		dichromate	salicylate
Lithium		disulphate	silicate
Magnesium		ferric/ferrous cyanide	silicofluoride
Manganese		fluoride	sulphate, sulphite
Mercury		formiate	thiosulphate
Molybdenum		gluconate	

