



Belgisch **Wegen**congres
Congrès belge de la **Route**

LEUVEN • 4-7.04.2022


SOPRANOISE

Comment caractériser les performances acoustiques
d'écrans antibruit installés le long des routes





SOPRANOISE

- Securing and **O**ptimizing the **P**erformance of **R**oad tr**A**ffic noise barriers with **N**ew meth**O**ds and **I**n- **S**itu **E**valuation
- Recherche Européenne ...
soutenue par la **CEDR** (Conférence Européenne des Directeurs des Routes) 
Conference of European
Directors of Roads
- Méthodes simplifiées pour caractériser les performances acoustiques intrinsèques d'écrans antibruit installés le long de routes



Tous les livrables publics sont disponibles sur le site <https://www.enbf.org/sopranoise/outcome/>



PUBLICATIONS



Deliverables

Deliverable 2.1 : Review of the physical significance of EN 1793-1, EN 1793-2, EN 1793-5 and EN 1793-6

You can download the deliverable 2.1 here...

Deliverable 2.2 : Final report on the main results of WP2 (including M2.1, M2.2. and M2.3) - Acoustic assessment of the intrinsic performances of noise barriers

You can download the deliverable 2.2 here...

Deliverable 3.1 - Final report on the main results of WP3 (including M3.1, M3.2 and M3.3) - In-situ inspection tools

You can download the deliverable 3.1 here...

Deliverable 4.1 Report on the development of the new quick methods in laboratory

This deliverable will be available soon...

Deliverable 5.1 : WP5 Intermediate progress report including M5.1, M5.2 and M5.3

You can download the deliverable 5.1 here...

Scientific Papers

Please find [here](#) all the scientific papers submitted for different conferences.



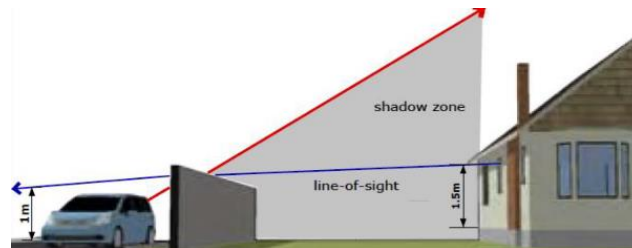
Performance acoustique d'un écran antibruit

Performances *extrinsèques*

Caractérisées par l'Insertion Loss **IL**: différence de niveau de bruit **sans** et **avec** écran antibruit



sans écran antibruit (© CEDR)

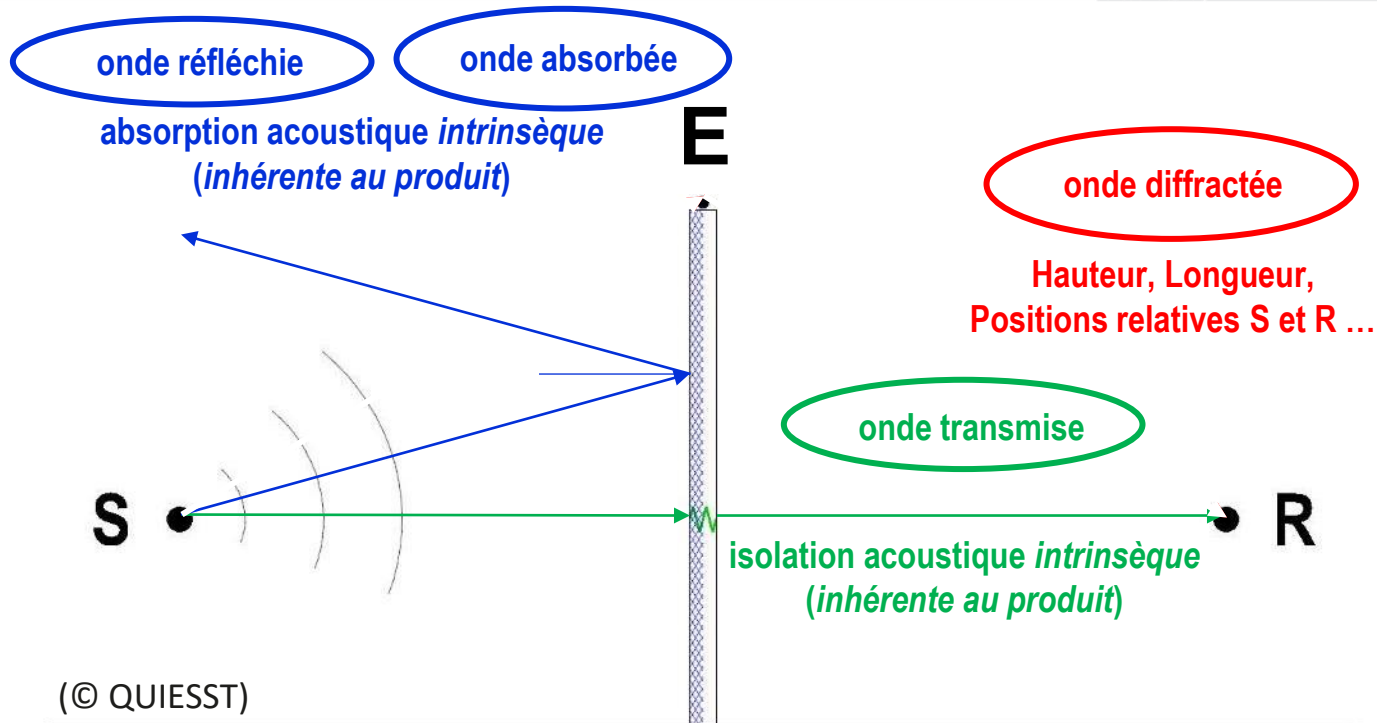


avec écran antibruit (© CEDR)

Plusieurs phénomènes physiques interviennent (T5.2 du livrable D5.1)
et les **performances intrinsèques** (inhérentes au produit) jouent aussi un rôle important ...



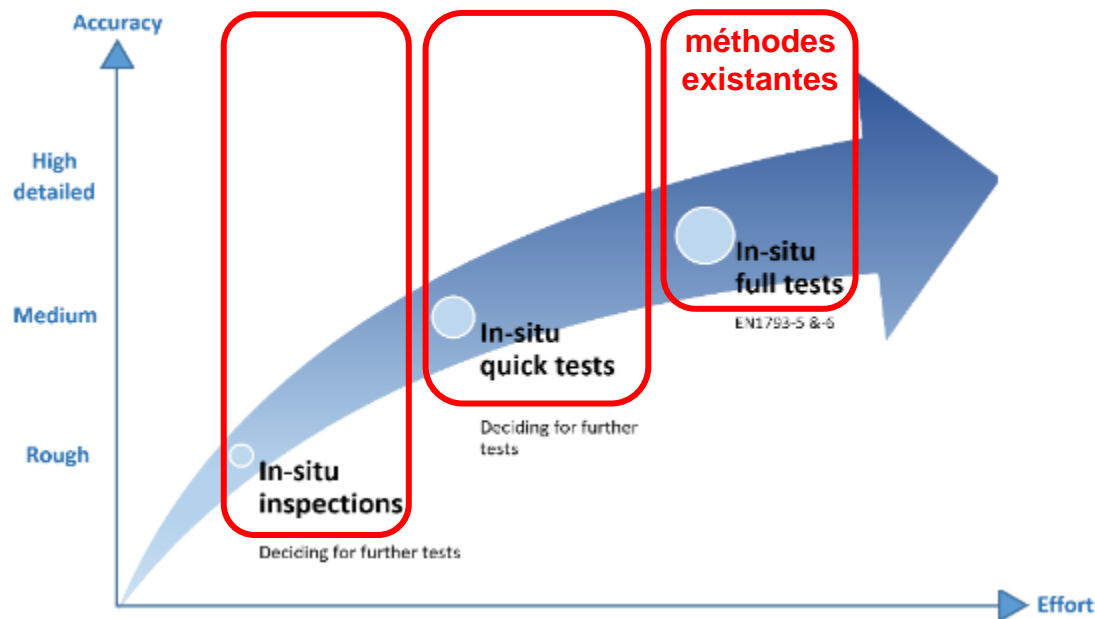
Caractéristiques *Intrinsèques*



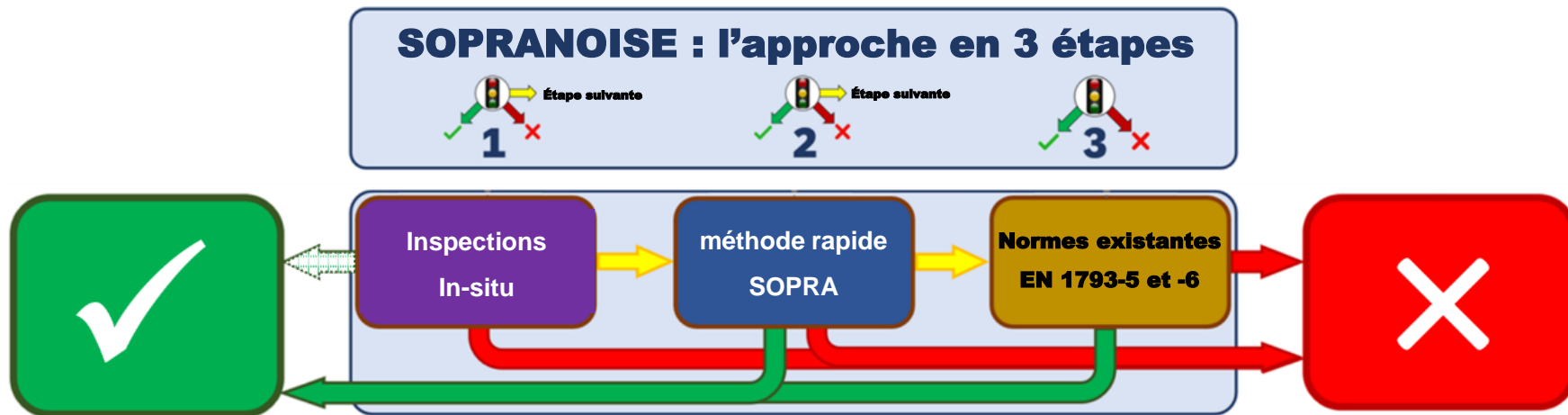
(© QUIESST)



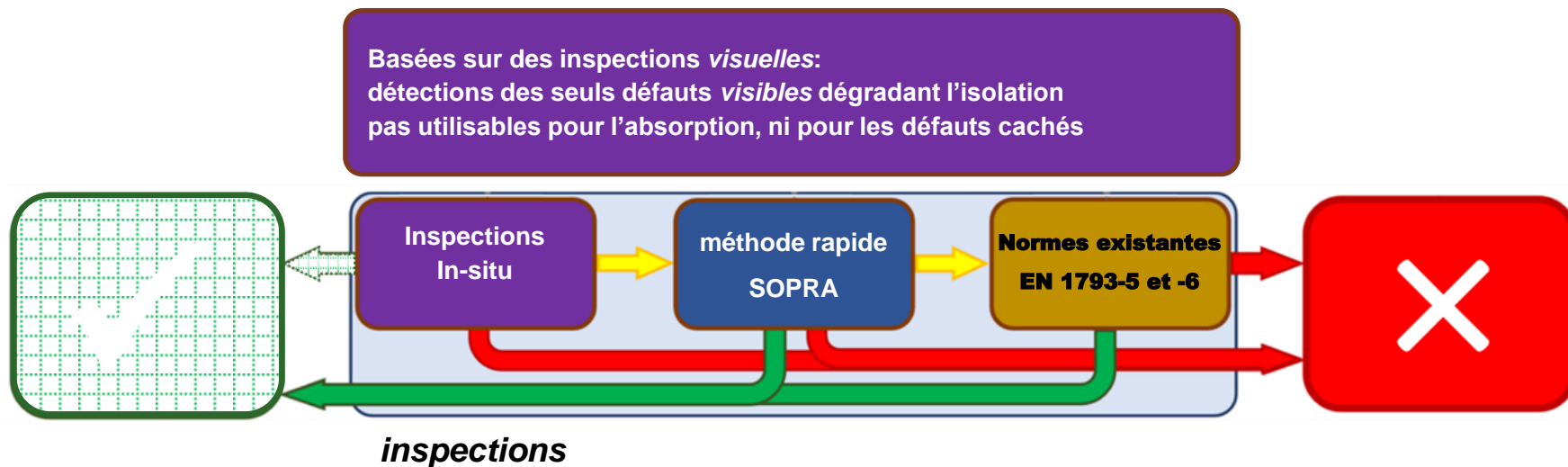
Comment caractériser les performances acoustiques *intrinsèques* d'écrans antibruit (absorption, isolation)?



SOPRANOISE les grands principes

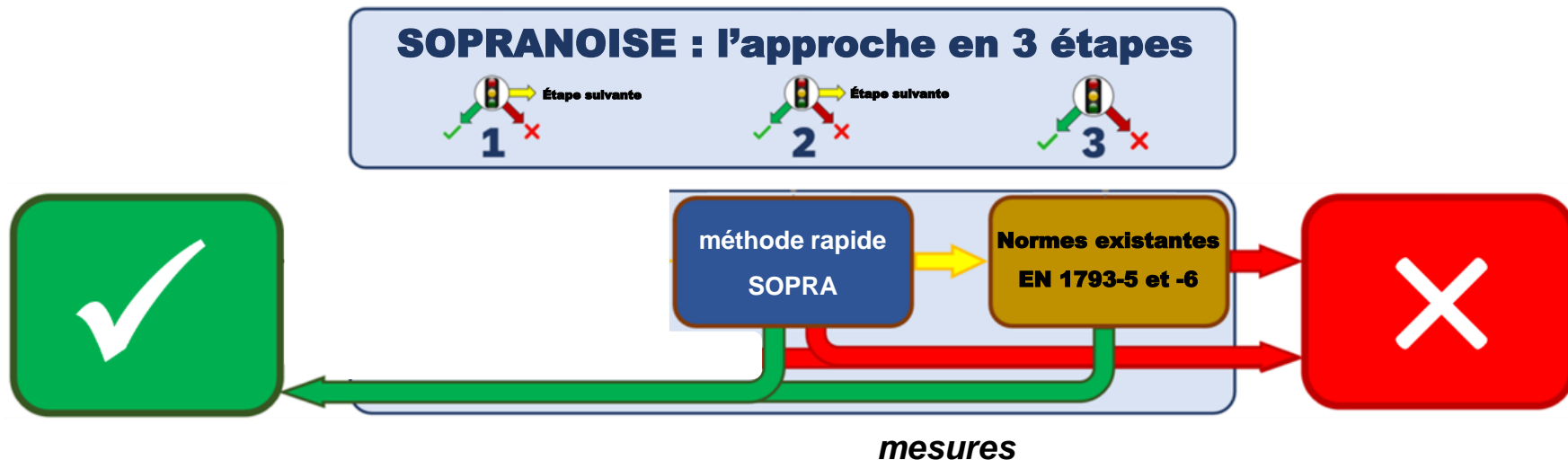


SOPRANOISE les grands principes





SOPRANOISE les grands principes





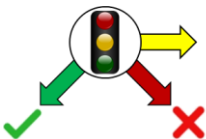


Inspections In-situ

Inspections visuelles assez faciles à faire
lors de visites de surveillance des routes

Fichier Excel

- Simple
- Entièrement personnalisable
- Résultats disponibles directement
- 5 onglets (4 accessibles)



Étape suivante

Préparation avant visite

1. Localisation

2. Caractéristiques de l'écran

3. Caractérisation des défauts

4. Résultats

Visite



NB inspection protocol
Sheet 1: Location

road name **B42**

near **Oberwolf**

emergency lane **yes**

from/to km **45.7** | **46.5**

direction **Frankfurt**

from/to coordinates **50.044433** | **8.137693**
50.044482 | **8.137751**

NB inspection protocol
Sheet 2: Construction

main construction material **acrylic glass**

absorbing front? **no**

absorbing back? **no**

material of posts **steel**

combined with

combined with

NB inspection protocol
Sheet 3: Defects

field no.	NB side	field height /m	defect location	type/cause of defect	view through	position /m		size /cm		additional notes (e.g. on visual/aural impression, absorption material, environmental conditions, general condition, reference to photographs ...)
						vertical	horizontal	vertical	horizontal	
35	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	15 - 35	65 - 125	
57	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	35 - 65	65 - 125	
83	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	35 - 65	125 - 235	
84	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	15 - 35	125 - 235	
86	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	15 - 35	65 - 125	
87	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	35 - 65	65 - 125	
89	front	2	at element	<input checked="" type="checkbox"/> impact <input type="checkbox"/> deformation <input type="checkbox"/> rust <input type="checkbox"/> vegetation <input type="checkbox"/> degradation <input type="checkbox"/> lacking material	yes	1.5 - 2.0	middle	35 - 65	125 - 235	

NB inspection protocol
Sheet 4: Acoustic assessment

Assessment for each NB field individually				Estimated overall assessment (superposition)			
field no.	acoustic condition	critical radius /m		field no.	acoustic condition	critical radius /m	
35	G	5		35	G	5	
57	G	9		57	G	9	
83	Q	17		83	Q	39	
84	G	8		84	Q	44	
86	G	5		86	Q	48	
87	G	9		87	Q	46	
89	Q	17		89	Q	38	



Préparation avant visite

NB inspection protocol

Sheet 1: Location

road name	B42	
near	Oberwalluf	
emergency lane	yes	
from/to km	45.7	46.5
direction	Frankfurt	
from/to coordinates	50.044433	8.137693
	50.044482	8.137751

NB inspection protocol

Sheet 2: Construction

main construction material	absorbing front?	absorbing back?	material of posts
acrylic glass	no	no	steel
combined with			
combined with			



Visite

NB inspection protocol Sheet 3: Defects



NB inspection protocol Sheet 4: Acoustic assessment

Assessment for each NB field individually

Estimated overall assessment (superposition)

field no.	NB side	field height /m	defect location
35	front	2	at element
57	front	2	at element
83	front	2	at element
84	front	2	at element
86	front	2	at element
87	front	2	at element
89	front	2	at element

field no.	acoustic condition	critical radius /m
35	G	5
57	G	9
83	Q	17
84	G	8
86	G	5
87	G	9
89	Q	17

field no.	acoustic condition	critical radius /m
35	G	5
57	G	9
83	Q	39
84	Q	44
86	Q	48
87	Q	46
89	Q	38

☐ ☐ ☐ ☐ ☐ ☐
 yes : 4.3 - 4.9 : middle : 5.0 - 5.5 : 5.6 - 6.2 : 6.3 - 6.9



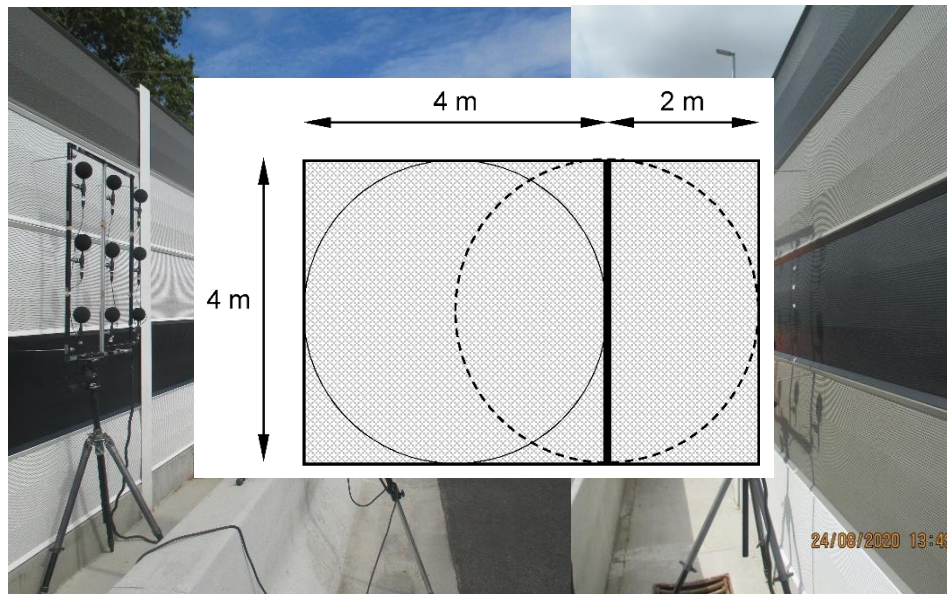
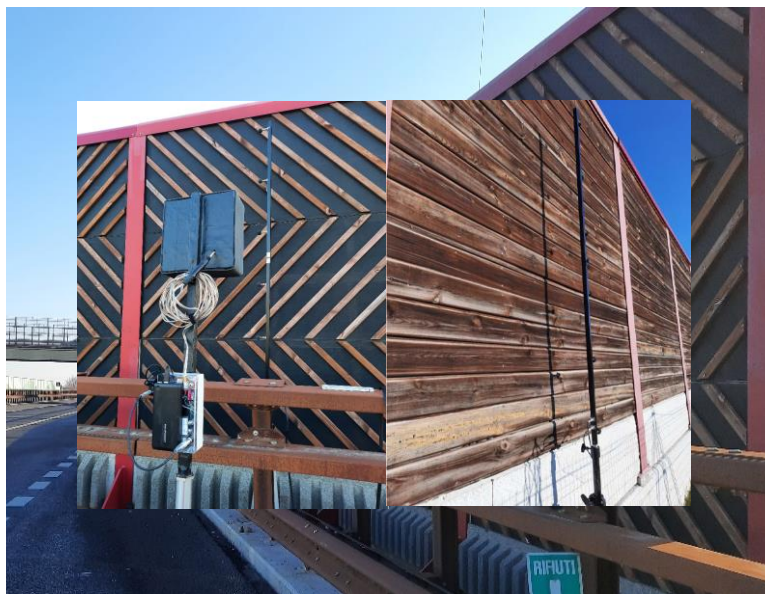
NB inspection protocol																
Sheet 3: Defects																
field no.	NB side	field height /m	defect location	type/cause of defect						view through	position /m		size /cm		additional notes (e.g. on visual/aural impression, absorption material, environmental conditions, general condition, reference to photographs ...)	
				impact	deformation	rust	vegetation	degradation	loosing material		vertical	horizontal	vertical	horizontal		
43	front	5	at element	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	yes	1.5 - 2.0	middle	15 - 35	125 - 235	
43	front	5	between element and post	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	yes	3.0 - 3.5	left	235 - 415	8 - 15	

NB inspection protocol		
Sheet 1: Location		
road name	B45	
near	Rodgau	
emergency lane	yes	
from/to km	107.0	107.5
direction	Dieburg	
from/to coordinates	50.009051	8.897331
	50.008208	8.897556

NB inspection protocol			
Sheet 2: Construction			
main construction material	absorbing front?	absorbing back?	material of posts
plastics	yes	yes	steel
combined with			
combined with			

NB inspection protocol			NB inspection protocol		
Sheet 4: Acoustic assessment			Sheet 4: Acoustic assessment		
Assessment for each NB field individually			Estimated overall assessment (superposition)		
field no.	acoustic condition	critical radius /m	field no.	acoustic condition	critical radius /m
43	Q	32	43	D	59
43	Q	27	43	D	59

Mesures In-situ



La méthode “rapide” SOPRA



Exemple sur l'autoroute A22 en Italie

Tests entre 10:00 and 16:00 (6 heures)

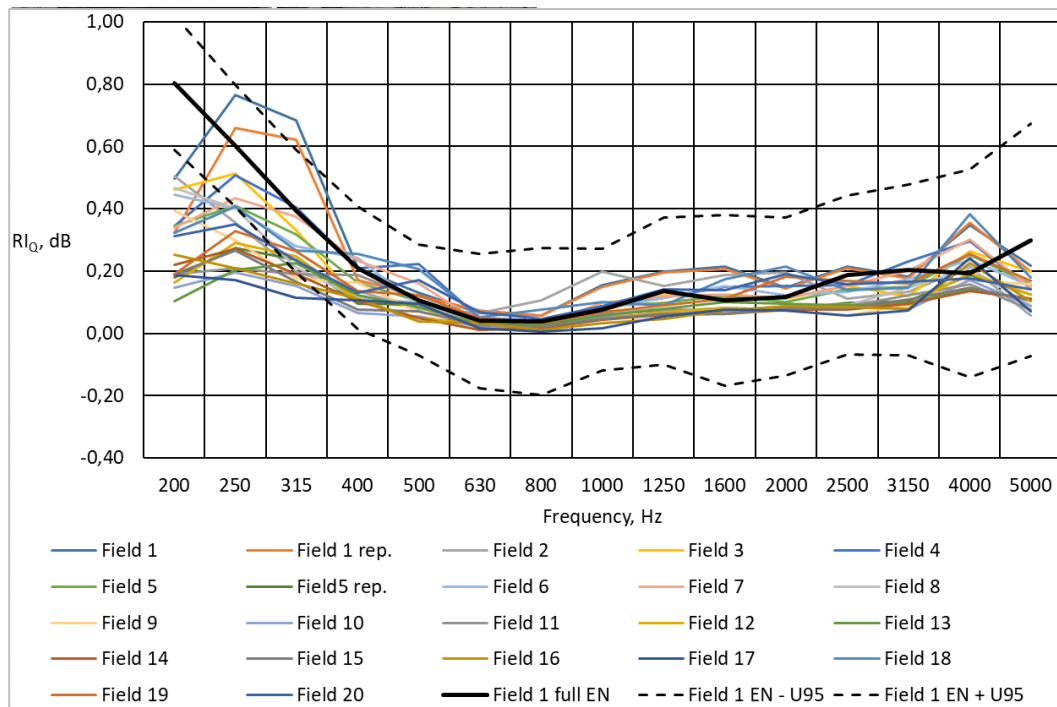
Barrière antibruit métallique:

- Longueur 600 m
- Hauteur 5,00 m
- Poteaux tous les 3,00 m

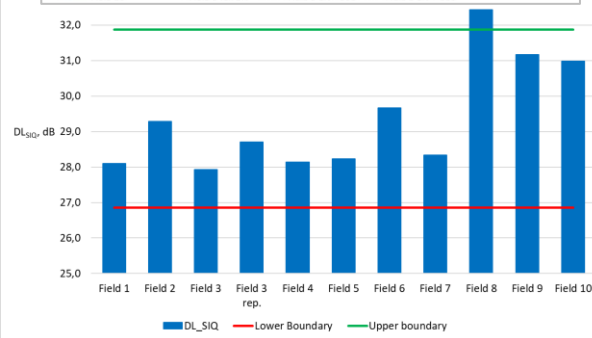
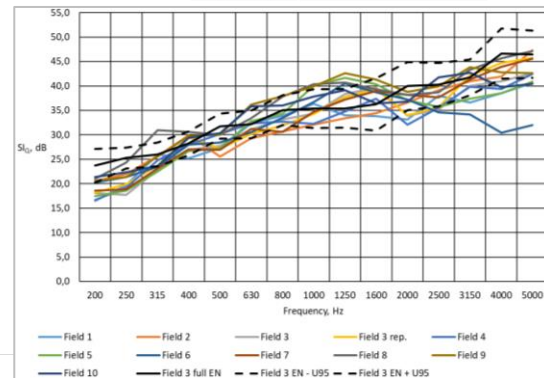
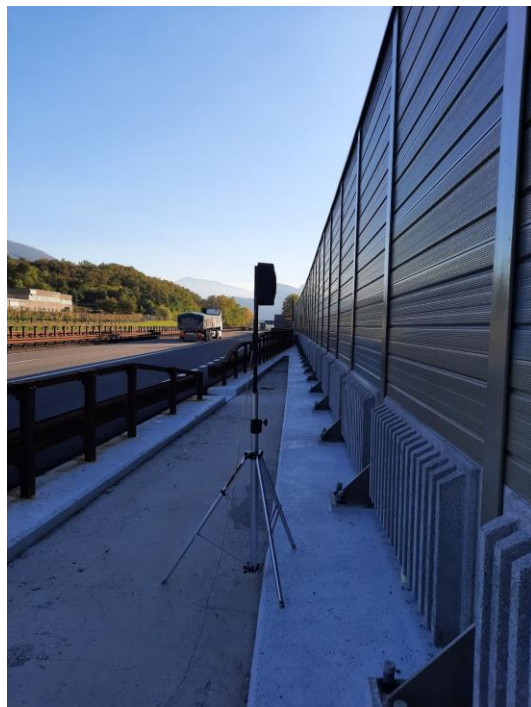
22 tests d'absorption

11 tests d'isolation

La méthode “rapide” SOPRA

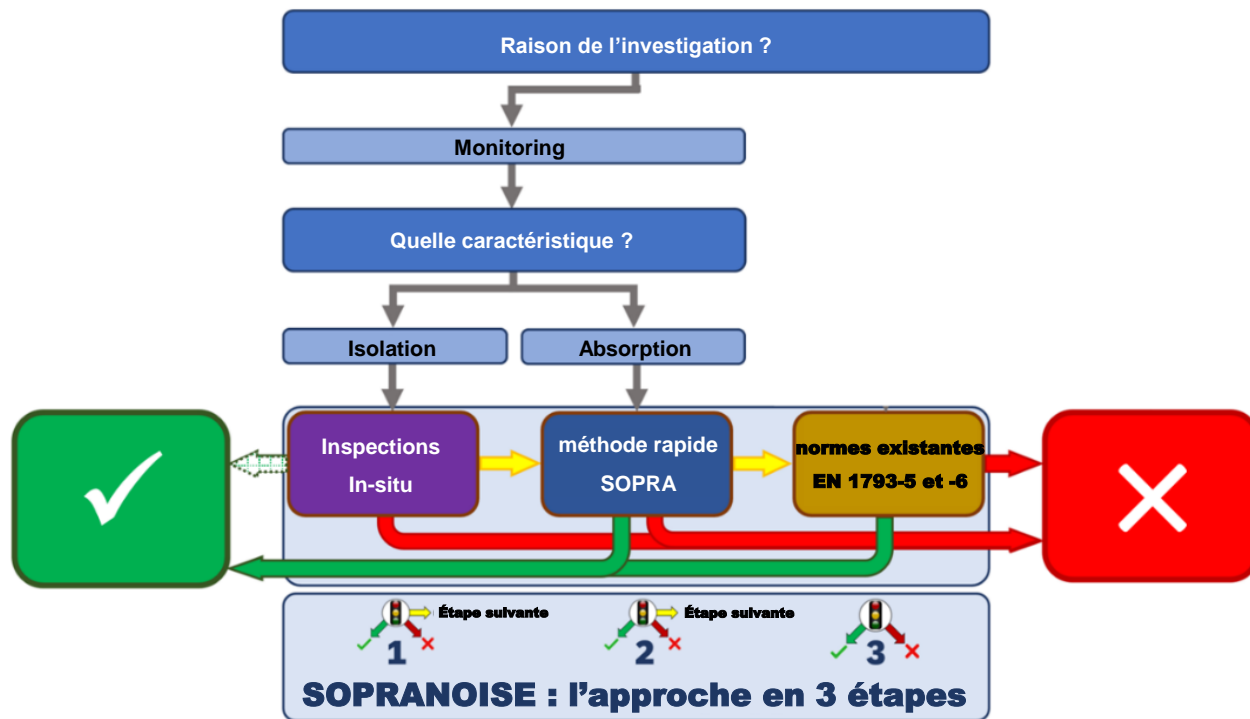


La méthode “rapide” SOPRA



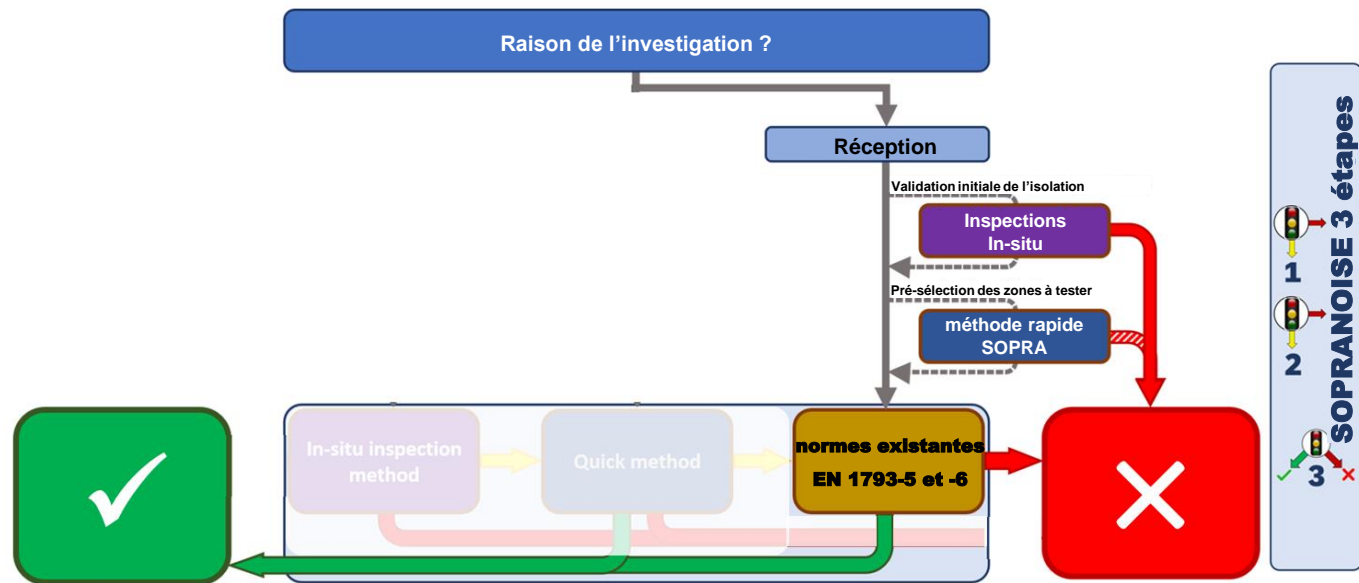


L'outil adapté à la bonne conclusion



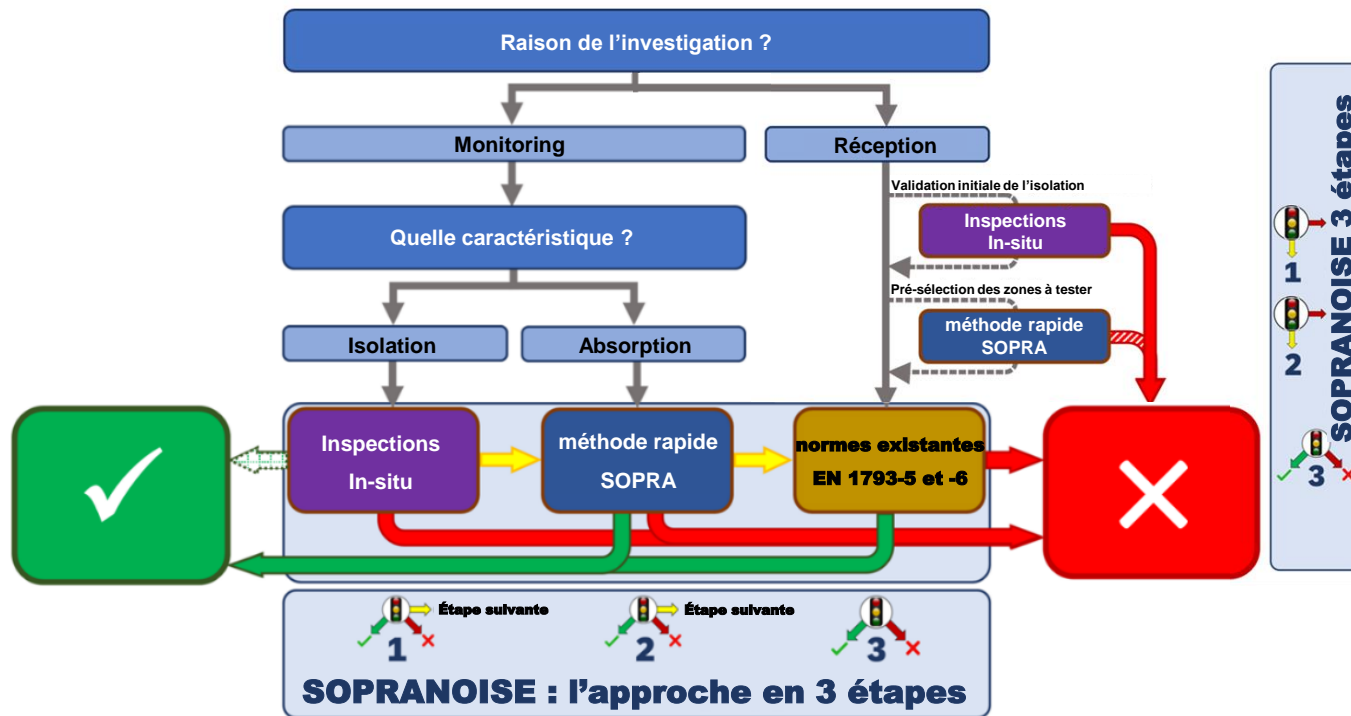


L'outil adapté à la bonne conclusion





L'outil adapté à la bonne conclusion





CONCLUSIONS

- Il est essentiel de pouvoir caractériser les performances acoustiques intrinsèques des écrans antibruit afin d'assurer que ces écrans réduisent correctement le bruit dans leur environnement et vont pouvoir continuer le faire.
- Les écrans antibruit peuvent être très longs et difficiles à tester de façon exhaustive avec les méthodes normalisées EN 1793-5 & 6: il y a un réel besoin pour d'autres méthodes de mesures et de monitoring des écrans de façon plus systématique et moins onéreuse.
- **L'approche en 3 étapes de SOPRANOISE** permet de placer l'effort correspondant à chaque niveau d'analyse, du niveau le plus simple (mais moins précis) au niveau le plus précis.



UNE ORGANISATION



ABR

Association
Belge de la Route



AGENTSCHAP
WEGEN & VERKEER

AVEC LE SOUTIEN DE



Centre de
recherches routières



BRUXELLES MOBILITÉ
SERVICE PUBLIC RÉGIONAL DE BRUXELLES



FBEV

Fédération Belge des Entrepreneurs de Travaux de Voirie asbl



Belgisch **Wegen**congres
Congrès belge de la **Route**

LEUVEN • 4-7.04.2022



Contact

👤 Jean-Pierre CLAIRBOIS

☎ +32 2 344 85 85

✉ jpc@atech-acoustictechnologies.com

