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Addition to: “Reducing screen-induced refraction of noise barriers in wind by vegetative screens”[1]

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In a recently published paper [1] (see title) a wind tunnel experiment at scale was described. It was shown that the performance of a single noise barrier and noise barriers on either side of an acoustic source in downwind conditions could be improved by using windscreens.

To calculate the insertion loss, corresponding frequencies of different configurations were first compared. The following step was averaging out these effects to obtain values for the insertion loss. When emission spectra are not flat, this is a suitable approach.

However, measurements in an anechoic chamber revealed that the acoustic line source in the experiment had a sufficiently flat frequency spectrum. So the above mentioned method was not necessary, and a more common way of calculating the insertion loss is now used. The total energy in the frequency interval under investigation is calculated. Based on these values, insertion losses were obtained. This definition of frequency band insertion loss is much more usual and therefore more suitable for comparison to other experiments and simulations.

In Table I, an overview is given of the net insertion loss (IL) in the frequency interval from 500 Hz to 1000 Hz (in full scale), for the different configurations of noise barriers and windscreens, together with the wind speeds above the boundary layer. The net IL is defined as the total intensity in the frequency band under investigation of a certain noise barrier configuration without windscreens minus the intensity level of the same noise barrier configuration with windscreens, at the same place and for the same wind speed measured above the boundary layer.

In this addition, only the results for the net IL are given, since this is a direct quantification of the effect of windscreens. Other (partial) results change too when applying the above-mentioned approach, but are less crucial for illustrating the conclusions arising from this study.

The effects of using windscreens are larger as a result of this more common way of processing the experimental data.

Table I. Net IL (in dB) by the windscreens at the test distances (expressed in screen heights H). A windless situation (= u_0) and two wind speeds, measured above the boundary layer, are used: $u_1 = 6.4$ m/s and $u_2 = 11$ m/s.

	3H	4H	5H	6H	7H	8H	9H	10H
$1ns + 1ws(H)$								
u_0	0,1	0,2	0,0	-0,1	0,4	0,4	0,2	-0,8
u_1	0,1	-0,2	0,2	0,2	0,5	0,3	1,1	0,9
u_2	0,1	0,6	0,7	1,4	1,7	2,1	2,9	2,9
$1ns + 1ws(2H)$								
u_0	0,2	-0,2	0,1	0,3	1,1	-0,1	0,2	0,1
u_1	-0,4	-0,5	0,4	0,3	0,6	0,4	0,9	1,0
u_2	-0,4	0,3	0,3	0,9	2,2	2,4	3,2	3,3
$2ns + 2ws(2H)$								
u_0	-0,3	1,0	0,0	-0,2	-0,8	0,0	0,5	0,0
u_1	0,1	0,6	1,0	0,8	0,4	2,0	1,3	1,9
u_2	0,5	0,8	2,2	1,7	2,0	3,4	4,0	4,2
$2ns + 1ws(2H), d$								
u_0	-0,3	1,2	0,3	0,0	-0,2	0,2	-0,5	0,5
u_1	-0,4	0,8	1,0	1,3	1,6	2,6	3,5	3,5
u_2	-0,5	0,6	2,1	3,3	4,1	5,4	6,1	5,5
$2ns + 1ws(2H), b$								
u_0	-0,4	0,3	-0,6	0,0	-0,4	0,4	-0,1	0,1
u_1	0,1	0,3	0,8	0,8	0,2	1,3	1,6	2,1
u_2	0,6	1,1	1,0	2,2	2,6	3,8	4,1	4,1

Improvements up to 6 dB are possible, depending on the configuration of noise barriers and windscreens used. The conclusions drawn in the original paper remain. In particular, when comparing a single noise barrier with a low ($1H, 1ns + 1ws(H)$) and a high ($2H, 1ns + 1ws(2H)$) vegetation screen, there is still not much difference between them. It is also better to place one windscreen behind the downwind noise barrier in a double noise barrier configuration ($2ns + 1ws(2H), d$) than placing windscreens on both sides ($2ns + 2ws(2H)$). The differences however are not as large as suggested in the original publication. As a consequence, using two windscreens is also effective in reducing screen-induced refraction in downwind direction and leads to an improvement of more than 4 dB at a distance of 10 times the noise barrier height.

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[1] Acustica united with Acta Acustica **88** (2002) 231–238