



Measurement of Sound reduction of CASI Sandwich Panels

Project	Sound Insulation properties of CASI Panels
Report	549376-A
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ISO14001
ISO9001
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Project: Sound Insulation properties of CASI Panels

Client: Stenca Trading A/S
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Summary: The measured Sound reduction index for the single CASI Panel is measured to 35 dB. For combination of 2 CASI panels with an intermediate layer values up to 46 dB has been measured.

The measurement results are valid for the tested samples only, and values for elements with larger surface dimensions may deviate.

Responsible: Leif Ødegaard

QA-responsible: Ole Winther Nielsen





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Contents

1. Introduction.....	4
2. Description of wall elements.....	4
3. Measurements	4
3.1. Measurement method.....	5
3.2. Measurement equipment	6
3.3. Measurement uncertainty	6
3.4. Measurement conditions	6
4. Measurement results	6
5. Conclusions	7





1. Introduction

On behalf of Stenca Trading, AF-Ingemansson has performed measurement of the sound insulating properties for 5 samples of sandwich wall elements.

The primary goals of the measurements were to get estimates of

- Sound transmission loss, R, for the whole construction in 1/3-octave frequency bands. Weighted sound reduction index, R_w. This weighted index is a single value indicator of the transmission loss of the test specimen.

2. Description of wall elements

The wall elements are constructed as combination of sandwich elements, with CASI calcium silicate boards, 300 kg/m³ as primary core material. Between the wall panels different kinds of intermittent layers has been tested. The individual element construction is as given below. All elements had the surface dimensions 1,300x800 mm².

Construction No.	CASI	Layer	CASI
1	19 mm	40 mm Filomat	19mm
2	19 mm		
3	19 mm	5mm Plywood	19mm
4	19 mm	1mm Perforated Alu Plate	19mm
5	19 mm	5 mm plywood + 2.7mm Stenca Drapery (Sari)	19 mm

Table 1.

Construction of tested Stenca sandwich wall elements.

3. Measurements

The measurements are performed according to ISO 15186 "Acoustics- Measurement of sound insulation in buildings and of building elements using sound Intensity"

The sound measurements were performed with a loudspeaker emitting broadband white noise as a sound source. The loudspeaker was placed in a test box (approx. 2x2x1.5 m³) with the one of the horizontal sides open, and the test element served as a wall panel in the box (1,350x800 mm²) of the box.





3.1. Measurement method

The sound source was driven with a pink noise signal generated by an external noise generator. The spatially averaged sound pressure level in the test box room was measured with an rotating microphone in connection with an integrating sound analyzer.

The noise transmitted through the test sample to the receiving room was measured using the Intensity technique.

The Sound Transmission R'_i loss was calculated as follows:

$$R'_i = L_p - L_i - 6 \text{ dB}$$

Where

L_p is the measured sound pressure level inside the box with the test element mounted.

L_i is the measured radiated sound intensity level over the measurement surface, when the test element when placed in the opening

The sound insulation was measured in 1/3-octave frequency bands as well as weighted according to ISO 717. The weighted value is designated R'_{iw} .

The sound power was measured using a sound intensity scanning technique according to ISO 9614-2. The microphone spacing used was 12 mm.

The measured sound levels were transferred to a PC for analysis. The reported sound reduction indices are calculated as described in ISO 717-1, "Acoustics – Rating of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation," (1996).





3.2. Measurement equipment

The following measuring instruments were used:

Instrument	Make	Type
Acoustic calibrator	Brüel & Kjær	4231
Intensity analyser	Brüel & Kjær	2260
Intensity probe	Brüel & Kjær	3595
Intensity Calibrator	Brüel & Kjær	3541
Sound Analyzer	Brüel & Kjær	2144

Table 2.

Measuring equipment.

The instruments are calibrated regularly with reference to international standards according to Ingemanssons quality system.

3.3. Measurement uncertainty

The measurement uncertainty on the R_{lw}' -value is estimated to ± 3 dB.

3.4. Measurement conditions

The measurements were performed at test facility at The Technical University in Lyngby, Denmark, on November the 25th 2009.

4. Measurement results

The measured insertion loss is shown in figure 1 and in table 3.

Construction No.	CASI	Layer	CASI	R_{lw}'
1	19 mm	40 mm Filomat	19mm	42 dB
2	19 mm	-	-	35 dB
3	19 mm	5mm Plywood	19mm	46 dB
4	19 mm	1 mm Perforated Alu Plate	19mm	39 dB
5	19 mm	5 mm plywood + 2.7mm Rubber	19 mm	46 dB

Table 3.

Measured Weighted sound reduction index R_{lw}' for the tested wall panels.



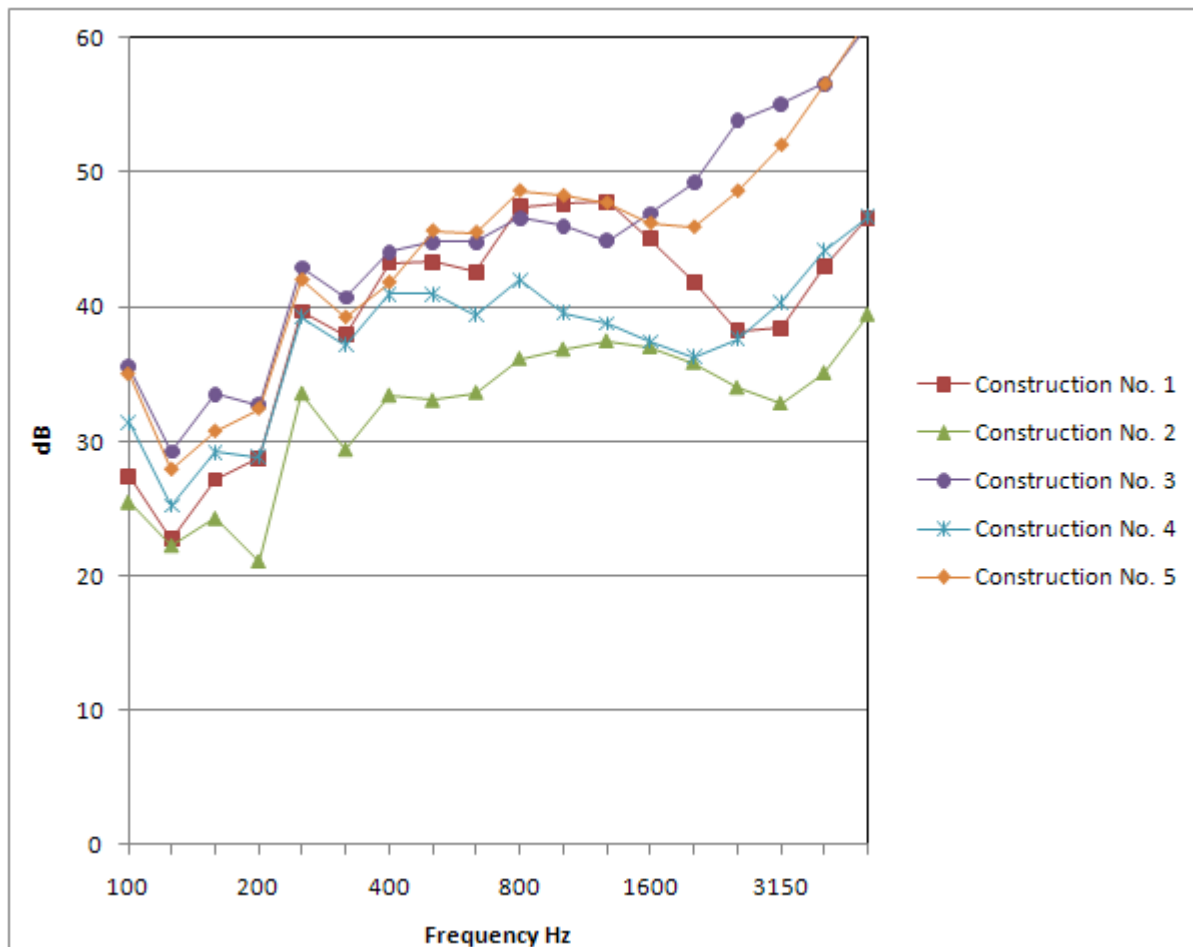


Figure 1.
Measured Sound Reduction for Stenca sandwich elements.

5. Conclusions

The measured weighted sound reduction indexes vary between 35 dB and 46 dB.

The measurement results are valid for the tested samples only, and values for elements with larger surface dimensions may deviate.

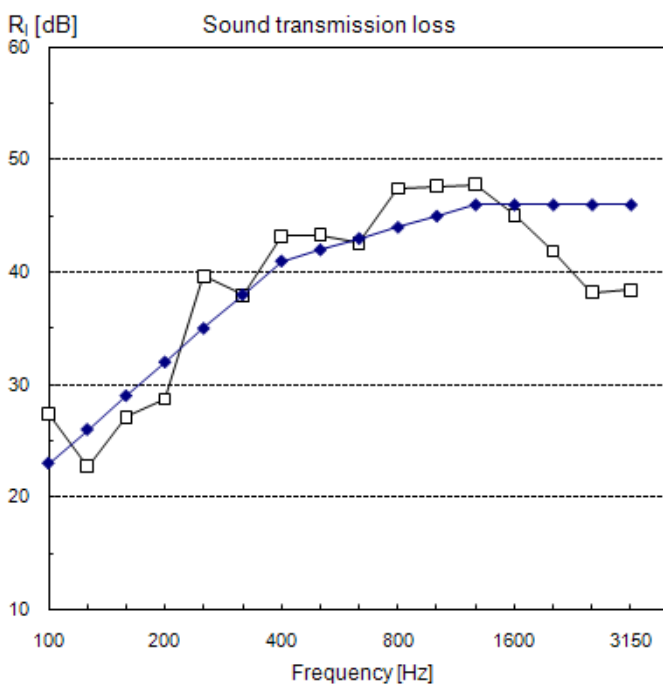




Appendix

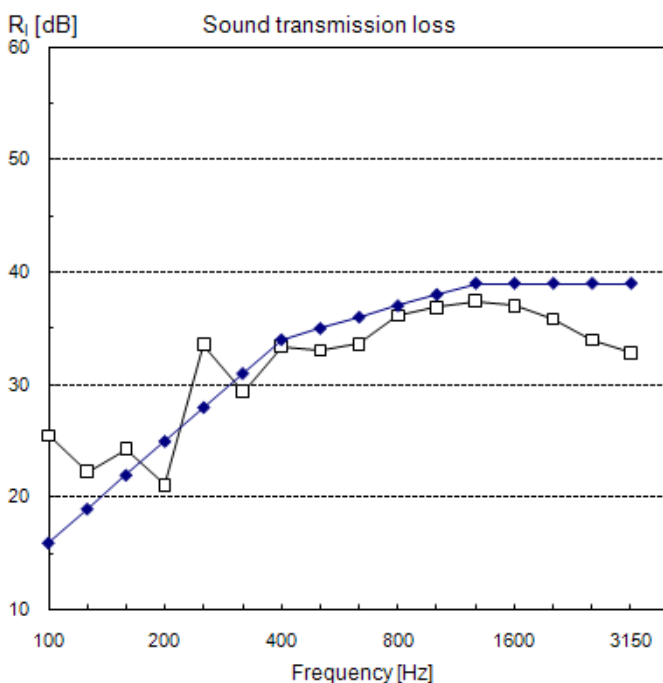
Detailed Results





Hz	dB
100	27.4
125	22.7
160	27.1
200	28.7
250	39.7
315	37.9
400	43.2
500	43.3
630	42.6
800	47.4
1000	47.7
1250	47.8
1600	45.0
2000	41.8
2500	38.2
3150	38.4
$R_{l,w}$	42

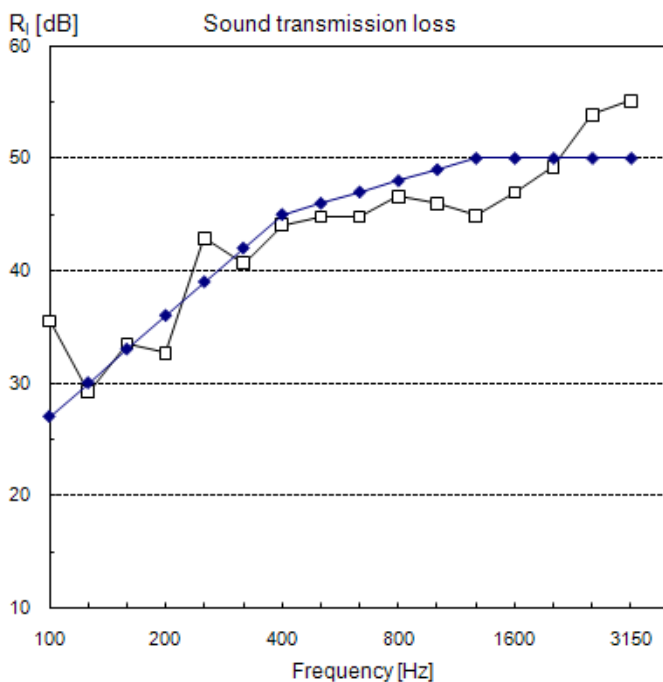
Measured Sound Reduction for Construction No.1.



Hz	dB
100	25.5
125	22.3
160	24.3
200	21.1
250	33.6
315	29.4
400	33.4
500	33.0
630	33.6
800	36.1
1000	36.8
1250	37.5
1600	37.0
2000	35.8
2500	34.0
3150	32.8
$R_{l,w}$	35

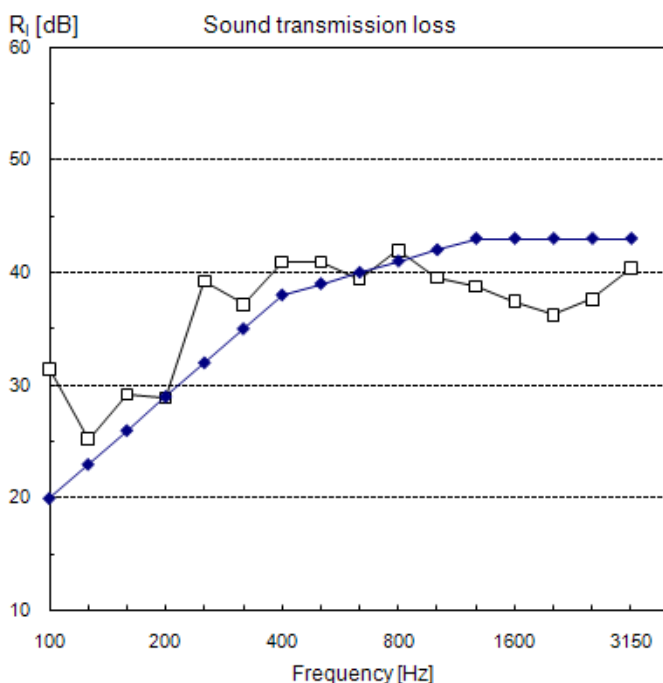
Measured Sound Reduction for Construction No.2.





Hz	dB
100	35.5
125	29.2
160	33.5
200	32.7
250	42.9
315	40.7
400	44.1
500	44.8
630	44.8
800	46.6
1000	46.0
1250	44.9
1600	47.0
2000	49.2
2500	53.9
3150	55.1
$R_{l,w}$	46

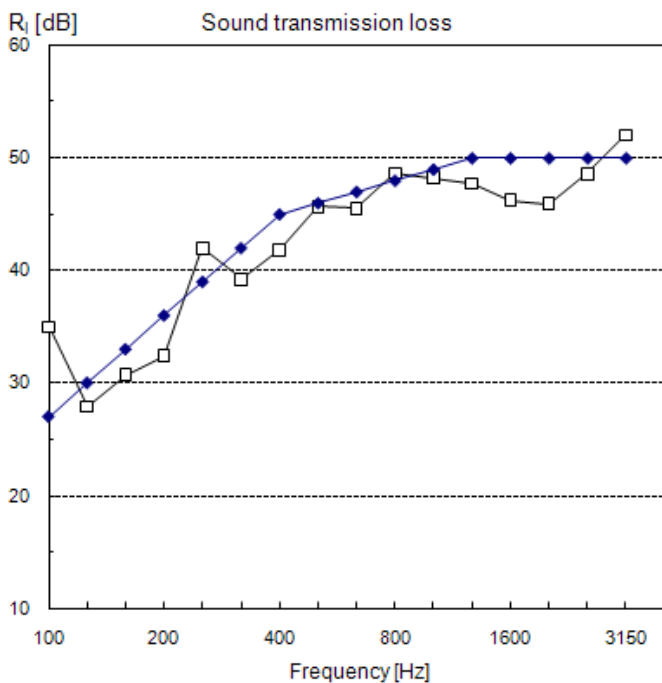
Measured Sound Reduction for Construction No.3.



Hz	dB
100	31.4
125	25.2
160	29.2
200	28.9
250	39.2
315	37.2
400	40.9
500	40.9
630	39.4
800	42.0
1000	39.6
1250	38.8
1600	37.4
2000	36.3
2500	37.6
3150	40.4
4000	44.2
5000	46.7
$R_{l,w}$	39

Measured Sound Reduction for Construction No.4.





Hz	dB
100	35.0
125	27.9
160	30.7
200	32.4
250	42.0
315	39.2
400	41.8
500	45.6
630	45.5
800	48.6
1000	48.2
1250	47.7
1600	46.2
2000	45.9
2500	48.6
3150	52.0
4000	56.5
5000	61.3
R _{1,w}	46

Measured Sound Reduction for Construction No.5.

