

CONTROL MEASUREMENTS OF CALCULATED FACADE SOUND INSULATION

- for road traffic noise
- in residential buildings

Calculations:

- Norwegian Building Inst. H47

Measurements:

- Norwegian Standard 8174
 - cf. ISO 140-5



NEW 4-LANE MOTOR ROAD



- Planning of facade insulation improvements by calculations. (150 residential houses. Design goal: 30-35 dBA Leq indoor level)
- Lightweight (wooden) facades
- 23 resident buildings are controlled (57 rooms) by measurements

TOPICS

- Comparing *calculated* facade insulation with *measured* facade sound insulation for road traffic noise. (dBA)
- Estimate *standard deviation* of room level measurements of road traffic noise. (dBA and 1/3 octave bands)

CALCULATIONS

- Handbook 47, 1999 (i.e. predecessor data 1979-99)

Before façade improvements:

Construction type?

Data reduction

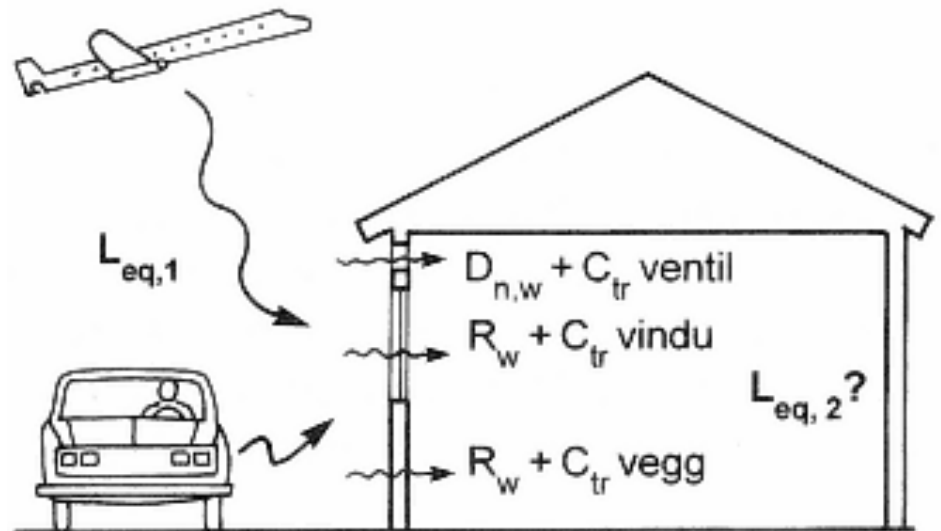
- (cf. Heggøy 09:40)

Accuracy ??

After façade improvements :

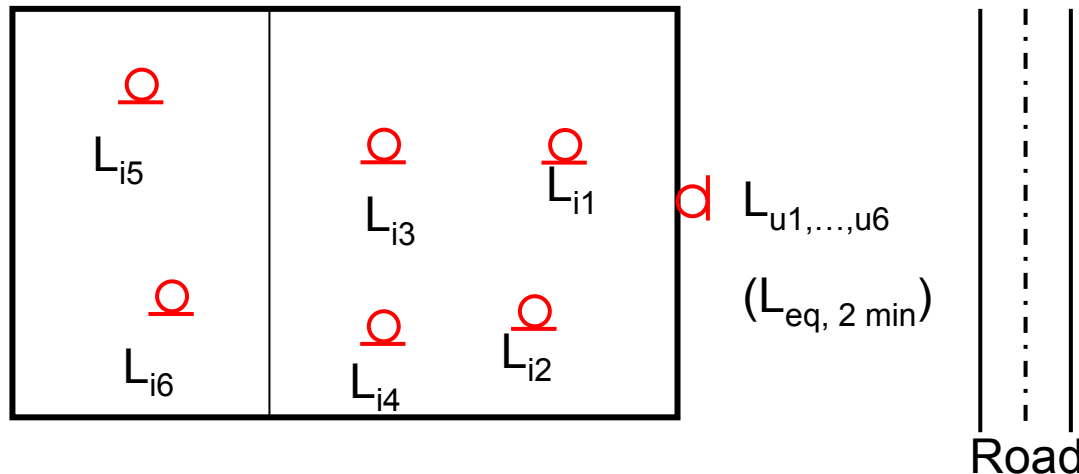
Construction type known

Accuracy $\pm 2-3$ dB



MEASUREMENTS

- Norwegian Standard 8174
 - Measurement of sound level from road traffic noise
- Measurement of facade insulation
 - Simultaneously (short time) difference measurements
 - small rooms < 50 m³ (3-4 pts), large rooms > 50 m³ (5-6 pts)



Level differences 1-n:

$$\Delta L_{f1} = L_{u1} - L_{i1}$$

$$\Delta L_{f2} = L_{u2} - L_{i2}$$

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$$\Delta L_{fn} = L_{un} - L_{in}$$

Facade insulation:

$$\Delta L_{f(1-6, \text{ave})}$$

(T_{30} measured)

CALCULATED vs. MEASURED

Results, ΔL_f (dBA)	Difference Calc. and Meas.	No. of rooms	SUM rooms
Calc. < Meas.	0 – 3 dB	25	30
	3 - 6	4	
	6 - 9	1	
	> 9	0	
			57

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Calc. < Meas.	0 – 3 dB	25	30
	3 - 6	4	
	6 - 9	1	
	> 9	0	
Calc. > Meas.	0 – 3	17	27
	3 - 6	9	
	6 - 9	1	
	> 9	0	
			57

CALCULATED vs. MEASURED - Conclusions

- Calc. vs. Meas.: 74 % (42 of 57 rooms) are within ± 3 dB, 54% are within ± 2 dB
- No tendency to underestimate nor overestimate the facade sound insulation by using H47 (Data reduced)
- Tendency to underestimate (Calc.<Meas.) the calculated facade sound insulation for older (not improved) walls

Measurement accuracy

