Measurement series to verify the accuracy of Stora Enso Acoustic Prediction tool - SEAP

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Introduction

→ **Verification measurements on SEAP model**

- Due to some potential errors in measurement data available in the start of the project an adapted measurement series were carried out
- The first model (pilot study) was too much on ”safe side”
- The model modular design implies easy adjustments

→ **Accuracy requirements ± 2 dB**

Method

→ **The measurements were divided into the following**

1. Full scale measurement series following the ISO 10140 standards
2. Small scale measurement series using 1 m^2 samples to deduce parameter trends.

→ **Full scale**

- 16 full scale floors and 5 full scale walls

→ **Small scale**

- 20 small scale measurements,
  - 1.0 x 1.0 meter large floating floor sample on a 4.0 x 2.5 m CLT floor

Method

→ **Airborne sound insulation – CLT**

- Different results horizontally and vertically?

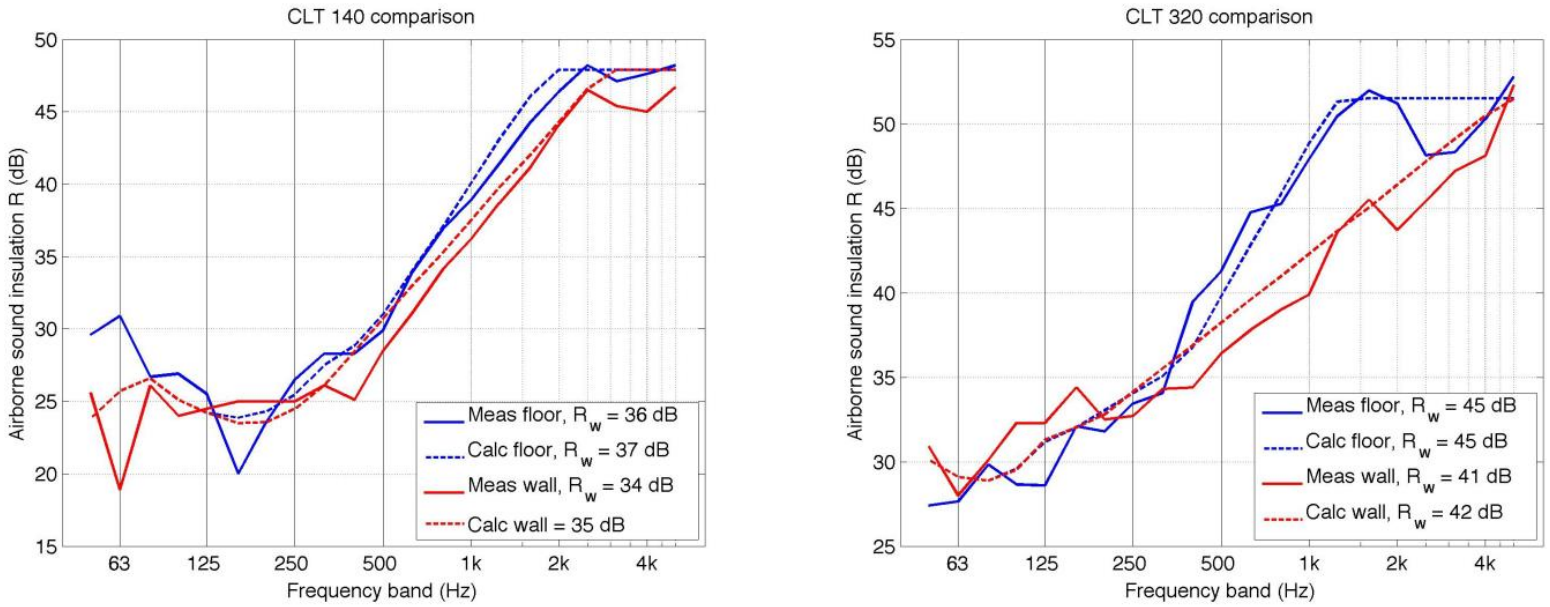


Figure 1: Measurement results vertically vs horizontally for different CLT thicknesses

Method

→ **Impact sound level – CLT**

- results due to laboratory and thickness

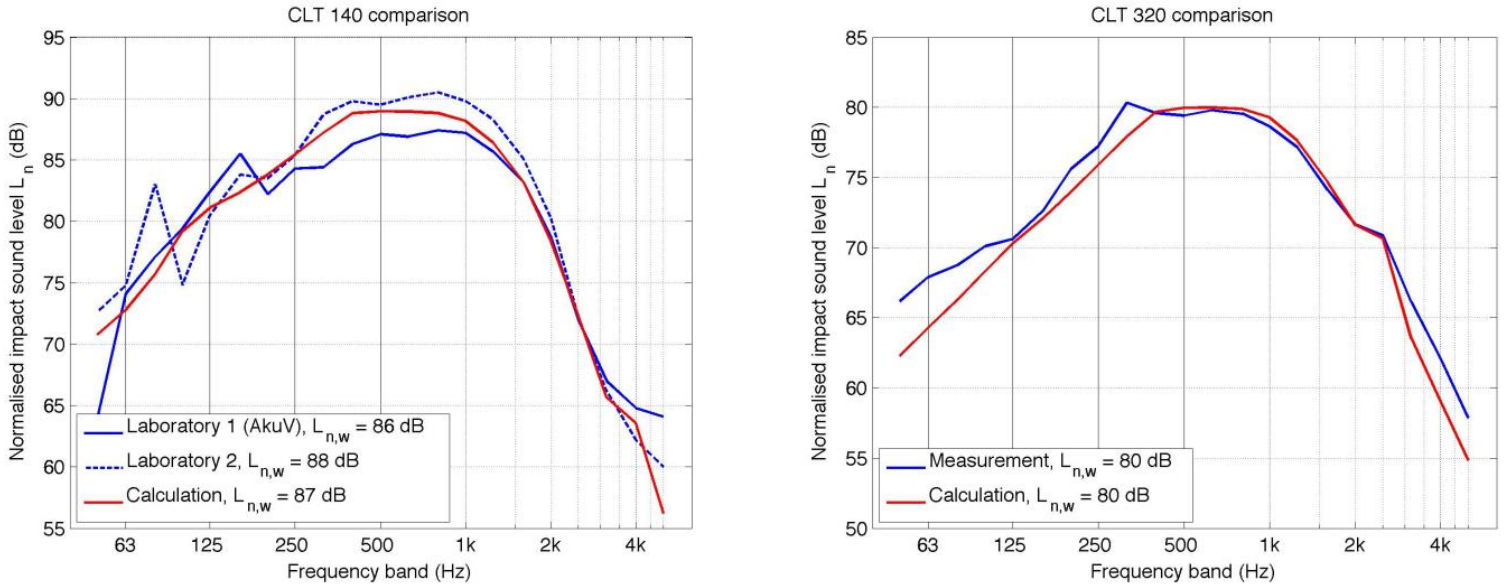
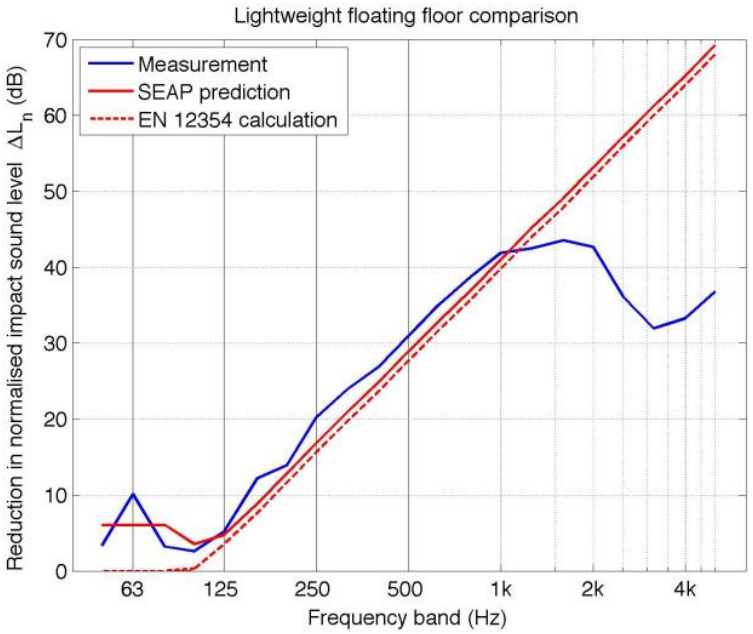


Figure 2: Measurement results vs SEAP for impact sound

Method

→ **Efficiency of floating floors**

- Measurements, SEAP and EN 12354



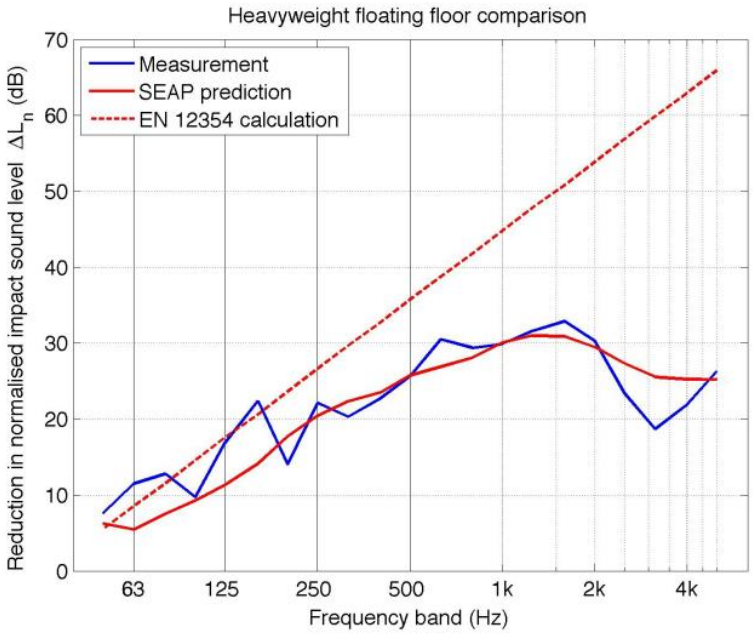


Figure 3: Measurement results vs SEAP, for impact sound reduction

Method

→ **Small-scale measurements**

- were made to get empirical input to how to account for changes in the SEAP prediction tool to one constructional parameter

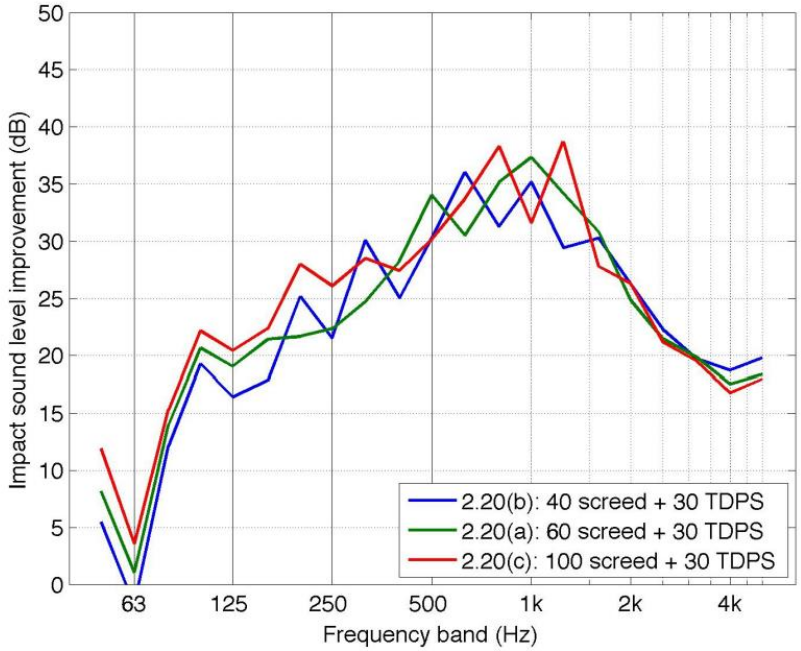


Figure 4: Small-scale measurement results for impact sound reduction of different screed thicknesses

Method

→ **Small-scale measurements**

- Efficiency of suspended ceiling

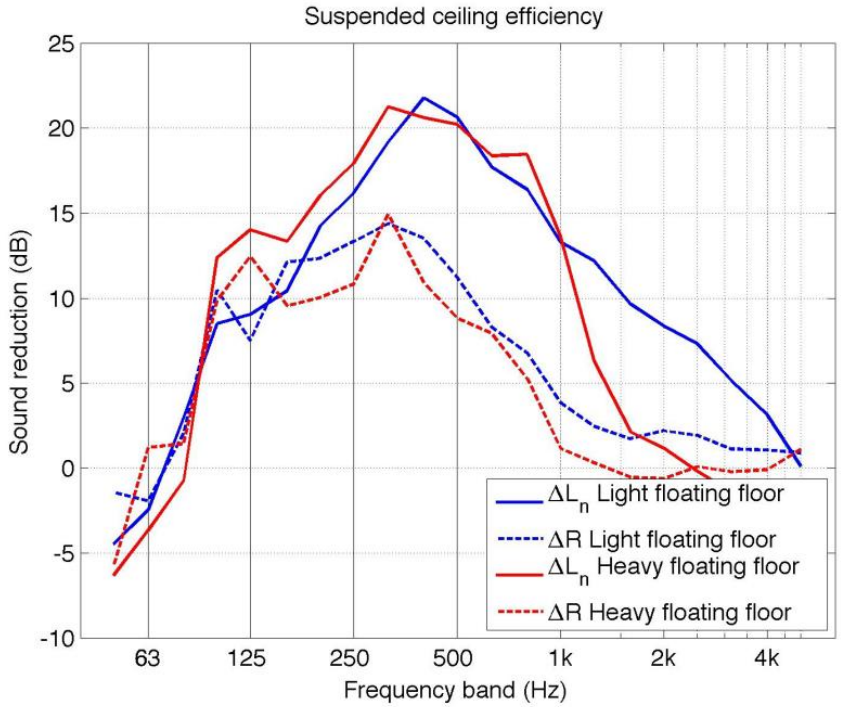
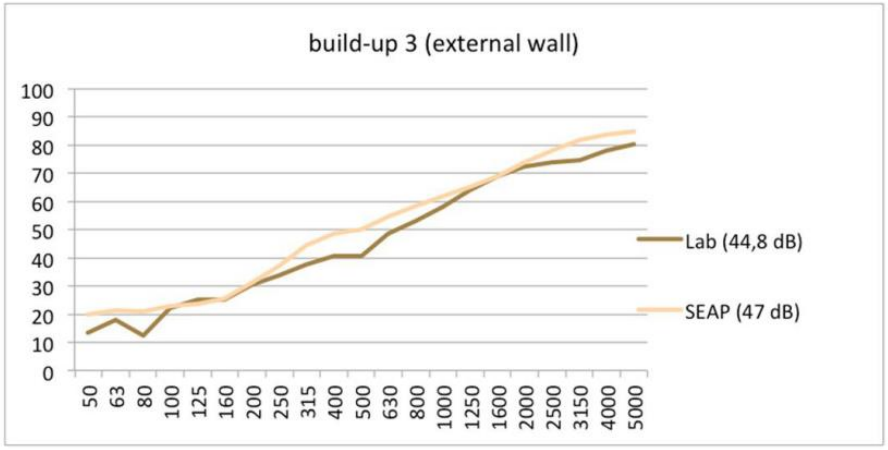
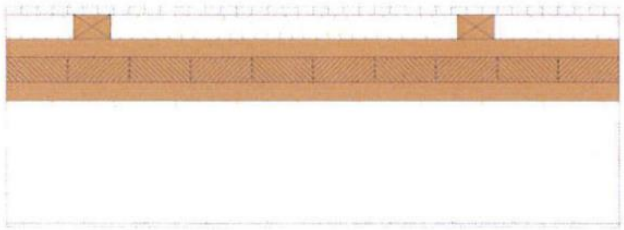


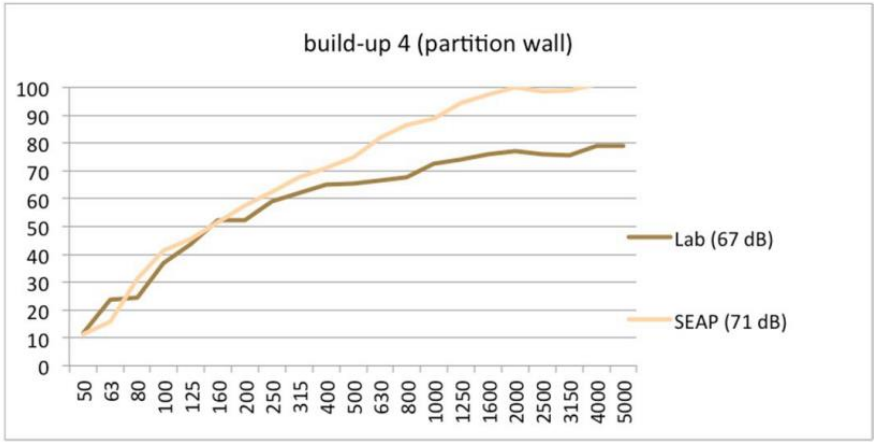
Figure 5: Measurement results for the efficiency of a suspended ceiling

Results after adjustments

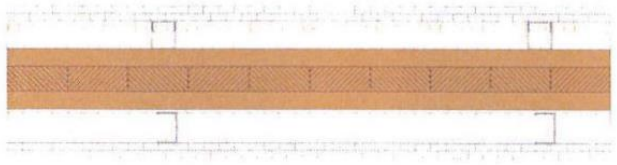


From above: Gypsum 12,5 mm – service cavity 40 mm / wooden battens rigidly fixed /mineral wool – CLT 100 C3s – mineral wool 160 mm – 7 mm plaster

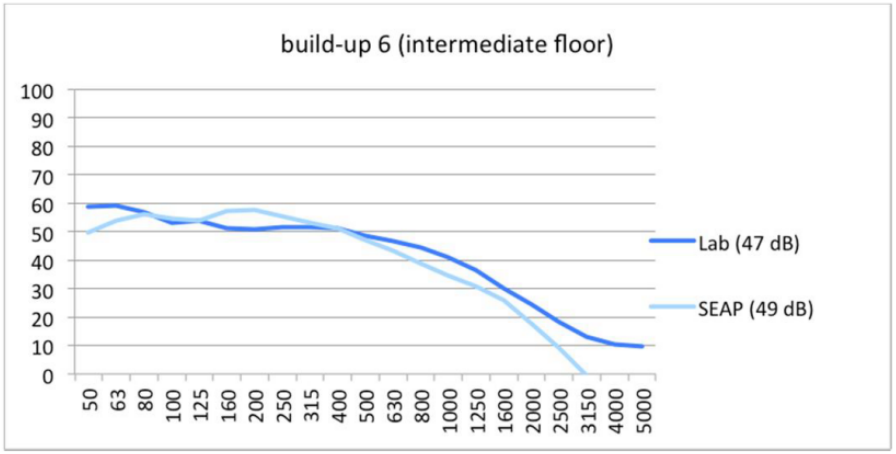




From above: Gypsum 2*12,5 mm – service cavity 60 mm / semi-elastic metal profile / 50 mm mineral wool – CLT 100 C3s – service cavity 55 mm / free standing profile 50 mm / 50 mm mineral wool – Gypsum 2*12,5 mm

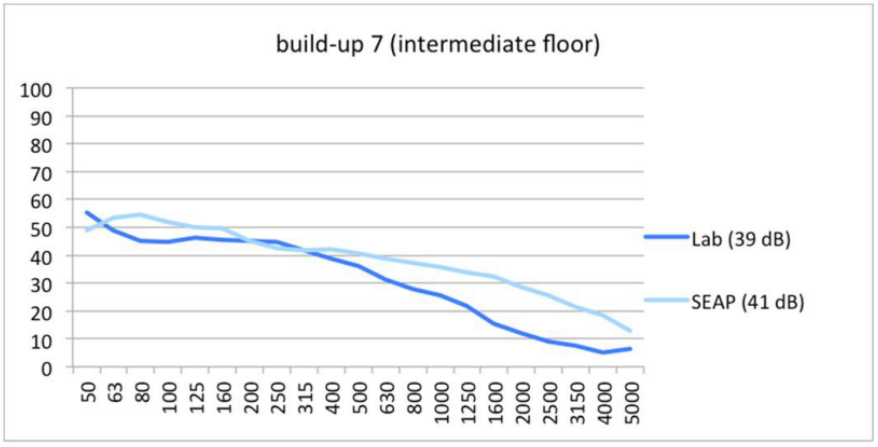


Results after adjustments



From above:

- 25 mm gypsum fibre board
- 20 mm impact sound insulation
- 120 mm gravel
- 150 mm CLT



From above

- 60 mm cement screed
- 20 mm impact sound insulation
- 120 mm gravel
- 150 mm CLT
- 120 mm res suspended ceiling with two layers of gypsum boards (25mm) + min wool

Concluding remarks

- **Stora Enso is now convinced that the accuracy is according to expectations ➔ the first version will be online this autumn**

- **The model will be completed with**
  - More basic elements
  - Additional floor and wall packages
  - Junctions
  - ....in order to calculate room to room and compare field values / building regulations

- **What is right and what is wrong – calculations or measurements?**

- **One thing is at least clear, calculation is much better in order to take the right decisions as new building systems are developed.**

Thanks

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