Aspects on $L_{n,w}$+$C_{I,50}$

I) Correlation with impact noise of walking persons

II) Comparison of ISO 717-2 rating with other rating curves using 350 lightweight floor measurements

Contributions from ift Rosenheim, Andreas Rabold
students of Hochschule Rosenheim
(Morkötter, Erhardt, Müller, Schmitz, Weber)

COST FP 0702 acoustic and vibration in timber buildings
Workshop in Delft, Netherlands 4st- 5th november 2010

Introductory question:

Is $L_{n,w}$ + $C_{I,50\text{-}2500}$ an appropriate quantity
to assess low frequency noise caused by walking persons?

Important to know in order

- to use existing data base
- to have a quantity for (low frequency) impact sound available **now**, which can be used

  -- in planning processes

  -- for consultancy

content

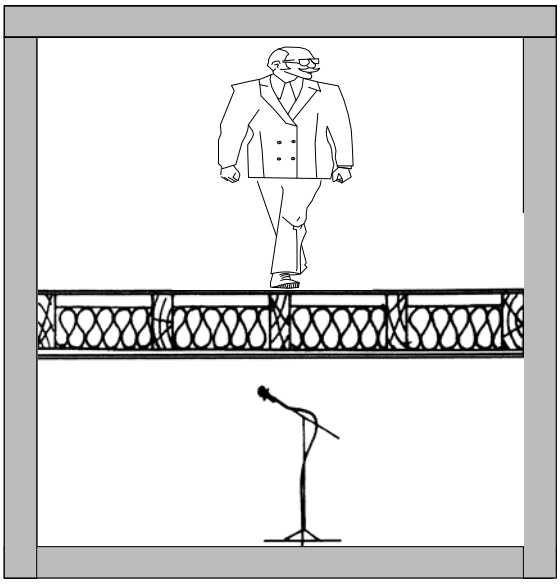
0) motivation

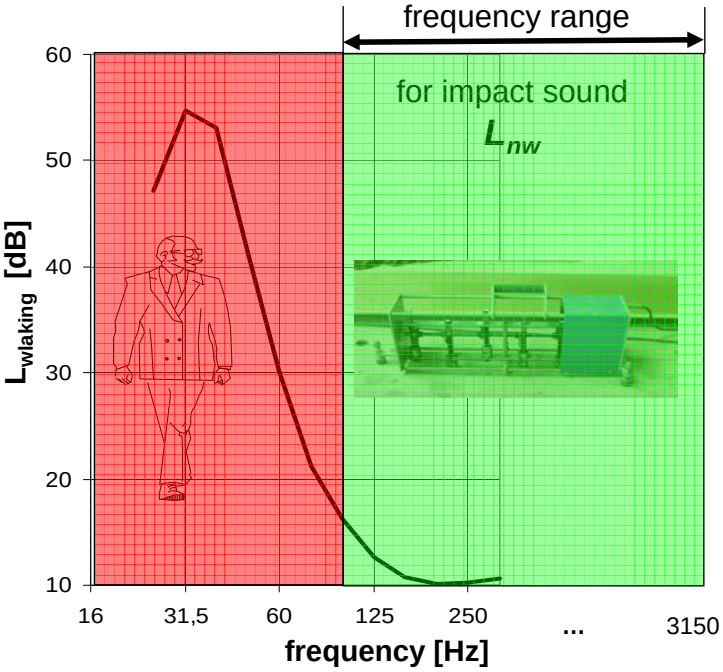
I) Correlation of $L_{n,w}$+$C_{I,50\text{-}2500}$ with impact noise of walking persons

II) Comparison of ISO 717-2 rating with other rating curves using 350 lightweight floor measurements

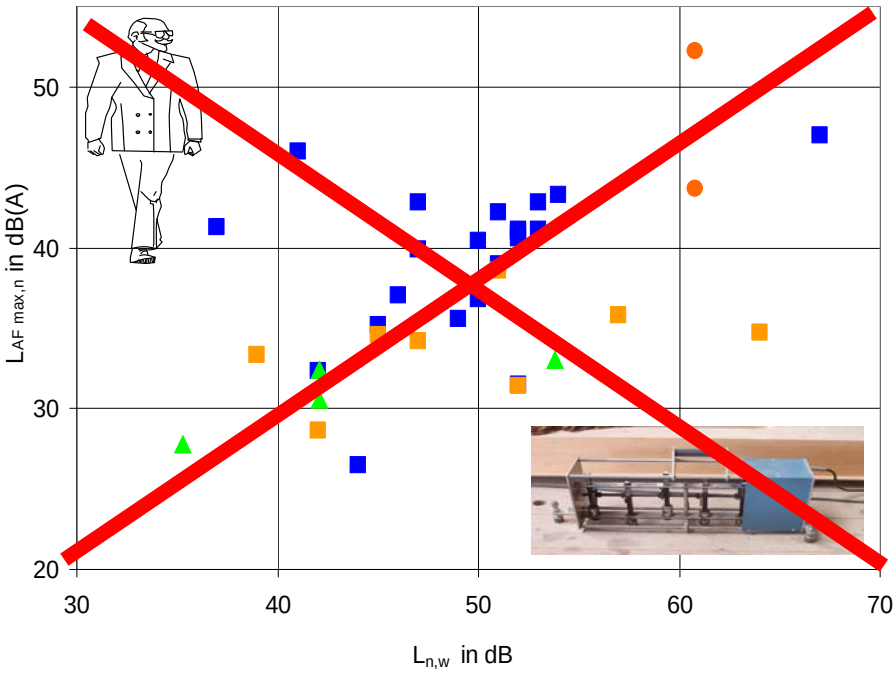
III) summary

0) Motivation: walking vs. tapping machine





0) Motivation: walking vs. tapping machine



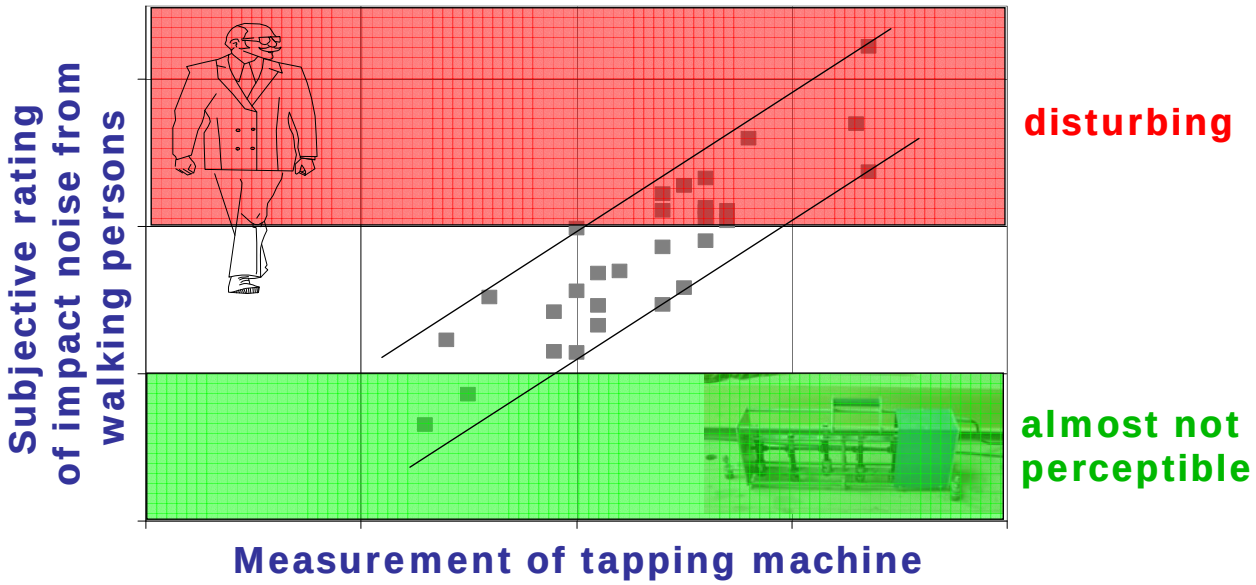
-> correlation of $L_{A,F,max}$ with impact sound from tapping machine not convincing

ift ROSENHEIM
Hochschule Rosenheim
University of Applied Sciences

0) Motivation: walking vs. tapping machine

aim of current investigations:

find a correlation between standardized measurement data and the subjective rating of walking noise



0) Motivation: walking vs. tapping machine

measurement of walking noise is difficult:

- different persons have a different „walking behaviour“
- bad signal–to–noise ratio

  (at low frequencies niose from disturbance)
- below 50 Hz the sound pressure is dominated by the receiving room

  (standing waves, resonances of light-weight building components, ..)

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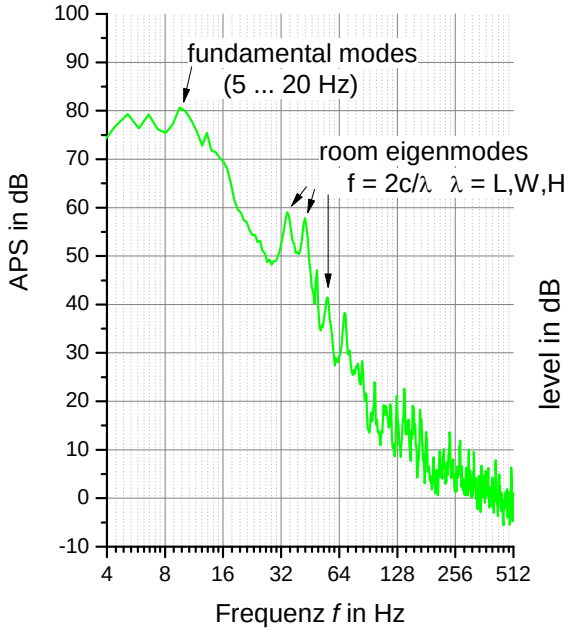
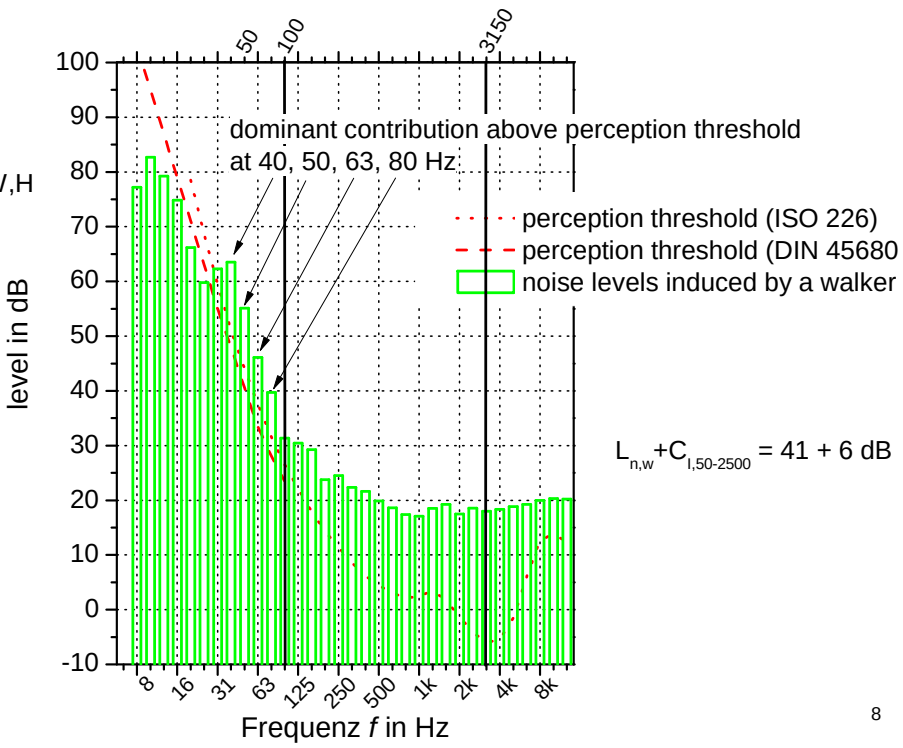
0) Motivation: walking vs. tapping machine

Example of a measurement of walking noise

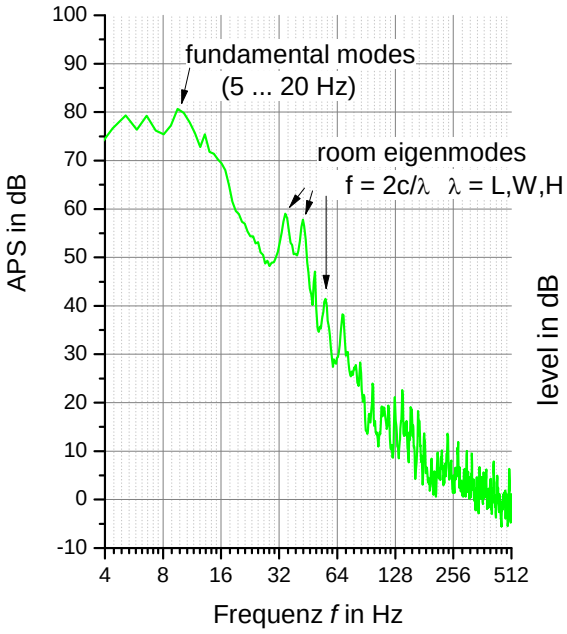


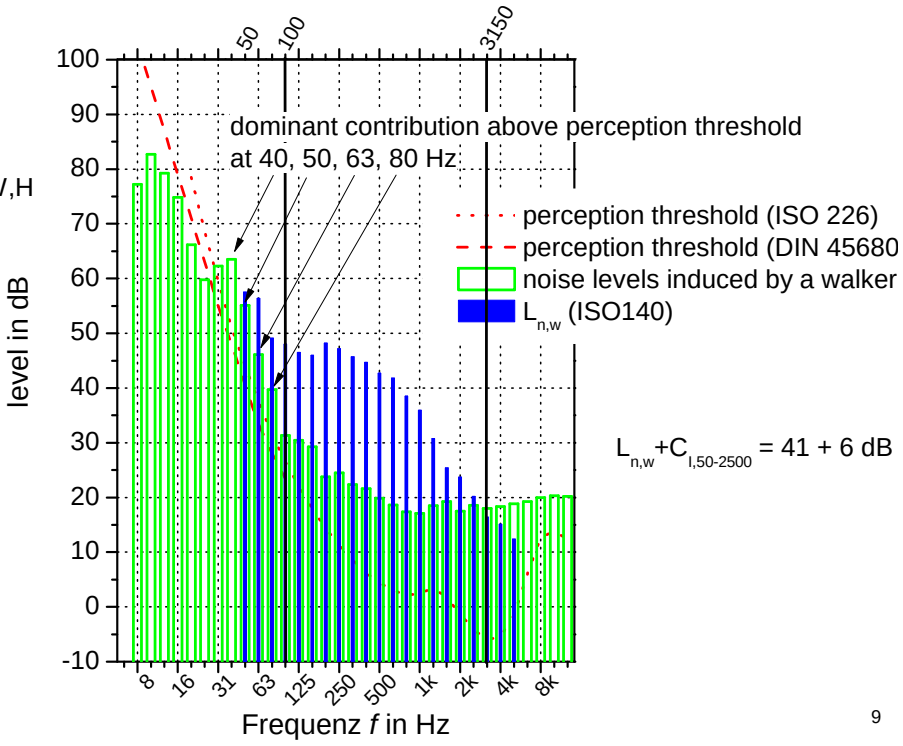


$L_{n,w}+C_{I,50-2500}$ = 41 + 6 dB

0) Motivation: walking vs. tapping machine

Example of a measurement of walking noise





$L_{n,w}+C_{I,50\text{-}2500}$ = 41 + 6 dB

I) Correlation of $L_{n,w}+C_{I,50\text{-}2500}$ with impact noise of walking persons

Which quantity should we use to use to assess walking noise?

- A-weighing and total sound level $L_{AF\,max,n}$

- loudness level L_N in phon (ISO 226)

- loudness level L_{NGD} in phon and
  loudness N_{GD} in sone according to Zwicker

comparison of:

35 measurements in

3 different test stands

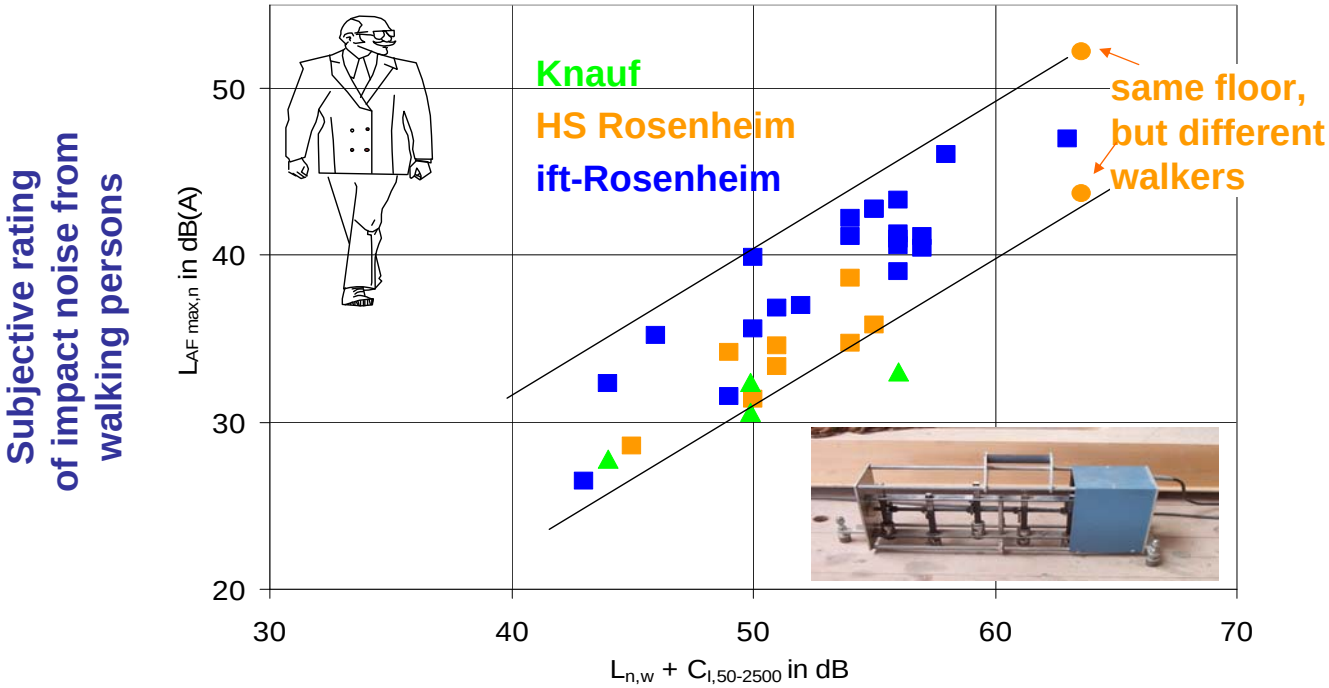
carried out by

4 different persons

- 75 ± 10 kg
- socks, no shoes
- 100 steps /min
- keep 70 cm distance to borders
- walk a „∞“ to excite a large area
- 30 s measurement time

I) Correlation of $L_{n,w}+C_{I,50-2500}$ with impact noise of walking persons

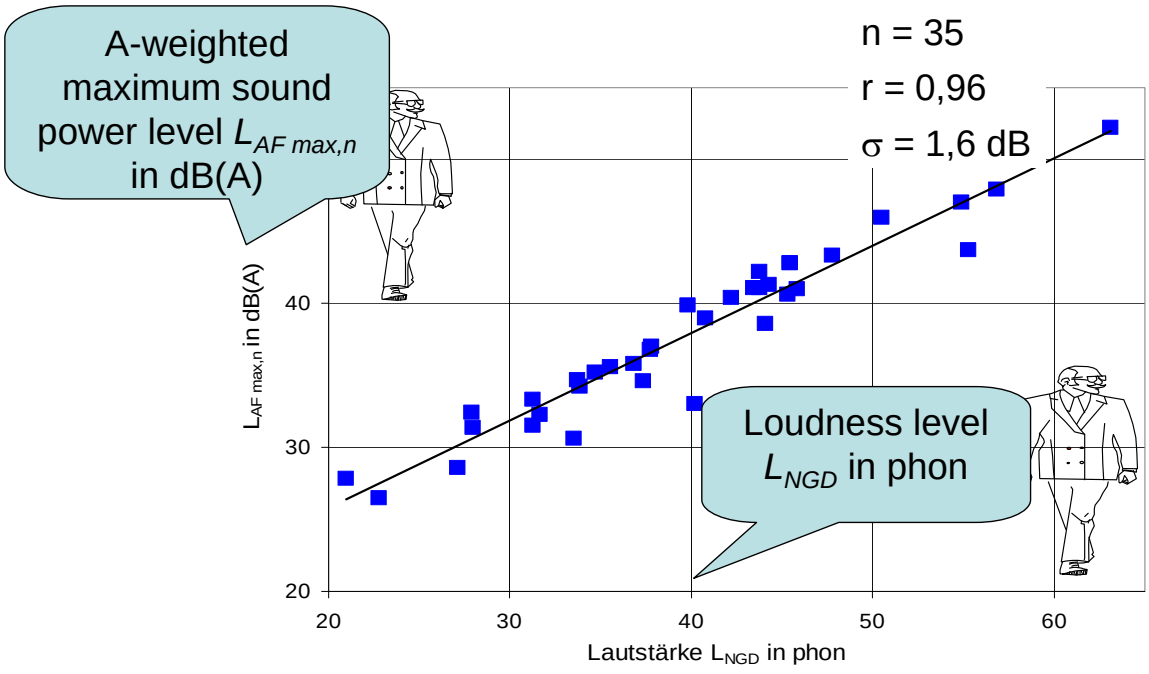
Correlation of $L_{n,w}+C_{I,50-2500}$ with $L_{AF\,max,n}$



Measurement with tapping machine

I) Correlation of $L_{n,w}+C_{I,50-2500}$ with impact noise of walking persons

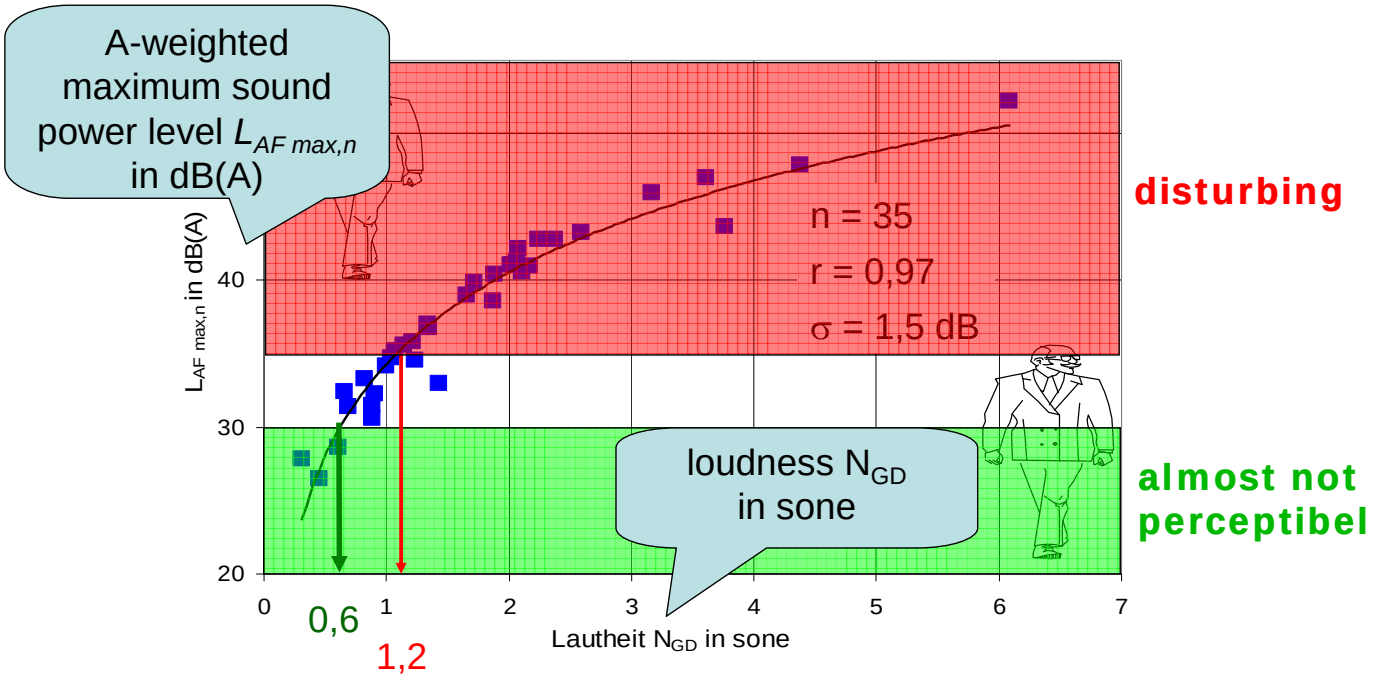
Correlation of $L_{AF\,max,n}$ with loudness level L_{NGD}



-> the same holds for loudness level accord. to ISO 226

I) Correlation of $L_{n,w}$+$C_{I,50\text{-}2500}$ with impact noise of walking persons

Correlation of $L_{AF\,max,n}$ with loudness N_{GD}



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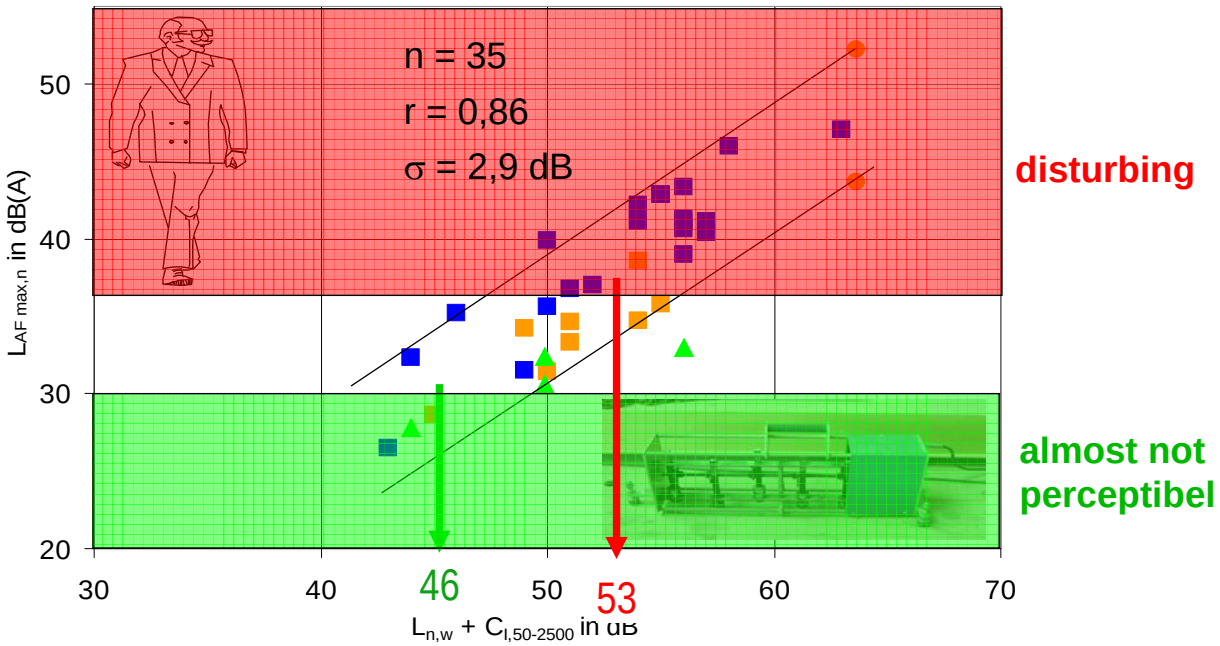
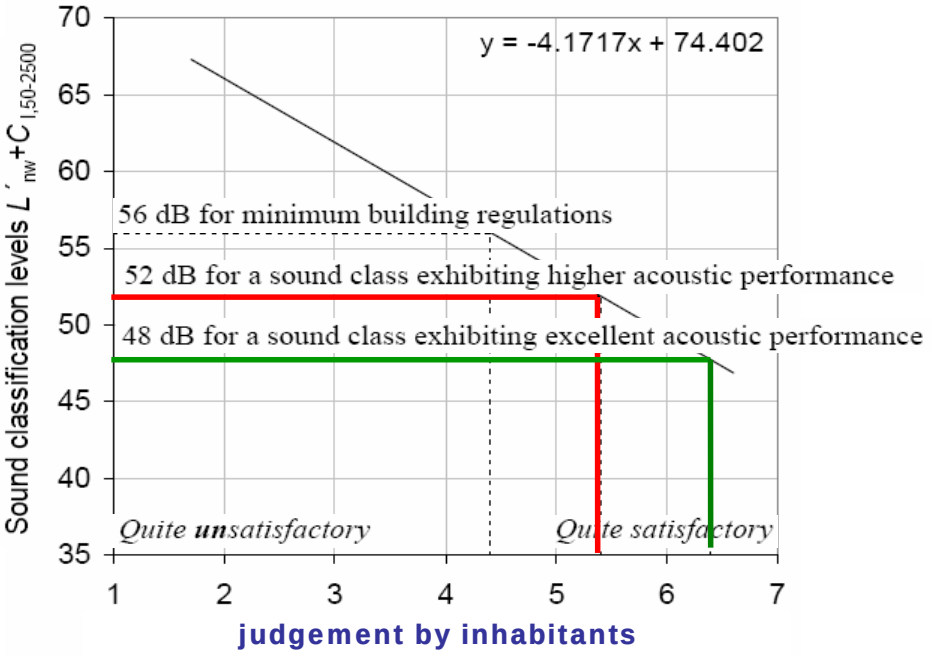
I) Correlation of $L_{n,w}$+$C_{I,50\text{-}2500}$ with impact noise of walking persons

derive sensible values for requests on impact sound



I) Correlation of $L_{n,w}+C_{I,50\text{-}2500}$ with impact noise of walking persons

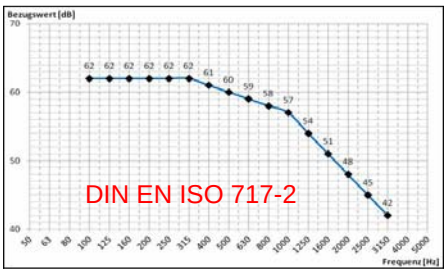
Investigations on impact sound in Scandinavia

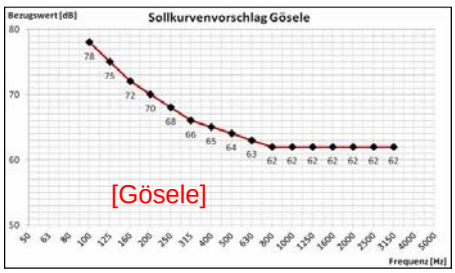


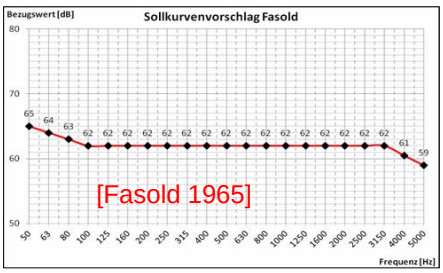
[Hagberg 2009]

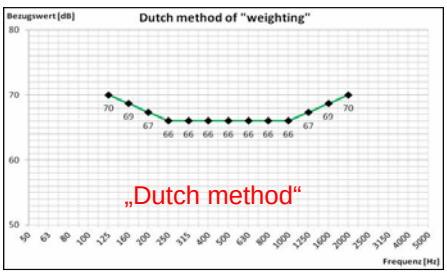
II) Comparison of ISO 717-2 rating with other rating curves

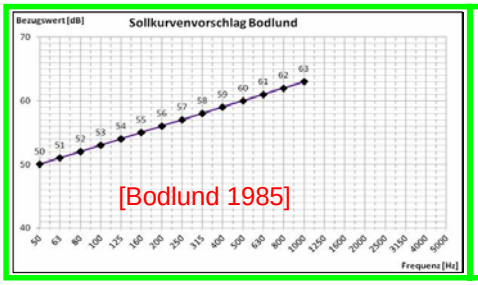
- choosen rating curves

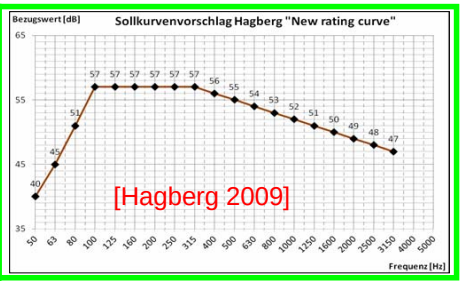




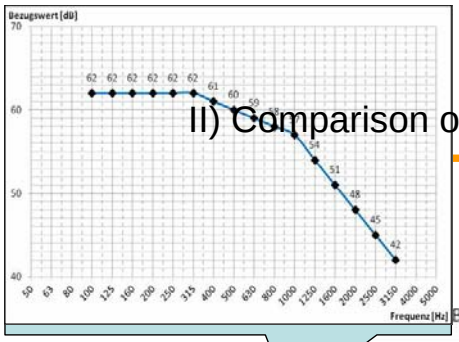








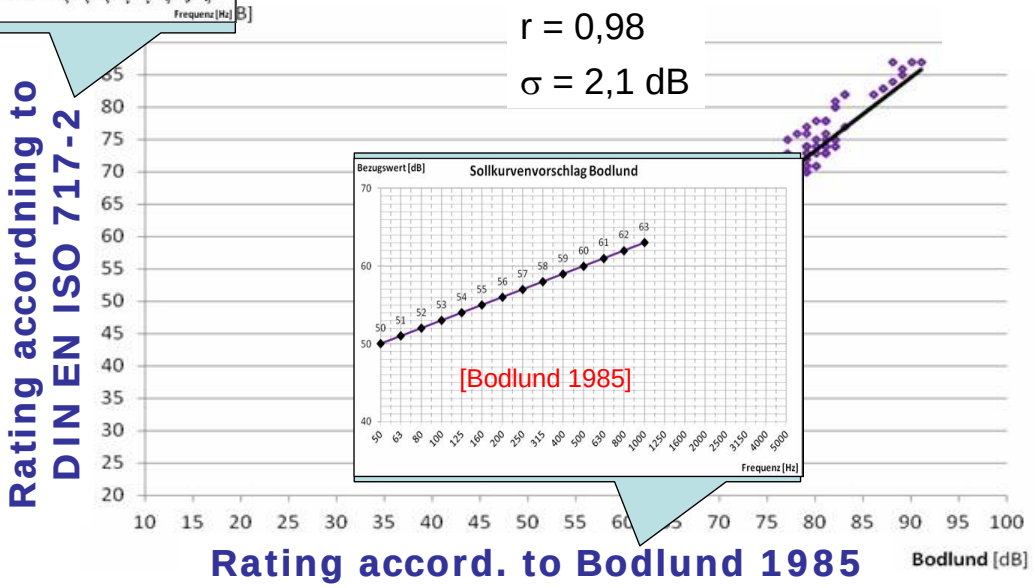
II) Comparison of ISO 717-2 rating with other rating curves



n = 356

r = 0,98

σ = 2,1 dB



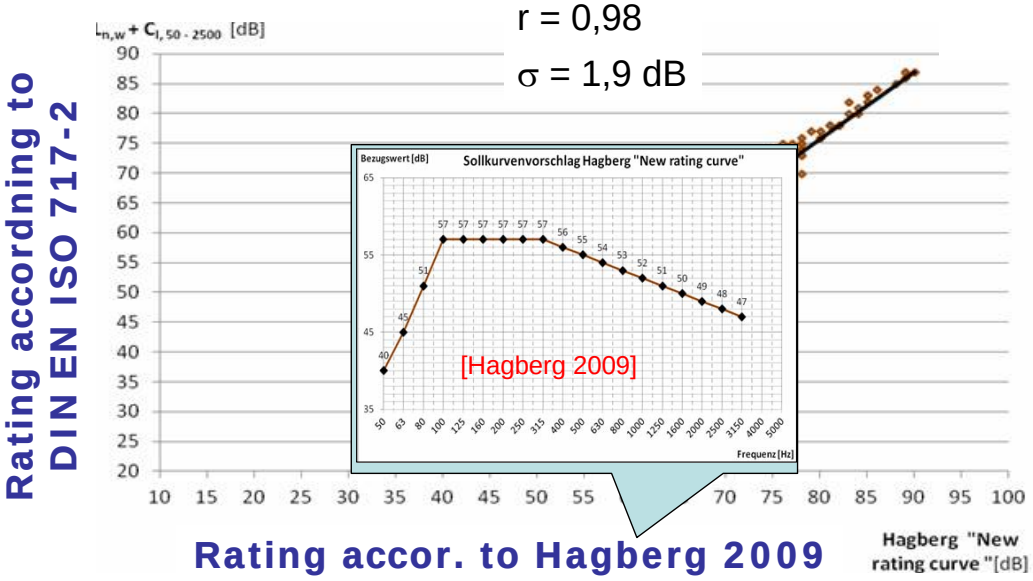
II) Comparison of ISO 717-2 rating with other rating curves

Alternative Bewertungskurven:

n = 356

r = 0,98

σ = 1,9 dB



III) summary

Conclusions from our investigations

- Measurements below 50 Hz are not favourable
- $L_{n,w} + C_{I,50\text{-}2500}$ of floors correlates quite good with $L_{AF\,max,\,n}$ or loudness levels L_{GD} or loudness N_{GD} from walking persons
- impact sound levels evaluated with other rating curves show a very good correlation with $L_{n,w} + C_{I,50\text{-}2500}$
- recommendations on request values for impact sound do agree with other investigations