

ROOM ACOUSTIC MEASURES IN CLASSROOMS

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1. INTRODUCTION

More and more people recognize that reverberation time does not on its own express the subjective experience of classrooms. Calculated reverberation time is in many cases not comparable with the measured one.

In an extensive study the room acoustic conditions in 18 classrooms were investigated.

2. MEASUREMENTS

The classrooms were located in Denmark, Germany, Norway and Sweden. In each classroom measurement of room acoustic descriptors were performed for several room configurations. At least two different suspended acoustic ceilings were evaluated in each room, in some cases in combination with wall absorbers. Measurements were also performed with and without furniture and for the empty room without ceiling treatment. Room acoustic descriptors related to the subjective quality aspects reverberance, clarity of speech and the strength of sound were measured. For reverberance the descriptors measured were reverberation times evaluated as EDT (early decay time), T_{15} , T_{20} and T_{30} . For speech clarity the descriptors STI and C_{50} was used. The steady-state noise levels in the rooms were evaluated by the descriptor Strength (G).

3. FINDINGS

Results from the measurements show that reverberance might be almost equal with acoustic ceilings having substantially different sound absorption properties. This is especially noticeable in mid and higher frequencies. The correlation with traditionally calculated reverberation time is poor. On the other hand the decrease of sound strenght from a steady state source can be estimated proportional to the amount of sound absorption in the room.

4. CONCLUSIONS

It is concluded that the late reverberation times (T_{20} and T_{30}) are insufficient in characterising the overall acoustical conditions. Rooms with almost equal (late) reverberation times could significantly differ in other descriptors like Strength (G) and Speech Clarity C_{50} .

In a following paper "Room Acoustic Evaluation of Different Room Types", Erling Nilsson will present more of the findings.