

# ROOM ACOUSTIC EVALUATION OF DIFFERENT ROOM TYPES

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## 1. INTRODUCTION

Room acoustic recommendations in standards and guidelines are very much about reverberation times. The reverberation time as an overall descriptor of room acoustical conditions is not suitable in all types of rooms. It is more or less restricted to reverberant rooms (Sabine room) where the diffuse conditions are prevailed during the decay process. In other room types like ordinary room with acoustical ceiling treatment or open-plan spaces supplementary measures are needed that better reveal the acoustical conditions and the subjective perceived acoustics.

## 2. ROOM TYPES

In this paper three different acoustical room types are discussed. The room types are the reverberant room (Sabine room), the room with acoustical ceiling treatment and the open-plan space. The behavior of fundamental parameters like reverberation time and steady-state sound pressure level is discussed. Suitable acoustical descriptors for the different room types are suggested.

### 2.1. The reverberant room

This room is characterized by low absorption and high diffusion, like the reverberation chambers in acoustic laboratories. In these rooms:

- Reverberation time is given by the sound absorption (Sabine formula)
- Sound pressure level can be calculated from the reverberation time knowing the sound power from the source
- Negligible influence of sound scattering non-absorbent objects

### 2.2. Room with acoustic ceiling

The reverberant room is quite rare in practice. A more common type of room is the room with acoustic ceiling. In these rooms:

- There is no clear relation between reverberation time and sound pressure level
- Acoustical treatment given the same reverberation time can have different influence on the steady-state sound pressure level
- Non-absorbent sound scattering objects have large influence on reverberation time but not on sound pressure level

### 2.3. Open-plan spaces

Room with extended forms such as open-plan offices and corridors constitute another group. Typically for these rooms are:

- Room acoustical descriptors like reverberation time, STI and others varies a lot over distance
- Ordinary room acoustic descriptors are not well suited as “global” parameters characterizing the acoustical conditions in open-plan spaces
- Measures related to the propagation of sound are more suitable for these types of rooms

## 3. CONCLUSIONS

Different types of room will create such different sound fields that various descriptors are required if a meaningful evaluation is to be made. The list of actual types of rooms can of course be very long, but if we restrict ourselves to the most common ones, three different basic acoustic types can be identified i.e. the reverberant room, the room with a sound-absorbing ceiling and rooms with extended forms like open-plan spaces and corridors.