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INVESTIGATION OF REVERBERATION TIME IN DIFFERENT PURPOSE ROOMS

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Abstract. Good acoustical qualities are essential in spaces in which speech communication is important. Excessive background noise or reverberation in such spaces interferes with speech communication and thus presents negative effects. Well planned acoustics in indoor environment enhances the feeling of safety and comfort. National regulation is a tool provided to manage acoustical comfort. Since 2004 put in force Lithuanian Building Regulation STR 2:01:07 [1] addresses acoustics in building by setting example requirements of maximum reverberation time value. Sound classification scheme described in these documents present limit values of reverberation time for common rooms (e.g. stairwells, corridors, etc.) in multi-storey dwellings, as well as in buildings for educational, medical treatment and short-term accommodation purposes. Classification scheme introduced five acoustic quality classes (increasing from class E to class A) for reverberation time limit value [2]. Class C referred as minimum regulatory requirement. Acoustic regulatory requirements for classrooms as well as to other acoustically sensitive rooms are introduced in USA and many European countries, while sound classification schemes are especially presented in Nordic countries [3].

Sound classification scheme do not provide any instructions or guidances how to develop necessary acoustical environment. Certain reverberation time in room requires a certain amount of absorption. Common recommendation is that acoustically absorbent ceiling should be provided in public circulation area and in rooms where speech intelligibility is important. For estimation of amount of absorbing material and their required placement in premises, regulations should be complied with some theoretical models. Sabine formula presented in standard LST EN 12354-6 [4] applied for assessment of appropriate theoretical reverberation time. Experimental study conformance with the reverberation time requirements in separate sound class was verified by measurement. Field measurements are made to demonstrate conformance using methods described in LST EN ISO 3382-2 [5]. The integrated impulse response option is used to obtain the decays, there is no need for repeated decays at each measurement position. Omni-directional sound sources are used and placed at positions that are typical for speakers. Microphone locations are selected where listeners are typically located.

Presented results of in situ investigations in different purpose rooms (newly built and rebuilt classrooms, conference room) show a good compliance with calculations. From measurement results in such premises concluded that in common cases it is impossible to achieve minimum acoustic regulatory requirements without acoustical linings.

Keywords: room acoustics, classification scheme, reverberation time, theoretical models, calculations.

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[5] LST EN ISO 3382-2:2008 Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms (ISO 3382-2:2008).