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Measuring absorption coefficients of open ceilings in multi-purpose halls

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This paper investigates the acoustical characteristics of open ceilings in multi-purpose halls using a 1:25 scale model. A steel truss, duct system, catwalk and opening were selected for the major components of open ceilings from a field survey of 17 existing halls. Absorption characteristics of the equipped ceilings with the 1:25 scale model were measured in a reverberation chamber according to ISO 354. It was found that different volume and materials of the ceiling spaces cause the composite decay characteristics to be similar to those of coupled room effects. Results showed that the absorption coefficients of an empty ceiling with 50% opening and 6 m of depth are 0.2-0.3 above 500 Hz. Adding steel trusses to the ceiling increases the absorption coefficient by 0.1 at 125-2,000 Hz; ducts and catwalks with steel trusses yield an increase in the absorption coefficient at high frequencies. The average absorption coefficients of the various composite ceiling structures were 0.19 to 0.61.