Fraunhofer Institut Bauphysik

Acoustic Test Facility for

Suspended Ceilings

with adjustable suspension height

Technical Data

Test facility P5 for suspended ceilings

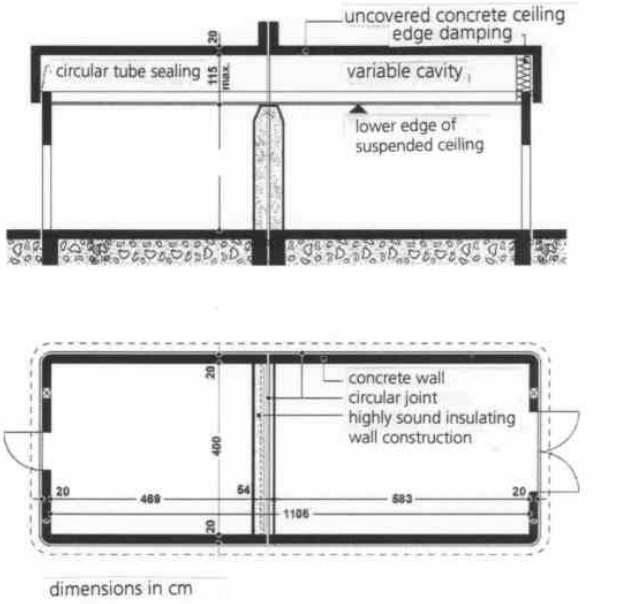
	Test chamber A	Test chamber B
Volumes	55,2 m³	72,7 m³
height to the lower edge of the suspended ceiling	2,98 m	2,98 m
width	4,00 m	4,00 m
length	4,68 m	6,13 m
Test area (both rooms) 44,2 m²		
Access through the test facility doors		
width	0,805 m	1,875 m
height	1,90 m	1,91 m

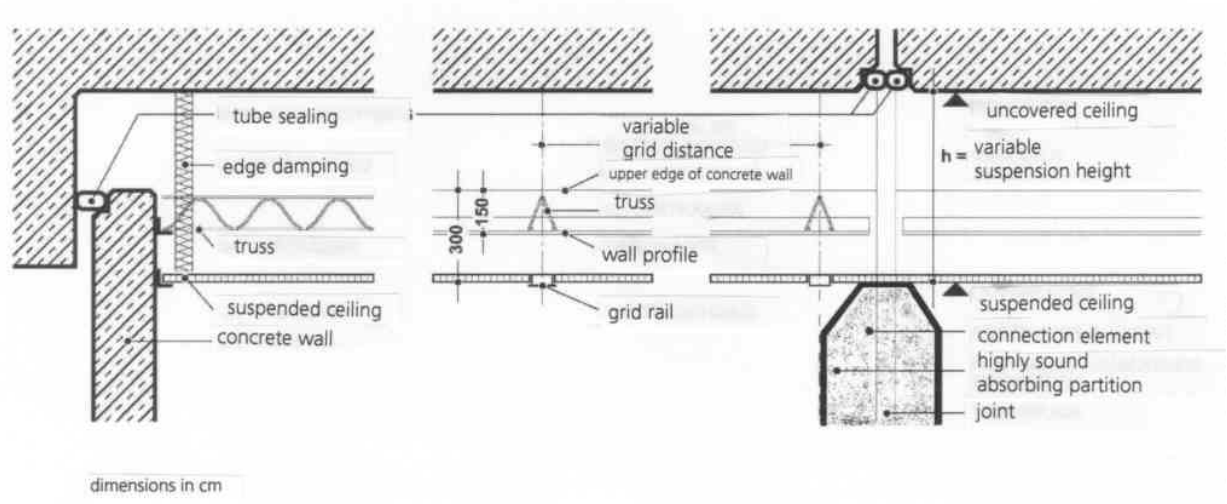
Maximum sound insulation in relation to the partition surface: $R'_{max,w}$ = 70 dB

The test facility for laboratory measurements of room-to-room airborne sound insulation of suspended ceilings with plenum (cavity) above it meets the requirements of standard DIN EN 20140, part 9. A partition wall with a weighted sound reduction index of R_w 70 dB divides the test facility into two rooms of different lengths.

The enormous advantages of continuous suspended ceilings make them the standard construction of office buildings and schools. But there is also a problem: The cavity above the ceiling, which extends over several chambers, is a bridge for sound propagation from room to room. The clear cavity height between uncovered floor and suspended ceiling has the greatest influence on the test facility properties. As a rule, any modification of the suspension height during measurement means a new provision and installation of the suspended ceiling for each suspension height, because the usual assembly system hardly permits a multiple use. In addition, the highly sound absorbing partition wall must be adjusted to each suspension height. Therefore, expenditures for installation in conventional test facilities are considerable. The test facility of the Fraunhofer Institute of Building Physics avoids these difficulties by leaving the suspended ceiling at its position and changing the height of the uncovered ceiling instead when modifying the suspension height.

The uncovered ceiling made of approx. 20 cm thick concrete is mounted on threaded spindles and mechanically infinitely adjustable in height. The hoisting device allows heights of the ceiling cavity from approx. 40 cm to 115 cm. The suspended ceiling to be tested is not mounted to the uncovered ceiling but to trusses. This construction allows the realization of actually occurring suspension heights in buildings. Furthermore, the accessibility of the cavity allows a relatively easy modification of the absorber layer as well as unchanged geometric and room acoustic conditions in the test facilities during measurements at variable suspension heights.





For the spatiotemporal average determination of the sound pressure level in the source room, the dodecahedron loudspeaker is pneumatically agitated along an inclined plane. The microphones in the source room and the receiving room are moved along an inclined circular path. The measurement of sound pressure levels and the average determination is carried out by a specific building acoustic measuring system. The values of the sound insulation $D_{n,c,w}$, C and C_{tr} are calculated on the basis of the gathered data according to DIN EN ISO 717, part 1.