Room Acoustics Module
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Room Acoustics Module

Description
The modern construction with fully glazed walls, concrete ceilings or fully fitted cooling ceilings and no carpets and curtains prevent optimum acoustics and give reverberant rooms.

According to room size and the available sources of sound, room resonances are generated, which must be muffled. The same is true for short-term reflections, which come from the periphery. To create the required acoustic result, it is important that an even repercussion time over the whole frequency spectrum of approx. 30 Hz to 8 kHz is obtained, so that all modes can subside at the same time. Through the openings in the cover plates, the acoustic waves can enter the room acoustics module. In the room acoustics module, the acoustic energy is converted into heat and reduces the sound. The efficiently operating room acoustics module fulfills the increased requirements of well balanced room acoustics in many areas, such as offices, recreation rooms, living rooms, production halls, firing ranges, etc., and can also be fitted at a later stage.

The Audimin room acoustics module is also highly suitable for use in schools and kindergartens. The reduction of the sound power level in a room and the reduction of the reverberation time significantly reduce the noise level in a room. Owing to the lower noise level, the concentration of the children and adolescents increases, the children tire less quickly, and the readiness to learn increases. Thus, the requirements of DIN-EN 18041 can be met.

The organs of hearing develop in a child until it has become an adult. If the child is permanently exposed to a high noise level, the sensitivity of the hearing is reduced, which may go as far as the so-called adolescent hard of hearing. This makes it necessary to ensure that children and adolescents are not permanently exposed to high noise levels, in order to avoid the so-called adolescent hard of hearing.

The AUDIMIN room acoustics modules offer the advantage of not having to perform additionally a silencing function when used in a cooling ceiling. The cooling ceiling can therefore be optimised in terms of its cooling function.

The room acoustics modules are prepared for mounting in walls or ceilings. Fitting an office (of up to 25 m²) with the Audimin-DW basic module, consisting of four acoustic elements 1000 x 500 mm, will already achieve a room damping of up to 4 dB! Moreover, the reverberating time in the office of approx. 2 sec. is reduced to approx. 0.8 sec.

The reverberation time is the time in which the sound level in a room decreases by 60 dB, after switching off the sources of sound. Accordingly, the reverberation is approximately the time in which the sound of loud clapping disappears and is no longer heard. This is based on the following physical fact: the longer the reverberation time, the louder a source of sound is heard. However, at the same time, it loses clearness. Reverberant rooms have a long reverberation time, maybe even an echo and thus less speech intelligibility.

The optimum values of reverberation times, in most cases at frequencies between 125 and 4000 Hz, are volume-dependent. The larger the room volume, the higher the reverberation times may be, without deterioration in the room acoustics quality. The optimum values in rooms for use with speech are \( T_{60} = 0.4 - 1 \) s.

The usual reverberation times of rooms in seconds

<table>
<thead>
<tr>
<th>Room Type</th>
<th>Reverberation Time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theatre</td>
<td>1.0</td>
</tr>
<tr>
<td>Concert halls</td>
<td>1 ... 2</td>
</tr>
<tr>
<td>Conference rooms</td>
<td>0.5 ... 1.5</td>
</tr>
<tr>
<td>Auditoriums</td>
<td>0.8 ... 1.5</td>
</tr>
<tr>
<td>Hotel rooms</td>
<td>1.0</td>
</tr>
<tr>
<td>Offices</td>
<td>0.5 ... 1.5</td>
</tr>
</tbody>
</table>

Calculation of the reverberation time:

\[
T = 0.163 \times \frac{V}{A}
\]

where:
- \( T \) = Reverberation time in seconds
- \( V \) = Room volume in m³
- \( A \) = Equivalent absorption area in the room in m² sabine
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**Sound absorption coefficients of different materials**

*Extract from DIN 18041*

Upon request, the AUDIMIN room acoustics modules are available in different models. For special requirements, we can design and measure the acoustics modules for you! Special designs are available upon request.

<table>
<thead>
<tr>
<th>Material Description</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel float finish</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.06</td>
</tr>
<tr>
<td>Gauged mortar finish</td>
<td>0.03</td>
<td>0.03</td>
<td>0.02</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Wallpaper on gauged mortar finish</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>Plaster, common concrete</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Marble, tiles, clinker</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Parquetry floor, bonded</td>
<td>0.04</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Parquetry floor, on subfloor</td>
<td>0.20</td>
<td>0.15</td>
<td>0.10</td>
<td>0.10</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>PVC floor covering (2.5 mm thick) on concrete floor</td>
<td>0.01</td>
<td>0.02</td>
<td>0.01</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Linoleum on concrete</td>
<td>0.02</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Carpeted floor, up to 6 mm of pile height</td>
<td>0.02</td>
<td>0.04</td>
<td>0.06</td>
<td>0.20</td>
<td>0.30</td>
<td>0.35</td>
</tr>
<tr>
<td>Carpeted floor, 7 to 10 mm of pile height</td>
<td>0.04</td>
<td>0.07</td>
<td>0.12</td>
<td>0.30</td>
<td>0.50</td>
<td>0.80</td>
</tr>
<tr>
<td>Gypsum plaster board, unperforated</td>
<td>0.25</td>
<td>0.12</td>
<td>0.10</td>
<td>0.05</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Particle boards, 10 to 12 mm, 300 mm of ceiling distance</td>
<td>0.42</td>
<td>0.28</td>
<td>0.49</td>
<td>0.78</td>
<td>0.58</td>
<td>0.62</td>
</tr>
<tr>
<td>Windows (insulation glazing, box and countersash windows)</td>
<td>0.28</td>
<td>0.20</td>
<td>0.10</td>
<td>0.06</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>Door, wood, painted</td>
<td>0.10</td>
<td>0.08</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Gypsum plaster boards 9.5 mm thick, 60 mm wall distance, voids boxed</td>
<td>0.31</td>
<td>0.08</td>
<td>0.04</td>
<td>0.07</td>
<td>0.09</td>
<td>0.08</td>
</tr>
<tr>
<td>Veneered wood or chip boards tight on solid base</td>
<td>0.04</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>4 mm hard particle board, boxed without insulating material, wall distance 60 mm</td>
<td>0.22</td>
<td>0.19</td>
<td>0.14</td>
<td>0.07</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>4 mm hard particle board, boxed with 40 mm mineral wool boards, wall distance 60 mm</td>
<td>0.67</td>
<td>0.21</td>
<td>0.14</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
</tr>
</tbody>
</table>
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Construction

Cover plate
- Steel sheet painted to RAL 9010 (white), other RAL colours (at an extra charge)
- Round holes (-R), offset layout, $\varnothing = 5\, \text{mm}$, division $7\, \text{mm}$, $FQ = 46\%$
- With square holes (-Q), straight layout, $20 \times 20\, \text{mm}$, division $23\, \text{mm}$, $FQ = 60\%$
- With chessboard holes (-S), $3 \times 30\, \text{mm}$, $FQ = 75\%$
- with cloth covering (-ST)

Acoustic panel
- Construction material class B1 (standard) to DIN 4102
- Construction material class A2 (non-flammable) to DIN 4102

Frame
- Steel sheet painted to RAL 9010 (white), other RAL colours (at an extra charge)

Model

Audimin-DW-R
- Cover plate with round holes, $FQ = 46\%$

Audimin-DW-Q
- Cover plate with square holes, $FQ = 60\%$

Audimin-DW-S
- Cover plate with holes in chessboard design, $FQ = 75\%$

Audimin-DF
- Ceiling module with mounting base in galvanized steel: $35\, \text{mm}$ or $55\, \text{mm}$ thick with acoustic insulating plate (building material class B1 to DIN 4102)

Audimin-...-ST
- Cloth covering made of Flair 1602

Audimin-...-A2
- Available as with Audimin-DW / -DF models, but with a non-flammable acoustic insulating plate (construction material class A2 to DIN 4102)

Different clear cross-sections give different effective absorption areas.

Installation

Concealed mounting (-VM)
- The modules are prepared for concealed wall mounting or ceiling suspension.

Mounting

Preferably to the wall. Audimin lower edge $1.20\, \text{m}$ above FFB.
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Room Acoustics Module
Models and dimensions
Dimensions
Audimin-DW

Audimin-DW: \( T = 35 \) or \( 55 \) mm

Suspension
vertical or horizontal

Detail Y

Available sizes
1000 x 500 x 35
1000 x 500 x 55
1200 x 600 x 35
1200 x 600 x 55
Reduced clear cross-sections as a result of metal covering reduce the effective absorption area and thus the sound absorption coefficient.
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Room Acoustics Module
Order details

Order example:
Audimin-DW-35-R 1000 x 500

Without order details the thick-frame model will be delivered.
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**Room Acoustics Module**

**Specification text**

Room acoustics module for improving room acoustics, comprising frame and perforated front plate made of sheet steel painted to RAL 9010 (white). Fitted with rear cover made of sheet steel painted to RAL 9010 with integrated mounting bores for wall and ceiling mounting. With integrated absorption material made of melamine-resin-based foam according to construction material class B1 to DIN 4102, free of synthetic mineral fibers, halogen or FCCs. Temperature-resistant from -50 to +150° C. Chemical resistance to organic solutions of dilute acids and bases. Tensile strength to DIN 53571 100 kPa classification. Average sound absorption to DIN 20354 a_s > 0.5 in the frequency range from 250 to 2000 Hz.

Product: **SCHAKO type Audimin-DW**

Faceplate:  
- Perforated round holes  
  Product: SCHAKO type Audimin-DW-R  
- Perforated chessboard pattern  
  Product: SCHAKO type Audimin-DW-S  
- Perforated square holes  
  Product: SCHAKO type Audimin-DW-Q  
- Painted in RAL special colour (at an extra charge)

- Absorber material non-flammable (construction material class A2) (at an extra charge)

Sheet steel frame painted in RAL 9010 (white). Room-faced cloth covering (Trevira) in B 1 design with concealed mounting, with cloth stretching device integrated in the frame to prevent sagging of the cloth when mounted horizontally. Fitted with rear cover made of sheet steel painted to RAL 9010 with integrated mounting bores for wall and ceiling mounting. With integrated absorption material made of melamine-resin-based foam according to construction material class B1 to DIN 4102, free of synthetic mineral fibers, halogen or FCCs. Temperature-resistant from -50 to +150° C. Chemical resistance to organic solutions of dilute acids and bases. Tensile strength to DIN 53571 100 kPa classification. Average sound absorption to DIN 20354 a_s > 0.5 in the frequency range from 250 to 2000 Hz.

Product: **SCHAKO type Audimin-DW-ST**

Faceplate:  
- Cloth covering FWs Design Flair....

Frame:  
- Painted in RAL special colour (at an extra charge)

- Absorber material non-flammable (construction material class A2) (at an extra charge)

Sheet steel frame painted to RAL 9010 (white), with integrated mounting base for screw-type mounting to the ceiling using approved dowel technology. Room-faced cloth covering (Trevira) in B 1 design with concealed mounting, with cloth stretching device integrated in the frame to prevent sagging of the cloth when mounted horizontally. Fitted with rear cover made of painted sheet steel in RAL 9010. With integrated absorption material made of melamine-resin-based foam according to construction material class B1 to DIN 4102, free of synthetic mineral fibers, halogen or FCCs. Temperature-resistant from -50 to +150° C. Chemical resistance to organic solutions of dilute acids and bases. Tensile strength to DIN 53571 100 kPa classification. Average sound absorption to DIN 20354 a_s > 0.5 in the frequency range from 250 to 2000 Hz.

Manufacturer: **SCHAKO Type Audimin-DF-ST**

Faceplate:  
- Cloth covering FWs Design Flair....

Frame:  
- Painted in RAL special colour (at an extra charge)

- Absorber material non-flammable (construction material class A2) (at an extra charge)