The purpose of architectural acoustics is to create an environment where sounds are clearly heard by the intended listener and noise is isolated or absorbed. Acoustics are important to the overall performance of most buildings that will be occupied by humans. Good acoustics can enhance productivity in offices, provide a more conducive learning environment in schools and deliver a better quality of life in residential units.

There are two ways of dealing with sound levels: sound insulation and sound absorption. Materials with heavy mass (like concrete walls) work well with sound insulation, while porous, lightweight materials work well with absorption. Sound insulation is usually more complicated than absorption. Combined, these approaches work to reduce the amount of outside sound reaching the receiver by trapping sound waves or making them travel a longer pathway.
**Measurements**

Sound Transmission Class (STC) is a numerical rating system on how well a building partition reduces the amount of noise at a given frequency that passes through. The higher the STC, the better the performance of sound insulation.

**STC What can be heard**

<table>
<thead>
<tr>
<th>STC</th>
<th>What can be heard</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Normal speech can be understood quite easily and distinctly through wall</td>
</tr>
<tr>
<td>35</td>
<td>Loud speech audible but not intelligible</td>
</tr>
<tr>
<td>40</td>
<td>Onset of ‘privacy’</td>
</tr>
<tr>
<td>45</td>
<td>Loud speech not audible; 90% of statistical population not annoyed</td>
</tr>
<tr>
<td>50</td>
<td>Very loud sounds such as musical instruments or a stereo can be faintly heard; 99% of population not annoyed</td>
</tr>
<tr>
<td>60+</td>
<td>Superior soundproofing; most sounds inaudible</td>
</tr>
</tbody>
</table>

Decibel units (dB) measure noise intensity and will often be quoted in reports and technical datasheets approximating between 40dB and 100dB. Noise can range outside of this measurement but usually indicates extreme and short-term noise intensity such as high-speed trains and car horns.

**Precast Noise Reduction**

An STC rating of 50 will satisfy most building code requirements. An 8” thick CarbonCast wall panel (wythes of 2” each) with 4” of insulation will provide an STC rating of 52. The rating can be increased by adding more mass to the wall.

Typically, an STC rating of 45 is sufficient between living units, while an STC rating of 50 is needed between living units and public spaces. The location of the building (suburban vs. urban) must also be taken into consideration because more crowded areas produce more outside noise.

STC is tested first in laboratory conditions, then on-site after installation to acquire an accurate STC rating. Laboratory conditions, although highly accurate, do not reflect all noise levels present at the unique environment for which the wall or barrier is intended.

Below is a chart showing the STC rating of concrete based on its weight per square foot.

![Sound Transmission Class (STC)](chart.png)

**Closing the Noise Gaps**

The STC rating of a wall can be severely compromised through flanking, penetrations, openings, doors, gaps and windows. Special attention needs to be paid during the design process to limit and correct these concerns.

**Flanking** – Noise can often travel in an indirect pathway, entering a building through unintended gaps and joints. To reduce these flanking pathways, designers need to take a special look at wall connections and caulking.

**Penetrations** – To reduce noise from penetrating a wall, more mass (e.g., thicker precast walls) can be used as a barrier between the exterior and the interior of the building.

**Openings, doors & gaps** – These create multiple and unavoidable channels for noise to reach a building’s interior. Effectively using sealant during installation and maintaining it throughout the building’s service life will help reduce noise intrusion. Similarly, doors with superior acoustic performance can be specified to mitigate the movement of noise through a wall assembly.

**Windows** – Glass creates limitations for acoustic efficiency, but using thick (6mm+) glass and precast concrete panels can help reduce these limitations and balance daylighting with acoustic qualities.

Because CarbonCast walls can be produced in large widths and full height modules with caulking and insulation at the joints, they can lower the possibility of leaks or flanking as compared to steel or wood structures that have multiple joints and connections. By working closely with your AltusGroup precaster, you can design walls and connections that optimize acoustic performance.

Additional technical information, product specifications and literature are available at altusprecast.com. You can also find a listing of AltusGroup precasters close to you or your project.

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Call us today to speak with a technical representative or request a lunch-and-learn program.