How to Make Walls Quiet

Introduction

"**Unwanted noise is the number one complaint in North America's buildings**, as people live closer together in their condominiums, apartments and homes and work in smaller footprints and closer to their coworkers at their offices."

As an example, a **fitness facility or hockey rink may produce peak volumes of 90 dB** either from music in a gym or spectator activity in a rink. This noise is usually of high frequency which is easier to block than low frequency. Depending on design layout of the building, this noise can be quite disruptive to staff and management in their offices, or patrons in quiet zones such as restaurants, bars, waiting areas etc. A typical 'quiet room' would measure about 30dB. To have a reasonably quiet room at 30 dB next to a noisy rink producing peaks of 90 dB, would require a wall rated at 60 dB (90–30=60).

Another example, a **good home entertainment system may produce sound peaks of 100dB or greater**, but factoring in the volume of low (base) frequency, it is generally suggested achieving an STC of 70 or greater.

Did you know?

- That standard *single wall* construction provides only **34 dB** of sound blocking
- That *typical interior concrete block* provides less than **40 dB** of sound blocking?
- **That the minimum building code is 50 dB**
- That many current designs are flawed in that they are based on 20 year old testing while many materials used have been modified to the detriment of sound blocking during this same time! Check with your architect or designer to be sure.

As a result, many homebuyers and tenants are asking if noise was considered when the structure was built. In addition, people who already have properties and are subjected to intrusive noise are searching for ways to bring quiet into their lives. This article looks at some current approaches as well as the latest improvements in achieving a high quality living environment.

What is a 'quiet building' and how do you measure it?

To better understand how to get a quiet environment, we need to define what it is. To do so, we need to understand a little about sound levels (measured in decibels, or dB) and STC (Sound Transmission Class) and IIC (Impact Insulation Class) ratings.

STC is a method of measuring sound transmission loss through a wall while IIS measures the loss through a ceiling wall assembly; essentially, the difference between the sound in one area and the sound in an adjacent area, over several frequency ranges. **This sound is measured in decibels, or dB (or STC in technical terms). Most multiunit construction in Canada requires (per building code) an STC rating of 50 on the 'party' walls between units.** This means that a noise will measure 50 dB softer on the other side of a wall with that rating. **An STC rating of 60 or more is recommended in higher quality construction,**

particularly in hotels, high-end town homes and condos, home theaters, and for active common meeting areas; the higher the STC (read dB) rating, the better. There are currently no IIC standards for ceiling floor assemblies, but it is generally viewed that an IIC above 50 is the starting point for floor ceiling assemblies.

Another perspective on quiet comes from The National Research Council of Canada. They completed an extensive survey of condo residents to determine noise-unhappiness with actual STC ratings of their walls. The result showed that complaints were reduced with walls at 50 or better, and almost non-existent with STC ratings of 60 or above. The exact same can be held true for IIC ratings.

A typical basic wall assembly, with single wood studs, insulation and 5/8" drywall on both sides has an STC rating of 34. A room built with this kind of wall next to the home theater would have noise levels at 66dB or more (100dB minus 34dB), which is far too loud for comfortable conversation. However with a wall built to an STC of 60, the adjacent room would have sound levels of 40dB, about as quiet as a library.

Floor ceiling assemblies are varied and one must take into account several factors. While a thicker concrete floor will help with IIC at lower frequencies, they remain weak when it comes to "tapping" noises. The reverse holds true for joist assemblies which may attenuate some of the higher frequencies with a resilient floor covering, but due to their thinner profiles may transmit the lower frequency "thumping" noises. Of course, if they are too thin, they start allowing airborne STC through as well.

Although good progress has been made over the years to develop new solutions, there are still many myths about how to reduce noise. Some well-meaning specifiers, builders and merchants may suggest approaches based on old or incomplete data.

Common Wall Soundproofing Myths

Fallacy	What they said	What it actually does
Fill the wall with egg cartons	"Will improve sound loss by 10dB"	No measurable effect
Put acoustic insulation in wall	"Will fix everything"	2-4dB improvement
Put a vinyl barrier under drywall	"Will improve sound loss by 27dB"	3-9dB improvement
Add another layer of drywall	"stops the bass sounds"	1-3dB per layer
Use foam as a barrier	"a great barrier"	<2dB improvement

Please note that a 23 dB improvement is virtually unnoticeable to the human ear – a disappointing result given the time, material and expense of the above methods.

If we want a 30dB improvement, we won't get there with egg cartons and vinyl. New products may reduce cost, labor, risk, liability and mistakes while improving STC ratings and reliability beyond older methods.

Traditional Approaches

Walls with higher STC values have been achieved for years using a variety of construction techniques. Aside from the fallacies listed earlier, there are products that will work when used correctly.

A commonly used technique since the 1960s, on both wood and metal studs, is called **resilient channel** (RC). These are metal channels that are placed perpendicular to the studs. The drywall is then screwed into the channel, being very careful that no screws touch a stud directly. In this way, the drywall is isolated from the studs, thus carrying less noise and vibration to the outer wall.

However, very careful construction is required to achieve the hoped-for benefits of resilient channels, since the screws are placed into the drywall and it is impossible to "see" if one accidentally touched a stud or any other object other than the channel. It is difficult to know for sure if the requirements have been met without testing the wall assembly later. In fact, recent investigation (often due to litigation) has shown that RC construction has a very high post-construction failure rate (meaning it doesn't deliver to its design specification) of as much as 90%. Many of the drawbacks of this method occur when a wall built with resilient channel is "short-circuited." This can be caused by over a dozen factors, including:

- When resilient channels are placed to close together on a wall

- If they are installed improperly or upside down

- If the RC extends too far and touches an adjoining wall or floor

- Improper installation of drywall, e.g. where heavy panels sag and touch the floor

Although resilient channels can provide results up to 5 dB, it is challenging to get the results you want, and the investment can go to waste.

Another technique involves using other **stud arrangements**, such as staggered-stud and double-stud to increase STC points. These approaches can double the material and labor costs, as well as taking up valuable space. These are best used in new construction, but not very practical in a remodel, unless your homeowners' association is willing to tear out the walls completely.

With flooring and to a lesser extent walls, typically **additional mass** was the answer. The thicker the concrete or block walls the better. With flooring you required some additional form of resilient layer like cork, foam pad or rubber underlayment. However, the cost of materials and additional labour and loss of usable space makes this type of solution unfeasible.

Newer Approaches

Advanced technology has brought new approaches, which can offer simpler, more reliable and lower cost soundproofing.

One such approach is a specially-engineered type of soundproofing drywall, built from multiple layers of materials and using viscoelastic polymers. The panels, along with their polymers, convert acoustic energy to heat energy, which you can't hear. A company named Quiet Solution is the technology and market leader, with a full line of '**QuietRock**' soundproofing drywall and 'QuietWood' soundproofing floor boards, from a low-priced panel, perfect for remodeling (QuietRock 510), to a high performance, THX-certified panel

for high-end studios and theaters (QuietRock 545THX). QuietRock has been used in thousands of projects by major builders, in new construction and remodels, across a range of styles and project budgets. Importantly, their products can be installed and finished like regular drywall. If applied over block or concrete it must be furred out to cause an air-gap.

QuietRock can be used in new construction or to remodel existing walls without demolition. For example, a standard sheet of 5/8-inch drywall added to a typical drywall-and-stud wall reduces sound coming through the wall by about 2 decibels. But one sheet of QuietRock added to a typical wall cuts the sound coming through the wall by about 20 decibels – a 75% reduction in sound. In new construction, a single sheet of QuietRock 525 on one side of a single stud wall achieves an STC rating of 51, exceeding building code requirements and thereby providing the simplest, lowest cost, and most reliable way to achieve code. In effect, adding just one sheet of QuietRock is equivalent to adding eight sheets of standard gypsum board.

New approaches like QuietRock can eliminate the need for expensive and difficult construction techniques. Because a soundproof drywall approach like QuietRock cannot be short-circuited, the results are likely to be better, and there are fewer litigation concerns for builders post construction.

Floors: With the current health concerns of fibre floor coverings, standard procedure in condos and offices has been to renovate with hardwood flooring or tiles. Due to limitations in the new floor assembly thickness, the use of pads, foam or otherwise is often suspended and using a cementitious based mortar and possibly some adhesive, the new flooring is generally applied directly to the cement substrate. This standard practice provides a perfect conduit for the transmission of Impact sound, with obvious IIC issues for the neighbour below.

Advanced technology yet again has brought a new 3-in-1 solution that is simple, more reliable and lowest cost.

SonoGrip™ is an engineered elastic polymer developed specifically for dampening and reducing high frequency foot fall vibration noise. Since sound and vibration is transmitted any time two hard surfaces come in direct contact, SonoGrip provides the critical break in that connection. It is troweled directly onto concrete, cement backer boards, plywood flooring or radiant heated substrates and acts as an adhesive, crack filler and IIC barrier. More impressively, at 1/8" – 1/4" SonoGrip is not only the thinnest solution, but the most effective and least expensive flooring IIC solution on the market today, whether you use it on new or existing construction.

Conclusion

Noise is a real problem that touches all of us. In many multifamily developments, the major complaint is, 'I hear my neighbor/co-worker.' Although there are many approaches to eliminating noise, technological advances by companies like Quiet Solution and SonoGrip have made it easier and more cost effective for homeowners, builders, and others to think of quiet as something that is easily within reach.

Manufacturers: QuietRock -www.quietsolution.com SonoGrip - www.sonogrip.com