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METAL PRODUCTS LIMITED

Quiet Spaces and How to Build Them

New uses for the space we live in, media rooms, home offices, and we should mention the computer games and music our kids play, have created a need to build walls that will provide better sound control. We are spending more of our time in our homes and we need to look at how we can make that space more comfortable with walls and floors that provide better sound control.

We measure the sound control that a wall or floor will provide with a rating system called **Sound Transmission Classification or S.T.C.** This is a measure of the ability for a particular wall or floor to reduce the transmission of airborne sound. The S.T.C. rating is based on tests conducted to industry recognized **A.S.T.M. standards**. This allows us to compare and rate different materials and assemblies as to how they perform in providing improved sound control.

There are many new or specialty type materials available to improve the STC performance of walls and floors. These products cost more and are not always readily available. However, using regular materials available from stock at your local building materials supply store we can obtain levels of sound control to meet most requirements. A *"better bang for our buck"* can have a different meaning when it comes to selecting materials. With a little research we can have materials that will provide better sound control and cost less. A 2 ½" steel stud for a wall will cost significantly less than a wood 2 x 4 and provide a higher STC value. Steel resilient channels installed onto wood floor joists will cost about the same as wood furring and provide a 20% higher STC value.

Performance and S.T.C. Ratings

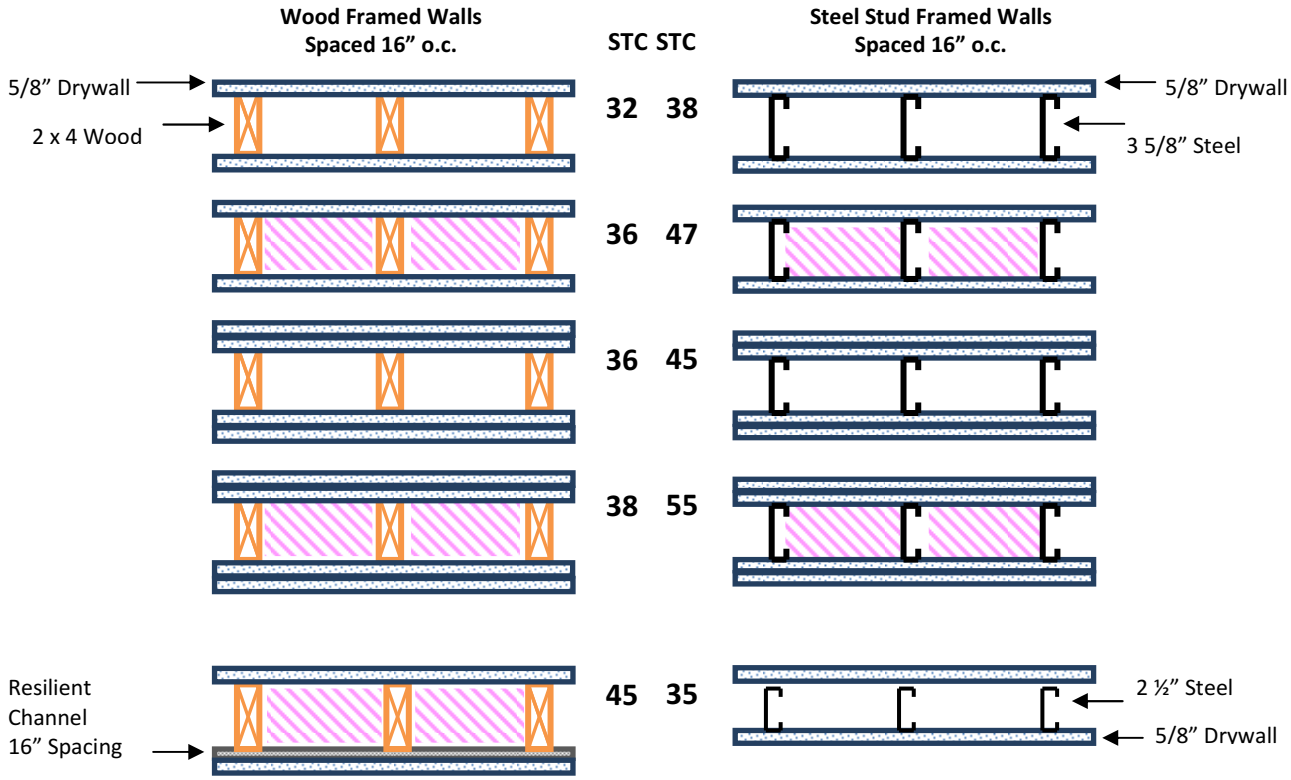
Most wall and floor assemblies fall within a range of S.T.C. 30 to S.T.C. 60. The higher the classification number, the better the sound control. Most walls and floors in our homes have an S.T.C. value of 30 to 35. The building code requires an S.T.C. of 50 for all floors and walls between units in apartments, condos and hotels. The following chart will give some understanding as to the performance you can expect from different S.T.C. ratings.

STC 25	Normal speech can be understood quite clearly
STC 30	Loud speech can be understood fairly well
STC 35	Loud speech audible but not intelligible
STC 42	Loud speech audible as a murmur
STC 45	Must strain to hear loud speech
STC 48	Some loud speech barely audible
STC 50	Loud speech not audible

There are other benefits to the use of steel. Steel is the best choice for the environment. Bailey Metal Products manufactures construction materials from steel coils containing 95% recycled content. Steel framing members are also 100% recyclable and can be recycled an infinite number of times without a loss in structural integrity. Indoor air quality will be greatly improved because steel framing does not produce off-gas or use glues or chemicals in the manufacturing process, or provide a surface that supports the growth of mould.

When the framing of the wall assembly is wood the use of steel resilient channels will be the most effective and economical component you can use to improve the S.T.C. rating. Resilient channels break the path of the sound and reduce sound transfer through the wall.

The wall selection chart below illustrates some common types of walls that provide different levels of sound control. This chart demonstrates the effectiveness of the various materials used.



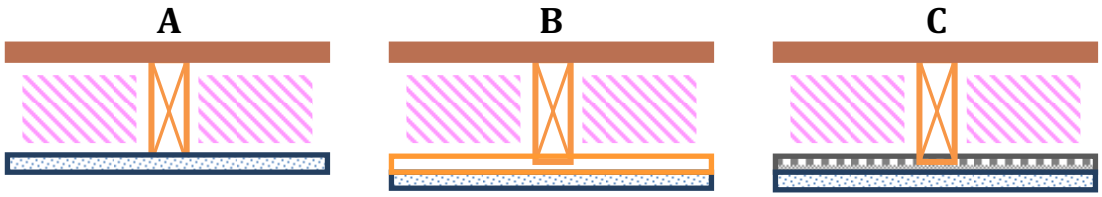
For most projects the floor joist framing will exist. In most case this will be dimensional lumber, or engineered wood "I" floor joist. Many new homes built today use steel floor joists and the following comments apply to all three types of floor joists.

For some cases the most annoying sound is caused by an impact on the floor above. This can be caused by falling objects, people walking or simply someone bouncing a ball on the floor. This type of noise is called impact noise, and the ability of a floor to reduce these sounds is classified by **Impact Insulation Classification or an I.I.C. rating**. Soft floor finishes (carpet) provide higher and better I.I.C. ratings. To improve the I.I.C. rating of a floor where impact noise is the problem may be as easy as an area rug over the "hard surface". What is on top of the floor or the sub-floor material will have greater significance on the I.I.C. rating than what is in the floor assembly.

Wood strapping or metal resilient channels can be used to attach drywall to the underside of the floor joist. Both cost about the same and improve the S.T.C. and I.I.C. rating of the floor assembly. However, steel resilient channels contribute twice that of wood strapping to the improvement of these ratings. The figure below illustrates various typical and upgraded floor assemblies and demonstrates how the different materials contribute to the improved S.T.C. and I.I.C. ratings of these floors.

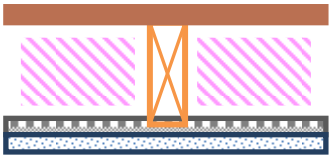
Typical wood joist construction with insulation and various furring systems for drywall.

Common to each example: 2 x 10 Wood Joists at 16" spacing, 5/8" OSB Sub Floor, 6" Glass Fibre, 5/8" Type X Drywall



	S.T.C.	I.I.C.
A: 5/8 Drywall fastened directly onto joist	**34**	**30**
B: 5/8 Drywall fastened onto wood furring	**42**	**35**
C: 5/8 Drywall fastened onto metal resilient channel	**52**	**46**

Options to upgraded wood joist construction with variations to the subfloor, cavity, and ceiling.



2 x 10 Wood Joists
5/8" OSB Sub Floor
6" Glass Fibre
5/8" Type X Drywall
Resilient Channel at 24" Spacing

	S.T.C.	I.I.C.
Floor as Constructed	**52**	**46**
as shown, **ADD** 5/8" OSB to the Floor	55	47
as shown, **ADD** 5/8" Drywall to the Ceiling	55	49
as shown, 6" Glass Fibre **Changed** to 8" Glass Fibre	53	46
as shown, 6" Glass Fibre **Changed** to 10" Glass Fibre	53	46
as shown, **ADD** Carpet and 9mm Under Pad	53	67
as shown, **ADD** 1.2mm Vinyl	---	44
as shown, **ADD** 1.9mm Vinyl	---	45

Noise can travel over and around walls, through windows, doors, air ducts, and any penetrations in the walls or ceilings. These conditions can be caused by recessed cabinets, electrical boxes, light fixtures, and/or pot lights. The STC ratings do not reflect the effect this "flanking" has on the performance of the wall or floor. If these flanking paths are not dealt with they can reduce significantly the performance of the assembly particularly for higher rated values.

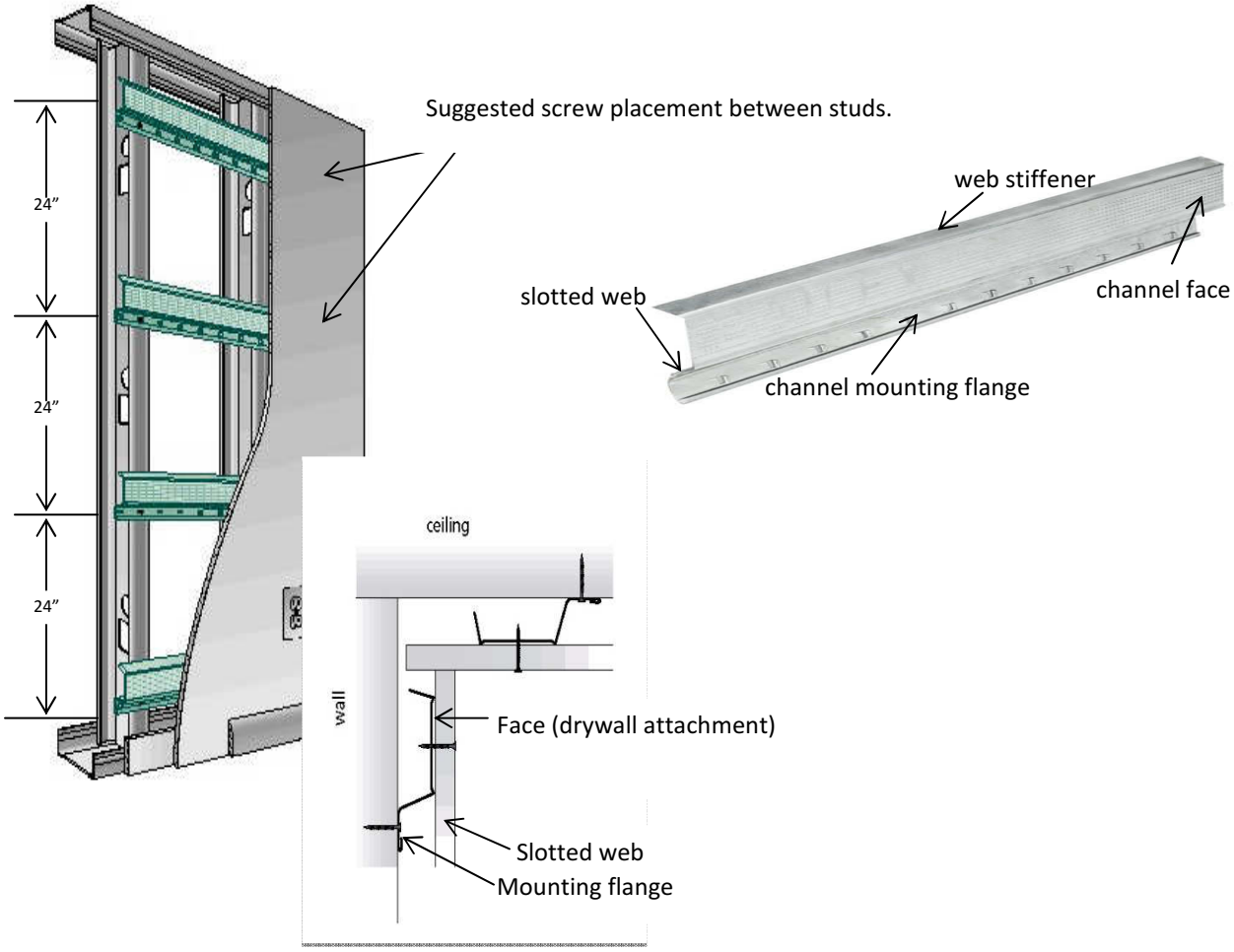
Some Good Practices to Follow:

Seal the perimeters with a non-hardening non-shrinking sealant.
Seal around all pipes, ducts and any services that penetrate assemblies.
Locate outlet boxes in adjacent stud cavities and not back to back.
Avoid recessed fixtures and cabinets and use surface mounted units.
Do not use sliding or "pocket" doors.
Install neoprene tape or soft weather-stripping on the top and jambs of the door frame and a "door sweep" or threshold closure on the bottom of the door.

Caution:

For resilient channels to give the best value it must be applied over an open insulated cavity (minimum 2 ½" depth). When resilient channels are applied onto existing wall surfaces (drywall partitions or masonry) and then finished in drywall, there is no, or at best, very little improvement in the performance of the assembly.

It is extremely important to install resilient channel correctly. Improper installation will nullify any advantage gained from using it in the first place. Please refer to our installation recommendations on the next page.



Installation Recommendations:

Proper installation of any building material is critical to that material achieving its intended performance level, and resilient channel is no exception in this regard. The following guideline may be used to ensure your resilient channel installation helps maximize the acoustic performance of your wall and/or ceiling.

- Attach resilient channels perpendicular to steel studs or joists using 10mm (3/8") Type S Pan Head Screws (for wood studs or joists use 1¼" Type W Pan Head Screws) driven through the pre-drilled holes in the channel mounting flange.

- These pre-drilled mounting flange holes work in tandem with the slots/holes in the web to ensure the required alignment with the wall studs and helps maximize intended sound resiliency.

- Resilient channels should be fastened to the wall framing with the mounting flange down, except at the floor level where the starter channel can be installed with the mounting flange up to accommodate fastening.

- For wall attachment, the first (lowest) row of resilient channel should not be more than 2" off the floor (measured from the floor to the center of the resilient channel face). The last (highest) row of resilient channel should not be more than 6" from the ceiling (measured from the ceiling to the center of the resilient channel face). Spaced at 24" o.c.

- For ceiling attachment, the first row and the last row of resilient channel should be located not more than 6" from the adjacent wall. Channels should be spaced at 24" o.c. for joists spaced at 16" o.c.; and at 16" o.c. for joist spaced at 24" o.c.

- Install resilient channels (walls or ceilings) taking good care that channel ends are cut short enough so they do not touch adjoining walls; as doing so would negatively impact on the intended sound performance.

- Where splicing is required due to wall and/or ceiling length, splice channels by nesting directly over a stud then screw-attach through both flanges. Reinforce with screws located at both ends of the splice.

- Fasten gypsum board to the resilient channel face using 1" drywall screws. Ensure all drywall fastening occurs between the stud members in order to eliminate any potential of "short-circuiting" the system via the drywall screws.

IMPORTANT – Remember that resilient channels should not carry heavy loads such as bookshelves or cabinetry.

* The reported STC and IIC values reflected in this document were taken from the National Building Code for Canada and the (NRC) National Research Council Reports IRC-IR-693 and IRC-IR-766.